Late Pre-contact Era Taíno Subsistence Economy and Diet: Zooarchaeological Perspectives from Maima

by

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Abstract

Taíno peoples, the indigenous population of Jamaica, were all but eradicated by Spanish colonization through the first half of the 16th century, with few historical accounts to document their culture and lifeways. Taíno subsistence economy in Jamaica has been studied intermittently by archaeologists/zooarchaeologists over the past four decades. Archaeological excavations at the Taíno village of Maima on the north coast of Jamaica in 2014 and 2015 provide additional data to expand this endeavor. Beyond a context for Maima and Taíno research across the Caribbean more generally, this dissertation presents the results of the faunal analysis first for invertebrates, and then the vertebrate remains recovered from excavations. These data are examined for spatial differences between households, temporal variation in archaeological deposits, and the variety of habitats represented in Taíno exploitation patterns. This dissertation subsequently undertakes a Caribbean-wide comparative analysis of the Maima invertebrate fauna employing data from 22 other sites dating to the temporal interval 200 to 1500 A.D. This meta-analysis explores differences in Taíno subsistence strategies related to landscape, island location, and culture group variation; the latter including the Classic, Western, and Lucayan Taíno. Variation in subsistence pursuits, with one exception, relate only to a site's distance from the coast and locally available resources. The results of this analysis contribute to the contemporary knowledge of the Jamaican Taíno with implications for understanding variation or lack thereof across the Caribbean.

Keywords: Jamaica; Caribbean; Zooarchaeology; Pre-contact

For Q

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List of Acronyms

aDNA	Ancient Deoxyribonucleic acid
ITIS	Integrated Taxonomic Information System
JNHT	Jamaica National Heritage Trust
MNI	Minimum Number of Individuals
NISP	Number of Identified Specimens
UNESCO	United Nations Educational, Scientific and Cultural Organization

Chapter 1.

Introduction

The Taíno settlement of Maima is a late pre-contact era site located on the north coast of Jamaica. Situated about a kilometer from what is today known as St. Ann's Bay, the Maima villagers had access to resources from the bay's coral reef as well as inshore and pelagic marine resources. Projects at Maima in 2014 and 2015 recorded artificial terracing and house platforms while excavations recovered a range of associated artifacts and fauna. The discovery of house terraces, along with a survey identifying the boundaries of the site, indicates that Maima was a large village occupied between ~1050 A.D. to just after contact with the Spanish in the early 16th century as indicated by the presence of a small number of Spanish artifacts. As the contact era was short and made little impact on the zooarchaeological record, my focus in this dissertation is on the pre-contact Jamaican Taíno. Zooarchaeological evidence at Maima informs about Taíno diet and subsistence strategies at this site. Coupled with comparative data from nearby sites, sites throughout Jamaica, and sites across the Caribbean, I further explore general patterns of subsistence for Taíno peoples.

Zooarchaeological analyses of subsistence strategies inform archaeologists about past diet but also present a picture of the local environment. The fauna found at Maima differ not only from those on other islands in the Caribbean but also from sites within a few kilometers. In my comparative analysis of these data, I attempt to explore variables that differentiate faunal assemblages, particularly including local environment, site placement, and cultural associations. Ultimately, and logically, this attempt illustrates that the most influential factor in faunal composition at a Taíno site is its relation to, and distance from, the coast.

Caribbean faunal studies, in general, have tended to be site-specific with few intra- or inter-island syntheses (deFrance 2013:378). deFrance (2013) notes that with studies published in English, French, Dutch, and Spanish, the international nature of archaeological research in the region is a contributing factor to the lack of comparative analyses. The comparative studies that have been done include island-wide surveys with concern for environmental change and human impacts on the environment (deFrance and Newsom 2005; Newsom and Wing 2004; Steadman and Jones 2006; Steadman and Stokes 2003). The few inter-island analyses (Azevedo 2015; Keegan et al. 2008; Newsom and Wing 2004) similarly focus on environmental and trophic level change.

This dissertation has three goals. First, I will identify and present the results of the identification and analysis of the Maima faunal remains excavated during the 2014 and 2015 field seasons. Second, I will place the subsistence strategies identified at Maima into a regional context within Jamaica, and then the wider Taíno region in the Caribbean which predominantly includes the Greater Antilles but also the Bahamas, Anguilla, and the Virgin Islands. To understand Maima in context, I conduct a meta-analysis using 22 late pre-contact Taíno sites. Finally, I employ the results of the comparative analysis to explore differing subsistence strategies related to site location, island groups, and cultural variation between Western, Classic, and Lucayan Taíno as they have been proposed (Rouse 1992).

Geography of the Caribbean

The Caribbean is made up of more than 700 islands, islets, and sand cays stretched over 4000 km from the coast of Venezuela in South America to the Bahaman islands off the coast of Florida (deFrance 2013:379). Each island differs in its geographical layout including its size, topography, geology, hydrography, fauna, and flora. This diversity provided a rich but variable base of possibilities for indigenous occupation in the Caribbean across time (deFrance 2013). Geographic and environmental variability has a direct effect on subsistence strategies between island groups, and in some cases within an island group or even within a single island.

The Caribbean is divided into four island groups: the Bahamian Islands, the Greater Antilles, Lesser Antilles, and the southern Caribbean islands (Figure 1). The Bahamian Islands, the northernmost island group, are low elevation limestone islands that receive relatively little rain and are sparsely vegetated. These islands have 5000 km^2 of coral reef that would have provided an abundant food source. The Greater Antilles group has the four largest islands in the region including Cuba, Hispaniola (the Dominican Republic and Haiti), Jamaica, and Puerto Rico (deFrance 2013:380). These islands comprise 90% of the overall landmass. The Greater Antilles are the exposed portions of a large submerged mountain chain running east-west through the Caribbean Sea (deFrance 2013:380). Consequentially, the large islands have mountainous central cores and established riverine systems, mangrove swamps, lagoons, beaches, coral reefs, as well as open marine habitat that provides terrestrial and riverine resources (deFrance 2013:380). Cuba and Hispaniola, as the two largest islands, have a higher diversity of fauna and flora.

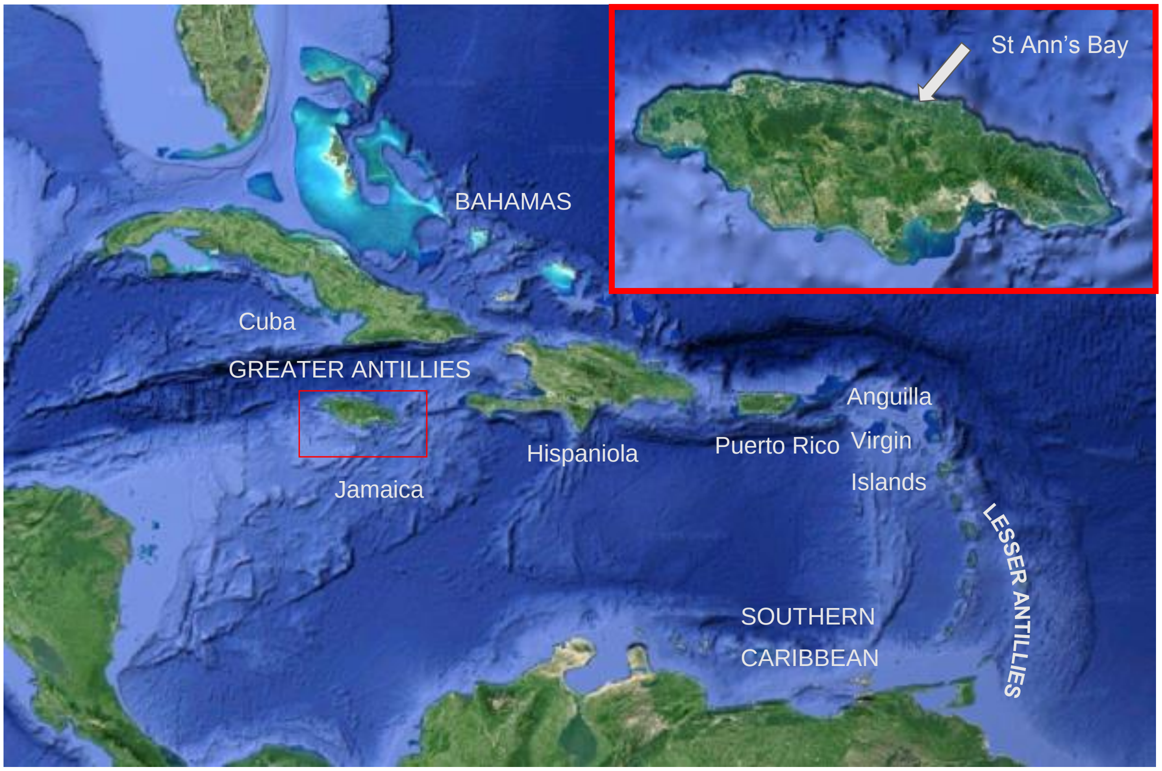

Figure 1: **Map of Caribbean with island groups in caps (Google Earth (2017) "Caribbean" 17°43'54"N 72°00'50"W, www.earth.google.com [March 13, 2017]).**

The Lesser Antilles group is a series of volcanic (windward) and raised coral limestone (leeward) islands that are, apart from Barbados, within sight of each other (deFrance 2013:380). There is great topographic, geologic, and island size variation across this group. Finally, the Southern Caribbean islands are distinct geographically due to their proximity to the mainland. Trinidad and Tobago were once connected to South America and, as such, have a floral and faunal composition that differs significantly from the rest of the Caribbean. The resources available for exploitation on these islands have much higher variability than the rest of the Caribbean and more closely resemble the resource suite available in South America.

Jamaica is the third largest island in the Caribbean. It has a landmass of 11,424 km^2 and a coastline of 1000 km (Woodward 2006a:75). The interior consists of mountainous terrain while the coastal regions are varied. The north coast tends to have a narrow, discontinuous coastal plain while in the southwest the coastal plain is expansive. Due to prevailing winds and rainfall patterns, the southern coastal plains are more arid than those on the north, resulting in different flora and fauna (deFrance 2013:380). Island geography is complex, integrating landscapes defined by early volcanism overlain by thick limestone with associated karst formation. The Taíno name for the island, *Xaymaca*, means "land of abundant springs", which are filtered through these limestone deposits.

Maima and St. Ann's Bay Geography and Habitats

In the area immediately surrounding Maima are terrestrial, marine, and riverine environments. Marine environments include reef, shoreline, beach, intertidal, mangrove, brackish, and pelagic regimes. Maima is approximately 1 km from the coast, the closest shoreline being St. Ann's Bay, which extends east to west for 3 km. On the north, St. Ann's Bay is bounded by coral reef while on the south its perimeter is formed by an alluvial fan for the Church River (Waters 1993:261) (Figure 2). Water depth in St. Ann's Bay is on average 2 to 4 m with the deepest section reaching 20 m at its entrance. The offshore reef acts as a barrier for much of the shoreline, facilitating an environment of sandy seagrass beds and *Halimeda*, a marine algae (Waters et al. 1993:267).

Pelagic waters are accessible by a channel and reef break centrally located on the bay as well as by open water beaches without reef to the east and west (Figure 2). To access pelagic resources requires both environmental and technical knowledge, including the construction of watercraft to reach deeper waters off the edge of the reef. (Giovas 2013:58). The Church River is the largest river flowing into St. Ann's Bay. Its drainage originates in the inland foothills on which Maima is situated. Alluvial deposits from the Church River form a prograding delta fan at its mouth resulting in a gently sloping beach face along the eastern end of the bay as well as a brackish marsh environment (Waters et al. 1993:266). Terrestrial environments include a narrow strip of coastal plain abutted by rolling hills and eventually inland to the Montpellier limestone plateau. Nodular or tabular layers of chert occur within the limestone and were abundantly exploited by Taíno peoples as is evident from archaeological excavations

(Burley et al. 2017). Hill slopes leading from the coastal plain into the interior mountains are heavily forested and would provide terrestrial resources including lizards, hutia, and birds.

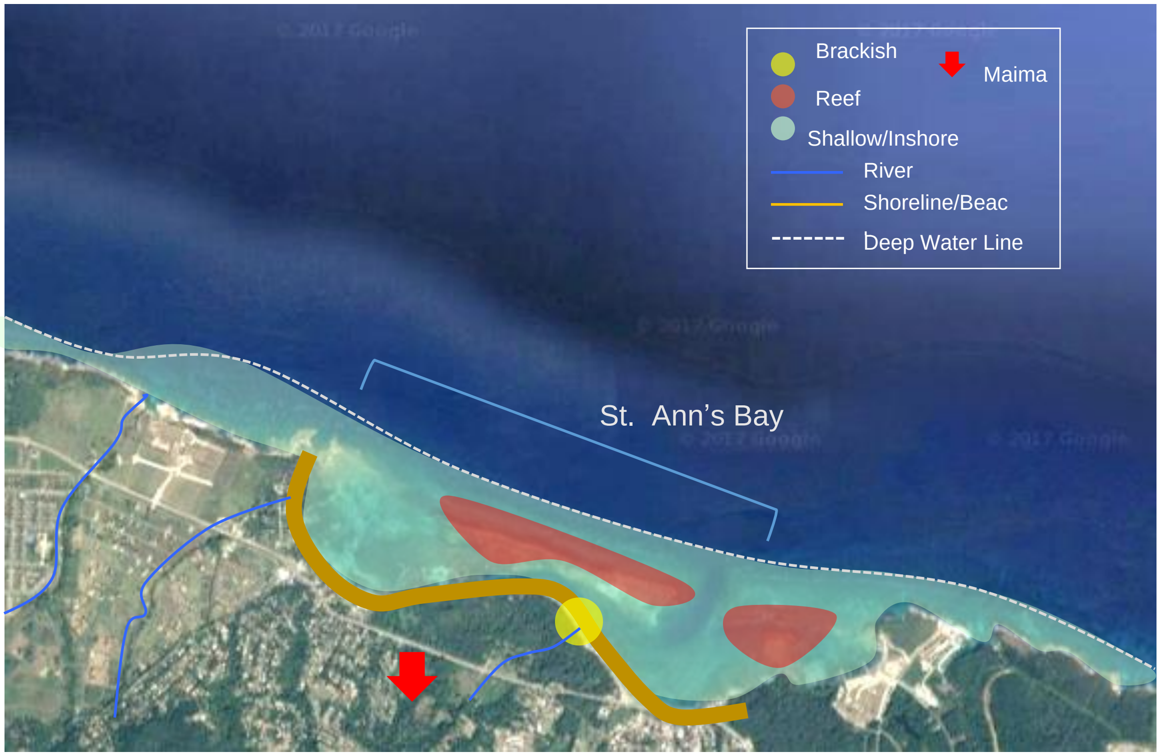

Figure 2: **Local environments and habitats in close proximity to Maima (Google Earth (2017) "St. Ann's Bay, Jamaica" 18°27'01"N 77°12'16"W, www.earth.google.com [March 13, 2017]).**

The environment that exists today in St. Ann's Bay and the surrounding area has changed since first Taíno settlement. Sedimentary data from the bay and delta fan suggest a major period of delta progradation and lagoon in-filling circa 1000-1300 A.D. Since 950 A.D. sea levels have also risen approximately 0.25 m (Waters 1993:263). Whether these changes impacted Taíno subsistence economy is unknown. Land clearing by the Spanish, and then English, for agricultural field systems, has taken place on a significant scale. Importantly the delta plain of the Church River was re-engineered during the British plantation era to create a single river channel as opposed to the former landscape of braided streams. Significant earthquakes in 1692 and 1907 resulted in landslips with the movement of colluvium across sections of the delta plain coincidentally burying archaeological remains of the Spanish colony, Sevilla la Nueva.

Outline of Dissertation

In this chapter, I have outlined my dissertation goals and the region in which the research is set. Chapter two provides a background overview of the culture history for the Caribbean and Jamaica. It also examines what we know of Taíno culture and its characterization across the Caribbean. Chapter three reviews zooarchaeological research, exploring various research questions and methods used by zooarchaeologists in the region. Discussions again range from the Caribbean generally, to zooarchaeological studies undertaken in Jamaica specifically. Chapter four provides an overview of archaeological fieldwork done at Maima and the nearby colonial site of Sevilla la Nueva. The establishment of Sevilla la Nueva in 1509 by the Spanish led to Taíno abandonment or forced removal from Maima. Taíno ceramics from Sevilla la Nueva, however, attest to some Taíno engagement with the Spanish during the early post-contact era. This chapter further reviews methodologies used during archaeological fieldwork at Maima in the 2014 and 2015 field seasons. The zooarchaeological data for this dissertation were recovered through these projects.

Chapters five and six provide the zooarchaeological data and the results of my analyses. Chapter five focuses on invertebrate remains, while Chapter six provides detail for vertebrate faunas. Both chapters focus on identification, quantification, distribution, and habitat analyses. Chapter seven takes the vertebrate faunal collection presented in Chapter six and integrates it into a regional comparative study of Caribbean vertebrate assemblages with the ultimate goal of finding and explaining regional patterns of diet and subsistence strategies. Taken as a representation of the late pre-contact era, roughly 200 to 1500 A.D., I examine this dataset for variation (richness) and diversity (evenness). I also include analysis of factors such as landscape, island group, and the associated Taíno culture group of a site, including the Classic, Western, and Lucayan Taíno. I then compare the taxa represented in each site as well as the different habitats exploited from site to site, island to island, and culture group to culture group. Finally, Chapter eight situates Maima within the context of this cross-comparative analysis and summarizes the findings of Chapter seven. Appendices A and B include the raw data from the Maima invertebrate and vertebrate analyses as well as providing datasets employed in the comparative analysis.

Chapter 2.

Caribbean Culture History and Development: Earliest Migrations through Contact

The recent trend in Caribbean archaeology has been to study migration patterns and sociocultural interactions throughout the region, adding to archaeological literature of culture history that is ever changing in its interpretations. The original culture history of the Caribbean and the various ethnic groups therein was pieced together through the decades of archaeological investigations and work done by Irving Rouse (Rouse 1986; 1992). This culture history, though for the most part still used today, has come under scrutiny in recent years as more evidence of migration patterns and ethnic differentiation among the indigenous peoples of the Caribbean is explored (Curet 2014; Fitzpatrick 2010; 2013; Keegan et al. 2013; Keegan 2000; Oliver 2009). Researchers are now focusing their questions on where the Caribbean groups migrated from, migration patterns, dates of migration, and the differences between groups and island groups. This chapter is a review of the Caribbean archaeological literature to understand Caribbean culture history and the place of Jamaica in that timeline. This review provides the context for my later discussion of the Maima faunal remains and their interpretation within the framework of Caribbean archaeology.

The Indigenous people of the Caribbean are known by many names, depending on their location, time period, and the source. The most common names are Arawak, Taíno, Carib, and Lucayan. The names Arawak and Taíno have been used interchangeably, Arawak being an older term, based on language affiliation for the Caribbean peoples who migrated from South America (Keegan and Atkinson 2006:13). Taíno has since been adopted and is used as the term the native peoples had for themselves, meaning “good” or “noble” (Keegan et al. 2013:11). Carib refers to the inhabitants of the Lesser Antilles (Allaire 2013) and Lucayan to the inhabitants of the Bahamas (Berman et al. 2013). Group names are also applied to time periods, with the earliest arrivals to the Caribbean called “Lithic,” “Archaic” or “Pre-ceramic” Age peoples, and the later migrations referred to as the “ceramic” age peoples (Keegan 1994;1996).

Caribbean Culture History and Development

A contemporary framework for Caribbean culture history begins with the work of Irving Rouse (Keegan 1994; Rouse 1992). Conducting research throughout the Caribbean, Rouse created a culture history and chronology based on archaeological traits, especially ceramic design in the later periods. Individual periods are defined through stratigraphically excavated sites and radiocarbon dating (Rouse 1992). From these excavations, Rouse described five distinct periods; Lithic, 4000 to 2000 B.C., Archaic 2000 to 200 B.C., Ceramic, 200 B.C. to 600 A.D., Formative, 600 to 1492 A.D., and Historic, after 1492 A.D. (Table 1). While Rouse defined the periods with specific series and subseries names, the temporal intervals attached to them were the later addition of Keegan (1994). Table 1 shows a basic outline of Rouse's culture history. Notably, the suffix "-oid" is used to distinguish a series and the suffix "-an" to distinguish a subseries. Although Table 1 only lists the primary series and subseries, Rouse continued to propose and define additional subseries throughout his career.

Time Period	Date Range	Rouse Series	Rouse Subseries
Lithic	4000 to 2000 B.C.	Casmiroid	Casimiran Courian Redondan
Archaic	2000 to 200 B.C.	Ortoiroid	Corosan Jolly Beach Boutbois Ortoire
Ceramic	200 B.C. to 600 A.D.	Saladoid	Ronquinan Cedrosan Huencan
Formative	600 to 1492 A.D.	Ostionoid	Osionan Meillacan Palmetto
Historic	After 1492 A.D.		

Table 1: Basic culture history for Caribbean (Keegan 1994; Rouse 1992).

The Lithic period documents the first movement of people into the Caribbean. According to Rouse (1992) this occurs at 4000 B.C. by mobile hunters and gatherers whose material culture lacks ground stone and ceramics (Keegan 1994; Rouse 1992). The most widely accepted model of this migration is the stepping stone hypothesis, where waves of migration began on the north coast of South America, moving up through Trinidad and Tobago, heading out to Grenada and Barbados, up through the Lesser Antilles chain, reaching Puerto Rico and then pausing (Keegan et al. 2013;

Rouse 1986). After a period in Puerto Rico and following the development of a chiefdom scale society, people moved on to Hispaniola, Cuba, and eventually Jamaica. This model is based largely on ceramic pattern distribution as well as more recent radiocarbon dates on the island chain reaching towards the Greater Antilles. Facilitating the stepping stone model is the fact that islands in the Lesser Antilles occur as a chain with visibility from one to the next, the only exception being Grenada from Trinidad and Tobago.

Fitzpatrick (2010; 2013) alternatively proposes an opposing theory, suggesting that the migration was from the north moving southward from the Greater Antilles. Using seafaring simulations, biological evidence, as well as re-evaluating existing chronologies with contemporary data, he suggests migrating groups would have bypassed smaller islands in favor of the larger ones in the Greater Antilles and then moved southward through the Lesser Antilles (Fitzpatrick 2010; 2013:202). Though this hypothesis is not without problems, he and other researchers do critically examine previous claims for first settlement and the radiocarbon dates upon which they are based (Fitzpatrick 2010; 2013; Keegan et al. 2013). Unfortunately, archaeological evidence for the Lithic period occurs at only a few sites. Rising sea levels and coastal erosion are suggested to be a possible explanation for the paucity of data (Rouse 1992). It is likely that there were multiple waves of migration throughout the region coinciding with the changing technologies and cultures seen in the lithic, archaic, and ceramic period transitions (Giovas and Fitzpatrick 2014).

The Archaic period subsequently is defined by the introduction of ground stone tools and a shift from an exclusive hunting and foraging economy to more extensive marine exploitation (Wing 1989). According to Rouse (1992), agricultural production has yet to occur during this period, though more recent research suggests at least low-level cultivation may have been present (Baik 2013). Archaic peoples are typically characterized as mobile fisher-hunter-gatherers with a majority of sites being coastal shell middens. Hofman et al. (2016) suggest Archaic groups were inter-connected with considerable inter-island voyaging.

In the ensuing Ceramic period, there is clear consensus for agriculture as the central component of subsistence economy but with continued emphasis on marine exploitation. The presence of ceramics provides better visibility on the archaeological landscape for site discovery allowing for greater documentation of the onset of this period. Ceramic period people(s) are believed to have arrived as a separate wave(s) of migration (Wilson 2007). During the Ceramic period people lived in large permanent settlements. Region wide studies suggest strong inter-island similarities between material culture and settlement pattern during this time (Wilson 2007). Ceramics also occur in the Formative period but where differences from the earlier Saladoid series to Ostionoid series are markedly different in style and form. During the Formative, there is the emergence of varying scales of socio-political complexity across the Caribbean. Cultural differences between the Greater and the Lesser Antilles became more dramatic, as well as inter-island differences within the Greater Antilles (Keegan 2000). The people known today as the Taíno are defined by the culture of this time period in the Greater Antilles.

The culture history framework proposed by Rouse remains in use today albeit more recent studies provide a greatly refined and detailed understanding of the Caribbean past. Keegan (2000; 2010), nevertheless, offers a challenge to Rouse and other archaeologists championing culture-historical interpretations of migration. He suggests Rouse's model incorporates both an incorrect categorization of material culture as well as a flawed chronology based on early and now questionable radiocarbon dates. Future research on migrations and regional interaction, at least for Keegan, requires greater documentation and understanding of material culture as well as the use of stable isotopes and mtDNA as evidence for movement and translocation.

Beyond migration routes and chronology, recent Caribbean research is beginning to question Rouse's models of cultural diffusion within the Formative period. Rouse presents a unilateral diffusion model based on individual migration events. He suggests that, after the ceramic making horticulturalists stopped in Puerto Rico and developed a complex chiefdom, they continued to colonize the rest of the Greater Antilles. Oliver (2009) alternatively proposes that the Caribbean followed more of a slow acculturation and transculturation over time between the archaic groups and later horticulturists. There existed, according to Oliver (2009), a complex system of exchanges and interaction between groups and even islands that created new identities. In support, he correctly observes that the early development of idols beginning with archaic groups on Hispaniola continued into the horticultural "Taíno" eras. These idols are referred to as *zemis*, or *cemi*, and are found in varying degrees of complexity and form throughout the

Taíno cultural area. Curet (2014) states that these idols and the symbols associated with them are the characteristic most used and relied upon to define the Taíno. He cautions however, that more data are needed to define a culture and particularly sub-cultures, including subsistence practices, geographical location, architecture, and site layout (Curet 2014:475).

Chapter three will focus on faunal and subsistence related research. Here it is important to state that the concept of Taíno horticulturists bringing first knowledge of agriculture to the Caribbean is likely more complex than originally believed. In defining archaic groups, Rouse (1992:58) created the concept of mobile hunter-gatherers, hence the “archaic” title. Newsom and Wing (2004) present evidence that archaic pre-ceramic peoples throughout the Caribbean did, in fact, cultivate domestic plants (also see Reid 2016). Evidence of domestic plants includes archaeobotanical specimens from Puerto Rico and the Virgin Islands indicating the cultivation of fruits and herbs. This cultivation practice may have been limited albeit there is some evidence that small areas were cleared for planting (Newsom and Wing 2004:128). The faunal evidence continues to suggest that the primary means of subsistence in the Archaic was based on faunal exploitation with reliance primarily on fish and molluscs along the coast, and small mammals and lizards’ further inland. This means of subsistence therefore changed in the ceramic era, with greater reliance on agriculture.

Taíno Culture and Practice

Rouse and other researchers in the Caribbean describe the intensification of plant cultivation and agricultural practices during the Ceramic era occurring after, or resulting from, people settling in large permanent settlements. Between 500 and 1000 A.D., chiefdoms developed and the need for more significant food production, particularly of manioc, was required for larger populations and the creation of surpluses for the emerging elites (Newsom and Wing 2004; Pagan-Jimenez 2013:393). The method of plant production included the use of raised fields, agricultural mounds, and the subsequent incorporation of irrigation and terracing (Newsom and Wing 2004; Pagan-Jimenez 2013:393). These agricultural methods spread with the Taíno across the region and likely became part of the cultural tradition and expectation for sustaining a population.

Taíno villages varied in scale but incorporated different structures and features including houses, storerooms, platforms, fences, windbreaks, and work huts (Samson 2010; 2013:368). A historical account by Oviedo y Valdes (Deagan and Cruxant 2002:34) describes houses as being either circular *(bohio)* or rectangular *(caney)* respectively associated with commoners or a *cacique* (Figure 3). Samson (2010; 2013) reviews household archaeology and architecture throughout the Caribbean documenting most pre-contact houses as being rounded or ovoid with highly variable sizes and construction details. At El Cabo, Dominican Republic, she describes and illustrates posthole patterns and household features for 30 houses as well as other features (Samson 2010; 2013:368). At El Cabo houses were typically 6.5 to 10 m in diameter consisting of two post circles, an outer layer for the exterior and an interior layer for the roof support. The houses were long-lived, having evidence of being rebuilt or renewed many times from the 9th to 16th centuries (Samson 2013). Some postholes indicate there was a house initiation and/or closing ceremony in which items were placed in a posthole and buried. Additionally, these excavations found large assemblages of pottery, shell, bone, coral, and stone artifacts pushed to the back of the house. Although only a limited number of houses are defined for Jamaica, the scale of houses appears to be much reduced with diameters in the range of 4 m (Burley et al. 2017). What size variation in Taíno houses might mean can only be speculated upon, but no doubt reflects on the nature of the residential occupation of nuclear versus extended families.

Figure 3: Taíno houses by Oviedo y Valdes in *historia general y natural de las Indias* (Deagan and Cruxant 2002:34).

Cultural variation among regional Taíno groups is expected, and the possibility of a single Taíno template or ethnographic present is unlikely. Indeed, Maclachlan and Keegan (1990) describe the use of a single template as an ethno-tyranny imposed by archaeologists on the past. Beyond architecture, this is certainly the case for a political structure where the Taíno of Puerto Rico, Hispaniola, and eastern Cuba developed a complex chiefdom-level society, from 600 A.D. through the time of contact, with distinctive material representations. This culture was, and is often still, defined in the literature as the "Classic Taíno." Other than material culture, the Classic Taíno had large and complex settlements, including the building of ball courts and central plazas (Curet 2014:475). The perimeters of some of these features were demarcated by standing stone slabs on which petroglyphs were inscribed (Oliver 2009:23). Tibes, in Puerto Rico, is the most well-excavated and well-known Classic Taíno village. Here the ball court and plaza have been reconstructed, with symbolically decorated slabs outlining the public spaces (Curet and Stringer 2010). Large numbers of religious and symbolic artifacts were recovered from Tibes, the best known and defined of these being tri-point stones. Tripoints are inferred to be a form of *cemi* that was used and traded amongst group leaders (Oliver 2009). Taíno *caciques* had a heavy political and religious influence over the day-to-day lives of their people (Oliver 2009).

When defining the cultural make-up of the surrounding islands, including other parts of Hispaniola, Cuba, Jamaica, the Bahamas, and parts of the Lesser Antilles, Rouse characterized indigenous peoples as "sub-Taíno" (Keegan et al. 2013:11), a title that has since taken on a pejorative meaning. These sub-groups of the Taíno included the Western Taíno from Cuba and Jamaica; the Eastern Taíno from the northern Lesser Antilles and the Virgin Islands; and the Lucayan Taíno from the Bahamas archipelago. They are all defined by Rouse (1986) as having progressively degraded or simplified traits of the Classic Taíno—where degradation and simplification were due to their distance from the cultural center. They shared a corps of overlapping Taíno traits, including ceramic design, *cemi* idols, and other religious symbols, but they were less complex in social and political structures, and less intricate in their material culture designs.

Settlement patterns, particularly in western Hispaniola and eastern Cuba had a similarly laid out village structure. However, instead of the stone enclosed ball courts and central plazas, earthen embankments bordered public spaces (Oliver 2009:23). For example, the site of En Bas Saline in Haiti is centered around a large C-shaped central plaza made of earthen ridges with an elite structure, possibly for a chief, at its center (Deagan 2004; Oliver 2009:23). In Jamaica, Burley et al. (2017) describe a settlement pattern based on artificial terracing along a hillside slope that is punctuated by house platforms. These differing site layouts seemingly illustrate cultural variation between regions at a scale perhaps even more refined than the subgroups proposed by Rouse.

More recent research is shifting towards the concept of Taíno culture as a spectrum developing in conjunction with existing archaic cultures in each area (Curet 2014; Oliver 2009; De La -Rodriguez 2011). Oliver (2009:24) defines this spectrum as a complex process that creates and recreates new identities within and between villages, regions, and islands—identities and allegiances reformulated in an environment characterized by cultural and social plurality, not homogeneity as is present within the diffusion model as earlier described. Rather than dividing the cultures of the Greater Antilles and Bahamas into culture sub-groups compared against the more "highly developed" groups in Puerto Rico, local or regional Taíno groups are to be positioned on the Taíno cultural spectrum. Within this line of thought, Oliver (2009:28) defines the Taíno as a "spectrum or mosaic of social groups who express, negotiate, and contest in various ways their 'Taínoness' and who participate with various degrees of intensity in becoming and being 'Taínoan." The Taíno have several ancestral cultural sources from which they have drawn upon to create this mosaic. Curet (2014) frames this within the Africanist concept of the "symbolic reservoir" where culture is an assemblage of symbols, beliefs, and myths from which groups or sub-groups obtain the ideological tools necessary to create a cultural tradition and legitimize their own interests (Curet 2014:480).

Jamaican Culture History and Archaeology

Archaeological investigations in Jamaica, though numerous, suffer from a lack of publication and the sharing of results. Jamaica has a reputation for being one of if not the least understood islands in Caribbean archaeology (Wesler 2013:250). This trend is changing with greater numbers of archaeologists working in Jamaica and where the University of the West Indies Mona history department has expanded their scope to include archaeology. Here I briefly outline the history of archaeology in Jamaica to contextualize the current culture history of the island and illuminate gaps in our understanding of the pre-contact period. Second, I outline what these archaeological investigations have unearthed about the Jamaican pre-contact period, and place it within the context of Caribbean archaeology as described in the previous section.

The history of archaeology in Jamaica begins with the observations of pre-contact era artifacts and burials throughout the eighteenth and nineteenth centuries. What might be called professional archaeology did not get underway until the late nineteenth century with the founding of the Institute of Jamaica in 1891 (Allsworth-Jones 2008:9). Two archaeologists in particular, Frank Cundall and J.E. Duerden began a systematic exploration to record pre-contact period sites across the island. Duerden (1897) created and published the first survey of Jamaican archaeology, which has been recently republished by Allsworth-Jones (2008). Cundall continued adding to Duerden's map of archaeological sites until the end of his life when his work was posthumously published as an appendix to Sherlock's *The Aborigines of Jamaica* (1939) (Allsworth-Jones 2008:10; Wesler 2013:250). During the early twentieth century, other excavation reports were published including G.C. Longley's "Kitchen Middens of Jamaica" (1914) and Theodor De Booy's report of 16 sites and four site excavations (Wesler 2013:250).

Excavation continued throughout the early and mid-twentieth century with the work of Robert H. Howard, Marion DeWolf, and Ronald Vanderwal. Howard's work in Jamaica resulted in a dissertation (Howard 1950) and a series of reports (Howard 1956; 1965) (Wesler 2013:250) showing 75 open-air sites, 25 caves, and nine petroglyphs. Howard also excavated at the White Marl site and defined White Marl style pottery (Wesler 2015:251). Howard's publications prompted DeWolf to publish decades-old site reports defining the Redware phase of Jamaican prehistory (DeWolf 1953; Wesler 2013:251). The work done by Howard and DeWolf created a culture-historical framework that continues in use today. Vanderwal, a graduate student of Howard, continued his work on Jamaican ceramics and further refined the characterization of White Marl style pottery (Wesler 2013:251).

Beginning in the late 1960's Jamaican archaeology entered a phase where amateur archaeology flourished (Wesler 2013:251). James Lee, a geologist who collected from and recorded sites throughout the island, dominated this work (Lee 1980; 1981; 1985; 1990). Lee's careful survey of all pre-historic sites across Jamaica resulted in 265 precisely documented middens and caves outlined in Allsworth-Jones (2008:20).

Lee also founded the Archaeological Club of Jamaica, which eventually became the Archaeological Society of Jamaica. The society's newsletter contains several reports of excavations done by society members (Wesler 2013:251). Lee continued his work until his retirement in 1986, at which time his years of collections and surveys were transferred to the University of the West Indies, Mona (Allsworth-Jones 2008:2).

Jamaican archaeology has notoriously suffered from lack of detailed publication of data, as has been noted. In recent years archaeologists have taken up the challenge to re-publish and re-explore past excavations and materials, particularly from Howard, Vanderwal, and Lee. Allsworth-Jones (2008) provides a major and critical synthesis in this respect based on the records and reported surveys done by Lee from 1951-1985. Since the 1980s, Jamaican archaeology also has been expanding, and archaeological heritage is now regulated by the Jamaican National Heritage Trust Act 1985. Archaeologist's employed by the Trust both ensure the legislation is adhered to as well as become engaged in archaeological studies themselves. In 1986 Edward Moulton-Barrett established a lectureship in archaeology at the University of the West Indies Mona and an archaeology laboratory (Wesler 2013:251).

Relative to Caribbean culture-history, Jamaica's is exceedingly short by comparison. Archaeological evidence for Lithic or Archaic settlement has yet to be found. While other islands of the Greater Antilles were reached and presumably settled beginning as early as 4000 B.C., it appears that the first people in Jamaica did not arrive until approximately 600 A.D. at the earliest. Callaghan (2008) suggests this is due to environmental factors. Weather patterns, propensity for hurricanes, and strong currents seemingly kept pre-contact era people from venturing towards Jamaica prior to at least 500 A.D. (Callaghan 2008). It was not until more politically complex societies began to develop on Puerto Rico and Hispaniola that Jamaica was occupied. Callaghan (2008:69) notes that this time of expansion likely led to the building of large canoes that would have been necessary to accommodate the heavy currents separating Jamaica from other Caribbean islands. Even Spanish accounts of the canoes in Jamaica tell of their size and strength. The size and number of canoes noted in the historic record suggest the Jamaican Taíno made the voyage regularly, staying in contact with other Taíno groups in Cuba and Hispaniola, most likely through a complex network of trade (Wilson 2007:105). Scholars note the anomaly of Jamaica not being occupied until so late, but they remain open to the idea that earlier material is present though undiscovered due to the lack of systematic and focused archaeological survey for early sites (Callaghan 2008; Allsworth-Jones 2008; Wesler 2013; Wilson 2007).

The first recorded peoples into Jamaica are associated with Rouse's Ostionan Ostionoid ceramic subseries. Jamaican archaeology defines this as the Redware or Little River period (DeWolf 1953). Radiocarbon dates from Little River sites place the period as early as 550 A.D. to as late as 995 A.D. (Wesler 2013:255). However, many of the radiocarbon dates were done in the 1960s with unreliable analytic protocols and calibrations. Recent data from Keegan et al. (2003) gives a later range of 710 to 990 A.D. Documented Little River sites are exclusively coastal and subsistence economy, while agriculturally based, had a maritime focus.

Following Little River is the phase associated with Rouse's Ostionan Meillacan subseries ceramics and the first Taíno occupation. This phase has been divided into three subgroups based on variation in ceramic design: White Marl, Montego Bay, and the most recently added Port Morant (Wessler 2013, Connolley 2015). Previously it was believed that the Little River culture had gradually adopted a new style of ceramic, later transitioning into the White Marl phase with cultural continuity; more recent research suggests a separate migration to Jamaica (Keegan and Atkinson 2006:26). Beyond ceramics there are other differences between Little River sites and those of White Marl and its variants. These differences include a change in subsistence economy, which is discussed further in Chapter 3, as well as an altered settlement pattern, with later sites dominantly located on coastal slopes and inland. Burley et al. (2017) believe that the inland settlement pattern was first established on Hispaniola and brought to Jamaica, and possibly Cuba, as part of the migration from which White Marl stems. As with the Little River period sites, radiocarbon dates for White Marl vary, the earliest being calibrated to 765 A.D. but with consensus placing the beginnings of this phase two centuries or so later (Wesler 2013:255).

The White Marl period sub-phases are regional ceramic variants without defined distinctions in other aspects of culture. The dominant White Marl ceramic substyle is characterized by geometric incised designs and extensively decorated lugs and handles whereas Montego Bay has deep heavy incisions on wide rims (Allsworth-Jones 2008:17). White Marl ceramics occur throughout Jamaica, with Montego Bay style present on the western coast and northwest side of the island (Wesler 2013). The third ceramic variant has recently been identified by Allsworth-Jones (2008) as the Port Morant style. It is characterized by decoration confined to the shoulder of the pot and made with a square-headed tool (Allsworth-Jones 2008:92). It occurs on the eastern coast of the island and is still a provisional type. Wesler (2013:258) speculates as to what these different ceramic types could indicate with regards to ethnic differences or regional polities. Without further data, and reliable ethnographic/historic accounts for the Jamaican Taíno, a resolution of this issue is difficult.

The White Marl phase defines the pre-contact Taíno peoples in Jamaica. From the time of their initial arrival until their encounters with the Spanish, the Taíno clearly thrived, with the archaeological record showing abundant and relatively dense settlement across the island. The exact size of the Taíno population in Jamaica at the time of contact has been debated. Estimates vary from tens of thousands to 100,000 to as high as 600,000 (Padron 2003:31, Wesler 2013:252). Wilson (2007) speculates further that there were more than 100 allied Taíno villages across the island. The number of recorded archaeological sites related to the White Marl phase provides strong support if not suggesting an even greater number.

Contact and Colonialism in Jamaica and the Caribbean

The ethnographic and historical knowledge of the Taíno is derived solely from the journals and accounts of Spanish explorers and colonists from contact until the Taíno population was largely eradicated. The earliest accounts by Spanish explorers of Jamaica were from Columbus's second voyage in 1494 when he spent about a week sailing along the north coast of the island (Wesler 2013:252). On that voyage, Columbus's notes a well-populated harbor he called Santa Gloria (St. Ann's Bay) (Allsworth-Jones and Wesler 2012b:3). During his brief stay, he mentions little about the indigenous inhabitants' other than "some 60,000 people came from the mountains, merely to look at us" (Morison 1963:222). Columbus did not return to Jamaica until his fourth voyage when he and his crew were marooned in St. Ann's Bay for a year. In 1509, after Columbus's departure, the Spanish founded a colony and capital for Jamaica at Sevilla la Nueva also in St. Ann's Bay. The following section provides an overview of the Spanish arrival, their contact with indigenous Taíno peoples of Maima and the consequences of this engagement.

Marooning of Columbus in Jamaica

On his fourth voyage of exploration, Columbus had to abandon two of his four ships off the coast of Panama. The remaining two were worm-eaten and leaking, forcing him to make way for Jamaica where he ran them aground on June 25, 1503, at Santa Gloria (St. Ann's Bay), a harbor known to Columbus from his second voyage (Padron 2003:8). The ships, *La Capitana* and *Santiago* were lashed together on the beach with below deck cabins flooded. This structure provided a bastion for Columbus and crew for the following year until June 29, 1504, when he was rescued.

For the year Columbus and crew were marooned in Jamaica, he and others provide only a limited narrative for his engagement with indigenous Taíno peoples and their culture. Morison (1963) translated and published all available documents on the voyages of Columbus, including his crew's journals, letters, and official Crown documentation. From the fourth voyage, Morison includes the royal instructions from the Crown, a crew and supply manifest, Columbus's *Lettera Rarissima* (a letter to the Queen recounting the journey), Diego Mendez's account of the expedition, and the journal of Ferdinand Columbus, Columbus's younger son who was 13 at the time of departure from Spain. This latter report occurs in a biographical account of his father titled *Historie* (Morison 1963:321). Though written years after the events he describes, it provides details of Spanish relationships among themselves as well as with the Taíno who lived in the area of St. Anne's Bay. An important note, relative to our understanding of Maima, he writes that the ships were positioned within a protective reef a quarter league (1.4 km) from this village (Morison 1963:367). Maima became one of several nearby villages from which the Spanish received food and supplies.

Diego Mendez similarly provides a much later description of events in 1503-1504 within his will of 6 June 1536 (Allsworth-Jones and Wesler 2012b:3; Morison 1963). Of particular importance, Columbus had Mendez engage the Taíno in acquiring supplies for him and the crew. During his explorations, Mendez visited the village of *Aguacadiba* where he negotiated with the *cacique* for the provision of food. He subsequently made the same agreement with a village three leagues further on (Morison 1963:392). The Spanish, according to Ferdinand Columbus, were eating in one day what the Taíno would in 20 days, and the Taíno were losing interest in Spanish trade goods (Morison 1963:161). Relations between Columbus and part of his crew also were frayed, resulting in a mutiny led by the Porras brothers. The mutineers set off across the island "pillaging at will, according to the strengths and resistance of the *caciques* whose territories they passed" (Morison 1963:361). A contingent of Columbus supporters successfully engaged the mutineers in what Morison refers to as the "Battle of Maima", taking place near the Taíno village of that name. Ultimately Mendez, who had been dispatched by Columbus in a Taíno canoe to Hispaniola, returned with a ship for their rescue.

Founding of Sevilla la Nueva

Five years after the departure of Columbus during his fourth voyage, the Spanish returned to Jamaica to establish the colony of Sevilla la Nueva. Governor Don Diego Columbus, eldest son of Christopher Columbus, sent Juan de Esquivel with a group of 80 settlers to Santa Gloria. Jamaica did not have the gold deposits of other islands, but it could be developed as an agricultural colony to support Spanish conquistadors heading to Terra Firma in search of gold (Woodward 2006a:79). The settlement at Sevilla la Nueva would be the capital for this agricultural and ranching colony, importing cattle and sheep in large quantities (Woodward 2006a:56)

The Spanish considered the Taíno to be one of the resources of the island. Sevilla la Nueva was built within close proximity to a large and known Taíno population, including the village of Maima (Woodward 2006a). This population, it was expected, would provide the labour force for the colonists. Historic accounts state that the Taíno were beaten with sticks and whips to produce a maximum agricultural yield (Padron 2003:149). In a letter to the King from Pedro de Mazuelo, the local Spanish treasurer, concerns were expressed that the entire indigenous population would be eradicated within two years (Padron 2003:149). As a response to this brutal treatment, two years after the founding of the town, the Taíno rose up against the Spanish and the forced labor system. In response, Esquivel rounded up the local *caciques* and killed them in a show of power and control, after which there were no further rebellions. It seems probable that Maima was abandoned at this time with the residents either taken as laborers, the women forced into domestic servitude in the form of Spanish "wives", while others fled into the mountains.

Upon his arrival in Sevilla la Nueva, Esquivel established the policy of *encomienda*, in which Taíno lands were granted to Spanish settlers and a certain number of Taíno laborers were assigned to each colonist (Woodward 2006b:162). There was, however, little uniformity to this policy, and many of the Taíno were mistreated (Woodward 2006a:61). Queen Isabella had earlier established the *encomienda* system, *repartimiento de Indios* in 1503, in which the Taíno under Spanish rule were given Christianity and civilization in exchange for their lands and labors (Padron 2003:148). This early system of *encomienda* is often referred to in the literature and historical documents as the *repartimiento*, that being a later system of labor that forced people to work for a certain amount of time each year.

The Spanish *encomienda*, and later *repartimiento,* were massively destructive to the Taíno population and culture. In the rest of the Greater Antilles, the Taíno were taken away as laborers to work in gold and silver mines and to dive for pearls (Padron 2003:149). The life expectancy of Taíno laborers was short, given the difficult work and brutal treatment they received. In Jamaica, the agricultural work was less punishing but equally decimated the Taíno population of the island. There are varying historical reports on how long the Taíno existed after colonization. Some state that the Taíno were completely decimated within a generation of contact while others claim that they persisted into the middle of the 16th century (Woodward 2006a:82). Sevilla la Nueva was abandoned by the Spanish in 1534 with removal of their capital to the south coast of the island. As to be discussed in Chapter 4, by that time Maima also was long abandoned.

Use of the Ethnohistoric Record

The records of the first Spanish explorers in the Caribbean are subject to a high degree of scrutiny when viewing them as historical or ethnographic records, but scholars have used them to piece together everything from kinship systems to hierarchical structures. There are many issues with the use of historical journals and accounts by the Spanish explorers as ethnographic data, the most notable being the motives of the writers, cultural biases, and the creation of an ethnographic present. Since the quincentenary, marking the 500 years since Columbus first sailed to the Caribbean, the motives and biases of Bartholome de las Casas, Peter Martyr D'Anghiera, and Gonzalo Fernandes de Oviedo y Valdes, who provide the only ethnographic information we have from the Caribbean, began to be questioned (Keegan 2013:71). With the continued use of these records, using a heavy lens of conservatism, scholars today have created an ethnographic present that permeates the entire history of the Taíno and Caribbean cultures. Often, the culture and behaviors that were observed by the Spanish, primarily on Hispaniola and other Greater Antilles islands, is applied to all the Caribbean peoples through all times (Maclachlan and Keegan 1990). When using these historic records, scholars must be aware who is being described and be careful not to assume those same cultural patterns fit from island to island or time period to time period. Despite these issues, a number of cultural behaviors can be gleaned from these records.

It can be interpreted from the archaeological record that the Taíno, particularly the Classic Taíno of Hispaniola and Puerto Rico, were chiefdom societies. A chiefdom is defined as having a complex socio-political with hereditary elites that govern but do not have the power to maintain a standing army or to tax those they govern (Allsworth-Jones and Wesler 2012b:1). There are multiple types of chiefdoms, but it is likely that the Taíno had local village, district, and regional chiefs (Allsworth-Jones and Wesler 2012b:2). Tibes, a large ceremonial site in the inland of Puerto Rico, is the most complex Taíno site yet discovered, and there is evidence there that the Classic Taíno had a discernable hierarchy of chiefs, lesser chiefs, and commoners (Allsworth-Jones and Wesler 2012b:3; Curet 2010). Being classified as “Western Taíno”, the question becomes whether these hierarchies existed in the same form in Jamaica. Rouse (1992) points out that given the density of the population, the advanced form of agriculture similar to that of the Classic Taíno, as well as the variety of ornaments and use of *zemis* in the home, the Jamaican Taíno may have had more in common with the Classic Taíno than he previously theorized (Allsworth-Jones and Wesler 2012b:3; Wesler 2013:252).

The Spanish early on adopted the word *cacique*, for leader or chief, which likely indicates that they had no equivalent word with which to convey the position (Wesler 2013). However, and this applies to all the writings of the Spanish during their encounters with indigenous peoples, they were unable to conceptualize indigenous culture of a society unless classified within Spanish conceptual categories. Whether these cultures resembled each other, as modern anthropologists would understand it, we will never know. This belief is shared among more recent Caribbean researchers, who are emphasizing more and more the differences between Taíno groups (Allsworth-Jones and Wesler 2012b:6).

Chapter 3.

Faunal Analysis in the Caribbean and Jamaica

This chapter reviews the contributions of faunal analysis and analysts to our understanding of the Caribbean past. Here I examine a variety of topics beginning with a review of zooarchaeological research across the Caribbean generally but with a subsequent examination of faunal studies in Jamaica. Faunal analyses in the Caribbean are diverse and contribute to a range of issues and topics beyond diet. Consequently, I also examine areas of environmental reconstruction, environmental impacts of resource exploitation, translocation of species and faunal data with consideration of social hierarchy. While much work has been done on the colonial and historical periods, my focus is on pre-contact era faunal studies as these inform this dissertation.

The faunal suite exploited by indigenous Caribbean peoples was diverse, consisting of estuarine and marine fish, mammals, and invertebrates, as well as local birds, iguanas, snakes, giant beetle grubs, and other insects (Deagan and Cruxant 2002:36). As this chapter illustrates, the specific diet of individual groups was dependent on time period and location. The time periods most closely studied for dietary change are between the Archaic and Ceramic periods, specifically considering the change after the introduction of permanent settlements and agriculture. Relative to location, variation in faunas available for exploitation occurred between islands as well as within different areas of larger islands. There is some degree of similarity in the range of fish, birds, reptile, and mammal species present across the Caribbean as a whole.

Any discussion of pre-contact era subsistence economies in the Caribbean must first emphasize the dominant role of agriculture. Local faunas did contribute a component of the diet, as is documented in the archaeological record. The cultivation of plants combined with arboriculture provided the primary subsistence staples and the majority of day-to-day foods from at least the beginnings of the Ceramic period. Agriculture allowed for substantial population growth and supported the emergence of socio-political complexity as described in the previous Chapter. Arguably one might even consider the invertebrate and vertebrate faunas exploited by the Taíno to be relishes, small components of the diet providing occasional variability or for conspicuous consumption within a social system emphasizing chiefly hierarchy and inequality. As I briefly discuss in the conclusion to this dissertation, when one considers the size of the faunal assemblage recovered from Maima given the temporal interval it represents, it is minor in scale. A similar situation occurs at many other sites across the Caribbean.

Faunal Studies in the Lesser and Greater Antilles

Trinidad and Tobago are believed to be the starting point of human migration into the Lesser Antilles from South America, this taking place around 4000 B.C. (Fitzpatrick 2013; Keegan et al. 2013). Being so close to the mainland of what is now Venezuela, the islands share an ecosystem with South America, making them unique to the rest of the Caribbean (Delsol and Grouard 2015:7). Fauna exploited by pre-contact period inhabitants, therefore, differed from patterns noticeable in the rest of the Caribbean. Delsol and Grouard (2015) have surveyed these differences by focusing on tetrapod, or four-limbed vertebrates, exploitation in the late ceramic and early formative (300 to 900 A.D.) ages. They attribute the large number of tetrapod remains to availability and opportunistic hunting more than any other factor. Steadman and Stokes (2003) compared data from a similar ceramic age site to a nearby pre-ceramic site. They found a greater emphasis on large terrestrial animals like turtles and monkeys in the pre-ceramic site. They argue that this difference was likely due to overhunting and the more sedentary agricultural lifestyle of the later ceramic age peoples.

North of Trinidad and Tobago, the island of Carriacou, part of the Grenadines archipelago and a former British colony, has been extensively surveyed and excavated by various archaeologists. The Grenadines island chain reflects, more so than Trinidad and Tobago, the climate, geography, and environment of the rest of the Caribbean. The coastal site of Grand Bay has been extensively excavated (Giovas 2013; Krigbaum et al. 2013; LeFabvre 2007). Krigbaum et al. (2013) and LeFabvre (2007) looked exclusively at the Grand Bay site diet. LeFabvre surveyed the zooarchaeological collection, finding there was a heavy reliance on marine resources, particularly marine fish and molluscs. In a companion, albeit later, article, Krigbaum et al. (2013) conducted carbon and nitrogen stable isotope analysis on human remains attempt in comparison to the zooarchaeological record. Again, they found a heavy reliance on marine resources, mainly fish, but less reliance on molluscs than the faunal record seemed to suggest. Keegan et al. (2008) further note an abundance of sea turtles in the ceramic age faunal record on the island, an occurrence they believe is anomalous given early overexploitation and impacts on sea turtle elsewhere in the Caribbean.

Further north in the Lesser Antilles, Hofman and Hoogland (2011) analyzed the fauna on the inland site of Plum Piece, on the island of Saba. The site is from the pre-ceramic era but differs from other pre-ceramic sites in that it is located inland rather than being coastal. It was believed that the pre-ceramic archaic peoples exploited mostly reef and inshore fish and molluscs along the coast. The work done at Saba, however, provides alternative insight and adds a level of complexity to the early period of settlement. The faunal resources exploited at Plum Piece were mostly terrestrial, including land snails, land crab and birds (Hofman and Hoogland 2003:16-17), there were little to no marine fish and molluscs. Given the large number of Audubons shearwaters, a species that breeds on Saba between February and July, the site was likely a specialized and seasonal camp.

In the northern Lesser Antilles, studies from Anguilla show that marine-based subsistence reflects the local availability of resources (Carder and Crock 2012; Carder et al. 2007; Crock et al. 2017). Through analysis of capture method, Crock et al. (2017) predict how long individuals spent exploiting specific marine habitats. Here they measure “marineness”, or the interrelationship community members have with the local marine environment. This model was introduced into the Caribbean by Elizabeth Wing (Wing and Scudder 1980), who found that a community’s time spent in marine environments is a direct reflection of how close the community is to the coast (Wing and Reitz 1982; Wing and Scudder 1980; 1983). Quitmyer (2003), working in the U.S. Virgin Islands, suggests this may be the case for later prehistory but with variation occurring in earlier contexts.

Keegan et al. (2008) review the role small islands play for archaeological understanding of the Caribbean. Using Pacific islands as an analogy, they focus on small island subsistence economies across the Lesser Antilles. Examining faunal data, it is subsequently proposed that smaller islands had superior terrestrial and marine resources, and this explains why small Caribbean islands were colonized first. They acknowledge, however, that smaller islands were far more susceptible to overexploitation of resources.

The Greater Antilles, consisting of the larger Caribbean islands of Cuba, Hispaniola, Jamaica, Puerto Rico, and the Cayman Islands, includes more variation in available and exploited resources. Studies done in the Greater Antilles answer similar research questions to those in the Lesser Antilles, specifically related to habitat exploitation and change through time. In Cuba, faunal research by Colton et al. (2009) and Colton and Worthington (2014) focus on dietary change in Cuban prehistory. In comparing pre and post-ceramic settlements in Cuba, they find that regardless of the integration of ceramics, diet did not change. Rather it was dependent on-site location.

The largest number of zooarchaeological studies from the Greater Antilles comes from sites on Puerto Rico. Much of this work relates to archaeological concerns for social complexity and the role it plays in diet (Carlson and Steadman; Curet 2010; deFrance 2010a: deFrance et al. 2010; deFrance and Newsom 2005; Duchemin 2013). This role is explored in depth later in this chapter. In considering resource and habitat exploitation, Carlson and Steadman (2012) in a comparative study of two Puerto Rican sites, found that, unlike the Cuban sites, faunal exploitation does change with time. At these sites taxa became less diverse with a greater focus on local resources (Carlson and Steadman 2012).

Throughout the Caribbean both coastal and terrestrial resources were available, but riverine fishing was restricted to the larger islands of the Greater Antilles where river systems drain interior mountainous zones. Freshwater faunas, for example, are abundantly present at Tibes, Puerto Rico, which is along the Portuguese River (Duchemin 2013; deFrance 2010a; 2013). In Jamaica, the sites of Coleraine, Green Castle, and Newry on the Wagwater River also incorporate riverine faunas (Carlson 2012).

The Cayman Islands are situated east of Cuba and northwest of Jamaica. Notably, evidence for human occupation prior to the arrival of Europeans has yet to be discovered. Ferdinand Columbus reports that during his father’s second voyage, he saw “two very small and low islands, full of turtles; all the sea about there was so full of them that they looked like little rocks, and for this reason those islands were called Las Tortugas,” which would be later renamed the Cayman Islands (Morison 1963:353). Because there was no pre-contact era exploitation of local resources, the islands contained many more species of reptile, bird, and fish than other islands in the

Caribbean (Carlson 2012). The Caymans serve to underscore the significant impact of indigenous peoples on faunal populations since first occupation in the Greater Antilles but also across the Caribbean broadly.

Faunal Studies in Jamaica

While Wesler (2013) describes a lack of publication in Jamaican archaeology overall, faunal studies are reasonably well reported upon and synthesized. Of particular note has been the work of Carlson (2012), who brought together various faunal collections from several projects in Jamaica for a comparative study of species variation and abundance. This study incorporates a number of collections from sites along the north coast from excavations by Allsworth-Jones and Wesler (2013) in St. Mary Parish. She also has identified faunal remains collected by avocational archaeologist James Lee from across Jamaica. As Carlson concludes, subsistence strategies and particularly economic species exploited by the Jamaican Taíno varied widely depending on the time of occupation.

Little River period sites are the least excavated and understood in Jamaica but yield important information about subsistence and environmental change. The two faunal collections from this period that have been most systematically excavated and reported are Paradise Park and Blue Marlin, both along the southern coast. At Paradise Park, a coastal shell midden, Keegan et al. (2003) report on the invertebrate fauna noting that the inhabitants relied heavily on species from high salinity seagrass beds. This observation contrasts the later occupation of the site where inhabitants relied heavily on molluscs from low salinity muddy substrates. To date, however, only the invertebrate fauna has been published. From the Blue Marlin site, Rampersad (2009) found that 77% of the collection was turtle bone while fish and hutia are only 7% and 4% of the faunal composition respectively. The site is believed to have been a seasonal camp, which would explain the overwhelming exploitation of turtle over other faunal sources (Rampersad 2009:38). Informatively, there have yet to be found a Little River period site that, subsequently, was occupied into the White Marl phase (Wesler 2013:256).

White Marl phase sites are much more extensively excavated and reported upon for faunal remains. Wing (1972; 1977) produced some of the first detailed faunal reports on the White Marl period. Her findings were summarized in later work with Newsom (Newsom and Wing 2004). Her analysis identifies and compares a number of coastal and inland sites across Jamaica, including Rodney House, White Marl on the south coast, and Cinnamon, Bellevue, Bengal, and Rio Nuevo on the north coast. She found that the further inland these sites are, the higher percentage of terrestrial resources they have (Newsom and Wing 2004:194). Sites closer to the coast have an increasing percentage of marine mollusc and fish.

Carlson's (2012) faunal assemblages from the four St Mary's Parish sites are from the same time period and occur within close proximity to each other. Three, Coleraine, Green Castle, and Newry, are located within 1 km of the coast and are close to the mouth of the Wagwater River. The fourth, the Wentworth site, is a coastal locale but without adjacent freshwater. In the sites close to a freshwater source, the samples were still heavily dominated by marine fish. The marine fish incorporated a high variety of species but with variable numbers of each. Despite having abundant marine and freshwater resources, 20% to 35% of the collections continued to be terrestrial animals, mostly the Jamaican galliwasp, a local lizard, and hutia. At Green Castle, hutia numbers increased through time, suggesting a growing preference for the rodent.

