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2015

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UNIVERSITY OF CALIFORNIA

Los Angeles

Forests, Gardens, and Fisheries in an Ancient Chiefdom: Paleoethnobotany and Zooarchaeology at Sitio Drago, a Late Ceramic Phase Village in Bocas del Toro, Panama

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Anthropology

by

Lana Sue Martin

2015

ABSTRACT OF THE DISSERTATION

Forests, Gardens, and Fisheries in an Ancient Chiefdom: Paleoethnobotany and Zooarchaeology at Sitio Drago, a Late Ceramic Phase Village in Bocas del Toro, Panama

by

Lana Sue Martin
Doctor of Philosophy in Anthropology
University of California, Los Angeles, 2015
Professor Richard G. Lesure, Chair

In seeking to understand variation and change in past human societies, archaeologists have shown that complex societies develop in a variety of cultural and ecological contexts. Reconstructions of emergent complexity throughout the New World reveal that past peoples constructed and maintained the type of landscapes ideal for supporting larger, more sedentary populations. An excellent case study of built landscapes is the prehistoric chiefdoms of lower Central America, a region bordered to the north by present-day El Salvador and Honduras and to the south by Colombia. By AD 200, prehistoric settlements located in both agriculturally productive and marginal areas became part of a network of paramount chiefdoms spanning lower Central America. These chiefdoms experienced population growth and political expansion up until sixteenth-century European colonization.

In this study, the relationship between environmental conditions and sociopolitical complexity is addressed through examination of plant and animal remains excavated from midden contexts at Sitio Drago (AD 800 to 1900), a Late Ceramic phase village site located on a Caribbean island in western Panama. The analyzed macrobotanical and faunal remains are derived from five excavation units representing human occupations spanning the Pre-Biscuitware (AD 800 to 1200), Biscuitware (AD 1200 to 1450), and Historic (AD 1600 to 1900) Phases. This project is the first integrative analysis of plant and animal remains from western Panama and provides new datasets valuable for regional and global comparisons.

Analyses of plant and animal taxa present in the assemblages suggest that Late Ceramic people at Sitio Drago used continual investments in the landscape to overcome the island’s thin, acidic soils. Differences in ubiquity values, densities, and standard counts confirm that villagers intensified production of tree fruits and maize in fields near residential structures. These managed plant foods appear to have become more important in the overall diet during a phase of population growth, while diversity of plant and animal resources declined. During the same time, as local fisheries are overexploited and depleted, people focused more on trapping and hunting terrestrial animals that are attracted to cleared-edge forest and orchards. This reconstruction of subsistence activities at Sitio Drago provides an example of how people living in areas less agriculturally productive and lacking key material resources can develop a resilient subsistence economy capable of supporting complex society without degrading the environment.

The dissertation of Lana Sue Martin is approved.

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Thomas A. Wake

Gregson Schachner

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2015

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ACKNOWLEDGEMENTS

In many ways, a dissertation is a sort of artifact. A dataset emerges from hundreds of interactions in the university, field, and lab; a conversation at a conference or in a seminar can dramatically reframe one's approach to interpreting data. As with most artifacts, many important contributions that make a dissertation possible are not readily visible on its surface. This project is no exception. Without the help of numerous individuals, this dissertation would be a craggy quarry extraction—at best, a roughly-prepared core.

Going all the way back to the source of this work, my dissertation would not be conceivable without Tom Wake, Co-Director of Proyecto Arqueológico Sitio Drago (PASD) and Director of the Zooarchaeology Laboratory at the Cotsen Institute of Archaeology at UCLA. I greatly admire his passion for bringing the prehistory of Panama out of a regionalist periphery and into general anthropological and environmental scholarship. Quite generously, Tom has provided for me a dissertation field site, field crew for two seasons of excavation, opportunities as assistant field instructor, training in zooarchaeology, access to faunal and floral comparative collections, networking with Panamanian scholars, a number of frights, and a bounty of cultural and natural history knowledge pertaining to California and Central America. I think of Tom as a true naturalist; as an archaeologist, he shows us that ecological history greatly enriches narratives of ancient human cultures. I thank Tom for the many opportunities and resources he has shared with me, for welcoming me to join his field family in Bocas, and for influencing my approach of embarking on theoretical jaunts only after exploring the ethnobiology of plants and animals represented in the archaeological assemblage.

I cannot acknowledge Tom without immediately thanking Christina Campbell, Co-Director of PASD and Professor of Anthropology at California State University, Northridge. During fieldwork on Isla Colón, Chrissy dedicates immense effort into managing project logistics, teaching archaeology field school students, and enforcing Tom's Golden Rule. Each summer, Chrissy shares her experiences as a primatologist with staff and students in Drago so that they may learn about the non-human anthropological subjects of the region. I have enjoyed Chrissy's contributions to Drago fieldwork, which produce a uniquely integrated curriculum of prehistory and modern ecology for everyone involved.

Dissertations undergo a series of dramatic transformations from the time they are drafted until they are filed. Back home in southern California, four committee members—in addition to Tom—invested substantial time and effort in guiding me to shape and retouch this work. Richard Lesure, the chair of my committee, supervised this project from start to finish and provided a bounty of anthropological guidance. As a scholar of Mesoamerican archaeology, Richard provided a valuable supraregional perspective on matters of social, economic, and political theory. Tom and I greatly appreciate his critical eye as we ponder how to present Sitio Drago to the larger archaeological community in future publications. I have also worked extensively with Richard on his Neolithic Demographic Transition of the New World project, and I remain inspired by his intense enthusiasm for integrating social theory with empirical data.

I am honored to have had the opportunity to work with Jeanne Arnold for the entire duration of my graduate career at UCLA. As the chair of my master's thesis committee, she set me off on my path in graduate school. I am in awe of her prolific work as a researcher, writer, teacher, and mentor, and I will continue to watch misuse of the word "comprise."

Greg Schachner has also worked with me since my first quarter in graduate school and has been an invaluable mentor. His gift for bridging data and theory with creative ideas, his enduring encouragement, and his practical advice have been an inestimable source of support for me throughout this entire process. Greg's thorough feedback on this dissertation—and the many dissertation project research proposals that precede it—has greatly improved the clarity of my arguments. Greg also served as my primary teaching mentor. I thank him for guiding me as a teaching assistant, and for the many lively discussions about pedagogy that helped me gain a sense of how I want to develop as a teacher.

This dissertation uses both archaeobotanical (plant) and zooarchaeological (animal) data. While Tom oversaw my faunal adventures, Amber VanDerwarker, Professor of Anthropology and Director of the Integrative Subsistence Laboratory at University of California, Santa Barbara, served as my go-to plant guru. Amber provided crucial advice and feedback, from project design to data analyses and, finally, paleoethnobotanical interpretation. Her feedback and assistance in fine-tuning data analyses and visualizations empirically strengthened this final product. During most of my tenure at UCLA, the presence of "plant people" in the archaeology community was sparse; I especially thank Amber for welcoming me to her lab and introducing me to her graduate students.

Numerous individuals contributed to this dissertation before a single word appeared on these pages. Conducting field research in Bocas del Toro introduced me to a number of delightful people who helped get this project out of the ground. I thank the Playa Drago community, especially the late Don Bolo Serracín and Alonso Iglesias for granting PASD permission to excavate on their properties. The enthusiastic support and participation of Ana

Serracín de Shaffer, and Willy and Juany Serracín is greatly appreciated. The staff at Ristaurante Yarisnori serves the best field food imaginable—quite the luxury, as any archaeologist would know. Nature hikes along the Mimbi Timbi are among my fondest Drago memories; Don Enrique Dixon, Sr. has been for us an excellent outdoor guide and informant on all subjects pertaining to the culture and history of Isla Colón. Finally, I am extremely grateful to the many forms of assistance Rogelio provided to us during the four summers I spent in Drago.

The community of researchers who work in and around the Bocas del Toro Archipelago is indeed a lively bunch whose support and comradery I much enjoyed. We can always count on friend, colleague, and PASD Panamanian Director Tomas Mendizábal for a good time and, if we ask nicely, more plastic storage crates. I have especially enjoyed riding in Tomas' car around the city (and beyond) as he shares the colorful political, economic, and social history and current situation of his native country. Ruth Dickau graciously shared with me archaeobotanical datasets from other sites in Panama. This data enabled the regional comparison discussed in Chapter VI. I am honored to know several scientists associated with the Smithsonian Tropical Research Institute (STRI), especially archaeologist Richard Cooke and paleobiologist Aaron O'Dea, both of whom provided information and access to resources essential to this project. I also thank Doug Dougherty, Michael and Kristina Davis, Jerry Howard, and Marilyn Holmes, staff members and researchers who excavated and analyzed materials foundational to constructing the site narrative discussed in Chapter II.

Extending this artifact's *chaîne opératoire* to a larger scale requires acknowledgement of people now scattered far and wide; namely, the field school students who helped excavate samples used in this dissertation. In all seriousness, I could have begun this dissertation with the sentence, "It was a dark and stormy night…" Students participating in the summer 2012 field school recognize this statement as factually correct concerning that year's flotation sampling—at least on one particular night, during one particular storm. Each memorable in their own way, I thank Jackie Jay, Knate Baker, Sami Rose, Brittany Kosiak, Erika Kruse, Marina Rockey, and Victoria Magallanes for their hard work and patience with my initial flotation exploits at Sitio Drago. Excavation during this season provided materials representing the domestic refuse deposits and the historic period occupation at the site.

All first nights in Drago feature Tom's memorable welcome lecture that includes a lengthy list of things likely to mercilessly eat, mutilate, bite, or sting a student. Those joining us for the 2014 field school witnessed a member of their cohort fall prey to the final category during their first beach excursion. Solid troopers despite venomous critters and incessant deluge, I thank Stephanie Salisbury, Jena Barajas, David del Grande, Catherine Clark, Kate Logue, Andy Fuenzalida Gonzalez, and Drew Preedeedilok. Their dedicated work helped me obtain flotation samples from the cemetery area of Sitio Drago, greatly expanding the depth and number of plant and animal remains considered in this dissertation.

Back home in Los Angeles, a number of indirect processes were essential to refining this dissertation to the point of filing. First, I want to thank the number one ally of grad students in the UCLA Anthropology Department: graduate advisor Ann Walters. I am constantly amazed by Ann's dedication to ensure that each student has "dotted their *i*'s and crossed their *t*'s." She not only does her job well, she goes above and beyond to do her job well with compassion and enthusiasm. Her uniquely exceptional qualities as an employee and human being were formally recognized with a True Bruin Chancellor's Excellence in Service Award in spring of 2011, but we members of the UCLA Anthropology graduate student community celebrate her achievements and dedication every time something happens that we desperately needed to happen. Ann makes the heavy journey through grad school so much lighter—with a smile, and possibly dished up with a side of snarky commentary.

There are, of course, other staff members in the Department of Anthropology at UCLA who work hard in the background to make every committee, degree, course, and research award materialize before our eyes. Arguably everyone's favorite aspect of being a graduate student is getting paid for what you love to do—be it writing, research, or teaching—and the woman who makes that happen is accounting and personnel analyst Tracy Humpbert. When we want to sign out paychecks or borrow keys, office coordinator Kate Royce is omnipresent at that helm. Got computer problems? Technical analyst Ty Lawrence keeps those machines running smoothly for us, even if you still believe that memory is just something one loses with age.

In my other home at UCLA, the Cotsen Institute of Archaeology, I thank Charles Stanish, Institute director, and John Papadopoulos, Interdepartmental Archaeology Program chair, for cultivating our thriving community of archaeologists who convene in the basement from all over campus. I am especially grateful for support and assistance provided by former student affairs officers Cheri Cavanaugh Quinto and Erika Santoyo, former fund manager Evgenia Grigorova, and UCLA/Getty Conservation Program staff research associate Vanessa Muros.

My doctoral research was made fiscally possible by several benevolent institutions. The costs of field research and laboratory analyses were generously covered by the UCLA Clement W. Meighan Research Fellowship Fund, UCLA Latin American Institute Field Research Grant, and UCLA Institute of Archaeology Steinmetz Travel Grants. The Institute for Field Research, directed by Dr. Ran Boytner, provided additional support for fieldwork. Many thanks to members of the UCLA Graduate Division selection committees for seeing potential in my application to the Dissertation Year Fellowship programs. Finally, throughout my graduate career, the UCLA Anthropology Conference Travel Grant enabled me to attend professional meetings essential to the development and sharing of my research.

Although I relish the idea of writing an entire acknowledgements section as an homage to a pretentious French phrase, I end that here. Grad school is a desolate place, and archaeologists in particular are the wandering cowboys and cowgirls of science. I whole-heartedly thank the many friends I made along the way. If I tried to name each individual, I would no doubt fail to mention at least one; you all know who you are. Of the people I have relationships with outside of archaeology—I thank Kevin Canzonieri for the bikes and hikes, Laura and Matthew McKinley for the Texas ex-pat comradery, and Matt Hassell for the adventures. As I break away from graduate school, I am immensely grateful for the personal and professional mentorship that Abby Levine has provided to me during the past six months. Finally, but not least, I feel privileged to have worked with Dave Leon throughout my entire graduate school experience. Thanks, Dave, for persistently creating space and challenging me to find meaning in my work.

My family has been incredibly supportive while I dragged myself and my partner around to the canyon, desert, and jungle—and, for the past year, as I spent a significant amount of time writing in isolation. Justin Martin, Hannah Smith, Jon Daly, Sharon Fabriz and Pat Reynolds, and Donny Smith: thanks for the love, road trips, dogs, coffee, books, art, mountains, plane tickets, libations, vacation rentals, food, and love. On that note, writing in isolation inspired me to adopt a young black cat. I thank Willow for her calming and comedic influence during much of my writing process.

Dylan Smith: thanks for being you, and for being with me.

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Presentations

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CHAPTER I

COMPLEXITY AND ECOLOGY IN ANCIENT PANAMA

Introduction

Archaeology offers a unique long-term perspective on society, culture, and the environment and is one of the few disciplines capable of developing historical narratives of societies in the Americas prior to European colonization. Early twentieth century scholars viewed Neotropical societies as primitive in ecological adaptation, circumscribed in size and complexity by impenetrable forest, year-round rainfall, and little arable land for seed crops (e.g., Gross 1975; Jennings and Norbeck 1964; Meggers 1954, 1979; Meggers and Evans 1964). Perspectives on sociopolitical complexity in the tropics were formed by the assumption that intensive production of maize (*Zea mays*: Poaceae) was required for the development of complex society in the Americas, and that pre-industrial people were unable to dramatically improve the landscape to support surplus production of plant foods. As archaeologists collect more evidence of complex, hierarchical prehistoric societies in Neotropical (New World) forests, many compelling pictures of human agency, innovation, and adaptation to the environment emerge.

Archaeological evidence shows that lower Central America, a region bordered to the north by present-day El Salvador and Honduras and to the south by Colombia, was host to an extensive network of ancient hierarchical societies that developed by AD 200 (Figure 1.1). These groups grew in size and complexity for over 1300 years despite cyclical political reorganization, intergroup conflict, and regional variation in environmental resources (Cooke 2005; Creamer and Haas 1985; Lange and Stone 1984). People in these ancient villages fundamentally altered their ecological roles through intensification of gardening, hunting, and fishing (Holmberg 2009;

Figure 1.1. Map depicting major cultural regions of ancient and contact-phase lower Central American chiefdoms.

O’Dea et al. 2014; Piperno 1994; Piperno and Holst 1998). Prehistoric settlements located in both agriculturally productive and marginal areas exhibit population growth and political expansion up until sixteenth-century European colonization (Berrey 2015; Mayo and Mayo 2013; Menzies and Haller 2012). This leads to several locale-specific, yet globally-relevant, questions. How did these practices impact local biogeography and increase availability of food resources without degrading the environment?

We can build a comprehensive narrative addressing these questions with documentation of a wider variety of archaeological sites representing different phases, phases of complexity, and ecological niches. One recently discovered site in western Caribbean Panama, Sitio Drago, holds great potential as a much-needed data point in regional reconstruction of life in ancient lower Central America (Wake 2014; Wake et al. 2004; Wake et al. 2012; Wake et al. 2013). Sitio Drago is a particularly evocative addition to the present set of lower Central American case studies. Preliminary analyses suggest the village was larger in size than neighboring settlements and that occupants intensively farmed grains and/or tubers. The multi-component village is located in the swampy lowlands of a small island, Isla Colón, in present-day Bocas del Toro province, an ecological niche that exemplifies the type of environmental conditions long thought to impede emergence of sociopolitical complexity.

However, growing accounts of the scale and complexity of human-landscape interactions around the globe have challenged scholars to develop new ways of understanding relationships between social and ecological processes (Balée and Erickson 2006; Crumley 2007; Crumley et al. 1995; Thompson 2014). In the New World, this effort is underpinned by scholarship detailing the humanization of landscapes prior to European conquest (Denevan 1992; Erickson 2008; Lentz 2000). As scholars seek more instances of indigenous American peoples substantially altering their environment to accommodate new social and ecological pressures, we discover new permutations of food production systems that fall outside of the prototypical agrarian systems characteristic of Western societies. The collective work of these scholars, approaching society and landscapes with consideration of both common processes and episodic occurrences, has established a novel interpretive paradigm known as "historical ecology" (Balée 2006; Brooks 1985; Crumley 1987; Swetnam et al. 1999). In borrowing this perspective, I hope to avoid many of the *a priori* assumptions about the type of environmental adaptations that can take place as a society grows in size and complexity.

This dissertation aims to produce a narrative of the long-term developments and unique historical contexts at play in shaping subsistence activities and landscapes at Sitio Drago. I begin by documenting and describing the different plant and animal food, medicinal, and non-food utilitarian resources found in middens at Sitio Drago. From this empirical baseline, I can evaluate the routine activities that formed everyday life. Next, I compare patterns of animal and plant procurement from one historic and two prehistoric occupations. Patterned change in subsistence would provide a snapshot of village adaptation to changing social, political, and ecological factors. Finally, I consider how long-term maintenance of landscape features and transformations in dietary preferences contributed to social complexity and supraregional political interaction taking place during the first and second millennium AD. The data supporting this research include 105 macrobotanical and 62 faunal samples from five excavation units representing domestic trash heaps (see Appendices A and B). These data were recorded primarily from the 2012 and 2014 excavations conducted by Proyecto Arqueológico Sitio Drago (PASD).

Intersections of Social and Ecological Systems in the Archaeological Record

Material records of ancient peoples' plant and animal consumption enable us to construct histories of past foodways and complex societies and draw deep connections between past and present subsistence practices (Braje et al. 2009; Nelson et al. 2012; Smith 2006; Stump 2013; Twiss 2007). Globalized corporate agriculture is often assumed to be the most efficient and reliable system to support modern hierarchical society. Long before revitalization of "eat local" movements, traditional agricultural societies developed innovative farming practices that mimic the dynamics of local landscapes, thus reducing instability and preventing degradation while maximizing food production in small spaces (Altieri 2004; Berkes et al. 1995; Erickson 1992). Narratives such as these allow us to consider a greater variety of subsistence activities capable of supporting complex society. In order to understand how people developed a productive, reliable subsistence economy on Isla Colón, I use a historical ecological approach rooted in syntheses of natural science and social history.

Historical Ecology

Historical ecology is a practical framework of concepts and methods for studying the past and future of the relationships between people and their environment (Balée 2002, 2006; Crumley 1987, 2002, 2007). This research framework was developed in part as a reaction to top-down models that seek to explain human behavior as a direct result of structural forces such as political institutions and ecological conditions. Research conducted under a historical ecology paradigm relies on the assumption that historical events serve as a primary catalyst for major changes in human-environment relationships, which are characterized as interactive dialogues between natural and cultural developments. These historical events (e.g., climate change, population growth, technological innovation) affect biocultural development in a punctuated equilibrium (Baleé 1998:13-14). Four interdependent postulates ground this theory: (1) humans have impacted virtually every space on Earth; (2) human society does not inherently destroy nor encourage development of inhabited biomes; (3) different types of human society impact the landscape in qualitatively, as well as quantitatively, different ways; and (4) the historical trajectories of human and non-human communities are best understood as an interwoven phenomenon through time (Baleé 1998:11).

The notion of ongoing ecological and social processes, punctuated by historical events, over the *longue durée* is a cornerstone of historical ecology (Andrieu 2013; Baleé and Erickson 2006; Crumley 1994, 2000, 2001; Davasse 1998; Davasse et al. 1997; Erickson 2010; Redman and Kinzig 2003). Political institutions and environmental settings place boundaries on human behaviors and beliefs, but individuals also produce and alter systems through their own actions. Such structure is not peripheral to individuals but is internalized in the form of pragmatic understandings about the world and everyday routines and behaviors (Bell 1992; Bourdieu 1977; Wenger 1998). It is through these routine daily activities that political systems and landscape transformations are postulated, generated, and maintained. In viewing the archeological site as a sequential accumulation of these activities and transformations, we can begin thinking about the ancient behaviors, beliefs, and activities that accompanied them. Historical ecology thus provides a compelling framework for understanding how the possibilities of human activity, and the archaeological record it forms, in each occupation were shaped by activity in preceding phases.

The archaeological record provides evidence of past cultures and environments quite unlike those in our own modern global society. In contexts where landscape transformations are an intrinsic component of subsistence systems, building analyses up from archaeological evidence—rather than starting with a model of political control—is more likely to reveal indigenous categories of activities (Brück 1999:99; see also Hayashida 2006; Morehart and Eisenberg 2010; Scarborough and Lucero 2010). Such bottom-up perspectives are rooted in data speaking directly to subsistence and landscape management activities, while top-down perspectives focus on elite management of the system (Erickson 2006b:235-237). These perspectives are not mutually exclusive; in fact, an integration of both can create a richly holistic, multi-scalar narrative of ancient political organization, economy, and social life.

Domesticated Landscapes in the Neotropics

The "Neotropics" refers to the biogeographic region that includes southern Mexico, Central and South America, and the West Indies. One of six major zoographical regions of the world, the Neotropical Zone is the most biologically diverse region on Earth (Kricher 2015). Archaeological interpretation of midden assemblages, which are primarily comprised of food debris, requires understanding of a diverse array of foraging, farming, hunting, and fishing activities. From the perspective of historical ecology research, a "domesticated landscape" is a landscape humans profoundly changed to improve availability of game animals, economically useful plants, overall biomass, and regional biodiversity. Changes maintained over time by people in the forest, savanna, soil, and water of the Neotropical habitat leave physical signatures embedded in the landscape (Erickson 2006b:235). Research driven by historical ecology begins with observing or inferring activities and practices from these signatures without imposing modern economic or cultural distinctions. Traditional cultural preference, often a historically-contextual factor, combined with evolutionary processes produces landscape histories unique to each settlement (Stahl 2008:9).

Domesticated landscapes are intersections of social and ecological systems that better support human activities through intergenerational labor investments (Bamford 1998; Shenk et al. 2010). In terms of political economy, these more productive environments are a valuable commodity in non-capitalist societies occupying marginal environments. Incremental development and alteration of soils and forest composition were essential to success for many people in Neotropical lowlands (Erickson 2006b:236; Nigh and Diemont 2013; Widgren 2012:122). Archaeologists and scholars of modern biogeography both use the term *landesque capital* to acknowledge the labor input that creates a necessary resource fixed in space yet fluid in time (Blaikie and Brookfield 1987:11; Doolittle 1984, 2000; Håkansson and Widgren 2014; Widgren 2007:72). Coinage of the term landesque capital is an example of historical ecologists' efforts to expand our understanding of economy in small-scale societies quite unlike our own.

Perhaps the most astonishing example of landesque capital is the *terra preta* soil formation. These soils are associated with large, dense archaeological sites in the central and southern Amazon Basin during the Middle to Late Holocene, and, in some cases, are the result of several millennia of human management (Iriarte 2007:182; Iriarte and Behling 2007; Mayle and Iriarte 2014; Neves et al. 2004). Without human intervention to slow the rapid pace of organic decay, rainforest floors contain thin, acidic, nutrient-poor soils. Indeed, the dark, fertile *terra preta* soils essential to the emergence of farming in the Amazon basin between 10,000 and 7000 years BP (Fraser et al. 2012; Heckenberger et al. 2007; Iriarte 2009; Petersen et al. 2004). The terraced fields, managed forests, and altered drainage systems are a unique pathway to complexity, as important to pre-Colombian Amazonia and Central America as craft specialization, underground food storage facilities, and intensified agriculture were to the development of complex societies located in agriculturally productive landscapes.

High rates of soil erosion represent another challenge to reliable production of plant food in the Neotropics. To avoid erosion and leaching of minerals essential to growing nutrient-heavy plants, such as maize, people in prehistoric farming societies around the world began terracing hills in order to maintain arable soil volume and increase square footage of fields (Miller and Gleason 1994; Treacy and Denevan 1994; Widgren 2012; Yamin and Metheny 1996:19). In general, terraces break up a long slope into a series of short ones. Each terrace collects and controls the excess water from a definite area of the slope above it. Vertical reinforcement of gardens and fields was likely an important modification of hilly alluvial lowland tropical landscapes to increase yield and resilience of grain and tuber crops. Terraces require consistent labor input to maintain, forming a key source of landesque capital for Neotropical farming societies (Fisher 2005; Iriarte et al. 2010; Luzzadder-Beach et al. 2012). Modifications of landscapes can create an area that supports intense plant food production. Over time, these changes lead to a reliable subsistence system that becomes embedded in the society's cultural package and persists through intergenerational sharing of traditions.

Political and Ecological Aspects of Chiefly Complexity

When European explorers first arrived in lower Central America, they encountered a network of elite centers, urban villages, and rural hamlets spread across the lowlands and highlands on both Atlantic and Pacific sides of the land bridge. In their journals, these explorers describe chiefs who fought to gain prestige in a local settlement while competing for power over a regional trade network. Thus, chiefly leaders stepped in and out of positions of authority due to ideological dynamics, rather than institutional demands. Anthropologists traditionally characterize these types of stateless complex societies as chiefdoms. Often regarded as the ultimate form of hierarchical institution, the state is classically defined as an organized community living under one centralized government that maintains a "monopoly of the legitimate use of physical force within a given territory" (Weber 1958:78). The chiefdom is a socially and politically centralized community governed by a leader of ascribed status, who may demonstrate some degree of economic and political power but lacks autonomous control of resource production (Earle 1978; Sahlins 1968). Chiefly polities vary in size; a complex chiefdom is, as characterized by Robert Carneiro's succinct definition, "an autonomous political unit comprising a number of villages or communities under the permanent control of a paramount chief" (Carniero 1981:45). Although the use of "stage" or typological models of unilinear evolution has fallen out of favor in anthropology, such terms characterizing the shape of political organization remain useful when discussing archaeological signatures of complex societies.

Political Organization of Chiefdoms

Chiefly polities are characterized by clearly defined social hierarchies exhibiting significant differences in upper and lower levels. As populations grow and complexity increases, chiefs maintain legitimacy by assuming authority over religion, warfare, communal labor projects, internal exchange, and regional trade (Creamer and Haas 1985:740; Levy 1979; Petersen 1982; Service 1978). Chiefly authority and political structure tend to be based on "charismatic kingships" driven by a shared cosmology and ideology of divine rule (Geertz 1973:331-338; Leach 1965:56-59; Tambiah 1976:69). Chiefdoms have multiscalar levels of centralized decision-making and political integration. One effect of this organization is that chiefly leadership is primarily external, or contained within the upper tiers, leaving most villages to govern their own activities (Cobb and Nassaney 1995). Paramount chiefdoms, including those in the Neotropical lowlands and Pacific islands, span many environmental and geological settings. The need for a wider, pan-regional distribution of locally-procured resources through trade and exchange may necessitate interlocal connections at multiple scales. Village- and household-level chiefly authority may govern acquisition of items necessary for routine life, while paramount chiefs seek control of exotic materials that represent their authority and divine rule (Junker 1999:65-67; Kiefer 1968).

Members of the upper social class reinforce this structure with restricted and conspicuous consumption of elite commodities and access to esoteric knowledge. In states, leaders maintain autonomous power over production of resources within a territory. Chiefs exercise managerial power by collecting surplus resources as tribute and redistributing goods to encourage growth of the system and coalescence of decision-making bureaucracy (Blitz 1993; Ingold 1983). Paramount chiefs of segmented polities manage internal interaction and conflict across different environmental zones by controlling access to information and sumptuary goods limited to particular regions, such as raw metal materials available at remote quarries (Earle 1978; Haas 1982).

Individual or kinship-based rank within upper and lower levels is negotiable, leading to conflict and hostilities between paramount chiefs and subchiefs. As a result, chiefdoms tend to exhibit cyclical patterns of emergence, expansion, fragmentation, and reconsolidation. This "chiefly cycling" created a long-term fission-fusion dynamic that, when viewed from a deep-time perspective, translates to both small-scale instability and large-scale resilience (Anderson 1994, 1996, 2001; Blitz 1999; Flannery 1972, 1995; Wright 1984, 1986). Attempts by chiefly elites to gain power through the manipulation of economy and ideology are analogous to those by aggrandizers in states. Leaders in states, however, have autonomous top-down control of resource production and distribution. In chiefdoms, non-elite extended families may surrender control of their food surpluses to chiefs to build alliances in effort to climb rank (Hayden 1995:95; Wesson 1999:156). Despite small-scale orderly disruptions among elite groups, chiefly networks as whole exhibit remarkable adaptability over multiple generations (Braje et al. 2011; Gotts 2007). State-level societies depend on a small pool of institutionalized leaders and rigid subsistence regime for survival; when certain limits are met, states often collapse and fragment into disparate polities. The cyclical transformation of chiefly organizations, on the other hand, allows leaders to reorganize and maintain regional cohesion despite social, political, and ecological disruptions.

Traditional models of chiefdom formation and chiefly political, economic, and social dynamics are useful for developing a perspective on the organization of non-state societies. However, various critiques of the chiefdom concept have emerged since the 1980s (Feinman and Neitzel 1984; Plog and Upham 1983; Yoffee 1993). Critiques of the chiefdom concept center on uncritical use of evolutionary and neoevolutionary models of political and cultural development (Beck 2013:27-28). The term “chiefdom” entered scholarly discourse during the early twentieth-century era of anthropological theory aimed at lumping societies into typologies. Early attempts at doing so aimed to characterize the unilinear stages of development leading from “primitive” hunter-gatherer groups up to “civilized” states (e.g., Service 1962). Today, some argue the term itself is far too embedded in racist ideology to permit its ongoing use, even if the chiefdom concept is used as a mere descriptor of political scale (e.g., Kehoe 1998). Others, notably Timothy Pauketat, are concerned with possible constrictions and distortions of archaeological inquiry when adhering to abstract concept derived from our phenomenological predicament in the industrialized state (Pauketat 2007). Through his critique, Pauketat advocates a disciplinary move away from a purely scientific inquiry to a more historically oriented one (Pauketat 2007:14-15); a theoretical shift similar in aim to that of historical ecology. Here, I use the term chiefdom as a descriptive category that explicitly differentiates the pre-capitalist society investigated here from states: a hierarchical complex society with a permanent elite class, yet fluid scope of elite control and regional organization.

Food Production and the Development of Complexity

Anthropological scholarship on ancient subsistence seeks to explain the broader social, economic, and political implications of food production (e.g., Cuéllar 2013; O'Connor 2015; Twiss 2012; Wilson and VanDerwarker 2016). The notion that agriculture is universally tied to emergent complexity has been an enduring topic in archaeological research, beginning with V. Gordon Childe's characterization of the "Neolithic Revolution" as a sudden appearance of sociopolitical complexity driven by the rapid switch to full-time farming (Childe 1936). The matter has become more nuanced, and scholars have popularized numerous models considering multiple permutations of settlement and subsistence leading to and supporting chiefdoms and states (Hastorf 1999:66; Hayden 1990), including those that acknowledge low levels of food production (Smith 2001; see also Rosenswig 2006) and complete absence of domesticated food resources (Arnold 1996a).

More recently, Arnold et al. (2015) have proposed a model of integrated "platforms of societal dynamics" that encourages discourse of emergent complexity without pegging subsistence as the central organizing principle in complex society. These platforms include (1) agency and authority, (2) social differentiation, (3) participation in communal events, (4) organization of production, (5) labor obligations, (6) articulation of ecology and subsistence, and (7) territoriality and ownership (Arnold et al. 2015:1-2). Foodways, while clearly not the sole determining factor in sociopolitical transformation, are nonetheless important parts of dynamics operative within each of these platforms.

Agriculture *does* characterize a way of life that is an outcome of the biological domestication process coupled with fundamental changes in social structure and local ecology. The emergence or intensification of food production is one mechanism that can stimulate the "seeds of inequality" already present in egalitarian society (Feinman 1995:262; see also Earle 1997; Haas 1982). Managerial elites oversee the communal labor that may, in some cases, be necessary for construction of irrigation canals, terracing, and forest clearing. In competing to control access to labor, property, staple surplus, and luxury wealth, aspiring elites further legitimize institutional leadership in early chiefdoms (Earle 1987:279). Successful management of food production systems during times of population growth strengthens the ideology of chiefly control or tax collection (Feinman 1995; Pauketat 1994:34). Emergent Mississippian societies, for example, may have benefiting from leaders who *directly* controlled food as they increased dependence on maize, because intensification of maize production would require expanding fallow fields and increasing labor required for maintenance (see Muller 2013:179).

In other models potentially applicable to Sitio Drago, elites in emergent complex societies legitimize institutional authority by restricting *access* to resources. They accomplish this by manipulating labor organization and controlling distribution of resources in exchange networks (Arnold 1996b:61). These strategies are apparent in non-agricultural northern Channel Island Chumash society during the Transitional phase (AD 1150 to 1300), when we find evidence of significant labor reorganization and an increase in socioeconomic disparity. During this time, a 300-year-long drought reorganizes local fisheries and reduces abundance of key drought-sensitive plant resources on Santa Cruz Island. Island elites respond to this climate disruption by further controlling production of microlithic tool and shell bead production, as well as the development and manufacture of the *tomol*, a new wood plank canoe that improved elites' access to and control of productive deep-water fishing. Elites use control of shell bead production, island-mainland trade, and deep sea fishing to exploit new subsistence strategies driven by climate change (Arnold 1992, 1996a; 2007; Arnold and Martin 2014). In this case, elites gained agency and authority through *indirect* control of food production as their population grew, as construction of the new *tomol* was necessary for procuring sufficient maritime food resources located in deep waters unreachable with reed boats.

Demand for expert management of food production systems provides an appealing explanation for why previously egalitarian societies would willingly accept increased hierarchy and inequality. However, this model is not a satisfactory explanation for emergence of complexity in areas that do *not* require complex infrastructure to exploit abundant resources. Food production – by generating surplus – can indirectly contribute to elite manipulations of labor through provisioning of non-food-producing individuals such as craft specialists (Arnold 1992). In Hawaiian chiefdoms, for example, a decentralized system of surplus food production is the economic basis of a two-tier sociopolitical stratification (Earle 1996:165-166). Communities are supported by their own farming practices, and food is infrequently exchanged as political finance between groups in the paramount chiefdom. Rather than autonomous elite control of non-elite resources, Earle describes the coexistence of two major exchange systems. On a smaller scale, households unregulated by chiefs participate in limited reciprocal exchange of farming-related goods (e.g., tool-quality raw stone material, adze [ax] blanks). On a larger scale, elite factions finance chiefly institutions through redistribution of surplus staple foods and raw materials to a restricted circle of lower ranking elites (Earle 1996:165-170).

Food Production in the Neotropics

Landscapes that have remained mostly unchanged in the Americas during the modern era were shaped by indigenous subsistence practices, some of which people still use today. Thus, ethnographic documentation and archaeological reconstruction of landscape transformations frequently accompany discussion of prehistoric foraging, farming, hunting, and fishing activities (Johnson 2014; Yu 2015). While ethnographic analogy can create misleading inferences, using ethnographic and ethnohistoric sources to inform archaeological interpretations of subsistence activities is particularly useful in the Neotropics. Many of the cultigens identified in the archaeobotanical record are present in today's traditional forest gardens. In most cases, prehistoric people altered forests in many different ways to encourage these plants' continual survival throughout phases of ecological and demographic change.

Definition of Plant Food Production Terms

I will begin with some basic definitions of these socially-significant terms to avoid confusion and provide a clear foundation for theoretical considerations of plant food production and complexity. Plant resources that people collect without interfering with the organism's surrounding environment are considered *wild* or *undomesticated* (Maramorosch 2012:4). Following Piperno and Pearsall (1998:6), *cultivation* is defined here as the selection of plants by people for their use. Cultivation describes intentional human activities producing artificially-selected plants and is the broadest characterization of human intervention in the plant world. Piperno describes cultivation as a symbiotic process, the earliest form of plant husbandry, which supported an ancient and independent emergence of plant domestication around the world (Piperno 2011). Mechanisms of cultivation involve preparing soils and selectively planting seeds of plants with superior economically-valuable parts (Gebauer and Price 1992; Price and Gebauer 1995; Smith 2006).

Domestication takes this technological transformation one step further by, as Price and Gebauer (1995) state, inducing genetic changes in plants and animals so that they become increasingly dependent on human intervention for their survival and reproductive success (see also Gebauer and Price 1992; Piperno and Pearsall 1998:6). Domesticated plants, especially maize and wheat, require human activities such as seed dispersal, tending, tilling, and transplanting once seed coats become too thick for natural propagation (Ford 1985). Following abandonment of a field, domesticated plants will likely disappear from the landscape.

Wild, cultivated, and domesticated plant communities respond differently to human presence and human abandonment. In the event that people stop tending an area, patches of wild and cultivated plants will continue to survive, perhaps with cultivated species experiencing a shift back to morphological traits less amenable to human desires and better suited for their own evolutionary survival (Weiss et al. 2006:1608). Sapodilla (*Manilkara zapota*: Sapotaceae), a cultivated tropical tree species with edible fruits and hardy wood popular for use in house construction, is an excellent example of genetic diversity driven by human manipulation. Hundreds of years after the collapse of the Mayan state, sapodilla stands persist in three historically urbanized ancient Maya ceremonial centers in Guatemala and Belize (Thompson et al. 2015b) and at the ancient Mayan city Tikal. Although all trees now have clear morphological indicates of being a wild, uncultivated plant, modern-era sapodilla trees in each of the four locations nonetheless bear striking genetic differences. Human intervention in tree management can provide an enduring marker of the landscape engineered by people over a thousand years ago (Lentz and Hockaday 2009; Lentz et al. 2015a, 2015b; Thompson et al. 2015a).

The terms agriculture and horticulture are often used interchangeably or viewed as bookends on a continuum of cultivation activities. *Horticultural systems* are small-scale house garden plots containing wild and domesticated plants intermixed (Midmore 2015:85). "Tree-cropping," the modification of tropical forests to encourage growth of economically valuable wild and domesticated trees, is a common form of Neotropical horticulture (Midmore 2015:211). Clement (1989, 2006) and Lentz (1986, 1991) emphasize that tree management was an important contribution to ancient foodways in tropical zones worldwide. Cultivation of palms, in particular, is an important component of the small-scale Neotropical food production system (Alcorn 1990; Balick 1984; Clement and Junqueira 2010; Clement et al. 2009). Indeed, palms and trees are like the Swiss army knives of forest gardens—they occupy little space yet provide numerous materials that can be used for different tasks.

Agricultural systems are large in scale and comprised of domesticated plants raised in smaller, extensive infields or larger, intensive outfields (Piperno and Pearsall 1998:6). Terraced fields are perhaps the most recognizable example of agricultural systems in the New World. Still practiced by traditional farmers around the world today, terracing—cutting a sloped ground surface in a series of successively receding flat platforms—naturally irrigates crops, retains sediment volume, prevents leaching of nutrients, and expands available surface area. These engineered landscapes are documented at archaeological sites in the U.S. Southwest (Homburg and Sandor 2011; Sandor et al. 1990), Aztec settlements in the Toluca Valley of central Mexico (Smith et al. 2013), Mayan cities in Belize (Chase et al. 2013), chiefdom villages in Costa Rica (Palumbo et al. 2013), and Andean societies going back as far as early pre-ceramic societies (Kendall 2013).

As societies grow in size and complexity, people may invest in a net increase of input (labor) per unit of land, amount of laborers, or adopt different modes of technology in order to intensify production (Morrison 1994:115). *Subsistence intensification* refers to an increase in food or other useful plant and animal resources in a horticultural or agricultural system. The logical extension of agriculture, wherein domesticated plants are selected for exceptionally large yields, is the production of more food than is necessary for survival—a *surplus* (Halstead 1989). Surplus crops are an advantage if people have the means to store harvests without high risk of spoilage. When successful, surplus production can be controlled by elites, increasing social inequality and cementing centralized political organization (Brumfiel and Earle 1987; Kirch 1984:161).

Food Production Systems in the Neotropics

Humans have affected existing forests on the planet in many ways, including removing trees, introducing exotic plants, and interfering with natural disturbance regimes such as fires. Anthropologists, geographers, and archaeologists have identified several specific types of landscape alterations that directly shape traditional subsistence in the Neotropics—namely, forest gardens, orchards, and fields (Denham et al. 2009; Ford and Nigh 2015; Moran and Ostrom 2005; Zarin et al. 2004). Forest gardening is a basic food production system in the Neotropics and one of the world's oldest forms of anthropogenic land use. People replace existing vegetation with trees, shrubs, herbs, and vegetables that are directly useful to humans. Traditional forest gardens maintained by Mayan farmers today represent the most resilient agroecosystem known in rural tropical communities (Junqueira et al. 2011; Lombardo and Prümers 2010; Toledo et al. 2003; Whitney et al. 2013). Resilience of forest gardens lies in mimicking the natural (undisturbed) structure of tropical forest ecosystems. Without human intervention, forests undergo a cycle of low to high biomass patches. Tree falls create gaps and cleared edges, lowering biomass, after which a series of successive growth patterns restore canopy and raise biomass (Forsyth and Miyata 2011). Similarly, farmers shift crop production in mosaic-like patches, physically moving fields and cleared edges to allow forest re-growth, enrich soil, and minimize sediment erosion (Lombardo et al. 2011). Fields are analogous to tree fall patches, while gardens and orchards are akin to canopy re-growth. Cultivators are able to maintain a sustainable, year-round supply of food by shaping the food production system to mimic the cyclical emergence and closure of cleared areas in mature rainforest (Ford and Nigh 2010; McKey et al. 1993).

Understory staple plant foods such as maize, manioc (*Manihot esculenta*: Euphorbiaceae), squash (*Cucurbita* sp.: Cucurbitaceae), and beans (*Phaseolus* sp.: Fabaceae) are often incorporated with a variety of fruit, vegetable, and nut-producing trees and shrubs. Intensification of trees and shrubs bearing particularly desirable fruits and nuts can lead to development of orchards (Baleé and Erickson 2006:216). With tree-cropping, the process of domestication can involve a more gradual transfer of the forest from uncontrolled utilization of trees and shrubs to controlled selection of particular fruits and replacement of less-desirable taxa with economically-valuable taxa (Dufour 1990:655). Orchards represent a highly productive use of land that has *not* been cleared.

Fields represent human exploitation of larger cleared areas for the purpose of maximizing production of specific plant resources. Increased production of crops grown in fields can be characterized by the infield-outfield model of agricultural intensification. Infield agriculture takes place in fields within walking distance of residences and contains extensive long-fallow polyculture crops and fruit tree crops. Outfield agricultural fields are located farther away from residences and involve intensive short-fallow monoculture staple crops (Killion 1990:199). Preference for particular crop types is often tied to variability in tropical soil quality. For example, nutrient-demanding maize is associated with fertile, anthropogenic Amazonian black earth matrices while bitter and sweet manioc varieties are better suited for depauperate, acidic, sandy soils (Fraser et al. 2012). People can improve fertility of fields by incorporating ash, fish bone, and organic garbage with farmed soils (Baleé 2013:28) and use runoff from these fields to nourish fish in mangroves (Gottsberger 1978; Goulding 1980).