The presence of Jamaican hutia in faunal collections has led to a debate as to whether hutia populations were tended and managed (Carlson 2012; Wing 2001b; 2008) or hunted from a wild population (Wilkins 2001). As noted above, Wing's research into the White Marl and Bellevue sites document an 80% reliance on terrestrial animals, mostly hutia. She argued that they were eaten in such large numbers and were such an integral part of the diet that they would have to be bred and penned. Wilkins (2001), however, later analyzed the hutia mandibles from the Bellevue site, measuring them to determine the age at death, finding that they represent an age range consistent with hunting practices from a wild population. Wilkins (2001:535) also notes that hutia have a low reproductive rate for their size, giving birth to an average litter of 1.5 offspring once or twice a year. This rate makes hutia penning a low return and improbable industry. Carlson (2012) used a similar approach to Wilkins in her study of the St. Mary Parish sites and found that there is a pattern to the age ranges of the hutia found there. She consequently claimed that it is possible, though not definite, that the hutia at those sites were being managed. Whether hutia were penned or hunted from a wild population, it is clear they represent a sought-after component of diet in Jamaica whether sites are coastal or far into the interior. Hutia consumption may also reflect social hierarchy and inequality. Deagan (2004) suggested, in her analysis of faunal remains from En Bas Saline, that the hutia was an elite food, consumed primarily by higher-ranking individuals, while the lower ranks rarely ate this species.

Species selection appears to have affected fishing practices at Jamaican Taíno sites, as seen in a recent study by Azevedo (2015). This study examined temporal change in fish exploitation patterns at the Bluefield Bay site along the southern coast. Azevedo's primary interest was on resource depletion over time. By first applying preference rankings to fish based on ease of access and size, she then analyzed the change in preferred fish stocks through time (Azevedo 2015:88-89). Her results illustrate that, as preferred fish were overexploited, the numbers of less preferred fish rose. She concludes that change in fish species exploitation is a function of overfishing of select species rather than a transition in cultural preference.

Faunal Studies and Environmental Effects

Overexploitation of animal resources and resource compression are possibly the most widely explored and published topic within Caribbean faunal studies. Many researchers (Blick 2007; Fitzpatrick et al. 2008; Hardt 2008; Pestle 2013b; Wing and Wing 2001) believe that overexploitation, extirpation, extinction, and resource stress are typical patterns for the pre-contact era Caribbean. There are two primary ways that researchers consider these issues: change through time in faunal resources (Carlson 1999; Carlson and Keegan 2003; Giovas 2013; Keegan et al. 2003; Steadman and Jones 2006; Steadman and Stokes 2002; Wilkins 2001); and change in trophic levels, or number of steps an animal is from the start of the food chain, mostly in fish (Blick 2007; Carder and Crock 2012; Carder et al. 2007; Fitzpatrick 2008; Hardt 2008; Pestle 2013b; Poteate and Fitzpatrick 2013; Poteate et al. 2015; Wing 2001a; 2001b; Wing and Wing 2001). There also is a concern with the documentation of extinction/extirpation events through anthropogenic impacts (Cooke et al. 2017).

Human Overexploitation of Fauna

Researchers throughout the Caribbean study diachronic change in faunal populations to understand the extent to which species were affected by human exploitation. Looking at sites across the Caribbean, Carlson and Keegan (2004) traced patterns of overexploitation between islands. They argued that, despite the Taíno being portrayed as good shepherds of the land, the Taíno exploited local fauna in an unsustainable way. They have attributed unsustainable practices to the cultural significance of the traditional Taíno diet (Carlson and Keegan 2004). This rigidity did not allow for diet to change when certain animals were being hunted to extinction. Rather, the Taíno would undertake alterations to the local environment to enhance resource availability, or they would relocate to a new island.

Most researchers studying environment or environmental change consider the data through the theoretical lens of foraging theory. Cost-benefit models including optimal foraging theory, prey-choice models, and patch-choice models have been used extensively by researchers in the Caribbean and continue to be used (Carder et al. 2007; Carlson and Steadman 2006; Giovas 2013; Keegan et al. 2003; Newsom and Wing 2004; Wing 2001a; Wing and Wing 1995). In particular, comparative analyses commonly consider optimal foraging, especially when looking at change over time and anthropogenic environmental impacts (Carder et al. 2007; Carlson and Steadman 2006; Giovas 2013; Keegan et al. 2003; Newsom and Wing 2004; Wing 2001a).

Taking into account different time periods, Steadman and Jones (2006) and Steadman and Stokes (2003) compared the subsistence strategies of an early pre-ceramic site to a later ceramic era site on Tobago. They found that between these periods, the pre-ceramic site included more variation in the taxa represented. At the ceramic age site the inhabitants were exploiting multiple environments rather than one or two (Steadman and Jones 2006; Steadman and Stokes 2003). They attributed this difference to a number of factors, including cultural preferences, environmental access, as well as environmental overexploitation on the part of the later ceramic age site inhabitants. They have suggested that due to the larger population and needs of ceramic-era peoples, they overtaxed the local environment and were forced to exploit a wider range of resources than seen at other sites.

Carlson (1999) attempted to measure the amount of over-exploitation by pre-contact period Caribbean populations by studying the site of Coralie, on Turks and Caicos. This site was first occupied as late as the 7th century A.D. She did this in order to observe the effects that people had on local fauna through over-predation. She found that certain bird and reptile populations, which were already vulnerable, were devastated early, but otherwise, the island faunal populations were sustained over the 400-year occupation span of the site. However, by 1200 A.D. the population of the surrounding area had grown too large, and the subsistence economy was focused on an over-exploited resource base (Carlson 1999:217). Similar to Steadman and Jones (2006) and Steadman and Stokes (2003), she found that, following the over-exploitation of certain resources, subsistence diversification with a wider variety of fauna resulted.

As opposed to studies reporting a decreasing size for individuals within species through time, Giovas (2013) and Giovas et al. (2013) report an increase in *Nerita tessellata* shell size with time at the Coconut walk site on Nevis. Employing a collection of over 37,000 nerita shells, Giovas (2013) examined human impacts not just for nerita, but for competing species as well. This examination suggests that the nerita shell size increase resulted from human exploitation of competing species, allowing nerita to grow larger and become more abundant before eventually being harvested. In a similar fashion Poteate et al. (2015) found that the Taíno from the Coconut Walk site were able to maintain a sustainable mollusc harvest. Sampling an extensive collection of shell from a 600-year-long occupation of the site, they found no evidence of over-exploitation through decreasing size of shell or exploitation of juvenile individuals (Poteate et al. 2015). In particular, there was a 10% increase in individual size through time, suggesting the practice of harvesting marine molluscs from the area was sustainable. They propose that more work needs to be done on coastal sites looking specifically at sustainable practices.

In Puerto Rico, there seems to be considerable variation in faunal assemblages associated with the Saladoid (Archaic) versus Ostionoid (early Ceramic) series. This is highlighted by Rainey (1940) who refers to the former as the “crab culture” due to the abundance of land crab exploited. A shift from land crab to marine molluscs during the Ostionoid phase was once heavily debated (Carbone 1980; Davis 1988; deFrance and Newman 2005; Rodriguez-Ramos 2005). Much like the trophic level discussions today, most archaeologists ultimately conceded that the shift was due to over-exploitation of one resource forcing a transition in subsistence practices (Giovas 2013; Keegan 1989; Wing 2001a).

Keegan et al. (2003) explored changes in the abundance of *Strombus gigas* (queen conch) and *Cittarium pica* (West Indian top snail) at the Paradise Park site in Jamaica. They report that the decline in these species was in large part due to changes in habitat. Sea level change, change in rainfall patterns as well as sedimentation from agricultural land clearing caused seagrass beds to lose water circulation and salinity. Ultimately this resulted in the development of mangrove. *Strombus gigas* and *Cittarium pica* no longer were present, but a different marine mollusc suite was able to colonize (Keegan et al. 2003).

Trophic Levels in Fish

In the last several decades, fisheries and marine resource systems around the world have diminished, leaving environmental archaeologists with the task of reconstructing baselines for these fisheries. Environmental archaeologists are taking what marine conservation biologists and environmental scientists are learning about these ecosystems and exploring where and when over-exploitation began. In these studies, over-exploitation refers to the process, rather than the outcome, of humans impacting the numbers and reproduction rates of species within an ecosystem. The term is used throughout the literature and generally refers to human's impact on ecosystems as part of the food web system. Many trace the initial impacts on these systems to the pre-contact era and the first arrival of humans (Blick 2007; Hardt 2008; Pestle 2013b). Others are convinced that the true beginnings of current problems occurred with the arrival of Europeans in the colonial era (Fitzpatrick 2008; Wing 2001a; 2001b; Wing and Wing 2001). And still, others argue that these impacts are more modern. In this view, neither pre-contact peoples nor early colonial technology and methods could have devastated fishery baselines (Blick 2010; Carder and Crock 2012; Carder et al. 2007; Poteate et al. 2015). In this section, I explore the various ways in which zooarchaeologists consider how past exploitation patterns could affect current issues in Caribbean fisheries.

The over-exploitation of marine resources is evident in faunal data in many ways. Targeting and over-fishing of larger fish can result in smaller fish size in future generations as the gene pool of larger fish is removed from the breeding system (Giovas 2013:16). However, this model is questioned through growing evidence that predation and overexploitation alter the lifecycle of certain fish, causing them to grow larger faster, and offsetting growth rate calculations. Over-harvesting of certain fish would therefore result in the capture of larger, rather than smaller, prey (Colaninno 2010:283). A more prominent means of studying marine over-exploitation is looking at trophic level cascades, where predators are hunted out, resulting in population increases for their prey (Wing and Wing 2001). Trophic level studies remove the factor of individual size, eliminating the growth rate factor. Since foraging fish that eat plankton are the dominant prey, over-population can have negative effects on plankton levels, sending the trophic system into disorder. Trophic-level cascades can happen from anywhere within the ecosystem, either from predators being over-exploited and the problem working down or the prey being over-exploited with the effects working up.

Many researchers have explored this concept of fishing down the food web. Blick (2007) used archaeological evidence from San Salvadore, Bahamas to show a decrease in species size and abundance, suggesting that inhabitants were over-exploiting local resources. The San Salvadore site population was estimated between 500 and 1000 individuals, a relatively low population size, showing that even a small human population can have significant impacts on the environment. Pestle (2013b) used radiocarbon dates on human remains to measure diachronic change in carbon and nitrogen stable isotope levels, in order to measure the mean trophic levels of the species humans were consuming. He reported that over a six-century time span, there was a one- to two-trophic-level decline. Like Blick (2007) and Hardt (2008), he attributed this change to the over-exploitation of species higher up on the food web, resulting in a “fishing down” of the trophic scale. Much like other studies (Blick 2007; Hardt 2008), Pestle (2013b) emphasized that the results in this study are local to the site in Puerto Rico that he was studying and should not be taken as evidence of a Caribbean-wide trophic shift.

Hardt (2008) traced the degradation of coral reef systems in Jamaica from pre-contact times through the modern era. She used archaeological data from previous studies along with scientific data from the modern era to develop a running baseline though time. What she found was that the pre-contact era people of Jamaica did have a perilous effect on coral reef fish populations, evidenced by a decrease in fish size, decreased abundance of preferred species, and an increased reliance on terrestrial fauna (Hardt 2008:145). Unlike those (Fitzpatrick 2008; Wing 2001a; 2001b; Wing and Wing 2001) studying in the wider Caribbean, Hardt suggested that the Spanish and

English occupations of Jamaica left time for coral reef fish populations to recover, at least until the mid-19th century when modern fishing techniques began. Wing (2001a; 2001b) studied the effects on local taxa after the arrival of Europeans. She found that marine and terrestrial species alike saw profound alterations to their populations.

Fitzpatrick (2008) and Wing (2001a; 2001b) agree that while over-exploitation occurred in Caribbean pre-contact times, the greatest change occurred with the arrival of European colonists. Wing (2001a), using archaeological evidence from the Leeward and the Virgin Islands, attributed an amplification of impacts on reef fish in the historic period to over-exploitation practices in late prehistory. In this case, altered trophic levels had occurred in the pre-contact era leading to resource stress on an already strained food system after European arrival. Fitzpatrick et al. (2008) traced declining populations of turtles, marine mammals, and reef fishes throughout the Caribbean, finding that select fish species were over-exploited in the pre-contact era, but after contact, many more taxa were threatened or became extinct (Fitzpatrick et al.2008:147). Large herbivores such as turtles and manatees, as well as large carnivorous fish, were extirpated from Caribbean seagrass beds and coral reefs, leaving the food chain to be dominated by invertebrates and small fish (Fitzpatrick et al. 2008:160). Turtles and manatees were locally endangered after becoming part of the commercial trade (Fitzpatrick et al. 2008:156). More studies like Fitzpatrick et al. (2008) utilizing archaeological data from all over the Caribbean are useful in tracing patterns between islands and island groups.

Not all researchers believe that archaeological data can be useful or meaningful in the issue of historic and contemporary fish stock depletion. In 2010 a debate occurred in *The Journal of Island and Coastal Archaeology*, which began with Baisre's (2010a) article challenging the notion that our current fisheries crisis can be attributed to past populations rather than modern peoples. He questioned the use of archaeological data for past or present environmental studies in the Caribbean. A marine biologist, Baisre stated that the archaeological data used to infer over-exploitation and to create environmental reconstructions are incomplete and inaccurate. He argued that pre-contact period fishermen lacked the technology to affect the fisheries baseline and could not have created trophic cascades (Baisre 2010a). The purpose of the article was to place the cause of the current fisheries crisis in the Caribbean to modern overfishing and not to indigenous pre-contact era peoples or early European colonists. Archaeological response to the article was overwhelmingly negative (Butler 2010; Curet 2010; deFrance 2010b; Fitzpatrick 2010; Jones 2010; Keegan 2010; McClenachan et al. 2010).

Butler (2010) and deFrance (2010b) responded that any consideration of pre-Columbian peoples as too primitive to have an impact on the environment is a bad precedent to set. Butler suggested that we alternatively recognize that humans have an intricate relationship with the environment, one that can alter ecosystems at different times and places (Butler 2010:149). deFrance (2010b) argued that pre-Columbian fishing strategies and technologies were not as destructive as modern ones, but that pre-contact peoples could still have a damaging effect on the environment, resulting in diminished returns. Diminished returns then result in people moving to new environments and creating new technologies furthering their impact on different niches (deFrance 2010b).

The responses to Baisre by other researchers focus on the question of how archaeology can and should inform about past and present environmental conditions. Keegan (2010) emphasized that over-exploitation is a process that begins in the past through development of cultural preferences for food, leading to the dominant exploitation of singular resources. Similarly, McClenachan et al. (2010) point out that the effects past peoples had on environmental conditions affect modern fishing and should be studied as a means of understanding that change. They argued that modern environmental issues began with the initial introduction of people to the environment, which would then include archaeological data. Jones (2010) pointed out that one of the primary purposes of archaeology is to study the interaction of humans with the environment and the effects that interaction has on both. Butler (2010) and Fitzpatrick (2010) agreed that there are issues in the archaeological record including sample size, collection standards, and disturbed cultural deposits that need to be addressed. However, all archaeologists responding to Baisre (2010a) agreed that archaeology does have the potential to inform about past environments and environmental change. Curet (2010) in particular stated that the article brings up the need for future scientific rigor in the field.

Baisre’s (2010b) response was mixed, agreeing with some points but disagreeing with others. He consequently concludes that zooarchaeologists and environmental archaeologists can and should collaborate with marine conservation biologists to create a more complete picture of the past as it affects current environmental issues. The debate resolution was a consensus that over-exploitation by pre-Columbian indigenous peoples of the Caribbean could and did happen—it was just a matter of to what degree.

Beyond the above, it is noteworthy that some researchers suggest anthropogenic impacts need to be examined on an area by area basis with the possibility that they might not occur universally. These studies emphasize that resource over-exploitation, particularly on marine species, should not be assumed upon the arrival of human to an island. Carder et al. (2007), Carder and Crock (2012), Giovas (2013), and Poteate et al. (2015) illustrate that the arrival of humans did not significantly impact marine resources. As I have previously outlined, Poteate et al. (2015) showed the sustained extraction of marine mollusc resources from Nevis for six centuries of occupation. Carder et al. (2007), working on two sites from Anguilla, calculate mean fish size at different temporal intervals and found that there was no notable change over the seven to nine centuries of occupation. In an island-wide study from Anguilla, Carder and Crock (2012) took into account data from species composition and variation, abundance-biomass relationships, local trophic structure, and fish size to analyze the sustainability of fish resources. They found that throughout the 1000-year occupation of the island (500 to 1500 A.D.), fish resources and trophic levels remained the same. Carder and Crock (2012) emphasized that their study, though contradicting many others in the Caribbean, should be used as a resource in studies focusing upon resource extraction throughout the region.

Researchers in the Caribbean agree more and more on the potential archaeology has for documenting resource stress but also emphasizing variability in resource exploitation patterns and consequential impacts. Universally determining the extent of trophic level shifts and species extinction is impractical and does not take environmental and cultural variability between islands and communities into account (Crader and Crock 2012; Crader et al. 2007; Giovas 2010; 2013; Pestle 2013b). Despite recent trends to consider Caribbean archaeology on a broader regional scale via cultural comparisons, environmental impact studies are trending towards smaller scale community-level data sets, focusing on how a specific community and people impacted the immediate environment around them.

Terrestrial Extinctions or Extirpations

The arrival of humans into the Caribbean resulted in extensive extirpation of vertebrates. Terrestrial species on small islands are particularly vulnerable to impacts associated with human colonization events either for their use as food or through secondary impacts. In the Caribbean there have been several projects in which extinction or extirpations events have been documented for bird species (Gala and Lenoble 2015; Olson 2015; Olson and Miaz-Lopez 2008; Steadman and Franklin 2017; Williams and Steadman 2001; Wing 2008), mammals (Cooke et al. 2017; Fitzpatrick et al. 2008; Soto-Centeno and Steadman 2015; Steadman et al. 2005; Turvey et al. 2006; 2007; 2009) and reptiles (Carlson 1999; Carlson and Keegan 2004; Carrillo et al. 1999; Fitzpatrick et al. 2008).

Studies have shown that numerous bird species went extinct prior to and following humans' arrival on the Caribbean islands (Steadman and Franklin 2017). As for the latter, the acquisition of plumage for human decorative uses potentially had substantive effects on colourful bird species. For example, aDNA evidence has shown that the Caribbean macaw flourished throughout the Caribbean before human occupation. After first settlement, and as a consequence of human predation presumably for feathers, macaw populations declined and went extinct (Gala and Lenoble 2015; Olson and Maiz-Lopez 2008). The extinction of the parakeet from Puerto Rico began with over-exploitation by pre-contact era peoples with ultimate extinction after European contact in the 19th century (Olson 2015). Williams and Steadman (2001) suggest that 50 to 60 endemic species of parrot would occupy the Caribbean islands if not for pre-contact era and historic era impact. Today there are only 12 species of parrot that survive in the West Indies (Williams and Steadman 2001:175).

Anthropogenic impact on mammals resulted in the extinction or extirpation of sloths, bats, and several species of rodent. Steadman et al. (2005) correlate and date the disappearance of sloths from North America, including the Caribbean, to the time of first human settlement. For the Caribbean, dates on sloth bones from cave sites on Cuba and Hispaniola overlap with human occupation dates indicating contemporaneity (Steadman et al. 2005:11765). Sloths lasted several millennia longer in the Caribbean than in North America but died out quickly after first settlement. Steadman et al. (2005)

suggest more work and evidence needs to be collected before coming to any conclusions about the human contribution to sloth extinction.

Radiocarbon dating bat fossils from the Bahamas, Soto-Centeno and Steadman (2015) show that the extinction of bat populations on the archipelago took place after human occupation. While there were significant extinction events in the late Pleistocene- Holocene era transition, wiping out 79%-84% of Caribbean land mammals, bats remained prominent (Soto-Centeno and Steadman 2015:1). Archaeological evidence from the Bahamas shows that bat extirpation resulted from pre-contact as well as contact era exploitation (Soto-Centeno and Steadman 2015:4).

Rodents, including the hutia and rice rat, were extensively utilized as food sources during the pre-contact era. It was not until the arrival of the Europeans that populations dwindled and, for the rice rat, became extirpated across many islands (Turvey et al. 2009). For the rice rat, the extirpation event is related to secondary impacts through European introduction of dogs, cats and mongoose as well as the black rat (Wing 2001b).

Sea turtles, once an important part of the pre-contact Caribbean diet, were extirpated throughout the pre-contact era, as evidenced by their quick disappearance in the archaeological record through time (Carlson 1999; Fitzpatrick et al. 2008; Keegan et al. 2003:1615; Newsom and Wing 2004). Through their study of resource depletion of the Bahamas, Carlson and Keegan (2004) found that sea turtles were often targeted first when available leaving limited and endangered stocks for later inhabitants (Carlson and Keegan 2004; Fitzpatrick et al. 2008:156). Further extirpation occurred during the historic era when turtles were again heavily targeted by European settlers (Fitzpatrick 2008:148).

Zooarchaeological Evidence for Species Translocation

Through faunal remains, zooarchaeologists are able to document the human translocation of new animals into an area for ecological enhancement (deFrance et al. 2010; Gala and Lenoble 2015; LeFabvre and deFrance 2014; Wing 2008) or, alternatively, document it as evidence for human migration or trade (LeFabvre and Giovas 2009; Wing 2001b).

Wing (2008) explored the intentional and unintentional movement of animals by people throughout the pre-contact era Caribbean, specifically considering the possible translocation of rats, agouti, hutia, dog, and guinea pig. Using evidence from archaeological sites, she reported on the difference in each species between “the endemic, the introduced, and the domestic” (Wing 2008:420). Endemic species can include hutia, though they may have been moved by people between certain islands, as also the rice rat. Introduced animals included the agouti and Antillean hutia, for which she suggests there is evidence for management. Wing also notes evidence of the ritual use of agouti on St. Kitts (Wing 2008:420). Domestic animals included dogs and guinea pig, which were deliberately transported between islands for practical purposes. Dog could have become part of the diet (Wing 2008), while the guinea pig is reported to have potentially served ritual purposes (deFrance 2010a; 2013).

The trade of guinea pig is an often-explored subject in zooarchaeological studies throughout the Caribbean. The guinea pig was traditionally used as part of divination and ritual in South American Andean cultures, and it is believed by archaeologists to have been employed by Caribbean cultures for ritual purposes as well (Curet and Pestle 2010; deFrance et al. 2010; Kimura et al. 2015; Morales 1995; Wing 2001b). Guinea pig remains have been excavated from archaeological contexts at 18 sites on nine Caribbean islands including Hispaniola, Jamaica, Puerto Rico, Vieques, St. John, Antigua, Saint Lucia, Carriacou, and Curacao (LeFabvre and deFrance 2014:20). The first guinea pig remains appear around 500 A.D. and are abundant until the late pre-contact era when their numbers significantly drop from archaeological assemblages (LeFabvre and deFrance 2014). LeFabvre and deFrance (2014) traced the movement of guinea pigs first reporting them in the western Caribbean with subsequent spread across the Lesser Antilles. Using guinea pig as a proxy for human migration, they associate guinea pig with the spread of the Ostionoid culture group. A trade in guinea pig with groups in South America is also proposed (LeFabvre and deFrance 2014:34).

LeFabvre and Giovas (2009) argue that animals provide a perfect proxy for studying human migration due to the penchant for humans to take valued and useful animals with them as they go. As well, commensal animals, that is animals that would benefit from human interaction, coincidentally could be transported between islands, so their presence also provides a record of human movement (LeFabvre and Giovas 2009:146). Febre et al. (2014) looked closely at the aDNA of hutia between Caribbean islands, tracing the phylogenetic history of the species. Since hutia arrived in the islands after the late Miocene land bridge to mainland South America (Fabre et al. 2014: 2), they originally arrived in the Lesser Antilles by rafting. aDNA of hutia from archaeological sites, however, provide information on their movement between islands possibly through intentional transplantation or as a result of human migration.

Social Hierarchies and Reconstructions

Faunal remains, and foodways more generally, have the potential to inform archaeologists about status based on who ate what and where (Curet and Pestle 2010). Much of the research on social meanings of food and animals in the Caribbean comes from the ceremonial center of Tibes, Puerto Rico (Curet and Pestle 2010; Curet et al. 2006a; DuChemin 2013; deFrance 2010a; deFrance et al. 2010). Even those studying other sites or doing comparative studies between faunal consumption and social effects reference Tibes as the quintessential Puerto Rico, Classic Taíno chiefdom example (deFrance et al. 1996; LeFebvre and deFrance 2013). As I have described in Chapter 2, Tibes is a civic ceremonial site on Puerto Rico that was settled during the early ceramic age, 300 to 400 A.D. (deFrance 2013:383). By around 900 A.D. it had developed into a sizeable ceremonial complex complete with monumental architecture and a large ball court (deFrance 2010:76). The emergence of this complex and stratified society offers a rare glimpse into the social hierarchies of the Taíno. Although it is 8 km from the coast, Tibes subsistence included marine shell from coral reefs and inshore fish, though inhabitants subsisted mostly on horticultural crops (deFrance 2013:383; deFrance et al. 2010).

The study of social status at Tibes has been undertaken from a number of directions. Curet and Pestle (2010) associated previously identified faunal remains with contexts of high status. Based on where certain faunal remains were found, their importance and value was inferred from their context. They found the guinea pig to be a high-status food as their recovery comes from a previously identified ritual area. However, the study addresses but does not clarify the difference between a high-status and a ritualistically important animal.

deFrance (2010a) took a different approach, finding that the faunal remains at Tibes do not change much between pre- and post-complex societies. She found that there is no significant change over time, even as complex monumental architecture developed (deFrance 2010a:88). She argued that if there were high- and low-status ranks at Tibes, it was not distinguished through food. LeFebvre and deFrance (2013) also report the same foods on sites in Puerto Rico that have no ball court or monumental architecture. deFrance 2010a:88) even argues that the maintenance of traditional food practices may have been purposeful to promote group and social unity.

DuChemin (2013) offered a comparative study of faunal remains from three contemporaneous and adjacent sites to Tibes. He explored the connection of ceremonial items and faunal remains between sites, finding that the faunal remains at each grew more similar with time and the growth of the larger ceremonial complex. Notably guinea pigs, believed to be ceremonial in nature, increased in abundance (DuChemin 2013:226).

Caribbean ethnographic and ethnoarchaeological data for food use and consumption as a social commodity are scarce to nonexistent. Several researchers consequently apply analogues drawn from comparable chiefdom scale societies, especially those from within Oceania (Carlson 1999; deFrance 2013; deFrance et al. 2010; Carlson and Steadman 2009; DuChemin 2013; LeFabvre and deFrance 2014; LeFebvre and Giovas 2009; Keegan et al. 2008). This type of analogy has several disadvantages. The Caribbean and Oceanic chiefdoms do share similar island contexts, but otherwise, they are substantially different with varied archaeological and historic pasts. Within Oceania social hierarchy relied heavily on feasting complexes with the raising and procurement of pigs being central; the largest land mammal in the Caribbean was the hutia. Ensor (2013:85) concludes that only independent archaeological data can accurately test for status, kinship, and social hierarchies. Analogies drawn from elsewhere need to be treated with a high degree of caution (Ensor 2013:85).

Chapter 4.

History of and Contemporary Archaeology at Sevilla la Nueva and Maima

Seville Estate Heritage Park

The Seville Estate Heritage Park encompasses parts of the Spanish colony of Sevilla la Nueva, the later English plantation, and the Taíno village of Maima. It has been subject to intermittent archaeological investigations since 1937. To date, archaeological investigations have been undertaken at the slave quarters (Armstrong 2011), the Sevilla la Nueva Governor’s fort and sugar mill (Cotter 1970; Woodward 1988), artisans’ workshop and Abbey (Woodward 1988; 2006a; 2006b), butchery (Speller et al. 2013) and most recently Maima (Figure 4). In the following review, I focus on the archaeology done at the Spanish and Taíno areas of the site. Artifacts and features from these areas provide insights into the relationships between the two groups and the changes that happened to the Taíno of Maima as a result of first contact and then colonization.

The Spanish colony of Sevilla la Nueva was founded in 1509 and subsequently abandoned in 1534 when the Spanish moved their capital to the south coast. In 1655, the English annexed Jamaica from the Spanish and initiated a colonization endeavor that continued to 1962. As part of this process, land grants were awarded to English colonists for the establishment of a plantation economy. The former colony of Sevilla la Nueva was integrated into a 2500-acre estate awarded to Captain Samuel Hemmings in 1670 (Woodward 2006a:89). Hemmings consequently established the New Seville Sugar Plantation. By the time Hemmings was establishing his plantation, the fortifications, sugar mill, and other structures were in ruin but remained a visible component of the landscape. In his visit to Jamaica in 1688 Sir Hans Sloane, an English naturalist, reported that the walls and structures left by the Spanish were mostly intact (Woodward 2006:89). By 1774, however, the historian Edward Long observed that the walls of these structures were ever diminishing (Woodward 2006:89). He also noted that the stone and bricks from the structures were being taken away and used in the building of new ones (Woodward 2006a:89). By the 19th century, there was no trace of the Sevilla la Nueva settlement remaining and its former presence was all but forgotten.

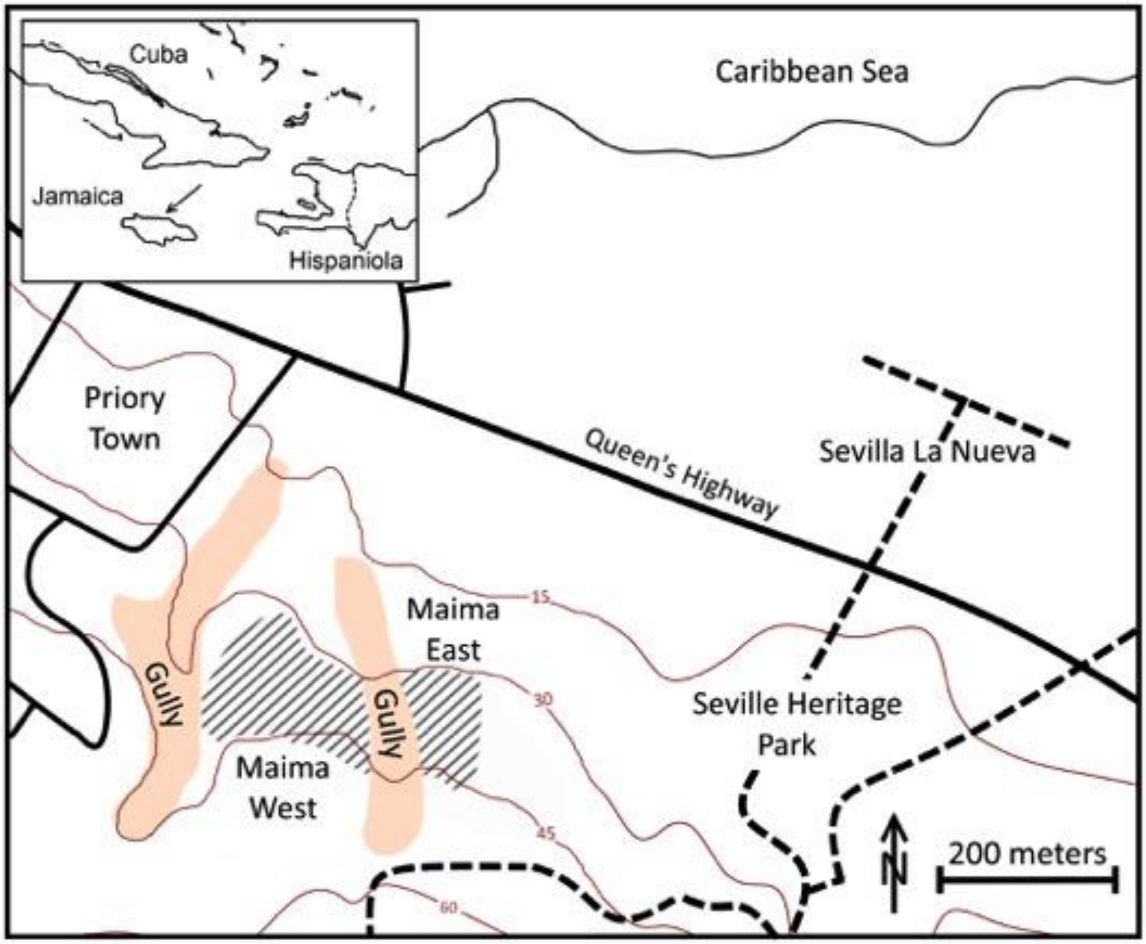

Figure 4: **Map of Maima in relation to Sevilla la Nueva, St. Ann's Bay, Jamaica (Burley et al. 2017).**

The modern story of Sevilla la Nueva begins in 1937 with the rediscovery of the Spanish settlement. The area that had once been the Governor's quarters and the industrial sector of Sevilla la Nueva was by then integrated into lower sugar fields for the English plantation. The estate manager, Geraint Casserly, was checking the fields when his horse stumbled on the old Spanish well (Woodward 2006a:89). He and a colleague conducted some modest excavations around the well and found that it had been associated with the Spanish fort built by Esquivel and finished by Garay (Woodward 2006a:90). During that excavation, they discovered not only the foundations of the Spanish fort but also a mix of Spanish and Taíno pottery (Cotter 1970). Casserly eventually notified Charles Cotter of his find, Cotter being an amateur historian and archaeologist. Cotter began a long-term search for, and investigation of other structures at Sevilla la Nueva, making notes and recording what he was finding. He began more earnest excavations in 1953 after stimulating interest in the site by archaeologists at the University of Florida. Cotter subsequently spent the next 15 years slowly excavating different areas of the site (Woodward 2006a:94).

During his excavations Cotter continued to recover Taíno ceramics and artifacts integrated with Spanish materials at the fort and sugar mill. In his excavations of the Governor's fort, for example, he recovered 1,797 Taíno ceramic fragments, all presumably in association with the Spanish settlement (Cotter 1970). Woodward (1988) later analyzed this collection as part of her MA thesis. Most of Cotter's excavations focused on the Spanish settlement, but he did conduct surveys in other areas of the estate, recording several earlier Taíno site locales. One of these, less than a kilometre west of the English Great House, had "a number of Arawak middens scattered over a large area" along "the back of the dry riverbed known as Parsons Gulley" (Aarons 1984:28). Due to its proximity to the Spanish settlement, it was Cotter who first identified the site as Maima (Cotter 1970). Cotter conducted some preliminary and exploratory excavations, the results of which are now unknown. Following Cotter, minor excavations were undertaken at Maima in the early 1950s by J.S. Tynsdale-Biscoe (1954). Like Cottor, Tynsdale-Biscoe was an amateur archaeologist who left very little in the way of notes or assessments from his study. Soon after this site was recorded there were several surrounding Taíno village sites discovered and tested, leading to a debate on alternative site locations for Maima (Aarons 1984).

The Seville Estate remained a working sugar plantation until 1971 when the Government of Jamaica purchased the by then 300-acre property. Due to the rich and diverse history that the site holds, the Jamaica National Heritage Trust sought to develop a heritage park for public interpretation and accessibility. In the 1980s, the Jamaican and Spanish governments entered into an agreement of cultural cooperation in which Spain would provide archaeological expertise to the Jamaican government to assist in the development of the heritage park (Woodward 2006a:98).

In the years leading up to the Columbus Quincentenary in 1992, considerable research efforts were dedicated to Spanish archaeology in the Americas. At Sevilla la Nueva, the Spanish expedition was led by Dr. Lorenzo E. Lopez y Sebastian of the

Universidad Complutense de Madrid and supervised by his assistant Fernando Velasco Steigard. Between 1981 and 1989 they undertook exploratory and extensive excavations across the whole of the Sevilla la Nueva site. In 1982 the Spanish team conducted test excavations at the Parson's Gully site previously identified as Maima. Despite the length of time and scale of the Spanish project, including 327 excavation units of either 2x2m or 4x4m in size dug across Sevilla la Nueva, Lopez y Sebastian produced little in the way of publications or reports. His only publications were three preliminary reports published in a Spanish periodical (Lopez y Sebastian 1982; 1986; 1987). At Maima the Spanish crew excavations were limited, with five excavation units scattered on the site.

In the few research notes that Lopez y Sebastian did publish, he reported finding several surface finds with “Arawak” materials but failed to identify their location. His only test excavations, however, were at Maima. He described Maima as extending over a broad area bounded by Parson's Gully on the western side (Lopez y Sebastian 1982:227). The first unit dug, along the edge of the gully, was positioned to find cultural materials that had slumped down into the gully. From this, he reported finding numerous ceramic fragments, mollusc shells, and small fragmented pieces of colonial glass (Lopez y Sebastian 1982:230). He also made mention in a later publication of the vast number of mollusc shells recovered and some vertebrate taxa, though the vertebrate remains were limited and degraded due to site sediments (Lopez y Sebastian 1986:237). The last Lopez y Sebastian publication (1986) reported that the Spanish team put four additional 2x2m excavation units in Maima to acquire cultural context for the Taíno materials that they were finding at the sugar mill and other parts of Sevilla la Nueva. No mention of the stratigraphy or site layout was made, the primary purpose of the excavation being to gather Taíno material culture as a comparison to that found within the Spanish settlement.

In 1988, while the Spanish excavations were ending at Sevilla la Nueva, Woodward was completing her Master's thesis on an analysis of the Cotter-excavated collections from Sevilla la Nueva. This collection consisted of materials from his years of excavation at the Spanish settlement supported by his notes. As previously noted, throughout his excavations Cotter found Taíno ceramics intermixed with Spanish artifacts. In fact, at the Governor's castle/fort, Woodward (1988:50) reported that 65% of the ceramics are of Taíno origin while only 35% derive from the Spanish. She interpreted this as the likely presence of Taíno wives or domestic servants who continued to manufacture and use Taíno ceramics. Also as part of the thesis, Woodward had analyzed the small faunal collection excavated by Cotter (McEwan 1982). McEwan and Woodward found mostly European domesticates but with some local fish and molluscs.

Woodward continued her research interests at Sevilla la Nueva as a Doctoral Dissertation project in the Archaeology Department at Simon Fraser University (SFU) with additional studies in more recent years. In all of these projects, Taíno ceramics and artifacts have continued to be found at Sevilla la Nueva. Between 2002 and 2004, excavations were conducted at the sugar mill and in the artisans' quarters, both revealing information and data about the lives and culture of the Spanish settlement. Woodward focused primarily on the Spanish colonial development and economy as it connected to sugar in her dissertation but continued to be interested in Taíno-Spanish relationships at the site, especially as these might be reflected in material culture. Related to this, she (2006a; 2006b) has identified and defined New Seville ware, a type of colonoware found at Sevilla la Nueva. New Seville ware incorporates Taíno-manufactured earthenware ceramics, but with vessel forms replicating those of Spanish ceramic types. New Seville ware vessels were identified initially through 37 fragments in the Cotter collection, but additional fragments have been found in later projects. This is further indication that the Taíno, likely Taíno women, had a presence and impact on the settlement.

Sevilla la Nueva as a settlement and the capital of Jamaica lasted for only 25 years. Its original location was on the braided tributary delta plain of the Church River. Following its abandonment in 1534, portions of the site became buried by alluvial deposition, in some cases providing a thick cap over site deposits. This has resulted in the preservation of structural remains and features that otherwise would have been destroyed during the British plantation-era residency. In 2004, a Spanish butchery site was located and tested south of the Queen's Highway and Governor's Fort by Burley. Burley and Woodward conducted excavations here in 2009, and a small Spanish residential site was identified nearby as well. In this area of the Sevilla la Nueva site, the archaeological remains were covered by a fine alluvial sediment and, subsequently, by a cap of compacted alluvial gravels. Excavations revealed terrace features on the edge of a small stream where livestock were butchered and the meat processed for storage.

The faunal assemblage was substantial, dominated by sheep but also including pig, cow, and other species of domesticates as well as fish and molluscs (Speller et al. 2013). Notably, the largest collection of artifacts recovered in 2009 was Taíno ceramics, also including examples of New Seville wares. This assemblage again was intermixed with 16th century Spanish ceramics, glass, metal, and other artifacts.

The Government of Jamaica submitted a 2009 nomination proposal for the Seville Estate Heritage Park to be added to the United Nations Educational, Scientific and Cultural Organization's (UNESCO) World Heritage List. The underlying rationale for the nomination is the presence and intermixture of Spanish, Taíno, British, and African (slave) heritage within the park and how this reflects upon the founding history for the configuration of contemporary Jamaica. As the nomination states, this embodies the Jamaican National motto "Out of Many, One People" <http://whc.unesco.org/en/tentativelists/5431/>. The nomination is currently being considered and remains on the UNESCO Tentative List.

2014 Survey and Initial Findings

By 2014 considerable archaeological research had been conducted at the Seville Estate Heritage Park. At the same time, specific knowledge of the Taíno settlement of Maima, a site projected to be within the boundaries of the estate, remained largely unknown. Burley and Woodward planned to rectify this situation with a field project in 2014. Of particular concern was to gather data on site size, layout, complexity, chronology, and the impact of modern activities on site deposits. My role was as field supervisor, with the additional objective of site evaluation for faunal content, including the possibilities of using the faunal data as a basis for a PhD dissertation. The field project was undertaken between February 1 and 28 with assistants hired from the local community. One of these individuals had been a field assistant on the Spanish team in the 1980s and was able to inform us of the details and location of excavation units from that time. The Spanish expedition also failed to backfill excavations in the 1980s, allowing us to easily verify unit location as well as document depth and stratigraphy.

As we recorded it in 2014, the Taíno site is located along the western edge of the Seville Estate. It covers an area of approximately 1.2 to 1.5 hectares and is divided by a steeply cut and deep gulley; presumably the one referred to earlier as "Parson's Gully."

The division by the gully led to designation of site areas as Maima East and Maima West. Maima East is only partially occupied with some segments converted to agricultural use, both presently and in the past. Maima West, on the other hand, is heavily populated as a squatters' settlement on "reclaimed" but untitled land. The 2014 project initially conducted a survey, auger testing, and limited test excavations on Maima East. This was the area the Spanish had worked in, and abundant archaeological remains had slumped into their excavation pits but were also widely distributed on the surface. Notably, a piece of New Seville ware was recovered from slump deposits in one of the open Spanish excavation units. The Spanish had established a site datum using a piece of rebar set in concrete; this reference point was rediscovered and re-employed for work at Maima East.

The survey of Maima West was substantially more limited due to the density and nature of modern residential occupation. The principal road into this area, however, had cut through what appeared to be a mounded late pre-contact era shell midden, and permission was acquired to place a 1 x 1.5 m test excavation in the adjacent yard. This unit was able to document a thick stratum of limestone gravel and marl fill, illustrating the construction of an artificial terrace built outward from the hillside. From this excavation, we also recovered a wrought-iron nail that had been reworked into a flat-edged tool and a second possible piece of New Seville ware. Additional survey at Maima West recorded three other areas with probable Taíno household occupations.

By discovering the presence of an artificial terrace at Maima West, a type of feature heretofore undocumented in Jamaica archaeology, it was possible to refocus examination of auger tests, excavations, and landforms at Maima East. Re-examination of stratigraphy in the two principal Spanish units (each 2 x 4 m), for example, showed the presence of terrace construction providing a levelled surface for Taíno occupation. Several of the auger tests also illustrated the presence of limestone gravel/clay fills. Most notably, however, a partial re-excavation of a Spanish unit through a thick gravelled fill layer clearly documented the extent to which infilling had occurred at the site (Figure 5).

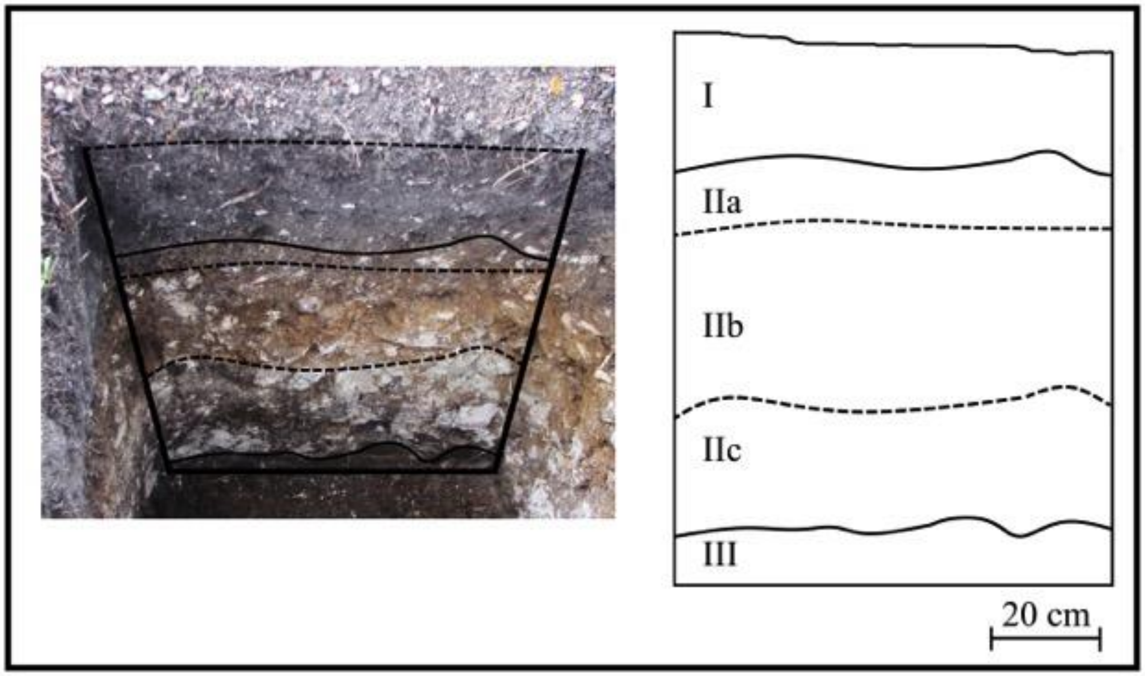

Figure 5: **Stratigraphic profile from the northwest corner of the House 10 Platform. Re-excavated section from the 1982 excavations showing the fill (Stratum II) from the terrace construction (Burley et al. 2017).**

The few units dug during the 2014 field season produced numerous ceramic, shell, and lithic fragments but little to no vertebrate remains. Marine and terrestrial mollusc remains were abundant and dispersed across the site area. Samples of these were recovered in 2014 for identification and to create a comparative collection for use in 2015.

2015 Excavations

With knowledge of the general site layout, size, and an idea about the complexity of the artificially constructed terraces, the 2015 field season set three objectives for investigations at Maima East. The first was to prepare a detailed map of terraces and other features as they were positioned on the rising slopes at the site. Second, the discovery of house terraces presented the potential opportunity to expose occupation surfaces with postholes and architectural features intact. And third, through excavations, we intended to recover a representative sample of late pre-contact/contact era White Marl phase material culture as well as introduced Spanish items and faunas reflective of the early 16th century colonial encounter and its impact. My focus was to recover faunal data for subsistence interpretation, both for the pre-contact and historic eras at the site.

These data are dealt with subsequently. For the remainder of this chapter I provide an overview of the 2015 project as context to the faunal remains and later interpretations.

The 2015 field season began by clearing the dense vegetation covering much of the Maima East site area, providing a clearer picture of the site landscape and it's artificially created platforms and terraces. There is a minimum of 12 platform features situated on six naturally formed terrace levels running upslope on the hillside (Figure 6). Three of the platform features had been excavated into by the Spanish in the 1980s; in the 2015 field season five others were either tested or had more extensive excavation. Site clearing facilitated our mapping goals, with two maps being prepared—one a two-dimensional plot of site features including breaks in slope, platform/house locations, depressions, and excavation unit locations (Figure 7). The second is a 20 cm contour map which, when plotted in SURFER at an oblique angle, provides slope perspective as well as illustrating the terraced nature of the Maima East hillside.

The stratigraphy across site excavations varies considerably. In some areas (i.e., Houses 8 and 11), there appear to be one or more occupation levels separated by fill layers; in others, this is not so apparent (Houses 7 and 10). In all cases, however, cultural materials or midden layers are incorporated within or are superimposed on original clay soils indicating that terrace construction was not part of the original site occupation but, rather, a later development (Burley et al. 2016; 2017). Terrace features were constructed using locally available materials including clay, limestone gravels, and finer marl. The fill layers also have inclusions of degraded ceramic shards and lithic flakes (Burley et al. 2016; 2017). This indicates that the fill used to create the artificial terraces and platforms was collected from the soil and possibly middens surrounding the area of construction. Terrace construction preceded by building outward from the upslope (southern) part of the hill with fill deposition being thicker on the downslope section of the terrace. In the case of Platforms 1 to 5 on the lowest of the terraces, these may have been constructed as slightly elevated and levelled occupation surfaces rather than terraces as defined above. The Maima East site settlement landscape has scattered household features identified by round raised surfaces on the terrace edges. Downslope drainage seems to have been directed around these areas into lower basins (Figure 6). It is possible that these basins were used as house gardens or growing areas. The excavation of five of these platforms provided evidence for household features; in two cases excavations were able to expose postholes or other features allowing us to infer the nature of architectural form for the Taíno house at Maima East.

House Unit 7

House 7 is adjacent to the higher raised House 8. This feature is not a terrace *per se*. As excavation has shown, it is formed by a bedrock depression into the hill slope that had been filled, leveled, and was then used as an occupation surface. Excavation of this feature was done by trowel employing 1 x 1 m provenience units with removed matrices passed through 6.4 mm sieves. Five of the units, however, were excavated by myself in 5 cm arbitrary layers employing 3.2 mm mesh for maximum faunal recovery.

Eight postholes were excavated at House 7 with four carved directly into the bedrock on which the feature was built (Figure 8). There is no clear pattern to the postholes. Two sets of postholes appear in pairs, similar to the paired posthole pattern documented by Samson (2010) at El Cabo Dominican Republic. The abundant artifact and invertebrate assemblages recovered from excavated deposits suggest a residential feature, notwithstanding the lack of posthole patterning. The size of the depression and the surface on which the house could be built suggests a small circular structure of ~4 m diameter.

The artifacts recovered at this feature are similar to those found at House 10, the only other house with extensive excavation. However, there is a notable increase in the quantities of both vertebrate and invertebrate taxa present. Additionally, there are a few indications of contact in this unit including a metal artifact fragment, as well as a cow's tooth. While House 10 includes invertebrate remains, but very little vertebrate fauna, House 7 includes vertebrate as well as larger numbers of invertebrates, particularly larger and intact *Strombus gigas*. There are also noticeably large numbers of vertebrate faunas found in the area between Houses 7 and 8, likely due to runoff from the higher up House 8.

House Feature 8

Feature 8 is a raised rounded platform that, as illustrated in its profile, has a stratified sequence of occupation (Figure 9). This includes an upper occupation level

(Stratum 2) occurring on a 20 cm terrace fill deposit (Stratum 3) overlying midden with at least two major depositional events (Strata 4 and 5). Charcoal samples from Strata 4a and 5 were sent to the University of Waikato Radiocarbon Dating Laboratory for AMS radiocarbon dating. These returned 95.4% calibrated dates for sequential midden deposits of 1291 to 1395 A.D. (Stratum 4a) and 1032 to 1154 A.D. (Stratum 5) (Table 2). Since level 3 is terrace construction fill, the Stratum 4a date gives a *terminus post quem* for terrace building at House 8 and quite possibly for the onset of terrace building at Maima more broadly (Burley et al. 2016). The House 8 artifact assemblage was dominated by ceramics. While the assemblage content closely mirrors the more sustantial collection from Maima East, it is too limited in numbers to identify temporal change based on stratigraphic separation.

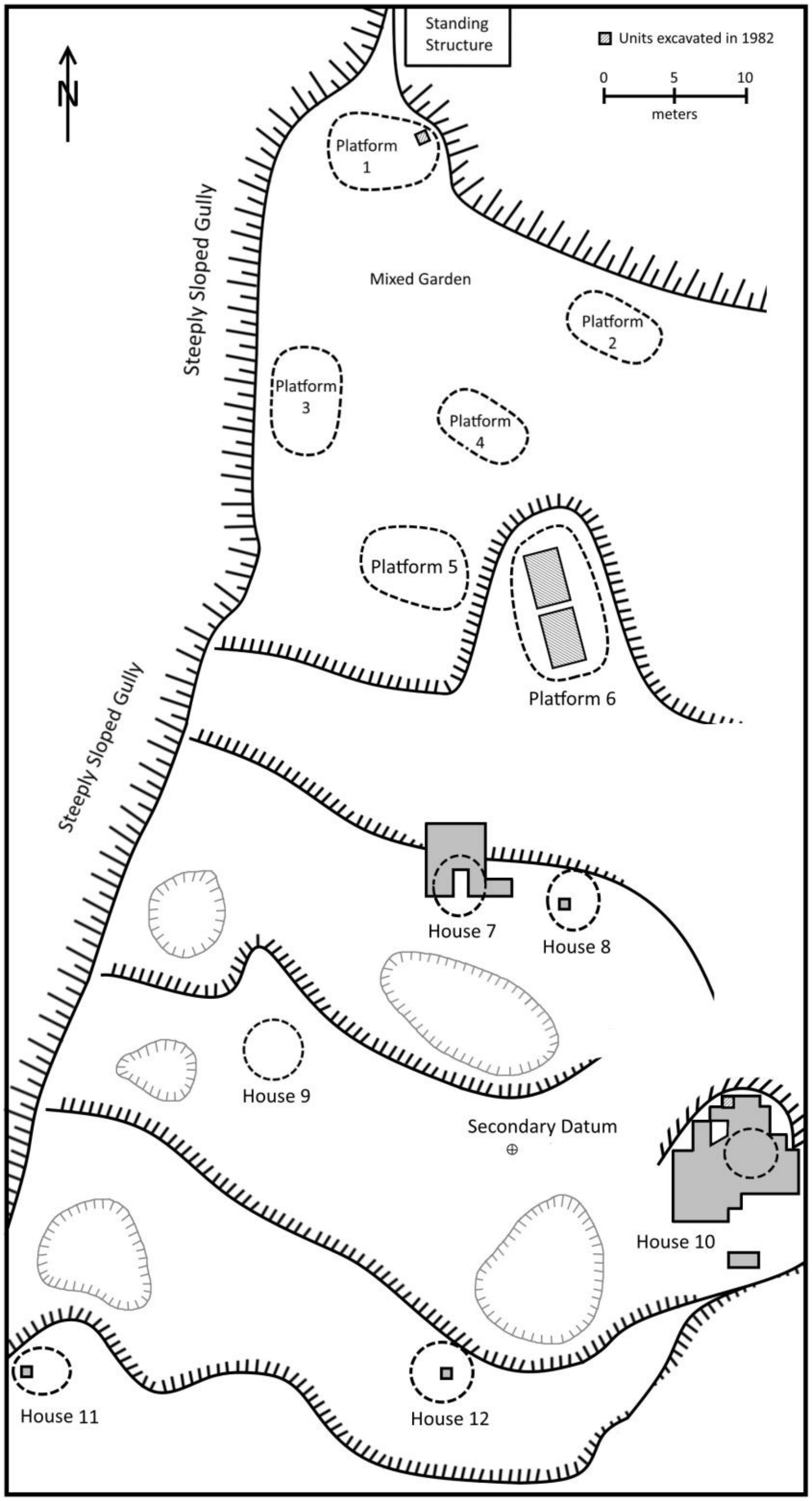

Figure 6: **Planview map of features and terrace breaks at Maima East. Platforms 1 and 6 as well as the House 10 terrace had open excavation units from the 1982 Spanish archaeological project. The depressions are 15 to 20 cm basin-like features with capacity for water retention today. Darkened excavations were conducted in 2015.**

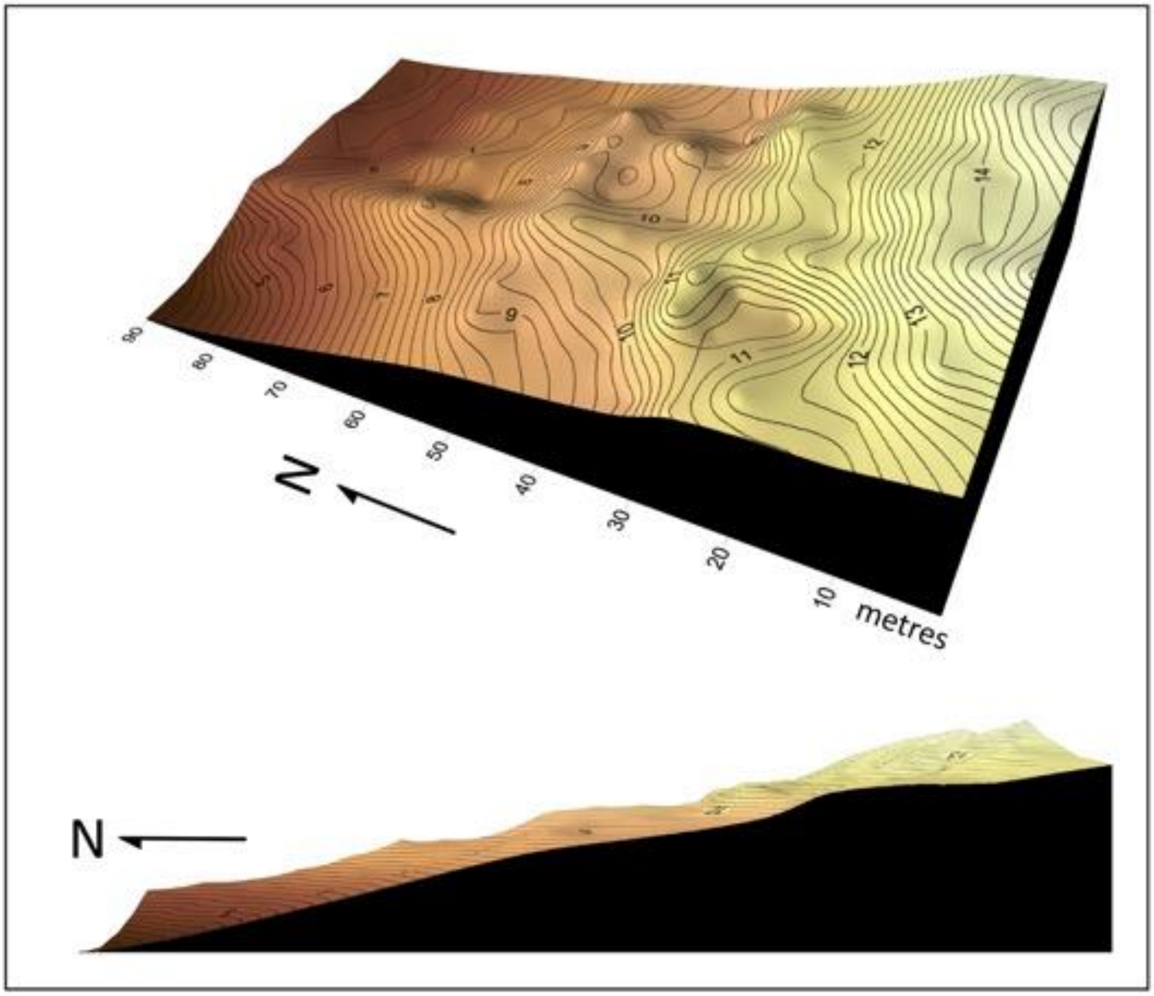

Figure 7: Contour elevation map (20 cm) for Maima East plotted with Surfer 3D imaging software. Images are given as slope perspective and an oblique view illustrating terracing. (Burley et al. 2016).

Figure 8: Placement of Postholes in Pairs from Feature 7 Bedrock. Sloped and in-filled depression form house floor is in the upper left (Photo By Author).