Domesticated landscapes begin with human interventions that increase plant biodiversity and productivity, yet these activities also significantly alter the local animal community. The fruits and nuts that managed trees produce are also enjoyed by medium- and small-sized mammals such as agoutis (*Dasyprocta* sp.: Dasyproctidae) and pacas (*Cuniculus* sp.: Cuniculidae). The term *garden hunting* describes the dynamic of using small forest clearings to cultivate plants yielding higher productivity and, simultaneously, attracting desirable prey (Linares 1976; Robinson and Bennett 2004). Garden hunting increases available meat biomass to people and reduces seasonality and scheduling problems associated with hunting in mature forests (Baleé 2013:39; Linares 1976:348; Piperno et al. 2000:4). According to this model, people will selectively hunt and trap animals that travel in fewer numbers and prefer living in cleared-edge environments, such as deer (Cervidae), rabbits (Leporidae), and large- to small-rodents (Rodentia). This strategy would become particularly efficient as Neotropical farmers intensified production of crops by clearing forests for larger fields located farther away from their homes. VanDerwarker suggests that garden hunting can be an effective strategy of risk management (VanDerwarker 2006:151); during healthy crop seasons people opportunistically select the most available prey, while in poor seasons farmers may be more selective in hunting larger prey. The *r*-selected game populations, those that have a high population growth rate and produce many offspring, can withstand heavy predation and recover quickly in population size.

The domestication of landscapes is a salient, holistic explanation of the demographic success and sociopolitical transformations that indigenous societies experienced in what we would today deem unproductive, marginal Neotropical terrain. These cultivation systems, especially orchard mosaics in the rainforest, may be less visible from a Eurocentric perspective. In order to reveal indigenous subsistence regimes, it is especially helpful to root reconstructions of ancient food production systems in analysis of empirical data directly relevant to food procurement such as archaeobotanical and zooarchaeological data (Denevan 2001, 2011, 2012; Erickson 2006b, 2008). While we can expect to see an overall increase in food productivity alongside population growth, the processes by which this takes place in a local, historically-contingent setting may be unexpected.

Sociopolitical Organization in Ancient Panama

Divergent trajectories in the sociopolitical organization and subsistence economies of early complex societies in the isthmus region provide an excellent case study of social-ecological dynamics. Environmental factors certainly do not determine the outcome of a culture's development, but substantial differences in rainfall and biogeographic distribution provide material limitations and advantages unique to each region (Moran and Brondízio 2013:4-6). In Panama, the narrow isthmus connecting North and South America is sharply divided by the dry central Pacific coast, wet western Caribbean coast, and cool, arid interior highlands. Within the past 50 years, archaeologists have documented dense populations throughout these regions.

Regional Variation in Climate and Biogeography

Regional characterizations of political organization and subsistence economy in ancient Panama are best understood in the context of biogeographic variation within the isthmian region (see Barrantes 1993; Bennett 1968; Gordon 1982). The *S*-shaped land bridge is bordered to the north by the Caribbean Sea and to the south by the Pacific Ocean, and divided roughly east-west by a continental divide formed by the Cordillera de Talamanca mountain range (Figure 1.2). More than 500 rivers and streams, mostly unnavigable, intersect rugged terrain ranging in elevation from 0 (marine coastline) to 3475 m.a.s.l. (Volcán Barú). Panama has a tropical climate with uniformly high temperatures and humidity but marked seasonal variation in rainfall, depending on the region. The wet season takes place between late April and middle December, with a dry season during the remaining phase. Climatic regions are determined by variation in the intensity of the two seasons in different places (Figure 1.2). The dry season is better developed on the Pacific coast, where the continental divide forms a rain shield for the Pacific lowlands. A wetter dry season occurs on the Atlantic coast and in highland regions (> 1000 m.a.s.l.), where moist air from the Caribbean is transported year-round via north and northeast prevailing winds.

Spatial variation in biogeography is thus distinguished by tropical moist forest in Western Panama and tropical dry forest in Central Panama. As a sea barrier, the isthmus has supported divergent environmental change off its two coasts and created differential ecosystems driven by contrasting life histories of plants and animals (Leigh et al. 2014). Trade-offs between organisms' ability to grow or compete in different climates play a major role in shaping contrasts in species composition of different vegetation zones. For example, drought-sensitive trees in the Pacific watershed grow at a significantly slower rate than those in the Caribbean region

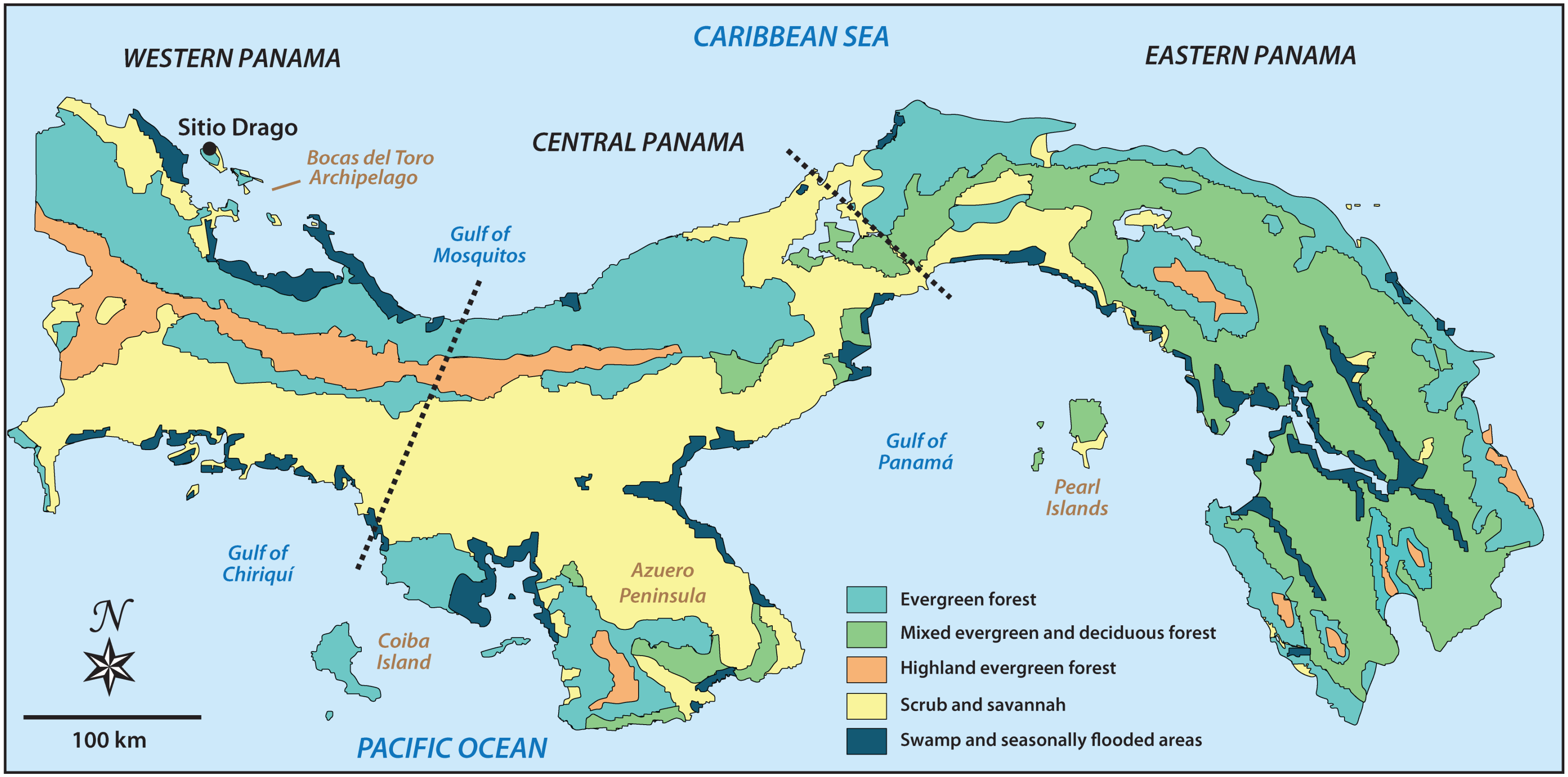

Figure 1.2. Map depicting major vegetation communities of twentieth-century Panama (after CIA 1981).

(Engelbrecht and Kursar 2003; Engelbrecht et al. 2007). In the lowland forests of Panama, the relationship between rainfall regime and species composition is shaped by the trade-off between tolerance of drought and tolerance of problems associated with wetter settings, such as disease and soil nutrient scarcity (Leigh et al. 2014:156). Similar patterning shapes marine biotic communities on each side of the land bridge. The eastern Pacific's nutrient-rich surface waters support faster-growing species with shorter life spans. Conversely, the Caribbean's clear, nutrient-poor surface waters favor species with longer life spans and effective defenses (Leigh et al. 2014:203).

These differences in biogeography may not limit development of complexity, but they may have influenced the timing of human social developments and shape of settlement patterns. Paleoindian phase settlements are documented in central Panama beginning around 9500 BC, but currently there is no evidence of human occupation in western Panama prior to 5400 BC (Cooke 1997:138). Later timing in western Panama may be due to the region's humid montane forests, which are notoriously difficult to clear and maintain. Further, lake sediment cores show that anthropogenic burning—and, possibly, horticultural activities—appear early in the Pacific foothills and much later in the Caribbean lowlands. People began clearing forests in the Lake La Yeguada watershed of central Panama at 11,000 BC and intensified these activities beginning around 7700 BC, an effect of early farming of grains and tubers (Piperno et al. 1990:108). Maize phytoliths first appear in soil from lowland central Pacific coast rockshelters at 5800 BC and are abundant in these locales by 3620 BC (Piperno et al. 1985). People began clearing forests and engaging in horticultural activities much later in western Panama, where Sitio Drago is located. Phytoliths from western Panama rockshelters indicate forest disruption beginning much later, around 3700 BC (Piperno 1989, 2007).

Contact-Era Chiefdoms

Three major cultural regions developed in the isthmian region by AD 200: the Gran Chiriquí of western Panama and eastern Costa Rica, the Gran Coclé of central Panama, and the Gran Darién of eastern Panama (Figure 1.3). Most archaeological work has been conducted in central and western Panama; few surveys have taken place in eastern Panama (for exception see Drolet 1980). By AD 500, the presence of a common ideology and shared artistic tradition, exchange of everyday commodities and prestige items, craft specialization, pronounced social inequality, and variability in archaeological site size and function are apparent in central Panama and, to a lesser extent, western Panama (Cooke 2005; Cooke and Sánchez 2003; Hoopes 2005:10; Linares and Ranere 1980; Ranere and Cooke 1996).

Using a direct historical approach based on accounts by Spanish explorers, we know the contact-era Panamanian landscape was dominated by extensive networks of chiefly control centers, villages, and rural hamlets. Panamanian society in the early sixteenth century was divided into two internally stratified classes: chiefs (elites) and commoners. A multi-tiered elite class consisted of *quevis* (paramount chiefs), *sacos* (secondary chiefs), and *çabras* (commoners by birth who achieved the lowest elite status through warfare). Elite rankings resulted from a combination of birth rights, interpersonal affiliations, and rewards for military service (Helms 1979:13). Paramount chiefs dwelled in compounds filled with *bohios* (large conical thatch-roofed houses on circular cobble foundations) that were enclosed by a stone wall and contained food storage facilities for surplus maize. Commoners resided in thatch-roofed homes lacking defensive structures or food storage facilities (Helms 1979:9). Using Goldman's classification scheme of status systems in ranked Polynesian societies (Goldman 1970), Helms characterizes contact-era Panamanian political organization as an "open" structure (Helms 1979:57). While

Figure 1.3. Map depicting major ancient cultural regions and archaeological sites located in present-day Panama.

chiefly authority was inherited, elite classes in open systems were negotiable to some degree and lacked rigidly formal, fixed genealogical status positions. Even though paramount chiefs were granted their status at birth, the competitive atmosphere meant that *quevis* actively expanded and demonstrated control in order to maintain their positions of authority while *sacos* and *çabras* aspired to advance their positions (Helms 1979:24). This competitive status system fostered a political environment in which elites constantly engaged in manipulations of property and resources to obtain, uphold, and expand their authority.

Ownership of material property, secular knowledge, and sacred knowledge in contact-era Panamanian society played a role in elite manipulations of status. Matrilineal inheritance of chieftainships and property was negotiated through marriage. These transactions included ownership and control of high chiefs' *bohios* and other elites' "towns" that were occupied by family and personal servants (Helms 1979:15). Warfare in central Panama helped lower-ranked elites gain individual political power by obtaining land and restricting access to valuable fishing and hunting territory. Spanish explorers noted that chiefly centers were located along trade routes on strategic points of control for access to local gold and copper deposits, marine food and non-food resources, and centers of exchange for supra-regional sumptuary items (Helms 1979:33). These accounts are replete with descriptions of elaborate shell bead, gold, pearl, and jade jewelry owned and displayed by elites. These types of material property are economically valuable in terms of their scarcity as a resource, but they also bear value as an ideological signal of power. Like those in Polynesia and San Blas Kuna (eastern Panama), elite chiefs in central Panamanian society used sumptuary display of craft items to display symbolic power in addition to economic wealth (Helms 1979:75).

Ownership of secular and sacred knowledge was also a prominent aspect of political dynamics throughout sixteenth-century Panama. Elite chiefs controlled access to geographically long-distance exchange systems in order to gain sumptuary items and secular knowledge (Helms 1979:130). These chiefs also controlled access to long-distance contacts in order to gain sacred knowledge. Access to either type of knowledge would have been inaccessible to commoners and less educated or less privileged elites (Helms 1979:135). This leadership role was embedded in widespread symbolic and ideological concepts regarding the basic nature of "man" and society as being ruled by a divinely appointed chief. For example, the traditional belief system of the San Blas Kuna people maintains that a god created the universe to be ruled by leaders, naturalizing leadership and hereditary inequality in the sacred and secular world (Helms 1979:73). Such symbolism "naturalizes" the political relationship and institutionalized material and spiritual disparity between elites and non-elites (Earle 1987:298). From this perspective, esoteric gold pieces worn by contact-era central Panamanian elites, and the sacred zoomorphic iconography portrayed on their high-quality ceramics, signaled a close, powerful association with the supernatural world (Helms 1979:119).

Control and conflict over these resources was a means by which aggrandizers could climb the ladder from elite to chiefly status. According to ethnohistoric accounts, new chiefs faced challenges from high-status competitors and were often forced to publically demonstrate their ability to wield power. Raiding of neighboring villages, capture of slaves, and elite long-distances exchanges were key means of accomplishing this goal (Helms 1979:28). Rather than fighting over material sources of power available in other regions, warfare appears to have mainly taken place between neighboring elites within each region—even within the same river valley (Helms 1979:33). Instead, conflict took place as raiding of *bohios* or control of important trade centers situated on the long-distance exchange routes (Helms 1979:34). Factionalism and competition at the elite level appears to have completely circumvent the trade networks of lower-ranked polities. Chiefdoms had large-scale, short-term instability at the elite level yet small-scale, long-term persistence in commoner-level strata (Helms 1979:34).

Prehistoric Chiefdoms

Traditional interpretive frameworks used by scholars working with lower Central American prehistory characterize the prehistoric population as supraregional paramount chiefdoms comprised of smaller—competitive and somewhat independent—polities (Creamer and Haas 1985; Lange and Stone 1984). Settlements in central Panama exhibit ceramic technology and nucleated villages at least several millennia prior to those in western Panama (Table 1.1). By the Middle Ceramic phase (200 BC to AD 700), early chiefdoms emerged in the Central Pacific slopes (Hansell 1987; Weiland 1984). By the Late Ceramic phase (AD 700 to 1500), large chiefdoms with regional control of trade networks are evident archaeologically (Cooke et al. 2003; Cooke and Mayo 2005; Menzies and Haller 2012).

The Central Pacific watershed contains some of the most impressive examples of chiefly activities. The first large, regionally important sites such as Barriles appear in the highlands around AD100 (Rosenthal 1980). Coastal political centers are apparent by AD 800, exemplified by the mounds and columns of La Pitahaya on Isla Palenque in the Pacific Gulf of Chiriquí (Linares 1980a, 1980b). Other high-status complexes in the interior areas of western Panama include the elaborate stone circles and house platforms discovered at Pitti-Gonzáles (Galinat 1980), Cerro Punta (Smith 1980), and settlements in the highlands (Holmberg 2009).

Around AD 500, several archaeological sites point to a phase of increased elite wealth and power, including the large ceremonial structures adorned with sculpted columns, colonnades,

Table 1.1. Archaeological Chronology of Central and Western Panama (after Cooke and Sanchéz 2003; Dickau 2010:201; Linares and Ranere 1980; Wake et al. 2013).

	Central Panama	**Western Panama**
AD 1600	*Spanish Contact ca. AD 1502*	
AD 1500		
AD 1400	Late Ceramic (AD 700 to 1500)	Late Ceramic Chiriquí (AD 700 to 1500)
AD 1300		
AD 1200		
AD 1100		
AD 1000		
AD 900		
AD 800		
AD 700		
AD 600	Middle Ceramic (BC 200 to AD 700)	Middle Ceramic Aguas Buenas (AD 0 to AD 700)
AD 500		
AD 400		
AD 300		
AD 200		
AD 100		
AD 1		
100 BC		Early Ceramic La Concepción (500 BC to AD 0)
200 BC		
300 BC	Early Ceramic (3300 to 200 BC)	
400 BC		
500 BC		
600 BC		Pre-Ceramic Boquete phase (2000 to 500 BC)
700 BC		
800 BC		
900 BC		
1000 BC		
2000 BC		
3000 BC		Pre-Ceramic Talamanca phase (6000 to 2000 BC)
4000 BC	Late Pre-Ceramic (6000 to 3300 BC)	
5000 BC		
6000 BC		
7000 BC	Early Pre-Ceramic (8500 to 6000 BC)	Paleoindian phase (11,500 to 6000 BC)
8000 BC		
9000 BC	Paleoindian phase (11,500 to 8500 BC)	
10,000 BC		
11,000 BC		

animal effigies, causeways, and elaborate stone pavements at Sitio Conte and El Caño and, in particular, the lavish elite burials discovered at Sitio Conte (Cooke 2005:150). Late Ceramic phase complexes such as Rivas site (southern Pacific Costa Rica) contain monumental architecture and are major nodes in the long-distance exchange system of Lower Central America (Frost and Quilter 2012; Quilter and Vargas 1995), supporting the observation that contact-phase chiefs competed for control of trade networks supplying exotic goods and esoteric knowledge (Helms 1979). Large settlements with terraces, house platforms, imported ceramics, and elite goods appear in the Caribbean watershed of central Panama by the Late Ceramic phase (Griggs 2005:353), most notably La Peguera (14 ha.) and El Uracillo (40 ha.) (Griggs et al. 2002).

Prior to AD 500, burials at sites such as Sitio Sierra (ca. 240 BC) lack evidence for social differentiation (Cooke 1984:287). After AD 500, we see an increase the number and abundance of elaborate furnishings in elite burials, which now include human sacrifices, ornaments of jade and *tumbaga* (gold-copper alloy), and zoomorphic effigies representing esoteric knowledge and power. Elaborate tombs at sites throughout central Panama, furnished with worked greenstone (typically agate or chalcedony) pieces and *tumbaga* adornments, are examples of honorific burials of chiefs who interacted with long-distance exchange networks (Hoopes 1992). Similarly, rich burials at Sitio Conte contain many gold adornments symbolic of chiefly power and elaborate black-and-red polychrome ceramics bearing zoomorphic iconography (Cooke 1984:291; Helms 1979:86). The use of black-and-red motifs in polychrome ceramics from Sitio Conte may have held analogous value to the black-and-red motifs in Kuna adornments that signified the good-and-evil dualism in their cosmology (Helms 1979:95).

Evidence for elite compounds in the Caribbean watershed of western Panama (ca. AD 700 to 1500) is more limited (Brizuela et al. 2006; Linares 1980a; Wake et al. 2004). Large ceremonial sites dating to the Early Ceramic phase (1500 to 500 BC) are present on the Caribbean slopes of eastern Costa Rica. Notable examples include the plazas, mounds, cobblestone roads, and elaborate burials at Guayabo de Turrialba (Findlow et al. 1979), circular plazas at Najera (Kennedy 1968), and cobbled causeways, circular stone-faced house foundations, large terraces, and evidence of goldworking at La Zoila, Las Mercedes, Costa Rica Farm, Parasal, La Cabaña, and Cubujuquí (Snarskis 2003:187). The Rivas Site, a large site with cobble architecture and elaborate burials at the foot of the Talamanca Mountain range in eastern Costa Rica, flourished as a ceremonial center for mortuary rituals to bury chiefly elite between AD 900 and 1300 (Quilter 2004). Many scholars assume these settlements, which exhibit traits of chiefdom-level political development (e.g., nucleated population centers, long-distance trade and exchange, craft specialization), relied on surplus maize production. However, this assumption has not yet been tested with empirical data speaking to past plant and animal procurement activities.

Subsistence Economy in Ancient Panama

In eastern Panama around AD 1510, Vasco Núñez de Balboa observed an abundance of root crops, maize, and cotton (Anghera 1912:225; Sauer 1966:174). Throughout the early sixteenth century, European explorers encountering highland interior and lowland Pacific coastal chiefdoms in central Panama commented on the abundance and diversity of agricultural products, including manioc, sweet potato (*Ipomoea batatas*: Convolvulaceae), maize, pineapple (*Ananas comosus*: Bromeliaceae), mamey (*Pouteria sapota*: Sapotaceae), coconut (*Cocos* *nucifera*: Arecaceae), and other fruits (Oviedo 1853:136, 142-143; Espinosa 1864:512-519; Helms 1979:11; Lothrop 1937:15-18; Sauer 1966:272-274).

Christopher Columbus traveled along the western Caribbean coast of Panama during his fourth and final voyage to the New World in AD 1502. He noted an abundance of agricultural plant resources, along with gold and textiles, in the homes of *caciques*. Specifically, Columbus reported massive fields of maize and orchards of palm and tree fruits useful for brewing fermented beverages (Colón 1959:253-254; Helms 1979:61; Sauer 1966:132-133; Wafer 1934:74). Archaeobotanical and zooarchaeological evidence from pre-contact settlements in these regions allow us to explore how people developed these systems over the *longue durée*. Ethnographic accounts of traditional subsistence activities practiced by people in the Bocas del Toro province provide useful analogies for interpreting faunal and floral remains presented in this dissertation (Gupta et al. 2005; Guzmán 1956; Joly et al. 1987; Smith 2005).

Plant and Animal Procurement in Modern Bocas del Toro

The Ngäbe-Buglé-Guaymí people of Bocas del Toro, Chiriquí, and Veraguas provinces are the focus of many ethnographic and sustainable agroforestry development projects in western Panama (Cusack and Dixon 2006; Gutierrez-Montes et al. 2009; Niehaus 2012; Beer et al. 1998). Although they partially engage in the cash-based economy, people who live in *comarcas* (indigenous reservations) rely primarily on subsistence agriculture and hunting-and-gathering. Swidden agriculture in Bocas del Toro is seasonal, comprised of root crops (e.g., yuca [*Manihot* sp.: Manihoteae], yam [*Dioscorea* sp.: Dioscoreaceae]), maize, banana (*Musa* sp.: Musaceae), rice (*Oryza* sp.: Poaceae), and bean. People farm these crops in patterns of slash-and-burn, short-rotation agriculture (Guzmán 1956:60). The composition of plants and rhythm of management activities differs depending on their location in the highlands or lowlands. Indigenous people in the lowlands of Bocas del Toro, Chiriquí, and Veraguas spend much of their labor on soil maintenance, encouraging drainage and accumulation of organic matter in soil. They accomplish this with a series of tasks—hoeing into banks, building ridges and mounds, bordering plots with legumes—that, together with inter-cropping and crop rotation, produce a continuous harvest throughout the year (Berleant-Schiller and Pulsipher 1986:16).

House gardens, fields, and orchards are easily maintained and intensified once created (Gnecco 2003; Posey 1993). Ngäbe-Buglé-Guaymí farmers increase food production as needed by intensively cultivating semi-permanent plots and treating these areas with irrigated water and organic soil enrichments (Berleant-Schiller and Pulsipher 1986:18). Gardens and orchards provide a large portion of plant food staples for family consumption, but foraging activities allow people to acquire medicinal resources. Studies have documented over 120 medicinal plants used by a single family in one year, reflecting the high diversity in plant communities surrounding people who live in rainforests alongside small garden plots (Gupta et al. 2005; Joly et al. 1987, 1990). These plants are of great cultural value to Ngäbe-Buglé-Guaymí society and are used for both ritual ceremonies and medical treatment of fevers, rashes, snake bites, childbirth, and dreams with particular themes associated with illness (e.g., eating meat and losing appetite; stung by a bee; transforming into a cat that fights and loses; falling; being in jail; tied with ropes; injured by an arrow; being touched by someone) (Gupta et al. 2005:146).

The high cost of obtaining protein is recognized as a limiting factor to subsistence in tropical forests. Many Ngäbe-Buglé-Guaymí families today raise pigs (*Sus* sp.: Suidae), chickens (*Gallus gallus domesticus*: Phasianidae), ducks (Anatidae), and the occasional cow (*Bos taurus*: Bovinae). Groups living in heavily forested areas of the *comarcas* routinely hunt and fish for wild meat. Hunting mainly takes place as routine trapping and shooting of prey that are readily available near houses and gardens. On occasion, people organize large hunting trips into the deep canopy forest for procurement of infrequently-consumed animals such as monkey and sloth (Smith 2005). In many cases, the type and quantity of game captured by hunters is affected by the timing of agricultural tasks, wage labor, access to different technologies, and cultural preference (Dunn 2004).

Plant and Animal Procurement in Ancient Central Panama

Macrobotanical and microbotanical remains from the Pacific and Atlantic watersheds of Panama point to a well-developed food production system in both regions by the time of Sitio Drago's earliest recorded occupation at AD 800 (for a comprehensive list of plants identified at Sitio Drago and other sites in central and western Panama, see Table 4.3 and Table 6.2.). Macrobotanical remains—carbonized plant parts—provide a basis for assessing the relative abundance and importance of plant resources. Microbotanical remains—phytoliths, starch grains, and pollen grains—preserve exceptionally well and often provide the earliest known presence of a cultigen. Milling stones and stone tools associated with manioc grating provide indirect (or, proxy) evidence of agricultural production during the later ceramic phases. Zooarchaeological remains allow us to assess the types and abundances of animals procured by prehistoric people, as well as patterns speaking to human impacts on biotic communities, such as species size and age at capture. Increased levels of wood charcoal in sediment samples obtained from lake beds or swamps can be proxy evidence of human-mediated forest clearing events taking place in the sampling site's watershed.

Most archaeobotanical, zooarchaeological, and proxy data have been recovered from central Panama (see Dickau 2010). The earliest documented human impact on the landscape in Panama took place around 11,050 years BP. Late Pleistocene and early Holocene human interference with the Panamanian forest is evident in pollen, phytolith, and charcoal records recovered from Lake La Yeguada, a small lake dammed by a basaltic lava flow in a volcano located on the Pacific foothills (Bush et al. 1992 and Piperno et al 1990). Evidence of larger-scale forest clearing from the Lake La Yeguada core suggests intensification of these activities beginning around 7000 years BP (Piperno et al. 1990:108). Sediment cores from an ancient lake bed in Monte Oscuro, an extinct volcano located in central Panama 3 km from the Pacific coast show an increase in concentration of grass and other herbaceous pollen and phytoliths beginning ca. 7500 years BP. Further, a significant rise in charred specimens suggests people began clearing forests around this time (Piperno and Jones 2003:81).

People in central Panama began cultivating plants before developing ceramic technology. Early Preceramic phase (8500 to 6000 BC) and Late Preceramic phase (6000 to 3300 BC) phytolith and starch grains extracted from artifact residue and sediments collected from several Preceramic rock shelters located near Parita Bay in central Pacific Panama (Aguadulce, Coronoa, Ladrones) suggest that people cultivated arrowroot (*Maranta arundinacea*: Marantaceae), squash, lerén (*Calathea allouia*: Marantaceae), and bottle gourd (*Lagenaria siceraria*: Cucurbitaceae) as early as 7700 to 5800 BC (Piperno and Pearsall 1998:213; Cooke and Ranere 1992b:123). Maize starch grains, phytoliths, and pollen first appear in central Panamanian sites around 5800 BC (Dickau 2010:10).

Despite the presence of maize cultivation, people living around 4000 BC at Aguadulce, Carabalí, and Vaca de Monte harvested and disposed of coyol palm (*Acrocomia aculeata*: Arecaceae), corozo palm (*Acrocomia media*: Arecaceae), peach palm (*Bactris gasipaes*: Arecaceae), oil palm (*Elaeis guineensis*: Arecaceae), algarrobo (*Albizia saman*: Fabaceae) tree fruits, hog plum (*Spondias mombin*: Anacardiaceae), nance (*Byrsonima crassifolia*:

Malpighiaceae), amaranth (*Amaranthus* sp.*:* Amaranthaceae) seeds, and bean (Dickau 2010:4-5). By 3300 BC, remains of palm fruits, maize, squash, beans, cacao, nance, avocado, and cultivated tubers are noticeably more abundant at larger sites in central Panama, including Sitio Sierra and Cerro Juan Díaz in the Pacific watershed and Site LP-9 in the Atlantic watershed (Dickau 2010:4-5). Surveys of large river valleys provide evidence of subsistence adaptations unique to each region. Concentrations of large milling stones have been documented in the Río Parita Valley (Haller 2004:146) and the Santa Maria River Basin of central Panama, suggesting at least a mixed economy of long-fallow cultivation, gathering, and hunting. Regional syntheses of data demonstrate an increase in abundance of grinding implements between 4500 and 2000 years BP, pointing to intensification of plant foods such as maize, palm nuts, and/or tubers during the Early Ceramic phase (Cooke and Ranere 1992b:126).

Coastal occupations developed adaptations to marine faunal resources. At the Aguadulce rock shelter near Parita Bay, for example, freshwater fish represented over 50% of the identified fish assemblage (Cooke and Jiménez 2008). Cooke discovered that marine fish were consumed in equal proportion at highland sites Sitio Sierra, suggesting late Ceramic Phase inland trade and transport of fish. This evidence suggests pre-Columbian societies may have used chiefly networking as a social adaptation to expand their diet breadth and enjoy exotic foods.

Plant and Animal Procurement in Ancient Western Panama

In comparison to central Panama, initial human occupation, forest clearing, and domestication of maize took place at a later date in western Panama. Recent microbotanical evidence recovered from highland preceramic sites (Hornito and Casita de Piedra) points to cultivation of maize, *Zamia* sp. corms (Zamiaceae), yams, palms, legumes, and *Calathea* sp. tubers (Marantaceae) as early as 5000 BC (Dickau 2010:14). Pollen and charcoal in a lake sediment core from Laguna Zoncho, a small mid-elevation lake in southernmost Costa Rica, provides evidence of 3000 years of human occupation, forest clearance, agriculture and fires in the area (Clement and Horn 2001). Presence of maize pollen and high frequencies of grass (Poaceae) and other disturbance taxa pollen ca. 1290 to 820 BC mark the beginning of the earliest documented phase of substantial human impact on the landscape in western Panama. Following a phase of forest regrowth around 820 BC to AD 180, pollen percentages again indicate more intense human activity around Laguna Zoncho, with increases in pollen of disturbance taxa and decreases in pollen of forest taxa (Clement and Horn 2001:423).

Prior to recovery and analysis of data discussed in this dissertation, evidence of subsistence economy in the Atlantic watershed is more abundant in eastern Costa Rica than in Panama. In neighboring eastern Costa Rica settlements, maize, beans, and local tree fruits are abundant in Early Ceramic macrobotanical assemblages dating as early as 500 BC, including Severo Ledesma (Snarskis 1976), Guayabo de Turrialba (Findlow et al. 1979), and La Cabaña (Snarskis 2003). Maize pollen is likewise abundant in off-shore core samples from the Caribbean coast of eastern Costa Rica beginning around 200 BC (Kennedy and Horn 2008).

People appear to increase production of palms, tree fruits (including avocado), maize, beans, and squash at later ceramic sites (ca. AD 700 to 1500) in the highlands of western Panama, including Casita de Piedra, Cerro Punta, La Pitahaya (Dickau 2010:12), Sitio Pitti-Gonzales, and Barrilles (Smith 1980:159, 162). Before excavations at Sitio Drago, most data representing subsistence activities in the lowlands of western Panama were obtained from Cerro Brujo (ca. AD 100 to 800). The Cerro Brujo zooarchaeological data suggest hunters were selective, with only three taxa (agouti, paca, and armadillo [*Dasypus novemcinctus*] representing the majority of the assemblage. In contrast, the most common taxa present in the region (e.g., three-toed sloth [*Bradypus tridactylus*: Bradypodidae], two-toed sloth [*Choloepus sphoffmanii*: Megalonychidae], howler monkey [*Alouatta palliata*: Platyrrhini], spider monkey [*Ateles geoffroyi*: Platyrrhini] and white-faced capuchin monkey [*Cebus capucinus*: Platyrrhini], tapir [*Tapirus bairdii*], spiny rat [*Proechimys semispinosus*: Echimyidae]) were poorly represented in the assemblage. This pattern demonstrates a preference for animals attracted to tubers and fruit trees, and minimal hunting of taxa in high canopy or remote mature forest.

Reconstructing Prehistoric Subsistence Economy

To understand the connections between food production, landscape domestication, and sociopolitical complexity, we need to first articulate the set of processes and events that shape culture and ecology. In the following chapters, I explore data representing plant and animal procurement during two distinct prehistoric occupations and one historic phase. These data derive from undisturbed middens and provide exceptionally well-preserved snapshots of routine plant and animal procurement. I present quantitative and qualitative analyses with interpretations rooted primarily in considerations of landscape developments necessary to produce changes in plant and animal procurement, such as soil enrichment, terracing, and garden hunting. In sum, this dissertation describes the accumulations of landesque capital necessary to sustain complex society on a small island in the Caribbean.

Although natural resources abound on Isla Colón, two marginalities posed a notable challenge to development of a well-connected hierarchical village. First, without human intervention the karst island geology hosts exceptionally thin soils that are subject to continual erosion and leaching of nutrients. Second, the small island is devoid of a source for tool-quality raw stone material. The expansion of population size and political connections during the Biscuitware phase at Sitio Drago exemplifies the power of technological innovation to make an insular location livable. From the Pre-Biscuitware to Biscuitware Phases, I compare preference for domesticated versus wild plant foods, assess potential intensification of specific plant food types, and identify shifts in production of plant foods from gardens, orchards, and/or fields. To further gauge how people altered their environment to accommodate population growth, and perhaps support trades associated with increased elite regional interaction, I turn to the zooarchaeological data to consider fishing in nearshore reefs versus offshore open seas and hunting and trapping of large closed-canopy prey in comparison to smaller taxa known to visit gardens and cleared forest edge.

In the following chapters, I present an account of peoples' subsistence activities during a phase of demographic change on an island naturally challenged to support village life. In doing so, this project produces the most comprehensive collection of plant and animal remains to date in western Caribbean Panama. Additional detailed archaeological excavations and analyses from sites located in western Panama are essential to expand our concept of prehistoric life in the wetter, less seasonally dry regions of lower Central America. Together with PASD's on-going analyses of ceramic, lithic, and shell artifacts from Sitio Drago, this project lays groundwork necessary for comprehensive regional comparison of settlement and subsistence patterns of ancient chiefdoms in central and western Panama.

CHAPTER II

ARCHAEOLOGICAL INVESTIGATIONS AT SITIO DRAGO

Introduction

The 2002 discovery of Sitio Drago on Isla Colón in Bocas del Toro province piqued the interest of archaeologists examining the pre-Columbian world of Western Panama. The staggering amount of artifacts recovered during initial excavations suggest these people lived in a stratified society and participated in a long-distance exchange network managed by elites in the paramount chiefdoms sprawled across lower Central America. Evidence mounts that Sitio Drago was, in fact, a large coastal village inhabited by people with far-flung political connections.

A key component in explaining how complexity emerged at Sitio Drago is discovering how they procured plant and animal foods and, in turn, impacted the area without unsustainably degrading island geography. While Isla Colón is situated in a location rich with marine and terrestrial food resources, several traits of the local ecology led to an early characterization of the area as "marginal." One challenge people faced in developing a community on Isla Colón was lack of useful tool-quality stone materials. Stone points, knives, choppers, scrapers, grinders, and milling implements are an essential component of pre-metallurgical society. Village life, therefore, depended on the organizational labor necessary to access these essential resources from the mainland, and perhaps trading with mainland groups.

Further adding to the challenge of living in this area is the climate, as an exceptionally high amount of rainfall takes place in Bocas del Toro year-round (Collin 2005:368). In moist tropical forests, land surface temperatures and humidity are especially high because of the hot, wet climate. In these ecosystems, nutrient cycling is rapid; carbon and mineral content is absorbed from the soil efficiently by the roots of forest plants. Many of the nutrients needed for agriculture (e.g., nitrogen, calcium, potassium, and magnesium) reside not in the soil itself but in the vegetation that the soil supports (Johnston 2003). Tropical soils generally lack, and fail to adequately retain, key nutrients needed for production of nutrient-demanding crops such as maize (*Zea mays*: Poaceae). If reliant on domesticated plants, people living in these ecosystems developed strategies to fertilize soil and maintain organic matter in plant cultivation areas despite frequent rainfall.

This chapter presents a history of archaeological research in the region and describes the cultural and ecological processes helpful for understanding interpretations of plant and animal remains recovered from Sitio Drago. Projects underway in Bocas del Toro province aim to better understand geological events that formed the island ecosystems we observe today (O'Dea and Collins 2013), historical human impacts on the region's Neotropical resources (Collin 2005; Cramer 2013; O'Dea et al. 2014), and sociocultural dynamics during historic (Howard 2014) and prehistoric (Wake and Mendizábal *in press*; Wake et al. 2004; Wake 2014) occupations.

Environmental Setting

Several characteristics of local climate and biogeography point to an ecological system productive for hunting, fishing, and foraging, yet potentially marginal for crop cultivation. The isthmian region is known for exceptionally high rates of species biodiversity and contains over 7000 known plant species and 1250 vertebrate species, of which at least 15% of these plants and animals are endemic to Panama. Variation in Bocas del Toro topography is more extreme than in other coastal Caribbean regions (Collin 2005; Cramer 2013). Isla Colón, in particular, is geographically complex and current habitats include dense tropical forest, cleared fields for cultivation or livestock, mangrove swamps, fringing reefs, and seagrass beds, as well as various freshwater environments such as ponds, rivers, streams, creeks, and flooded caves. Old-growth forest and mangrove forest provide diverse habitats for economically valuable plants and animals. Almirante Bay is closed from the Caribbean Sea and well-protected from destructive waves and soil erosion associated with open marine conditions. Drainage of Río Changuinola and Río Oeste from the mainland coast, as well as mangrove swamps and small streams from the island coasts, has historically created an environment with exceptionally high concentrations of nutrient enrichment, chlorophyll, and zooplankton biomass (D'Croz et al. 2005). Although modern deforestation and agricultural runoff negatively impacts the health of these communities, an abundance of terrestrial and marine subsistence resources persist in the area.

Local Climate and Biogeography

Boca del Drago (9°24'56''N, 82°19'37''W) is a small beach community located on the northwestern corner of Isla Colón, approximately 18 km northwest of Bocas Town, Bocas del Toro province (Figure 2.1). The largest island of the local archipelago (61 km^2), Isla Colón is located the shortest distance (1 km) from the nearby mainland Punta Cuaro peninsula. Isla Colón is formed by three lithostratigraphic units that provide a geochronology dating to the Plio-Pleistocene. The Old Bank Formation (3.5-2.0 mya) is comprised of blue-gray mudstones and sandstones intersected with beds of volcanic rock. The La Gruta Formation (2.0-1.77 mya; Early Pleistocene) is comprised of recrystallized ancient reefs and reef rubble. The most recent Pleistocene-epoch Ground Creek Formation is comprised of sandstone and siltstone compacted with carbonate-rich skeletal fragments of marine organisms and forms the karst platform supporting the island landscape (Coates et al. 2005; McNeill et al. 2013). Aside from the limestone stream pebbles incised for use as fishing net weights, Isla Colón lacks a natural source of tool-quality rock, necessitating importation of stone raw materials from quarries on

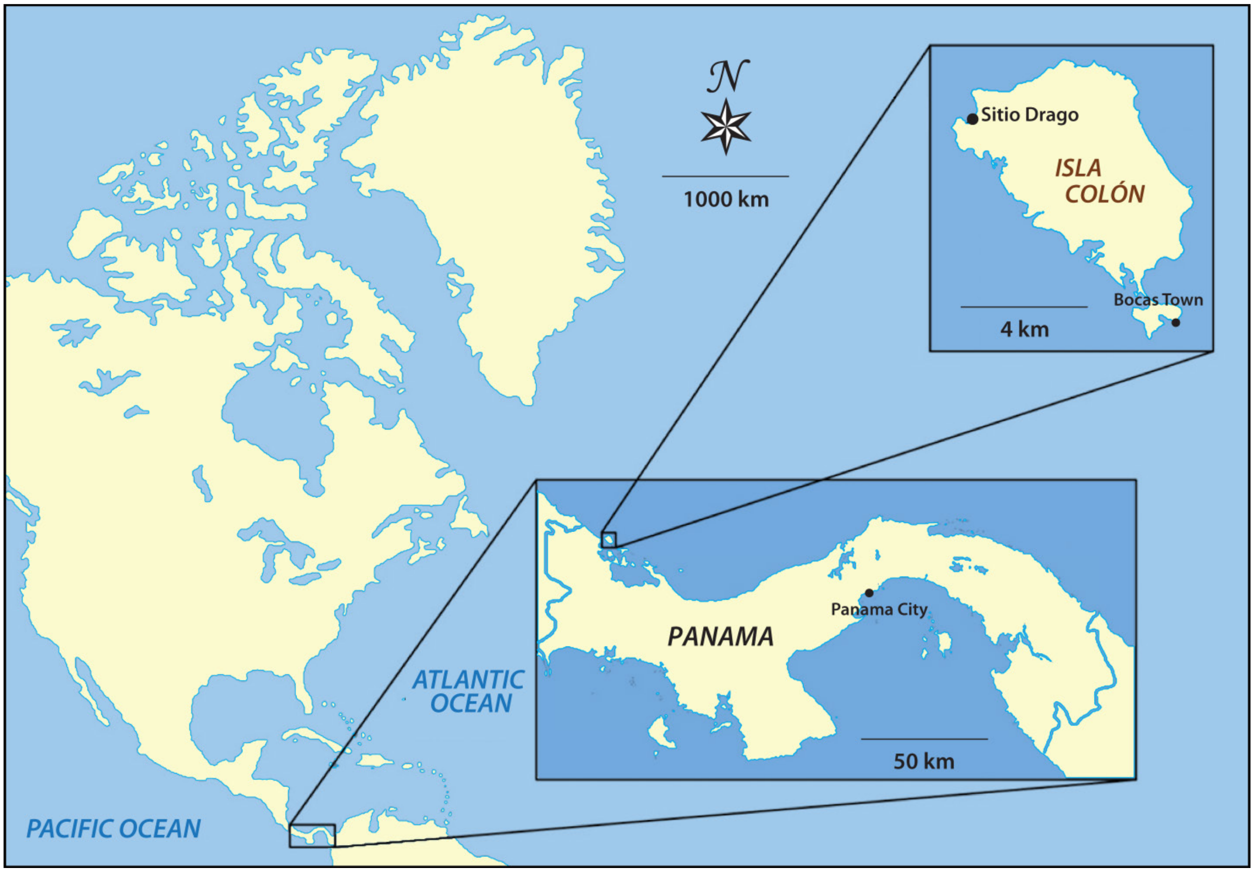

Figure 2.1. Location of Sitio Drago in the Bocas del Toro archipelago (after Wake et al. 2012:4).

other islands or the mainland. The presence of prominent karst features throughout the island suggests prehistoric inhabitants had access to a year-round supply of water, although groundwater pollution during the modern era has prevented human consumption of springwater. Sediments in Boca del Drago are composed of Holocene silts and coralline sands derived from reef erosion and promote preservation of archaeological materials with well-facilitated drainage and a pH at Sitio Drago in the range of 7 to 7.5.