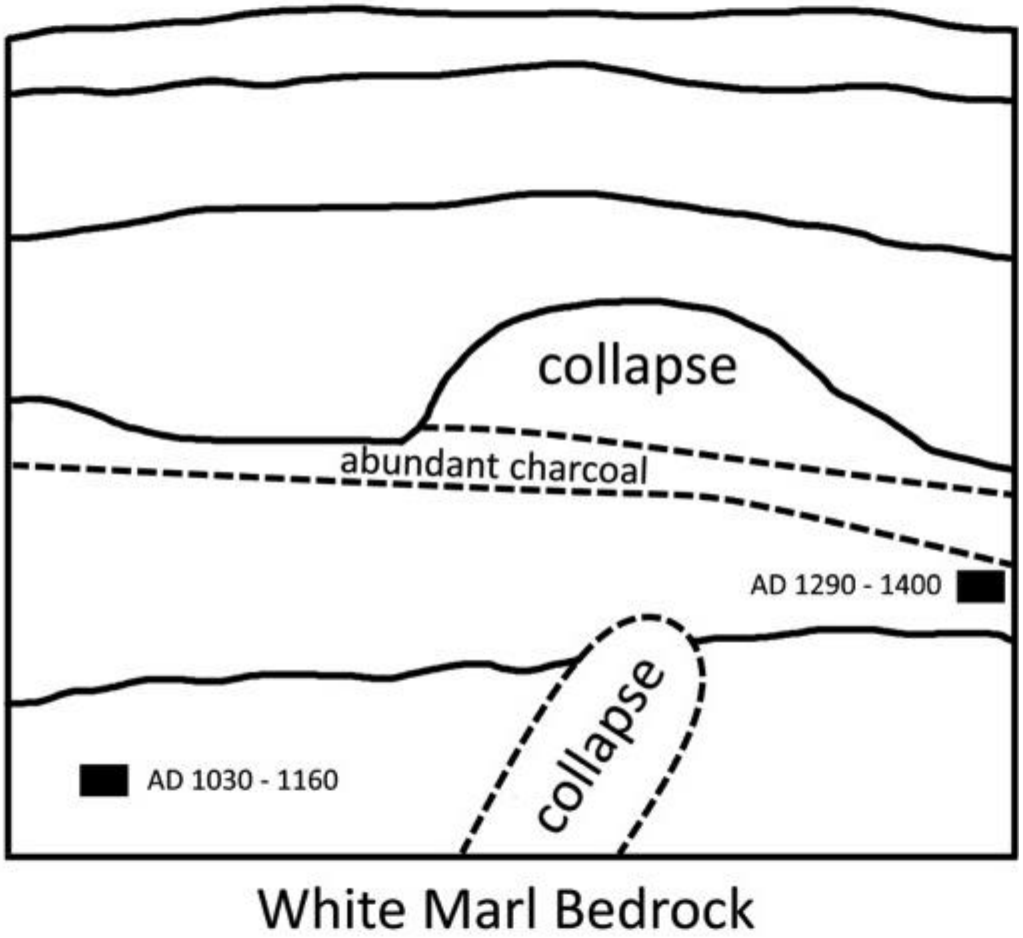

Figure 9: **House 8 Stratigraphic profile with AMS radiocarbon sample locations and dates. Stratum I, surface loam; Stratum II, mottled occupation layer of blocky clay, shell, ceramics and other cultural materials; Stratum III, light gray crushed and compact limestone aggregate and marl fill with limited cultural material. This stratum represents a terrace/house platform feature; Stratum IV, gray brown mixed clay with organics, abundant cultural material and shell; Stratum V, very dark gray midden, with packed shell, cultural materials and limited clay. Stratum V is deposited directly on to limestone bedrock**

Sample Context	AMS Date	Calibrated 68.2%	Calibrated 95.4%
House 8 Strata IVb	627 ± 20 BP	1298-1390 A.D.	1291-1395 A.D.
House 8 Strata V	938 ± 20 BP	1038-1151 A.D.	1032-1154 A.D.

Table 2: Radiocarbon dates for two strata in House 8. Dates are based wood charcoals not identified as to species. Calibration was done with Calib 7.1 using IntCal 13 radiocarbon calibration curve (Reimer et al. 2013).

House Unit 10

The 1980s Spanish project had excavated a 2 x 2 m unit into the north slope of the terrace for House 10. This project was abruptly terminated as the unit encountered gravel fill between 25 and 30 cm below the surface. A portion of this unit was re-excavated in 2014, extending the excavation through the terrace fill into the original ground surface. The consequential profile illustrated a substantial terrace construction at the site (Figure 5). With a high probability for the presence of postholes and other architectural features, the 2015 project undertook an expansive excavation across this feature's surface. Excavation removed the upper clay/loam surface cover down to the underlying platform as a single stratigraphic unit. Provenience was maintained in 1 x 1 m units. A second stratigraphic unit was subsequently excavated into the upper few centimeters of the platform in search of features. This excavation revealed a circular house floor consisting of 10 exterior postholes and a center post (Figures 10 and 11). The house measures 4 m in diameter, with the center posthole 30 to 35 cm in diameter dug to a depth of 40 cm. Packed limestone rock, found with the postholes, supported a number of the posts.

The western edge of House 10 is without identifiable postholes. Tentatively this area is interpreted to be a door locale insofar as it is opposite prevailing winds from the south/southeast. On the western part of the house is also a large rock feature that was possibly part of a floor or work surface. In the post-occupation period, the surface of the terrace was cut through with a hill slope drainage channel, washing away packed marl sediments that likely made up the occupation surface and house floor deposits.

A large percentage of the artifacts found from this house were excavated from an outside area in the southwestern part of the excavation block. This most likely is the location for a house midden. House 10 has the largest numbers of artifacts from the

Maima East excavations in large measure because of the expanded size of the excavation area ($50m^2$). The nature of the assemblage represents residential occupation with a large volume of ceramics, two examples of petaloid celts, a range of pestel-like handstones with metates, net weights, abraders, flaked stone expedient tools, and debitage as well as branch coral sprigs (Burley et al. 2017). Four anthropomorphic/zoomorphic adorno images were also recovered, these possibly being representations of *zemi.* Notably, the House 10 excavations also recovered six hand-wrought nails, two pieces of glass, and two caprine (sheep/goat) bones, all consistent with the 16th century Spanish contact era.

House 10 excavations recovered a sizeable collection of invertebrate remains but almost no vertebrate taxa. To test whether this was a function of the excavation strategy in which 6.4 mm sieves were employed, I opened three 50 x 50 cm units in unexcavated spaces around the house using the 3.2 mm mesh screen. Though there were a few unidentifiable vertebrate fragments recovered, the results suggest a real absence of faunal materials at House 10 compared to Houses 7 and 8. Why this is the case is difficult to infer. It may be that the slope-wash running across the site surface displaced smaller types of fauna. It may also be that the House 10 residents had a food preparation and consumption area separate from their residence.

Summary

The 2015 excavations at Maima resulted in a more detailed understanding of the site compared to 2014, particularly as it exposed architectural features and settlement pattern. Recovered assemblages also provide insight into the household toolkits and behaviors at the household level. While the artifact assemblages between the houses varied little, the lack of vertebrate fauna at House 10 is intriguing if not problematic for interpretation. In the following chapters I focus more specifically on the identification and interpretation of vertebrate and invertebrate remains, its implications for subsistence economy at Maima, and its implications for the larger context of Taíno subsistence practices in the late pre-contact era White Marl phase.

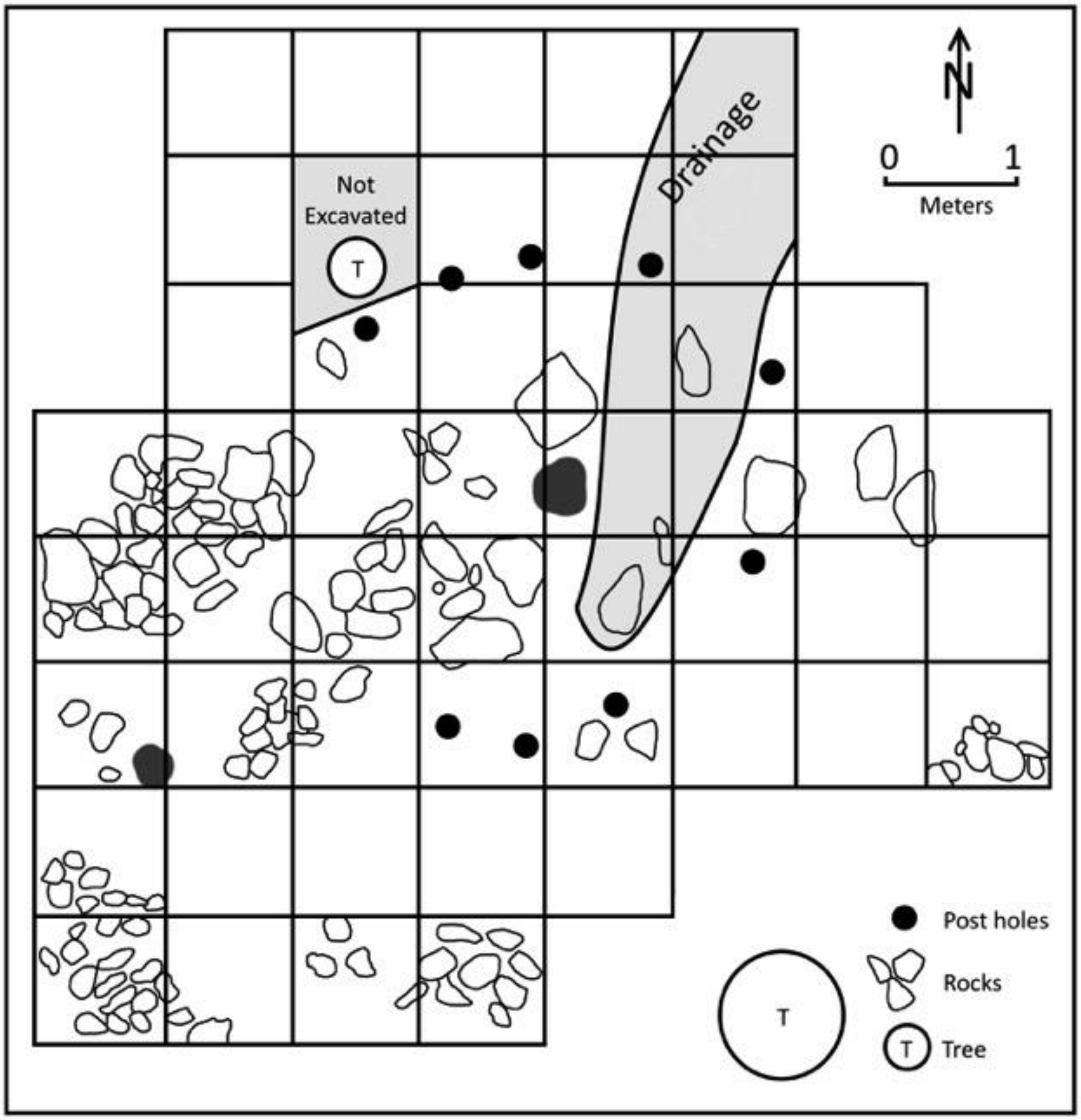

Figure 10: House 10 feature plan and post hole pattern. Exposed rocks are white limestone chunks incorporated into terrace fill. The drainage channel in upper right has cut through the terrace and is post occupation in age.(Burley et al. 2016).

Figure 11: **Excavations of House 10 showing location and layout of postholes and scale of household (Photo by Author).**

Chapter 5.

Invertebrate Identification and Analysis

The Maima invertebrate shell collection consists of a total number of identified specimens (NISP) of 8,592 shells and shell fragments, with an estimated minimum number of individuals (MNI) of 5,360. Shells were found in all units and house excavations at Maima and represent a valuable source of data regarding subsistence and subsistence strategies in the pre-contact era. The following chapter is a presentation of the results of the invertebrate analysis. First, the methods used for their collection and identification are reviewed. Second, terrestrial snail shells are presented and, as argued, inferred to be a natural occurrence, not part of the Taíno subsistence economy. Third, the identifications and quantification of marine shells are provided followed by a discussion of the habitats exploited for marine mollusc harvesting. Finally, an intra-site analysis compares the marine molluscs' distributions over time from the two house features that were excavated in 5 cm levels.

Shell Identification Methodology

Fieldwork at Maima in 2014 included the recovery of invertebrate remains from the excavation of slump deposits in the Spanish trenches and the test excavations at Maima West. These were identified through published and online comparisons that, subsequently, provided a type collection that could be referenced for 2015 analyses. Shell from 2015 excavations was bagged by house feature, unit, and level/stratum. This collection was identified, quantified, and catalogued during the final week of the field project. Identification was made to species level when possible, identified to size category as outlined later, had valve side identified for bivalves, and was quantified by provenience. Wear patterns, or other modifications were similarly noted.

In addition to the comparative collection created for this project, shells were identified in 2015 using identification manuals and field guides (Abbot and Morris 1995; Warmke and Abbot 1961). Names given to mollusc species can be varied dependent on source and publication date (Giovas 2013:115). This has resulted from the ongoing assessment of evolutionary relationships particularly as DNA supports them.

Identifications of mollusc species in this dissertation have been checked against a single source, the Integrated Taxonomic Information System (ITIS) (www.itis.gov). This system is maintained and updated by a United States government partnership including the Smithsonian Institution. The identification of genus and species of land snails has been inconsistent throughout Caribbean archaeology. In this dissertation, four species of land snail were identified, two of which were distinct species of *Pleurodonte*. They are differentiated mostly by their size but also differing inner lip shape on the aperture. They are classified here as *Pleurodonte invalida* for the smaller and *Pleurodonte strangulate* for the larger. These are the names most commonly referred to in the Jamaican literature.

Quantifications were made using standard measures of NISP and MNI (Lyman 2008; Reitz and Wing 1999). MNI was calculated within each arbitrary layer of a unit. In the case of House 7, where some units were not excavated in 5 cm layers but as a single stratum occupation floor, MNI was calculated for the cumulative unit total. For gastropods, the size of the fragment was measured while the presence of a spire was used for MNI. This was particularly noteworthy in calculating MNI for Strombus sp., as they were often fragmented. In bivalves, right or left side and presence of the hinge in fragments were counted. The larger number of either right or left valves for each species provides the MNI.

Time constraints did not allow for individual or cumulative weights to be taken for the collection. For comparative analysis of size across the site and through time for the more common bivalves (*Codakia orbicularis* and *Arca zebra),* specimens were categorized into aggregated measurement groups of small, medium, and large employing a type collection template (Table 3). This scale is used as a guideline for sizing with samples being put into the closest possible category. Measurements were taken from intact specimens, with height measurements taken from the tip of the umbo on the dorsal edge to the furthest point on the ventral edge. Length measurements were taken from the furthest points on the posterior and anterior edges.

Shell Species	Small Size	Medium Size	Large Size
Arca zebra	1.5cm H, 3cm L	2cm H, 4.5cm L	3cm H, 6cm L
Codakia orbicularius	3cm H, 3.5cm L	4.5cm H, 5cm L	7.5cm H, 7cm L

Table 3: Size Categories for *Arca zebra* and *Codakia orbicularius*.

Time constraints in the field and the volume of shell recovered did not allow the full collection to be analyzed. Rather, a sample of excavation units was identified for analysis (Table 4). In House 7, three units (A4, A7, and C5) were excavated in arbitrary 5 cm levels allowing for comparative analysis across time (Figure 12). In addition, five more units were identified where excavation provenience was treated as a single occupation zone. The units were chosen based on their location within the feature; care was given to ensure both inside and outside house areas were sampled. In House 10, ten units were sampled, each with two stratigraphic based levels. Four units were sampled from inside the house and six from outside (Figure 13). Units I8, I9, and J8 were positioned in the midden area of the house. The sampling of specific units within Houses 7 and 10 facilitates inter- and intra-house comparisons at Maima East. Invertebrate remains from all other test excavations were analyzed, providing a broader context for the comparative analysis across the site.

Feature	Levels	Units
7		A4, A7, A8, B4, C5, D5, D6, E5
8	All Levels	
10		F10, F11, G13, G14, H10, H11, I8, I9, J8, M13
11	All Levels	
12	All Levels	
13	All Levels	
14	All Levels	

Table 4: Features and Units Sampled for Invertebrate Remains at Maima.

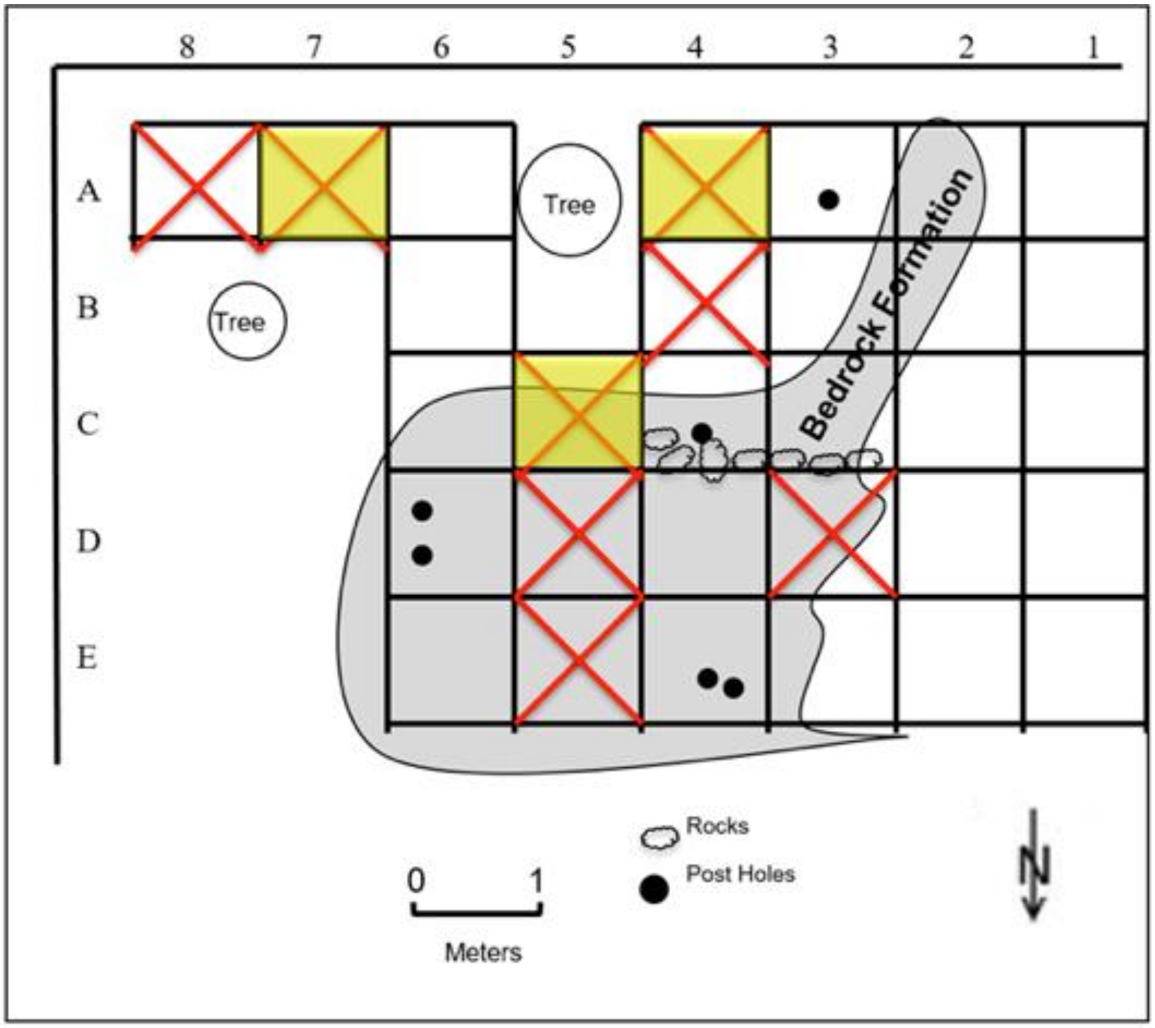

Figure 12: House 7 units sampled for invertebrate analysis. Red X indicates a sampled unit, yellow highlighted square indicates units that were excavated in 5 cm arbitrary levels.

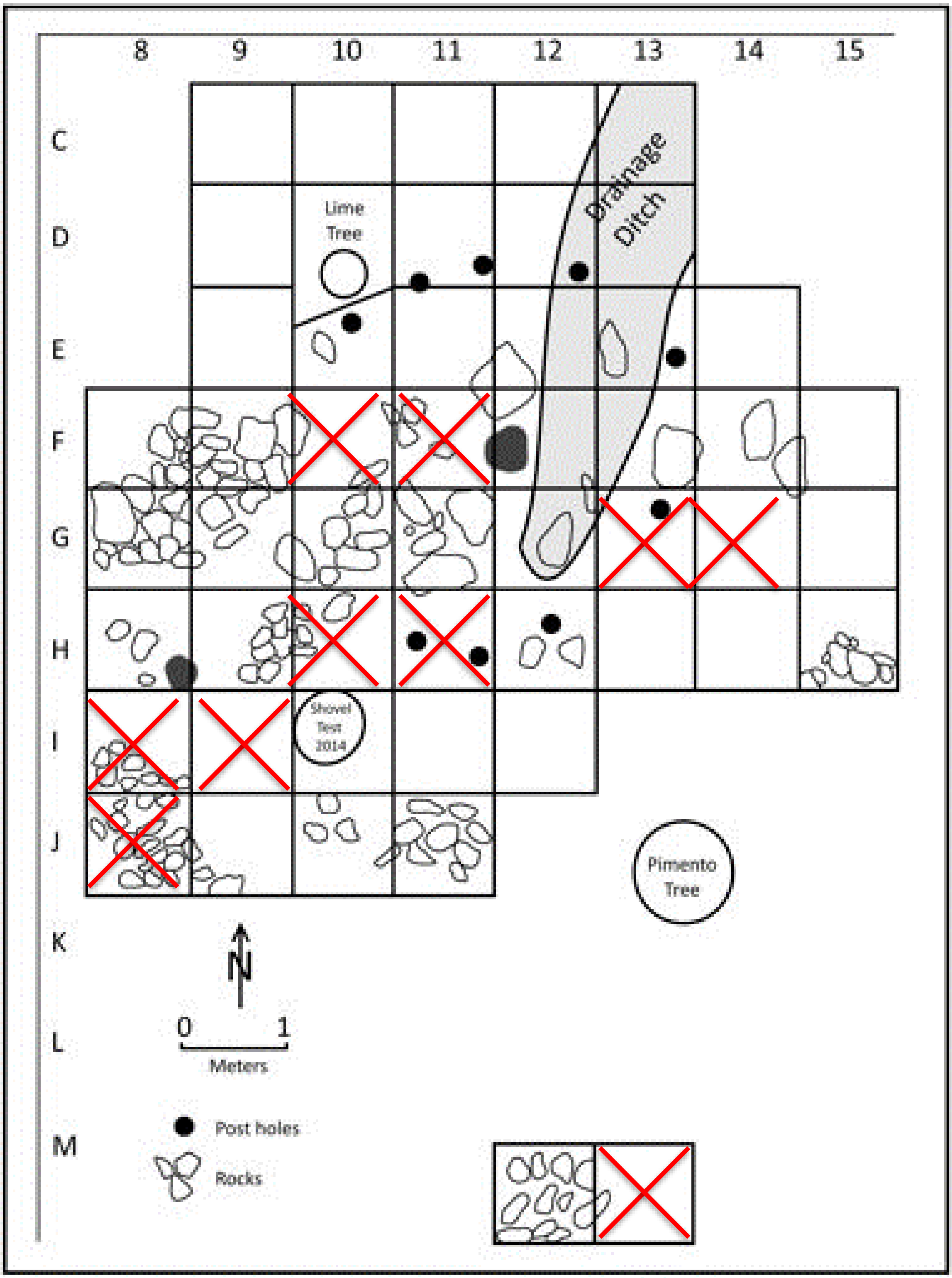

Figure 13: House 10 units sampled for Invertebrate analysis. Red X indicates a unit sampled (modified from Burley et al. 2016).

Land Snail Presence and Interpretation

Zooarchaeological studies in the Caribbean tend to treat land snails as environmental inclusions and indicators at the site rather than being contributions to diet. Newsom and Wing (2004:2) noted that land snails are a commensal species that are attracted to the soil nutrients that develop as a result of house refuse like bone, shell, plant remains, and charcoal. Due to land snail attraction to the nutrient-rich soil produced by middens, they argue snail presence is incidental and should not be calculated alongside other shell representatives of subsistence practices. In support of this position, I add that land snails are not a firmly documented food source anywhere in Caribbean ethnography or ethnohistory (Newsom and Wing 2004:2). Similarly, land snails are considered inedible by Jamaicans today. I consequently treat the land snail assemblage independent of other invertebrate fauna from Maima.

Though incidental, some scholars have used the presence of land snails to infer past environment and site conditions (Carlson 1999; Giovas 2013; Mitchell et al. 2012; Newsom and Wing 2004). Carlson (1999:81), for example, employed land snail environmental tolerances to interpret hot, humid environments, while the presence of other species allowed for inference of a dryer environment. Newsom and Wing (2004:162) promoted the use of land snails for surveying midden development. They found that in a densely packed crab-shell midden, the presence of land snails increases over time. They suggested that the rise and fall of land snail numbers within a midden can point to information about midden development rather than just environmental conditions. Differential distributions within a midden may reflect times of midden use and disuse (Newsom and Wing 2004:162). They also suggested that greater numbers of land snails within a stratum potentially indicates a slower rate for midden development where populations have the time to expand and accumulate before being buried.

Within the recovered faunal collections from Maima, land snails include four taxa: *Microsagda epistyliulum*, *Plurodonte invalida*, *Plurodonte strangulate*, and Poteria sp. These four total 2,590 shells and shell fragments (Table 5). Land snails, thus, compose 27% of the total shell for the site and 72% of the identified gastropods. Tables 6 and 7 illustrate the distribution of land snails from Houses 7 and 8 in the units that were excavated by 5 cm arbitrary levels. In comparing relative percentages through levels, patterning appears to be absent as it might suggest environmental shifts or changes in midden accumulation over time. Comparison of land snail assemblages between units does, however, illustrate some degree of spatial variability within House 7. Unit A7 shows an increase in shell over time with an abundance in level 4, while unit C5 has a decrease over time. House 8 has an even representation of land snails across time. House 8, however, has a much smaller amount of overall shell than either Houses 7 or 10. Comparison of House 10 (Table 8) land snail numbers indicate a larger number of land snails present in the first level of each unit compared to the second. This is not surprising since the upper level potentially includes snails deposited in the house floor occupation as well as those after house abandonment.

Species	H-7	H-8	H-10	H-11	H-12	H-13	H-14	Total
Microsagda epistyliulum	14	1	--	--	--	--	--	15
Plurodonte strangulate	76	16	17	32	32	--	--	173
Plurodonte invalida	512	68	940	328	339	--	--	2,187
Poteria sp.	37	8	43	79	46	3	7	223
Total	639	93	1000	439	417	3	7	2,589

Table 5: **Land snail species (NISP) represented at Maima.**

.

Level	House 7 Unit A4	%	House 7 Unit A7	%	House 7 Unit C5	%	Total	%
1 (0-5cm)	3	1.3	7	3.1	36	15.5	46	19.9
2 (5-10cm)		--	15	6.5	21	9.0	36	15.5
3 (10-15cm)	22	9.4		--	17	7.3	39	16.7
4 (15-20cm)		--	45	19.4	11	4.8	56	24.2
5 (20-25cm)	2	0.9	15	6.5	6	2.5	23	9.9
6 (25-30cm)		--	26	11.3	6	2.5	32	13.8
Total	27	11.6	108	46.8	97	41.6	232	100

Table 6: **Land snail distribution (NISP and %NISP) through time at Houses 7 and 8**

Level	House 8	%
1 (0-5cm)	4	6.2
2 (5-10cm)	8	12.6
3 (10-15cm)	5	7.9
4 (15-20cm)		--
5 (20-25cm)		--
6 (25-30cm)	10	15.6
7 (30-35cm)	6	9.3
8 (35-40cm)	3	4.6
9 (40-45cm)	8	12.6

10 (45-50cm)	2	3.2
11 (50-55cm)	7	10.9
12 (55-60cm)		--
13 (60-65cm)	11	17.1
Total	64	100

Table 7: Land snail distribution (NISP and %NISP) through time at House 8.

Unit	Level 1	Level 2	Total
F10	68 (6.9%)	_	68
F11	58 (5.9%)	16 (1.6%)	74
G13	85 (8.6%)	1 (0.1%)	86
G14	126 (12.7%)	_	126
H10	87 (8.8%)	13 (1.3%)	100
H11	110 (11.1%)	4 (0.4%)	114
I8	113 (11.4%)	15 (1.6%)	128
I9	67 (6.7%)	27 (2.7%)	94
J8	89 (8.9%)	26 (2.6%)	115
M13	87 (8.7%)	_	87
Total	889 (89.7%)	102 (10.3)	991 (100%)

Table 8: Land snail distribution (NISP), %NISP in parentheses, House 10 strata 1 and 2.

Shell Identification and Distributions

Identification and quantification of Maima marine molluscs are given in Tables 10 and 11 for NISP and MNI respectively. Maima has a more limited marine mollusc assemblage than other faunal collections in the area and region (Mitchell et al. 2012), albeit there exists a diverse range of shellfish species. Since this collection informs about diet and environments exploited by the Taíno at Maima, my discussion examines overall site distributions, an intra-site comparison between houses and an examination of change through time comparing arbitrary levels within excavation units. For most data sets, I calculate and use percentiles of a species presence as a relative abundance measure (%NISP or %MNI). This allows for comparison across houses and units where there are substantive differences in assemblage size.

The molluscs collection from Maima was not only varied in species but in a general sense non-fragmented. Figure 14 shows the fragmentation of shells from the Maima marine mollusc collection as a whole. House 7 contained the majority of shell, having abundant refuse deposits located within or adjacent to it (Table 9). Of the fragmentary shell, most appear to have been broken by processes of deposition and subsequent site use/trampling.

Before presenting the data on marine molluscs, it is important to note, that there was a distinctive lack of land crab within the Maima shell collection. Reports on shell analyses from other Jamaican pre-contact sites all record the presence of land crab within their collections in varying amounts (Keegan et al. 2003; Mitchell et al. 2012; Scudder 2006; Wing 1972). Wing (2001a) suggests that a decrease in land crab numbers combined with an increase in marine molluscs potentially indicates overexploitation of the former. Whether this is the case at Maima is unknown.

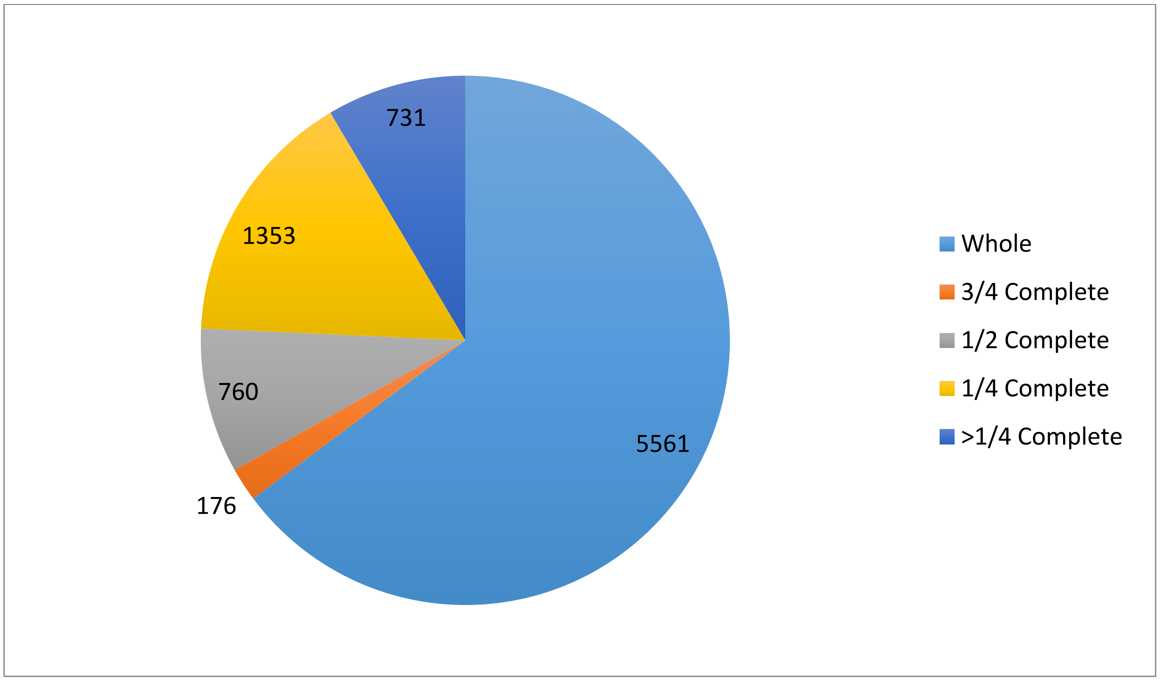

Figure 14: Shell fragmentation site totals based on NISP.

The Maima marine shell collection has a total NISP of 5,932 and MNI is estimated to be 2,899. Within the collection, bivalves represent 83.5% of the NISP totals and 74.7% of the MNI totals while gastropods represent 15.5% of the NISP and 24.3% of the MNI. Chiton sp. dorsal shell plates make up the remaining 1% of each NISP and MNI but are limited in numbers in any context.

Calculations for shell density within each house feature are indicated in Table 9. The highest volume of shell occurs within Houses 7 and 12, despite differing volumes of occupation matrices excavated from each. These calculations, while indicative of how much shell was found in each unit relative to the excavation volume, cannot indicate behavioral patterns at the individual houses. Preservation, post depositional circumstances, and excavation sampling can all play a part in varying densities.

House Unit	Volume	Shell Count	Density
7	2.95 m^3	3588	1217.6
8	0.65 m^3	569	875.3
10	2.35 m^3	1135	482.9
11	0.65 m^3	66	101.5
12	0.35 m^3	490	1400
13	0.1 m^3	21	210
14	0.15 m^3	61	406
Totals	7.2 m^3	5932	824.4

Table 9: Calculations of shell per cubic meter by house.

Species	**7 NISP**	**%**	**8 NISP**	**%**	**10 NISP**	**%**	**11 NISP**	**%**	**12 NISP**	**%**	**13 NISP**	**%**	**14 NISP**	**%**	**Total (#)**	**Total (%)**
Bivalves																
Acropagia fausta	161	4.4	15	2.6	27	2.4	2	3.0	14	2.9	1	4.7	13	21.3	233	3.9
Anadara notabilis	2	.05	6	1.0	4	0.3	--	--	--	--	--	--	--	--	12	.2
Arca zebra	360	10.0	115	20.2	246	21.7	4	6.0	22	4.5	--	--	10	16.3	757	12.7
Asaphis deflorata	5	0.1	--	--	--	--	1	1.5	--	--	--	--	--	--	6	.1
Chione granulata	37	1.0	7	1.2	9	0.8	1	1.5	4	0.8	--	--	--	--	57	.9
Codakia orbicularis	2429	67.6	333	58.5	702	61.9	50	76.0	288	58.8	15	71.4	27	44.2	3844	64.8
Donax denticulatus	--	--	1	0.1	--	--	1	1.5	--	--	--	--	--	--	2	.03
Total Bivalves	*2993*	*83.3*	*477*	*83.8*	*988*	*87.0*	*59*	*89.0*	*328*	*67.0*	*16*	*76.1*	*50*	*82.0*	*4911*	*82.6*
Gastropods																
Adamsiella sp.	2	.05	4	0.7	1	.08	--	--	--	--	1	4.7	--	--	8	.1
Certhiidae beatty	--	--	1	0.1	--	--	--	--	--	--	--	--	--	--	1	.01
Cerithium litteratum	--	--	--	--	1	.08	--	--	--	--	--	--	--	--	1	.01
Cittarium pica	35	0.9	1	0.1	5	0.4	1	1.5	8	1.6	--	--	1	1.6	51	51
Conus daucus	1	.02	--	--	--	--	--	--	--	--	--	--	--	--	1	.01
Cymatium martinianum	1	.02	--	--	--	--	--	--	4	0.8	--	--	--	--	5	.08
Cymatium sp.	1	.02	--	--	--	--	--	--	--	--	--	--	--	--	1	.01
Fasciolaria tulipa	36	0.9	8	1.4	9	0.7	1	1.5	5	0.1	--	--	2	3.3	61	1.0
Fissurella nodosa	--	--	--	--	--	--	--	--	1	0.2	--	--	--	--	1	.01
Limpet sp.	11	0.3	2	0.3	3	0.2	--	--	8	1.6	1	4.7	--	--	25	.4
Lithopoma pheobium	4	0.1	--	--	--	--	--	--	1	0.2	--	--	--	--	5	.08
Livona pica	9	0.2	2	0.3	2	0.1	--	--	--	--	--	--	--	--	13	.2
Murex sp.	10	0.3	2	0.3	5	0.4	--	--	--	--	--	--	--	--	17	.2
Mytilopsis domingensis	--	--	1	0.1	--	--	--	--	2	0.4	--	--	--	--	3	.05
Naticidea sp.	--	--	--	--	--	--	--	--	1	0.2	--	--	--	--	1	.01
Nerita tessellata	28	0.7	10	1.7	2	0.1	1	1.5	13	2.7	--	--	--	--	54	.9
Olivia sp.	2	.05	--	--	1	.08	--	--	--	--	--	--	--	--	3	.05
Purpura patula	1	.02	1	0.1	2	0.1	--	--	6	1.2	--	--	1	1.6	11	.1
Sinum sp.	156	4.3	18	3.2	45	4.0	1	1.5	31	6.3	--	--	--	--	251	4.2
Strombus pugilis	--	--	--	--	--	--	--	--	1	0.2	--	--	--	--	1	.01
Strombus gigas	172	4.8	24	4.2	45	4.0	1	1.5	12	2.4	1	4.7	5	8.2	260	4.3
Tectarius muricatus	89	2.5	6	1.1	25	2.2	1	1.5	30	6.1	2	9.5	1	1.6	154	2.5
Thais rustica	3	.08	1	0.1	--	--	--	--	--	--	--	--	--	--	4	.07
Turbo sp.	3	.08	--	--	--	--	--	--	1	0.2	--	--	--	--	4	.07
Total Gastropods	*564*	*15.7*	*82*	*14.4*	*145*	*12.8*	*6*	*9.0*	*124*	*25.3*	*5*	*23.8*	*10*	*16.4*	*938*	*15.8*

Species	**7 NISP**	**%**	**8 NISP**	**%**	**10 NISP**	**%**	**11 NISP**	**%**	**12 NISP**	**%**	**13 NISP**	**%**	**14 NISP**	**%**	**Total (#)**	**Total (%)**
Chitons																
Chiton sp.	15	0.4	2	0.3	1	.08	1	. 1.5	15	3.0	--	--	1	1.6	35	.5
Unidentified bivalve	12	0.3	8	1.4	1	.08	--	--	21	.5	--	--	--	--	42	.7
Unidentified gastropod	3	.08	--	--	--	--	--	--	2	0.4	--	--	--	--	5	.08
Unidentified mollusc	5	0.1	--	--	--	--	--	--	--	--	--	--	--	--	5	.08
Shell Total	3592	*100*	569	*100*	1135	*100*	66	*100*	490	*100*	21	*100*	61	*100*	*5936*	*100*

Table 10: NISP totals and relative abundance (%NISP) for marine molluscs species by house.

Species	**7 MNI**	**%**	**8 MNI**	**%**	**10 MNI**	**%**	**11 MNI**	**%**	**12 MNI**	**%**	**13 MNI**	**%**	**14 MNI**	**%**	**Total (#)**	**Total (%)**
Bivalves																
Acropagia fausta	68	3.9	11	3.6	18	3.1	1	3.2	7	3.3	1	9.0	3	11.5	109	3.7
Anadara notabilis	1	.05	4	1.3	4	0.6	--	--	--	--	--	--	--	--	9	.3
Arca zebra	209	12.0	52	16.8	132	22.6	4	12.9	14	6.7	--	--	6	23.0	417	14.3
Asaphis deflorata	4	0.2	--	--	--	--	1	3.2	--	--	--	--	--	--	5	.1
Chione granulata	23	1.3	4	1.3	7	1.2	1	3.2	3	1.4	--	--	--	--	37	1.3
Codakia orbicularis	1010	58.3	171	55.3	309	53.0	16	51.6	91	44.0	5	45.4	7	27.0	1609	55.5
Donax denticulatus	--	--	1	0.3	--	--	1	3.2	--	--	--	--	--	--	2	.06
Total Bivalves	*1314*	*75.9*	*243*	*78.6*	*470*	*80.4*	*24*	*77.4*	*115*	*55.5*	*6*	*54.5*	*16*	*61.5*	*2188*	*75.5*
Gastropods																
Adamsiella sp.	2	0.1	4	1.3	1	0.1	--	--	--	--	1	9.0	--	--	8	.2
Certhiidae beatty	--	--	1	0.3	--	--	--	--	--	--	--	--	--	--	1	.03
Certhium litteratum	--	--	--	--	1	0.1	--	--	--	--	--	--	--	--	1	.03
Cittarium pica	31	1,8	1	0.3	5	0.8	1	3.2	6	2.9	--	--	1	3.8	45	1.5
Conus daucus	1	.05	--	--	--	--	--	--	--	--	--	--	--	--	1	.03
Cymatium martinianum	1	.05	--	--	--	--	--	--	3	1.4	--	--	--	--	4	.1
Cymatium sp.	1	.05	--	--	--	--	--	--	--	--	--	--	--	--	1	.03
Fasciolaria tulipa	28	1.6	1	0.3	9	1.5	1	3.2	5	2.4	--	--	2	7.6	46	1.5
Fissurella nodosa	--	--	--	--	--	--	--	--	1	0.4	--	--	--	--	1	.03
Limpet sp.	11	0.6	2	0.6	3	0.5	--	--	8	3.8	1	9.0	--	--	25	.8
Lithopoma pheobium	4	0.2	--	--	--	--	--	--	1	0.4	--	--	--	--	5	.1
Livona pica	9	0.5	2	0.6	2	0.3	--	--	--	--	--	--	--	--	13	.4
Murex sp.	2	0.1	2	0.6	5	0.8	--	--	--	--	--	--	--	--	9	.3
Mytilopsis domingensis	--	--	1	0.3	--	--	--	--	2	0.9	--	--	--	--	3	.09
Naticidea sp.	--	--	--	--	--	--	--	--	1	0.4	--	--	--	--	1	.03
Nerita tessellata	27	1.6	10	3.2	2	0.3	1	3.2	10	4.8	--	--	--	--	50	1.7
Olivia sp.	2	0.1	--	--	1	0.1	--	--	--	--	--	--	--	--	3	.09
Purpura patula	1	.05	1	0.3	2	0.3	--	--	5	2.4	--	--	1	3.8	9	.3
Sinum sp.	102	5.9	15	4.9	36	6.1	1	3.2	11	5.3	--	--	--	--	165	5.6
Strombus pugilis	--	--	--	--	--	--	--	--	1	0.4	--	--	--	--	1	.03
Strombus gigas	101	5.8	17	5.5	22	3.7	1	3.2	8	3.8	1	9.0	4	15.3	154	5.3
Tectarius muricatus	86	5.0	6	1.9	25	4.2	1	3.2	27	13.0	2	18.1	1	3.8	148	5.1
Thais rustica	3	0.1	1	0.3	--	--	--	--	--	--	--	--	--	--	4	.1
Turbo sp.	2	0.1	--	--	--	--	--	--	1	0.4	--	--	--	--	3	.09
Total Gastropods	*415*	*23.9*	*65*	*21.0*	*113*	*19.3*	*6*	*19.3*	*90*	*43.4*	*5*	*45.4*	*9*	*34.6*	*703*	*24.3*

Species	**7 MNI**	**%**	**8 MNI**	**%**	**10 MNI**	**%**	**11 MNI**	**%**	**12 MNI**	**%**	**13 MNI**	**%**	**14 MNI**	**%**	**Total (#)**	**Total (%)**
Chitons																
Chiton sp.	2	0.1	1	0.3	1	0.1	1	3.2	2	0.9	--	--	1	3.8	8	.2
Shell Total	*1731*	*100*	*309*	*100*	*584*	*100*	*31*	*100*	*207*	*100*	*11*	*100*	*26*	*100*	*2899*	*100*

Table 11: **MNI totals and relative abundance (%MNI) for every species by house.**

Marine Molluscs Types Exploited

Percentages of bivalves versus gastropods are presented in Figures 15 and 16 for four house features as a comparative measure of MNI and NISP. These show a high degree of similarity within household assemblages with bivalves dominant over gastropods. Without variation, this pattern can be taken as most likely representative of Maima subsistence practices as a whole. A comparison of the six most abundant species of marine molluscs across houses also shows a high degree of homogeneity. As is illustrated in Figure 17, *Codakia orbicularis* substantially dominates assemblages with *Arca zebra* the second most abundant.

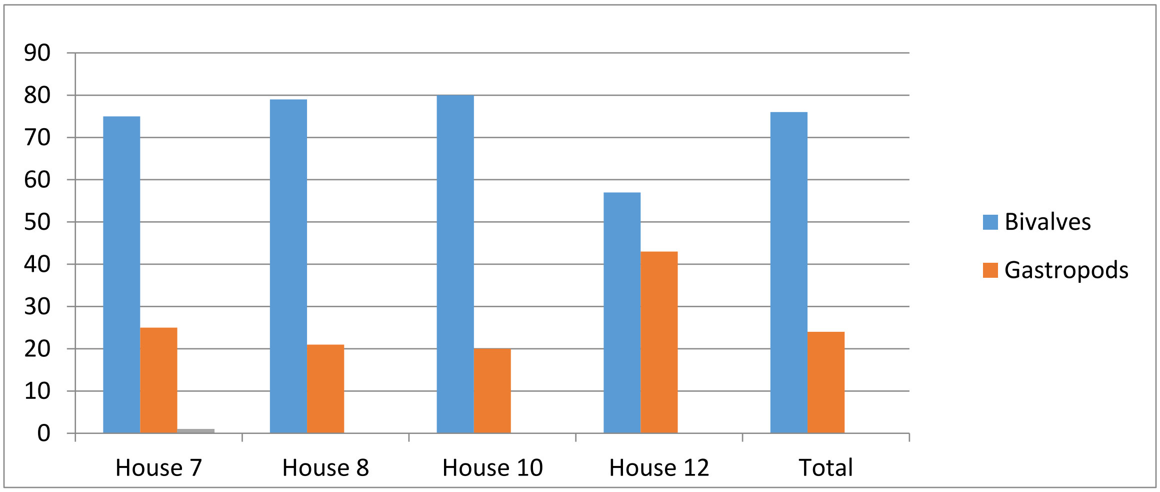

Figure 15: Relative abundance (%MNI) marine molluscs types by house.

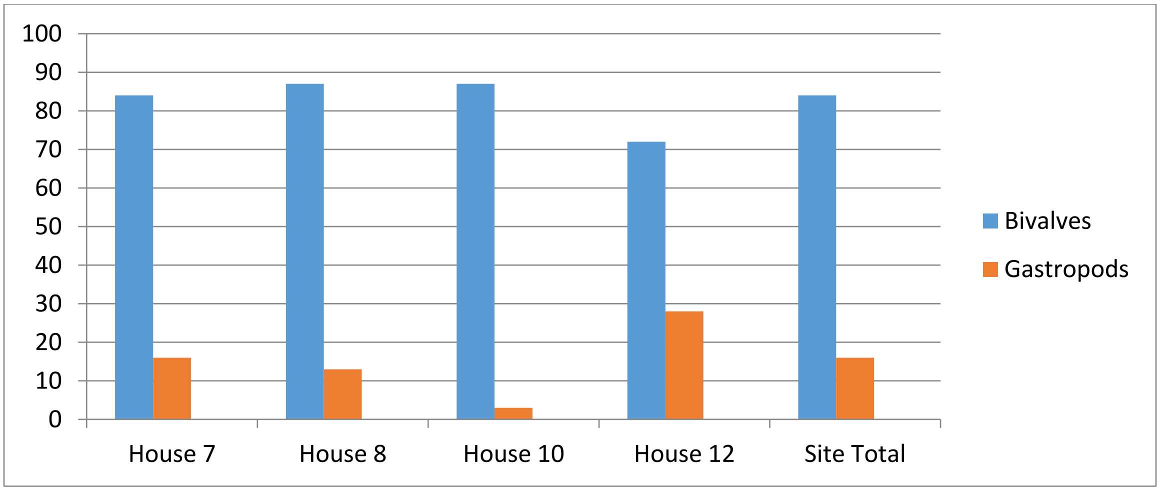

Figure 16: Relative abundance (%NISP) marine mollusc types by house.

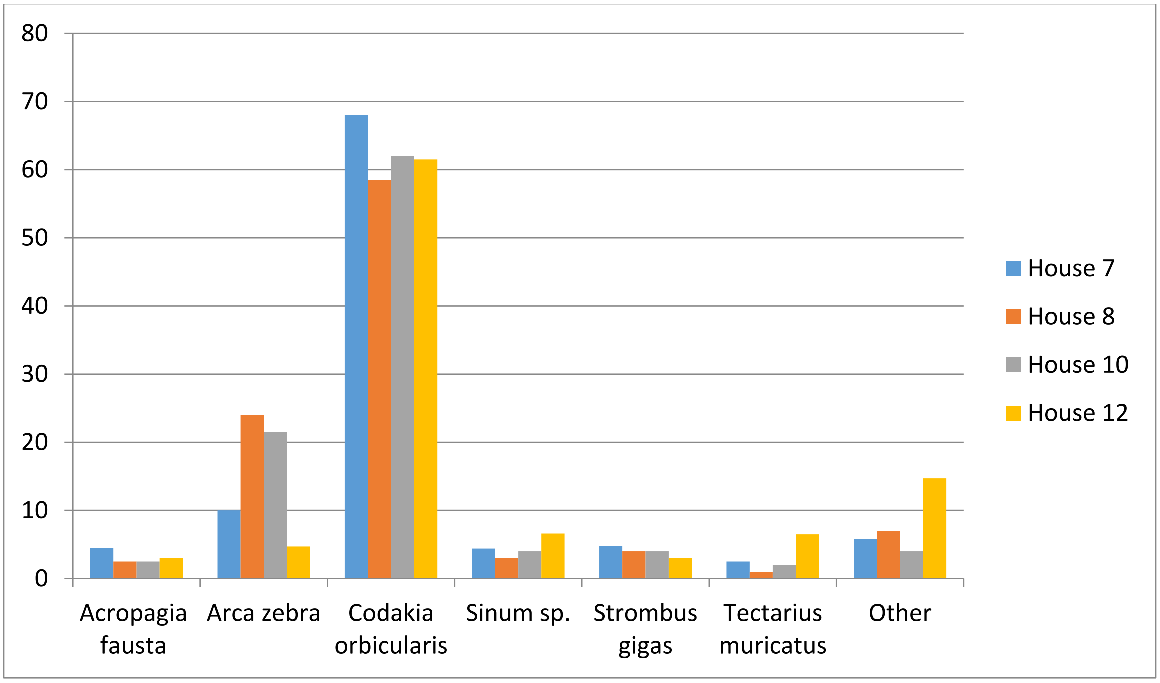

Figure 17: **Relative abundance (%NISP) of six most common species found in Maima collection by house.**

Marine Mollusc Habitats

Habitats represented in the Maima shell collection are presented in Table 12. The three dominant bivalve species *Codakia orbicularius*, *Arca zebra*, and *Arcopagia fausta* are similar in their habitat, preferring shallow sandy bottom seagrass bed environments. *Arca zebra* can also be found in coral reefs attached to rocks or coral (Warmke and Abbot 1961:187). *Acropagia fausta* represents 3.9% NISP and 3.7% MNI for the collection, while *Arca zebra* comprises 13.2% NISP and 14.2% MNI. *Codakia orbicularis* is by far the most abundant invertebrate in the Maima collection, constituting 64.8% NISP and 55.5% MNI. Shallow seagrass beds are abundant in St. Ann's Bay today, and they appear to have been more widespread prior to 1500 A.D. (Waters et al. 1993:267).

The three most abundant gastropod species have habitats similar to the bivalves just discussed. Sinum sp. is a genus of predatory sea snails and comprise 4.2% NISP and 5.6% MNI of the total shell assemblage. While Sinum sp. inhabit the sandy substrate of shallow waters, they can also be found in intertidal zones. *Strombus gigas*, the queen conch, encompass 4.3% NISP and 5.3% MNI. Again this species prefers a shallow seagrass bed environment (Warmke and Abbot 1961:88). *Tectarius muricatus* is the only intertidal species to be exploited in abundance within the collection. This species attaches itself to rocks in the intertidal zone. It incorporates 2.5% NISP and 5.1% MNI of the total shell assemblage. *Tectarius muricatus* is slightly more abundant at House 12, albeit the total House 12 assemblage is small (n=490) and the relative percentage may be due to sampling error.

Twenty-seven other species of marine molluscs comprise the remaining 7.6% NISP within the total assemblage. These represent a diversity of habitats, dominated by shallow inshore locales but also including the intertidal, reef, brackish mangrove, and riverine zones (Figure 18). This variation is notable in that Taíno foreshore/reef foraging practices were not exclusively selective but extended to a full range of edible marine molluscs species with different habitat requirements.

In the first chapter I described habitats in close proximity to Maima as including terrestrial, riverine, and various marine types including shallow water, brackish, mangrove, intertidal/shoreline, and pelagic. Figure 18 illustrates the environments near Maima in which marine molluscs could be exploited. This is the contemporary environment and, as stated earlier, the bay likely included a larger area of shallow waters in the pre-contact period with the possibilities that the coral reef was also extended (Waters et al. 1993:267).

Figure 18: **Map indicating local and available habitats for invertebrate exploitation in and around Maima (Google Earth (2017) "St. Anns Bay, Jamaica" 18°27'01"N 77°12'16"W, www.earth.google.com [March 13, 2017]).**

Species	**Common Name**	**Riverine**	**Mangrove/ Brackish**	**Rocky Intertidal**	**Shallow/ Inshore**	**Reef**
Bivalves						
Acropagia fausta	Tellin clam				X	
Anadara netabillis	Eared Ark				X	
Arca zebra	Turkey Wing Ark				X	X
Asaphis deflorata	Gaudy sanquin				X	X
Chione granulata	Beaded venus				X	
Codakia orbicularis	Tiger lucine				X	
Donax denticulatus	Coquina				X	
Gastropods						
Adamsiella sp.	Sea snail				X	
Certhiidae beatty	Sea snail	X	X			
Certhium litteratum	Sea snail				X	X
Citlarium pica	West Indian topsnail				X	X
Conus daucus	Carrot cone				X	
Cymatium martinianum	Triton snail			X		
Cymatium sp.	Triton			X		
Fasciolaria tulipa	True tulip				X	X
Fissurella nodulusa	Keyhole limpet			X		
Limpet sp.	Limpet			X		
Lithopoma pheobium	Turban snail				X	
Livona pica	Topsnail				X	
Murex sp.	Murex				X	X
Mytilopsis domingensis	False mussel			X		
Naticidea sp.	Sea snail				X	
Nerita tessallata	Nerite		X	X	X	X
Olivia sp.	Olives				X	
Purpura patula	Rock snail			X		
Sinum sp.	Moon snail			X	X	
Srombus gigas	Queen conch				X	X
Strombus pugilis	West Indian Fighting Conch				X	X
Strombus sp.	Conch				X	X
Tectarius muricatus	Beaded Periwinkle			X		
Thais rustica	Dog winkles			X		
Turbo sp.	Turbo				X	X

Table 12: **Invertebrate species present, common name, and habitat occupied for Maima invertebrate species.**

Figures 19 and 20 show the relative abundance by house for the environments represented by the invertebrate collection. Brackish species were not included as there was only a single brackish shell found in Feature 8, *Certhidae beatty.* Regardless, the environment most represented in the collection is by far the shallow water/reef. This is due to the general abundance of species from that environment and because the collection is made up largely of *Codakia orbicularis* shells. From the collection overall, 93% NISP and 89% MNI come from the shallow water/reef.

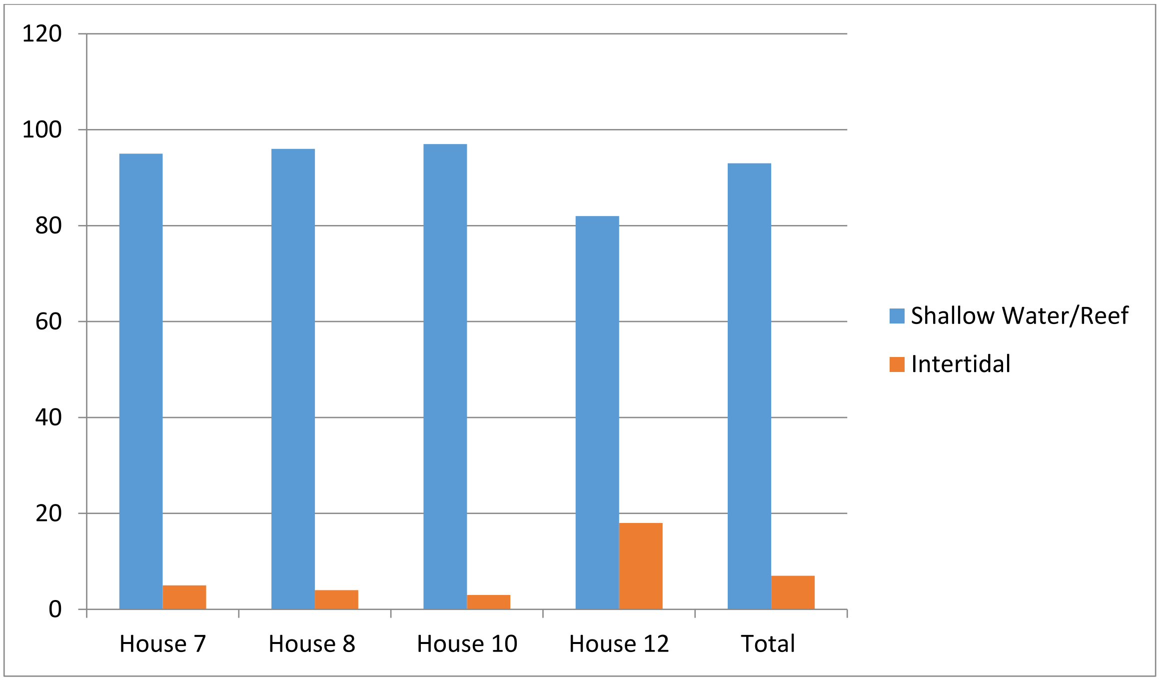

Figure 19: Relative abundance (%NISP) mollusc environments by house.

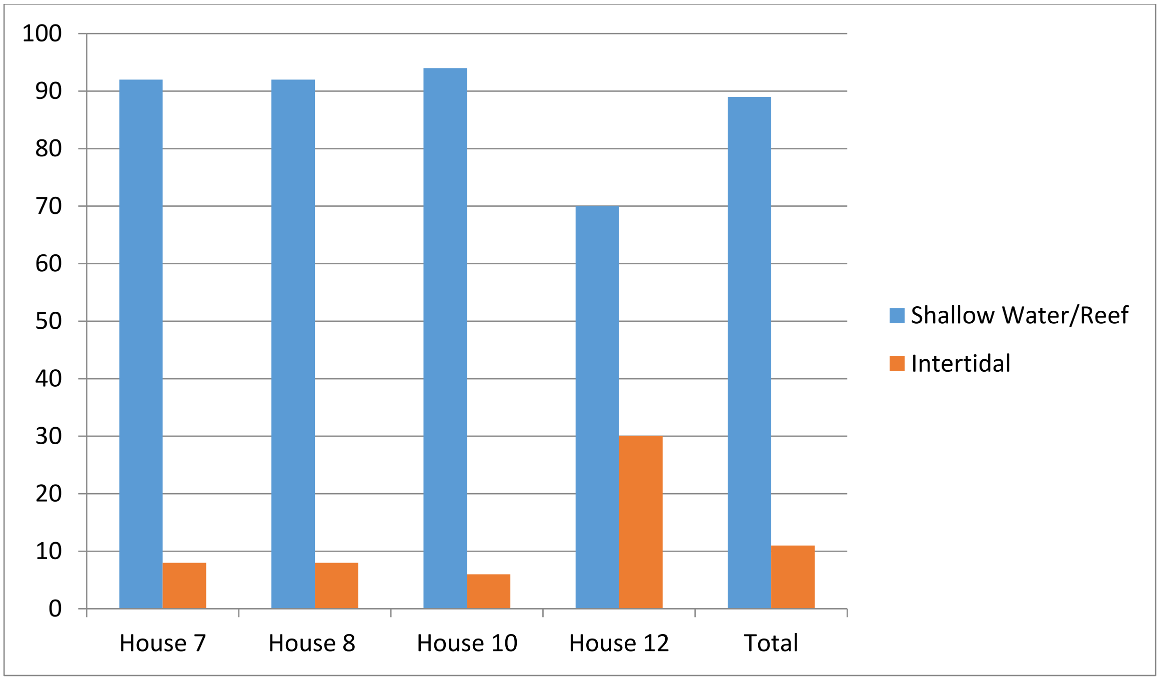

Figure 20: **Relative abundance (% MNI) mollusc habitats by house.**

As the map in Figure 18 indicates, the shallow water environment that was available in St. Ann's Bay was within close proximity to Maima and is the largest marine environment in the vicinity. *Codakia orbicularis* is the dominant species present in each of the houses presumably indicating a shared use of the habitat. House 12 shows the most variation in exploited habitats. This difference is due to the abundance of the intertidal species *Nerita tessallata* and *Tectarius muricatus*. Together they comprise 10% of the house invertebrates. Overall, the habitat data from Maima indicates the importance of reef and shallow marine substrates of St. Ann's Bay for the marine mollusc component of subsistence economy at Maima.

Intra-house Distributions

To identify marine mollusc exploitation patterns over time, and possible changes in marine mollusc consumption, I examined the excavated assemblages in Houses 7 and 8 where provenience was maintained in controlled 5 cm levels. This includes one unit in House 8 where 13 levels were excavated and three units (A4, A7, and C5) in House 7 where six levels were completed. A radiocarbon date from the lower level of House 8 places a time depth of 350 to 450 years for accumulated deposits in that house.

The House 8 arbitrary levels cannot be assumed to be regulated time intervals for deposition, but they do potentially reveal changes in marine mollusc exploitation during the occupation of this house. Figure 21 displays the combined abundance of bivalves and marine gastropods in each level of House 8. Notably, the higher peaks in Levels 2, 5, and 9 (Figure 22) are associated with artifacts and concentrations of charcoal suggestive of distinct occupation events. The Level 5 shell assemblage, with the largest proportion of shell from the unit, is dominated by *Arca zebra* (97%). This may represent a single collection and dumping event. *Codakia orbicularis* in House 8 was consistently exploited throughout all levels of the excavation unit. To potentially assess environmental or dietary stress, I have compared size categories for this species across levels (Figure 22). Notably, the distribution of smaller specimens is concentrated only in the lower levels of the unit (Levels 6-13), while the larger specimen category seems more prevalent in the upper ones (Levels 2, 3, and 5). If resource depression through human impact were a factor, I would hypothesize the reverse to be the case. These data, therefore, seemingly illustrate a consistent harvest over time.

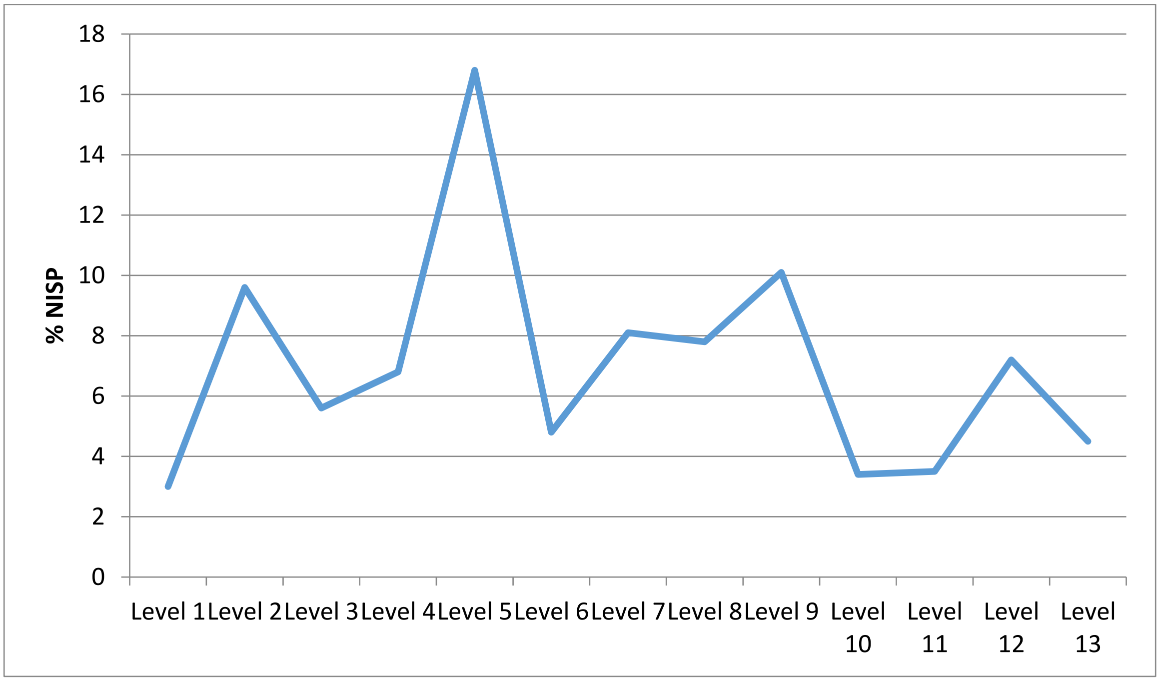

Figure 21: **House 8 excavation unit cumulative shell NISP% by level.**

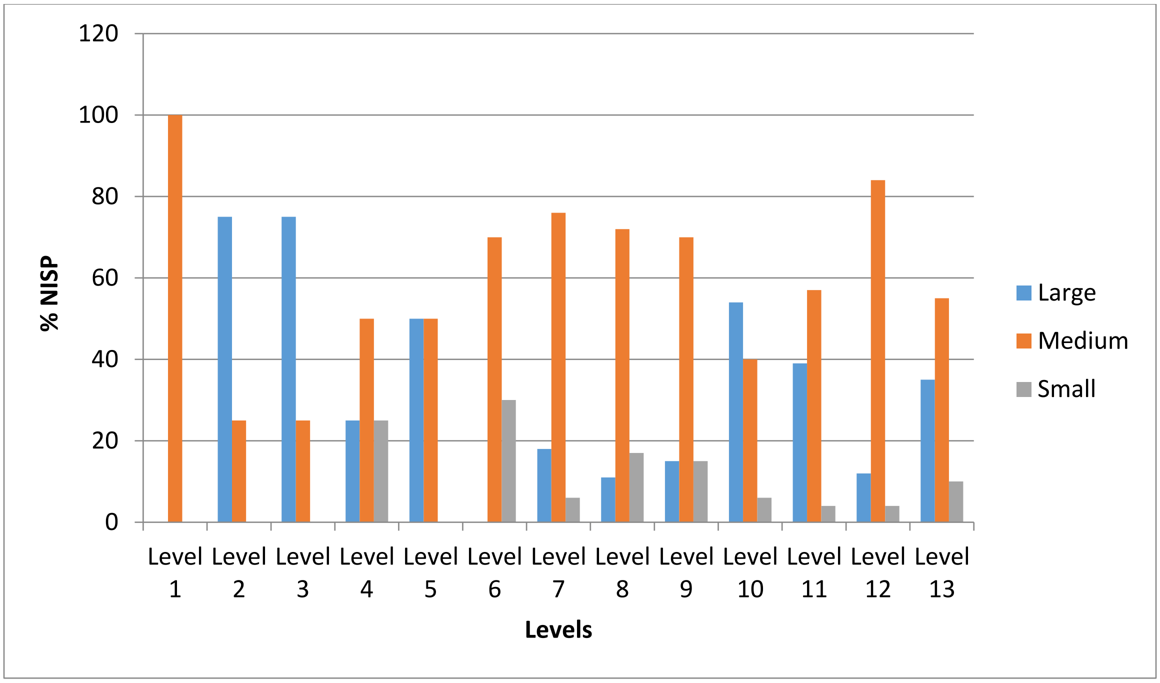

Figure 22: Relative abundance (%NISP) *Codakia orbicularis* at House 8 (level 1 is the uppermost level).

Based on a small number of Spanish artifacts from House 7 excavations, the occupation of this house extends into the post-contact period. The three units excavated in 5 cm levels in this feature indicate different patterns of marine mollusc exploitation across levels compared to House 8. Figure 23 shows the three units in House 7 and the relative numbers of marine molluscs for each. Unit C5 is on the northern edge of the excavation while Units A4 and A7 are on the southern edge. Figure 24 shows the relative abundance (%NISP) for each unit by level. From top to bottom there is a clear downward trend in abundance in C5; Units A4 and A7, however, have a somewhat different pattern. Indeed, in Level 3 of A4, there is a sharp peak in marine molluscs' while A7 has the complete opposite, being associated with a sterile marl layer. Variability in the pattern over levels probably illustrates differential dumping in different areas at different times in House 7.

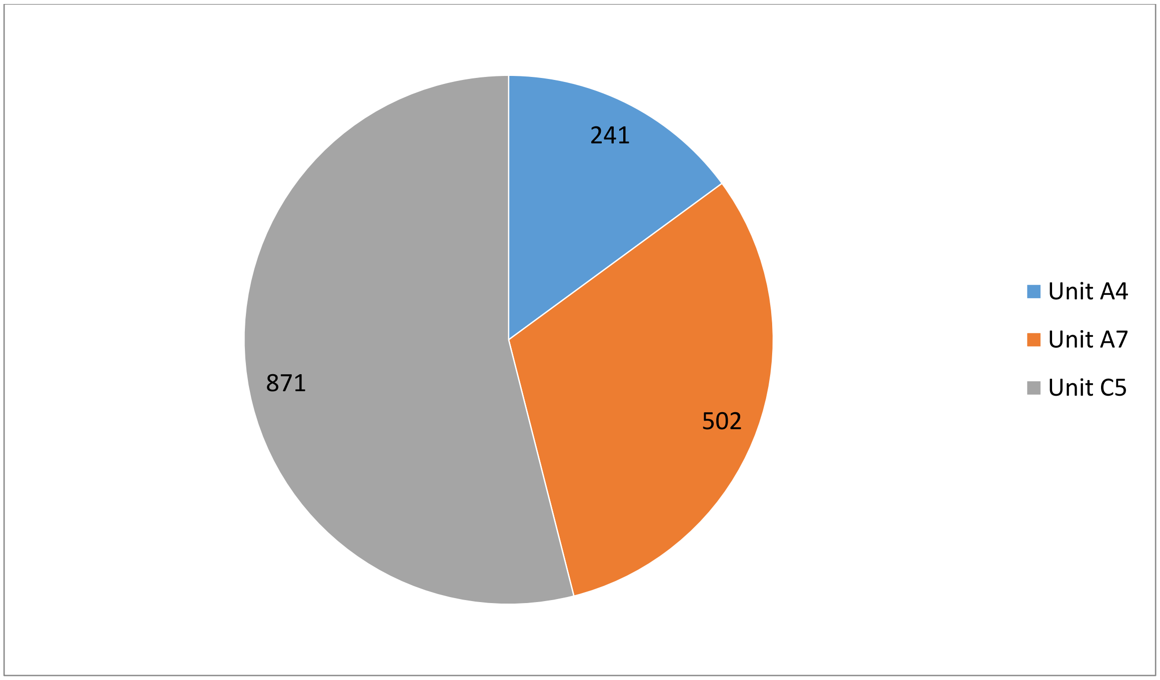

Figure 23: **House 7 abundance of invertebrate shells (NISP).**

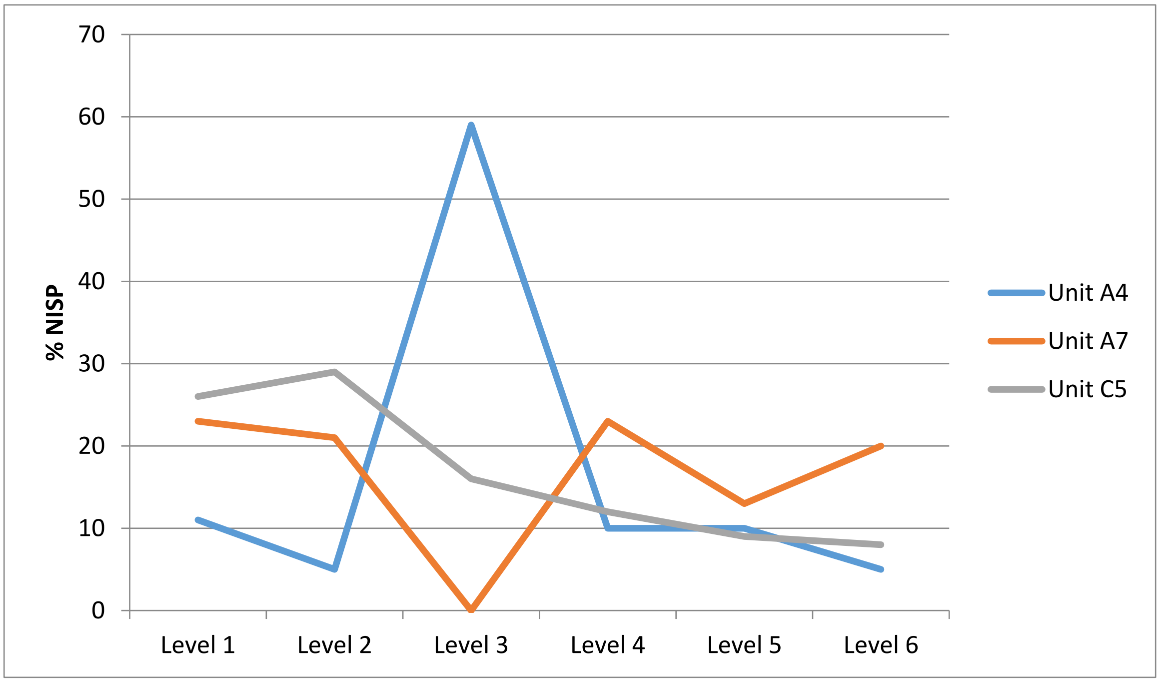

Figure 24: **Exploitation of invertebrates at House 7 over time for units A4, A7, and C5 in relative abundance (%NISP).**

Considering the presence of *Codakia orbicularius*, House 7 has a similar distribution to House 8. For House 7, I examined integrated size data for *Codakia orbicularis* across the three units excavated in 5 cm levels to again see if a pattern might emerge relative to resource impacts. As Figure 25 illustrates, there exists little difference between levels with medium-sized specimens dominant. This potentially indicates a stable harvesting pattern at House 7 possibly extending to even the earliest years of Spanish contact.

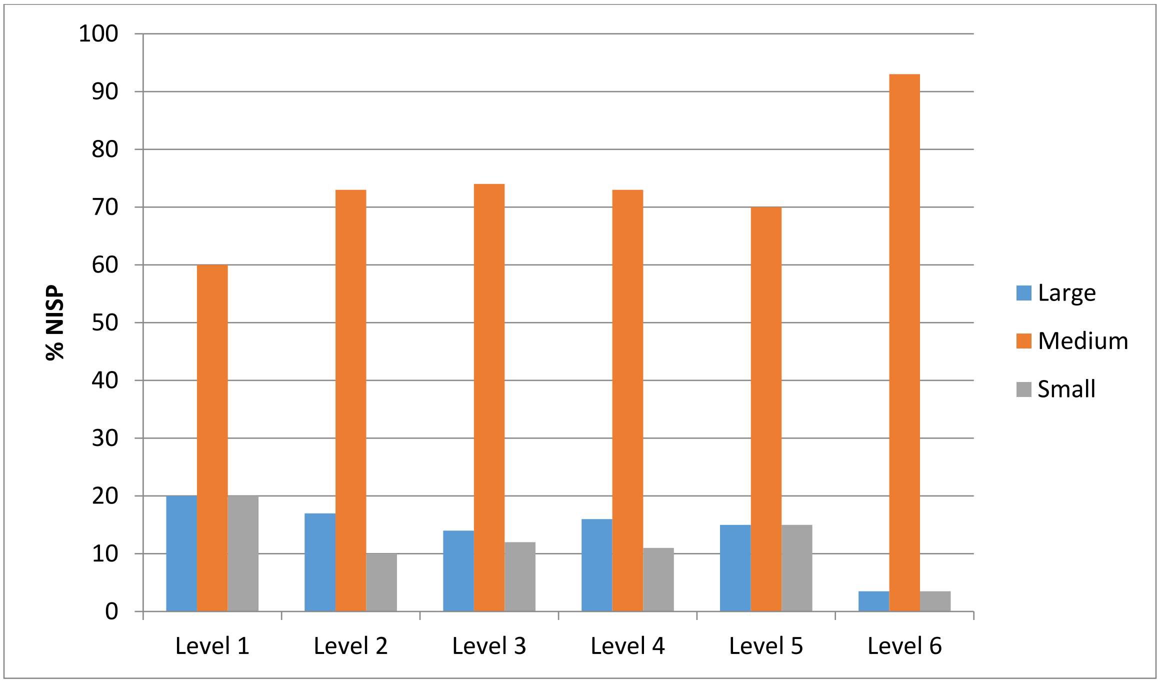

Figure 25: **Relative abundance (%NISP) of different sized *Codakia orbicularis* at House 7.**

Marine Mollusc Analysis Summary

The marine mollusc remains found at Maima provide one glimpse into subsistence strategies employed by the Taíno during the late pre-contact era. While there is a great deal of variation in species present, the assemblage is clearly dominated by the bivalve *Codakia* orbicularius*.* This species, as with others found at Maima, comes from a shallow water habitat in St. Ann's Bay, an area that is characterized by seagrass and a sandy bottom. However, examination of distribution patterns and size across excavation levels to infer changing practices through time showed no pattern. There appears to have been regularized consistency in harvesting results with no apparent impact on marine mollusc beds.

Chapter 6.

Vertebrate Fauna Identification and Analysis

To identify subsistence strategies at Maima for comparison to other Jamaican, Western Taíno, and Taíno sites in the wider Caribbean requires the identification and analysis of recovered faunal remains. In the preceding chapter, I presented the Maima Invertebrate data from 2015 site excavations. The goal of this chapter is to present the Maima vertebrate faunal analysis with initial interpretations of the habitats exploited by Maima villagers. I first provide an overview of the methodology undertaken in the analysis. Second, I review the collection overall and the species found. Third, I examine sub-groups within the faunal collection, initially with fish remains and habitat exploitation, then focusing on the hutia assemblage and what that potentially represents in the behavior and subsistence strategies of the Maima villagers. Finally, I end with a discussion of the small collection of European domesticate fauna with possible explanations for its presence at the site.

Vertebrate Taxa Methodology

All bone from the 2015 field season was transported to the Zooarchaeological Laboratory at Simon Fraser University for cataloguing, identification, and analysis. Identification was done in accordance with the criteria outlined in Driver (2011). Field methods previously described included all excavated matrices being passed through 6.4 mm mesh with a subsample of units being screened with 3.2 mm mesh to maximize bone recovery. The greatest majority of vertebrate remains were recovered from Houses 7 and 8 with small amounts in Houses 10, 11, and 12. House 10 excavations employed 6.4 mm sieve size only. To test whether smaller bones were being lost through the sieve, three 50 cm x 50 cm units were excavated on the perimeter of the house excavation (Figure 26) with excavated matrices screened using 3.2 mm mesh. Only a very small number of unidentifiable bone fragments were recovered. This indicates that the relative absence of vertebrate taxa in House 10 is not due to excavation techniques but some other set of processes or factors. The total number of specimens is 1,912, representing a minimum of 23 species.

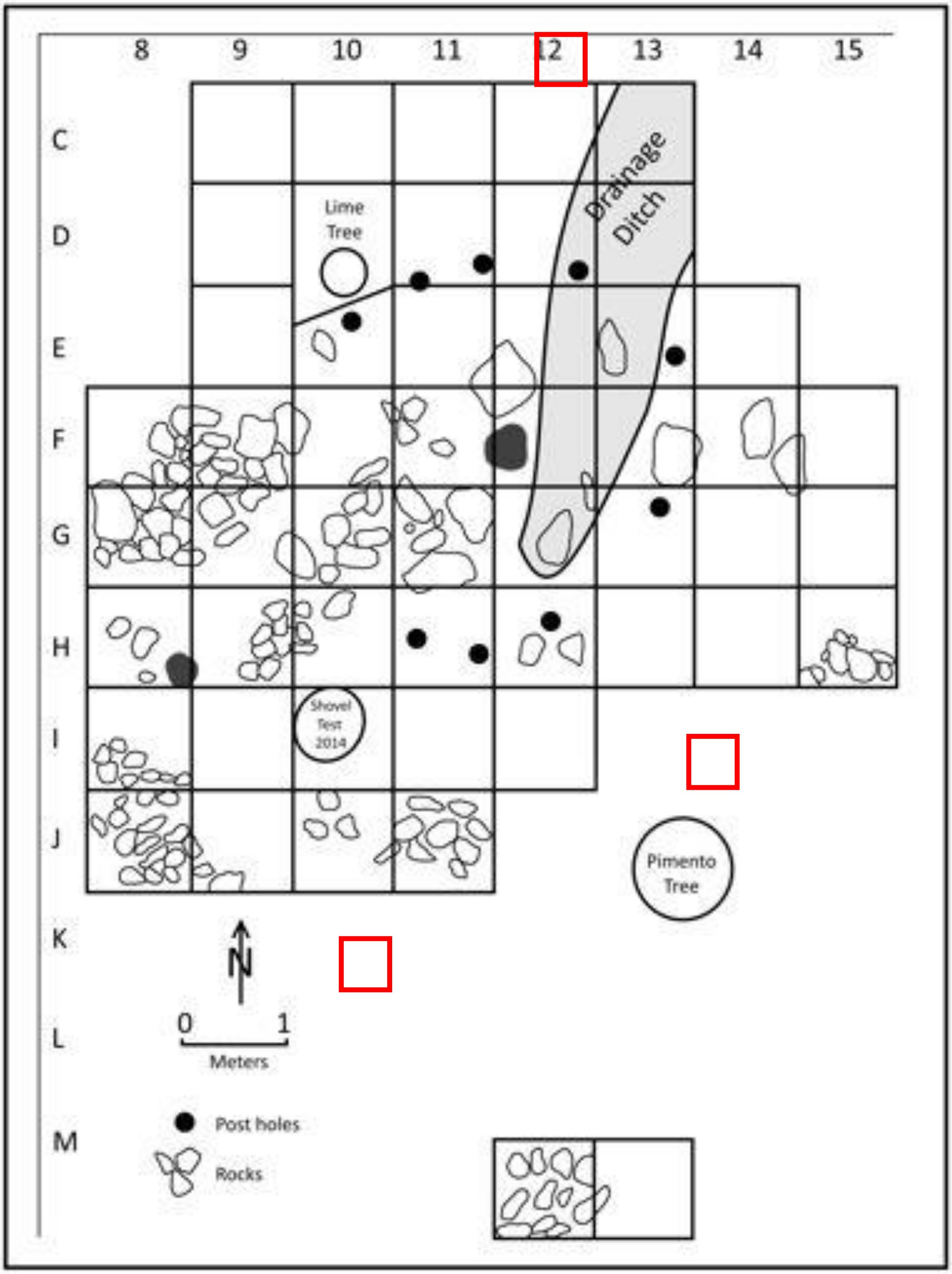

Figure 26: Location of 50x50 cm test units, represented by red rectangles, with 64 mm screen at House 10.

Species	Common Name	7 NISP (#)	7 NISP (%)	8 NISP (#)	8 NISP (%)	10 NISP (#)	10 NISP (%)	11 NISP (#)	11 NISP (%)	12 NISP (#)	12 NISP (%)	Total NISP (#)	Total NISP (%)
Actinoterygii	Bony Fishes												
Acanthuridae	Surgeonfish/Tang	1	.08	1	0.1	--	--	--	--	--	--	2	0.1
Actinopterygii	Ray Finned Fish	861	71.5	540	81.6	40	87.0	1	33.3	--	--	1442	75.3
Albula vulpes	Bonefish	2	0.1	1	0.1	--	--	--	--	--	--	3	0.2
Albulidae	Bonefish	1	.08	--	--	--	--	--	--	--	--	1	.05
Carangidae	Jack	6	0.4	3	0.4	--	--	--	--	--	--	9	0.4
Clupeidae	Herring	2	0.1	--	--	--	--	--	--	--	--	2	0.1
Diodontidae	Porcupinefish	11	0.9	7	1.0	--	--	--	--	--	--	18	0.9
Haemulidae	Grunt	--	--	3	0.4	--	--	--	--	--	--	3	0.2
Holocentridae	Squirrelfish	6	0.4	5	0.7	--	--	--	--	--	--	11	0.5
Labridae	Wrasse	3	0.2	--	--	--	--	--	--	--	--	3	0.2
Lutjanidae	Snapper	--	--	4	0.6	--	--	--	--	--	--	4	0.2
Scaridae	Parrotfish	30	2.4	13	1.9	--	--	--	--	--	--	43	2.2
Scarus spp.	Parrotfish	1	.08	--	--	--	--	--	--	--	--	1	.05
Scombridae	Tuna	12	0.9	6	0.9	--	--	--	--	--	--	18	0.9
Serranidae	Grouper/Seabass	71	5.9	30	4.5	1	2.1	--	--	--	--	102	5.3
Sparisoma sp.	Parrotfish	7	0.5	--	--	--	--	--	--	--	--	7	0.4
Sphyraena sp.	Barracuda	6	0.4	2	0.3		--	--	--	--	--	8	0.4
Actinopterygii Total		1018	84.6	615	93.0	41	89.1	--	--	1	100	1677	87.8
Chondrichthyes	Cartilaginous Fishes	--	--	--	--	--	--	--	--	--	--	--	--
Negaprion brevirostris	Lemon Shark	2	0.1	--	--	--	--	--	--	--	--	2	0.1
Reptilia		--	--	--	--	--	--	--	--	--	--	--	--
Turtle		--	--	1	0.1	--	--	--	--	--	--	1	.05
Aves		8	0.6	7	1.0	--	--	--	--	--	--	15	0.85
Mammalia		--	--	--	--	--	--	--	--	--	--	--	--
Bos taurus	Cow	2	0.1	--	--	--	--	--	--	--	--	2	0.1
Caprinae	Sheep/Goat	--	--	--	--	2	4.3	--	--	--	--	2	0.1
Canis familiaris	Dog	1	.08	1	0.1	--	--	--	--	--	--	2	0.1
Geocapromys brownii	Hutia	163	13.5	36	5.4	2	4.3	1	33.3	--	--	202	10.4
Oryzomys antillarum	Rice Rat	4	0.3	--	--	--	--	--	--	--	--	4	0.2
Small Mammal		--	--	1	0.1	--	--	--	--	--	--	1	.05
Medium Mammal		2	0.1	1	0.1	--	--	--	--	--	--	3	0.2
Mammalia Total		170	14.1	38	5.7	5	10.8	1	33.3	--	--	216	11.2
Unidentified		2	0.1	--	--	--	--	--	--	--	--	2	0.1
Totals		1203	100	661	100	46	100	3	100	1	100	1912	100

Table 13: Faunal data from Maima, NISP, and relative abundance (%NISP) for each species, class, and house.

The Maima vertebrate remains were sorted by unit and level and identified, when possible, to genus and species using the Simon Fraser University Zooarchaeological Laboratory comparative collection and reference guides (Froese and Pauly 2016). The comparative collection in the zooarchaeological lab facilitated identification of mammal remains. However, the comparative fish collection for Caribbean species was limited. Consequently, unidentifiable fish specimens were sent to Alexis Ohman at the College of William and Mary, Williamsburg, Virginia. William and Mary has a well-developed Caribbean fish comparative collection. Due to the fragmentary nature of many of the specimens, much of the fish bone could be identified only to family. These, nevertheless, provide a diverse set of information including habitat and life cycle, which is important for analysis.

The vertebrate collection was quantified with the number of identified specimens (NISP) but does not include a measure for Minimum Number of Individuals (MNI) or weight. MNI counts would not inform of species variation or quantity, nor would they be useful in the comparative analysis due to the low numbers of vertebrates found in each unit, layer, and feature. Weight, while recorded for individual specimens, is a misleading comparative measure due to the fragmentary nature of the collection with weights for the most part being 0.5 g or less.

Faunal Data and Identifications

The Maima vertebrate collection as a whole is fragmentary and small in number but includes a variety of 23 species. Various fishes represent 1677 (87.8%) specimens, while terrestrial mammals, mostly hutia, account for 232 (12.2%) specimens (Table 13). Not only is the vertebrate collection small but unlike shell, it is highly fragmented (Figure 27). Of the recovered specimens, 68% are only one quarter or less complete with fish bones being much more fragmentary compared to hutia. Notably, there are no visible rodent or carnivore marks on any of the bones, suggesting fragmentation is related to trampling or other post-depositional processes.

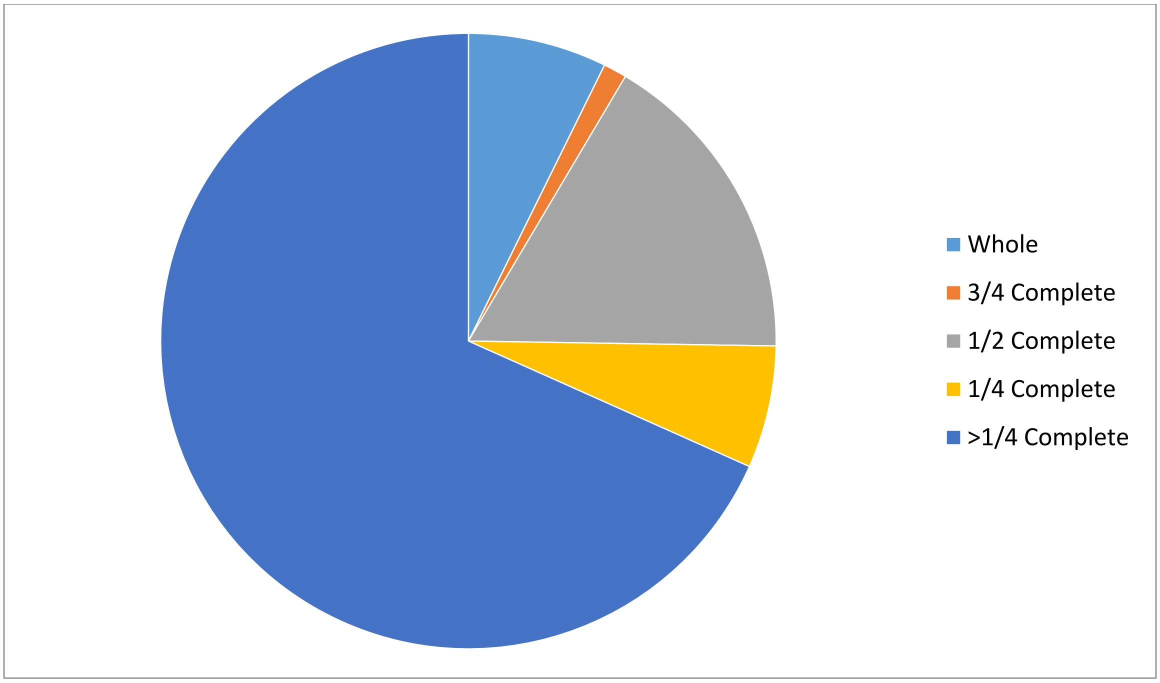

Figure 27: Vertebrate fauna fragmentation at Maima.

Houses 7 and 8 had the majority of faunal recoveries, including 97% of the total NISP count. The numbers of identified specimens are insufficient to consider change through time in either of these houses reliably, but the house data can be compared to each other. In this, they have very similar collections in general composition and species. House 7 includes 85% marine resources and 15% terrestrial, while House 8 contains 86% marine and 14% terrestrial. Species found in House 8, despite being a smaller excavation area, are highly similar to House 7. As illustrated in Table 13, of the 18 fishes identified in total from the two houses, 10 of these are shared. House 7 incorporates 16 of the overall 18 while House 8 has 12. This overlap implies an overall consistency in the Maima fishery and this aspect of Maima diet.

A single turtle bone was identified in Level 13 of the 1 x 1 m unit in House 8. Radiocarbon dates for this unit and the bone’s stratigraphic association indicate an age for the specimen of pre-1050 BP. One bone is hardly a basis upon which to make a substantive interpretation, but its early presence near the beginning of the White Marl phase without later occurrence in the assemblage might reflect a change in turtle abundance or, perhaps, local extirpation.

Fragmentary bird bones were found in both of the House 7 and House 8 assemblages. Unfortunately, these were highly fragmented and unidentifiable.

Individual specimens are of various sizes, and likely represent multiple species of bird. There are no indications of butchery or culinary preparation on the bones to indicate consumption practices.

Aside from hutia and contact-era mammals to be discussed, two other mammal species are present in the faunal assemblage—*Oryzomys antillarum* (rice rat) and *Canis familiaris* (domestic dog). Four bones of Jamaican rice rat were recovered from House 7 deposits. These are small rats that were prevalent near Taíno settlements and garden plots (Carlson 2012:72). At Maima they most likely were attracted to the midden or trash areas rather than being a component of diet. Rice rats are no longer found in Jamaica. After contact and colonization, they were extirpated by domestic dogs and cats as well as the European rat and the 1872 introduction of mongoose (Carlson 2009:19).

Dogs are limited to two specimens recovered from House 7, a canine tooth and an ulna fragment. Dogs are found in faunal assemblages at other Taíno sites throughout the Caribbean and in Jamaica (Carlson 2009; 2012; Wing 2008). They are not endemic to the Caribbean and were brought with people as Caribbean islands were colonized or were introduced later (Wing 2008). They are, however, not abundant, suggesting they are variably present among Jamaican Taíno groups. Dogs presumably were used in the hunting of hutia (Carlson 2009:17; Carlson 2012:75; Wing 2008).

In Jamaica, dogs are found at the sites of White Marl and Cranbrook (Carlson 2009; Wing 2008). In these sites, the dog bones were recovered from midden contexts; however, throughout the Caribbean, particularly in the Lesser Antilles, dogs are often found in burial contexts (Giovas 2013; Newsom and Wing 2004). When dog remains are found in midden contexts they commonly are fragmented and usually represented by teeth (Wing 2008:419). In the case of Maima, the dog bones were found in a midden context along with other fauna. Canine scavenging of midden areas for food scraps is a possible explanation for the limited size of the vertebrate assemblage at Maima. At Cranbrook, where dog remains similarly are present, (Carlson 2009), there also occurs far fewer faunal remains than might be expected.

The Maima Fishery and Habitats Exploited

A brief review of the habitats found in and around the area of Maima is provided in the introductory chapter of this dissertation. Specific habitats represented by the fish collection are examined as they relate to exploitation and procurement of different fish species. My analysis follows the Caribbean environmental classifications defined by Newsom and Wing (2004) for vertebrate marine species. This analysis includes shallow/inshore, coral reef, and pelagic zones. These categories are the most widely used and allow for better and more detailed comparisons between sites. An additional zone of brackish water is added due to the presence of species in the collection found in this type of area. Fish species adapted to one or more of these habitats have differing behaviors that affect their procurement and capture methods. As seen in Table 14, some fish taxa occupy multiple habitats often as part of the natural life cycle while others occupy different habitats as juveniles and adults. For example, Sphyraena sp. (barracuda) can occupy both shallow inshore and reef environments as adults, but as juveniles enter brackish water. Carangidae (jacks) also can occupy reef environments and the reef edge around the pelagic zone. For this analysis, species are only considered for analysis that can be put confidently into one habitat category.

Table 14 lists the species, genera, and families of fish identified at Maima as well as their corresponding habitats and general behavior. No freshwater fish were identified in the collection. Barracuda is listed as the only potential brackish habitat type. Clupeida (herring) and Scombridae (tuna) are the only representatives from pelagic waters. There are some shallow water/inshore species, though most of these can also be found in reefs. Albulidae (bonefish) are the only family to inhabit just the shallow water/inshore environment alone. The lemon shark represented by two ossified vertebrae could also be caught in the shallow inshore environment. The remaining species are found exclusively in a reef environment.

The importance of the reef in pre-contact era Caribbean diet has been noted in studies throughout the region (Fitzpatrick 2009; Giovas 2013; Keegan et al. 2008; LeFabvre 2007). A complex and highly biodiverse environment, reefs produce not only much of the marine mollusc remains reported upon in the previous chapter but are a habitat from which numerous fish species can be harvested. Reef fish represent 82.5% of the total fish identified at Maima; the remainder includes 7.8% coming from inshore areas, and 9.7% from the pelagic zone. The most abundant reef fish from the Maima collection are Holocentridae (squirrelfish), Serranidae (grouper/seabass), and Sparisoma (parrotfish). These four represent 92% of the total reef fish assemblage. From those, the groupers are the most abundant, themselves representing 52% of the total reef fish. Other than habitat, the fish assemblage can also be characterized by method of capture.

Solitary fish like groupers, squirrelfish, and parrotfish can be captured with hook and line, spear, or harpoon (Berman et al. 2013:271; Newsom and Wing 2004:209). In the reef environment, snappers and groupers are carnivorous, aggressive, and occupy high trophic levels (Froese and Pauly 2013). The aggressive behaviour makes capture with hook and line a likely form of acquisition (Giovas 2013:57; Wing and Wing 2001). Tuna are schooling fish, but their larger size and strength are traits making net capture difficult. These, too, are more likely to be captured with a hook and line (Carlson 2009:15). Tuna occupy deeper pelagic waters and require canoes capable of open ocean environments for fishing (Carlson 2009:15).

Otheichthyes	**Brackish**	**Pelagic**	**Shallow/ Inshore**	**Coral Reef**	**Habitat and Behaviour**
Acanthuridae (Surgonfish/Tang)				X	Inshore reefs and rocky areas, schooling
Albula vulpes (Bonefish)			X		Inshore, moving to shallow grass beds to feed, schooling
Albulidae (Bonefish)			X		Inshore, moving to shallow grass beds to feed, schooling
Carangidae (Jack)		X		X	Shallow reefs, schooling
Clupeidae (Herring)		X			Pelagic, schooling
Diodontidae (Porcupinefish)			X	X	Inshore or shallow reef cracks and crevices, solitary
Haemulidae (Grunt)				X	Reefs, sea grass beds, and mangroves, schooling
Holocentridae (Squirrelfish)				X	Shallow reef crevices, solitary
Labridae (Wrasse)				X	Shallow reefs and rocky areas, schooling
Lutjanidae (Snapper)				X	Reefs and rocky areas, schooling
Scaridae (Parrotfish)				X	Coral reefs, shallow coral reefs
Scarus sp.				X	Coral reefs, shallow coral reefs

(Parrotfish)					
Scombridae (Tuna)		X			Pelagic waters, schooling
Serranidae (Grouper/Seabass)				X	Reefs and rocky bottoms
Sparisoma sp. (Parrotfish)				X	Coral reefs
Sphyraena sp. (Barracuda)	X		X	X	Near shore reefs, sea grass or mangroves, juveniles enter brackish water, solitary
Chondrichthyes *Negaprion brevriostris* (Lemon Shark)			X	X	Reefs, mangroves, enclosed bays, or river mouths, comes inshore at night

Table 14: Fish species, habitats represented, and behavior of species present, adapted from Carlson (2009).

Despite high numbers of fish that, typically, are interpreted as hook and line capture species, there were no fishhooks recovered from Maima. Indeed, the occurrence of fishhooks in archaeological contexts across the Caribbean is rare. It is assumed these were made from perishable materials including wood and thorns and are not preserved in Taíno assemblages (Berman et al. 2013; Keegan 1986; Keegan 2000:143; Newsom and Wing 2004:51). Wooden fishhooks have been recovered from a site on Crooked Island in the Bahamian archipelago (Berman et al. 2013; Carlson 1999:112).

Ethnographic and archaeological evidence indicates that, other than hook and line, fish capture methods in a coral reef environment include seine nets, basketry traps, and fish poison (Newsom and Wing 2004:209). Schooling fish readily captured using nets include surgeonfish, jack, grunt, and wrasse. Schooling fish make up 18% of the identified fish collection. The presence of net sinkers at Maima, including girdled and perforated types (Figure 28), indicates net use. These would have been attached to the bottom of seine nets to hold them in place (Carlson 1999:115). Application of a seine net on the reef is capable of capturing all types of reef fish whether omnivores, carnivores, solitary or schooling (Keegan 1986:823; Newsome and Wing 2004:209; Wing and Reitz 1982). Consequently, designation of fish capture type to individual species of reef fish based on diet or behavioral traits may be misleading.

Basketry traps might also have been used for fish capture at Maima. Traditionally made from wood, cane, and palm, they were shaped into an S-form with a conical entrance at both ends (Newsom and Wing 2004:209). These types of traps could be used to capture several different types of reef fish, again cross cutting dietary or social behaviors. Fish poisons were also known to be used in the Caribbean. They were made from the bark of *Lonchicarpus* and *Piscidia* trees (Newsom and Wing 2004:209). The bark was ground and then dispersed into a shallow marine environment or holes in the reef at low tide. The poison stuns the fish, which rise to the surface for collecting. Unfortunately, neither basketry traps nor fish poisons leave an archaeological trace and, therefore, cannot be definitively proven at Maima.

Hutia Analysis and Interpretation

Hutia are present on most Caribbean islands but, while they share a genus across the region, separate species occur in different areas. The Jamaican hutia (*Geocapromys brownie)* is the largest land mammal to occupy the island in the pre-European past. It is endemic to Jamaica and would have been present prior to first human settlement. The occurrence of hutia bone in faunal assemblages from most archaeological sites in Jamaica suggests they were a

Figure 28: Net weights recovered from Maima excavations. Top recovered from House 7, bottom recovered from House 10.

Sought-after component of the diet. Spanish accounts, as previously described, indicate that the Taíno at Maima in 1503-1504 A.D. offered Columbus and his crew hutia as part of their provisions (Morison 1963:356).

Hutia are herbivorous and live in small groups. They lacked natural predators, which made them particularly susceptible to hunting pressure once people arrived on Jamaica. Unlike most rodents, hutia breed in litters of one or two once a year. Their population, therefore, does not replenish fast and can be diminished quickly. As I have examined previously, with this population limitation, archaeologists have argued they were likely penned and bred by the Taíno as a component of subsistence economy (Wing 2001b). It has been suggested that the optimal age for the culling of penned hutia is 8 to 12 months of age (Wilkins 2001). For faunal analysts, this then provides a distinct age profile against which hutia remains may be compared. The hutia age profile from Maima and other considerations of bone modifications add to this discussion.

In the Maima collection, 202 hutia bones were identified, most of these coming from Houses 7 and 8. The hutia assemblage is less fragmentary than the fish. Cut marks were observed on six specimens, breaks were present on two, and pathologies were identified on four. The cut marks are likely indicative of consumption practices while the breaks, both on nearly whole scapula, could be indicative of hunting practices. The hutia assemblages consist of a representative sample of elements, including skull, teeth, limb, and axial fragments. Based on the left calcanei the assemblage has an MNI of eight.

Analysis of the hutia bones included estimation of age from which an age of death profile might be established. Ancient DNA analysis also was attempted but proved unsuccessful in our abilities to extract DNA. Sexing was not possible given the limited numbers of bones identified as well as not having access to a large comparative collection. Estimation of age was determined in two ways. The first included bones being broadly labeled as either immature or mature based on epiphyseal fusing on long bones and vertebrae. Ageing 20% of the collection with this method was possible. Of the aged sample, 80% were immature, and 20% were mature. The second method used hutia mandibles and was based on mandibular tooth row measurements (Carlson 2009; Wilkins 2001) (Figure 29). In her study of hutia on Jamaica, Wilkins (2001) found that the length of the mandibular tooth row corresponded well with age, and she created a methodology for determining age from these measurements. She found that a tooth row measurement of 12 mm or less was a very young individual, a 12 to 14.8 mm tooth row was a one-year-old young adult that had reached reproductive age, a 14.8 to 19 mm tooth row was a young adult, and above 20 mm was a tooth row from a full-grown mature individual. In the Maima collection there were, four mandibles with a complete tooth row that was measurable, each coming from a different individual. One has a measurement of 15 mm, two are 16 mm, and one is 16.5 mm. Not only are these young not fully mature individuals but they are also similar in age and likely overall size. It is only a sample of four individuals, but they represent an age profile possibly indicative of penning.

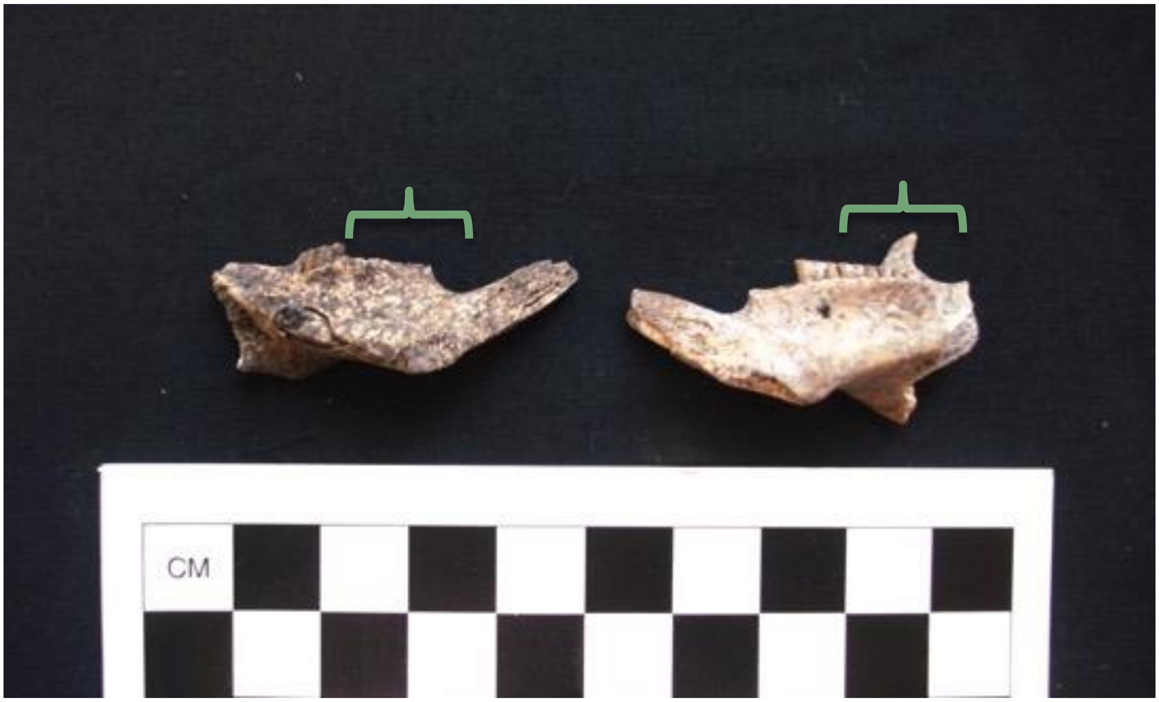

Figure 29: Hutia tooth row analysis.

Carlson's (2009) study of faunal remains at the Jamaican sites of Fairfield and Cranbrook identified a wide range of tooth row measurements for hutia indicating various ages and sizes when killed. Carlson (2012) also found tooth row measurement averages of 15.3 mm and 16.9 mm respectively in the St. Mary Parish sites of Wentworth and Green Castle, similar to Maima. She concluded that consistency in the age of death for hutia in these sites suggests population management for penned individuals. Wilkins (2001) noted that at the Bellevue site, an interior Taíno settlement, hutia make up 80% of the faunal remains. Wilkins (2001) found that the majority of these were young adults with only a small number being mature. She, however, suggested that the hutia at Bellevue were hunted rather than being penned and bred. Of the Bellevue collection (Wing 2001b) as well as for sites throughout the Caribbean (Wing 2008) Wing (2001, 2008) alternatively argues that hutia were commonly penned and culled. She also cites excavations in Hispaniola for evidence of corrals that were constructed of poles and thatch (Wing 2008:419; Loven 1935 as cited in Wing 2008:419). Finally, Wing (2008) maintains that, where hutia hunting does occur, dogs were integrated into the strategy for their capture.

European Domesticates

A small number of European domesticate faunal specimens was recovered from Houses 7 and 10. This includes two cow teeth from House 7, two caprine metapodials from House 10, and two large mammal bones, likely rib fragments, also from House 10 (Figures 30 and 31). These vertebrate remains were found in context with a number of European-derived artifacts including fragments of glass, Spanish roof tile, and Spanish era nails. These specimens indicate Houses 7 and 10 were occupied into the post-contact period. It seems unlikely that these remains were acquired during Columbus's stay in Jamaica. That being the case, then, the specimens must have been acquired during the Spanish occupation of Sevilla la Nueva. Excavations at Sevilla la Nueva have recovered abundant domestic faunas, dominantly including sheep and pig but also cattle and horse (Woodward 1988; Speller et al. 2013).

The few domestic specimens that are present at Maima seem anomalous in that they do not represent meat cuts or raw materials for tool manufacture. Crader (1990) has noted this type of bone being present in slave archaeology, where slaves were given low-valued pieces. Here, however, it is difficult to see any value beyond, perhaps, the novelty of large European domesticate skeletal materials.

Vertebrate Faunal Analysis Summary

The vertebrate faunal remains recovered from excavations at Maima provide an overall glimpse of animal exploitation and the role of animals in Maima subsistence economy. The variation of fish is notable with a clear focus on reef fish. In this respect, possible capture strategies included hook and line fishing, spear fishing, use of seine nets, and possibly basketry traps. Domesticated animals include dog, and possibly hutia that may have been kept in pens. Garden pests include the Jamaican rice rat and also hutia. When compared to the invertebrate assemblage described in the previous chapter, considerable insight is gained into the range of resources used by the Taíno to supplement their agricultural subsistence exploits.

Figure 30: Cow tooth recovered from House 7.

Figure 31: **Caperine metatarsal and phalanx recovered from House 10.**

Chapter 7.

Comparative Caribbean Dataset

The following chapter is a comparative study of Caribbean faunal assemblages with the ultimate goal of finding and explaining regional patterns of diet and subsistence strategies. This comparative analysis considers the Greater Antilles as well as smaller islands adjacent to Puerto Rico and the Bahamas. This area reflects the region occupied by the Taíno in the late pre-contact period from 1000 to 1500 A.D. Concentrating on this time and place in the Caribbean allows for the exploration of hypotheses about diet and subsistence strategies of the late pre-contact period Taíno, with consideration of variation between sub-groups, islands, and site-specific locations. For this analysis, only vertebrate faunal remains are used. Vertebrate data are more available in the literature, and while invertebrate data is available for some sites, it is not for others. I begin this analysis with an overview of the regional literature and previously published hypotheses on diet and subsistence patterns, followed by my hypotheses on patterns expected from this study. This is followed by an overview of the sites, assemblages, and data used for the study. I then present data to test the hypotheses that I have developed.

Previous comparative analyses of Caribbean faunal assemblages have attempted to address the degree to which social dynamics or environmental factors affect subsistence (Carder et al. 2007; Carlson and Steadman 2009; Duchemin 2013; Giovas 2013; Grouard 2002; Keegan et al. 2003; Newsom and Wing 2004; Steadman and Jones 2006; Wing 2001a; Wing and Wing 1995). However, these previous studies mostly focus only on two or three sites from the same island and/or culture group. deFrance (2013) noted the need for a broader comparative study of Caribbean fauna to seek patterning beyond individual islands or cultural subdivisions. Research done by Wing (1972; 1977; 1989; 2001a; 2001b; 2008; Wing and Wing 2001; Newsom and Wing 2001) on subsistence patterning has acted as a baseline for zooarchaeologists in the region. While considering subsistence patterns as well as environmental impact, she also emphasizes the need for research into: 1) decreased variability in faunal populations over time; 2) differential distribution for terrestrial mammals between inland and coastal sites; 3) marine resource depletion over time; and 4) decreasing size of fish over time. According to Wing's comparative analyses, these patterns occur throughout the Caribbean (Newsom and Wing 2004).

Researchers in the Caribbean tend to fall into two broad categories when theorizing about subsistence patterns. One group has looked at environmental impacts while the other has focused on social effects (see Chapter 3). Environmental impact studies have generally considered some aspect of foraging theory, whether that is optimal foraging theory (Newsom and Wing 2001; Wing 1977; 2001a), multiple optima theory (Giovas 2013), or resource depletion models (Azevedo 2015; Wing 2001b). Foraging theory, however, is limited in its application due to the lack of large, high-ranking mammalian species on the islands (Giovas 2013:7). Species ranking, thus, is confined to fish species that are often used to consider resource depletion rather than species choice (Azevedo 2015; Wing 2001b). Applications of foraging theory in the Caribbean often consider prey and patch choice through consideration of the habitats being exploited and why. This chapter examines richness and evenness of faunal assemblages, as well as the relationship between site location and faunal exploitation. Trends through time are not evaluated in this analysis due to a lack of well-dated sources.

Archaeologists who consider social effects on subsistence are confined almost exclusively to Puerto Rico (Curet and Pestle 2010; Duchemin 2013; deFrance 2010; Pestle et al. 2013). This is due to the presence of the ceremonial center of Tibes and the archaeological work done in and around that site. Social hierarchies, feasting, and a complex tribute system have all been hypothesized as the causes of assemblage variability between Tibes and adjacent sites. Here zooarchaeologists have attempted to identify and consider the role of high status foods and feasting (Curet and Pestle 2010; Pestle 2013a) and tribute systems based on complex hierarchies (Duchemin 2013). Duchemin (2013) in particular has examined social and ceremonial behaviors in the zooarchaeological study of three sites that acted as satellite villages to Tibes. Here I explore whether those patterns are unique to Puerto Rico or whether the complex social systems seen in Puerto Rico are present in other late pre-contact era Taíno sites. Combining these data with the faunal analysis from Maima, I hope to also contribute to understanding the regional variations of the Taíno, particularly the Jamaican variant.

With the exception of Wing's research, cross-site comparative studies are often done within a single island or, in the case of the Lesser Antilles, island group. The question of whether subsistence patterns differ between islands or the broad spatial divisions of Taíno culture groups laid out by Rouse has not yet been considered. However, this lack of comparative data between culture groups is not unique to zooarchaeological study. It has only been recently that the concepts of the Taíno culture groups of Classic, Western, and Lucayan have been questioned (Curet 2014: Etayo 2010; Pestle et al. 2013). Curet (2014) has suggested that differences among the Taíno are more complex than these three simple categories allow for. Curet (2014) and Pestle et al. (2013) suggest that the region should be considered in local frames of reference rather than a large encompassing culture history model. This concept has yet to be considered for faunal assemblages.

Of the hypotheses and patterns noted above, my focus is on differences between culture groups, differences between islands, and differences between inland and coastal subsistence strategies. To do this, I consider both foraging theory as well as social considerations of food as identity and integration into social hierarchies. What follows are the three hypotheses I seek to test:

1. Inland sites will have relatively less marine fauna than coastal sites. I expect to see not only higher percentages of marine fauna in sites closer to the shore but also a strong correlation between distance from the shore and percent of marine fauna. I also expect that this relationship will be the same in all islands and across Taíno culture groups. I expect the ratio of marine to terrestrial resources to be dependent only on the distance of the site from the coast.

2. Subsistence patterns will not be related to the particular Taíno cultural group (Classic, Western, Lucayan) to which a site is assigned. Instead, I expect environmental factors such as island size or differential access to habitats will influence variation in fauna.

3. The movement of marine resources from the coast to inland sites will result in differences in the relative importance of different marine resources in these locales. When marine resources are found at inland sites, the relative abundance of different taxa will not be the same as at nearby coastal sites.

In order to understand the faunal remains identified at Maima on a larger scale, a dataset of 22 comparative site assemblages was compiled from within the Taíno culture area. To best compare other sites to Maima, only sites that were occupied during the late pre-contact period (200 to 1500 A.D.) and contact eras were chosen for comparison. Additionally, only sites that had available NISP data were used as the Maima faunal collection was not calculated for MNI, and it would not be comparable to assemblages where only MNI was calculated. Unfortunately, a large number of sites report their faunal results only in MNI so these data could not be used directly in the comparative Caribbean dataset.

A set of 15 sites included in their reports complete list of taxa and reported the NISP values for each taxa. An additional seven sites were added for which NISP data for individual taxa were not presented. Rather than presenting NISP data by taxon, these site reports present NISP by general category (i.e., mammals, birds, reptiles, and fish). In addition, some of these eight site reports provide information on habitats represented by the faunal remains in their collection, particularly the marine habitats (i.e., pelagic, inshore, coral reef, brackish), freshwater, and terrestrial environments. While these eight sites can be used for aspects of analyses in this chapter, they are employed only where animal class and habitat data are explored. Figures 32 and 33 illustrate where each of these 22 sites is located within Jamaica and the Caribbean. Table 15 indicates what data were used from each site and provides chronological age and Taíno culture grouping.

Figure 32: Map of Jamaican archaeological sites used in comparative Caribbean dataset. (1) Maima; (2) Fairfield; (3) Cranbrook; (4) Bluefields Bay; (5) Rodney House; (6) White Marl; (7) Bellevue; (8) Cinnamon. (Google Earth (2017) "Jamaica" 18°08'12"N 77°14'18"W, www.earth.google.com [March 13, 2017]

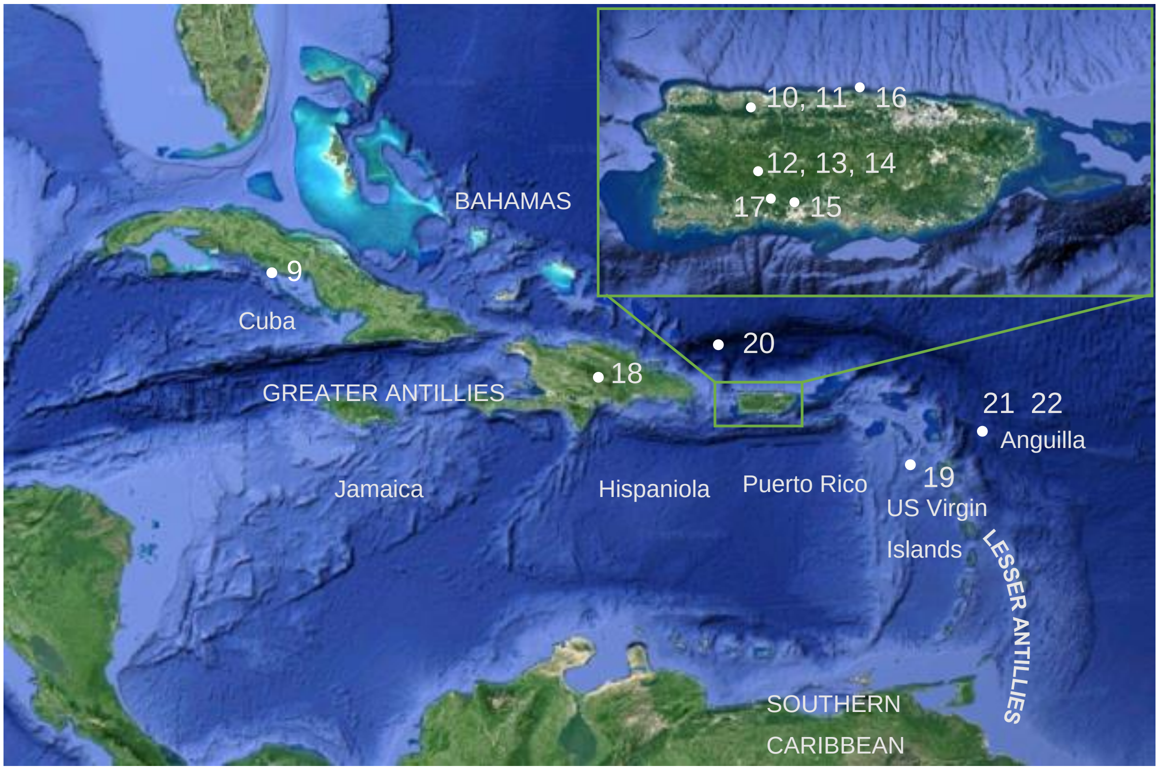

Figure 33: **Map of additional Caribbean sites used for comparative analysis. (9) Vega del Palmar; (10) Rio Tanama AR-38; (11) Rio Tanama AR-39; (12) La Jacanas; (13) La Mineral; (14) Los Gongolones; (15) El Bronce; (16) Maisabel; (17) Tibes; (18) En Bas Saline; (19) Cinnamon Bay; (20) Coralie; (21) Barnes Bay; (22) Sandy Ground. (Google Earth (2017) "Caribbean" 17°43'54"N 72°00'50"W, www.earth.google.com [March 13, 2017]**

Site Name	Taxa Data	Island	Date Range	Taíno region
1. Maima	X	Jamaica	1050-1520 A.D.	Western Taíno
2. Fairfield	X	Jamaica	1270-1420 A.D.	Western Taíno
3. Cranbrook	X	Jamaica	980-1100 A.D.	Western Taíno
4. Bluefields Bay	X	Jamaica	1050-1500 A.D.	Western Taíno
5. Rodney House		Jamaica		Western Taíno
6. White Marl		Jamaica		Western Taíno
7. Bellevue		Jamaica		Western Taíno
8. Cinnamon		Jamaica		Western Taíno
9. Vega del Palmar	X	Cuba	630-990 A.D.	Western Taíno
10. Rio Tanama AR-38	X	Puerto Rico	1100-1500 A.D.	Classic Taíno
11. Rio Tanama AR-39	X	Puerto Rico	400-800 A.D.	Classic Taíno
12. La Jacanas	X	Puerto Rico	1300-1500 A.D.	Classic Taíno
13. La Mineral	X	Puerto Rico	950-1240 A.D.	Classic Taíno
14. Los Gongolones	X	Puerto Rico	1160-1310 A.D.	Classic Taíno
15. El Bronce		Puerto Rico		Classic Taíno
16. Maisabel		Puerto Rico	200-500 A.D.	Classic Taíno
17. Tibes	X	Puerto Rico		Classic Taíno
18. En Bas Saline		Hispaniola		Classic Taíno

19. Cinnamon Bay	X	US Virgin Islands	1020-1490 A.D.	Classic Taíno
20. Coralie	X	Bahamas	710-1170 A.D.	Lucayan
21. Barnes Bay	X	Anguilla	770-1200/1400 A.D.	Lucayan
22. Sandy Ground	X	Anguilla	650-1200/1500 A.D.	Lucayan

Table 15: Sites used for comparative Caribbean dataset (Azevedo 2015(4); Carder et al. 2007(10,11); Carlson 1999(20); 2009(2,3); Carlson and Steadman 2009(21,22); Connelly 2011(2,3), Colton and Worthington 2014 (9); Deagan 2004 (18); deFrance 2010 (17); Duchemin 2013(12,13,14); Quitmyer 2003(19); Newsom and Wing 2004(5,6,7,8,15,16); Scudder 2006(5)).

Each of the assemblages incorporated into the comparative analysis was subject to varying excavation and identification methodologies. A brief consideration of faunal recovery methods and sample integrity is accordingly given, including excavation screen size, comparative collection utilized and general identification practices. Sample size from each assemblage is provided in Table 16. Although there are 22 different sites sampled for the analysis, many have the same zooarchaeologists in charge of identifications and analysis, and many utilize the same comparative collection for faunal identifications. In this respect, there are a total of eight zooarchaeologists doing the identifications; eighteen assemblages were identified using the comparative collections at the Florida Museum of Natural History Zooarchaeological Laboratory. The small number of specialists and the use of the same comparative collections potentially adds to the integrity of the dataset as a whole. All field projects employed sieves of at least a 1/4-inch (6.4 mm) mesh, with some being done through a 1/8-inch (3.2 mm) mesh. All researchers also favor making identification to the family level, and identify to genus and species only when there is a comparative specimen and a large enough sample for verification.