Typical of the western Caribbean region of Panama, Isla Colón has a tropical climate with uniformly high temperatures and humidity but marked seasonal variation in rainfall. The wet season takes place between late April and middle December, with a dry season during the remaining phase. However, Bocas del Toro experiences a higher precipitation rate (330 cm annually) in comparison to other Caribbean coastal localities (e.g., 200 cm annually on the central coast) and lacks a pronounced dry season (Cubit et al. 1989; Kaufmann and Thompson 2005; in Cramer 2013:3). Excessively high rainfall is linked with blight and decreased crop yields in both archaeological and modern contexts as excessive moisture leads to stalk rotting, microbial disease, and difficulty with post-harvest storage (Bellon et al. 2005). Such challenges of wet lowland agriculture have been invoked by scholars in dismissing the notion of a dense, sedentary agricultural settlement in prehistoric Bocas del Toro (Linares 1977). More recently, however, archaeologists investigating Classic Mayan agricultural intensification in the tropical lowlands have argued that cultivation through intensive weeding and mulching can increase maize productivity and lengthen harvest times (Johnston 2003). Further, Payton Sheets and colleagues (Sheets et al. 2011) present compelling evidence that moisture-tolerant root crops like yuca (*Manihot esculenta*: Euphorbiaceae) may have played a more important role in supporting Classic-phase Mayan agricultural communities than previously thought.

Finding Ancient Societies in Bocas del Toro

Historical and ethnohistorical accounts written by sixteenth-century European explorers traveling through Panama describe large villages with multifamily houses, extensive fruit tree groves, and large fields of maize. When Christopher Columbus sailed past the Belén River east of Bocas del Toro province during his final voyage to the New World in 1502-1503, he reported that a “numerous but dispersed population, living in small communities near streams and modest rivers, characterized the central Bocas del Toro area around Almirante Bay” (Sauer 1966:248, paraphrasing Colón 1959). He noted that "all the surroundings and small islands were full of maize fields" (Sauer 1971:126). Despite these accounts, no archaeological evidence of pre-Columbian people emerged until 1949.

Archaeologists exploring Panama during the early- to mid-twentieth century focused primarily on sites in the drier central Pacific region. Matthew Stirling and Marion Stirling, archaeologists with the Bureau of American Ethnology (BAE) at the Smithsonian Institution, led the first exploration of Bocas del Toro province and Isla Colón in 1949. The Stirlings identified several middens located along the coastal plain of Almirante and conducted test excavations, which produced no material culture, in the nearby mainland forest. During a brief survey conducted on Isla Colón in 1953, they recorded the presence of several large ceramic urns exposed by a storm along a beach ridge. The Stirlings concluded that a small population seasonally inhabited the coastlines of the Bocas del Toro region during pre-Columbian times, but did not grow in size or complexity to the point of expanding the settlement inland (Stirling and Stirling 1964:274-5).

Several years later, B. Leroy Gordon, a cultural geographer with the University of New Mexico (UNM) working through the United States Office of Naval Research, conducted the first systematic excavation of shell-bearing middens backing the Chiriquí Lagoon in mainland Almirante. Gordon notes that his excavations recovered a surprisingly low density of ceramic sherds, small stone celts (axes), and metate fragments. He did discover a high density of well-preserved faunal remains identified as various shellfish species, peccary (Tayassuidae), large rodent, turtle, fish, and birds. Gordon interpreted the presence of ceramics as evidence that people in the region may have been involved in semi-sedentary cultivation of maize, but he identified the sites as seasonal occupations of "emergency refuge" due to the lack of associated burials, lack of complete pottery vessels, and distant proximity from shellfish gathering sources (Gordon 1962:8). As a result of Gordon's excellent recovery of materials, ongoing efforts to understand the region's archaeological record have emphasized systematic, detailed excavation of middens.

Initial Assessments of Prehistoric Life in Bocas del Toro

During the early 1970s, Olga Linares and Anthony Ranere, archaeologists associated with the Smithsonian Tropical Research Institute (STRI), conducted extensive survey of the Aguacate Peninsula and discovered four widely dispersed sites including Cerro Brujo, the largest documented site (~1 ha.) in the region prior to discovery of Sitio Drago (see Figure 2.2). Linares and Ranere's excavations focused on middens within a 22x36-m area located 3 km inland. These middens contained intact stratigraphy representing domestic refuse disposal from AD 600 to 900 and are surrounded by smaller middens within a 1-km radius. Excavations produced a dense faunal assemblage, a variety of stone artifacts, and a small collection of ceramic sherds. The ceramic typology at Cerro Brujo divides the prehistoric occupation into two phases. The earlier (lower) phase contains Aguas Buenas and Bugaba style ceramic sherds, while the later (upper) phase lacks these styles, instead containing sherds representing Chiriquí-type vessels. The stone

Figure 2.2. Major archaeological sites in lowlands and highlands of western Panama and southeastern Costa Rica.

tools are identified as blades primarily used for hide working, and adzes and celts useful for clearing forest (Ranere and Rosenthal 1980). The bulk of data recovered from Cerro Brujo was faunal remains, consisting primarily of mollusks, fish, manatee (*Trichechus* sp.: Trichechidae), and terrestrial mammals. The prevalence of medium-sized mammals that favor disturbed habitats such as agouti (*Dasyprocta punctata*: Dasyproctidae), paca (*Cuniculus paca*: Cuniculidae), and armadillo (*Dasypus novemcinctus*: Dasypodidae) suggests a hunting pattern restricted to areas near hamlets and cleared fields (Grayson 1973; Linares 1976, 1977:309). Likewise, the abundance of sea turtle, mollusks from inter-tidal zones, and fish taxa that prefer rocky outcrops and shallow-water reefs (e.g., snook [Centropomidae], snapper [Lutjanidae], sea bass [Serranidae]) suggests a subsistence economy well adapted to local marine resources.

Based on their work at Cerro Brujo, Linares and Ranere concluded that the Bocas del Toro region was sparsely occupied by people who primarily practiced hunting, fishing, and shellfish gathering with supplementary crop cultivation (Linares 1974; Linares and Ranere 1980:66). The ceramic assemblage at Cerro Brujo lacked diversity in comparison to those recovered from contemporaneous sites, most notably Sitio Conte in the Central Pacific region and La Pitahaya in the Chiriquí highlands. Linares and Ranere (1980) interpreted this material culture assemblage, together with their characterization of the regional settlement pattern as small and diffuse, as evidence of an isolated, backwater occupation that had spread outward as an "adaptive radiation" from larger, more complex groups in central Pacific Panama. The adaptive radiation model postulated that people entered the Bocas del Toro region only after an eruption of Volcán Barú around AD 600. Determining the preceramic and formative origins of western Panama groups to be from central Panama suggested these people brought in foreign technologies rather than innovating their own. These broad interpretations allowed scholars of

Lower Central America to characterize the Bocas del Toro region as a remote settlement lacking interaction with outside influences (e.g., Gordon 1962, 1982; Haberland 1984; Linares 1979). The history of archaeological investigation in the area, particularly Gordon's discovery of dense faunal remains in middens at Chiriquí Lagoon, prompted directors of the Sitio Drago project to develop a research design based on systematic, comprehensive recovery of materials with fine mesh screens.

Discovery and Documentation of Sitio Drago

Except for brief exploration on nearby Isla Bastimentos (Brizuela 2006), further archaeological investigation did not take place in the region until Thomas Wake, director of the Zooarchaeology Laboratory at University of California, Los Angeles (UCLA) and Christina Campbell, professor of Anthropology at California State University, Northridge (CSUN), began exploring Sitio Drago in 2002 (Wake et al. 2004). In collaboration with Dr. Tomás Mendizábal, a Panamanian archaeologist and former director of Museo Antropológico Reina Torres de Araúz (MARTA), Wake and Campbell formed Proyecto Arqueológico Sitio Drago (PASD) with the goal of conducting systematic, fine-scale recovery of materials. From 2003 to 2012, members of PASD dug 51 1-x1-m excavation block units into middens at Sitio Drago (Figure 2.3). PASD crew also conducted archaeological survey and excavation elsewhere on Isla Colón; during the 2009 and 2010 field seasons a series of 20 1-x1-m test units were placed in scattered occupations identified on the surface in nearby forest surrounding Sitio Teca (Figure 2.4). PASD excavations follow a consistent recovery procedure; excavated soils are washed through 3-mm mesh screens, where large ceramic, stone, bone, and carbon specimens are removed from the screen and all remaining materials are bagged and labeled as "bulk midden." Studies have demonstrated that sorting midden in a laboratory setting, rather than at the screen in the field, significantly

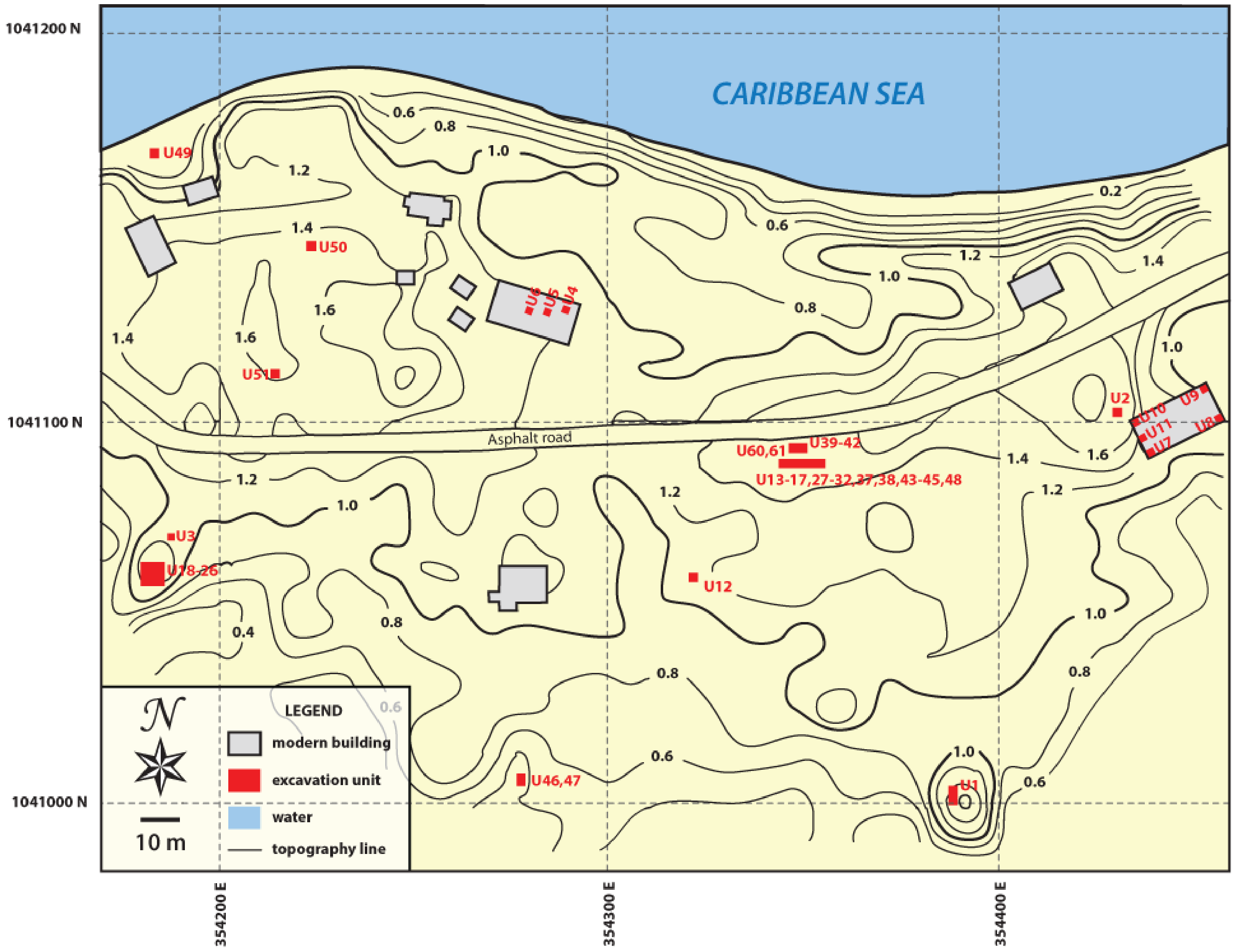

Figure 2.3. Map of Sitio Drago, located on the northern end of Isla Colón, with 100-m grid lines within Zone 17 P, projected on the WGS84 Geode (after a digital map surveyed and drawn by Hans Barnard, August 2006).

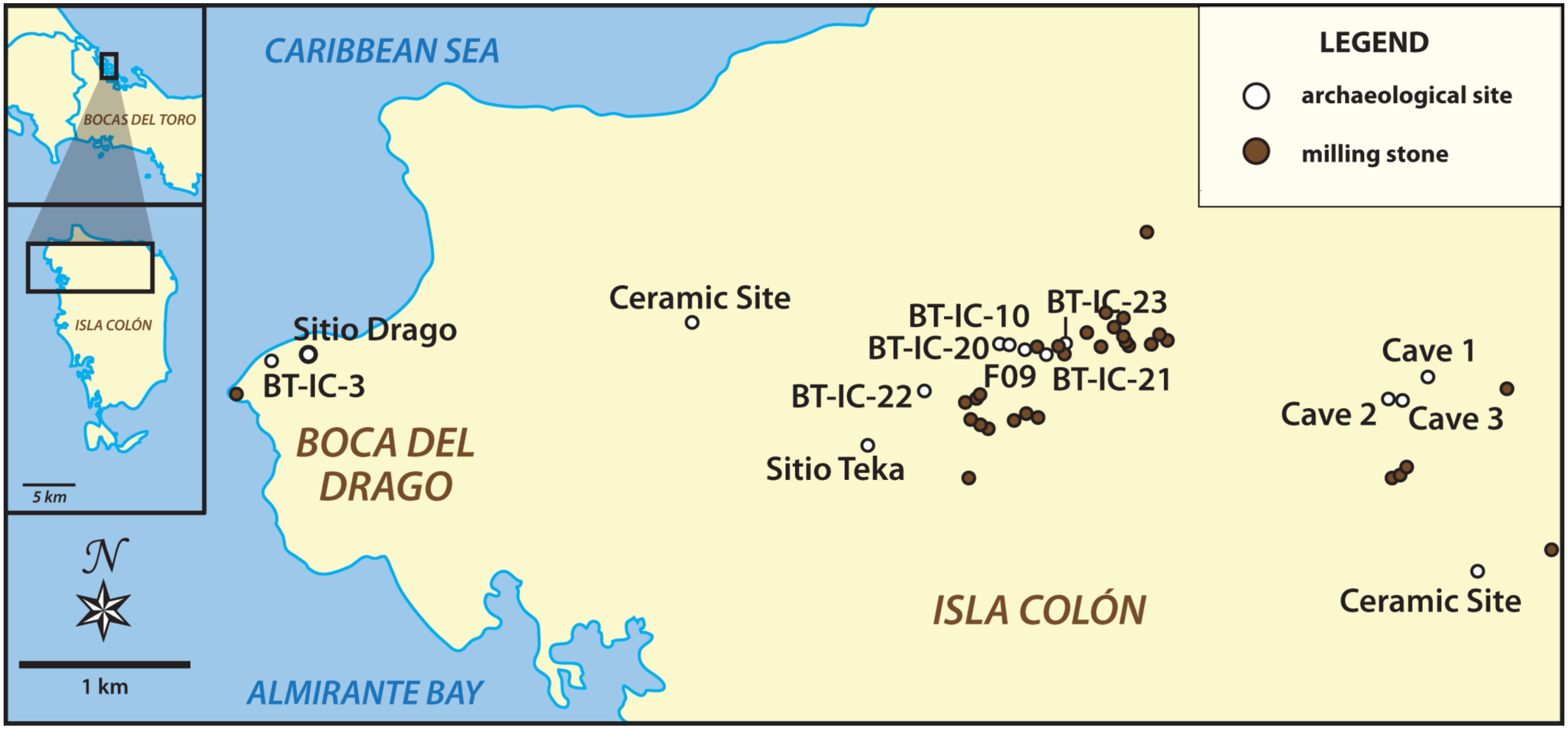

Figure 2.4. Location of archaeological sites and milling stones recorded on Isla Colón (after survey data collected by Michael Davis, summer 2009).

improves recovery rate of small materials such as beads, bone, and plant specimens (see Graesch 2009).

Initial survey and excavation conducted during summer 2002-2009 took place on property owned by the family of Don Aristides "Bolo" Serracín, a Bocatoreño of Spanish descent and retired employee of the United Fruit Company. The Serracín property includes 15 low mounds scattered over 18 ha. spanning AD 750 to present. These mounds include a cemetery used during the prehistoric and historic occupations of Boca del Drago. Excavation during summer 2012 took place on property owned by Alonso Iglesias, a Bocatoreño of Afro-Caribbean descent. The identified boundaries of Sitio Drago span both the Serracín and Iglesias properties; the latter contains middens with a particularly well-developed historic phase linked to the occupation of Sr. Iglesias' ancestors who settled there during the mid-1800s. Field crew returned to the Serracín property during summer 2014 to recover additional material from the artifact- and ecofact-rich midden contexts located adjacent to mortuary features. Plant and animal remains obtained from Sitio Drago contexts located on both properties are the focus of this study.

Remote sensing survey conducted in collaboration with Dr. Alexis Mojica, a geophysicist affiliated with Centro Experimental de Ingeniería (CEI) at Universidad Tecnológica de Panama, has enabled PASD crew to delineate site boundaries and identify possible tombs without the use of invasive recovery techniques. In the 2007 and 2008 field seasons, electrical resistivity mapping of a 1288-m^2 study area delineated several middens on the Serracín property. Field crew placed excavation units over several large groups of electrical abnormalities detected to a depth of 50 cm below ground surface (Wake et al. 2012:51). In addition, field crew conducted pseudo-three-dimensional tomographic imaging in the same study area. This technique, which obtains information about anomalies deeper than 50 cm below ground surface, detected a large abnormality between depths of 15 and 35 cm below surface (Wake et al. 2012:54). Anomalies detected with both methods are associated with archaeological features constructed of coral slabs for the interment of human remains. Excavation of these anomalies revealed tombs of four individuals (Burials 1, 2, 3, and 4).

Spatial Contexts and Occupational Phases on Isla Colón

Recent excavation and analysis of material from Sitio Drago provides evidence of a deeper and more complex prehistoric record than has been previously reported on the Aguacate Peninsula (Linares and Ranere 1980). In addition to Sitio Drago, PASD crew surveyed an approximately 60 ha. transect on the northern half of the island and identified several sites bearing diagnostic ceramic and lithic artifacts, including over 50 large (>100 kg) igneous milling stones that were transported via boat from nearby islands or the mainland. Several test units and three caves in the survey area produced radiocarbon dates ranging from approximately AD 60 to 1850 (Wake 2014:83). People occupied Isla Colón at least 500 years earlier than other known mainland sites in Bocas del Toro, suggesting the island was not, in fact, a remote uninhabited landscape.

Sitio Drago contains two main areas: a series of *domestic contexts* comprised of several low (2-3 m in height) middens along beachfront flats, and a *mortuary context* located near the center of the site, about 50 m from the eroding shoreline. The mortuary context contains middens surrounding a cluster of burials (Figure 2.5). Excavation reveals that these middens are elevated concentrations of domestic trash overlapping with scattered remnants of old occupation surfaces. The beachfront middens include remnants of relatively level surfaces and could have been constructed to keep residential structures above floodwaters. Middens contain dense accumulations of habitation debris, including plant, animal, and shell remains, ceramic

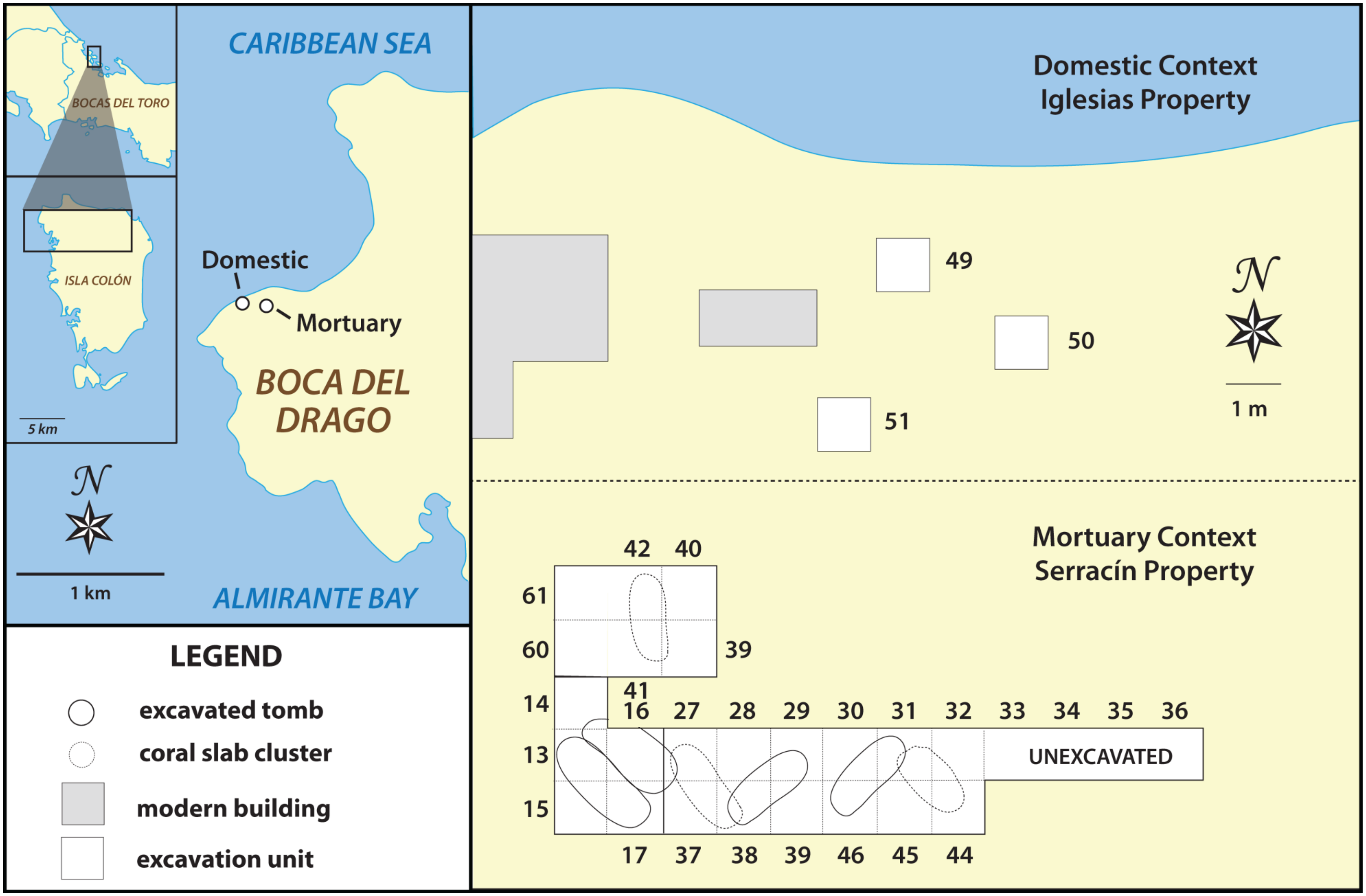

Figure 2.5. Location of excavation units and tombs in domestic and mortuary contexts at Sitio Drago.

fragments, broken stone tools, lithic flakes, worked shell and bone objects (Figure 2.6). Other than isolated teeth, no human remains have been found in these domestic refuse deposits (see Figure 2.5) (Wake 2006, 2008, 2010, 2014). Complete manos and fragments of manos and *flat metates* associated with milling seeds, carved from imported basalt, are present in both occupation phases (Wake 2014). Aside from numerous fish bones, the only direct evidence for fishing at Sitio Drago are "waisted" stone net weights. Most of these basaltic and limestone pebbles, which have a "waist" chipped or incised around the middle on which to tie a string, are lightweight but a few exceptionally heavy net weights have been covered.

Middens in the prehistoric mortuary area contain at least three tombs made of coral slabs. Each tomb contains an individual skeleton interred with sand and covered with additional coral slabs. Wake notes that "delicate placement" of a secondary burial between Tombs 1 and 2 provides evidence of collective "social memory of who is buried there" (2014:84). The area surrounding the tombs, today a field for cattle grazing and cultivation of fruit trees, bears midden containing an exceptionally wide array of well-preserved materials. Excavation of this area produced the largest, most diverse assemblage of ceramics in western Panama. Many of the recovered vessels represent ornate traded wares that tend to be associated with feasting events, including exotic fine-ware drinking cups and serving vessels, larger *ollas* (thick vessels associated with food storage), and cooking vessels broken *in situ*.

Analysis of materials recovered from all areas of Sitio Drago indicate two distinct prehistoric occupations, and 43 radiocarbon dates obtained from excavation units places formation of the site's deposits around AD 800 to 1900 (Wake et al. 2013; Wake 2014:83). The earlier phase of occupation, the Pre-Biscuitware Phase (AD 800 to 1200), is represented by a lens spanning the bottom of the archaeological deposit up to 30 cm below the ground surface.

Figure 2.6. Examples of decorative objects recovered from Isla Colón: shell beads carved as sea animal effigies (bottom, Sitio Drago), carved greenstone pendant (middle left, Sitio Teca), crocodile effigy carved from deer antler (middle right, Sitio Drago), and beads made of alligator teeth and marine shell (top, Sitio Drago). Photographs by Thomas A. Wake (2008).

Excavated strata have produced a wide variety of ceramic artifacts, dominated by locally produced utilitarian wares and Bocas Brushed wares (e.g., Kudarauskis et al. 1980, Linares 1980a). Bocas Brushed wares often have raised figures of marine organisms such as starfish, octopi, crabs, lobsters, fishes, dolphins, and birds applied to the shoulders and/or handles of the vessels (Figure 2.7). Present in assemblages associated with both phases, these rougher, thicker vessels have brown paste and temper of coarse sand or crushed stone temper. Decorations include red slip on rim with stripe patterns, brushed exterior, and plastic adornments of various marine and terrestrial creatures. An abundance of Bocas Brushed ceramics and small shell beads–the vast majority of which are from the mortuary area–are characteristic of this earlier Late Ceramic Phase at Sitio Drago.

The later occupation, the Biscuitware Phase, dates from approximately AD 1200 to 1450. In addition to distinct changes in soil, the later Late Ceramic phase at Sitio Drago contains an abundance of finer, high-fired, thin-walled Biscuitware ceramics (Linares de Sapir 1968). Biscuitware sherds, found only in the upper 30 to 40 cm of the deposit, are varying shades of beige with smooth bodies and appliqué decoration, including figurines at the shoulders and geometric designs applied on the neck (Figure 2.8). The Biscuitware ceramic tradition may represent vessels imported from the Pacific slope of Chiriquí or a locally produced variant (Wake et al. 2013:4). Most Biscuitware pieces recovered from Sitio Drago are restricted-neck vessels with detailed, low-relief plastic decorations of geometric shapes with tripod bases and, sometimes, legs with zoomorphic form. Biscuitware Phase deposits terminate around 10 to 20 cm below ground surface. A scatter of historic debris (ca. AD 1600 to 1900) is visible on the surface in some areas of the site. Radiocarbon dates obtained from post-Biscuitware ceramic-heavy deposits excavated from interior parts of the island date to post-contact (post-AD 1502),

Figure 2.7. Examples of Aguas Buenas ceramics recovered from Sitio Teca, including rims, plastic adornments, and hollow supports. Photographs by Thomas A. Wake (2010).

Figure 2.8. Examples of Bisquit Ware ceramics recovered from Sitio Drago, including rims, walls, and plastic adornments. Photographs by Thomas A. Wake (2008).

suggesting people continued to use an indigenous ceramic tradition well beyond initial European contact and settlement on the island.

Evidence of Political Interaction

This suite of evidence excavated from Sitio Drago suggests people living on Isla Colón were not isolated and had sufficient political clout in the supraregional trade network to manage exchange transactions. Further, people living on Isla Colón maintained enough political authority and control over labor organization to manage the requisite number of people and watercraft necessary to transport large boulders from the mainland to island hilltops. A watercraft industry represents a huge investment in procurement of materials and coordination of construction and maintenance of boats. Chiefs would need boats capable of hauling large cargo and sailing long distances in order to gain power through travel, trade, exchange, alliance-building, and commercial activities.

In addition to locally-produced ceramics, a number of regionally-diagnostic ceramics present in the Sitio Drago assemblage indicate that Bocas del Toro was part of a larger lower Central America trade and exchange network from at least 2000 to 500 years ago. High quality ceramic wares imported from great distances have not been identified at Cerro Brujo or other archaeological sites in the region. These imported ceramics are present in both the Pre-Biscuitware and Biscuitware Phase deposits. A variety of less common, high quality vessels, including Conte Polychrome and Macaracas polychrome sherds (Cooke 2012), recovered from the middens adjacent to the mortuary area are of styles associated with the Pacific coast of Panama from central Coclé to western Veraguas regions (Figure 2.9).

Among the whole serving vessels discovered smashed in situ, Irazú Yellow-on-Red sherds represent a ceramic style produced in central Costa Rica (Figure 2.10). Chocolate Incised

Figure 2.9. Examples of imported ceramics recovered from Sitio Drago: Conte Polychrome from the central Pacific coast of Panama. Photographs by Thomas A. Wake (2008).

wares are present mainly in the Biscuitware deposit, sourced to Chiriquí regions of western Panama and southwestern Costa Rica. Cups made in this style are composed of brown paste with fine temper and have hollow vessel supports in the form of standing mammal figures. Interestingly, these legs contain loose clay balls that produce a rattling sound when shaken or swirled. The many brown paste, fine temper sherds representing these vessels are associated with the Chocolate Incised ceramic tradition (Figure 2.11). Two ceramic styles, Mora Polychrome and Asiento Polychrome, present in Pre-Biscuitware assemblages are associated with northwestern Costa Rica and Pacific Chiriquí. A few sherds identified as Papagayo Polychrome and Mora Polychrome, styles made approximately 400 km away in southwestern Nicaragua, are found in the earlier phase deposits (Figure 2.12 and Figure 2.13; Wake et al. 2013:3-4).

Evidence of Environmental Impact

Detailed analysis of zooarchaeological remains forms a foundation for discussing temporal changes in population size and subsistence practices. Kay (2010) notes that a significant reduction in the mean trophic level of fish taxa, with a concurrent increase in density of terrestrial mammals, took place during the Biscuitware Phase. In comparison with the Pre-Biscuitware Phase, the Biscuitware faunal assemblage exhibits signs of a reduced diversity of mollusk, fish, and terrestrial fauna and substitution of desirable conchs and clams with less desirable taxa (Wake et al. 2013:16). Measurements of the West Indian fighting conch (*Strombus pugilis*: Strombidae) specimens recovered from Sitio Drago provide concrete evidence of overfishing by villagers after AD 1200. Harvested by people in the area for over 1500 years, specimens from earlier phases are significantly larger at sexual maturity than conch shells in both younger archaeological and contemporary populations. This difference translates to a 66% decline in meat yield from 7000 years ago to today (O'Dea et al. 2014:7). The significant

Figure 2.10. Examples of imported ceramics recovered from Sitio Drago: Irazú Yellow-on-Red from central Costa Rica. Photograph by Thomas A. Wake (2008).

Figure 2.11. Examples of imported ceramics recovered from Sitio Drago: Chocolate Incised Wares from the Chiriquí regions of western Panama and southwest Costa Rica. Photographs by Thomas A. Wake (2008).

Figure 2.12. Examples of imported ceramics recovered from Sitio Drago: Mora Polychrome from northwest Costa Rica (left) and Papagayo Polychrome from southwest Nicaragua (right). Photographs by Thomas A. Wake (2008).

Figure 2.13. Examples of imported ceramics recovered from Sitio Drago: Diquís Brushed from southern Costa Rica. Photographs by Thomas A. Wake (2008).

changes in the composition and size of aquatic taxa provide examples of environmental impacts caused by the long-term occupation of the island, continuous exploitation of marine resources, and increase in population size.

Results of Survey on Isla Colón and Nearby Mainland Locales

During summer 2010, PASD crew conducted excavation and survey on property owned by John Hubbard, president of the Golden Dragon Teak Plantation, located 2 km southeast from the Serracín property. Excavation of 15 1-x-1-m units at Sitio Teca, a 3-ha single-component site dating from AD 60 to 430, provides data for addressing the timing of settlement in Bocas del Toro. Deposits up to 40 cm below surface produced a collection of diagnostic ceramic specimens described as Teca Brown (n=78), Dragon Orange (n=82), and Bosque Incised (n=20) (Wake 2010). These ceramic sherds closely resemble the Bugaba/Aguas Buenas complex identified at sites in the Chiriquí highlands (Holmberg 2009; Palumbo 2009; Spang et al. 1980). Stone artifacts recovered from Sitio Teca are associated with crop cultivation and forest clearing, including 95 tool-quality flakes, 10 milling stone fragments, two chopper tools, two hammer stones, two digging hoe tangs, and one polished stone celt. In addition, survey crew documented 48 large ground milling stones within a 60-ha transect of land that had been cleared of native forest and re-planted with teak (see Figure 2.4 and Figure 2.14). Sitio Teca represents the oldest evidence of human occupation in Bocas del Toro and pre-dates Cerro Brujo and Sitio Drago. The ceramic and stone artifact assemblages suggest either direct or indirect social ties with Chiriquí highlands to import stone materials and ceramic technology (Wake 2010). One direction for future archaeological research on Isla Colón is to investigate a probable shift in political alliance or status from the Sitio Teca to Sitio Drago occupations. Interestingly, Sitio Teca bears the only greenstone artifacts recovered from the island, and *tumbaga* pieces have only been found in Sitio

Figure 2.14. Examples of large igneous mortars identified in the inland forest of Isla Colón. Photograph by Lana S. Martin.

Drago middens. This observation corresponds with a broad pattern throughout lower Central America, in which jade and greenstone are prized elite items until AD 500, when gold becomes the preferred material for display of wealth.

In 2010, pedestrian survey of a *finca*—a large rural farm, often kept in a family for multiple generations—located on the mainland near the Aguacate Peninsula revealed similar pre-Columbian cultural materials, supporting the notion that, by the Ceramic phase, villages were common along Caribbean coasts of eastern Costa Rica and western Panama (Haberland 1984). PASD crew conducted a one-day non-collection survey of Finca los Caracoles, a cacao plantation in Chiriquí Grande on a hill overlooking the mainland coast of Laguna de Chiriquí. Materials observed include large (~1 m in diameter) milling stones similar in appearance to those documented in Isla Colón forests, a smaller decorative metate carved with jaguar and human trophy head motifs, finished worked stone blades, and Bocas Brushed ceramic wares (Wake 2014, personal communication). While we lack radiometric dating of these materials, their similarity in form suggests an occupation contemporaneous with that of Sitio Drago. These observations point to a need for further documentation of the archaeological record in Bocas del Toro, particularly as deforestation and erosion threatens preservation of these deposits.

Recent Developments in Archaeological Research

Current efforts toward analyzing materials from Sitio Drago have focused on reassessing settlement and subsistence of Late Ceramic phase villagers. Most notably, Linares' (1977) interpretation of Cerro Brujo suggested that people in Bocas del Toro lived in small, socially isolated groups and experienced little sociopolitical change through time. Linares proposed that people in this area did not farm maize; rather, they cultivated tubers and fruits in a system that she termed *vegeculture* (Linares 1976, 1977). Numerous scholars have expressed skepticism about this characterization but lacked the empirical evidence necessary to engage in productive dialogue (see Lange 1984). Several notable trends in settlement and subsistence emerge from preliminary findings at Sitio Drago and imply a more dynamic narrative. The presence of ceramics imported from Costa Rica, Nicaragua, and the Pacific coast of Panama implies that villagers at Sitio Drago interacted at least indirectly with people in other regions of Lower Central America. The abundance of large milling stones and smaller lithic tools associated with plant processing suggests a long-term commitment to cultivation of maize and/or starchy root crops. Differences in ceramic types recovered from the two phases indicate a temporal shift in local ceramic technology and/or sources of regional importation during the Biscuitware Phase.

Although archaeological investigation of Sitio Drago has taken place for more than ten years and has involved completion of several theses and publications, a synthesis of prehistoric sociopolitical dynamics and environmental impacts remains incomplete. The small-scale nature of PASD investigations has necessitated frugal use of resources and time spent in the field. Detailed recovery of midden deposits has resulted in a backlog of several seasons' worth of unsorted materials, which are presently stored in Bocas del Toro. Excavation has primarily focused on routine disposal contexts; residential areas and lithic or ceramic production centers have not yet been identified. One challenge that remains is incomplete analysis of several important classes of archaeological remains. For example, the ceramic assemblage presently lacks a formal typology that could be used to establish relative chronology and more closely document interconnections between different areas. In addition, while the lithic assemblage promises particular analytical value, it remains to be examined. Because villagers were required to import all stone material from quarries or trade networks located off the island, identification of geochemical composition of lithics would provide key information about off-island sourcing of lithics and inter-regional trading.

Historical Developments on Isla Colón

Several substantial demographic changes have taken place at Sitio Drago, represented archaeologically in the upper levels of the Biscuitware deposit and some of the Historic Phase contexts. Historic reports suggest the supraregional network connecting chiefdoms across Panama during earlier times collapsed soon after European contact, resulting in more isolated local populations (Gordon 1982). These accounts are supported by the styles of ceramic sherds and ground stone artifacts documented on the mainland near the Aguacate Peninsula during the 2012 PASD survey. Unfortunately, the post-AD 1500 archaeological record at Sitio Drago is ephemeral in comparison to the prehistoric contexts. From the early eighteenth century AD onward, a series of major demographic changes on Isla Colón brought with them dramatic shifts in land use and ultimately produced the diverse community that is modern Bocas del Toro (Howard 2014).

During the eighteenth century AD, European pirates, buccaneers, and prospectors began using the islands in Bocas del Toro as hide-outs and ports to replenish supplies. At this time, four indigenous groups—the Doraces, Changuenas, Téribes, and Bribri—occupied the islands and, according to some accounts, continued to fish, hunt, and cultivate house gardens. Many of these groups disappeared after Europeans began controlling coastal areas and Spanish missionaries attempted proselytization. By the time the British set up trade centers in AD 1820, the Miskito people from the Mosquitia Kingdom on the coasts of Nicaragua and Honduras had raided Bocas del Toro and took slaves. The remaining groups appear to have fled the area. Ngöbe–Buglé people from the highlands of western Panama moved into the region, where they continue to live on unclaimed land today (Stephens 2008:66).

By the end of the nineteenth century AD, trade of coconut (*Cocos nucifera*: Arecaceae), cacao (*Theobroma cacao*: Malvaceae), sarsaparilla (*Smilax* sp.: Smilacaceae), vanilla (*Vanilla* sp.: Orchidaceae), turtle meat, and turtle shells, along with incipient banana (*Musa* sp.: Musaceae) plantations, put Bocas del Toro on the map. German settler Jochen Ludwig Heinrich Hein launched the famous banana industry in Almirante Bay and eventually operated a large-scale plantation exporting the commercially successful "Gros Michel" banana variant *(Musa acuminata* L. cv. 'Gros Michel': Musaceae) to purchasers around the world. Turn-of-the-century banana tycoons recognized the strategic position of Boca del Drago and, together with the Colombian government, constructed a canal running from Playa Drago to the Changuinola River. The sudden influx of laborers and business people necessitated municipal amenities; Bocas Town, on the southern end of Isla Colón, was established and became an active port town (Stephens 2008:67).

Construction of canals, railroads, houses, docks, and boardwalks during this time had a noticeable impact on the mangrove forests and reefs in various parts of Isla Colón, including Boca del Drago. Although malaria and yellow fever had become epidemic, and coconut disease, plagues of grasshoppers, and thrips destroyed fields of bananas and coconuts, the United Fruit Company (UFCO) acquired local operations in AD 1899. Subsequent intensification of banana cropping along the Changuinola River increased activity at the Drago port. In AD 1916, an earthquake with a magnitude of 7 heavily damaged Bocas del Toro properties and led to UFCO withdrawing operations from the area. Farmers who acquired the plantations began growing cacao to replace diseased bananas (Stephens 2008:68). The sudden decline in large-scale commercial activity resulted in abandonment of land or, sometimes, distribution of parcels to former employers of the banana companies.

The Bocas del Toro archipelago was not accessible by car until AD 1982, when oil tanker access prompted the first road to be built through Chiriquí Grande to Almirante Bay. Around this time, the Smithsonian Tropical Research Institute (STRI) established a research station on Isla Colón and declared Bocas del Toro the “Galapagos of Panama” in efforts to raise awareness of the need to protect the local environment. Tourism boomed during the late twentieth century AD. Today, people of Ngöbe–Buglé heritage practice small-scale horticultural farming, tree-cropping, and commercial organic cacao farming, while Panamanian landowners raise cattle in cleared fields on Isla Colón and the mainland. The area surrounding Sitio Drago has developed into a small residential area, with approximately eight households and one restaurant that serves tourists who come to Playa Drago.

CHAPTER III

RECONSTRUCTING SUBSISTENCE ACTIVITIES AT SITIO DRAGO

Introduction

Human interactions with plant and animal communities were recognized early in the history of the natural and social sciences. Historians, geographers, and anthropologists of the nineteenth and early twentieth centuries constructed narratives of past hunting, fishing, foraging, and cultivation activities based on historic documents and contact with indigenous peoples practicing what scholars considered to be traditional lifeways (Fried 1952; Lowie 1954; Redfield 1934; Sauer 1925, 1952; Wissler and Weitzner 1922; Woodbury 1959). Mid-twentieth century anthropologists and ecologists viewed human cultural developments and subsistence strategies primarily as adaptations to the physical environment. Julian Steward (1902-1972) distinguished "cultural" from "biological" ecology and viewed the "natural" environment as a major contributor to human social organization (Steward 1949, 1950, 1953).

During the 1960s, a generation of anthropologists who sought to make archaeology a truly scientific discipline ushered in the "New Archaeology" movement (Bayard 1969; Bettinger 1980; Binford 1962, 1977, 1978, 1981; Gould 1977; Schuyler 1970; Wilson 1975). The subsequent rush of technological innovation and development of deep respect for the scientific method led to more precise recovery of faunal and floral remains. Over time, improvements in recovery and analysis of ecofacts have increased the abundance and richness of archaeobotanical and zooarchaeological data (Cwynar et al. 1979; Ford 1979; Grayson 2014; Hastorf 1999; Hastorf and Popper 1988; Lyman and Cannon 2004; Madella et al. 2015; Marston et al. 2014;

Miksicek 1987; Minnis 1981; Pearsall 1982; Piperno 2006; Reitz and Wing 2008; Thomas 1996; VanDerwarker and Peres 2010).