The sites used in the comparative Caribbean dataset come primarily from the Greater Antilles with a few from smaller islands in the northern Caribbean. From Jamaica, most assemblages are from north coast sites with a similar time frame and environment to Maima. However, a few south coast sites were also included to gain a broader picture of pre-contact era Jamaican subsistence. Northern Jamaican sites include Fairfield and Cranbrook (Carlson 2009; Connelly 2011) and Bellevue and Cinnamon (Newsom and Wing 2004). Southern Jamaican sites include Bluefields Bay (Azevedo 2015), Rodney House (Newsom and Wing 2004; Scudder 2006), and White Marl (Newsom and Wing 2004). Complete NISP raw data was available for Fairfield, Cranbrook, and Bluefields Bay. From these data, species could be broken down into animal class and environment to compare to data from the remaining sites where only class and environment data were available. Species were put into class categories due to the large and varied numbers of species from island to island throughout the Caribbean.

Other faunal assemblages from the Greater Antilles are from Cuba, Puerto Rico, and Hispaniola. From Cuba, the site of Vega del Palmar is reported as being an early pre-ceramic site. However, the upper levels are associated with a later occupation dating to around 900 A.D. (Colton and Worthington 2014). Therefore, only the data from the upper levels were used in the comparative dataset. This site is also identified with the Western Taíno and is the only site outside of Jamaica to belong to this group. A single site from Hispaniola, En Bas Saline, Haiti, was included in the dataset (Deagan 2004; Newsom and Wing 2004). This site is particularly interesting in this comparison due to it being a contact era site that was impacted by Spanish exploration and colonization, much like Maima.

The majority of other Greater Antilles sites come from Puerto Rico. Beginning with the inland sites, Tibes (deFrance 2010) represents a large ceremonial center as I have discussed. The sites of La Jacanas, La Mineral, and Los Gongolones are smaller satellite villages around Tibes that likely supplied the ceremonial center with food and other resources (Duchemin 2013). El Bronce, another satellite community of Tibes, is an inland site to the south of the ceremonial center (Newsom and Wing 2004). All sites in and around Tibes are in close proximity to the Portuguese River. A coral reef flat occurs near the mouth of this river potentially facilitating trade or transfer of marine resources inland. The two Rio Tanama sites (AR-38 and AR-39) are 8 km from the coast and represent later period habitations (Carlson and Steadman 2009). Maisabel, the only coastal site with a faunal assemblage available for Puerto Rico, is located along the northern coast of the island and is the earliest represented site in the collection.

Outside of the Greater Antilles, the Taíno lived on the smaller islands of the Bahamas as well as islands just to the east of Puerto Rico. The Taíno who occupied the Bahamas and the northern islands of the Lesser Antilles have been defined as a separate cultural group known as the Lucayan. Though it is possible and hypothesized that the sites from these geographical areas represent an extension of the Classic Taíno, I have left their identification as Lucayan. These sites include Coralie, Bahamas (Carlson 1999), Barnes Bay and Sandy Ground, Anguilla (Carder et al. 2007). The site of Cinnamon Bay, US Virgin Islands (Quitmyer 2003) is on a smaller island some distance from Puerto Rico and Hispaniola, but it represents a Classic Taíno ceremonial site. Due to their presence on smaller islands, these sites are all coastal and within half a kilometer of the shore.

Richness

To assess the comparability of sites within the sample, I begin with an evaluation of richness. Richness is based on the number of unique taxa from a site and is often considered in relation to assemblage size (Table 16). As a measure of variation within an assemblage, it often correlates positively with the size of the collection where larger faunal assemblages will have a higher number of taxa than smaller assemblages. Because species, genus, and family identifications often overlap, the number of taxa is calculated first by counting each identified species, then each genus with no identified species, then each family with no species or genus identified, making the number of taxa the number of mutually exclusive taxa. In this way, there is no overlap between recognized taxa.

The data base sites vary considerably in total NISP, and this has an effect on richness. For example, Rio Tanama AR-38, La Mineral, and Los Gongolones all have small assemblages and, therefore, the smaller number of taxa represented in those collections is to be expected. The sites with larger NISP counts, such as Bluefields Bay, Coralie, and Sandy Ground, have a larger number of taxa.

Figure 34 shows the relationship between sample size and richness with the logarithmic trend line showing the correlation between sample size and number of taxa. Figure 34 includes all assemblages highlighted in Table 16. Including all sites produces an R^2 value of 0.7082, indicating a fairly strong correlation between number of taxa and NISP from each assemblage. This trend is expected in faunal collections as noted above. There are, however, three very large assemblages in the plot; that is, those with a sample size of over 10,000 NISP. With those outliers removed from the plot, Figure 35 illustrates a stronger correlation with an R^2 value of .84083. When the three sites with NISP over 10,000 are plotted together, they show the same strong correlation with an R^2 value of .99971. Each of these plots illustrates the expected—that the number of taxa in an assemblage is a function of assemblage size. Consequently, the larger the sample size, the more variability there will be in the taxa represented.

To determine whether differences in richness occur, one has to consider assemblages of similar size from different locations or culture groups. Island biogeography (Whittaker 2006) anticipates that smaller islands have less variability in species present. Archaeological sites on small islands should, therefore, exhibit less richness than sites on larger islands. In the dataset used for this analysis, the larger assemblages come from small islands and the smaller assemblages come from large islands. Unfortunately, we do not have assemblages of approximately the same size from both large and small islands. Figure 37 shows that large assemblages on small islands exhibit a high number of taxa. Figure 38 shows that small assemblages from large islands demonstrate a strong correlation between NISP and number of taxa, as discussed above for the entire dataset. Smaller assemblage sizes may be the result of archaeological methods and sampling (e.g., how much volume was excavated) or potentially preservation conditions as opposed to subsistence economy *per se*. Given these possibilities, I can draw no conclusions about the effect of island size on richness.

Site	NISP	Number of Taxa
Maima	1862	26
Bluefields Bay	11296	23
Fairfield	6113	55
Cranbrook	2461	34
Vega del Palmar	1172	21
Rio Tanama AR-39	3104	46
Rio Tanama AR-38	77	6
La Jacanas	1189	37
La Mineral	67	11
Los Gongolones	86	10
Tibes	3868	54
Coralie	33828	58
Barnes Bay	6769	44
Sandy Ground	25074	49
Cinnamon Bay	3970	39

Table 16: **Richness data for comparative Caribbean dataset**

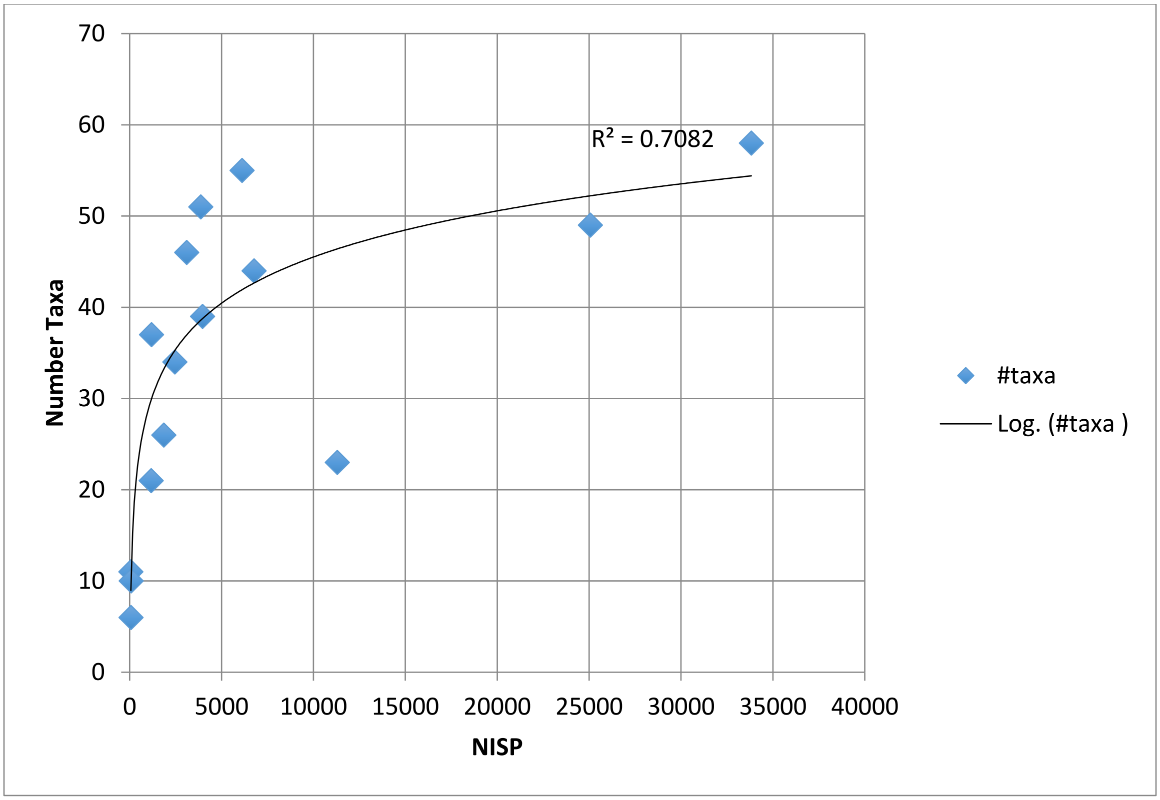

Figure 34: **Scatter plot of richness including all assemblages analyzed.**

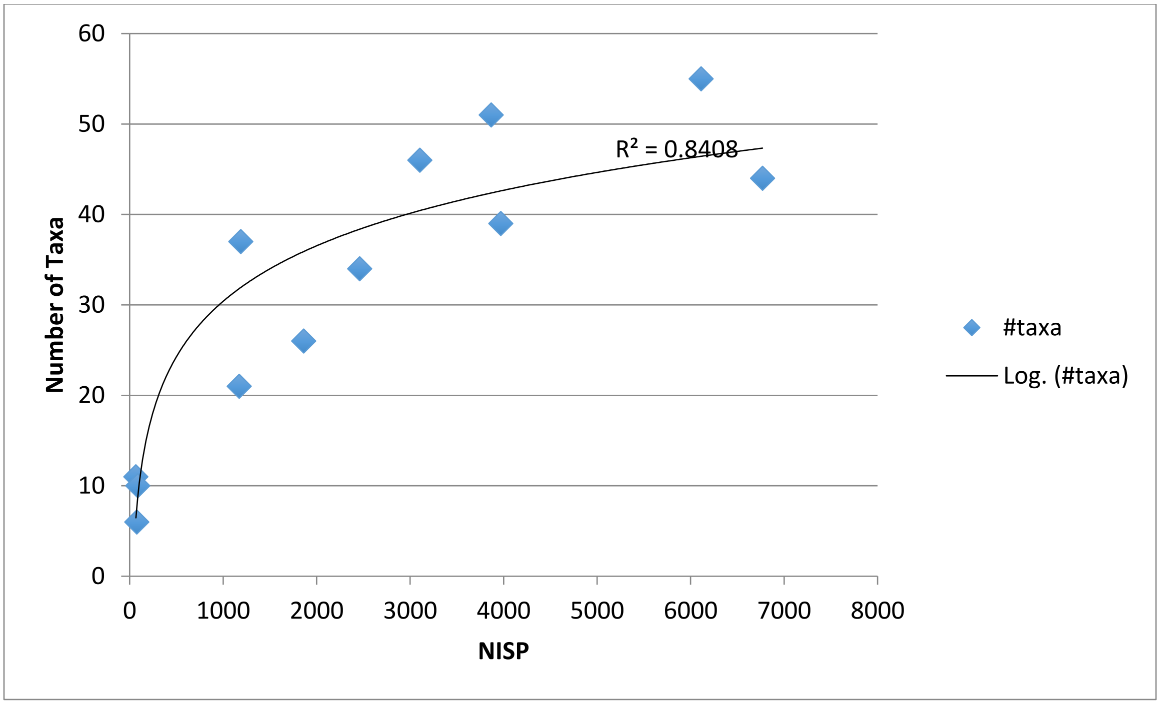

Figure 35: **Scatter plot of richness including assemblages with NISP under 10,000.**

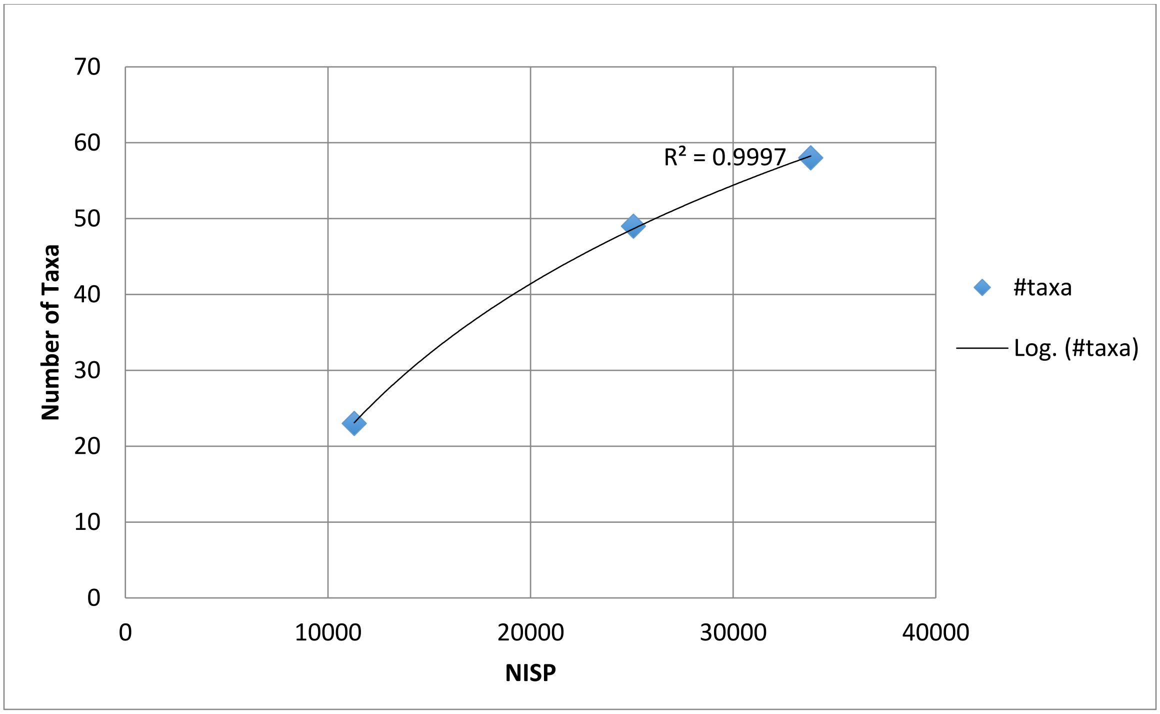

Figure 36: **Scatter plot of richness including assemblages with NISP over 10,000.**

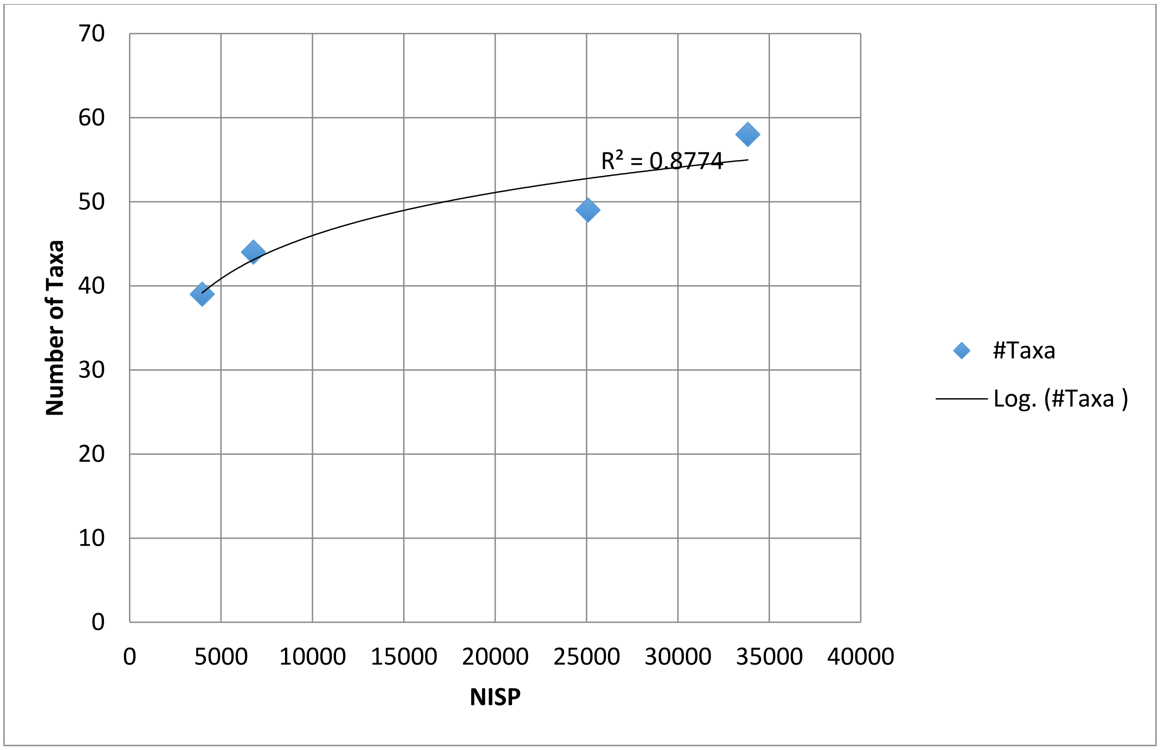

Figure 37: **Richness of faunal assemblages from small islands.**

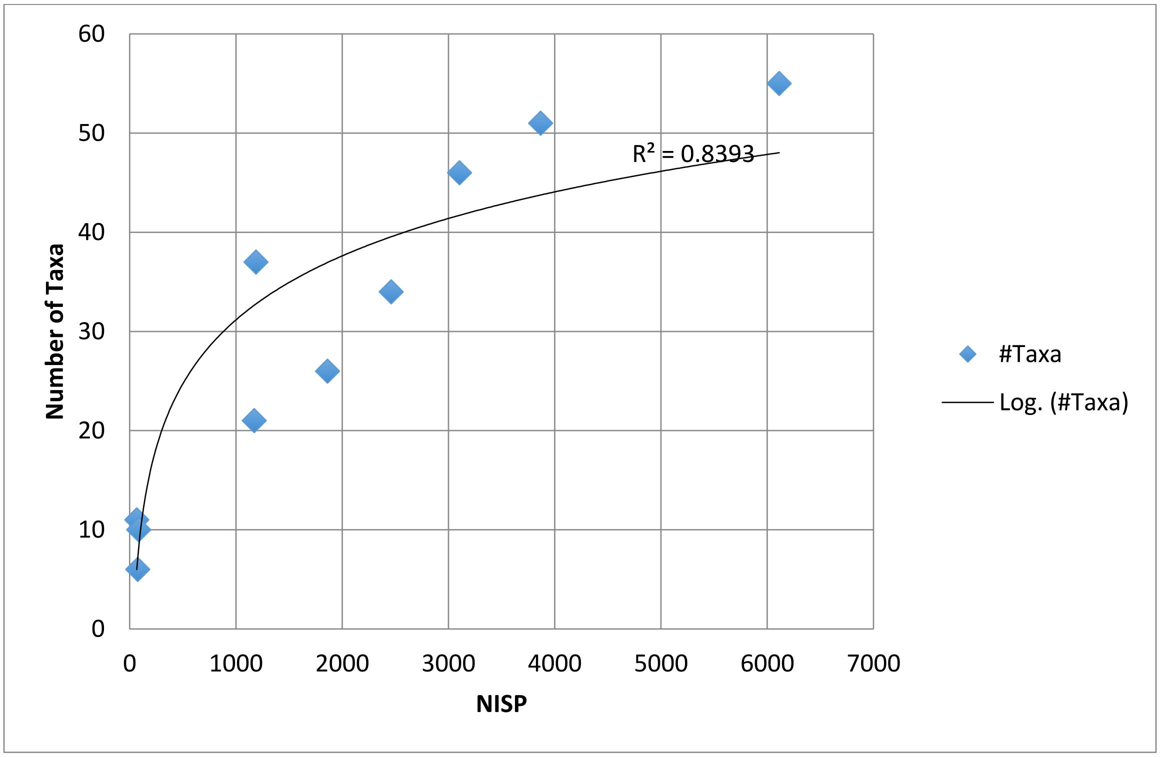

Figure 38: **Richness of faunal assemblages from large islands.**

Evenness

Evenness is the measure of how species abundance is distributed among individual taxa, using species richness and NISP data. It indicates the diversity of each collection and which species were exploited and emphasized within a collection (Newsom and Wing 2004:199). From the measures of heterogeneity that are indicated, we can see from site to site whether people are relying on a single, group, or a wide variety of species. Evenness is the measure of taxonomic heterogeneity (*H'*), calculated using the following Shannon-Weiner index equation:

$$H^{'} = -\sum p_i \mathrm{log}(p_i)$$

where *Pi* is the proportion (P) of taxon I in the assemblage (Shannon and Weaver 1949). The higher the *H* value, the greater diversity in the collection. Evenness (*e*), which takes into account collection richness, is then calculated through:

$$e = \mathrm{H'} / \mathrm{ln}S \text{ (or Hmax)}$$

where S is taxonomic richness (Shannon and Weaver 1949). Evenness is represented from 0 to 1 where a value of 1 would indicate an even species representation. Table 17 shows results for 14 sites in the Caribbean dataset where raw NISP data are available. There appears to be little difference in the evenness across the sites and regions. The two outliers are La Mineral in Puerto Rico, which has a high evenness value in faunal representation, and Coralie, which has a low evenness value. The low diversity at Coralie is due to a heavy reliance on sea turtle at that site (Carlson 1999). At each of the other sites, there is an average of .60 which indicates some diversity in the collections but with reliance on certain species. Figure 39 shows the heterogeneity and evenness visually, again indicating largely similar evenness values within cultural groups and across the Caribbean.

Site	H	*e* (H/Hmax)
Maima	0.86	0.62
Bluefields Bay	0.60	0.42
Fairfield	1.03	0.57
Cranbrook	1.02	0.64
Vega del Palmar	0.67	0.51
Rio Tanama AR-39	1.00	0.59
Rio Tanama AR-38	0.56	0.66
La Jacanas	0.96	0.59
La Mineral	0.93	0.86
Los Gongolones	0.75	0.75
Coralie	0.67	0.37
Barnes Bay	0.91	0.55
Sandy Ground	1.02	0.60
Cinnamon Bay	1.16	0.73

Table 17: **Diversity calculations for sites in comparative analysis.**

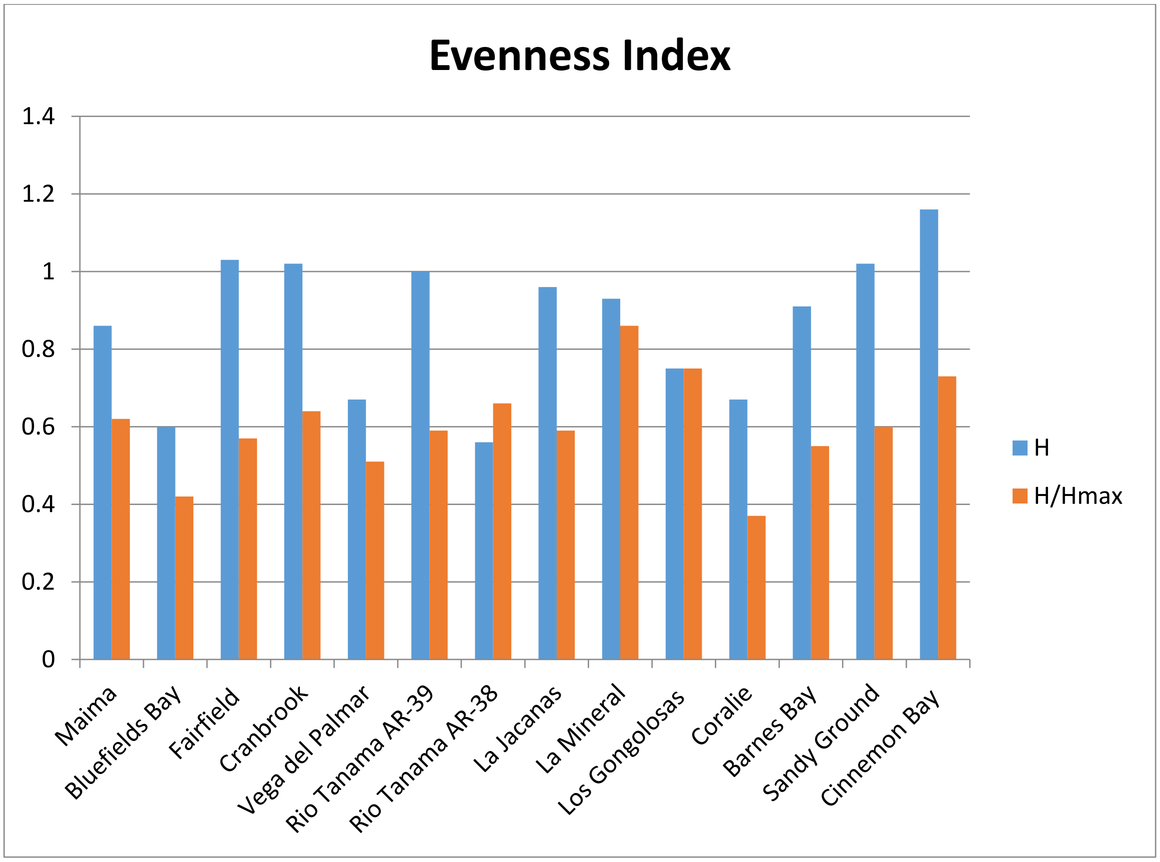

Figure 39: **Diversity plotted for the comparative Caribbean dataset.**

Site Location

Based on Wing's previous work (Newsome and Wing 2004; Wing 2001a; 2001b), I have hypothesized that coastal sites will incorporate higher quantities of marine resources compared to those further inland. For all 22 sites in the comparative Caribbean dataset, the percent of marine fauna was calculated and compared against the distance of each site from the coast. Percentages of marine taxa were calculated from NISP and from site reports where marine taxa percentages are included (Table 18). Distance measurements were also taken from available site reports, articles, books, and dissertations and are presented in kilometers from the coast. This analysis indicates how important site location is to subsistence strategies and, as a result, the taxonomic composition of faunal assemblages. Table 19 lists the sites used in the distance analysis, the island on which they are located, and the percentage of marine vertebrates identified at each as well as distance from the coast.

Marine taxa are defined as those living in and captured in marine environments. They are species that, to exploit, require access to the coast by a Taíno group. Turtles are defined as terrestrial or marine based on their family classification. All turtle species falling under the family Cheloniidae are considered sea turtles and are classified as marine taxa. It is possible that sea turtles were captured in the water or on the beach as they laid their eggs. However, either way, the capture of sea turtles would have required coastal access. Turtles falling under the family classification Emydidae are considered terrestrial as they could be found in inland pond and marsh environments.

The relationship between marine fauna and distance from the coast across the late pre-contact era Taíno region was tested by plotting the percent of marine fauna from each assemblage against coastal distance (Figure 40). With an R^2 value of .32762 on a logarithmic curve, there is no apparent correlation. However, visual inspection of Figures 40 and 41 shows that sites from Puerto Rico are responsible for this circumstance. When the Puerto Rican sites are removed (Figure 42), there is an R^2value of .82385 between the percent of marine fauna and the site distance from the coast. This correlation is constant regardless of which island or culture group is considered. As well, the non-Puerto Rican Classic Taíno sites of En Bas Saline and Cinnamon Bay are consistent with the Western Taíno sites on Jamaica and Cuba and the Lucayan sites from the Bahamas and Anguilla rather than being more closely associated with Classic Taíno sites on Puerto Rico. This sets Puerto Rican sites further apart as having a subsistence strategy different from the other Caribbean and even Classic sites.

Site	Terrestrial%	Marine%
Maima	11.7	85.6
Bluefields Bay	22.2	77.8
Fairview	8.9	91.1
Cranbrook	12.5	87.4
Rodney House	29.1	70.9
White Marl	61.8	38.2
Bellevue	88.8	11.2
Cinnamon	11.1	88.9
Vega del Palmar	69.2	30.8
Rio Tanama AR-39	90.2	48.7
Rio Tanama AR-38	40.2	59.7
La Jacanas	74.5	25.5
La Mineral	22.4	77.5
Los Gongolones	37.8	62.1
Coralie	39.7	60.3
Barnes Bay	0.9	99.1
Sandy Ground	0.2	99.8
Cinnamon Bay	2.5	97.5
El Bronce	31.1	68.9
Maisabel	17.5	82.5
En Bas Saline	15	75

Table 18: Terrestrial and marine faunal percentage data from comparative Caribbean dataset.

Site	Island	% Marine	Distance (km)
Maima	Jamaica	85.6	1
Bluefields Bay	Jamaica	77.8	0.5
Fairview	Jamaica	91.1	2.5
Cranbrook	Jamaica	87.4	1
Rodney House	Jamaica	70.9	1
White Marl	Jamaica	38.2	5.6
Bellevue	Jamaica	11.2	10

Cinnamon	Jamaica	88.9	0
Vega del Palmar	Cuba	30.8	2.5
Rio Tanama AR-39	Puerto Rico	48.7	8
Rio Tanama AR-38	Puerto Rico	59.7	8
La Jacanas	Puerto Rico	25.5	14.5
La Mineral	Puerto Rico	77.5	11.5
Los Gongolones	Puerto Rico	62.1	12
El Bronce	Puerto Rico	68.9	7.3
Maisabel	Puerto Rico	82.5	0.5
Tibes	Puerto Rico	70.1	8
En Bas Saline	Hispaniola	75.0	0.5
Coralie	Bahamas	60.3	0.5
Barnes Bay	Anguilla	99.1	0
Sandy Ground	Anguilla	99.8	0
Cinnamon Bay	Virgin Islands	97.5	0.5

Table 19: Percentage marine fauna and distance from the coast site comparative Caribbean dataset.

From the preceding analysis, it is clear that something different is happening in the subsistence patterns of the inland Puerto Rican sites. Related to this, Duchemin (2013:50) reports that villages and communities in proximity to the ceremonial center of Tibes were subject to the complex hierarchical social structures in play at the ceremonial center. He suggested a tributary system was in place, where adjacent and more distant coastal settlements contributed to the center's needs. The Puerto Rico data given here does suggest that amounts of marine fauna were being transported from the coast to inland sites. These centers appear to have maintained large populations, and coastal resources would have been needed both to maintain the population and to provide variation in diet. However, Duchemin (2013) also notes that this movement can be observed in archaeological context only, making it difficult to infer hierarchical tribute and ceremony (Duchemin 2013). Whatever the case, the Puerto Rican sites are unique within the dataset, and it is important to note that it is specifically Puerto Rico, and not all Classic sites, that occur as outliers.

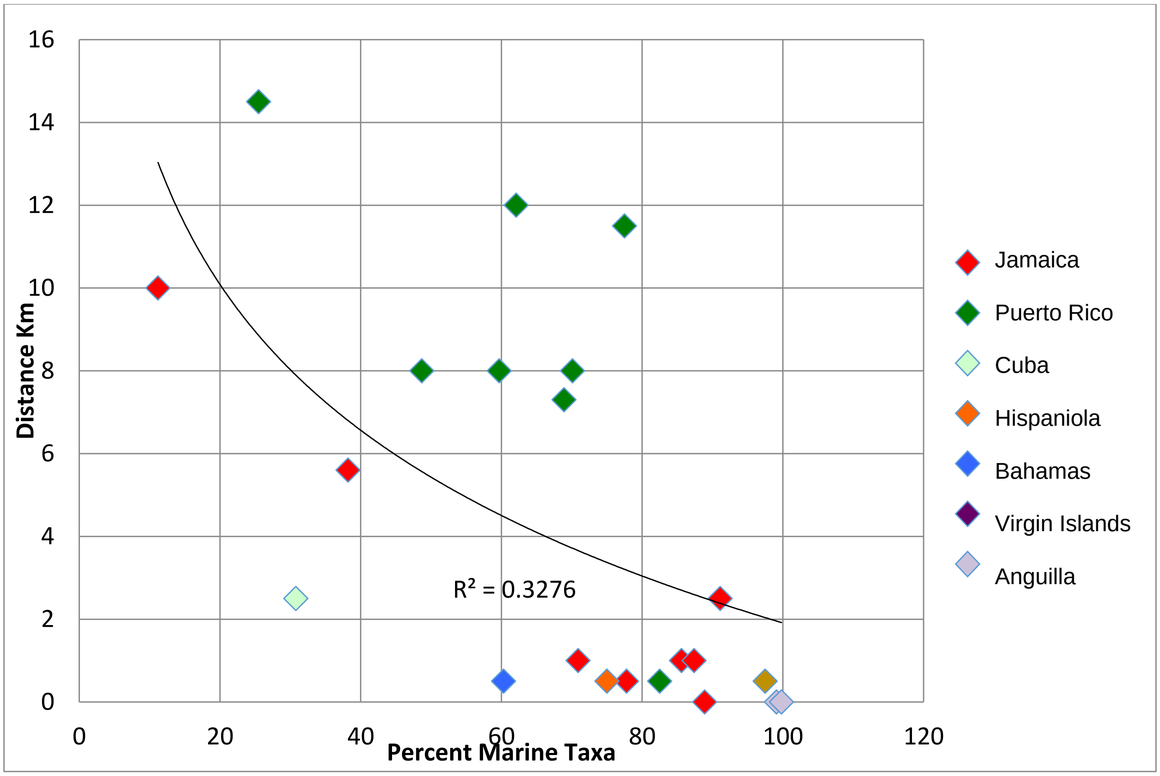

Figure 40: **Distance of site to the coast plotted against the percent of marine taxa Identified in the assemblage plotted by island.**

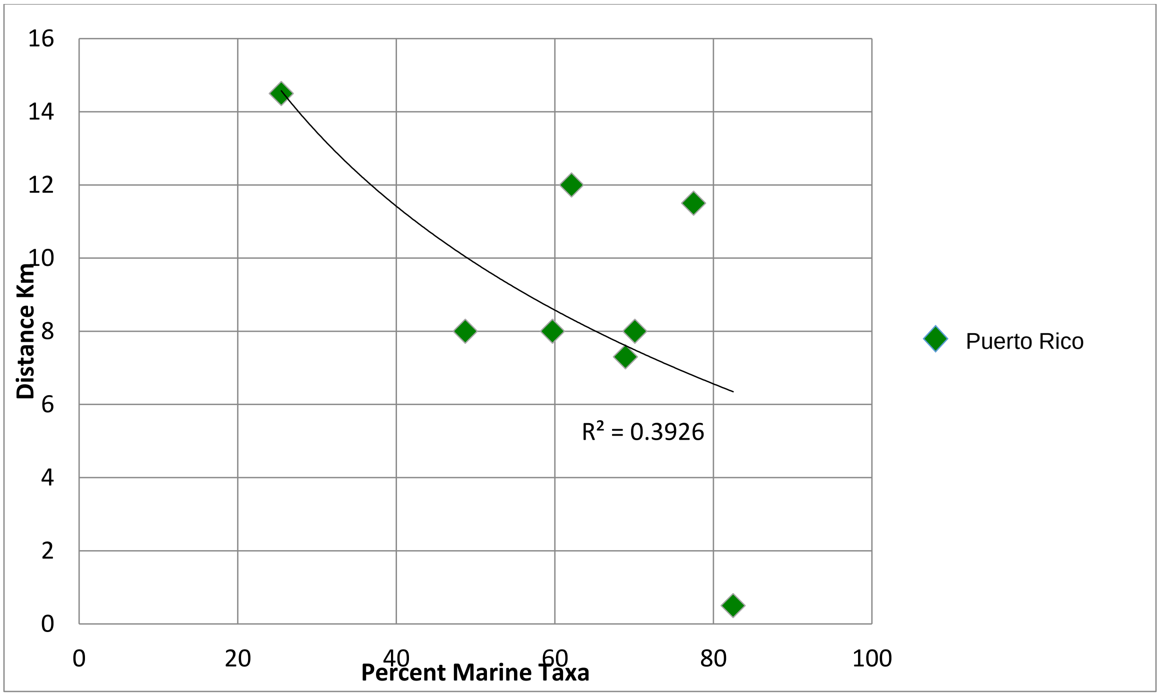

Figure 41: **Distance of Puerto Rican Sites to coast plotted against percent marine taxa in assemblage.**

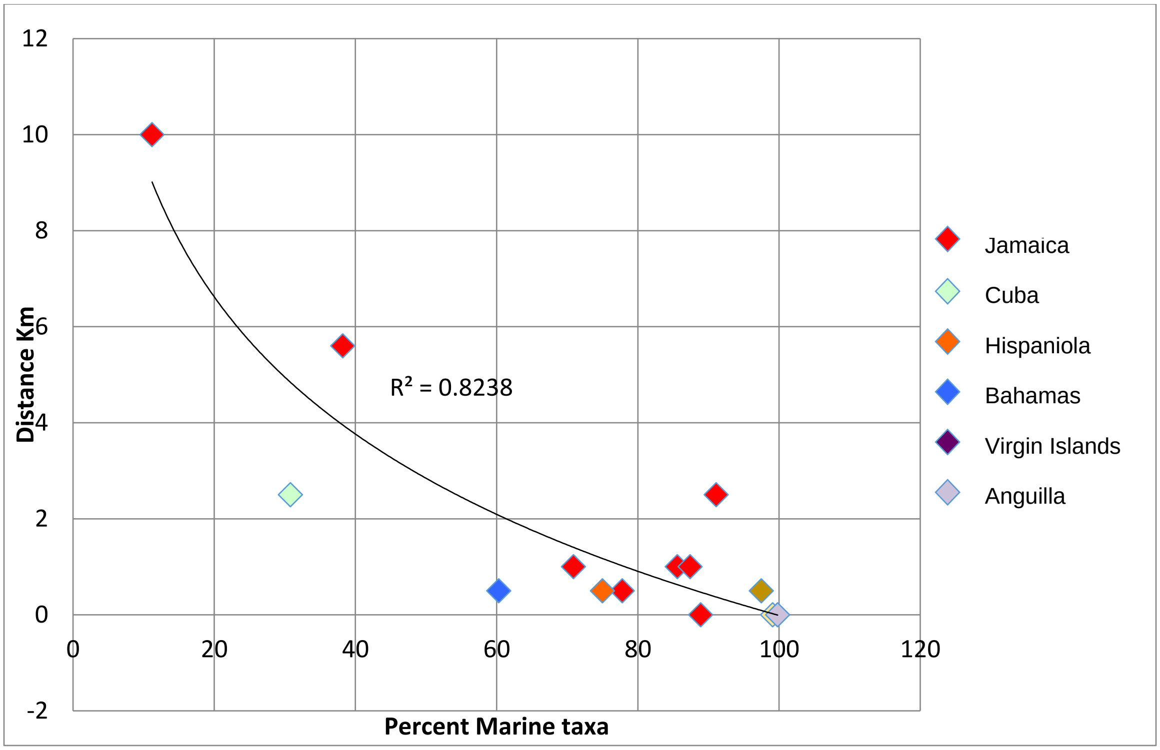

Figure 42: **Distance of non Puerto Rican sites to coast plotted against percent marine taxa in assemblage.**

Species and Habitats Represented

In order to evaluate whether specialized foraging and subsistence practices occur within the data set, I consider different classes of animals that are present, followed by an analysis of habitats, and specifically marine habitats exploited at each site. An analysis of specialization in subsistence potentially will differentiate sites and islands into dietary patterns.

Table 20 and Figure 43 presents the percentages of each animal class for sites in the dataset. Represented are all of the specimens in the collection that can be identified to the class level, which includes most of the identifiable vertebrate assemblages. As indicated, for the most part, fish represent the highest percentage of exploited vertebrates at any given site. There are a few exceptions including the inland Jamaican site of White Marl and inland Puerto Rican site of La Jacanas which have high percentages of mammals. Coralie, from the Bahamas, has the highest percentage of reptiles in the collection, these being sea turtles. The site of Coralie is likely a specialized site for turtle capture and processing, accounting for the large numbers of turtle remains (Carlson 1999).

Site	% Mammals	% Bird	% Reptile	% Amphibian	% Fish
Maima	11	0.7	0.1	0	88.2
Bluefields Bay	22.2	0.1	0.2	0	77.4
Fairfield	5.9	0.9	2.1	0	91
Cranbrook	11.9	0.4	0.6	0	86.9
White Marl	52.8	3.8	5.3	0	38.2
Vega del Palmar	59.7	0.5	0.9	0	31
Rio Tanama AR-39	21.2	13.6	16.2	0.06	48.7
Rio Tanama AR-38	35	1.2	3.8	0	59.7
La Jacanas	61.6	1.2	15.5	0	21.6
La Mineral	14.9	2.9	29.8	0	52.2
Los Gongolones	34.0	0	1.1	0	63.9
Coralie	0	0.9	58.2	0	40.9
Barnes Bay	0.3	0.4	0.3	0	99
Sandy Ground	0.05	0.05	2	0	97.8
Cinnamon Bay	1.8	0.3	0.4	0	97.5
Tibes	14.6	6.3	4.5	0.1	74.5
El Bronce	18.2	0	13.1	0	68.7
Maisabel	2.1	7.4	7.9	0	82.6
En Bas Saline	6.5	1.5	7	0	85

Table 20: Vertebrate faunal class data from comparative Caribbean dataset.

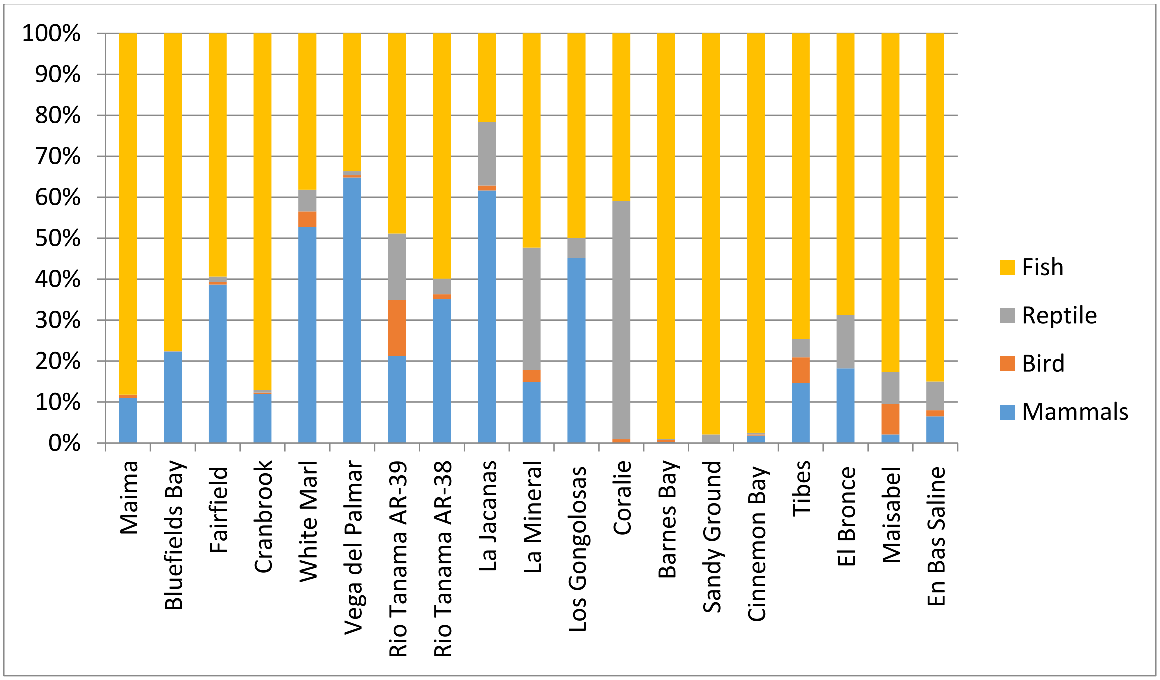

Figure 43: **Bar graph displaying vertebrate faunal classes from comparative Caribbean dataset.**

It is clear from Table 20 and Figure 43 that mammals, reptiles, and fish are the three most important classes at most sites. With that in mind Figure 44 plots these three categories on a tri-plot to visualize which classes are most abundant in what regions and on what islands. Most of the sites lean towards being abundant in fish, but it is the Jamaican sites that most cluster towards that area of the graph. As in the site location analysis, the Puerto Rican sites also cluster together closer towards the mammal portion of the graph, likely due to their inland settlement pattern. It is also clear that the smaller islands of Anguilla and the Virgin Islands have a heavy reliance on fish. Despite those sites representing different Taíno cultural groups, they appear to have similar subsistence patterns based on their location on the coast of small islands.

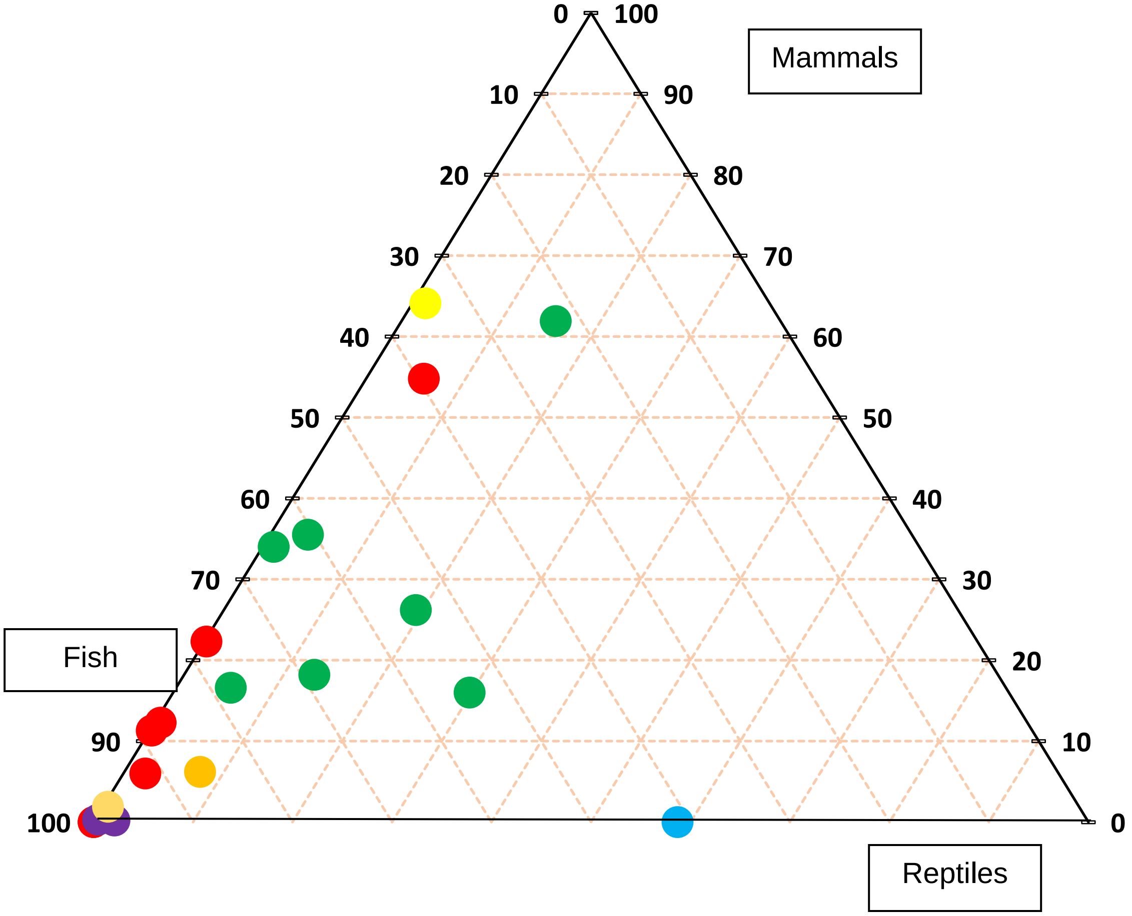

Figure 44: **Tri- plot charting the representation of fish, mammals, and reptiles in the dataset by sites on different islands.**

Marine Habitat Analysis

The following analysis subdivides faunal assemblages by marine habitats in order to undertake a finer-grained analysis of subsistence practices. The analysis only uses data from the bony fish assemblages. Furthermore, the analysis only uses data from taxa that can be assigned confidently to a particular habitat. Marine turtles are excluded because they crossover habitats and therefore cannot be assigned to a specific marine habitat. This reduces the number of specimens included in the analysis, leaving a number of sites with very small assemblages. Where small NISP counts are present, differences of just one or two bones can have a large impact on the calculated percentages. I have consequently removed these sites including Rodney House and Bellevue from Jamaica and Rio Tanama-38, La Mineral, Los Gongolones, and El Bronce from Puerto Rico. Table 21 presents habitat data from all the sites in the dataset, and as indicated in the total fish NISP column, all sites with an identified NISP of fish less than 100 were removed for the remainder of consideration.

Table 21 looks more closely at specific habitats and fish were categorized as being from freshwater, brackish, coral reef, inshore, and pelagic habitats. Considering the fish habitat data visually (Figure 45), it appears as though three habitats dominate the assemblage, coral reef, inshore, and pelagic fish. Brackish fish are variable and are likely due to the availability of brackish environments in relation to the sites. Coral reef fish are the most abundant in the collection as a whole, although when there are fewer coral reef fish, they are usually outnumbered by inshore and occasionally pelagic fish.

The variability in habitat exploitation, in general, is likely due to site proximity to certain environments. Coastal sites overall have more coral reef resources, which are common to coastal environments but not guaranteed or as common as inshore habitats. However, when considering coastal sites alone, where inhabitants are fishing on a regular basis, variability exists between coral reef, inshore and pelagic habitat use. That could be due to a site's proximity specifically to a coral reef, although coastal sites like Maisabel and Vega del Palmar, are closely located to reef environments but have a relatively high percentage of inshore and pelagic fish. It may be that fishing technology is impacting fish habitat exploitation patterns. Pelagic species are captured with hook and line and require a suitable watercraft for open ocean environments (Keegan 1985; Wing and Wing 1999; Wing 2001b). It also may be selective choice of particular types of fish.

Finally, my third hypothesis was that greater selectivity in species choice would occur when fish were transported or traded from coastal to inland locations. The previous analysis showed that most fish assemblages are dominated by three habitats, coral reef, inshore, and pelagic. I now consider whether inland sites have faunal data representing the same marine habitats as is the case for coastal sites. I do this by comparing the percentages of fish from the three dominant habitat categories (Table 22).

Site	Freshwater	%	Brackish	%	Coral Reef	%	Inshore	%	Pelagic	%	Total Fish NISP
Maima	0	0	0	0	189	82.5	18	7.8	22	9.7	229
Bluefields Bay	0	0	0	0	765	83.7	148	16.2	0	0	913
Fairview	0	0	18	1.3	679	44.2	80	5.3	756	49.2	1537
Cranbrook	0	0	2	.6	309	83.3	26	7.2	33	8.9	371
Rodney House	3	3.8	0	0	35	44.8	39	50	1	1.2	78
White Marl	0	0	0	0	70	25.0	205	74.5	4	1.4	279
Bellevue	2	13.3	0	0	2	13.3	10	66.6	1	6.6	15
Cinnamon	2	1.3	0	0	106	73.6	11	7.6	25	17.3	144
Vega del Palmar	0	0	0	0	70	33.9	136	66.1	0	0	206
Rio Tanama AR-39	0	0	69	40.1	45	26.1	56	32.6	2	1.2	172
Rio Tanama AR-38	0	0	0	0	0	0	2	100	0	0	2
La Jacanas	0	0	12	4.7	213	83.5	28	10.9	2	0.7	255
La Mineral	0	0	0	0	7	77.7	0	0	2	22.2	9
Los Gongolones	0	0	2	33.3	2	33.3	2	33.3	0	0	6
Coralie	0	0	0	0	3583	93.7	156	4.0	83	2.1	3823
Barnes Bay	0	0	0	0	1438	87.3	34	2.0	175	10.6	1647
Sandy Ground	0	0	0	0	1666	57.2	157	5.3	1085	37.3	2908
Cinnamon Bay	0	0	7	0.6	741	71.3	157	15.1	134	13.8	1039
El Bronce	14	17.7	0	0	20	25.3	44	55.6	1	1.2	79
Maisabel	5	3.2	0	0	64	41.0	44	28.2	43	27.5	156
En Bas Saline	6	3.5	0	0	108	63.5	47	27.6	9	5.2	170

Table 21: **Marine habitat data (NISP and %NISP) for all sites the Caribbean dataset.**

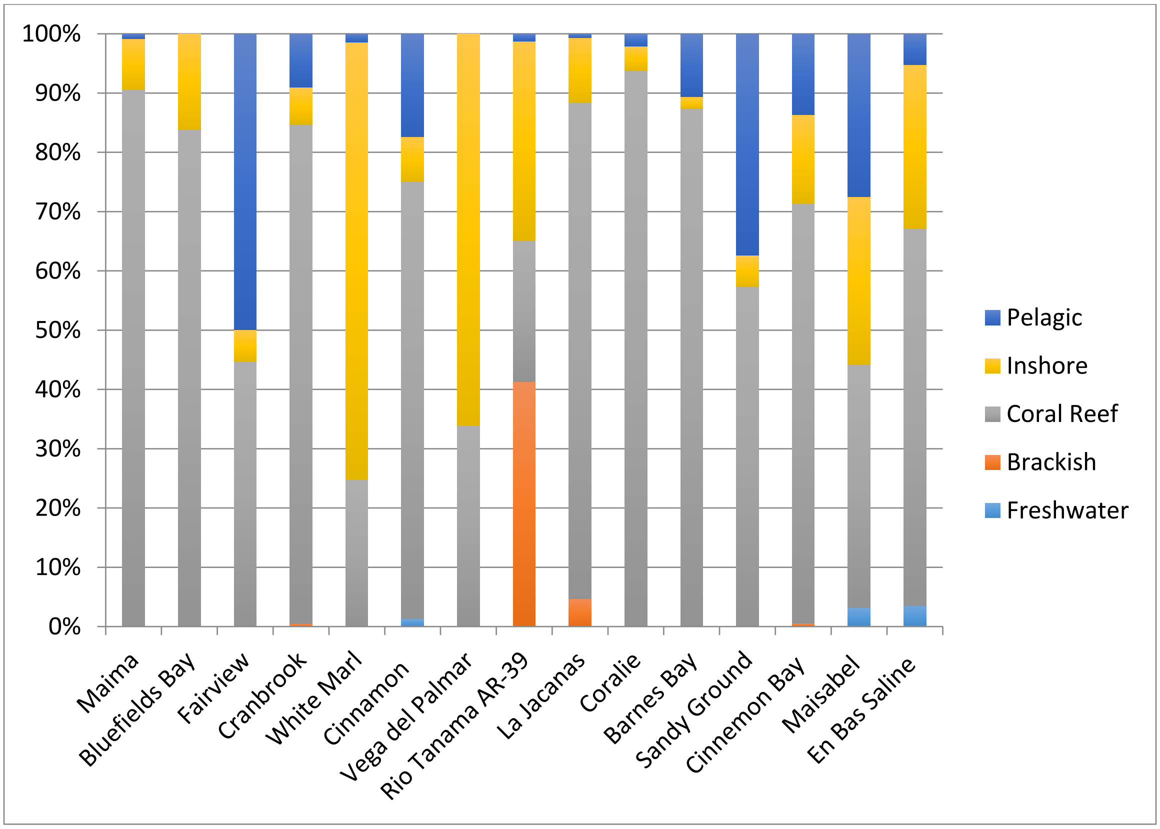

Figure 45: **Bar graph showing marine species habitat data Caribbean dataset.**

Site	Coral Reef NISP	%	Inshore NISP	%	Pelagic NISP	%	Total
Maima	189	90.4	18	8.6	2	0.9	209
Bluefields Bay	765	83.7	148	16.2	0	0	913
Fairview	679	45.1	80	5.3	746	49.5	1505
Cranbrook	309	85.6	26	7.2	26	7.2	361
White Marl	70	25.1	205	73.4	4	1.4	279
Cinnamon	106	74.6	11	7.7	25	17.6	142
Vega del Palmar	70	34.0	136	66.0	0	0	206
Rio Tanama AR-39	45	44.5	56	55.4	0	0	101
La Jacanas	213	87.6	28	11.5	2	0.8	243
Coralie	3583	93.7	156	4.0	83	2.1	3822
Barnes Bay	1438	87.3	34	2.0	175	10.6	1647
Sandy Ground	1666	57.2	157	5.3	1085	37.3	2908
Cinnamon Bay	741	71.8	157	15.2	134	13.0	1032

Maisabel	64	42.3	44	29.2	43	28.5	151
En Bas Saline	108	65.9	47	28.7	9	5.4	164

Table 22: Habitat data for sites with NISP over 100, coral reef, inshore, and pelgaic habitats.

Figure 46 examines the presence of fish from each habitat by island while Figure 47 plots the presence of fish by Taíno culture group. These plots illustrate that there is a lack of pattern for habitat exploitation when correlated with island, island size, and Taíno cultural region. However, when a site's location of coastal versus inland is considered, a pattern is present as shown in Figure 48. Coastal sites generally have higher percentages of coral reef fish, with inland sites having higher percentages of inshore or pelagic fish. A notable exception is the site of La Jacanas, Puerto Rico, which has a high percentage of reef fish despite being an inland site.

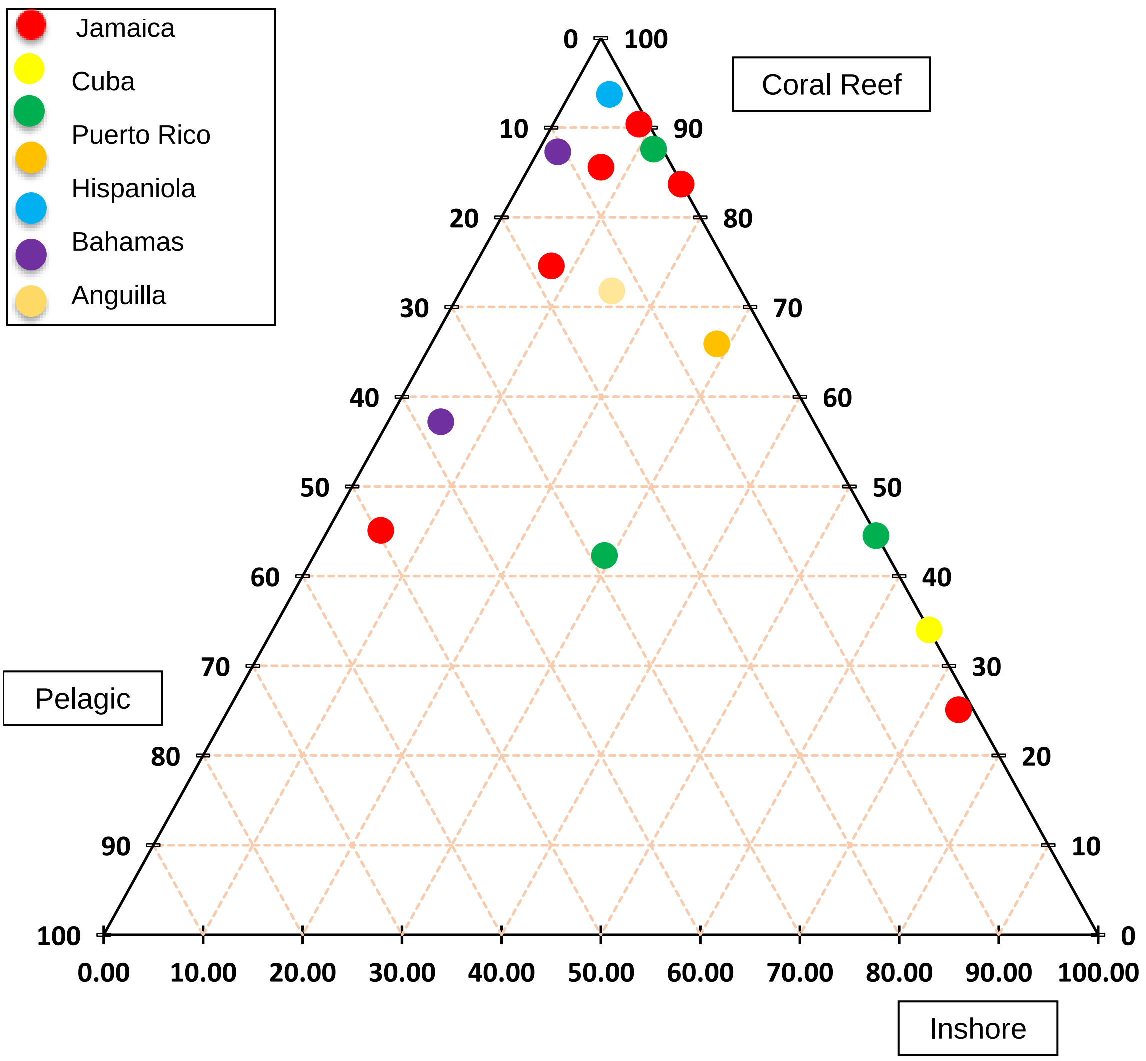

Figure 46: **Tri-plot indicating percentages of reef, pelagic, and inshore fish, plotted by island.**

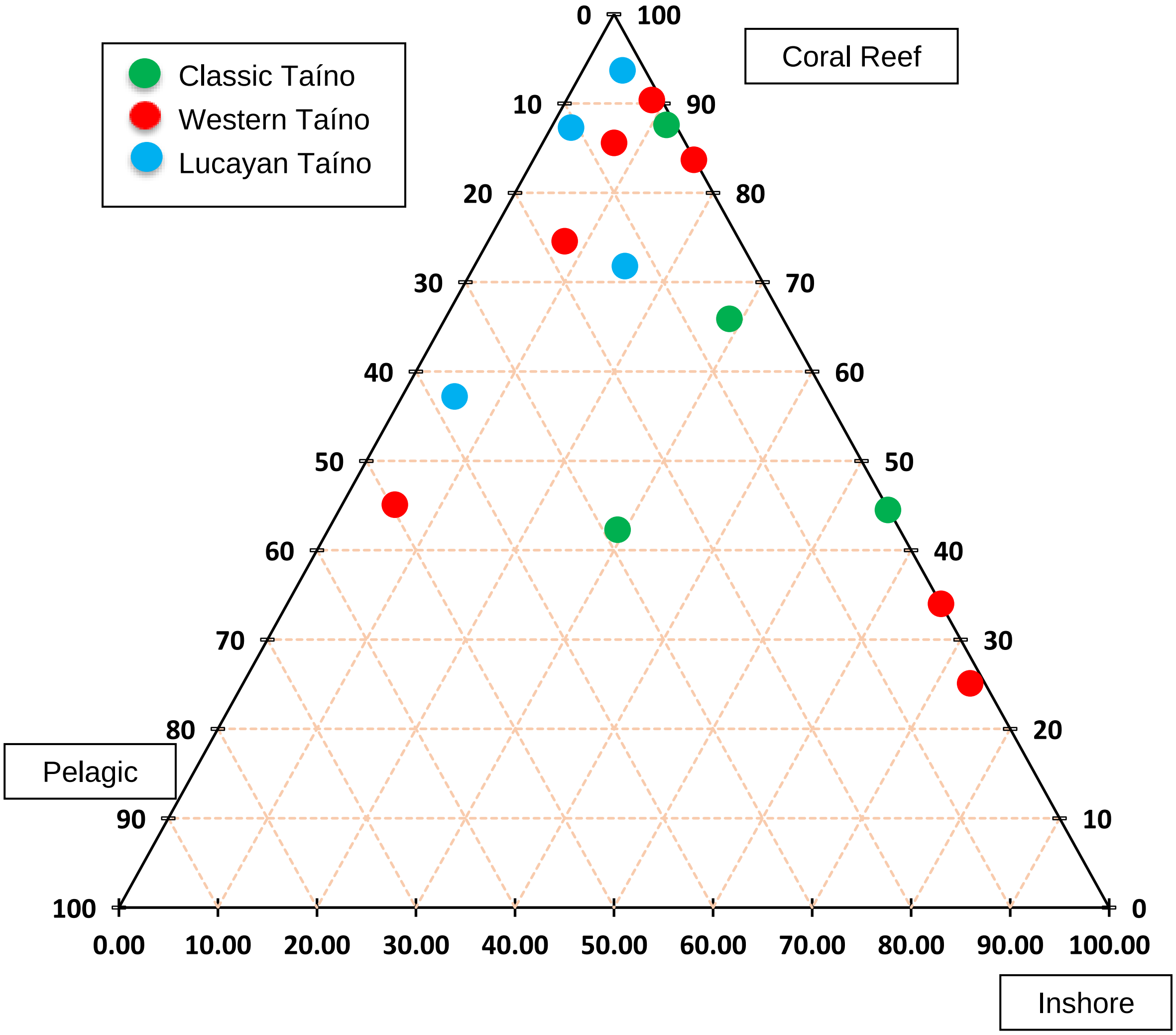

Figure 47: **Tri-plot indicating percentages of reef, pelagic, and inshore fish, plotted by Taíno group identification.**

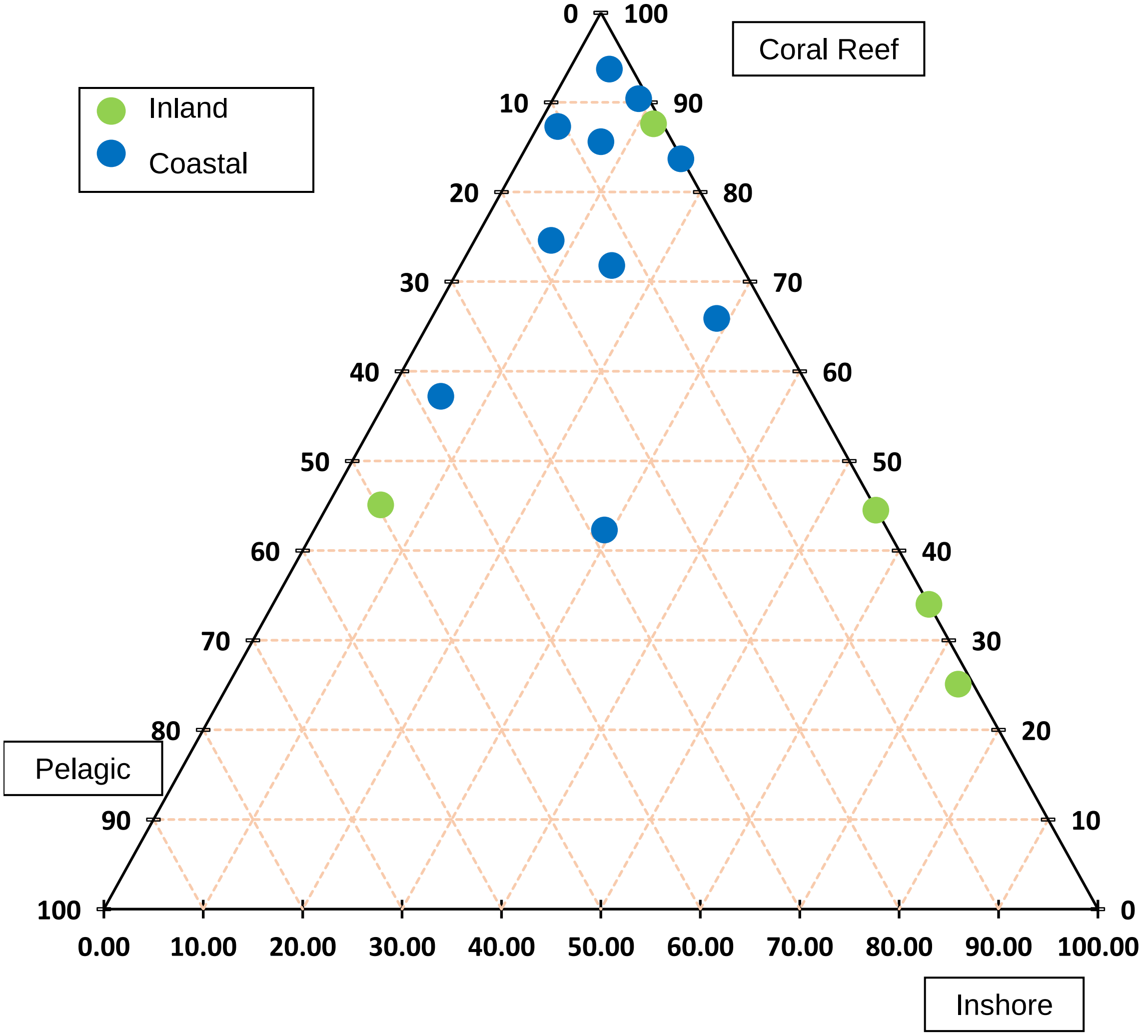

Figure 48: **Tri-plot indicating percentages of reef, pelagic, and inshore fish, plotted by inland and coastal site locations..**

This pattern of coral reef fish being more prominent on coastal sites and not being transported inland applies to all of the islands and regions considered in this study. Whether a site is located on Puerto Rico, Jamaica, Cuba, Hispaniola, or any of the other smaller islands does not affect the pattern. There are several factors potentially contributing to the pattern including dietary preference, species status as conspicuous consumption, and differential abilities to preserve fish for transport.

Summary of Comparative Analysis

The comparative analysis of cross-Caribbean faunal assemblages provides informative results relative to late pre-contact era subsistence strategies. At the beginning of the chapter, I proposed three hypotheses to be examined. The first suggested inland sites will have relatively less marine fauna than coastal sites. This is logical and expected, and the data confirm this association. The data, however, show not only a coastal/inland distinction but a correlation between distance from the shore and percent marine fauna. In the second hypothesis, I propose that faunal exploitation patterns will be consistent between island types with similar habitats rather than illustrating variation between Taíno culture groups. My analysis of fish habitat exploitation patterns found no variation between Taíno culture groups but also little patterning within island groups, with the notable exception of the Puerto Rican sites. Rather, it emphasized the importance of site location and available resources as underlying factors in exploitation across the Taíno region as a whole. The third hypothesis stated that species selectivity will characterize the movement of marine resources from the coast to inland sites. Analysis of the data verifies this proposition in that reef fish, while abundant at most coastal sites, were present in far fewer numbers at inland sites compared to inshore and pelagic species. What this pattern potentially means can only be speculated upon but serves as an intriguing result for future consideration and research.

As a final observation, I suggest future research in cross-Caribbean subsistence strategies could benefit from enhanced methodological consideration. The identification and reporting of species NISP rather than MNI only will provide a larger number of comparative sites for consideration. Reporting of local site environments and adjacent habitats similarly informs comparative analyses and facilitates more in-depth inference. And site reports and other publications on faunal analyses need to include a detailed discussion of field and analytic methodologies on how faunal remains were recovered, how they were identified, and why they are quantified in the way they are being presented.

Chapter 8.

Conclusions

My goals for this study were to focus on two critical undertakings. First, I sought to identify and analyze the Maima faunal remains, providing interpretive information for this site to flesh out and complement other aspects of archaeological data. Chapters 5 and 6 take on this task. Second, I sought to place Maima in the context of a wider Jamaican and Caribbean comparative analysis. This meta-analysis was a means of identifying what made Maima unique and what made it similar to other sites in the area and the region. Simultaneously this comparative analysis facilitated research into subsistence patterns and resource use in the late pre-contact era Taíno Caribbean more broadly. Chapter 7 provides this study. In this conclusion, I summarize these findings by first examining results and interpretations from the comparative analysis. I subsequently focus a final discussion on Maima and insights gained from zooarchaeology at the site.

Faunal Exploitation in Wider Late Pre-Contact Era Caribbean

In Chapter 7, I examined the measures of richness and evenness as well as site placement on the landscape and its habitat. I sought to explore the correlation between a site's location in the Caribbean and whether subsistence patterns varied between islands and between Rouse's archaeological constructs of Western, Classic, and Lucayan Taíno peoples. The result is not surprising—subsistence pattern is dictated by a site's location, whether coastal or inland. The study of fish resources and habitats yield the most detailed insight. These species are the most abundant source of protein across the whole of the Caribbean islands (Giovas 2013). Marine resources are present at both inland and coastal sites but differentially so in composition. On coastal sites, there are greater numbers of reef fish compared to inland sites, where inshore species dominate. Why the latter is the case remains to be determined. Both coastal and inland sites also include other types of vertebrate fauna including the hutia, guinea pig, birds, turtles, and other reptiles. These are supplementary components to the diet, especially for inland sites where their remains are present in higher numbers. Patterns noted in Chapter 7 shed light on subsistence strategies of the late pre-contact era.

Caribbean archaeologists have found substantive evidence that the Taíno and other pre-contact period people of the region were responsible for resource depletions (Blick 2007; Fitzpatrick 2008; Hardt 2008; Keegan et al. 2003; Pestle 2013b; Wing and Wing 2001). Comparative studies illustrate over time a decrease in species variability, changes in environments exploited, and diminished sizes of animals (Wing and Newsome 2004; Wing and Wing 2001). However, at Maima, and at other late prehistoric Taíno sites in Jamaica, these patterns are not so apparent. Changes in environmental availability, habitat use, or focal species in subsistence seems absent or minimal. It is difficult to infer why this is the case. Wing (2001a; 2001b), Wing and Newsom (2004) and Wing and Wing (2001) have shown through the analysis of both faunal and paleoethnobotanical remains that subsistence and subsistence change depend on the region in which a site is located. In this model for Caribbean subsistence strategies, choice is a reflection of availability and not of cultural dictates (Wing 2001a; 2001b; Wing and Wing 2001). Evidence for resource depletion illustrates an over-reliance on particular species as a result of their original availability. This model is interesting for, while the Maima diet appears to have remained constant throughout the late pre-contact era, evidence of resource over-exploitation of the area was not observed.

Other factors influential to subsistence practice could be the purposeful introduction of animals to specific areas and the socio-economic role these animals came to play. As noted in Chapter 3, zooarchaeological studies in the Caribbean have drawn connections between subsistence economy and social status, particularly on Puerto Rico (Curet and Pestle 2010; deFrance et al. 2010; Duchemin 2013; LeFabvre and deFrance 2014). Duchemin (2013) described a coast-inland tribute system in Puerto Rico, where resources from the coast were transported long distances to inland sites. At Tibes, for example, pelagic fish were identified in ceremonial contexts, and archaeologists working on the site have interpreted their presence as an indicator that they were being consumed ritually or communally. Unfortunately, evidence for communal or ceremonial consumption of species in Jamaica has yet to be found.

The introduction of the guinea pig to the region, particularly Hispaniola and Puerto Rico where it is found in the highest numbers, had a particular effect on the connection of animals to the Taíno social structure but would have had minimal effect on overall subsistence (LeFabvre and deFrance 2014). Commonly found in socially significant spaces, guinea pig bone has become an indicator of hierarchical and shamanistic behavior for Taíno society (Curet and Pestle 2010). There is suggestion that the hutia could have acted as a stand-in for guinea pig on islands where they were unavailable (LeFabvre and deFrance 2014:37) howver, substantial evidence for this interpretation is lacking. In fact, outside of the ceremonial center of Tibes on Puerto Rico, there is no evidence that social hierarchies or other social processes significantly affected subsistence practices or resources.

Finally, horticultural and agricultural intensity at these sites is varied, and it is unfortunate that archaeologists have not yet been able to study this to any degree. We know that Taíno villages throughout the Greater Antilles and Bahamas produced the majority of their food through agricultural endeavor (Berman and Pearsall 2008; Newsom and Wing; Pagán-Jiménez 2013). Ethnobotanical and archaeobotanical studies in the Caribbean similarly record an agricultural based economy from ethnographic and stable isotope data (Berman and Pearsall 2008; Pagán-Jiménez 2008; 2011; 2013; Pestle 2013a). There has yet to be any large-scale archaeological study of how much of the Taíno diet was dependent on agricultural produce in comparison to how much was provided by hunting hutia, fishing, and marine mollusc capture practices.

Faunal Exploitation in Pre-contact Era Jamaica and at Maima

The Jamaican sites incorporated within the comparative Caribbean dataset indicate distinct differences in subsistence practices between site locations on the coast versus inland. Coastal sites like Maima, Cranbrook, Cinnamon, and Fairview have similar marine resource profiles, no doubt due to their proximity to reef environments and similar suites of resources available for exploitation (Figure 45). The more inland sites of White Marl and Bellevue have a higher reliance on hutia, while marine resources tend to be restricted to inshore and pelagic fish species (Newsom and Wing 2004:194).

Focusing specifically on Maima relative to other Caribbean sites, the subsistence economy fits well with the overall pattern. Taíno inhabitants of Maima relied heavily on reef resources, presumably from the nearby reef in St. Ann’s Bay. Some evidence of pelagic and inshore fish was found, but the vast majority of both fish and marine molluscs were from the reef. The strategy for fish capture at Maima was possibly varied as assumed throughout the Caribbean. Stone net weights, nevertheless, are the only archaeological evidence we found at Maima for fish capture strategies. The weights, we assume were used with seine nets that are characteristically pulled across the reef. This type of net does not discriminate in its capture, meaning its use results in a wide spectrum assemblage of fish species as we have documented at Maima. Similar to other north coastal Jamaican sites, a small percentage of the vertebrate taxa at Maima were hutia, a supplement to the protein part of the diet. Age profiles of hutia present in the Maima collection possibly suggest they were domestically penned as opposed to being hunted.

Reflections on Maima Fauna or Lack Thereof

Maima fits the standard profile for faunal remains in Jamaican sites as noted, but what differentiates this site from several others is a relative lack of vertebrate and invertebrate taxa. The size of the village spans an area of approximately 1.5 hectares, and has a time depth of almost 500 years for deposits. We would then anticipate a far more robust faunal recovery as a consequence. In fact, there are far fewer vertebrate faunal remains at Maima than most comparable sites in Jamaica. The question of why this is the case is problematic, particularly as it might reflect upon subsistence practices of the Maima residents. Possible explanations may be potential preservation bias, scavenging by dogs, site layout, or a subsistence economy centrally focused on horticulture.

In respect of limited faunal remains, there are other sites in the Caribbean that are similar to Maima. The large site of Tibes in Puerto Rico, for example, includes only 3,868 bones, a number far fewer than other smaller settlements (deFrance 2010). Tibes was a ceremonial complex not a village occupation *per se*. However, Duchemin (2013), also working in Puerto Rico, found limited numbers of vertebrate fauna in his excavations of shell midden sites. He attributes this to a complex system of centralized food production while evoking a prey choice model (Lupo 2006; Marshall 1991) where hutia and fish were sought after, but the more difficult resources to capture were taken to the ceremonial center in support of social hierarchy. On Jamaica, the site of Cranbrook, in St. Mary Parish, has a comparable amount of vertebrate remains to Maima; why faunal remains are scarce at the Cranbrook site is not addressed (Allsworth-Jones and Wesler 2012a; Carlson 2012).

The most logical of answers for limited faunal assemblages are factors of recovery and preservation where faunal data are simply missed or not preserved. I have described our recovery techniques employing nested sieves of 6.4 and 3.2 mm size and feel confident the integrity of the field methods applied did impact recovery rates. Considerations of preservation may apply in part to vertebrate faunal remains, but it would need to be examined across the site. In some areas, Houses 7 and 8 for example, the vertebrate faunal assemblage incorporates abundant small bone including spinal processes of fish, small fish vertebrate, as well as small mammal phalanges. These illustrate a site matrix in which bone degradation has been limited if occurring at all. In other areas of the site where little to no vertebrate taxa were recovered, such as House 10, additional sampling was undertaken and this replicated results of the initial excavation. In the case of House 10, post-abandonment site processes may have led to this lack of faunal bone. As earlier noted water flow across the house platform removed the house floor and shallow deposits therein, including fauna (Burley 2017:343).

In Chapter 6, I have reported evidence for the presence of dogs at Maima within the faunal assemblages. Dogs, as scavengers, may also explain in part the limited amount of vertebrate faunal data. Evidence of dogs occurs at other sites in Jamaica including White Marl and Cranbrook (Carlson 2009; Wing 2008). In these sites, the dog bones were found midden contexts as is the case of Maima. Also, like Maima, the site of Cranbrook included dog remains and has far fewer faunal remains than would be expected (Table 20). Nevertheless, in both cases, there is little to no taphonomic evidence for gnawing or puncture marks on any of the bones.

Another possible explanation for the relative lack of vertebrate remains is sampling bias across a considerable village. Our excavations of Maima were centered on household structures at Maima East except for a single 1 x 1 m test unit in a house at Maima West. It is possible that vertebrate faunas were being processed, cooked, and consumed in specialized areas away from household structures. To confirm or reject this hypothesis would require additional sampling. A spatially extensive and systematic auger test project was undertaken at Maima East and, at least as could be observed in removed matrices, faunal remains were for the most part absent.

As with vertebrate taxa, invertebrate abundance at Maima seems low, and its distribution is concentrated to house floor remains or small nearby pocket middens. As well as could be identified by surface features, the number of these middens is few. The most abundant species recovered from excavation is *Codakia orbicularius*, including an MNI count of 1609; this accounts for 55% of the total MNI for marine molluscs across the site (Table 11). If one assumes an average meat weight of 10 to 15 g per individual (Wing 2001b:497), the total meat weight contribution to diet then is only in the range 16 to 24 kg of protein. One can hardly suggest this to be a dietary staple given the length of time Maima was occupied. I also note that the presence of this species is substantially lower in House 10, especially given the relative size of the House 10 excavation. This discrepancy again suggests water scouring as a potential disturbance factor altering House 10 faunal recovery.

Finally, and given the preceding discussion, I suggest that the limited fauna at Maima are possibly a reflection of a Maima subsistence economy that is almost totally centered on agriculture. Small gardens seem to be associated with individual households, but these would be incapable of generating the scale of production needed to sustain a village in the longer term. Researchers in the wider Caribbean have noted the intensive production of root crops like manioc were aimed at creating surpluses (Newsom and Wing 2004; Pagan-Jimenez 2013:393). Additionally, researchers have suggested that this intensification accompanied the transition from horticulture to agriculture, evidenced by technological changes including irrigation, terracing, and raised fields (Newsom and Wing 2004; Pagan-Jimenez 2013:393). These raised fields would have produced large quantities of root crops such as manioc and sweet potatoes. Recent paleoethnobotanical and stable isotope analyses into Caribbean agricultural practices have also noted the presence and importance of maize (Berman and Pearsall 2008; Pagan-Jimenez 2011a; Pestle 2010). Thus, as I have suggested in the introduction to Chapter 3, vertebrate and invertebrate faunas at Maima potentially represent no more than relish, a component of the diet that produces some variability or was used for conspicuous consumption. This is a consideration that might be examined for other sites with limited fauna across the Caribbean

The Contact Era in Maima Fauna or Lack Thereof

European contact with the Taíno peoples of Maima began with Christopher Columbus in 1503-1504 when he was stranded in St. Ann's Bay for a year. With the establishment of Seville la Nueva in 1509, we must expect intense interactions given the colony’s location less than a kilometer from the village. These encounters notwithstanding, tangible evidence for this contact is limited to no more than a few European items and isolated skeletal elements of caperine and cow. This suggests that the nature of contact involved little in the way of trade and likely was a one-sided encounter. Deagan (2004), at En Bas Saline on Hispaniola, similarly found little in the way of European goods or fauna to indicate Spanish engagement. She framed this as purposeful resistance to Spanish lifeways. The brief encounter evidenced at Maima suggests that Maima was rapidly abandoned soon after the settlement of Sevilla la Nueva. Further research on the contact era at Maima would be necessary to address the concept of purposeful resistance.

Future study of Spanish-Taíno encounters in Jamaica will be challenged accordingly. Specifically, within the area of zooarchaeology, faunal and foodways studies have the potential to survey the changing lifeways and culture of indigenous Caribbean peoples. While contact era sites are rare and, as seen in the case of Maima, often contain little amounts of European materials, they should nonetheless be surveyed, recorded, and considered. The contact era caps the story of the Taíno, as they were before contact, in a way unique to the Americas. To learn of the final years of a culture that no longer exists as it did before contact is a job that archaeologists should be eager to take on.

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Appendix A.

Maima Faunal Catalog

Maima Invertebrate Catalog

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	A4	2, 5-10cm		Acropagia fausta	Bivalve	1	1		whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Acropagia fausta	Bivalve	4	2		3/4	Shallow marine
7	A4	3, 10-15cm	25/4/15	Acropagia fausta	Bivalve	4	1		>1/4	Shallow marine
7	A4	5, 20-25cm		Acropagia fausta	Bivalve	1	1		>1/4	Shallow marine
7	A7	1, 0-5cm	1/5/15	Acropagia fausta	Bivalve	2	1		>1/4	Shallow marine
7	A7	2, 5-10cm	1/5/15	Acropagia fausta	Bivalve	3	2		whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Acropagia fausta	Bivalve	6	3		1/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Acropagia fausta	Bivalve	3	1		>1/4	Shallow marine
7	A7	5, 20-25cm	2/5/15	Acropagia fausta	Bivalve	2	1		1/4	Shallow marine
7	A7	6, 25-30cm	2/5/15	Acropagia fausta	Bivalve	2	2		whole	Shallow marine
7	A7	6, 25-30cm	2/5/15	Acropagia fausta	Bivalve	1	1		1/4	Shallow marine
7	A8			Acropagia fausta	Bivalve	7	4		whole	Shallow marine
7	A8			Acropagia fausta	Bivalve	12	3		1/4	Shallow marine
7	B4			Acropagia fausta	Bivalve	3	2		whole	Shallow marine
7	B4			Acropagia fausta	Bivalve	1	1		1/2	Shallow marine
7	B4			Acropagia fausta	Bivalve	4	1		1/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Acropagia fausta	Bivalve	6	3		1/4	Shallow marine
7	C5	2, 5-10cm	29/4/15	Acropagia fausta	Bivalve	3	2		whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Acropagia fausta	Bivalve	9	3		1/4	Shallow marine
7	C5	3, 10-15cm	29/4/15	Acropagia fausta	Bivalve	1	1		whole	Shallow marine
7	C5	3, 10-15cm	29/4/15	Acropagia fausta	Bivalve	2	1		>1/4	Shallow marine
7	C5	4, 15-20cm	29/4/15	Acropagia fausta	Bivalve	1	1		whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	C5	4, 15-20cm	29/4/15	Acropagia fausta	Bivalve	3	1		1/4	Shallow marine
7	C5	6, 25-30cm	29/4/15	Acropagia fausta	Bivalve	1	1		3/4	Shallow marine
7	C5	6, 25-30cm	29/4/15	Acropagia fausta	Bivalve	4	1		>1/4	Shallow marine
7	D5			Acropagia fausta	Bivalve	6	3	large	whole	Shallow marine
7	D5			Acropagia fausta	Bivalve	8	2		1/2	Shallow marine
7	D5			Acropagia fausta	Bivalve	22	8		>1/4	Shallow marine
7	D6			Acropagia fausta	Bivalve	9	5		whole	Shallow marine
7	D6			Acropagia fausta	Bivalve	2	1		1/4	Shallow marine
7	E5			Acropagia fausta	Bivalve	5	3		whole	Shallow marine
7	E5			Acropagia fausta	Bivalve	6	2		1/2	Shallow marine
7	E5			Acropagia fausta	Bivalve	17	3		1/4	Shallow marine
8		10, 50-60cm	23/4/15	Acropagia fausta	Bivalve	3	2		whole	Shallow marine
8		12, 65-70cm	24/4/15	Acropagia fausta	Bivalve	1	1	large	whole	Shallow marine
8		2, 5-10cm	21/4/15	Acropagia fausta	Bivalve	1	1		1/4	Shallow marine
8		7, 35-40cm	22/4/15	Acropagia fausta	Bivalve	2	1		whole	Shallow marine
8		7, 35-40cm	22/4/15	Acropagia fausta	Bivalve	1	1		1/2	Shallow marine
8		8, 40-45cm	22/4/15	Acropagia fausta	Bivalve	2	1		whole	Shallow marine
8		9, 45-50cm	23/4/15	Acropagia fausta	Bivalve	1	1		whole	Shallow marine
8		9, 45-50cm	23/4/15	Acropagia fausta	Bivalve	1	1		1/2	Shallow marine
8		PHF 20-40cm	23/4/15	Acropagia fausta	Bivalve	3	2		whole	Shallow marine
10	F10	1		Acropagia fausta	Bivalve	1	1		whole	Shallow marine
10	F10	1		Acropagia fausta	Bivalve	1			>1/4	Shallow marine
10	F11	1		Acropagia fausta	Bivalve	3	1		>1/4	Shallow marine
10	G14	2		Acropagia fausta	Bivalve	1	1		>1/4	Shallow marine
10	H10	2		Acropagia fausta	Bivalve	1	1		whole	Shallow marine
10	H11	1		Acropagia fausta	Bivalve	2	2		whole	Shallow marine
10	H11	1		Acropagia fausta	Bivalve	1	1		1/4	Shallow marine
10	I8	1		Acropagia fausta	Bivalve	1	1		whole	Shallow marine
10	I8	1		Acropagia fausta	Bivalve	2	1		1/4	Shallow marine
10	I8	2		Acropagia fausta	Bivalve	1	1		>1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
10	I9	1		Acropagia fausta	Bivalve	1	1		whole	Shallow marine
10	I9	1		Acropagia fausta	Bivalve	2	1		>1/4	Shallow marine
10	I9	2		Acropagia fausta	Bivalve	2	1		whole	Shallow marine
10	J8	1		Acropagia fausta	Bivalve	1	1		whole	Shallow marine
10	J8	1		Acropagia fausta	Bivalve	2	1		1/4	Shallow marine
10	M13			Acropagia fausta	Bivalve	3	2		whole	Shallow marine
10	M13			Acropagia fausta	Bivalve	2	1		1/2	Shallow marine
11		7, 35-40cm		Acropagia fausta	Bivalve	2	1		>1/4	Shallow marine
12		1, 0-5cm	28/4/15	Acropagia fausta	Bivalve	3	2		>1/4	Shallow marine
12		2, 5-10cm	28/4/15	Acropagia fausta	Bivalve	1	1		3/4	Shallow marine
12		2, 5-10cm	28/4/15	Acropagia fausta	Bivalve	3	1		>1/4	Shallow marine
12		3, 10-15cm	28/4/15	Acropagia fausta	Bivalve	2	1		1/2	Shallow marine
12		4, 15-20cm	28/4/15	Acropagia fausta	Bivalve	2	1		>1/4	Shallow marine
12		5, 20-25cm	28/4/15	Acropagia fausta	Bivalve	1	1		3/4	Shallow marine
12		5, 20-25cm	28/4/15	Acropagia fausta	Bivalve	2			1/4	Shallow marine
13		1, 0-5cm		Acropagia fausta	Bivalve	1	1		>1/4	Shallow marine
14		2, 5-10cm		Acropagia fausta	Bivalve	3	1		>1/4	Shallow marine
14		3, 10-15cm		Acropagia fausta	Bivalve	10	2		>1/4	Shallow marine
7	A4	1, 0-5cm		Adamsiella sp.	Gastropod	1	1		whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Adamsiella sp.	Gastropod	1	1		whole	Shallow marine
8		1, 0-5cm	21/4/15	Adamsiella sp.	Gastropod	1	1		whole	Shallow marine
8		2, 5-10cm	21/4/15	Adamsiella sp.	Gastropod	1	1		whole	Shallow marine
8		6, 30-35cm	22/4/15	Adamsiella sp.	Gastropod	2	2		whole	Shallow marine
10	F10	1		Adamsiella sp.	Gastropod	1	1		whole	Shallow marine
13		1, 0-5cm		Adamsiella sp.	Gastropod	1	1		whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Alcadia dubiosa	Gastropod	1	1		1/2	Marine
7	A7	4, 15-20cm	2/5/15	Anadara notabilis	Bivalve	2	1		whole	Shallow marine
8		11, 60-65cm	23/4/15	Anadara notabilis	Bivalve	3	2		whole	Shallow marine
8		12, 65-70cm	24/4/15	Anadara notabilis	Bivalve	3	2		whole	Shallow marine
10	H11	1		Anadara notabilis	Bivalve	1	1		whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
10	I8	1		Anadara notabilis	Bivalve	1	1		whole	Shallow marine
10	I9	1		Anadara notabilis	Bivalve	1	1		whole	Shallow marine
10	J8	2		Anadara notabilis	Bivalve	1	1		whole	Shallow marine
7	A4	1, 0-5cm		Arca zebra	Bivalve	3	2	medium	whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Arca zebra	Bivalve	3	2	large	whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Arca zebra	Bivalve	5	3	medium	whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Arca zebra	Bivalve	1	1	small	whole	Shallow marine
7	A4	4, 15-20cm		Arca zebra	Bivalve	2	1	medium	whole	Shallow marine
7	A4	5, 20-25cm		Arca zebra	Bivalve	3	2	medium	whole	Shallow marine
7	A4	6, 25-30cm		Arca zebra	Bivalve	3	2	medium	whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Arca zebra	Bivalve	2	1	small	whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Arca zebra	Bivalve	2	1	medium	whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Arca zebra	Bivalve	1	1	large	whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Arca zebra	Bivalve	2	1	large	whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Arca zebra	Bivalve	6	3	medium	whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Arca zebra	Bivalve	2	1		>1/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Arca zebra	Bivalve	1	1	large	whole	Shallow marine
7	A7	4, 15-20cm	2/5/15	Arca zebra	Bivalve	5	4	medium	whole	Shallow marine
7	A7	5, 20-25cm	2/5/15	Arca zebra	Bivalve	2	2	large	whole	Shallow marine
7	A7	5, 20-25cm	2/5/15	Arca zebra	Bivalve	2	2	medium	whole	Shallow marine
7	A7	6, 25-30cm	2/5/15	Arca zebra	Bivalve	1	1	large	whole	Shallow marine
7	A7	6, 25-30cm	2/5/15	Arca zebra	Bivalve	2	1	medium	whole	Shallow marine
7	A8			Arca zebra	Bivalve	2	1	small	whole	Shallow marine
7	A8			Arca zebra	Bivalve	68	38	medium	whole	Shallow marine
7	A8			Arca zebra	Bivalve	3	2	large	whole	Shallow marine
7	A8			Arca zebra	Bivalve	2	1		1/2	Shallow marine
7	C5	1, 0-5cm	29/4/15	Arca zebra	Bivalve	2	1	small	whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Arca zebra	Bivalve	8	5	medium	whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Arca zebra	Bivalve	2	2	large	whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Arca zebra	Bivalve	5	3		1/2	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	C5	2, 5-10cm	29/4/15	Arca zebra	Bivalve	2	1	large	whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Arca zebra	Bivalve	12	7	medium	whole	Shallow marine
7	C5	3, 10-15cm	29/4/15	Arca zebra	Bivalve	10	6	medium	whole	Shallow marine
7	C5	3, 10-15cm	29/4/15	Arca zebra	Bivalve	5	3	small	whole	Shallow marine
7	C5	4, 15-20cm	29/4/15	Arca zebra	Bivalve	4	2	medium	whole	Shallow marine
7	C5	4, 15-20cm	29/4/15	Arca zebra	Bivalve	1	1	small	whole	Shallow marine
7	C5	4, 15-20cm	29/4/15	Arca zebra	Bivalve	1	1	large	whole	Shallow marine
7	C5	5, 20-25cm	29/4/15	Arca zebra	Bivalve	4	2	med	whole	Shallow marine
7	C5	6, 25-30cm	29/4/15	Arca zebra	Bivalve	3	2	medium	whole	Shallow marine
7	C5	6, 25-30cm	29/4/15	Arca zebra	Bivalve	5	3	small	whole	Shallow marine
7	C5	6, 25-30cm	29/4/15	Arca zebra	Bivalve	1	1		1/4	Shallow marine
7	D5			Arca zebra	Bivalve	8	4	large	whole	Shallow marine
7	D5			Arca zebra	Bivalve	38	22	medium	whole	Shallow marine
7	D5			Arca zebra	Bivalve	8	4	small	whole	Shallow marine
7	D5			Arca zebra	Bivalve	3	2	large	whole	Shallow marine
7	D5			Arca zebra	Bivalve	14	8	medium	whole	Shallow marine
7	D6			Arca zebra	Bivalve	1	1	large	whole	Shallow marine
7	D6			Arca zebra	Bivalve	11	6	medium	whole	Shallow marine
7	E5			Arca zebra	Bivalve	12	7	large	whole	Shallow marine
7	E5			Arca zebra	Bivalve	66	37	medium	whole	Shallow marine
7	E5			Arca zebra	Bivalve	11	4		1/2	Shallow marine
8		10, 50-60cm	23/4/15	Arca zebra	Bivalve	2	1	large	whole	Shallow marine
8		10, 50-60cm	23/4/15	Arca zebra	Bivalve	1	1	small	whole	Shallow marine
8		12, 65-70cm	24/4/15	Arca zebra	Bivalve	3	2	medium	whole	Shallow marine
8		12, 65-70cm	24/4/15	Arca zebra	Bivalve	1	1	large	whole	Shallow marine
8		13, 70-75cm	24/4/15	Arca zebra	Bivalve	2	1	medium	whole	Shallow marine
8		2, 5-10cm	21/4/15	Arca zebra	Bivalve	1	1		whole	Shallow marine
8		3, 10-15cm	21/4/15	Arca zebra	Bivalve	1	1	large	3/4	Shallow marine
8		3, 10-15cm	21/4/15	Arca zebra	Bivalve	2	1	medium	whole	Shallow marine
8		3, 10-15cm	21/4/15	Arca zebra	Bivalve	1	1	small	3/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
8		5, 25-30cm	22/4/15	Arca zebra	Bivalve	114	30	medium	whole	Shallow marine
8		6, 30-35cm	22/4/15	Arca zebra	Bivalve	1	1	large	whole	Shallow marine
8		7, 35-40cm	22/4/15	Arca zebra	Bivalve	1	1	large	whole	Shallow marine
8		7, 35-40cm	22/4/15	Arca zebra	Bivalve	4	2	medium	whole	Shallow marine
8		7, 35-40cm	22/4/15	Arca zebra	Bivalve	1	1	small	whole	Shallow marine
8		8, 40-45cm	22/4/15	Arca zebra	Bivalve	1	1	large	whole	Shallow marine
8		8, 40-45cm	22/4/15	Arca zebra	Bivalve	1	1	medium	whole	Shallow marine
8		9, 45-50cm	23/4/15	Arca zebra	Bivalve	4	2	medium	whole	Shallow marine
8		PHF 20-40cm	23/4/15	Arca zebra	Bivalve	4	2	large	whole	Shallow marine
8		PHF 20-40cm	23/4/15	Arca zebra	Bivalve	1	1	small	whole	Shallow marine
10	F10	1		Arca zebra	Bivalve	3	2	medium	whole	Shallow marine
10	F11	1		Arca zebra	Bivalve	4	2	medium	whole	Shallow marine
10	G13	1		Arca zebra	Bivalve	39	20	medium	whole	Shallow marine
10	G13	1		Arca zebra	Bivalve	4	2	large	whole	Shallow marine
10	G13	2		Arca zebra	Bivalve	3	2	medium	whole	Shallow marine
10	G14	2		Arca zebra	Bivalve	2	1	medium	whole	Shallow marine
10	G14	2		Arca zebra	Bivalve	76	40	medium	whole	Shallow marine
10	G14	2		Arca zebra	Bivalve	5	3	large	whole	Shallow marine
10	H10	2		Arca zebra	Bivalve	1	1	medium	whole	Shallow marine
10	H11	1		Arca zebra	Bivalve	5	3		whole	Shallow marine
10	H11	1		Arca zebra	Bivalve	37	18		whole	Shallow marine
10	H11	1		Arca zebra	Bivalve	5	3		whole	Shallow marine
10	H11	1		Arca zebra	Bivalve	3	1		1/4	Shallow marine
10	H11	2		Arca zebra	Bivalve	4	2	medium	whole	Shallow marine
10	I8	1		Arca zebra	Bivalve	9	5	medium	whole	Shallow marine
10	I8	1		Arca zebra	Bivalve	1	1	small	whole	Shallow marine
10	I8	2		Arca zebra	Bivalve	4	2	medium	whole	Shallow marine
10	I9	1		Arca zebra	Bivalve	6	3	medium	whole	Shallow marine
10	I9	1		Arca zebra	Bivalve	1	1	large	whole	Shallow marine
10	I9	2		Arca zebra	Bivalve	7	4	medium	whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
10	I9	2		Arca zebra	Bivalve	1	1	large	whole	Shallow marine
10	J8	1		Arca zebra	Bivalve	2	1	small	whole	Shallow marine
10	J8	1		Arca zebra	Bivalve	13	7	medium	whole	Shallow marine
10	J8	1		Arca zebra	Bivalve	1	1	large	whole	Shallow marine
10	J8	2		Arca zebra	Bivalve	1	1	large	whole	Shallow marine
10	J8	2		Arca zebra	Bivalve	4	2	medium	whole	Shallow marine
10	M13			Arca zebra	Bivalve	4	2	medium	whole	Shallow marine
10	M13			Arca zebra	Bivalve	1	1	large	whole	Shallow marine
11		6, 30-35cm		Arca zebra	Bivalve	1	1		whole	Shallow marine
11		7, 35-40cm		Arca zebra	Bivalve	1	1	small	whole	Shallow marine
11		8, 40-45cm		Arca zebra	Bivalve	1	1		whole	Shallow marine
11		10, 50-55cm		Arca zebra	Bivalve	1	1		whole	Shallow marine
12		1, 0-5cm	28/4/15	Arca zebra	Bivalve	2	1		>1/4	Shallow marine
12		2, 5-10cm	28/4/15	Arca zebra	Bivalve	3	2	large	whole	Shallow marine
12		2, 5-10cm	28/4/15	Arca zebra	Bivalve	1	1	medium	3/4	Shallow marine
12		2, 5-10cm	28/4/15	Arca zebra	Bivalve	3	2	small	whole	Shallow marine
12		3, 10-15cm	28/4/15	Arca zebra	Bivalve	2	1	medium	3/4	Shallow marine
12		3, 10-15cm	28/4/15	Arca zebra	Bivalve	2	1	small	3/4	Shallow marine
12		3, 10-15cm	28/4/15	Arca zebra	Bivalve	1	1		>1/4	Shallow marine
12		4, 15-20cm	28/4/15	Arca zebra	Bivalve	2	1		3/4	Shallow marine
12		5, 20-25cm	28/4/15	Arca zebra	Bivalve	3	2	small	whole	Shallow marine
12		5, 20-25cm	28/4/15	Arca zebra	Bivalve	2	1	medium	whole	Shallow marine
12		6, 25-30cm	28/4/15	Arca zebra	Bivalve	1	1	medium	whole	Shallow marine
14		2, 5-10cm		Arca zebra	Bivalve	5	3	medium	whole	Shallow marine
14		2, 5-10cm		Arca zebra	Bivalve	2	1	large	whole	Shallow marine
14		3, 10-15cm		Arca zebra	Bivalve	3	2	medium	whole	Shallow marine
7	A8			Asaphis deflorata	Bivalve	1	1		whole	Shallow marine
7	B4			Asaphis deflorata	Bivalve	2	1		whole	Shallow marine
7	D5			Asaphis deflorata	Bivalve	1	1		whole	Shallow marine
7	E5			Asaphis deflorata	Bivalve	1	1		whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
11		11, 55-60cm		Asaphis deflorata	Bivalve	1	1		whole	Shallow marine
8		9, 45-50cm	23/4/15	Certhidae beatty	Gastropod	1	1		whole	Brackish
10	F10	1		Certhium litteratum	Gastropod	1	1		whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Chione granulata	Bivalve	3	2		>1/4	Shallow marine
7	A7	2, 5-10cm	1/5/15	Chione granulata	Bivalve	3	2		>1/4	Shallow marine
7	A7	5, 20-25cm	2/5/15	Chione granulata	Bivalve	1	1		whole	Shallow marine
7	A7	6, 25-30cm	2/5/15	Chione granulata	Bivalve	1	1		whole	Shallow marine
7	A7	6, 25-30cm	2/5/15	Chione granulata	Bivalve	1	1		>1/4	Shallow marine
7	A8			Chione granulata	Bivalve	2	1		whole	Shallow marine
7	A8			Chione granulata	Bivalve	2	1		1/4	Shallow marine
7	B4			Chione granulata	Bivalve	1	1		whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Chione granulata	Bivalve	2	1		whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Chione granulata	Bivalve	2	1		>1/4	Shallow marine
7	C5	2, 5-10cm	29/4/15	Chione granulata	Bivalve	1	1		1/2	Shallow marine
7	C5	4, 15-20cm	29/4/15	Chione granulata	Bivalve	3	1		>1/4	Shallow marine
7	C5	4, 15-20cm	29/4/15	Chione granulata	Bivalve	1	1		whole	Shallow marine
7	C5	5, 20-25cm	29/4/15	Chione granulata	Bivalve	1	1	small	whole	Shallow marine
7	C5	5, 20-25cm	29/4/15	Chione granulata	Bivalve	2	1		1/2	Shallow marine
7	D5			Chione granulata	Bivalve	3	2		whole	Shallow marine
7	D5			Chione granulata	Bivalve	4	1		1/4	Shallow marine
7	E5			Chione granulata	Bivalve	1	1		whole	Shallow marine
7	E5			Chione granulata	Bivalve	2	1		>1/4	Shallow marine
8		11, 60-65cm	23/4/15	Chione granulata	Bivalve	1	1		1/4	Shallow marine
8		12, 65-70cm	24/4/15	Chione granulata	Bivalve	1	1		whole	Shallow marine
8		13, 70-75cm	24/4/15	Chione granulata	Bivalve	1	1	large	whole	Shallow marine
8		5, 25-30cm	22/4/15	Chione granulata	Bivalve	1	1	small	whole	Shallow marine
8		7, 35-40cm	22/4/15	Chione granulata	Bivalve	1	1	large	whole	Shallow marine
8		7, 35-40cm	22/4/15	Chione granulata	Bivalve	1	1	medium	whole	Shallow marine
8		7, 35-40cm	22/4/15	Chione granulata	Bivalve	1	1	small	whole	Shallow marine
10	F11	2		Chione granulata	Bivalve	1	1	large	whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
10	G13	1		Chione granulata	Bivalve	1	1		1/2	Shallow marine
10	G14	2		Chione granulata	Bivalve	2	1		whole	Shallow marine
10	H10	1		Chione granulata	Bivalve	1	1		>1/4	Shallow marine
10	J8	1		Chione granulata	Bivalve	2	1		whole	Shallow marine
10	J8	2		Chione granulata	Bivalve	1	1		1/4	Shallow marine
10	M13			Chione granulata	Bivalve	1	1		whole	Shallow marine
11		7, 35-40cm		Chione granulata	Bivalve	1	1	small	whole	Shallow marine
12		4, 15-20cm	28/4/15	Chione granulata	Bivalve	1	1		whole	Shallow marine
12		4, 15-20cm	28/4/15	Chione granulata	Bivalve	1			1/4	Shallow marine
12		5, 20-25cm	28/4/15	Chione granulata	Bivalve	1	1		3/4	Shallow marine
12		6, 25-30cm	28/4/15	Chione granulata	Bivalve	1	1		1/4	Shallow marine
7	A4	3, 10-15cm	25/4/15	Chiton sp.	Univalve	2	1		whole	Intertidal
7	A4	4, 15-20cm		Chiton sp.	Univalve	1	1		whole	Intertidal
7	A7	1, 0-5cm	1/5/15	Chiton sp.	Univalve	2	1		whole	Intertidal
7	A8			Chiton sp.	Univalve	9	2		whole	Intertidal
7	E5			Chiton sp.	Univalve	1	1		whole	Intertidal
8		2, 5-10cm	21/4/15	Chiton sp.	Univalve	2	2		whole	Intertidal
10	F10	1, 0-5cm		Chiton sp.	Univalve	1	1		whole	Intertidal
11		4, 15-20cm		Chiton sp.	Univalve	1	1		whole	Intertidal
12		2, 5-10cm	28/4/15	Chiton sp.	Univalve	1	1		whole	Intertidal
12		5, 20-25cm	28/4/15	Chiton sp.	Univalve	14	3		whole	Intertidal
14		3, 10-15cm		Chiton sp.	Univalve	1	1		whole	Intertidal
7	A4	1, 0-5cm		Citlarium pica	Gastropod	1	1		whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Citlarium pica	Gastropod	1	1		whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Citlarium pica	Gastropod	3	3		>1/4	Shallow marine
7	A7	1, 0-5cm	1/5/15	Citlarium pica	Gastropod	2	2		whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Citlarium pica	Gastropod	1	1		whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Citlarium pica	Gastropod	1	1		>1/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Citlarium pica	Gastropod	1	1		whole	Shallow marine
7	A7	5, 20-25cm	2/5/15	Citlarium pica	Gastropod	1	1		whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	A8			Citlarium pica	Gastropod	3	3		whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Citlarium pica	Gastropod	6	6		whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Citlarium pica	Gastropod	4	4		whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Citlarium pica	Gastropod	2	1		1/4	Shallow marine
7	C5	3, 10-15cm	29/4/15	Citlarium pica	Gastropod	2	1		1/4	Shallow marine
7	C5	3, 10-15cm	29/4/15	Citlarium pica	Gastropod	1	1		whole	Shallow marine
7	C5	4, 15-20cm	29/4/15	Citlarium pica	Gastropod	1	1		whole	Shallow marine
7	C5	5, 20-25cm	29/4/15	Citlarium pica	Gastropod	3	1		1/4	Shallow marine
7	C5	6, 25-30cm	29/4/15	Citlarium pica	Gastropod	1	1		1/4	Shallow marine
7	D5			Citlarium pica	Gastropod	1	1		3/4	Shallow marine
8		3, 10-15cm	21/4/15	Citlarium pica	Gastropod	1	1		whole	Shallow marine
10	F10	1		Citlarium pica	Gastropod	2	2		whole	Shallow marine
10	G14	2		Citlarium pica	Gastropod	1	1		whole	Shallow marine
10	H10	1		Citlarium pica	Gastropod	2	2		3/4	Shallow marine
11		7, 35-40cm		Citlarium pica	Gastropod	2	2		whole	Shallow marine
12		1, 0-5cm	28/4/15	Citlarium pica	Gastropod	3	1		>1/4	Shallow marine
12		2, 5-10cm	28/4/15	Citlarium pica	Gastropod	2	2		>1/4	Shallow marine
12		2, 5-10cm	28/4/15	Citlarium pica	Gastropod	1	1		1/2	Shallow marine
12		3, 10-15cm	28/4/15	Citlarium pica	Gastropod	1	1		>1/4	Shallow marine
12		6, 25-30cm	28/4/15	Citlarium pica	Gastropod	1	1		whole	Shallow marine
14		2, 5-10cm		Citlarium pica	Gastropod	1	1		whole	Shallow marine
7	A4	1, 0-5cm		Codakia orbicularius	Bivalve	1	1	small	whole	Shallow marine
7	A4	1, 0-5cm		Codakia orbicularius	Bivalve	1	1	medium	whole	Shallow marine
7	A4	1, 0-5cm		Codakia orbicularius	Bivalve	2	1		1/2	Shallow marine
7	A4	1, 0-5cm		Codakia orbicularius	Bivalve	8	3		>1/4	Shallow marine
7	A4	2, 5-10cm		Codakia orbicularius	Bivalve	1	1		whole	Shallow marine
7	A4	2, 5-10cm		Codakia orbicularius	Bivalve	3	2		whole	Shallow marine
7	A4	2, 5-10cm		Codakia orbicularius	Bivalve	1	1		1/2	Shallow marine
7	A4	3, 10-15cm	25/4/15	Codakia orbicularius	Bivalve	4	2	large	whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Codakia orbicularius	Bivalve	42	21	medium	whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	A4	3, 10-15cm	25/4/15	Codakia orbicularius	Bivalve	9	5	small	whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Codakia orbicularius	Bivalve	11	4		1/2	Shallow marine
7	A4	3, 10-15cm	25/4/15	Codakia orbicularius	Bivalve	9	1		1/4	Shallow marine
7	A4	4, 15-20cm		Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
7	A4	4, 15-20cm		Codakia orbicularius	Bivalve	5	3	medium	whole	Shallow marine
7	A4	4, 15-20cm		Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine
7	A4	4, 15-20cm		Codakia orbicularius	Bivalve	3	1		1/2	Shallow marine
7	A4	5, 20-25cm		Codakia orbicularius	Bivalve	2	1	medium	whole	Shallow marine
7	A4	5, 20-25cm		Codakia orbicularius	Bivalve	12	2		1/4	Shallow marine
7	A4	6, 25-30cm		Codakia orbicularius	Bivalve	3	2	medium	whole	Shallow marine
7	A4	6, 25-30cm		Codakia orbicularius	Bivalve	1	1	small	whole	Shallow marine
7	A4	6, 25-30cm		Codakia orbicularius	Bivalve	1	2		whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Codakia orbicularius	Bivalve	2	2	large	whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Codakia orbicularius	Bivalve	7	5	medium	whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Codakia orbicularius	Bivalve	4	2	small	whole	Shallow marine
7	A7	1, 0-5cm	1/5/15	Codakia orbicularius	Bivalve	10	2		1/2	Shallow marine
7	A7	1, 0-5cm	1/5/15	Codakia orbicularius	Bivalve	35	5		1/4	Shallow marine
7	A7	2, 5-10cm	1/5/15	Codakia orbicularius	Bivalve	3	2	large	whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Codakia orbicularius	Bivalve	12	8	medium	whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Codakia orbicularius	Bivalve	2	2	small	whole	Shallow marine
7	A7	2, 5-10cm	1/5/15	Codakia orbicularius	Bivalve	6	4		1/2	Shallow marine
7	A7	2, 5-10cm	1/5/15	Codakia orbicularius	Bivalve	29	8		1/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
7	A7	4, 15-20cm	2/5/15	Codakia orbicularius	Bivalve	8	5	medium	whole	Shallow marine
7	A7	4, 15-20cm	2/5/15	Codakia orbicularius	Bivalve	2	2	small	whole	Shallow marine
7	A7	4, 15-20cm	2/5/15	Codakia orbicularius	Bivalve	7	3		1/2	Shallow marine
7	A7	4, 15-20cm	2/5/15	Codakia orbicularius	Bivalve	16	6		1/4	Shallow marine
7	A7	5, 20-25cm	2/5/15	Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
7	A7	5, 20-25cm	2/5/15	Codakia orbicularius	Bivalve	13	10	medium	whole	Shallow marine
7	A7	5, 20-25cm	2/5/15	Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	A7	5, 20-25cm	2/5/15	Codakia orbicularius	Bivalve	6	3		1/2	Shallow marine
7	A7	5, 20-25cm	2/5/15	Codakia orbicularius	Bivalve	13	4		1/4	Shallow marine
7	A7	6, 25-30cm	2/5/15	Codakia orbicularius	Bivalve	24	14	medium	whole	Shallow marine
7	A7	6, 25-30cm	2/5/15	Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
7	A7	6, 25-30cm	2/5/15	Codakia orbicularius	Bivalve	6	2		1/2	Shallow marine
7	A7	6, 25-30cm	2/5/15	Codakia orbicularius	Bivalve	28	5		1/4	Shallow marine
7	A7	7, 30-35cm		Codakia orbicularius	Bivalve	2	1	medium	whole	Shallow marine
7	A8			Codakia orbicularius	Bivalve	9	5	small	whole	Shallow marine
7	A8			Codakia orbicularius	Bivalve	99	56	medium	whole	Shallow marine
7	A8			Codakia orbicularius	Bivalve	4	2	large	whole	Shallow marine
7	A8			Codakia orbicularius	Bivalve	9	6		1/2	Shallow marine
7	A8			Codakia orbicularius	Bivalve	31	7		1/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Codakia orbicularius	Bivalve	9	5	large	whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Codakia orbicularius	Bivalve	25	15	medium	whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Codakia orbicularius	Bivalve	6	3	small	whole	Shallow marine
7	C5	1, 0-5cm	29/4/15	Codakia orbicularius	Bivalve	5	3		3/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Codakia orbicularius	Bivalve	52	8		1/4	Shallow marine
7	C5	2, 5-10cm	29/4/15	Codakia orbicularius	Bivalve	9	5	large	whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Codakia orbicularius	Bivalve	77	41	medium	whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Codakia orbicularius	Bivalve	19	10	small	whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Codakia orbicularius	Bivalve	15	5		1/2	Shallow marine
7	C5	2, 5-10cm	29/4/15	Codakia orbicularius	Bivalve	47	13		1/4	Shallow marine
7	C5	3, 10-15cm	29/4/15	Codakia orbicularius	Bivalve	3	2	small	whole	Shallow marine
7	C5	3, 10-15cm	29/4/15	Codakia orbicularius	Bivalve	22	12	medium	whole	Shallow marine
7	C5	3, 10-15cm	29/4/15	Codakia orbicularius	Bivalve	6	4	large	whole	Shallow marine
7	C5	3, 10-15cm	29/4/15	Codakia orbicularius	Bivalve	6	3		1/2	Shallow marine
7	C5	3, 10-15cm	29/4/15	Codakia orbicularius	Bivalve	47	9		1/4	Shallow marine
7	C5	4, 15-20cm	29/4/15	Codakia orbicularius	Bivalve	2	1	large	whole	Shallow marine
7	C5	4, 15-20cm	29/4/15	Codakia orbicularius	Bivalve	14	8	medium	whole	Shallow marine
7	C5	4, 15-20cm	29/4/15	Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	C5	4, 15-20cm	29/4/15	Codakia orbicularius	Bivalve	17	3		1/2	Shallow marine
7	C5	4, 15-20cm	29/4/15	Codakia orbicularius	Bivalve	32	8		1/4	Shallow marine
7	C5	5, 20-25cm	29/4/15	Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine
7	C5	5, 20-25cm	29/4/15	Codakia orbicularius	Bivalve	3	2	medium	whole	Shallow marine
7	C5	5, 20-25cm	29/4/15	Codakia orbicularius	Bivalve	3	2	large	whole	Shallow marine
7	C5	5, 20-25cm	29/4/15	Codakia orbicularius	Bivalve	6	2		1/2	Shallow marine
7	C5	5, 20-25cm	29/4/15	Codakia orbicularius	Bivalve	31	8		1/4	Shallow marine
7	C5	6, 25-30cm	29/4/15	Codakia orbicularius	Bivalve	2	1		whole	Shallow marine
7	C5	6, 25-30cm	29/4/15	Codakia orbicularius	Bivalve	5	3		1/2	Shallow marine
7	C5	6, 25-30cm	29/4/15	Codakia orbicularius	Bivalve	28	5		1/4	Shallow marine
7	D5			Codakia orbicularius	Bivalve	18	9	large	whole	Shallow marine
7	D5			Codakia orbicularius	Bivalve	177	97	medium	whole	Shallow marine
7	D5			Codakia orbicularius	Bivalve	54	28	small	whole	Shallow marine
7	D5			Codakia orbicularius	Bivalve	118	56		1/2	Shallow marine
7	D5			Codakia orbicularius	Bivalve	154			1/4	Shallow marine
7	D5			Codakia orbicularius	Bivalve	25	14	small	whole	Shallow marine
7	D5			Codakia orbicularius	Bivalve	151	81	medium	whole	Shallow marine
7	D5			Codakia orbicularius	Bivalve	11	6	large	whole	Shallow marine
7	D5			Codakia orbicularius	Bivalve	4	1		1/2	Shallow marine
7	D5			Codakia orbicularius	Bivalve	12	3		1/4	Shallow marine
7	D6			Codakia orbicularius	Bivalve	4	3	small	whole	Shallow marine
7	D6			Codakia orbicularius	Bivalve	98	54	medium	whole	Shallow marine
7	D6			Codakia orbicularius	Bivalve	12	7	large	whole	Shallow marine
7	D6			Codakia orbicularius	Bivalve	20	7		1/2	Shallow marine
7	D6			Codakia orbicularius	Bivalve	48	16		1/4	Shallow marine
7	E5			Codakia orbicularius	Bivalve	27	15	small	whole	Shallow marine
7	E5			Codakia orbicularius	Bivalve	246	135	medium	whole	Shallow marine
7	E5			Codakia orbicularius	Bivalve	24	13	large	whole	Shallow marine
7	E5			Codakia orbicularius	Bivalve	99	23		1/2	Shallow marine
7	E5			Codakia orbicularius	Bivalve	118	27		1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
8		1, 0-5cm	21/4/15	Codakia orbicularius	Bivalve	6	3	medium	1/4	Shallow marine
8		10, 50-60cm	23/4/15	Codakia orbicularius	Bivalve	5	3	large	whole	Shallow marine
8		10, 50-60cm	23/4/15	Codakia orbicularius	Bivalve	4	2	medium	whole	Shallow marine
8		10, 50-60cm	23/4/15	Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine
8		10, 50-60cm	23/4/15	Codakia orbicularius	Bivalve	1	1		>1/4	Shallow marine
8		11, 60-65cm	23/4/15	Codakia orbicularius	Bivalve	3	2	large	whole	Shallow marine
8		11, 60-65cm	23/4/15	Codakia orbicularius	Bivalve	4	2	medium	whole	Shallow marine
8		11, 60-65cm	23/4/15	Codakia orbicularius	Bivalve	1	1	small	whole	Shallow marine
8		11, 60-65cm	23/4/15	Codakia orbicularius	Bivalve	3	1		1/4	Shallow marine
8		12, 65-70cm	24/4/15	Codakia orbicularius	Bivalve	4	2	small	whole	Shallow marine
8		12, 65-70cm	24/4/15	Codakia orbicularius	Bivalve	23	13	medium	whole	Shallow marine
8		12, 65-70cm	24/4/15	Codakia orbicularius	Bivalve	4	2	large	whole	Shallow marine
8		12, 65-70cm	24/4/15	Codakia orbicularius	Bivalve	6	1	medium	1/2	Shallow marine
8		13, 70-75cm	24/4/15	Codakia orbicularius	Bivalve	4	2	large	whole	Shallow marine
8		13, 70-75cm	24/4/15	Codakia orbicularius	Bivalve	7	4	medium	whole	Shallow marine
8		13, 70-75cm	24/4/15	Codakia orbicularius	Bivalve	5	3	small	whole	Shallow marine
8		2, 5-10cm	21/4/15	Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
8		2, 5-10cm	21/4/15	Codakia orbicularius	Bivalve	7	4	medium	whole	Shallow marine
8		2, 5-10cm	21/4/15	Codakia orbicularius	Bivalve	3	2	small	whole	Shallow marine
8		2, 5-10cm	21/4/15	Codakia orbicularius	Bivalve	33	10		1/4	Shallow marine
8		3, 10-15cm	21/4/15	Codakia orbicularius	Bivalve	3	2	large	whole	Shallow marine
8		3, 10-15cm	21/4/15	Codakia orbicularius	Bivalve	1	1	medium	whole	Shallow marine
8		3, 10-15cm	21/4/15	Codakia orbicularius	Bivalve	18	3		1/4	Shallow marine
8		5, 25-30cm	22/4/15	Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
8		5, 25-30cm	22/4/15	Codakia orbicularius	Bivalve	1	1	medium	whole	Shallow marine
8		6, 30-35cm	22/4/15	Codakia orbicularius	Bivalve	2	1	medium	whole	Shallow marine
8		6, 30-35cm	22/4/15	Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine
8		6, 30-35cm	22/4/15	Codakia orbicularius	Bivalve	9	2		1/4	Shallow marine
8		6, 30-35cm	22/4/15	Codakia orbicularius	Bivalve	3	2		whole	Shallow marine
8		7, 35-40cm	22/4/15	Codakia orbicularius	Bivalve	4	2	small	whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
8		7, 35-40cm	22/4/15	Codakia orbicularius	Bivalve	16	9	medium	whole	Shallow marine
8		7, 35-40cm	22/4/15	Codakia orbicularius	Bivalve	4	2	large	whole	Shallow marine
8		7, 35-40cm	22/4/15	Codakia orbicularius	Bivalve	8	2		1/4	Shallow marine
8		7, 35-40cm	22/4/15	Codakia orbicularius	Bivalve	4	2		1/2	Shallow marine
8		8, 40-45cm	22/4/15	Codakia orbicularius	Bivalve	4	2	large	whole	Shallow marine
8		8, 40-45cm	22/4/15	Codakia orbicularius	Bivalve	27	14	medium	whole	Shallow marine
8		8, 40-45cm	22/4/15	Codakia orbicularius	Bivalve	14	8	small	whole	Shallow marine
8		9, 45-50cm	23/4/15	Codakia orbicularius	Bivalve	4	2	large	whole	Shallow marine
8		9, 45-50cm	23/4/15	Codakia orbicularius	Bivalve	18	10	medium	whole	Shallow marine
8		9, 45-50cm	23/4/15	Codakia orbicularius	Bivalve	12	6	small	whole	Shallow marine
8		9, 45-50cm	23/4/15	Codakia orbicularius	Bivalve	5	7		3/4	Shallow marine
8		9, 45-50cm	23/4/15	Codakia orbicularius	Bivalve	10			1/4	Shallow marine
8		PHF 20-40cm	23/4/15	Codakia orbicularius	Bivalve	16	9	small	whole	Shallow marine
8		PHF 20-40cm	23/4/15	Codakia orbicularius	Bivalve	25	14	medium	whole	Shallow marine
8		PHF 20-40cm	23/4/15	Codakia orbicularius	Bivalve	7	4	large	whole	Shallow marine
8		PHF 20-40cm	23/4/15	Codakia orbicularius	Bivalve	9	3		1/4	Shallow marine
8		Surface	21/4/15	Codakia orbicularius	Bivalve	1	1	medium	3/4	Shallow marine
10	F10	1		Codakia orbicularius	Bivalve	7	4	medium	whole	Shallow marine
10	F10	1		Codakia orbicularius	Bivalve	2	1	large	whole	Shallow marine
10	F10	1		Codakia orbicularius	Bivalve	6	2		1/2	Shallow marine
10	F10	1		Codakia orbicularius	Bivalve	7	2		1/4	Shallow marine
10	F11	1		Codakia orbicularius	Bivalve	8	4	medium	whole	Shallow marine
10	F11	1		Codakia orbicularius	Bivalve	15	4		1/4	Shallow marine
10	F11	1		Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
10	F11	2		Codakia orbicularius	Bivalve	3	2	small	whole	Shallow marine
10	F11	2		Codakia orbicularius	Bivalve	6	3	medium	whole	Shallow marine
10	G13	1		Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine
10	G13	1		Codakia orbicularius	Bivalve	35	18	medium	whole	Shallow marine
10	G13	1		Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
10	G13	1		Codakia orbicularius	Bivalve	2	1		1/2	Shallow marine