These developments have impacted our perceptions of pre-Columbian life in the Neotropical forest. Traditional historical, geographical, anthropological, and archaeological perspectives on native Amazonia, for example, viewed tropical rainforests as a limiting factor on social development (e.g., Meggers 1971). The shared perspective that poor environments—landscapes lacking fertile soils and readily-available, year-round protein sources—produce only simple societies is rooted in the assumption that these non-state people cannot alter the environment to improve productivity and support dense populations. Updated perspectives on the ancient past emerge from dialectical interaction of new methods, discoveries, and ideas (Hastorf 1999; Marston et al. 2014; VanDerwarker et al. 2016). Recent archaeological work in the Neotropics is a perfect example of this iterative process; our recent ability to empirically document domesticates from microscopic analysis has pushed back the known date of plant domestication and landscape impacts (Pearsall 1978, 1994; Piperno 1994; Piperno and Jones 2003; Piperno et al. 1985, 1990, 2000, 2009). These discoveries unleashed an avalanche of research projects aimed at understanding human activities that have created, transformed, and managed landscapes through complex, long-term interactions (e.g., Baleé and Erickson 2006; Denham et al. 2009; Erickson 2003; Heckenberger 2008, 2014; Iriarte et al. 2004; Iriarte et al. 2012; Stahl 2008). Key advancements in field and lab techniques, together with a new emphasis on human agency in tropical landscape transitions, make this dissertation project a possibility.

This chapter explains how samples used in this dissertation project were obtained, processed, and analyzed. For this project I used archaeobotanical and zooarchaeological data obtained from five loci excavated at Sitio Drago during the summers of 2012 and 2014, following a strategy I developed to mitigate common problems of tropical archaeobotanical recovery (see Hather 1994). These samples went through several stages of processing and analysis. First, field crew members excavated samples as part of a long-term archaeological project conducted on Isla Colón (Wake 2014). Next, all screen residue samples, floated macrobotanical samples, and sediment samples were exported to UC Berkeley, UCLA, and UC Santa Barbara, and were processed and examined by several archaeologists. This stage relied on standard paleoethnobotanical methods (Hastorf and Popper 1988; Marston et al. 2014; Pearsall 2001; Piperno 2006) and zooarchaeological methods (Lyman 2008; Reitz and Wing 2008; VanDerwarker and Peres 2010). The final stage of analysis involved my use of numerical and statistical analyses for identifying patterns in data that are not readily visible in the raw counts and calculated densities. I paid particular attention to patterning in data from the two prehistoric Phases in order to identify potential change in plant and animal food procurement accompanying demographic shifts taking place during the Biscuitware Phase.

Issues of Recovery and Preservation Bias

Accurate interpretation of patterns in archaeobotanical assemblages relies on an understanding of preservation and recovery biases. Human activities related to plant use and environmental factors determine what types of plants we can expect to be preserved. Prehistoric seeds are introduced to the archaeological record through direct resource utilization (e.g., collecting, processing, consumption), indirect resource utilization (e.g., non-food plants used for fuel or construction), and environmental factors not related to human activities (e.g., seed rain) (Gallagher 2014; Henry 2014; Minnis 1981:145; Pearsall 2014). Recovery of caches of stored, uncooked seeds is rare and requires an exceptionally arid environment for preservation of these uncarbonized materials (Miksicek 1987:224). More commonly, archaeologists recover plants from primary and secondary refuse contexts. Primary refuse contexts contain plants disposed during processing and cooking activities (Raviele 2011). Plants that are eaten whole are less likely to have carbonized parts appear in the archaeobotanical assemblage. Plants that are processed through removal of inedible parts (e.g., nuts and maize [*Zea mays*: Poaceae]) are more likely to be represented in discard contexts since inedible portions of the plant are routinely burned and disposed of in a consistent manner (Miksicek 1987:225).

Plants typically preserve best in anaerobic environments or in conditions with consistent levels of temperature and moisture that limit organic decomposition and mechanical damage (Antolín and Buxó 2011; Lancelotti et al. 2010; Miksicek 1987). Natural formation processes affecting preservation of carbonized plant remains include mechanical, bacterial, and chemical destruction, as well as bioturbation (Miksicek 1987:230-231). Mechanical destruction is most significant in regions where seasonal fluctuations in temperature and precipitation cause soils to expand and contract, increasing fragmentation of plant remains. Carbonization of plant remains minimizes risk of organic decay, but floral specimens are still subject to degradation from bacteria and chemical properties in soil (Gasser and Adams 1981; Haslam 2004). Insects, worms, and burrowing rodents can further disrupt the archaeobotanical assemblage by removing seeds, directly damaging specimens, or mixing different cultural deposits. These factors have varying degrees of impact depending on the environment; generally, natural formation processes are more destructive in humid mesic or tropical locales and less destructive in arid desert or highland locales (Clement et al. 2003; Reitz and Shackley 2012).

Conducting paleoethnobotany in the Neotropical lowlands can be a challenge due to high species diversity and relatively poor preservation of archaeobotanical remains (Hather 1994; Pearsall 1995). The high biodiversity measure of plants in the tropics is tied to a greater degree of phenotypic plasticity. This wide range of morphological variation within species results in seeds that are more difficult to identify in comparison to modern comparative collections. Humidity, expansion and contraction of soils, and biotic agents all contribute to forming an archaeobotanical assemblage that is heavily fragmented and difficult to identify. However, a combination of field and laboratory procedures can mitigate these challenges (Hageman and Goldstein 2009; Lentz 2000; Pearsall 1995). A blanket sampling strategy provides the most accurate representation of prehistoric plant use by collecting a sample of the same size (in soil volume) from every unit and level excavated (D'Alpoim Guedes and Spengler 2014; Jones 1989; Toll 1988). This standardized sampling strategy is especially important in tropical environs, where preservation of archaeobotanical materials can be poor (Pearsall 1995:118).

Since the 1970s, water flotation of archaeobotanical remains has been the primary method of recovering plant specimens from archaeological sediment (Chapman and Watson 1993; Toll 1988; White and Shelton 2014; Wright 2005). Flotation yields more seeds than wet or dry screening, with a 90% to 100% recovery rate using the *poppy seed recovery test* (Wagner 1988:20-21). However, the effectiveness of flotation is dependent on soil matrix, and sampling strategy may need to be adapted to local matrix (Chiou et al. 2013; Hageman and Goldstein 2009). Soils from shell-bearing middens, even in the tropics, may be sandy enough to disperse during the typical 15 to 20 minute standard flotation phase (Pearsall 1995:116). Clayey, moist soils are particularly troublesome as they adhere to carbonized specimens. During dry sieving, charcoal caked with clayey matrix is difficult to detect visually and tend to fragment to a great degree. Further, saturated carbon is unlikely to float and may settle in the heavy fraction screen during flotation. Due to these conditions, it became necessary to increase sediment sample volume, deflocculate samples by adding detergent, and use a finer heavy fraction mesh size during excavations at Sitio Drago in order to obtain adequate archaeobotanical sample size.

Field Methods

The samples used in this study were obtained from two sources: vertical column samples and floral and faunal materials trapped by screens during the excavation of midden deposits. Proyecto Arqueológico Sitio Drago (PASD) field crew and participants in the Sitio Drago Field School excavated the column samples and midden deposits examined in this dissertation during summers 2012 and 2014.

General Excavation Procedure

PASD director Thomas Wake designed general excavation procedures to maximize recovery of smaller artifacts and ecofacts. In so doing, we aim to compensate for the higher degree of fragmentation and degradation common among materials excavated in Neotropical contexts. Following standard project procedure to ensure consistency across excavation seasons, 2012 and 2014 crews systematically excavated the midden deposits from all seven units using 1-x-1-m units hand-dug by trowel in arbitrary 10-cm levels. When excavators encountered clearly defined cultural lenses, they changed to digging natural levels of various depths. Crews then wet screened all excavated sediments using 3-mm mesh. Although wet screening can contribute to fragmentation of wood charcoal and large carbonized plant specimens, it is necessary at Sitio Drago due to moist, sandy soils. Prior attempts at dry screening have revealed that a layer of fine sediment adheres to artifacts and ecofacts recovered from the screens, obscuring them from accurate viewing in the field.

Ceramic artifacts, some stone artifacts, shell, and bone were all gently washed with water, dried, and cataloged. However, field crews are instructed to leave potential cutting, scraping, and milling implements unwashed in order to allow future examination of starch, phytolith, and lipid residues. Field crew bagged all materials recovered from the screen, including small fragments of shell, rock, and bone. Staff and field school students later washed (again through 3-mm mesh) and dried the shell concentrations. Crew sorted these cleaned bulk samples into categories of broad material types in the field lab. Saving bulk midden materials greatly increases the number of recovered shell beads and faunal specimens such as fish and small rodent bones. At the end of each field season, Sitio Drago project directors export all sorted floral and faunal remains to the UCLA Zooarchaeology and Paleoethnobotany laboratories in the Cotsen Institute of Archaeology for analysis during the upcoming academic year.

Flotation Sampling

All light and heavy fractions examined in this dissertation derive from flotation sampling of Units SD-49, -50, and -51 excavated at Sitio Drago during the 2012 field season, and Units SD-60 and -62 excavated during the 2014 field season. To ensure adequate size of the archaeobotanical assemblage for analytical purposes, I increased sample volume from the standard 2-3 liters each to 6.5 liters each. Two vertical columns were excavated in 30-x-30-cm block units from walls of closed units, following the arbitrary and natural levels established during bulk excavation. This comprehensive blanket sampling strategy is recommended by paleoethnobotanists to facilitate comparison between different archaeological contexts and to identify biases created by cultural and natural formation processes (Celant et al. 2015; Lennstrom and Hastorf 1995; Pearsall 2001). To improve consistency in sample volume, and, by proxy, minimize recovery rate unevenness in data representing different contexts, I double-checked *in situ* measurements of soil volume with calibrated bucket measurements (Wright 2005:21).

Following excavation, I processed all flotation samples in the field using a self-constructed hand-pump flotation tank (Shelton and White 2010), a system that demonstrates high recovery rate using the poppy seed recovery standard (Wagner 1988:127-128), requires no electricity to operate, and recycles tank water without cross-contamination of samples (Figure 3.1). This flotation system allows efficient processing of large sediment samples while offering a clear view of tanks to ensure minimal loss of specimens. Soil samples were poured into the 45-gallon water-filled main tank and separated into light and heavy fractions using a 0.75-mm screen. Hand-pumping water upward into the heavy fraction mesh directs buoyant light fraction materials into a sluice, where they are collected with chiffon net. I integrated detergent in tank water as deflocculate to encourage suspension of buoyant particles and the breakdown of any clayey matrix. Approximately 20 to 30 minutes of water circulation were required to allow low-density plant material to float to the top and high-density plant material to rest in the heavy fraction while sediments settled at the bottom of the water tank. Once the water had been visibly cleared of plant materials, I removed the heavy fraction and light fraction and hung them on a line to dry in chiffon nets labeled with provenience information.

Laboratory Methods

In order to identify plants and animals in Sitio Drago middens, I processed and analyzed all ecofacts recovered from hand-picked wet-screened samples, light fraction floated samples, and heavy fraction floated samples. I identified and quantified macrobotanical specimens at UCLA following the 2012 and 2014 field seasons. Dr. Wake identified the bulk of faunal specimens obtained during summer 2012 excavations. Dr. Wake and I processed all other vertebrate remains at UCLA from August 2014 to January 2015. Combined with Dr. Wake's extensive zooarchaeological research at Sitio Drago over the past decade (O'Dea et al. 2014;

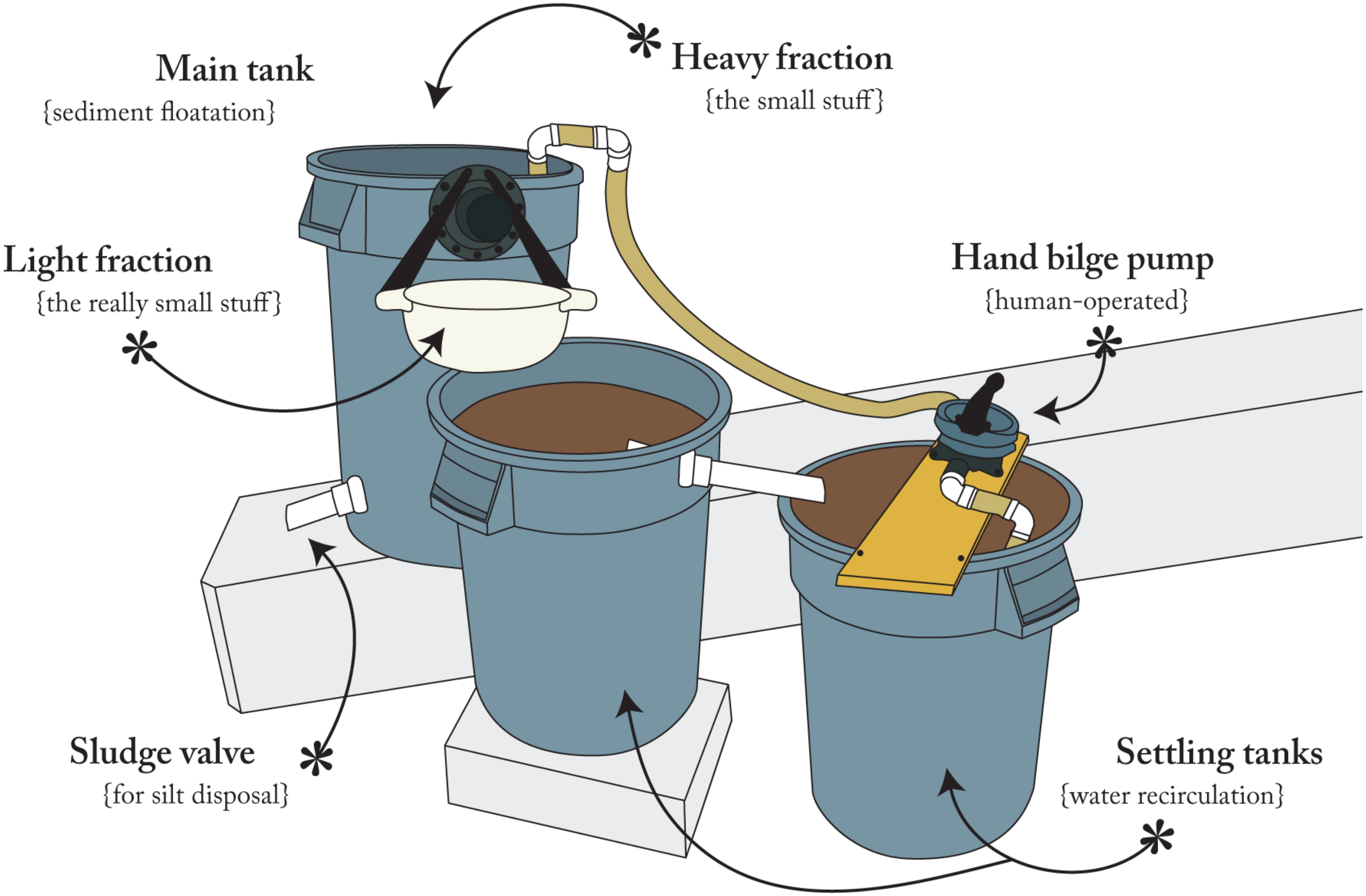

Figure 3.1. Schematic for hand-pump flotation system used in recovery of floral and faunal remains from sediments excavated at Sitio Drago during the summers of 2012 and 2014. Illustration by Lana S. Martin.

Wake 2004; Wake et al. 2004; Wake et al. 2013), these collective efforts have produced the largest archaeobotanical and zooarchaeological assemblages from western Panama to date.

Macrobotanical Methods

Fragments of seeds, nutshell, rinds, and corms provide the most relevant data for discussing diachronic patterns of farming and foraging (Fritz and Nesbitt 2014). Separating light and heavy fractions into groups sorted by particle size provides data important for assessing and comparing biases in recovery methods. Paleoethnobotanists usually sieve light fractions for a detailed examination of buoyant plant parts and scan the heavy fractions for presence of non-floating charcoal. However, carbonized plant remains in tropical midden contexts are typically water-logged and non-buoyant. Since saturated carbon specimens settle in the heavy fraction, I sieved and thoroughly sorted materials from both the light and heavy fractions. In order to compare catchment of light and heavy fractions, I separately recorded counts and weights of materials from the samples.

I systematically sorted all light and heavy fractions using a series of nested sieves, then bagged and labeled identified and unidentified specimens with provenience information. I poured the dried light and heavy fractions through a series of nested screens (2.0, 1.0, and 0.5 mm). The size-separated samples were then hand sorted using a binocular microscope (10-40X). Bone, ceramic, lithic, metal, glass, and carbonized plant materials were collected from 2-mm screens, while only carbonized plant materials were collected from 1- and 0.5-mm screens. Remaining materials, comprised of sediment concretions, gravel, and shell fragments, were collected and labeled as "midden fill." I disposed of modern plant remains, rootlets, and fine sediments. Finally, I recorded weights of material types, along with provenience information, to facilitate comparison of midden composition and recovery effectiveness.

Carbonized plant remains from all light and heavy fractions were further sorted morphologically, following a procedure similar to the one outlined above. I separated fragments of identifiable seeds, nutshell, rinds, and corms into categories based on similarity of appearance. I identified all carbonized plant remains to the taxonomic level of genus and family, when possible, through the use of images available through references (Dickau 2005) and comparative plant and seed collections housed at UCLA and the Smithsonian Tropical Research Institute (STRI) laboratory in Panama City, Panama while under the supervision of Dr. Wake. If the seeds were not classifiable they were noted as "unidentified seed" or "unidentified plant fragment." I grouped unidentifiable seed types of similar shape and morphology, assumed to belong to the same genus, and labeled them numerically (e.g., "Unknown 1"). Sets of taxa from each sample were weighed, counted, recorded, and packaged in 1.5-ml polypropylene microcentrifuge tubes, accompanied by a small piece of paper containing a unique bulk lot number and taxon information.

Wood charcoal analysis can enable reconstruction of tree wood availability and inference of peoples' preference for types of building and kindling materials (Asouti and Austin 2005; Marston 2009, 2014; Théry-Parisot et al. 2010; Thompson 1994; Yarnell 1982:6). Although a detailed identification and analysis of wood charcoal from these samples is not feasible during the completion of this dissertation, I separated wood charcoal into general monocot (e.g., palms [Arecaceae]) and dicot (e.g., *Ficus* sp. [Moraceae]) tree wood categories. Wood charcoal and carbonized amorphous plant fragments were weighed, recorded, bagged, labeled with provenience information, and set aside for future analysis.

Zooarchaeological Methods

Analyses of preserved bone from middens provide baseline data that allow us to assess hunting and fishing activities at Sitio Drago. Results of zooarchaeological analysis can demonstrate ancient peoples' preference for cleared-edge versus closed-canopy forest species, shedding light on the relationship between farming, foraging, and hunting in the local subsistence economy (Emery 2004; VanDerwarker and Peres 2010; Wolverton and Lyman 2012). For this project, Dr. Wake and I analyzed faunal remains recovered from the levels and units corresponding with the flotation samples. We recorded elements represented, taxonomic identification (to the level of genus and family, when possible), and specimen count (see Reitz and Wing 2008:158). Dr. Wake and I identified specimens from Units SD-60 and -61 using the comparative animal bone collection housed at the UCLA Zooarchaeological Laboratory. We noted faunal specimens not classifiable to element or taxa as “unidentified bone” or “unidentified faunal fragment.” I recorded primary data on paper tags and specimens were bagged separately by element, and then entered the data into a spreadsheet.

Paleoethnobotanical Analysis

After I completed all identifications of all plant remains from flotation samples and screen residue samples, I entered count totals, but not weights, into a series of spreadsheets. Aside from wood charcoal, weight of plant parts is noted to be insignificant to assessing archaeological seed remains (Pearsall 1982). I summed totals for each taxonomic type by level, unit, and site. Then I assigned unique specimen numbers, sample numbers, and associated cultural time phases. Next, I entered sediment sample volume measurements (recorded on sample labels) to standardize seed counts per liter of soil. Further, I produced graphs comparing relative abundance and densities of plant types across spatial and temporal contexts. These measures allow me to establish a baseline record of the palms, tree fruits, and cultivated foods that Late Ceramic phase occupants procured.

Absolute Counts and Weights

The simplest way to represent identified archaeobotanical remains is with the absolute counts and weights of seed fragments present in each sample. Weights have been shown to provide less accurate quantity data then counts, leading many paleoethnobotanists to base subsequent statistical analysis on counts (Pearsall 2001:223). In addition, absolute measures of paleobotanical data do not offer the same detail we associate with other forms of archaeological materials. Zooarchaeologists, for example, are able to quantify faunal fragments in a collection by calculating the Minimum Number of Individual (MNI) and the Number of Identified Specimens (NISP) (Grayson 2014:51; Reitz and Wing 2008:206). Similar standardized procedures for dealing with floral fragments have not yet been developed due to the relatively few anatomical features present on seeds (Wright 2010:51). Given the challenges of teasing apart formation processes involved in the carbonization of seeds – accidental or intentional charring, for example – it is difficult to infer specific events or activities from their rate of occurrence (Wright 2010; Yarnell 1964).

Ubiquity Indices

The presence-absence analysis (ubiquity) of plant taxa provides an overview of plant resource availability through time and space. *Ubiquity* of plant taxa is a semi-quantitative description of paleobotanical data, defined as the number of samples in which a particular taxon is found, calculated on a dataset with at least 10 samples (Jones 1991a, 1991b; Marston 2014; Wright 2010). The visual representation of ubiquity involves a table with an indicator of presence (often an “x” or check mark) of taxa in a column divided by rows representing different time phases or regions. Often presence is expressed as a relative frequency (percentage), a figure obtained by dividing the number of samples in which the taxon is present by the total number of samples in the collection. The threshold of "presence" can be raised by relying on a higher set range of percentages, a clause useful when dealing with complicated datasets. Taxa present with a ubiquity value of less than 5% are likely to have ended up in the assemblage accidentally; a higher ubiquity value more strongly suggests the seeds were introduced into the archaeological record through cooking and eating activities (Pearsall 2001; VanDerwarker 2010; Van der Veen 2003). Ubiquity values can also be used to assemble resource rankings and to administer further statistical analyses.