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10	G13	1		Codakia orbicularius	Bivalve	6	1		1/4	Shallow marine
10	G13	2		Codakia orbicularius	Bivalve	4	2	medium	whole	Shallow marine
10	G14	2		Codakia orbicularius	Bivalve	8	4	medium	whole	Shallow marine
10	G14	2		Codakia orbicularius	Bivalve	4	2		1/2	Shallow marine
10	G14	2		Codakia orbicularius	Bivalve	11	3		1/4	Shallow marine
10	G14	2		Codakia orbicularius	Bivalve	5	3	small	whole	Shallow marine
10	G14	2		Codakia orbicularius	Bivalve	30	16	medium	whole	Shallow marine
10	G14	2		Codakia orbicularius	Bivalve	3	2	large	whole	Shallow marine
10	H10	1		Codakia orbicularius	Bivalve	5	3	small	whole	Shallow marine
10	H10	1		Codakia orbicularius	Bivalve	30	15	medium	whole	Shallow marine
10	H10	1		Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
10	H10	1		Codakia orbicularius	Bivalve	7	2		1/2	Shallow marine
10	H10	1		Codakia orbicularius	Bivalve	38	11		1/4	Shallow marine
10	H10	2		Codakia orbicularius	Bivalve	12	6	medium	whole	Shallow marine
10	H10	2		Codakia orbicularius	Bivalve	1	1	small	whole	Shallow marine
10	H11	1		Codakia orbicularius	Bivalve	3	2	small	whole	Shallow marine
10	H11	1		Codakia orbicularius	Bivalve	51	26	medium	whole	Shallow marine
10	H11	1		Codakia orbicularius	Bivalve	5	3	large	whole	Shallow marine
10	H11	1		Codakia orbicularius	Bivalve	12	3		1/2	Shallow marine
10	H11	1		Codakia orbicularius	Bivalve	31	6		1/4	Shallow marine
10	H11	2		Codakia orbicularius	Bivalve	1	1		whole	Shallow marine
10	H11	2		Codakia orbicularius	Bivalve	3	2		whole	Shallow marine
10	H11	2		Codakia orbicularius	Bivalve	2	1		whole	Shallow marine
10	H11	2		Codakia orbicularius	Bivalve	2	1		1/4	Shallow marine
10	I8	1		Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine
10	I8	1		Codakia orbicularius	Bivalve	63	33	medium	whole	Shallow marine
10	I8	1		Codakia orbicularius	Bivalve	2	1	large	whole	Shallow marine
10	I8	1		Codakia orbicularius	Bivalve	10	2		1/2	Shallow marine
10	I8	1		Codakia orbicularius	Bivalve	18	4		1/4	Shallow marine
10	I8	2		Codakia orbicularius	Bivalve	1	1	small	whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
10	I8	2		Codakia orbicularius	Bivalve	9	5	medium	whole	Shallow marine
10	I8	2		Codakia orbicularius	Bivalve	2	1	large	whole	Shallow marine
10	I8	2		Codakia orbicularius	Bivalve	7	2		1/2	Shallow marine
10	I9	1		Codakia orbicularius	Bivalve	15	8		whole	Shallow marine
10	I9	1		Codakia orbicularius	Bivalve	15	4		1/2	Shallow marine
10	I9	1		Codakia orbicularius	Bivalve	9	1		1/4	Shallow marine
10	I9	2		Codakia orbicularius	Bivalve	36	18	medium	whole	Shallow marine
10	I9	2		Codakia orbicularius	Bivalve	2	1	large	whole	Shallow marine
10	J8	1		Codakia orbicularius	Bivalve	6	4	small	whole	Shallow marine
10	J8	1		Codakia orbicularius	Bivalve	27	15	medium	whole	Shallow marine
10	J8	1		Codakia orbicularius	Bivalve	3	2	large	whole	Shallow marine
10	J8	1		Codakia orbicularius	Bivalve	17	3		1/4	Shallow marine
10	J8	2		Codakia orbicularius	Bivalve	3	2	small	whole	Shallow marine
10	J8	2		Codakia orbicularius	Bivalve	25	14	medium	whole	Shallow marine
10	J8	2		Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
10	J8	2		Codakia orbicularius	Bivalve	6	3		1/2	Shallow marine
10	J8	2		Codakia orbicularius	Bivalve	12	2		1/4	Shallow marine
10	M13			Codakia orbicularius	Bivalve	36	19	medium	whole	Shallow marine
10	M13			Codakia orbicularius	Bivalve	4	1		1/2	Shallow marine
10	M13			Codakia orbicularius	Bivalve	1			1/4	Shallow marine
11		3, 10-15cm		Codakia orbicularius	Bivalve	4	1		>1/4	Shallow marine
11		4, 15-20cm		Codakia orbicularius	Bivalve	1	1		>1/4	Shallow marine
11		6, 30-35cm		Codakia orbicularius	Bivalve	3	1		>1/4	Shallow marine
11		6, 30-35cm		Codakia orbicularius	Bivalve	1			1/2	Shallow marine
11		7, 35-40cm		Codakia orbicularius	Bivalve	3	2	medium	whole	Shallow marine
11		7, 35-40cm		Codakia orbicularius	Bivalve	8	1		>1/4	Shallow marine
11		8, 40-45cm		Codakia orbicularius	Bivalve	3	1		1/2	Shallow marine
11		8, 40-45cm		Codakia orbicularius	Bivalve	4	1		1/4	Shallow marine
11		8, 40-45cm		Codakia orbicularius	Bivalve	1	1	medium	whole	Shallow marine
11		9, 45-50cm		Codakia orbicularius	Bivalve	2	1	medium	whole	Shallow marine

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11		9, 45-50cm		Codakia orbicularius	Bivalve	9	2		>1/4	Shallow marine
11		10, 50-55cm		Codakia orbicularius	Bivalve	2	1	medium	whole	Shallow marine
11		10, 50-55cm		Codakia orbicularius	Bivalve	3	1		1/4	Shallow marine
11		11, 55-60cm		Codakia orbicularius	Bivalve	1	1	medium	whole	Shallow marine
11		11, 55-60cm		Codakia orbicularius	Bivalve	5	1		1/4	Shallow marine
12		1, 0-5cm	28/4/15	Codakia orbicularius	Bivalve	1	1	Large	Whole	Shallow marine
12		1, 0-5cm	28/4/15	Codakia orbicularius	Bivalve	35	8		>1/4	Shallow marine
12		2, 5-10cm	28/4/15	Codakia orbicularius	Bivalve	1	1	medium	whole	Shallow marine
12		2, 5-10cm	28/4/15	Codakia orbicularius	Bivalve	1	1	medium	3/4	Shallow marine
12		2, 5-10cm	28/4/15	Codakia orbicularius	Bivalve	33	6		>1/4	Shallow marine
12		3, 10-15cm	28/4/15	Codakia orbicularius	Bivalve	2	1	large	whole	Shallow marine
12		3, 10-15cm	28/4/15	Codakia orbicularius	Bivalve	9	5	medium	whole	Shallow marine
12		3, 10-15cm	28/4/15	Codakia orbicularius	Bivalve	2	1	small	whole	Shallow marine
12		3, 10-15cm	28/4/15	Codakia orbicularius	Bivalve	9	2		1/4	Shallow marine
12		3, 10-15cm	28/4/15	Codakia orbicularius	Bivalve	36	11		>1/4	Shallow marine
12		4, 15-20cm	28/4/15	Codakia orbicularius	Bivalve	2	1	large	whole	Shallow marine
12		4, 15-20cm	28/4/15	Codakia orbicularius	Bivalve	12	6	medium	whole	Shallow marine
12		4, 15-20cm	28/4/15	Codakia orbicularius	Bivalve	7	4	small	whole	Shallow marine
12		4, 15-20cm	28/4/15	Codakia orbicularius	Bivalve	44	12		>1/4	Shallow marine
12		4, 15-20cm	28/4/15	Codakia orbicularius	Bivalve	12	5	medium	3/4	Shallow marine
12		5, 20-25cm	28/4/15	Codakia orbicularius	Bivalve	1	1	large	whole	Shallow marine
12		5, 20-25cm	28/4/15	Codakia orbicularius	Bivalve	5	3	medium	whole	Shallow marine
12		5, 20-25cm	28/4/15	Codakia orbicularius	Bivalve	29	6		1/4	Shallow marine
12		6, 25-30cm	28/4/15	Codakia orbicularius	Bivalve	1	1	small	whole	Shallow marine
12		6, 25-30cm	28/4/15	Codakia orbicularius	Bivalve	5	3	medium	whole	Shallow marine
12		6, 25-30cm	28/4/15	Codakia orbicularius	Bivalve	3	2	large	whole	Shallow marine
12		6, 25-30cm	28/4/15	Codakia orbicularius	Bivalve	16	3		1/4	Shallow marine
12		7, 30-35cm	29/4/15	Codakia orbicularius	Bivalve	5	3	medium	whole	Shallow marine
12		7, 30-35cm	29/4/15	Codakia orbicularius	Bivalve	17	4		>1/4	Shallow marine
13		1, 0-5cm		Codakia orbicularius	Bivalve	14	3		1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
13		1, 0-5cm		Codakia orbicularius	Bivalve	1		medium	whole	Shallow marine
14		1, 0-5cm		Codakia orbicularius	Bivalve	5	1		>1/4	Shallow marine
14		2, 5-10cm		Codakia orbicularius	Bivalve	6	1		>1/4	Shallow marine
14		3, 10-15cm		Codakia orbicularius	Bivalve	2	1	medium	whole	Shallow marine
14		3, 10-15cm		Codakia orbicularius	Bivalve	5	2		1/2	Shallow marine
14		3, 10-15cm		Codakia orbicularius	Bivalve	9	2		1/4	Shallow marine
7	A4	3, 10-15cm	25/4/15	Conus daucus	Gastropod	1	1		whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Cymatium martinianum	Gastropod	1	1		whole	Intertidal
12		2, 5-10cm	28/4/15	Cymatium martinianum	Gastropod	2	1		1/4	Intertidal
12		3, 10-15cm	28/4/15	Cymatium martinianum	Gastropod	1	1		1/4	Intertidal
12		5, 20-25cm	28/4/15	Cymatium martinianum	Gastropod	1	1	large	1/4	Intertidal
7	C5	3, 10-15cm	29/4/15	Cymatium sp.	Gastropod	1	1		whole	Intertidal
8		9, 45-50cm	23/4/15	Donax sp.	Bivalve	1	1		whole	Shallow marine
11		7, 35-40cm		Donax sp.	Bivalve	1	1		whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Fasciolarian tulipa	Gastropod	2	2		3/4	Shallow marine
7	A4	3, 10-15cm	25/4/15	Fasciolarian tulipa	Gastropod	1	1		1/2	Shallow marine
7	A7	1, 0-5cm	1/5/15	Fasciolarian tulipa	Gastropod	3	3		>1/4	Shallow marine
7	A7	2, 5-10cm	1/5/15	Fasciolarian tulipa	Gastropod	1	1		1/2	Shallow marine
7	A7	2, 5-10cm	1/5/15	Fasciolarian tulipa	Gastropod	1	1		1/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Fasciolarian tulipa	Gastropod	2	2		3/4	Shallow marine
7	A7	6, 25-30cm	2/5/15	Fasciolarian tulipa	Gastropod	1	1		3/4	Shallow marine
7	A8			Fasciolarian tulipa	Gastropod	7	7		3/4	Shallow marine
7	A8			Fasciolarian tulipa	Gastropod	1	1		1/4	Shallow marine
7	B4			Fasciolarian tulipa	Gastropod	1	1		whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Fasciolarian tulipa	Gastropod	1	1		1/4	Shallow marine
7	C5	5, 20-25cm	29/4/15	Fasciolarian tulipa	Gastropod	1	1		1/2	Shallow marine
7	D5			Fasciolarian tulipa	Gastropod	5	5		1/2	Shallow marine
7	D6			Fasciolarian tulipa	Gastropod	3	3		3/4	Shallow marine
7	E5			Fasciolarian tulipa	Gastropod	3	3		3/4	Shallow marine
7	E5			Fasciolarian tulipa	Gastropod	3	2		1/2	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
8		1, 0-5cm	21/4/15	Fasciolarian tulipa	Gastropod	1	1		>1/4	Shallow marine
10	F10	1		Fasciolarian tulipa	Gastropod	1	1		1/2	Shallow marine
10	H10	1		Fasciolarian tulipa	Gastropod	1	1		>1/4	Shallow marine
10	H10	2		Fasciolarian tulipa	Gastropod	1	1		whole	Shallow marine
10	H11	1		Fasciolarian tulipa	Gastropod	4	4		1/4	Shallow marine
10	M13			Fasciolarian tulipa	Gastropod	2	2		1/4	Shallow marine
11		8, 40-45cm		Fasciolarian tulipa	Gastropod	1	1		1/4	Shallow marine
12		3, 10-15cm	28/4/15	Fasciolarian tulipa	Gastropod	1	1		>1/4	Shallow marine
12		4, 15-20cm	28/4/15	Fasciolarian tulipa	Gastropod	2	2		1/2	Shallow marine
12		5, 20-25cm	28/4/15	Fasciolarian tulipa	Gastropod	1	1		1/4	Shallow marine
12		7, 30-35cm	29/4/15	Fasciolarian tulipa	Gastropod	1	1		>1/4	Shallow marine
14		2, 5-10cm		Fasciolarian tulipa	Gastropod	1	1		>1/4	Shallow marine
14		3, 10-15cm		Fasciolarian tulipa	Gastropod	1	1		1/4	Shallow marine
7	A4	3, 10-15cm	25/4/15	Fasciolarian tulipa?	Gastropod	1			1/2	Shallow marine
7	C5	4, 15-20cm	29/4/15	Fasciolarian tulipa?	Gastropod	2	2		1/2	Shallow marine
12		2, 5-10cm	28/4/15	Fissurella nodulusa	Gastropod	1	1		whole	Intertidal
12		1, 0-5cm	28/4/15	Flat land snail	Gastropod	4	4		whole	Terrestrial
12		1, 0-5cm	28/4/15	Flat land snail	Gastropod	4	1		1/2	Terrestrial
7	A7	2, 5-10cm	1/5/15	Limpet sp.	Gastropod	1	1		whole	Intertidal
7	A7	4, 15-20cm	2/5/15	Limpet sp.	Gastropod	1	1		whole	Intertidal
7	A7	6, 25-30cm	2/5/15	Limpet sp.	Gastropod	1	1		whole	Intertidal
7	A8			Limpet sp.	Gastropod	6	6		whole	Intertidal
7	C5	1, 0-5cm	29/4/15	Limpet sp.	Gastropod	1	1		1/4	Intertidal
7	C5	4, 15-20cm	29/4/15	Limpet sp.	Gastropod	1	1		1/4	Intertidal
8		10, 50-60cm	23/4/15	Limpet sp.	Gastropod	1	1		whole	Intertidal
8		10, 50-60cm	23/4/15	Limpet sp.	Gastropod	1	1		1/2	Intertidal
10	H10	2		Limpet sp.	Gastropod	1	1		whole	Intertidal
10	J8	1		Limpet sp.	Gastropod	1	1		whole	Intertidal
10	J8	2		Limpet sp.	Gastropod	1	1		whole	Intertidal
12		5, 20-25cm	28/4/15	Limpet sp.	Gastropod	3	3		3/4	Intertidal

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
12		6, 25-30cm	28/4/15	Limpet sp.	Gastropod	5	5		whole	Intertidal
13		1, 0-5cm		Limpet sp.	Gastropod	1	1		whole	Intertidal
7	A7	1, 0-5cm	1/5/15	Lithopoma phoebium	Gastropod	1	1		>1/4	Shallow marine
7	C5	3, 10-15cm	29/4/15	Lithopoma phoebium	Gastropod	1	1		3/4	Shallow marine
7	C5	4, 15-20cm	29/4/15	Lithopoma phoebium	Gastropod	1	1		whole	Shallow marine
7	C5	5, 20-25cm	29/4/15	Lithopoma phoebium	Gastropod	1	1		1/4	Shallow marine
12		6, 25-30cm	28/4/15	Lithopoma phoebium	Gastropod	1	1		1/2	Shallow marine
7	A8			Livona pica	Gastropod	1	1		whole	Shallow marine
7	C5	3, 10-15cm	29/4/15	Livona pica	Gastropod	1	1		>1/4	Shallow marine
7	C5	5, 20-25cm	29/4/15	Livona pica	Gastropod	1	1		3/4	Shallow marine
7	D5			Livona pica	Gastropod	2	2		whole	Shallow marine
7	D5			Livona pica	Gastropod	1	1		>1/4	Shallow marine
7	D5			Livona pica	Gastropod	2	2		whole	Shallow marine
7	E5			Livona pica	Gastropod	1	1		>1/4	Shallow marine
10	I8	1		Livona pica	Gastropod	1	1		3/4	Shallow marine
10	I9	1		Livona pica	Gastropod	1	1		whole	Shallow marine
7	A8			Microsagda epistyliulum	Gastropod	14	14		whole	Terrestrial
8		6, 30-35cm	22/4/15	Microsagde epistyliulum	Gastropod	1	1		whole	Terrestrial
7	A4	3, 10-15cm	25/4/15	Muricidae	Gastropod	3	3		>1/4	Shallow marine
7	A8			Muricidae	Gastropod	2	1		1/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Muricidae	Gastropod	1	1		>1/4	Shallow marine
7	C5	4, 15-20cm	29/4/15	Muricidae	Gastropod	2	1		>1/4	Shallow marine
7	D5			Muricidae	Gastropod	1	1		>1/4	Shallow marine
7	E5			Muricidae	Gastropod	1	1		1/2	Shallow marine
8		2, 5-10cm	21/4/15	Muricidae	Gastropod	1	1		>1/4	Shallow marine
8		3, 10-15cm	21/4/15	Muricidae	Gastropod	1	1			Shallow marine
10	F11	1		Muricidae	Gastropod	1	1		>1/4	Shallow marine
10	H10	1		Muricidae	Gastropod	2	2		>1/4	Shallow marine
10	H11	1		Muricidae	Gastropod	1	1		>1/4	Shallow marine
10	J8	1		Muricidae	Gastropod	1	1		>1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
8		6, 30-35cm	22/4/15	Mytilopsis domingensis		1	1		whole	Intertidal
12		4, 15-20cm	28/4/15	Mytilopsis domingensis		2	2		1/2	Intertidal
12		2, 5-10cm	28/4/15	Naticidae sp.		1	1		whole	Intertidal
7	A4	3, 10-15cm	25/4/15	Nerita tessalata	Gastropod	2	2		whole	Intertidal
7	A4	4, 15-20cm		Nerita tessalata	Gastropod	2	2		whole	Intertidal
7	A7	1, 0-5cm	1/5/15	Nerita tessalata	Gastropod	2	2		whole	Intertidal
7	A7	1, 0-5cm	1/5/15	Nerita tessalata	Gastropod	5	5		1/2	Intertidal
7	A7	5, 20-25cm	2/5/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
7	A7	6, 25-30cm	2/5/15	Nerita tessalata	Gastropod	2	2		whole	Intertidal
7	A7	6, 25-30cm	2/5/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
7	A8			Nerita tessalata	Gastropod	1	1		whole	Intertidal
7	A8			Nerita tessalata	Gastropod	1			1/4	Intertidal
7	C5	1, 0-5cm	29/4/15	Nerita tessalata	Gastropod	3	3		whole	Intertidal
7	C5	1, 0-5cm	29/4/15	Nerita tessalata	Gastropod	3	3		3/4	Intertidal
7	C5	4, 15-20cm	29/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
7	C5	6, 25-30cm	29/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
7	D5			Nerita tessalata	Gastropod	1	1		whole	Intertidal
7	E5			Nerita tessalata	Gastropod	2	2		whole	Intertidal
8		1, 0-5cm	21/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
8		13, 70-75cm	24/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
8		2, 5-10cm	21/4/15	Nerita tessalata	Gastropod	2	2		whole	Intertidal
8		7, 35-40cm	22/4/15	Nerita tessalata	Gastropod	2	2		whole	Intertidal
8		8, 40-45cm	22/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
8		9, 45-50cm	23/4/15	Nerita tessalata	Gastropod	2	2		whole	Intertidal
8		PHF 20-40cm	23/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
10	F10	1		Nerita tessalata	Gastropod	2	2		whole	Intertidal
11		9, 45-50cm		Nerita tessalata	Gastropod	1	1		whole	Intertidal
12		1, 0-5cm	28/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
12		1, 0-5cm	28/4/15	Nerita tessalata	Gastropod	5	2		1/2	Intertidal
12		2, 5-10cm	28/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal

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12		3, 10-15cm	28/4/15	Nerita tessalata	Gastropod	4	4		1/2	Intertidal
12		4, 15-20cm	28/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
12		5, 20-25cm	28/4/15	Nerita tessalata	Gastropod	1	1		whole	Intertidal
7	A4	2, 5-10cm		Olivia sp.	Gastropod	1	1		whole	Intertidal
7	A7	2, 5-10cm	1/5/15	Olivia sp.	Gastropod	1	1		whole	Intertidal
10	F10	1		Olivia sp.	Gastropod	1	1		whole	Intertidal
7	A4	4, 15-20cm		Operculum		1			whole	
7	A4	6, 25-30cm		Operculum		2			whole	
7	C5	3, 10-15cm	29/4/15	Operculum		1			whole	
8		2, 5-10cm	21/4/15	Operculum		1			whole	
8		PHF 20-40cm	23/4/15	Operculum		1				
12		1, 0-5cm	28/4/15	Operculum		2			whole	
10	F11	1		Operculum		2			whole	
7	A4	3, 10-15cm	25/4/15	Plurodonte strangulate	Gastropod	4	4		whole	Terrestrial
7	A7	1, 0-5cm	1/5/15	Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
7	A7	4, 15-20cm	2/5/15	Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
7	A7	6, 25-30cm	2/5/15	Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
7	A8			Plurodonte strangulate	Gastropod	18	18		whole	Terrestrial
7	A8			Plurodonte strangulate	Gastropod	2	2		3/4	Terrestrial
7	C5	1, 0-5cm	29/4/15	Plurodonte strangulate	Gastropod	1	1		1/2	Terrestrial
7	C5	2, 5-10cm	29/4/15	Plurodonte strangulate	Gastropod	4	4		whole	Terrestrial
7	C5	2, 5-10cm	29/4/15	Plurodonte strangulate	Gastropod	3	1		1/4	Terrestrial
7	C5	3, 10-15cm	29/4/15	Plurodonte strangulate	Gastropod	1	1		3/4	Terrestrial
7	C5	4, 15-20cm	29/4/15	Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
7	C5	5, 20-25cm	29/4/15	Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
7	C5	6, 25-30cm	29/4/15	Plurodonte strangulate	Gastropod	1	1		1/2	Terrestrial
7	D5			Plurodonte strangulate	Gastropod	14	14		whole	Terrestrial
7	D5			Plurodonte strangulate	Gastropod	4	1		>1/4	Terrestrial
7	D5			Plurodonte strangulate	Gastropod	2	2		whole	Terrestrial
7	D5			Plurodonte strangulate	Gastropod	1	1		1/2	Terrestrial

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	D6			Plurodonte strangulate	Gastropod	5	5		whole	Terrestrial
7	D6			Plurodonte strangulate	Gastropod	4	4		whole	Terrestrial
7	E5			Plurodonte strangulate	Gastropod	7	7		whole	Terrestrial
8		11, 60-65cm	23/4/15	Plurodonte strangulate	Gastropod	2	2		whole	Terrestrial
8		13, 70-75cm	24/4/15	Plurodonte strangulate	Gastropod	2	2		3/4	Terrestrial
8		2, 5-10cm	21/4/15	Plurodonte strangulate	Gastropod	1	1		1/4	Terrestrial
8		7, 35-40cm	22/4/15	Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
8		7, 35-40cm	22/4/15	Plurodonte strangulate	Gastropod	1	1		1/4	Terrestrial
8		8, 40-45cm	22/4/15	Plurodonte strangulate	Gastropod	3	2	small	whole	Terrestrial
8		PHF 20-40cm	23/4/15	Plurodonte strangulate	Gastropod	4	4		whole	Terrestrial
8		PHF 20-40cm	23/4/15	Plurodonte strangulate	Gastropod	2	2		>1/4	Terrestrial
10	F11	1		Plurodonte strangulate	Gastropod	2	2		whole	Terrestrial
10	G13	1		Plurodonte strangulate	Gastropod	2	2		whole	Terrestrial
10	G13	2		Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
10	G14	1		Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
10	H10	1		Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
10	H11	2		Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
10	I8	1		Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
10	J8	1		Plurodonte strangulate	Gastropod	1	1		>1/4	Terrestrial
10	J8	1		Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
10	J8	2		Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
10	M13			Plurodonte strangulate	Gastropod	5	5		whole	Terrestrial
11		7, 35-40cm		Plurodonte strangulate	Gastropod	3	3		1/4	Terrestrial
11		7, 35-40cm		Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
11		8, 40-45cm		Plurodonte strangulate	Gastropod	3	3		whole	Terrestrial
11		9, 45-50cm		Plurodonte strangulate	Gastropod	7	7		whole	Terrestrial
11		10, 50-55cm		Plurodonte strangulate	Gastropod	5	5		whole	Terrestrial
11		10, 50-55cm		Plurodonte strangulate	Gastropod	5	3		1/2	Terrestrial
11		11, 55-60cm		Plurodonte strangulate	Gastropod	3	3		whole	Terrestrial
11		13, 65-70cm		Plurodonte strangulate	Gastropod	5	5		whole	Terrestrial

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
12		1, 0-5cm	28/4/15	Plurodonte strangulate	Gastropod	1	1		whole	Terrestrial
12		1, 0-5cm	28/4/15	Plurodonte strangulate	Gastropod	3	1		>1/4	Terrestrial
12		2, 5-10cm	28/4/15	Plurodonte strangulate	Gastropod	3	1		>1/4	Terrestrial
12		2, 5-10cm	28/4/15	Plurodonte strangulate	Gastropod	1	1		1/2	Terrestrial
12		3, 10-15cm	28/4/15	Plurodonte strangulate	Gastropod	1	1		3/4	Terrestrial
12		4, 15-20cm	28/4/15	Plurodonte strangulate	Gastropod	2	2		3/4	Terrestrial
12		4, 15-20cm	28/4/15	Plurodonte strangulate	Gastropod	12	6		1/4	Terrestrial
12		5, 20-25cm	28/4/15	Plurodonte strangulate	Gastropod	6	6		3/4	Terrestrial
12		6, 25-30cm	28/4/15	Plurodonte strangulate	Gastropod	3	3		3/4	Terrestrial
7	A4	1, 0-5cm		Plurodonte invalida	Gastropod	2	2		whole	Terrestrial
7	A4	1, 0-5cm		Plurodonte invalida	Gastropod	1	1		1/4	Terrestrial
7	A4	3, 10-15cm	25/4/15	Plurodonte invalida	Gastropod	14	14		whole	Terrestrial
7	A4	3, 10-15cm	25/4/15	Plurodonte invalida	Gastropod	3	3		1/2	Terrestrial
7	A4	5, 20-25cm		Plurodonte invalida	Gastropod	2	2		1/2	Terrestrial
7	A7	1, 0-5cm	1/5/15	Plurodonte invalida	Gastropod	2	2		whole	Terrestrial
7	A7	1, 0-5cm	1/5/15	Plurodonte invalida	Gastropod	4	2		1/4	Terrestrial
7	A7	2, 5-10cm	1/5/15	Plurodonte invalida	Gastropod	6	6		whole	Terrestrial
7	A7	2, 5-10cm	1/5/15	Plurodonte invalida	Gastropod	6	6		1/2	Terrestrial
7	A7	4, 15-20cm	2/5/15	Plurodonte invalida	Gastropod	28	28		whole	Terrestrial
7	A7	4, 15-20cm	2/5/15	Plurodonte invalida	Gastropod	10	10		1/2	Terrestrial
7	A7	5, 20-25cm	2/5/15	Plurodonte invalida	Gastropod	8	8		whole	Terrestrial
7	A7	5, 20-25cm	2/5/15	Plurodonte invalida	Gastropod	4	4		1/2	Terrestrial
7	A7	6, 25-30cm	2/5/15	Plurodonte invalida	Gastropod	15	15		whole	Terrestrial
7	A7	6, 25-30cm	2/5/15	Plurodonte invalida	Gastropod	10	4		1/4	Terrestrial
7	A8			Plurodonte invalida	Gastropod	4	4		whole	Terrestrial
7	A8			Plurodonte invalida	Gastropod	274	274		whole	Terrestrial
7	A8			Plurodonte invalida	Gastropod	6	2		1/4	Terrestrial
7	C5	1, 0-5cm	29/4/15	Plurodonte invalida	Gastropod	17	17		whole	Terrestrial
7	C5	1, 0-5cm	29/4/15	Plurodonte invalida	Gastropod	4	4		3/4	Terrestrial
7	C5	1, 0-5cm	29/4/15	Plurodonte invalida	Gastropod	10	6		1/2	Terrestrial

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	C5	2, 5-10cm	29/4/15	Plurodonte invalida	Gastropod	1	1		whole	Terrestrial
7	C5	2, 5-10cm	29/4/15	Plurodonte invalida	Gastropod	8	8		whole	Terrestrial
7	C5	2, 5-10cm	29/4/15	Plurodonte invalida	Gastropod	2	2		1/2	Terrestrial
7	C5	2, 5-10cm	29/4/15	Plurodonte invalida	Gastropod	3	1		1/4	Terrestrial
7	C5	3, 10-15cm	29/4/15	Plurodonte invalida	Gastropod	9	9		whole	Terrestrial
7	C5	3, 10-15cm	29/4/15	Plurodonte invalida	Gastropod	5	3		1/2	Terrestrial
7	C5	4, 15-20cm	29/4/15	Plurodonte invalida	Gastropod	6	6		whole	Terrestrial
7	C5	4, 15-20cm	29/4/15	Plurodonte invalida	Gastropod	1	1		3/4	Terrestrial
7	C5	5, 20-25cm	29/4/15	Plurodonte invalida	Gastropod	4	4		whole	Terrestrial
7	C5	6, 25-30cm	29/4/15	Plurodonte invalida	Gastropod	2	2		whole	Terrestrial
7	C5	6, 25-30cm	29/4/15	Plurodonte invalida	Gastropod	3	1		1/2	Terrestrial
7	D5			Plurodonte invalida	Gastropod	3	3		whole	Terrestrial
7	D5			Plurodonte invalida	Gastropod	5	2		1/2	Terrestrial
7	D5			Plurodonte invalida	Gastropod	25	25		whole	Terrestrial
7	D6			Plurodonte invalida	Gastropod	2	2		whole	Terrestrial
7	E5			Plurodonte invalida	Gastropod	3	2		1/2	Terrestrial
8		1, 0-5cm	21/4/15	Plurodonte invalida	Gastropod	2	2		1/2	Terrestrial
8		10, 50-60cm	23/4/15	Plurodonte invalida	Gastropod	1	1		3/4	Terrestrial
8		11, 60-65cm	23/4/15	Plurodonte invalida	Gastropod	5	5		3/4	Terrestrial
8		13, 70-75cm	24/4/15	Plurodonte invalida	Gastropod	7	7		whole	Terrestrial
8		13, 70-75cm	24/4/15	Plurodonte invalida	Gastropod	2	2		1/2	Terrestrial
8		2, 5-10cm	21/4/15	Plurodonte invalida	Gastropod	4	4		whole	Terrestrial
8		2, 5-10cm	21/4/15	Plurodonte invalida	Gastropod	2	1		1/2	Terrestrial
8		3, 10-15cm	21/4/15	Plurodonte invalida	Gastropod	2	2		whole	Terrestrial
8		3, 10-15cm	21/4/15	Plurodonte invalida	Gastropod	1	1		1/2	Terrestrial
8		6, 30-35cm	22/4/15	Plurodonte invalida	Gastropod	6	6		whole	Terrestrial
8		6, 30-35cm	22/4/15	Plurodonte invalida	Gastropod	1	1		1/2	Terrestrial
8		7, 35-40cm	22/4/15	Plurodonte invalida	Gastropod	4	4		whole	Terrestrial
8		9, 45-50cm	23/4/15	Plurodonte invalida	Gastropod	7	7		whole	Terrestrial
8		9, 45-50cm	23/4/15	Plurodonte invalida	Gastropod	1	1		3/4	Terrestrial

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
8		PHF 20-40cm	23/4/15	Plurodonte invalida	Gastropod	17	17		whole	Terrestrial
8		PHF 20-40cm	23/4/15	Plurodonte invalida	Gastropod	6	4		1/2	Terrestrial
10	F10	1		Plurodonte invalida	Gastropod	61	61		whole	Terrestrial
10	F11	1		Plurodonte invalida	Gastropod	49	40		whole	Terrestrial
10	F11	2		Plurodonte invalida	Gastropod	16	16		whole	Terrestrial
10	G13	1		Plurodonte invalida	Gastropod	83	83		whole	Terrestrial
10	G14	1		Plurodonte invalida	Gastropod	118	118		whole	Terrestrial
10	G14	1		Plurodonte invalida	Gastropod	5	3		1/2	Terrestrial
10	H10	1		Plurodonte invalida	Gastropod	80	80		whole	Terrestrial
10	H10	2		Plurodonte invalida	Gastropod	13	13		whole	Terrestrial
10	H11	1		Plurodonte invalida	Gastropod	98	98		whole	Terrestrial
10	H11	1		Plurodonte invalida	Gastropod	5	3		1/2	Terrestrial
10	H11	2		Plurodonte invalida	Gastropod	3	3		whole	Terrestrial
10	I8	1		Plurodonte invalida	Gastropod	112	112		whole	Terrestrial
10	I8	2		Plurodonte invalida	Gastropod	16	16		whole	Terrestrial
10	I9	1		Plurodonte invalida	Gastropod	65	65		whole	Terrestrial
10	I9	2		Plurodonte invalida	Gastropod	26	26		whole	Terrestrial
10	J8	1		Plurodonte invalida	Gastropod	77	77		whole	Terrestrial
10	J8	1		Plurodonte invalida	Gastropod	7	4		1/2	Terrestrial
10	J8	2		Plurodonte invalida	Gastropod	21	11		whole	Terrestrial
10	J8	2		Plurodonte invalida	Gastropod	4	1		1/2	Terrestrial
10	M13			Plurodonte invalida	Gastropod	81	81		whole	Terrestrial
11		3, 10-15cm		Plurodonte invalida	Gastropod	1	1		whole	Terrestrial
11		6, 30-35cm		Plurodonte invalida	Gastropod	13	13		1/4	Terrestrial
11		6, 30-35cm		Plurodonte invalida	Gastropod	11	11		whole	Terrestrial
11		7, 35-40cm		Plurodonte invalida	Gastropod	24	24		whole	Terrestrial
11		7, 35-40cm		Plurodonte invalida	Gastropod	7	7		1/4	Terrestrial
11		8, 40-45cm		Plurodonte invalida	Gastropod	41	41		whole	Terrestrial
11		8, 40-45cm		Plurodonte invalida	Gastropod	12	5		1/2	Terrestrial
11		9, 45-50cm		Plurodonte invalida	Gastropod	12	3		>1/4	Terrestrial

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
11		9, 45-50cm		Plurodonte invalida	Gastropod	31	31		whole	Terrestrial
11		10, 50-55cm		Plurodonte invalida	Gastropod	62	62		whole	Terrestrial
11		10, 50-55cm		Plurodonte invalida	Gastropod	17	8		1/2	Terrestrial
11		11, 55-60cm		Plurodonte invalida	Gastropod	26	26		whole	Terrestrial
11		11, 55-60cm		Plurodonte invalida	Gastropod	7	7		1/2	Terrestrial
11		13, 65-70cm		Plurodonte invalida	Gastropod	43	43		whole	Terrestrial
11		13, 65-70cm		Plurodonte invalida	Gastropod	21	11		1/4	Terrestrial
12		1, 0-5cm	28/4/15	Plurodonte invalida	Gastropod	4	4		whole	Terrestrial
12		1, 0-5cm	28/4/15	Plurodonte invalida	Gastropod	3	1		3/4	Terrestrial
12		1, 0-5cm	28/4/15	Plurodonte invalida	Gastropod	10	3		1/4	Terrestrial
12		2, 5-10cm	28/4/15	Plurodonte invalida	Gastropod	20	20		whole	Terrestrial
12		2, 5-10cm	28/4/15	Plurodonte invalida	Gastropod	12	12		3/4	Terrestrial
12		2, 5-10cm	28/4/15	Plurodonte invalida	Gastropod	10	5		1/2	Terrestrial
12		3, 10-15cm	28/4/15	Plurodonte invalida	Gastropod	50	50		whole	Terrestrial
12		3, 10-15cm	28/4/15	Plurodonte invalida	Gastropod	17	17		3/4	Terrestrial
12		3, 10-15cm	28/4/15	Plurodonte invalida	Gastropod	17	7		1/2	Terrestrial
12		4, 15-20cm	28/4/15	Plurodonte invalida	Gastropod	56	56		whole	Terrestrial
12		4, 15-20cm	28/4/15	Plurodonte invalida	Gastropod	24	13		1/2	Terrestrial
12		5, 20-25cm	28/4/15	Plurodonte invalida	Gastropod	43	43		whole	Terrestrial
12		5, 20-25cm	28/4/15	Plurodonte invalida	Gastropod	13	6		1/2	Terrestrial
12		5, 20-25cm	28/4/15	Plurodonte invalida	Gastropod					Terrestrial
12		6, 25-30cm	28/4/15	Plurodonte invalida	Gastropod	15	15		whole	Terrestrial
12		6, 25-30cm	28/4/15	Plurodonte invalida	Gastropod	2	2		3/4	Terrestrial
12		6, 25-30cm	28/4/15	Plurodonte invalida	Gastropod	5	2		1/2	Terrestrial
12		7, 30-35cm	29/4/15	Plurodonte invalida	Gastropod	4	4		whole	Terrestrial
12		7, 30-35cm	29/4/15	Plurodonte invalida	Gastropod	2	2		3/4	Terrestrial
12		7, 30-35cm	29/4/15	Plurodonte invalida	Gastropod	7	2		1/4	Terrestrial
13		1, 0-5cm		Plurodonte invalida	Gastropod	16	16		whole	Terrestrial
14		1, 0-5cm		Plurodonte invalida	Gastropod	2	2		1/2	Terrestrial
14		2, 5-10cm		Plurodonte invalida	Gastropod	5	5		whole	Terrestrial

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
14		3, 10-15cm		Plurodonte invalida	Gastropod	2	2		whole	Terrestrial
7	A4	3, 10-15cm	25/4/15	Poteria sp.	Gastropod	1	1		whole	Terrestrial
7	A7	2, 5-10cm	1/5/15	Poteria sp.	Gastropod	3	3		whole	Terrestrial
7	A7	4, 15-20cm	2/5/15	Poteria sp.	Gastropod	6	6		whole	Terrestrial
7	A7	5, 20-25cm	2/5/15	Poteria sp.	Gastropod	3	3		whole	Terrestrial
7	A8			Poteria sp.	Gastropod	13	13		whole	Terrestrial
7	C5	1, 0-5cm	29/4/15	Poteria sp.	Gastropod	3	3		whole	Terrestrial
7	C5	3, 10-15cm	29/4/15	Poteria sp.	Gastropod	2	2		whole	Terrestrial
7	C5	4, 15-20cm	29/4/15	Poteria sp.	Gastropod	3	3		whole	Terrestrial
7	C5	5, 20-25cm	29/4/15	Poteria sp.	Gastropod	1	1		whole	Terrestrial
7	D5			Poteria sp.	Gastropod	1	1		whole	Terrestrial
8		1, 0-5cm	21/4/15	Poteria sp.	Gastropod	2	2		whole	Terrestrial
8		2, 5-10cm	21/4/15	Poteria sp.	Gastropod	1	1		whole	Terrestrial
8		3, 10-15cm	21/4/15	Poteria sp.	Gastropod	2	2		whole	Terrestrial
8		6, 30-35cm	22/4/15	Poteria sp.	Gastropod	2	2		whole	Terrestrial
8		PHF 20-40cm	23/4/15	Poteria sp.	Gastropod	1	1		whole	Terrestrial
10	F10	1		Poteria sp.	Gastropod	8	8		whole	Terrestrial
10	F11	1		Poteria sp.	Gastropod	6	6		whole	Terrestrial
10	G14	1		Poteria sp.	Gastropod	2	2		whole	Terrestrial
10	H10	1		Poteria sp.	Gastropod	7	7		whole	Terrestrial
10	H11	1		Poteria sp.	Gastropod	7	7		whole	Terrestrial
10	I9	1		Poteria sp.	Gastropod	1	1		whole	Terrestrial
10	J8	1		Poteria sp.	Gastropod	2	2		whole	Terrestrial
10	M13			Poteria sp.	Gastropod	1	1		whole	Terrestrial
11		7, 35-40cm		Poteria sp.	Gastropod	11	11		whole	Terrestrial
11		8, 40-45cm		Poteria sp.	Gastropod	7	7		whole	Terrestrial
11		9, 45-50cm		Poteria sp.	Gastropod	14	14		whole	Terrestrial
11		10, 50-55cm		Poteria sp.	Gastropod	18	18		whole	Terrestrial
11		11, 55-60cm		Poteria sp.	Gastropod	3	3		whole	Terrestrial
11		13, 65-70cm		Poteria sp.	Gastropod	26	26		whole	Terrestrial

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
12		1, 0-5cm	28/4/15	Poteria sp.	Gastropod	5	5		whole	Terrestrial
12		1, 0-5cm	28/4/15	Poteria sp.	Gastropod	2	1		1/2	Terrestrial
12		2, 5-10cm	28/4/15	Poteria sp.	Gastropod	12	12		whole	Terrestrial
12		2, 5-10cm	28/4/15	Poteria sp.	Gastropod	2	2		whole	Terrestrial
12		3, 10-15cm	28/4/15	Poteria sp.	Gastropod	13	13		whole	Terrestrial
12		3, 10-15cm	28/4/15	Poteria sp.	Gastropod	3	1		1/2	Terrestrial
12		4, 15-20cm	28/4/15	Poteria sp.	Gastropod	6	6		whole	Terrestrial
12		5, 20-25cm	28/4/15	Poteria sp.	Gastropod	1	1		1/2	Terrestrial
12		6, 25-30cm	28/4/15	Poteria sp.	Gastropod	1	1		whole	Terrestrial
12		7, 30-35cm	29/4/15	Poteria sp.	Gastropod	1	1		whole	Terrestrial
13		1, 0-5cm		Poteria sp.	Gastropod	3	3		whole	Terrestrial
14		1, 0-5cm		Poteria sp.	Gastropod	1	1		whole	Terrestrial
14		2, 5-10cm		Poteria sp.	Gastropod	6	6		whole	Terrestrial
7	C5	1, 0-5cm	29/4/15	Poteria sp	Gastropod	1	1		whole	Terrestrial
7	A7	4, 15-20cm	2/5/15	Purpura patula	Gastropod	1	1		whole	Intertidal
8		1, 0-5cm	21/4/15	Purpura patula	Gastropod	1	1	small	1/2	Intertidal
10	J8	2		Purpura patula	Gastropod	2	2		whole	Intertidal
12		3, 10-15cm	28/4/15	Purpura patula	Gastropod	2	2		whole	Intertidal
12		3, 10-15cm	28/4/15	Purpura patula	Gastropod	1	1		1/4	Intertidal
12		4, 15-20cm	28/4/15	Purpura patula	Gastropod	1	1		1/4	Intertidal
12		5, 20-25cm	28/4/15	Purpura patula	Gastropod	2	1		>1/4	Intertidal
14		3, 10-15cm		Purpura patula	Gastropod	1	1		whole	Intertidal
7	A4	1, 0-5cm		Sinum sp.	Gastropod	1	1		whole	Shallow marine
7	A4	2, 5-10cm		Sinum sp.	Gastropod	2	2		whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Sinum sp.	Gastropod	3	3		whole	Shallow marine
7	A4	5, 20-25cm		Sinum sp.	Gastropod	3	3		>1/4	Shallow marine
7	A7	1, 0-5cm	1/5/15	Sinum sp.	Gastropod	2	2		1/2	Shallow marine
7	A7	1, 0-5cm	1/5/15	Sinum sp.	Gastropod	6	5		>1/4	Shallow marine
7	A7	2, 5-10cm	1/5/15	Sinum sp.	Gastropod	5	5		>1/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Sinum sp.	Gastropod	5	5		whole	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	A7	5, 20-25cm	2/5/15	Sinum sp.	Gastropod	1	1		>1/4	Shallow marine
7	A7	6, 25-30cm	2/5/15	Sinum sp.	Gastropod	1	1		3/4	Shallow marine
7	A7	7, 30-35cm		Sinum sp.	Gastropod	1	1		>1/4	Shallow marine
7	A8			Sinum sp.	Gastropod	17	7		>1/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Sinum sp.	Gastropod	13	4		>1/4	Shallow marine
7	C5	2, 5-10cm	29/4/15	Sinum sp.	Gastropod	4	4		whole	Shallow marine
7	C5	2, 5-10cm	29/4/15	Sinum sp.	Gastropod	6	2		1/4	Shallow marine
7	C5	3, 10-15cm	29/4/15	Sinum sp.	Gastropod	1	1		3/4	Shallow marine
7	C5	3, 10-15cm	29/4/15	Sinum sp.	Gastropod	6	1		>1/4	Shallow marine
7	C5	4, 15-20cm	29/4/15	Sinum sp.	Gastropod	1	1		3/4	Shallow marine
7	C5	4, 15-20cm	29/4/15	Sinum sp.	Gastropod	5	1		>1/4	Shallow marine
7	C5	5, 20-25cm	29/4/15	Sinum sp.	Gastropod	2	1		>1/4	Shallow marine
7	C5	6, 25-30cm	29/4/15	Sinum sp.	Gastropod	8	3		>1/4	Shallow marine
7	D5			Sinum sp.	Gastropod	14	14		whole	Shallow marine
7	D5			Sinum sp.	Gastropod	15	6		>1/4	Shallow marine
7	D5			Sinum sp.	Gastropod	2	2		whole	Shallow marine
7	D6			Sinum sp.	Gastropod	12	12		whole	Shallow marine
7	D6			Sinum sp.	Gastropod	1	1		1/4	Shallow marine
7	E5			Sinum sp.	Gastropod	10	10		whole	Shallow marine
7	E5			Sinum sp.	Gastropod	9	3		1/4	Shallow marine
8		1, 0-5cm	21/4/15	Sinum sp.	Gastropod	1	1		whole	Shallow marine
8		10, 50-60cm	23/4/15	Sinum sp.	Gastropod	1	1		whole	Shallow marine
8		11, 60-65cm	23/4/15	Sinum sp.	Gastropod	1	1		whole	Shallow marine
8		12, 65-70cm	24/4/15	Sinum sp.	Gastropod	1	1		whole	Shallow marine
8		2, 5-10cm	21/4/15	Sinum sp.	Gastropod	3	1		>1/4	Shallow marine
8		3, 10-15cm	21/4/15	Sinum sp.	Gastropod	2	2		whole	Shallow marine
8		3, 10-15cm	21/4/15	Sinum sp.	Gastropod	2	1		1/4	Shallow marine
8		8, 40-45cm	22/4/15	Sinum sp.	Gastropod	2	2		whole	Shallow marine
8		PHF 20-40cm	23/4/15	Sinum sp.	Gastropod	4	4		whole	Shallow marine
8		PHF 20-40cm	23/4/15	Sinum sp.	Gastropod	1	1		>1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
10	F10	1		Sinum sp.	Gastropod	1	1		whole	Shallow marine
10	F11	2		Sinum sp.	Gastropod	1	1		whole	Shallow marine
10	G13	1		Sinum sp.	Gastropod	2	2		whole	Shallow marine
10	G13	1		Sinum sp.	Gastropod	1	1		>1/4	Shallow marine
10	G13	2		Sinum sp.	Gastropod	1	1		whole	Shallow marine
10	G14	2		Sinum sp.	Gastropod	1	1		whole	Shallow marine
10	H10	1		Sinum sp.	Gastropod	2	2		whole	Shallow marine
10	H10	1		Sinum sp.	Gastropod	7	2		>1/4	Shallow marine
10	H10	2		Sinum sp.	Gastropod	1	1		whole	Shallow marine
10	H11	1		Sinum sp.	Gastropod	4	4		whole	Shallow marine
10	H11	1		Sinum sp.	Gastropod	1	1		>1/4	Shallow marine
10	H11	2		Sinum sp.	Gastropod	1	1		whole	Shallow marine
10	H11	2		Sinum sp.	Gastropod	1	1		>1/4	Shallow marine
10	I8	1		Sinum sp.	Gastropod	3	3		>1/4	Shallow marine
10	I8	1		Sinum sp.	Gastropod	1	1		whole	Shallow marine
10	I9	1		Sinum sp.	Gastropod	2	2		whole	Shallow marine
10	I9	1		Sinum sp.	Gastropod	3	1		>1/4	Shallow marine
10	J8	1		Sinum sp.	Gastropod	1	1		1/2	Shallow marine
10	J8	2		Sinum sp.	Gastropod	4	4		whole	Shallow marine
10	M13			Sinum sp.	Gastropod	4	4		whole	Shallow marine
10	M13			Sinum sp.	Gastropod	3	1		>1/4	Shallow marine
11		7, 35-40cm		Sinum sp.	Gastropod	1	1		>1/4	Shallow marine
12		2, 5-10cm	28/4/15	Sinum sp.	Gastropod	3	1		>1/4	Shallow marine
12		3, 10-15cm	28/4/15	Sinum sp.	Gastropod	1	1		3/4	Shallow marine
12		3, 10-15cm	28/4/15	Sinum sp.	Gastropod	11	2		>1/4	Shallow marine
12		4, 15-20cm	28/4/15	Sinum sp.	Gastropod	1	1		whole	Shallow marine
12		4, 15-20cm	28/4/15	Sinum sp.	Gastropod	2	1		1/4	Shallow marine
12		5, 20-25cm	28/4/15	Sinum sp.	Gastropod	1	1		whole	Shallow marine
12		5, 20-25cm	28/4/15	Sinum sp.	Gastropod	9	3		1/2	Shallow marine
12		6, 25-30cm	28/4/15	Sinum sp.	Gastropod	3	1		>1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
8		10, 50-60cm	23/4/15	Spirostamma simile	Gastropod	1	1		whole	Terrestrial
7	A4	2, 5-10cm		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
12		2, 5-10cm	28/4/15	Strombus pugilis	Gastropod	1	1		1/2	Shallow marine
7	A4	1, 0-5cm		Strombus gigas	Gastropod	1	1		1/4	Shallow marine
7	A4	1, 0-5cm		Strombus gigas	Gastropod	3	1		>1/4	Shallow marine
7	A4	2, 5-10cm		Strombus gigas	Gastropod	1			>1/4	Shallow marine
7	A4	3, 10-15cm	25/4/15	Strombus gigas	Gastropod	1	1		whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Strombus gigas	Gastropod	1	1		whole	Shallow marine
7	A4	3, 10-15cm	25/4/15	Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
7	A4	3, 10-15cm	25/4/15	Strombus gigas	Gastropod	2			>1/4	Shallow marine
7	A4	4, 15-20cm		Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
7	A4	6, 25-30cm		Strombus gigas	Gastropod	1	1		3/4	Shallow marine
7	A4	6, 25-30cm		Strombus gigas	Gastropod	1			>1/4	Shallow marine
7	A7	1, 0-5cm	1/5/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
7	A7	1, 0-5cm	1/5/15	Strombus gigas	Gastropod	3	1		>1/4	Shallow marine
7	A7	1, 0-5cm	1/5/15	Strombus gigas	Gastropod	1			>1/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Strombus gigas	Gastropod	1	1		3/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Strombus gigas	Gastropod	1	1		3/4	Shallow marine
7	A7	4, 15-20cm	2/5/15	Strombus gigas	Gastropod	1			>1/4	Shallow marine
7	A7	5, 20-25cm	2/5/15	Strombus gigas	Gastropod	1	1		3/4	Shallow marine
7	A7	5, 20-25cm	2/5/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
7	A7	5, 20-25cm	2/5/15	Strombus gigas	Gastropod	1			>1/4	Shallow marine
7	A7	6, 25-30cm	2/5/15	Strombus gigas	Gastropod	1	1		3/4	Shallow marine
7	A7	6, 25-30cm	2/5/15	Strombus gigas	Gastropod	1			>1/4	Shallow marine
7	A7	7, 30-35cm		Strombus gigas	Gastropod	1			>1/4	Shallow marine
7	A8			Strombus gigas	Gastropod	6	6		3/4	Shallow marine
7	A8			Strombus gigas	Gastropod	2	2		3/4	Shallow marine
7	A8			Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
7	A8			Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Strombus gigas	Gastropod	5	1		>1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	C5	1, 0-5cm	29/4/15	Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Strombus gigas	Gastropod	7	2		>1/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Strombus gigas	Gastropod	3	2		>1/4	Shallow marine
7	C5	1, 0-5cm	29/4/15	Strombus gigas	Gastropod	1	1		1/2	Shallow marine
7	C5	2, 5-10cm	29/4/15	Strombus gigas	Gastropod	3	1		>1/4	Shallow marine
7	C5	2, 5-10cm	29/4/15	Strombus gigas	Gastropod	5	2		>1/4	Shallow marine
7	C5	2, 5-10cm	29/4/15	Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
7	C5	2, 5-10cm	29/4/15	Strombus gigas	Gastropod	1	1		3/4	Shallow marine
7	C5	3, 10-15cm	29/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
7	C5	4, 15-20cm	29/4/15	Strombus gigas	Gastropod	1	1			Shallow marine
7	C5	4, 15-20cm	29/4/15	Strombus gigas	Gastropod	1	1			Shallow marine
7	C5	4, 15-20cm	29/4/15	Strombus gigas	Gastropod	1	1		3/4	Shallow marine
7	C5	5, 20-25cm	29/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
7	C5	6, 25-30cm	29/4/15	Strombus gigas	Gastropod	3	2		>1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	1	1		1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	1	1		whole	Shallow marine
7	D5			Strombus gigas	Gastropod	1	1		whole	Shallow marine
7	D5			Strombus gigas	Gastropod	1	1		whole	Shallow marine
7	D5			Strombus gigas	Gastropod	3	2		1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	4	2		>1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	9	4		>1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	2	1		1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	1	1		1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	1	1		3/4	Shallow marine
7	D5			Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	3	2		>1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	3	3		whole	Shallow marine
7	D6			Strombus gigas	Gastropod	4	4		>1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	D6			Strombus gigas	Gastropod	5	3		>1/4	Shallow marine
7	D6			Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
7	D6			Strombus gigas	Gastropod	6	2		>1/4	Shallow marine
7	E5			Strombus gigas	Gastropod	1	1		whole	Shallow marine
7	E5			Strombus gigas	Gastropod	1	1		whole	Shallow marine
7	E5			Strombus gigas	Gastropod	1	1		whole	Shallow marine
7	E5			Strombus gigas	Gastropod	9	9		>1/4	Shallow marine
7	E5			Strombus gigas	Gastropod	7	3		>1/4	Shallow marine
7	E5			Strombus gigas	Gastropod	6	2		>1/4	Shallow marine
7	E5			Strombus gigas	Gastropod	2	2		>1/4	Shallow marine
7	E5			Strombus gigas	Gastropod	14	6		>1/4	Shallow marine
8		1, 0-5cm	21/4/15	Strombus gigas	Gastropod	5	2		>1/4	Shallow marine
8		10, 50-60cm	23/4/15	Strombus gigas	Gastropod	1	1			Shallow marine
8		11, 60-65cm	23/4/15	Strombus gigas	Gastropod	1	1		1/4	Shallow marine
8		12, 65-70cm	24/4/15	Strombus gigas	Gastropod	3	2		1/4	Shallow marine
8		12, 65-70cm	24/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
8		13, 70-75cm	24/4/15	Strombus gigas	Gastropod	1	1		3/4	Shallow marine
8		2, 5-10cm	21/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
8		2, 5-10cm	21/4/15	Strombus gigas	Gastropod	1			>1/4	Shallow marine
8		2, 5-10cm	21/4/15	Strombus gigas	Gastropod	1	1			Shallow marine
8		3, 10-15cm	21/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
8		3, 10-15cm	21/4/15	Strombus gigas	Gastropod	1			>1/4	Shallow marine
8		5, 25-30cm	22/4/15	Strombus gigas	Gastropod	1	1	small	whole	Shallow marine
8		6, 30-35cm	22/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
8		6, 30-35cm	22/4/15	Strombus gigas	Gastropod	1			1/4	Shallow marine
8		7, 35-40cm	22/4/15	Strombus gigas	Gastropod	1	1		3/4	Shallow marine
8		9, 45-50cm	23/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
8		9, 45-50cm	23/4/15	Strombus gigas	Gastropod	1			>1/4	Shallow marine
8		9, 45-50cm	23/4/15	Strombus gigas	Gastropod	1	1		1/4	Shallow marine
8		PHF 20-40cm	23/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
10	F11	2		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	G13	1		Strombus gigas	Gastropod	3	1		>1/4	Shallow marine
10	G13	1		Strombus gigas	Gastropod	1			>1/4	Shallow marine
10	G14	1		Strombus gigas	Gastropod	2	2		>1/4	Shallow marine
10	G14	1		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	G14	1		Strombus gigas	Gastropod	4	1		>1/4	Shallow marine
10	H10	1		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	H10	1		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	H10	1		Strombus gigas	Gastropod	1			>1/4	Shallow marine
10	H10	2		Strombus gigas	Gastropod	1	1		1/4	Shallow marine
10	H11	1		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	H11	2		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	I8	1		Strombus gigas	Gastropod	3	1		>1/4	Shallow marine
10	I8	1		Strombus gigas	Gastropod	1			>1/4	Shallow marine
10	I8	1		Strombus gigas	Gastropod	3			>1/4	Shallow marine
10	I8	2		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	I9	1		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	I9	1		Strombus gigas	Gastropod	2			>1/4	Shallow marine
10	J8	1		Strombus gigas	Gastropod	2	2	small	whole	Shallow marine
10	J8	1		Strombus gigas	Gastropod	2	1		>1/4	Shallow marine
10	J8	1		Strombus gigas	Gastropod	2			>1/4	Shallow marine
10	J8	2		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	J8	2		Strombus gigas	Gastropod	1			>1/4	Shallow marine
10	J8	2		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
10	M13			Strombus gigas	Gastropod	1	1		whole	Shallow marine
10	M13			Strombus gigas	Gastropod	1	1		1/4	Shallow marine
10	M13			Strombus gigas	Gastropod	2			1/4	Shallow marine
10	M13			Strombus gigas	Gastropod	1			1/4	Shallow marine
10	M13			Strombus gigas	Gastropod	1	1		1/4	Shallow marine
11		7, 35-40cm		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
12		2, 5-10cm	28/4/15	Strombus gigas	Gastropod	2	2		>1/4	Shallow marine
12		3, 10-15cm	28/4/15	Strombus gigas	Gastropod	1	1		whole	Shallow marine
12		3, 10-15cm	28/4/15	Strombus gigas	Gastropod	3	3		>1/4	Shallow marine
12		3, 10-15cm	28/4/15	Strombus gigas	Gastropod	1			>1/4	Shallow marine
12		5, 20-25cm	28/4/15	Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
12		5, 20-25cm	28/4/15	Strombus gigas	Gastropod	4			>1/4	Shallow marine
12		6, 25-30cm	28/4/15	Strombus gigas	Gastropod	1	1			Shallow marine
13		1, 0-5cm		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
14		1, 0-5cm		Strombus gigas	Gastropod	1	1		3/4	Shallow marine
14		2, 5-10cm		Strombus gigas	Gastropod	2	2		>1/4	Shallow marine
14		2, 5-10cm		Strombus gigas	Gastropod	1			>1/4	Shallow marine
14		3, 10-15cm		Strombus gigas	Gastropod	1	1		>1/4	Shallow marine
7	D5			Strombus gigas	Gastropod	4	4		whole	Intertidal
10	F10	1		Strombus gigas	Gastropod	6	6		whole	Intertidal
10	F11	1		Strombus gigas	Gastropod	5	5		whole	Intertidal
10	G14	2		Strombus gigas	Gastropod	2	2		whole	Intertidal
10	H10	1		Strombus gigas	Gastropod	3	3		whole	Intertidal
10	H11	1		Strombus gigas	Gastropod	9	9		whole	Intertidal
13		1, 0-5cm		Strombus gigas	Gastropod	2	2		whole	Intertidal
14		2, 5-10cm		Tectarius muricatium	Gastropod	1	1		whole	Intertidal
7	A4	1, 0-5cm		Tecterius muricatum	Gastropod	1	1		whole	Intertidal
7	A4	2, 5-10cm		Tecterius muricatum	Gastropod	1	1		whole	Intertidal
7	A4	3, 10-15cm	25/4/15	Tecterius muricatum	Gastropod	2	2		whole	Intertidal
7	A4	4, 15-20cm		Tecterius muricatum	Gastropod	5	5		whole	Intertidal
7	A4	5, 20-25cm		Tecterius muricatum	Gastropod	2	2		whole	Intertidal
7	A7	1, 0-5cm	1/5/15	Tecterius muricatum	Gastropod	9	9		whole	Intertidal
7	A7	2, 5-10cm	1/5/15	Tecterius muricatum	Gastropod	7	7		whole	Intertidal
7	A7	4, 15-20cm	2/5/15	Tecterius muricatum	Gastropod	6	6		whole	Intertidal
7	A7	5, 20-25cm	2/5/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
7	A8			Tecterius muricatum	Gastropod	4	1		whole	Intertidal

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	C5	1, 0-5cm	29/4/15	Tecterius muricatum	Gastropod	16	16		whole	Intertidal
7	C5	1, 0-5cm	29/4/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
7	C5	2, 5-10cm	29/4/15	Tecterius muricatum	Gastropod	8	8		whole	Intertidal
7	C5	2, 5-10cm	29/4/15	Tecterius muricatum	Gastropod	1	1		1/2	Intertidal
7	C5	3, 10-15cm	29/4/15	Tecterius muricatum	Gastropod	4	4		3/4	Intertidal
7	C5	3, 10-15cm	29/4/15	Tecterius muricatum	Gastropod	3	3		3/4	Intertidal
7	C5	5, 20-25cm	29/4/15	Tecterius muricatum	Gastropod	5	5		whole	Intertidal
7	C5	5, 20-25cm	29/4/15	Tecterius muricatum	Gastropod	1	1		1/4	Intertidal
7	C5	6, 25-30cm	29/4/15	Tecterius muricatum	Gastropod	2	2		whole	Intertidal
7	D5			Tecterius muricatum	Gastropod	3	3		whole	Intertidal
7	E5			Tecterius muricatum	Gastropod	3	3		whole	Intertidal
8		1, 0-5cm	21/4/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
8		11, 60-65cm	23/4/15	Tecterius muricatum	Gastropod	1	1		3/4	Intertidal
8		2, 5-10cm	21/4/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
8		3, 10-15cm	21/4/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
8		6, 30-35cm	22/4/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
8		PHF 20-40cm	23/4/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
11		3, 10-15cm		Tecterius muricatum	Gastropod	1	1		whole	Intertidal
12		1, 0-5cm	28/4/15	Tecterius muricatum	Gastropod	4	4		whole	Intertidal
12		1, 0-5cm	28/4/15	Tecterius muricatum	Gastropod	2	1		1/2	Intertidal
12		2, 5-10cm	28/4/15	Tecterius muricatum	Gastropod	6	6		whole	Intertidal
12		2, 5-10cm	28/4/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
12		3, 10-15cm	28/4/15	Tecterius muricatum	Gastropod	9	9		3/4	Intertidal
12		4, 15-20cm	28/4/15	Tecterius muricatum	Gastropod	2	2		whole	Intertidal
12		6, 25-30cm	28/4/15	Tecterius muricatum	Gastropod	1	1		whole	Intertidal
12		7, 30-35cm	29/4/15	Tecterius muricatum	Gastropod	2	2		whole	Intertidal
12		7, 30-35cm	29/4/15	Tecterius muricatum	Gastropod	3	1		1/2	Intertidal
7	A4	3, 10-15cm	25/4/15	Thais rustica	Gastropod	2	2		whole	Intertidal
7	A7	4, 15-20cm	2/5/15	Thais rustica	Gastropod	1	1		whole	Intertidal
8		6, 30-35cm	22/4/15	Thais rustica	Gastropod	1	1		whole	Intertidal

House	Unit	Level	Date	Shell ID	Shell Type	NISP	MNI	Size Category	Completeness	Environment
7	C5	1, 0-5cm	29/4/15	Turbo sp.	Gastropod	2	1		>1/4	Shallow marine
7	C5	2, 5-10cm	29/4/15	Turbo sp.	Gastropod	1	1		>1/4	Shallow marine
12		6, 25-30cm	28/4/15	Turbo sp.	Gastropod	1	1		whole	Shallow marine
8		9, 45-50cm	23/4/15	Turbo sp. Invona pica	Gastropod	1	1		1/2	Shallow marine
8		PHF 20-40cm	23/4/15	Turbo sp. Livona pica	Gastropod	1	1		whole	Shallow marine
7	C5	3, 10-15cm	29/4/15	Unidentified						
8		11, 60-65cm	23/4/15	Unidentified						
7	A4	1, 0-5cm		Unidentified		1	1		whole	
12		1, 0-5cm	28/4/15	Unidentified		32			>1/4	
12		4, 15-20cm	28/4/15	Unidentified		3				
12		7, 30-35cm	29/4/15	Unidentified		12			>1/4	
7	D5			Unidentified gastropod		1	1		whole	
12		1, 0-5cm	28/4/15	Unidentified Gastropod		1	1	Small	whole	
12		1, 0-5cm	28/4/15	Unidentified Gastropod		1	1	Small	?	
7	D5			unidentified land snail		1	1		whole	

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House	Unit	Level	Class	Species	Element	Element Type	NISP	Completeness	Age	Environment
8		Post Hole Feature	Mammal	Hutia	Rib		1			Terrestrial
8		Post Hole Feature	Mammal	Hutia	Tibia	Distal end	1	1/2		Terrestrial
8		Post Hole Feature	Mammal	Hutia	Scapula	Distal end	1	1/2		Terrestrial
8		13, 70-75cm	Mammal	Hutia	Calcaneus		1	whole		Terrestrial
8		13, 70-75cm	Mammal	Hutia	Scapula	Distal end	1	1/4		Terrestrial
8		13, 70-75cm	Mammal	Hutia	Radius	Proximal end	1	1/4		Terrestrial
8		13, 70-75cm	Mammal	Hutia	Patella		1	whole		Terrestrial
8		13, 70-75cm	Mammal	Hutia	Rib	vertebral end	1	1/2		Terrestrial
8		13, 70-75cm	Mammal	Hutia	Vertebrae	lumbar vert	1	whole		Terrestrial
8		13, 70-75cm	Mammal	Hutia	vertebrae		1	1/4		Terrestrial
8		13, 70-75cm	Mammal	Hutia	Unidentified Long Bone		1	>1/4		Terrestrial
8		12, 65-70cm	Mammal							Terrestrial
8		12, 65-70cm	Mammal	Hutia	Radius	Distal end	1	1/4		Terrestrial
8		12, 65-70cm	Mammal	Hutia	Maxilla		1	>1/4		Terrestrial
8		12, 65-70cm	Mammal	Hutia	Rib		1	whole		Terrestrial
8		12, 65-70cm	Mammal	Hutia	Femur	Proximal	1	1/2		Terrestrial
8		12, 65-70cm	Mammal	Hutia	Humerus	Distal	1	1/4		Terrestrial
8		12, 65-70cm	Mammal	Hutia	Calcaneus		1	whole		Terrestrial
8		12, 65-70cm	Mammal	Hutia	Ichium	Icheal Tuberocity	1	>1/4		Terrestrial
8		Wall Clean Up	Mammal	Hutia	Mandible		1	1/2		Terrestrial
8		7, 35-40cm	Mammal	Dog?	Ulna		1	>1/4		Terrestrial
8		11, 60-65cm	Mammal	Hutia	Humerus	Distal	1	1/4		Terrestrial
8		11, 60-65cm	Mammal	Small Mammal	Long Bone		1	>1/4		Terrestrial
8		4, 15-25cm	Mammal	Hutia	Phalange		1	whole		Terrestrial
8		4, 15-25cm	Mammal	Hutia	Calcaneus		1	whole		Terrestrial
8		3, 10-15cm	Mammal	Hutia	Ulna	Proximal	1	1/2		Terrestrial
8		3, 10-15cm	Mammal	Hutia	Tooth incisor		1	1/2		Terrestrial

House	Unit	Level	Class	Species	Element	Element Type	NISP	Completeness	Age	Environment
8		10, 50-60cm	Mammal	Hutia	Cranium	Auditory Bulla	1	>1/4		Terrestrial
8		9, 45-50cm	Mammal	Hutia	Cranium		1	>1/4		Terrestrial
8		9, 45-50cm	Mammal	Hutia	Mandible		1	1/4		Terrestrial
7	A8		Mammal	Jamaican Rice Rat	Mandible		1	1/2		Terrestrial
7	A8		Mammal	Jamaican Rice Rat	Tooth	Incisor	1	whole		Terrestrial
7	A8		Mammal	Jamaican Rice Rat	Humerus	Distal	1	3/4		Terrestrial
7	A8		Mammal	Hutia	Mandible			1/2		Terrestrial
7	A8		Mammal	Hutia	Femur	Proximal		>1/4	Mature	Terrestrial
7	A8		Mammal	Hutia	Ulna	Proximal	2	1/4	Immature	Terrestrial
7	A8		Mammal	Hutia	Ulna	Proximal	1	1/2	Immature	Terrestrial
7	A8		Mammal	Hutia	Scapula	Distal	1	1/4	Immature	Terrestrial
7	A8		Mammal	Hutia	Scapula		2	1/4		Terrestrial
7	A8		Mammal	Hutia	Calcaneus		4	whole	Immature	Terrestrial
7	A8		Mammal	Hutia	Calcaneus		1	whole	Mature	Terrestrial
7	A8		Mammal	Hutia	Metapoid		3	whole		Terrestrial
7	A8		Mammal	Hutia	Phalange		7	whole		Terrestrial
7	A8		Mammal	Hutia	Vertebrae		15	>1/4		Terrestrial
7	A8		Mammal	Hutia	Rib		2	3/4		Terrestrial
7	A8		Mammal	Hutia	Tooth	Molar	8	3/4		Terrestrial
7	A8		Mammal	Hutia	Tooth	Incisor	6	3/4		Terrestrial
7	A8		Mammal	Hutia	Maxilla		1	1/4		Terrestrial
7	A8		Mammal	Hutia	Calcaneus		1	whole	Immature	Terrestrial
7	A8		Mammal	Hutia	Tibia	Distal	2	1/2		Terrestrial
7	A8		Mammal	Hutia	Femur		1	1/2		Terrestrial
7	A8		Mammal	Hutia			14	>1/4		Terrestrial
7	A8		Mammal	Hutia	Sacrum		1	1/2		Terrestrial
7	A7	Level 2, 5-10cm	Mammal	Hutia	Humerus	Distal	2	1/4	Immature	Terrestrial
7	A7	Level 2, 5-10cm	Mammal	Hutia	Ulna	Proximal	1	1/2	Immature	Terrestrial
7	A7	Level 2, 5-10cm	Mammal	Hutia	Phalange		2	whole		Terrestrial
7	A7	Level 2, 5-10cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial

House	Unit	Level	Class	Species	Element	Element Type	NISP	Completeness	Age	Environment
7	A7	Level 4, 15-20cm	Mammal	Rice Rat	Tooth	Incisor	1	whole		Terrestrial
7	A7	Level 4, 15-20cm	Mammal	Hutia	Tooth	Molar	1	3/4		Terrestrial
7	A7	Level 4, 15-20cm	Mammal	Hutia	Vertebrae		5	>1/4		Terrestrial
7	A7	Level 4, 15-20cm	Mammal	Hutia	Unidentifiable long bone		7	>1/4		Terrestrial
7	B6		Mammal	Hutia	Unidentifiable long bone		1	>1/4		Terrestrial
7	C5	Level 1, 0-5cm	Mammal	Hutia	Astragulus		1	whole		Terrestrial
7	C5	Level 1, 0-5cm	Mammal	Hutia	Metapoid		2	1/2		Terrestrial
7	C5	Level 1, 0-5cm	Mammal	Hutia	Phalange		1	whole		Terrestrial
7	C5	Level 1, 0-5cm	Mammal	Hutia	Unidentifiable long bone		1	>1/4		Terrestrial
7	C5	Level 2, 5-10cm	Mammal	Hutia	Rib		1	3/4		Terrestrial
7	C5	Level 2, 5-10cm	Mammal	Hutia	Tibia	Distal	1	1/2	Immature	Terrestrial
7	C5	Level 2, 5-10cm	Mammal	Hutia	Femur	Distal	1	1/2	Immature	Terrestrial
7	C5	Level 2, 5-10cm	Mammal	Hutia	Calcaneus		1	whole	Immature	Terrestrial
7	C5	Level 4, 15-20cm	Mammal	Hutia	Calcaneus		1	whole	Mature	Terrestrial
7	C5	Level 4, 15-20cm	Mammal	Hutia	Phalange		1	whole		Terrestrial
7	C5	Level 4, 15-20cm	Mammal	Hutia	Unidentifiable long bone		1	>1/4		Terrestrial
7	C5	Level 6, 25-30cm	Mammal	Hutia	Calcaneus		1	whole	Immature	Terrestrial
7	C5	Level 6, 25-30cm	Mammal	Hutia	Unidentifiable long bone		1	>1/4		Terrestrial
7	A7	Level 7, 30-35cm	Mammal	Hutia	Scapula	Distal	1	1/4	Immature	Terrestrial
7	A7	Level 3, 10-15cm	Mammal	Hutia	Tooth	Incisor	4	whole		Terrestrial
7	A7	Level 3, 10-15cm	Mammal	Hutia	Tooth	Molar	2	whole		Terrestrial
7	A7	Level 3, 10-15cm	Mammal	Hutia	Vertebrae		2	>1/4		Terrestrial
7	A7	Level 3, 10-15cm	Mammal	Hutia	Femur	Proximal	1	1/4		Terrestrial
7	A7	Level 3, 10-15cm	Mammal	Hutia	Metapoid		2	1/2		Terrestrial
7	A7	Level 3, 10-15cm	Mammal	Hutia	Metapoid		2	whole		Terrestrial
7	A7	Level 3, 10-15cm	Mammal	Hutia	Unidentifiable long bone		2	>1/4		Terrestrial
7	A7	Level 5, 20-25cm	Mammal	Hutia	Ulna	Proximal	1	3/4	Immature	Terrestrial
7	A7	Level 5, 20-25cm	Mammal	Hutia	Tooth	Molar	1	1/2		Terrestrial
7	A7	Level 1, 0-5cm	Mammal	Hutia	Metapoid		1	1/2		Terrestrial
7	A7	Level 1, 0-5cm	Mammal	Hutia	Vertebrae	Caudal	1	whole		Terrestrial

House	Unit	Level	Class	Species	Element	Element Type	NISP	Completeness	Age	Environment
7	A7	Level 1, 0-5cm	Mammal	Hutia	Unidentifiable long bone		3	>1/4		Terrestrial
7	E4		Mammal	Hutia	Tibia	Distal	1	1/4	Mature	Terrestrial
7	C6		Mammal	Hutia	Ulna		1	whole	Immature	Terrestrial
7	C6		Mammal	Hutia	Femur	Distal	1	3/4	Immature	Terrestrial
7	C6		Mammal	Hutia	Radius	Distal	1	>1/4		Terrestrial
7	C6		Mammal	Hutia	Vertebrae		2	1/2		Terrestrial
7	C6		Mammal	Hutia	Illium		1	>1/4		Terrestrial
7	C6		Mammal	Hutia	Ulna		1	1/4		Terrestrial
7	D6		Mammal	Hutia	Metapoid		1	whole		Terrestrial
7	D5		Mammal	Hutia	Femur			>1/4	Immature	Terrestrial
7	D5		Mammal	Hutia	Radius		1	whole	Immature	Terrestrial
7	D5		Mammal	Hutia	Ulna		1	1/2	Immature	Terrestrial
7	D5		Mammal	Hutia	Humerus		1	>1/4	Mature	Terrestrial
7	D5		Mammal	Hutia	Humerus		1	>1/4	Mature	Terrestrial
7	D5		Mammal	Hutia	Unidentifiable long bone		4	>1/4		Terrestrial
7	A8		Mammal	Cow	Tooth	Molar	1	whole		Terrestrial
7	D6		Mammal	Large Mammal	Rib		2	>1/4		Terrestrial
10	I6		Mammal	Medium Mammal	Unidentifiable long bone		1	>1/4		Terrestrial
10	I13		Mammal	Sheep/Goat	Phalange		1	whole		Terrestrial
10	H10		Mammal	Sheep/Goat	Metapoid		1	>1/4		Terrestrial
10	K9	Level 1, 0-5cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
8		Post Hole Feature	Mammal	Hutia	Tooth	Incisor	1	whole		Terrestrial
8		Wall Clean Up	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
8		Level 13, 70-75cm	Mammal	Hutia	Tooth	Incisor	2	whole		Terrestrial
8		level 9, 45-50cm	Mammal	Hutia	Tooth	Incisor	1	whole		Terrestrial
8		Level 10, 50-60cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
8		Level 6, 25-30cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
8		Level 6, 25-30cm	Mammal	Hutia	Metapoid		1	whole		Terrestrial
8		Level 2, 5-10cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
7	A7	Level 1, 0-5cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial

House	Unit	Level	Class	Species	Element	Element Type	NISP	Completeness	Age	Environment
7	D5		Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
7	D5		Mammal	Hutia	Tooth	Incisor	1	whole		Terrestrial
7	B6		Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
7	A8		Mammal	Hutia	Tooth	Molar	2	whole		Terrestrial
7	A8		Mammal	Hutia	Tooth	Incisor	2	whole		Terrestrial
7	C5	Level 6, 25-30cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
7	C5	Level 3, 10-15cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
7	C5	Level 3, 10-15cm	Mammal	Hutia	Astragulus		1	whole		Terrestrial
7	A4	Level 6, 25-30cm	Mammal	Hutia	Tooth	Molar	1	whole		Terrestrial
7	A8		Mammal	Hutia	Humerus	Distal	2	1/4	Immature	Terrestrial
11		9	Mammal	Hutia	vertebra		1	>1/4		Terrestrial
10	50x50	2, 5-10cm	Mammal	Hutia	Patella		1	>1/4		Terrestrial
7	A8		Mammal	Hutia	Humerus		1	>1/4		Terrestrial
7	E5		Mammal	Unidentified	unidentified		1	>1/4		Terrestrial
7	B6		Mammal	Cow	Tooth		1	1/2		Terrestrial

Vertebrate Catalog – Birds

House	Unit	Level	Class	Element	Side	NISP	Completeness	Habitat
8		Post Hole Feature	Bird	Femur	Proximal	1	1/4	Terrestrial
8		13, 70-75cm	Bird	Unidentified Long Bone		1	>1/4	Terrestrial
8		4, 15-25cm	Bird	Phalanx		1	whole	Terrestrial
8		10, 50-60cm	Bird	Unidentifiable long bone		1	1/4	Terrestrial
7	A7	Level 5, 20-25cm	Bird	Ulna	Distal	1	1/4	Terrestrial
7	A7	Level 1, 0-5cm	Bird	Vertebrae	Cervical	3	whole	Terrestrial
7	C5	1, 0-5cm	Bird	Longbone		1	>1/4	Terrestrial
7	A7	1, 0-5cm	Bird	vertebra		3	whole	Terrestrial
8		4, 15-20cm	Bird	Longbone		1	>1/4	Terrestrial
8		13, 70-75cm	Bird	Longbone		1	>1/4	Terrestrial
8		Post Hole Feature	Bird	Longbone		1	>1/4	Terrestrial

Vertebrate Catalog – Reptiles

House	Level	Taxa	Element	NISP	Completeness	Habitat
8	13, 70-75cm	Turtle	Shell	1	>1/4	Terrestrial

Appendix B.

Comparative Caribbean Dataset

Jamaican Sites

Taxa	Common Name	Habitat	Maima NISP	Maima %NISP	Bluefields Bay NISP	Bluefields Bay %NISP	Fairfield NISP	Fairfield %NISP	Cranbrook NISP	Cranbrook %NISP
Mammalia										
Oryzomys antillarum	Rice Rat	Terrestrial	4	1			40	1.9	18	2.6
Geocapryomys brownii	Hutia	Terrestrial	200	44.2	2433	69.9	323	16.4	265	38.3
Rodentia	Rodent	Terrestrial	1	0.2	33	0.8			2	0.3
Carnivora	Sea Mammal	Marine			46	1.4				
Canis familiaris	Dog	Terrestrial	2	0.5					8	1.1
Aves										
unidentified aves	Bird	Terrestrial	15	3.3	14	0.5	37	1.7	11	1.5
Ardeidae	Heron	Terrestrial					1	0.04		
Anatidae	Duck	Terrestrial					1	0.04		
Dendrocygna aborea	West Indian Whistling Duck	Terrestrial					1	0.04		
Buteo jamaicansu\is	Red Tailed Hawk	Terrestrial					1	0.04		
Rallidae	Rail	Terrestrial					1	0.04		
Porphyrula martinica	American Purple Gallinule	Terrestrial					3	0.1		
cf. Amarolimnas concolor	Uniform Crake	Terrestrial					1	0.04		
Laridae	Gull	Terrestrial					1	0.04		
Amazona collaria/A. agilis	Yellow Billed Amazon	Terrestrial					2	0.08		
Geotrygon montana	Ruddy Quail-Dove	Terrestrial					1	0.04		
Geotrygon versicolor	Crested Quail-Dove	Terrestrial					5	0.2		

Taxa	Common Name	Habitat	Maima NISP	Maima %NISP	Bluefields Bay NISP	Bluefields Bay %NISP	Fairfield NISP	Fairfield %NISP	Cranbrook NISP	Cranbrook %NISP
Passeriformes	Bird	Terrestrial					1	0.04		
Reptila										
Unidentified Reptile	Reptile	Terrestrial			16	0.4				
Cheloniidae	Sea Turtle	Marine	1	0.2	4	0.1	10	0.4		
Iguanidae	Iguana	Terrestrial			3	0.1				
Trachemys terrepen	Pond Slider	Terrestrial					116	5.5	1	0.2
Cyclura collei or Celestus occiduus	Jamaican Giant Galliswap	Terrestrial					2	0.08		
cf. Leiocephalus jamaicensis	Curly Tailed Lizard	Terrestrial					1	0.04		
Squamata	Lizard	Terrestrial					1	0.04		
Celestus sp.	Lizard	Terrestrial					1	0.04		
Testudines	Turtle	Terrestrial							2	0.3
Cheloniidae	Sea Turtle	Marine							12	1.7
Tropidophis or Alsophis	Wood Snake	Terrestrial							1	0.2
Chondichthyes	Cartilaginous Fish									
Unidentified Cartilaginous Fish	Cartilaginous Fish	Marine			30	0.7				
Negaprion brevirostris	Lemon Shark	Coral Reef	2	0.5			1	0.04		
Carcharhinus sp.	Requiem Shark	Marine					3	0.1		
Rhyzoprionodon terraenovae	Sharpnose Shark	Inshore							1	0.2
Dasyatis americana	Stingray	Inshore							2	0.3
Actinopterygii	Bony Fish									
Acanthurus sp.	Surgonfish	Coral Reef	2	0.5			8	0.3	1	0.2
Albula vulpes	Bonefish	Coral Reef	3	0.6			1	0.04		
Albulidae	Bonefish	Inshore	1	0.2						
Balistidae	Triggerfish	Coral Reef			39	1	15	0.7	17	0.8
Belonidae	Needlefish	Pelagic					2	0.08		

Taxa	Common Name	Habitat	Maima NISP	Maima %NISP	Bluefields Bay NISP	Bluefields Bay %NISP	Fairfield NISP	Fairfield %NISP	Cranbrook NISP	Cranbrook %NISP
Bodianus sp.	Hogfish	Coral Reef					2	0.08	2	0.3
Calamus sp.	Porgy	Inshore					8	0.3	2	0.3
Carangidae	Jacks	Inshore	9	1.9	19	0.5	4	0.1		
Caranx crysos	Blue Runner	Coral Reef					1	0.04		
Caranx hippos	Crevalle Jack	Coral Reef							2	0.3
Caranx ruber	Bar Jack	Coral Reef					19	0.9		
Caranx sp.	Jacks	Coral Reef					25	1.1	1	0.2
Centropomus sp.	Snook	Inshore					1	0.04	3	0.4
Clupeidae	Herring/Shad	Pelagic	2	0.5						
Diodon hystrix	Spot fin Porcupinefish	Coral Reef							5	0.7
Diodontidae	Porcupinefish	Coral Reef	11	0.6	125	3.5	37	1.7		
Epinephelus sp.	Grouper	Coral Reef					182	8.7	114	16.4
Ethynnes allatteratus	Little Tunny	Inshore					3	0.1		
Eugerres plumieri	Stripped Mojarra	Inshore					5	0.2		
Gobiomorus dormitor	Bigmouth sleeper	Brackish					18	0.9	2	0.3
Haemulidae	Grunts	Coral Reef	3	0.6	217	6.1	207	9.9	4	0.5
Halichoeres sp.	Wrasse	Coral Reef					1	0.04	1	0.2
Holocentridae	Squirrelfish	Coral Reef	11	2.4	2	0.04	20	0.9	19	2.8
Katsuwonus pelamis	Slipjack Tuna	Pelagic					730	34	26	3.8
Lutjanus jocu	Dog snapper	Coral Reef			9	0.2				
Labridae	Wrass	Coral Reef	3	0.6	118	4.1				
Lachnolaimus maximus	Hogfish	Coral Reef					2	0.08		

Taxa	Common Name	Habitat	Maima NISP	Maima %NISP	Bluefields Bay NISP	Bluefields Bay %NISP	Fairfield NISP	Fairfield %NISP	Cranbrook NISP	Cranbrook %NISP
Lactophyrs sp.	Boxfish	Coral Reef					1	0.04	2	0.3
Lutjanidae	Snapper	Coral Reef	4	1	56	1.6	96	5.5	36	5.7
Lutjanus analis or L. griseus	Mutton Snapper	Coral Reef					2	0.08		
Lutjanus synagris	Lane snapper	Coral Reef			32	0.9				
Mugilidae	Mullet	Inshore			1	0.03				
Mulloidichthyes martinicus	Yellow goatfish	Coral Reef							1	0.2
Mycteroperca bonaci	Black grouper	Coral Reef							8	1.1
Mycteroperca sp,	Grouper	Coral Reef					10	0.4	9	1.4
Pomacanthidae	Angelfish	Coral Reef			2	0.04				
Sparisoma rubripinne	Redtail	Coral Reef			51	1.4				
Scaridae	Parrotfish	Coral Reef	43	10.5	1	0.03	4	0.1	1	0.2
Scrombridae	Mackrel/Tuna	Pelagic	18	5			10	0.4	7	1
Serranidae	Grouper	Coral Reef	102	22.5	1	0.03	8	0.3	3	0.4
Sparidae	Porgy	Inshore			128	3.6	45	2.1		
Sparisoma aurofrenatum	Redband Parrotfish	Coral Reef					13	0.6	3	0.4
Sparisoma chyrsopterum	Redtail Parrotfish	Coral Reef			86	2.4			1	0.2
Sparisoma spp.	Parrotfish	Coral Reef	7	1.5	25	0.6			46	7.6
Sparisoma viride	Stoplight Parrotfish	Coral Reef			1	0.03	25	2.1	33	4.8
Sphyraena barracuda	Great Baracuda	Inshore	8	1.7			14	0.6	19	2.8
Thynnus sp.	Bluefin Tuna	Pelagic					14	0.6		
Unidentified bony fish		Marine	1440		7804		4026		1770	

Cuban (Western Taíno) Site

Taxa	Species common name	Habitat	Vega del Palmar NISP	Vega del Palmar %NISP
			NISP	%NISP
Mammal				
Boromys offella	Oriente Cave Rat	Terrestrial	1	0.1
Caromys pilorides	Cuban hutia	Terrestrial	62	6
Geocapromys columbianus	Cuban coney	Terrestrial	11	1
Mysateles prehensilis	Prehensile-tailed hutia	Terrestrial	5	0.4
Caromyns sp	Hutia	Terrestrial	623	61.9
Aves				
Unidentified Bird	Bird	Terrestrial	7	0.6
Reptile				
Cheloniidae	Sea turtle	Marine	4	0.3
Cyclura nubila	Cuban iguana	Terrestrial	12	1.1
Lepidochelys sp.	Ridley sea turtle	Marine	1	0.1
Serpentes sp.	Snake	Terrestrial	8	0.7
Trachemys decussata	Cuban slider	Terrestrial	60	5.8
Testudinata	Turtle	Terrestrial	22	2.1
Actinopterygii				
Actinopterygii	Ray Finned Fish	Marine	150	
Epnephelus cf. itijara	Atlantif Goliath Grouper	Coral Reef	3	0.3
Epinephelus sp.	Grouper	Coral Reef	32	3.1
Lutjanus analis	Mutton Snapper	Coral Reef	1	0.1
Lutjanus cyanopterus	Cubera Snapper	Coral Reef	2	0.2
Lutjanus sp.	Snapper	Coral Reef	17	1.6

Taxa	Species common name	Habitat	Vega del Palmar NISP	Vega del Palmar %NISP
Caranx sp.	Jack	Coral Reef	8	0.7
Centropomus sp.	Snook	Inshore	114	11.1
Lachnolaimus maximus	Hogfish	Coral Reef	3	0.3
Megalops atlanticus	Atlantic Tarpon	Coral Reef	3	0.3
Sphyraena barracuda	Great Baracuda	Inshore	1	0.1
Mugil curema	Flathead Grey Mullet	Inshore	21	2
Diodontidae	Porcupinefish	Coral Reef	1	0.1

Puerto Rico and Hispaniola (Classic Taíno) Sites

Taxa	Common Name	Habitat	Rio Tanama AR-39 NISP	Rio Tanama AR-39 %NISP	Rio Tanama AR-38 NISP	Rio Tanama AR-38 %NISP	La Jacanas NISP	La Jacanas %NISP	La Mineral NISP	La Mineral %NISP	Los Gongolones NISP	Los Gongolones %NISP
Mammal												
Canis familiaris	Domestic Dog	Terrestrial	28	1.5								
Cavia porcellus	Guinea Pig	Terrestrial			1	3	21	1.7				
Dasyprocta leporina	Agouti	Terrestrial										
Heteropsomys insulans	Insular Cave Rat	Terrestrial	4	0.2								
Isolobodon portoricensis	Puerto Rican Hutia	Terrestrial	510	28.9	19	57	354	30.7	5	12	8	20.7
Nesophontes edithae	Puerto Rican Nesophontes	Terrestrial	1	0.1			1	0.1				
Oryzoomyini	Rice Rat	Terrestrial										
Rodentia	Rodent	Terrestrial									4	9.8
UID Mammal	Mammal	Terrestrial	117	6.6	7	22	357	30	5	12	18	43
Aves												
Amazona leucocephaia	Cuban Amazon	Terrestrial										
Amazona sp.	Amazon	Terrestrial										
Anas discors	Blue Winged Teal	Terrestrial					1	0.1				
Ardea herodias	Great Blue Heron	Terrestrial										
Ardeidae sp.	Heron	Terrestrial	1	0.1			4	0.3				
Burhinus bistriatus	Double-Stripped Thick-Knee	Terrestrial										
Buteo jamaicensis	Red Tailed Hawk	Terrestrial	5	0.2								
Butorides virescens	Green Heron	Terrestrial	1	0.1								

Taxa	**Common Name**	**Habitat**	**Rio Tanama AR-39 NISP**	**Rio Tanama AR-39 %NISP**	**Rio Tanama AR-38 NISP**	**Rio Tanama AR-38 %NISP**	**La Jacanas NISP**	**La Jacanas %NISP**	**La Mineral NISP**	**La Mineral %NISP**	**Los Gongolones NISP**	**Los Gongolones %NISP**
Coccyzus minor	Mangrove Cuckoo	Terrestrial	1	0.1								
Coloumba	Pigeon	Terrestrial	27	1.5								
Columba leucocephala	White Crowned Pigeon	Terrestrial	9	0.5								
Columbidae sp.	Pigeon	Terrestrial	16	0.9								
Columbina passerina	Common Ground Dove	Terrestrial	2	0.1								
Corvus nasicus	Cuban Crow	Terrestrial										
Dendrocygna arborea	West Indian Whistling Duck	Terrestrial										
Egretta rufescens	Reddish Egret	Terrestrial										
Eudocimus ruber	Scarlet Ibis	Terrestrial										
Fulica spp.	Coot	Terrestrial					1	0.1				
Geotrygon chrysia	Key West Quail-Dove	Terrestrial										
Geotrygon larva	Puerto Rican Quail-Dove	Terrestrial	35	1.9								
Haematopus palliatus	American Oystercatcher	Terrestrial										
Larus atricilla	Laughing Gull	Terrestrial										
Limnodromus griseus	Short-Billed Dowitcher	Terrestrial										
Nyctannasa violacea	Yellow-Crowned Night Heron	Terrestrial										
Nesotrochis debooyi	Antillean Cave Rail	Terrestrial	11	0.6								
Nycticorax	Black-crowned night heron	Terrestrial	2	0.1								
Otus nudipes	Puerto Rican Screech Owl	Terrestrial	1	0.1								

Taxa	Common Name	Habitat	Rio Tanama AR-39 NISP	Rio Tanama AR-39 %NISP	Rio Tanama AR-38 NISP	Rio Tanama AR-38 %NISP	La Jacanas NISP	La Jacanas %NISP	La Mineral NISP	La Mineral %NISP	Los Gongolones NISP	Los Gongolones %NISP
Pandion haliaetus	Osprey	Terrestrial										
Passeriformes	Passerine	Terrestrial					3	0.2				
Passeriformes sp.	Songbird	Terrestrial	15	0.8								
Pheoricopterus ruber	American Flamingo	Terrestrial										
Porphyrio martinicus	American Purple Gallinule	Terrestrial	1	0.1								
Rallidae sp.	Rail	Terrestrial	1	0.1			5	0.4				
Sula dactylatra	Masket Booby	Terrestrial										
Sula	Red-Footed Booby	Terrestrial										
Tyrannus dominicensis	Grey Kingbird	Terrestrial										
UID bird	Bird	Terrestrial	253	14.3					2	4.7		
Zenaida asiatica	White Winged Dove	Terrestrial	10	0.5								
Zenaida aurita	Zenaida Dove	Terrestrial										
Zenaida macroura	Mourning Dove	Terrestrial	5	0.2	1	3						
Zenaida or Geotrygon	Dove	Terrestrial	29	0.5								
Reptiles												
Alsophis portoricensis	Puerto Rican Racer	Terrestrial	12	0.6								
Caretta	Loggerhead Sea Turtle	Marine										
Chelonia mydas	Green Sea Turtle	Marine										
Cheloniidae	Sea Turtle	Marine	1	0.1			16	1.3	10	24.2		
Colubridae sp.	Snake	Terrestrial	1	0.1			15	1.2				
Cyclura carinata	Rock Iguana	Terrestrial										

Taxa	Common Name	Habitat	Rio Tanama AR-39 NISP	Rio Tanama AR-39 %NISP	Rio Tanama AR-38 NISP	Rio Tanama AR-38 %NISP	La Jacanas NISP	La Jacanas %NISP	La Mineral NISP	La Mineral %NISP	Los Gongolones NISP	Los Gongolones %NISP
Cyclura pinguis	Ground Iguana	Terrestrial	9	0.5								
Cyclura sp.	Rock Iguana	Terrestrial					17	1.4	1	2.3		
Diploglossus pleei	Puerto Rican Galliswap	Terrestrial	36	2								
Emydidae	Pond Turtle	Terrestrial					11	0.9			1	2.4
Epicrates chrysogaster	Turks Island Boa	Terrestrial										
Epicrates inornatus	Puerto Rican Boa	Terrestrial	18	1								
Eretmochelys imbricata	Hawksbill Sea Turtle	Marine										
Geochelone sp.	Tropical Tortoise	Terrestrial										
Iguana sp.	Iguana	Terrestrial										
Lacertilia	Lizard	Terrestrial					5	0.4				
Leiocephalus psammodromus	Curley-tailed lizard	Terrestrial										
Reptilia UID	Reptile						1	0.1				
Sauria sp.	Lizard	Terrestrial	8	0.4								
Serpentes	Smake	Terrestrial										
Squamata	Scaled Lizard	Terrestrial										
Testudines	Turtle						120	10	9	21.4	4	9.7
Trachemys stejnegeri	Central Antillean Slider	Terrestrial	419	24.7	3	9						
Amphibians												
Anura	Frog	Terrestrial	2	0.1								
Cartilaginous fishes												
Carcharhinidae	Requiem Shark	Inshore	1	0.1								

Taxa	Common Name	Habitat	Rio Tanama AR-39 NISP	Rio Tanama AR-39 %NISP	Rio Tanama AR-38 NISP	Rio Tanama AR-38 %NISP	La Jacanas NISP	La Jacanas %NISP	La Mineral NISP	La Mineral %NISP	Los Gongolones NISP	Los Gongolones %NISP
Lamniformes	Mackerel Shark	Coral Reefs					8	0.5				
Rajiformes	Ray	Marine					2	0.1				
Chondrichthyes	Shark	Marine										
Boney Fishes												
Acanthurus sp.	Surgonfish	Coral Reef										
Alphestes afer	Mullon hamlet	Coral Reef										
Alubula vulpes	Bonefish	Coral Reef										
Anguilla rostrata	American Eel	Brackish	11	0.6			2	0.1				
Anisotremus sp.	Grunt	Coral Reef										
Balistes capriscus	Grey Triggerfish	Inshore										
Balistes vetula	Queen Triggerfish	Inshore										
Balistidae sp.	Triggerfish	Coral Reef	3	0.1			2	0.1				
Belonidae	Needlefish	Inshore										
Bodianus rufus	Spanish Hogfish	Coral Reef										
Bothus lunatus	Plate fish	Inshore										
Calamus sp.	Sweet Flag	Inshore	1	0.1			3	0.2				
Carangidae sp.	Jack	Inshore	10	0.5			6	0.5			1	2.4
Caranx crysos	Blue Runner	Coral Reef					2	0.1				
Caranx hippos	Crevalle jack	Pelagic	2	0.1								
Caranx ruber	Bar Jack	Coral Reef	1	0.1								
Caranx spp.	Jack	Coral Reef					1	0.1				
Carcharhius sp.	Shark	Pelagic										
Centropomus sp.	Common Snook	Inshore	15	0.8			18	1.5			1	2.4
Centropristis sp.	Bass	Coral Reef					3	0.2				
Cephalopholis cruentatus	Graysby	Coral Reef										
Cephalopholis fulva	Coney	Coral Reef										

Taxa	**Common Name**	**Habitat**	**Rio Tanama AR-39 NISP**	**Rio Tanama AR-39 %NISP**	**Rio Tanama AR-38 NISP**	**Rio Tanama AR-38 %NISP**	**La Jacanas NISP**	**La Jacanas %NISP**	**La Mineral NISP**	**La Mineral %NISP**	**Los Gongolones NISP**	**Los Gongolones %NISP**
Clupeidae	Herring/Shad	Pelagic										
Dasyatis americana	Southern Stingray	Inshore										
Diodon hystrix	Spot-fin Porcupinefish	Coral Reef										
Diodon Spp.	Porcupinefish	Coral Reef					6	0.5				
Diodontidae	Porcupinefish	Coral Reef					30	2.5	3	7.1		
Eleotridae sp.	Sleeper Gobies	Inshore	5	0.2	1	3						
Elops saurus	Ladyfish	Inshore					1	0.1	1	2.3		
Epinephelus adscensionis	Rock Hind	Coral Reef										
Epinephelus guttatus	Red Hind	Coral Reef										
Epinephelus itjara	Atlantic Goliath Grouper	Coral Reef										
Epinephelus morio	Red Grouper	Coral Reef										
Epinephelus sp.	Grouper	Coral reef	5	0.2			22	1.8	1	2.3		
Epinephelus stratus	Nassau Grouper	Coral Reef										
Euthynnus sp.	Mackeral	Pelagic										
Gobiomoros dormitor	Bigmouth sleeper	Brackish	58	3.5			10	0.8			2	4.8
Gymnothorax sp.	Moray	Coral Reef										
Haemulidae sp.	Grunts	Coral Reef	7	0.3			3	0.2				
Haemulon album	White Margate	Coral Reef										
Haemulon flaviolineatum	French Grunt	Coral Reef										
Haemulon plumieri	White Grunt	Coral Reef										
Haemulon sciurus	Blue Striped Grunt	Coral Reef										
Haemulon spp.	Grunt	Coral Reef					6	0.5				

Taxa	Common Name	Habitat	Rio Tanama AR-39 NISP	Rio Tanama AR-39 %NISP	Rio Tanama AR-38 NISP	Rio Tanama AR-38 %NISP	La Jacanas NISP	La Jacanas %NISP	La Mineral NISP	La Mineral %NISP	Los Gongolones NISP	Los Gongolones %NISP
Halichoeres radiatus	Puddingwife wrasse	Coral Reef										
Holocentrus ascensionis	Squirrelfish	Coral Reef										
Kyphosus sectratrix/incisor	Yellow Sea Chub	Coral Reef										
Labridae	Wrasse	Coral Reef										
Lachnolaimus spp.	Wrasse	Coral Reef					3	0.2				
Lactophuyrs sp.	Trunkfish	Coral Reef										
Lutjanidae	Snapper	Coral Reef					17	1.5	2	4.7		
Lutjanus analis	Mutton Snapper	Coral Reef										
Lutjanus apodus	Schoolmaster Snapper	Coral Reef										
Lutjanus griseus	Mangrove Snapper	Coral Reef										
Lutjanus mahogoni	Mahogany Snapper	Coral Reef										
Lutjanus sp.	Snapper	Coral Reef	17	0.9			14	1.1				
Malacenthidae	Tilefish	Inshore										
Mugilidae sp.	Mullet	Inshore	23	2.3	1	3						
Mycteropercia sp.	Grouper	Coral Reef					2	0.1				
Ostraciidae	Pufferfish	Inshore										
Prionotus sp.	Searobin	Brackish										
Scaridae	Parrotfish	Coral Reef					32	3			1	2.4
Scarus spp.	Parrotfish	Coral Reef					3	0.2				
Scorpaenidae	Scorpionfish	Coral Reef										
Scromberomorus sp.	Mackerel	Pelagic										
Scrombridae	Mackerel/Tuna	Pelagic										
Seriola sp.	Amberjack	Coral Reef										

Taxa	Common Name	Habitat	Rio Tanama AR-39 NISP	Rio Tanama AR-39 %NISP	Rio Tanama AR-38 NISP	Rio Tanama AR-38 %NISP	La Jacanas NISP	La Jacanas %NISP	La Mineral NISP	La Mineral %NISP	Los Gongolones NISP	Los Gongolones %NISP
Serranidae sp.	Seabass/grouper	Coral Reef	8	0.4			12	1			1	2.4
Sparidae	Porgy	Inshore										
Sparisoma sp.	Parrotfish	Coral Reef							1	2.3		
Sparisoma viride	Spotlight Parrotfish	Coral Reef	4	0.2			47	4.1				
Spheoriodes testudineus	Checkered Puffer	Coral Reef										
Syphraena barracuda	Great Barracuda	Inshore	1	0.1								
Thunnus sp.	Mackerel	Pelagic					2	0.1	2	4.7		
Trachinotus falcatus	Permit	Coral Reef										
Tylosurus spp.	Needlefish	Inshore										
UID boney fish	Fish	Marine	1341		44				25		45	

Lucayan and Eastern Taíno Sites

Taxa	**Common Name**	**Habitat**	**Coralie NISP**	**Coralie %NISP**	**Barnes Bay NISP**	**Barnes Bay %NISP**	**Sandy Ground NISP**	**Sandy Ground %NISP**	**Cinnamon Bay NISP**	**Cinnamon Bay %NISP**
			NISP	%NISP	NISP	%NISP	NISP	%NISP	NISP	%NISP
Mammal										
Canis familiaris	Domestic Dog	Terrestrial					2	0.05		
Cavia porcellus	Guinea Pig	Terrestrial								
Dasyprocta leporina	Agouti	Terrestrial			4	0.2	7	0.2		
Heteropsomys insulans	Insular Cave Rat	Terrestrial								
Isolobodon portoricensis	Puerto Rican Hutia	Terrestrial							49	5.2
Nesophontes edithae	Puerto Rican Nesophontes	Terrestrial								
Oryzoomyini	Rice Rat	Terrestrial			4	0.2	2	0.05		
Rodentia	Rodent	Terrestrial							4	0.3
UID Mammal	Mammal	Terrestrial			14	0.7			19	1.7
Aves										
Amazona leucocephaia	Cuban Amazon	Terrestrial	6	0.02						
Amazona sp.	Amazon	Terrestrial	2	0.01						
Anas discors	Blue Winged Teal	Terrestrial								
Ardea herodias	Great Blue Heron	Terrestrial	23	0.09						
Ardeidae sp.	Heron	Terrestrial	1	0.01						
Burhinus bistriatus	Double-Stripped Thick-Knee	Terrestrial	4	0.01						
Buteo jamaicensis	Red Tailed Hawk	Terrestrial								
Butorides virescens	Green Heron	Terrestrial								

Taxa	Common Name	Habitat	Coralie NISP	Coralie %NISP	Barnes Bay NISP	Barnes Bay %NISP	Sandy Ground NISP	Sandy Ground %NISP	Cinnamon Bay NISP	Cinnamon Bay %NISP
Coccyzus minor	Mangrove Cuckoo	Terrestrial								
Coloumba	Pigeon	Terrestrial								
Columba leucocephala	White Crowned Pigeon	Terrestrial	2	0.01						
Columbidae sp.	Pigeon	Terrestrial								
Columbina passerina	Common Ground Dove	Terrestrial								
Corvus nasicus	Cuban Crow	Terrestrial	22	0.09						
Dendrocygna arborea	West Indian Whistling Duck	Terrestrial	15	0.08						
Egretta rufescens	Reddish Egret	Terrestrial	1	0.01						
Eudocimus ruber	Scarlet Ibis	Terrestrial	8	0.03						
Fulica spp.	Coot	Terrestrial								
Geotrygon chrysia	Key West Quail-Dove	Terrestrial	2	0.01						
Geotrygon larva	Puerto Rican Quail-Dove	Terrestrial								
Haematopus palliatus	American Oystercatcher	Terrestrial	1	0.01						
Larus atricilla	Laughing Gull	Terrestrial	2	0.01						
Limnodromus griseus	Short-Billed Dowitcher	Terrestrial	1	0.01						
Nyctannasa violacea	Yellow-Crowned Night Heron	Terrestrial	1	0.01						
Nesotrochis debooyi	Antillean Cave Rail	Terrestrial								
Nycticorax	Black-crowned night heron	Terrestrial								
Otus nudipes	Puerto Rican Screech Owl	Terrestrial							1	0.1

Taxa	Common Name	Habitat	Coralie NISP	Coralie %NISP	Barnes Bay NISP	Barnes Bay %NISP	Sandy Ground NISP	Sandy Ground %NISP	Cinnamon Bay NISP	Cinnamon Bay %NISP
Pandion haliaetus	Osprey	Terrestrial	3	0.01						
Passeriformes	Passerine	Terrestrial								
Passeriformes sp.	Songbird	Terrestrial								
Pheoricopterus ruber	American Flamingo	Terrestrial	3	0.01						
Porphyrio martinicus	American Purple Gallinule	Terrestrial								
Rallidae sp.	Rail	Terrestrial								
Sula dactylatra	Masket Booby	Terrestrial	20	0.08						
Sula	Red-Footed Booby	Terrestrial	65	0.2						
Tyrannus dominicensis	Grey Kingbird	Terrestrial	1	0.01						
UID bird	Bird	Terrestrial	111	0.5	28	1.6	10	0.2	8	0.6
Zenaida asiatica	White Winged Dove	Terrestrial								
Zenaida aurita	Zenaida Dove	Terrestrial	2	0.01						
Zenaida macroura	Mourning Dove	Terrestrial								
Zenaida or Geotrygon	Dove	Terrestrial								
Reptiles										
Alsophis portoricensis	Puerto Rican Racer	Terrestrial			3	0.1				
Caretta	Loggerhead Sea Turtle	Marine	1	0.01						
Chelonia mydas	Green Sea Turtle	Marine	6545	27.6						
Cheloniidae	Sea Turtle	Marine					203	5.9		
Colubridae sp.	Snake	Terrestrial								
Cyclura carinata	Rock Iguana	Terrestrial	12538	52.6						
Cyclura pinguis	Ground Iguana	Terrestrial								

Taxa	Common Name	Habitat	Coralie NISP	Coralie %NISP	Barnes Bay NISP	Barnes Bay %NISP	Sandy Ground NISP	Sandy Ground %NISP	Cinnamon Bay NISP	Cinnamon Bay %NISP
Cyclura sp.	Rock Iguana	Terrestrial	1	0.01						
Diploglossus pleei	Puerto Rican Galliswap	Terrestrial								
Emydidae	Pond Turtle	Terrestrial								
Epicrates chrysogaster	Turks Island Boa	Terrestrial	4	0.01						
Epicrates inornatus	Puerto Rican Boa	Terrestrial								
Eretmochelys imbricata	Hawksbill Sea Turtle	Marine					1	0.02		
Geochelone sp.	Tropical Tortoise	Terrestrial	533	2.3						
Iguana sp.	Iguana	Terrestrial					3	0.09	2	0.1
Lacertilia	Lizard	Terrestrial								
Leiocephalus psammodromus	Curley-tailed lizard	Terrestrial	52	0.2						
Reptilia UID	Reptile									
Sauria sp.	Lizard	Terrestrial			2	0.1	3	0.09		
Serpentes	Smake	Terrestrial							12	1.1
Squamata	Scaled Lizard	Terrestrial							1	0.1
Testudines	Turtle				18	1	297	8.6	3	0.2
Trachemys stejnegeri	Central Antillean Slider	Terrestrial								
Amphibians										
Anura	Frog	Terrestrial								
Cartilaginous fishes										
Carcharhinidae	Requiem Shark	Inshore								
Lamniformes	Mackerel Shark	Coral Reefs								

Taxa	Common Name	Habitat	Coralie NISP	Coralie %NISP	Barnes Bay NISP	Barnes Bay %NISP	Sandy Ground NISP	Sandy Ground %NISP	Cinnamon Bay NISP	Cinnamon Bay %NISP
Rajiformes	Ray	Marine							4	0.3
Chondrichthyes	Shark	Marine							1	0.1
Boney Fishes										
Acanthurus sp.	Surgonfish	Coral Reef	6	0.02	9	0.5	12	0.3	1	0.1
Alphestes afer	Mullon hamlet	Coral Reef			2	0.1				
Alubula vulpes	Bonefish	Coral Reef	294	1.3	1	0.05	16	0.4		
Anguilla rostrata	American Eel	Brackish								
Anisotremus sp.	Grunt	Coral Reef					3	0.09		
Balistes capriscus	Grey Triggerfish	Inshore					1	0.02		
Balistes vetula	Queen Triggerfish	Inshore	56	0.2						
Balistidae sp.	Triggerfish	Coral Reef			25	1.4	128	3.7	21	1.9
Belonidae	Needlefish	Inshore							13	1.1
Bodianus rufus	Spanish Hogfish	Coral Reef	13	0.06	2	0.1	4	0.1	28	2.5
Bothus lunatus	Plate fish	Inshore	10	0.05						
Calamus sp.	Sweet Flag	Inshore	30	0.2	8	0.4	46	1.4	12	1
Carangidae sp.	Jack	Inshore			16	0.9	91	2.6	61	5.4
Caranx crysos	Blue Runner	Coral Reef	4	0.01						
Caranx hippos	Crevalle jack	Pelagic	1	0.01						
Caranx ruber	Bar Jack	Coral Reef	34	0.1			4	0.1	13	1.1
Caranx spp.	Jack	Coral Reef	64	0.3	11	0.6	7	0.3	25	2.1
Carcharhius sp.	Shark	Pelagic	82	0.4						

Taxa	Common Name	Habitat	Coralie NISP	Coralie %NISP	Barnes Bay NISP	Barnes Bay %NISP	Sandy Ground NISP	Sandy Ground %NISP	Cinnamon Bay NISP	Cinnamon Bay %NISP
Centropomus sp.	Common Snook	Inshore								
Centropristis sp.	Bass	Coral Reef								
Cephalopholis cruentatus	Graysby	Coral Reef			2	0.1				
Cephalopholis fulva	Coney	Coral Reef			1	0.05	2	0.05		
Clupeidae	Herring/Shad	Pelagic							68	5.9
Dasyatis americana	Southern Stingray	Inshore	39	0.1						
Diodon hystrix	Spot-fin Porcupinefish	Coral Reef	199	0.9	3	0.1	3	0.09		
Diodon Spp.	Porcupinefish	Coral Reef							1	0.1
Diodontidae	Porcupinefish	Coral Reef			26	1.5	73	2.1	4	0.3
Eleotridae sp.	Sleeper Gobies	Inshore								
Elops saurus	Ladyfish	Inshore							1	0.1
Epinephelus adscensionis	Rock Hind	Coral Reef			4	0.2				
Epinephelus guttatus	Red Hind	Coral Reef			4	0.2	2	0.05		
Epinephelus itjara	Atlantic Goliath Grouper	Coral Reef					1	0.02		
Epinephelus morio	Red Grouper	Coral Reef			1	0.05	4	0.1		
Epinephelus sp.	Grouper	Coral reef	395	1.6					42	3.6
Epinephelus stratus	Nassau Grouper	Coral Reef	4	0.01	1	0.05	8	0.3		
Euthynnus sp.	Mackeral	Pelagic					16	0.4		
Gobiomoros dormitor	Bigmouth sleeper	Brackish								

Taxa	**Common Name**	**Habitat**	**Coralie NISP**	**Coralie %NISP**	**Barnes Bay NISP**	**Barnes Bay %NISP**	**Sandy Ground NISP**	**Sandy Ground %NISP**	**Cinnamon Bay NISP**	**Cinnamon Bay %NISP**
Gymnothorax sp.	Moray	Coral Reef							2	0.1
Haemulidae sp.	Grunts	Coral Reef			37	2.1				
Haemulon album	White Margate	Coral Reef	16	0.07			2	0.05		
Haemulon flaviolineatum	French Grunt	Coral Reef	8	0.3			1	0.02		
Haemulon plumieri	White Grunt	Coral Reef	3	0.01	8	0.4	5	0.1		
Haemulon sciurus	Blue Striped Grunt	Coral Reef	1	0.01	5	0.2				
Haemulon spp.	Grunt	Coral Reef	1083	4.5	1	0.05	91	2.6	53	4.6
Halichoeres radiatus	Puddingwife wrasse	Coral Reef	115	0.4	1	0.05			4	0.3
Holocentrus ascensionis	Squirrelfish	Coral Reef	17	0.07					14	1.2
Kyphosus sectratrix/incisor	Yellow Sea Chub	Coral Reef	5	0.02						
Labridae	Wrasse	Coral Reef			32	1.8	92	2.6	1	0.1
Lachnolaimus spp.	Wrasse	Coral Reef			2	0.1				
Lactophuyrs sp.	Trunkfish	Coral Reef	398	1.6						
Lutjanidae	Snapper	Coral Reef			21	1.2	108	3.1		
Lutjanus analis	Mutton Snapper	Coral Reef	1	0.01	5	0.2	5	0.1		
Lutjanus apodus	Schoolmaster Snapper	Coral Reef	5	0.02			1	0.02		

Taxa	Common Name	Habitat	Coralie NISP	Coralie %NISP	Barnes Bay NISP	Barnes Bay %NISP	Sandy Ground NISP	Sandy Ground %NISP	Cinnamon Bay NISP	Cinnamon Bay %NISP
Lutjanus griseus	Mangrove Snapper	Coral Reef	5	0.02	1	0.05	6	0.2		
Lutjanus mahogoni	Mahogany Snapper	Coral Reef	1	0.01	2	0.1	1	0.02		
Lutjanus sp.	Snapper	Coral Reef	441	1.8	6	0.2			67	5.8
Malacenthidae	Tilefish	Inshore			2	0.1				
Mugilidae sp.	Mullet	Inshore								
Mycteropercia sp.	Grouper	Coral Reef	3	0.01	9	0.4	17	0.4		
Ostraciidae	Pufferfish	Inshore			1	0.05	8	0.3	23	2
Prionotus sp.	Searobin	Brackish							7	0.6
Scaridae	Parrotfish	Coral Reef			38	2.2	625	19.1	54	4.7
Scarus spp.	Parrotfish	Coral Reef	380	1.5	51	2.9	30	0.8	13	1.1
Scorpaenidae	Scorpionfish	Coral Reef			11	0.6				
Scromberomorus sp.	Mackerel	Pelagic	1	0.01			36	1		
Scrombridae	Mackerel/Tuna	Pelagic			175	10.1	1033	30	66	5.7
Seriola sp.	Amberjack	Coral Reef					1	0.02		
Serranidae sp.	Seabass/grouper	Coral Reef			240	14.9	402	11.6		
Sparidae	Porgy	Inshore			3	0.1	7	0.3	4	0.3
Sparisoma sp.	Parrotfish	Coral Reef	83	0.3	767	45.5	2	0.05	383	33.5
Sparisoma viride	Spotlight Parrotfish	Coral Reef			109	6.3	10	0.2	15	1.3
Spheoriodes testudineus	Checkered Puffer	Coral Reef	3	0.01						

Taxa	Common Name	Habitat	Coralie NISP	Coralie %NISP	Barnes Bay NISP	Barnes Bay %NISP	Sandy Ground NISP	Sandy Ground %NISP	Cinnamon Bay NISP	Cinnamon Bay %NISP
Syphraena barracuda	Great Barracuda	Inshore	21	0.1	4	0.2			43	3.7
Thunnus sp.	Mackerel	Pelagic								
Trachinotus falcatus	Permit	Coral Reef	2	0.01						
Tylosurus spp.	Needlefish	Inshore					4	0.1		
UID boney fish	Fish	Marine	10035		5049		21638		2827	