Assessment of Individual Taxa

Summarizing the distribution of individual taxa is useful for showing variation in abundance of particular plant types in different phases or spatial contexts. Following VanDerwarker (2006) and Scarry (1986), I use box plots (see also McGill et al. 1978; Scarry and Steponaitis 1997) to assess distribution of individual taxa during each phase. Box plots visualize the actual archaeobotanical data, and the charts display medians and dispersions around medians rather than means. Mean values may or may not transparently represent actual values in the data; an uneven distribution of values may skew mean values and lead to inaccurate interpretations. As such, the purpose of the box plot is to summarize a distribution of data and show all the data values that compose the distributions. Here, I use the MYSTAT 12 statistical program to produce notched box plots with hinges representing the 26th and 75th percentiles of distribution of values in the assemblage. In doing so, box plot charts allow us to assess potential statistically significant changes in plant taxa abundance.

Ratios

Interpretations of preference for particular plant foods are usually based on ratios of weighted plant fragment counts. Ratios rely on standardized archaeobotanical data and allow more flexible comparisons across different sample sizes and depositional contexts, even different categorical groupings of taxa (Miller 1988:71-72). Three types of ratios common in paleoethnobotany are densities, percentages, and comparisons. Densities represent the amount of carbonized material to sediment volume in a sample, telling us about the concentration of plant remains in the archaeological deposit. Percentages represent the amount of a particular seed taxon compared to the number of total identified seeds in a collection. These ratios can reveal rankings of taxa prevalence in a collection. Comparisons represent ratios of mutually exclusive categories – for example, taxon, groups of taxa, or types of carbonized materials such as seeds versus wood charcoal (Marston 2014; Miller 1988). Ratios are typically represented with bar graphs or dot charts that provide a simple visualization of findings.

Assessment of Diversity

Archaeobotanists are often interested in determining the species diversity of the plant assemblage. A comparison of species diversity among different phases can reveal patterns in the composition of plant types procured, and change in diversity of an assemblage can be tied to shifting subsistence strategies (e.g., Bonzani 1997; Lindborg and Eriksson 2004; Van der Veen 2008). Species richness (the number of taxa present) provides an indicator of the range of resources people sought, but in many human systems the subsistence regime is skewed toward a particular subset of taxa (i.e., the assemblage is unevenly distributed). Samples with an even distribution of density values among taxa are considered more diverse than samples containing the same number of taxa but disproportionally high abundance of a few taxa. An assemblage with high evenness is indicative of a diverse plant exploitation economy in which people utilized the landscape in a broad pattern.

Diversity statistics are influenced by variability in sample sizes, which is a problem that archaeologists commonly encounter. In order to examine the effects of sample size variation in my study, I use DIVERS, a statistical program that Keith Kintigh designed to measure the diversity of assemblages of different sample sizes (Kintigh 1984, 1989, 1991). The DIVERS Monte Carlo diversity/sample size analysis calculates richness and evenness (H/Hmax) dimensions of diversity for a given data set. In order to control for influence of inconsistent sample sizes within the population, the DIVERS program uses the Monte-Carlo method to derive expected diversity for a model distribution over a range of sample sizes (Kintigh 1984, 1989). Once expected distribution has been calculated, the program randomly draws samples of different sizes from the total population to determine the richness we should expect for any given sample size. Here, I plot actual values against a 95% confidence interval that is based on the randomly generated expected values. The program enables us to assess when differences among assemblages are likely to be due to real changes in ancient behavior, rather than just differences in sample size. In addition, I calculated richness as an overall diversity index (H') and equitability (V') of the archaeobotanical assemblage using the Shannon-Weaver (or Shannon-Weiner) Index (Lentz 1991; Lepofsky and Lertzman 2005). Both H’ and V’ values are visually depicted in a series of bar graphs in order to clearly compare trends in diversity measures across time.

Zooarchaeological Analysis

Although Dr. Wake and colleagues have produced numerous reports of animal procurement and prehistoric human impacts on local fisheries at Isla Colón (O’Dea et al. 2014;

Wake et al. 2013), analysis of the faunal assemblage procured alongside this project's floral assemblage expands our discussion of landscape alteration. After identifications of all animal remains from screened and heavy fraction samples were finished, I entered primary data, the Number of Individual Specimens (NISP), into a series of spreadsheets. Secondary data collection consists of indexing and quantifying the primary data according to relative frequencies of taxa, dietary contributions, and procurement strategies (see Reitz and Wing 2008:202). Calculating the Minimum Number of Individuals (MNI) representing taxa in each sample facilitates comparison of relative frequencies across contexts. The MNI is calculated by tallying bone elements in a parsimonious fashion; the greatest number of the same element (e.g., left femur) in an assemblage is the smallest possible number of specimens that can be represented.

Both NISP and MNI values are useful in estimating taxonomic abundance and producing visual summaries of the faunal assemblage. Constructing categories of procurement strategies provides an estimation of the structure, locale, and seasonal timing of past peoples' hunting and fishing activities. I created qualitative categories of procurement strategy based on niche preference of prey; for example, hunting of cleared-edge versus closed-canopy forest mammals, catching of near-shore versus off-shore fishes. I developed these categories using ethnographic and ethnohistoric accounts of indigenous hunting behavior in the western Caribbean Panama region (Castillero Calvo 1995; Cusack and Dixon 2006; Linares 1976; Smith 2003, 2005). Tables of data and ratios visualize relative abundance of taxa and suggest preference for animal class (e.g., mammal, fish, amphibian) and prey attracted to specific habitats. Additional statistical analyses—including ratios and assessments of diversity—follow protocol described in the previous section of this chapter.

Examination of Formation Processes

Articulating the formation processes at midden sites provides important context for subsequent interpretation of archaeobotanical and zooarchaeological data. Archaeologists who examine the circular shell middens associated with hunter-gatherers in the Southeastern U.S. have developed three broad categories for anthropological interpretations of middens (Thompson 2007). The “general accumulation” model characterizes mounds as the gradual accumulation of habitation debris and food debris formed by permanent or semi-permanent habitation. We expect to see a consistent pattern of material deposition across space and time and, perhaps, evidence of residential structures and hearths. A “ceremonial” midden is formed through deposition of trash during short-term feasting episodes and/or intentional monument construction. These mounds were built relatively rapidly and lack evidence of trampling, surface fires, and artifacts. A third model views shell-bearing middens in the Southeastern U.S. as a combination of routine habitation and episodic ceremonial activities. Such mounds have a spatial arrangement of both accumulation types described above, with certain areas of the mound containing a larger volume of shell and food remains associated with high status (Thompson 2007:91-92). The driving purpose of mound development, of course, may change through time.

By comparing the densities of food debris and artifact types, we can gain some insight into the human activities that formed a trash heap. If middens at Sitio Drago were formed as debris accumulated beside residences, we expect to see differences in the artifact assemblage in different areas of the midden and through different time phases. While shell count and weight was not recorded during the 2012 excavations, I recorded weights (in grams) of the seven main categories of materials recovered from prehistoric and historic middens at Sitio Drago: bead, bone, ceramic, ferrous metal, glass, lithic, and plant parts. Even without an assessment of shell volume, comparison of these material types demonstrates continuity or discontinuity in activities forming these mounds. This study examines patterns in the seven categories of archaeological materials recovered from Units SD-49, -50, and -51 heavy fraction flotation samples. (Heavy fraction materials other than faunal and floral remains from Units SD-60 and -61 have not yet been sorted and cannot be included in this analysis.) It is important to note that I sieved heavy fraction materials through 1/8” mesh prior to exportation. Thus, weights presented here do not include heavy fraction sample fragments smaller than the 1/8” mesh size; these tiny materials are presently in storage at the STRI research station on Isla Colón. In addition, an assessment of midden composition for units excavated alongside the prehistoric cemetery (Units SD-60 and -61) is not possible as those materials have not yet been sorted.

Comparison of Time Phases

Differentiation of midden material composition across time phases would suggest changes in disposal as growth of population and re-networking of political ties took place during the Biscuitware Phase. I generated a series of bar graphs comparing the relative percentage of seven major material types in grams across the Pre-Biscuitware (AD 800 to 1200), Biscuitware (AD 1200 to 1450), and Historic (AD 1600 to 1900) phases from Units SD-49, -50, and -51 combined (Figure 3.2; Table 3.1 and Table 3.2). Ceramic sherds represent the vast majority of materials by weight recovered from heavy fraction, and consistently dominate the material types across time phases. Since this figure visually obscures patterns in material categories with much smaller frequency, I eliminated ceramics and generated a similar set of graphs comparing the relative percentage of the remaining six major material types (Figure 3.3). Bone increases from 45% of weight in the Pre-Biscuitware Phase to 60% of the assemblage in the Biscuitware Phase, falling to below 10% in the Historic Phase. Lithic materials are represented by an inverse pattern,

Table 3.1. Weights (g) of Material Types Recovered from Units SD-49, -50, and -51, across Pre-Biscuitware, Biscuitware, and Historic Phases.

Material Type	**Pre-Biscuitware Phase (g)**	**Biscuitware Phase (g)**	**Historic Phase (g)**	**Total Weight (g)**
Bead	0	15.00	0	*15.00*
Bone	9858.91	3854.87	290.33	*14,004.11*
Ceramic	173,142.00	27,759.75	19,116.75	*220,019.00*
Ferrous	0	32.49	182.28	*214.77*
Glass	0	24.75	2.02	*26.77*
Lithic	11,619.50	1870.28	3033.68	*16,523.46*
Plant	464.78	74.81	121.35	*660.94*
Total Weight (g)	*19,5085.19*	*33,631.95*	*22,746.41*	*251,463.55*

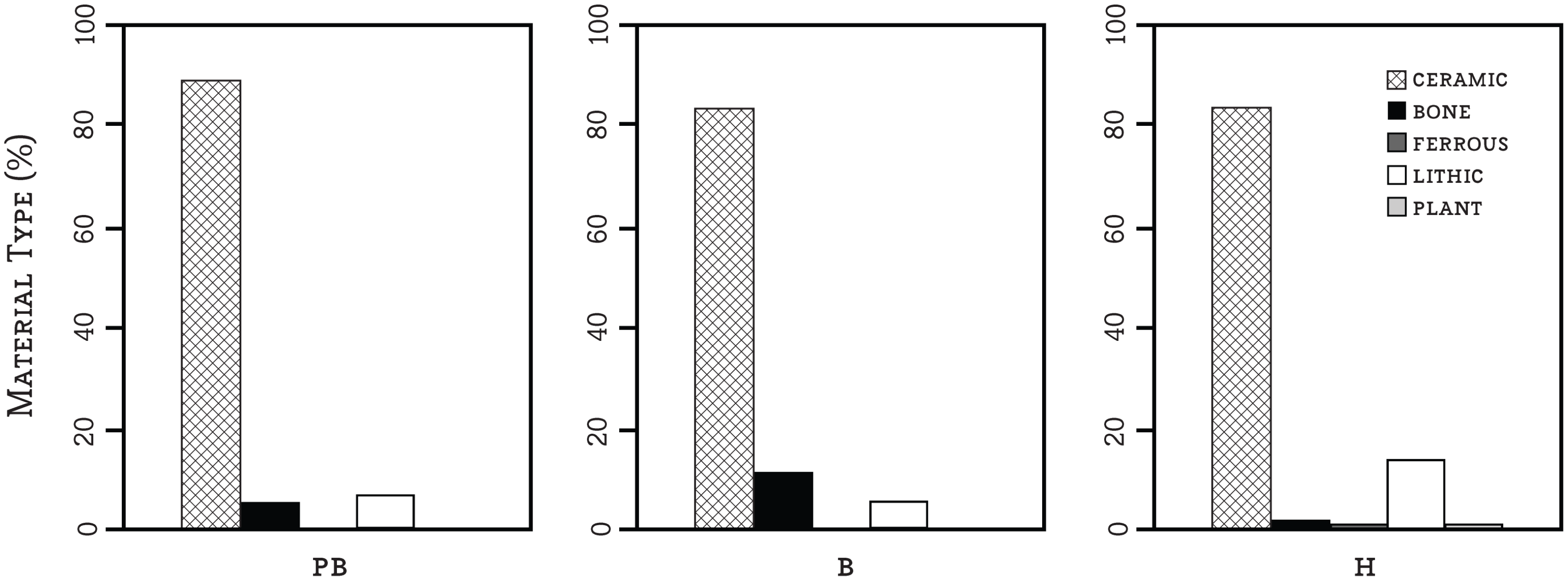

Figure 3.2. Comparison of weights (g) of material types (including ceramics) recovered from Units SD-49, -50, and -51, across Pre-Biscuitware, Biscuitware, and Historic Phases.

Table 3.2. Relative Percentage of Material Types by Weight (g) Recovered from Units SD-49, -50, and -51, across Pre-Biscuitware, Biscuitware, and Historic Phases.

Material Type	Pre-Biscuitware Phase (%)	Biscuitware Phase (%)	Historic Phase (%)
Bead	0	0.04	0
Bone	5.05	11.46	1.28
Ceramic	88.75	82.54	84.04
Ferrous	0	0.1	0.8
Glass	0	0.07	0.01
Lithic	5.96	5.56	13.34
Plant	0.24	0.22	0.53

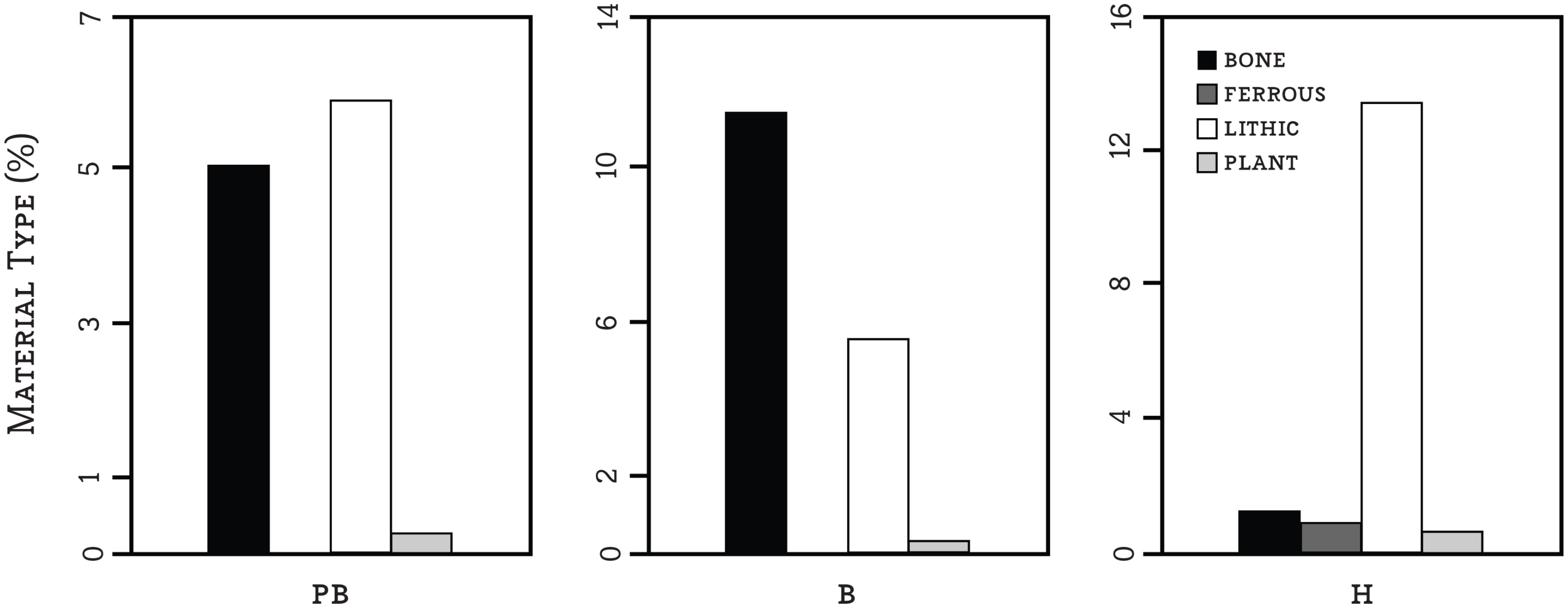

Figure 3.3. Comparison of weights (g) of material types (excluding ceramics) recovered from Units SD-49, -50, and -51, across Pre-Biscuitware, Biscuitware, and Historic Phases.

decreasing slightly in the Biscuitware Phase and increasing substantially in the Historic Phase palimpsest. Presence of plant specimens is consistent throughout all three phases. Historic Phase deposits contain a small amount of glass and ferrous metal fragments, representing about 5% of the assemblage. One fragment of metal appears in the Biscuitware Phase assemblage, likely due to mixing of materials from the upper levels of that phase with the lower levels of the Historic Phase deposit.

Comparison of Units

Next, I generated a similar set of graphs comparing the relative percentage of eight major material types in weight across Units SD-49, -50, and -51 with all three phases combined (Figure 3.4; Table 3.3 and Table 3.4). Again, ceramic represents the vast majority of materials present and maintains a consistent presence across units. In comparison to the other units, Unit SD-49 contains a slightly larger percentage of ceramic materials by weight. To highlight variation in smaller categories, I again eliminated ceramics and generated a similar graph comparing the relative percentage of the remaining seven major material types (Figure 3.5). Units SD-49 and -50 have similar composition of materials, while SD-51 varies considerably. Bone is approximately 19% of the assemblage by weight in Units SD-49 and-50, yet represents about 68% in Unit SD-51, the unit located closest to the road and containing the deepest prehistoric deposits. Weight of lithics relative to other materials demonstrates an inverse pattern, varying from 75% of the assemblage in Units SD-49 and -50 to only 30% in SD-51. Relative percentage of plant materials is consistent across all three units, with a slight decrease in Unit SD-51. Ferrous materials are most abundant in Unit SD-49, the unit located closest to the shoreline with a well-developed Historic Phase deposit containing the remains of a disintegrated engine. The

Table 3.3. Weights (g) of Material Types Recovered from Units SD-49, -50, and -51, Pre-Biscuitware, Biscuitware, and Historic Phases Combined.

Material Type	**Unit SD-49 (g)**	**Unit SD-50 (g)**	**Unit SD-51 (g)**	**Total Weight (g)**
Bead	0	15.00	0	*15.00*
Bone	1180.34	1582.14	11,241.62	*14,004.10*
Ceramic	94,003.50	38,379.75	87,635.25	*220,018.50*
Ferrous	182.28	6.45	26.04	*214.77*
Glass	2.02	1.09	23.66	*26.77*
Lithic	4733.93	6855.78	4933.75	*16,523.45*
Plant	189.36	274.23	197.35	*660.94*
Total Weight (g)	*100,291.43*	*47,114.44*	*104,057.67*	*251,463.53*

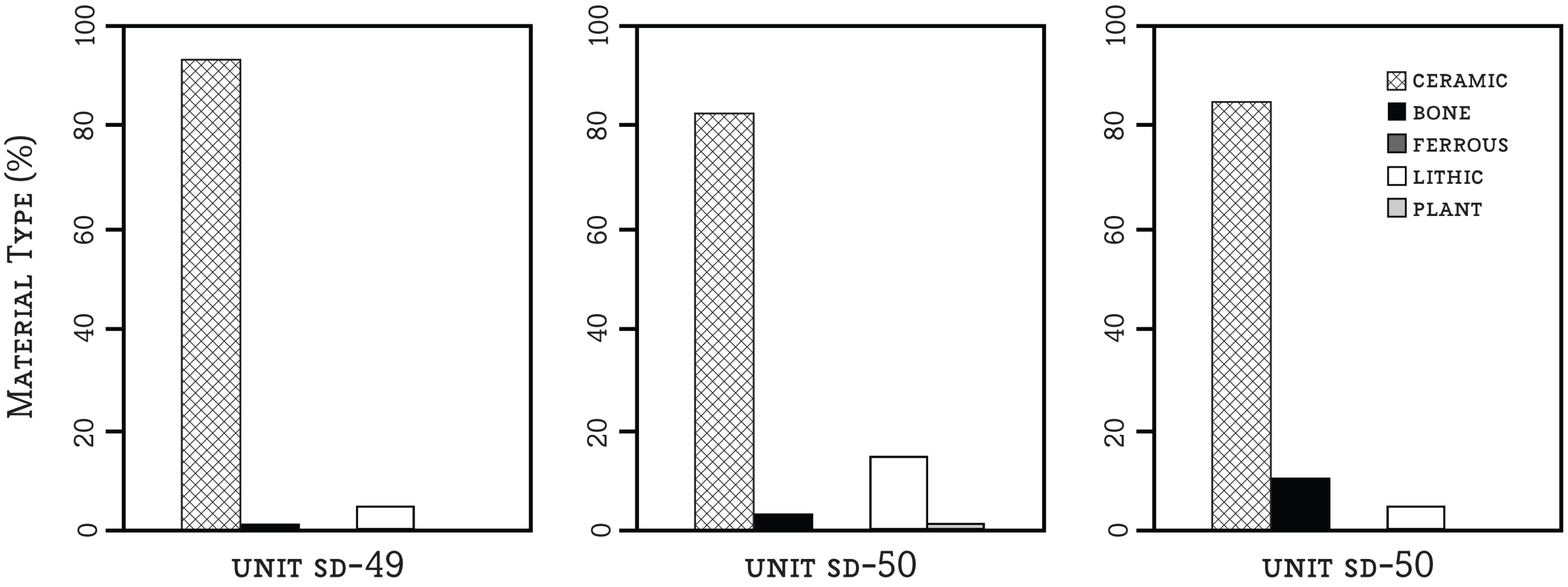

Figure 3.4. Comparison of weights (g) of material types (including ceramics) recovered from Units SD-49, -50, and -51, Pre-Biscuitware, Biscuitware, and Historic Phases combined.

Table 3.4. Relative Percentage of Material Types by Weight (g) Recovered from Units SD-49, -50, and -51, across Pre-Biscuitware, Biscuitware, and Historic Phases.

Material Type	Unit SD-49	Unit SD-50	Unit SD-51
Bead	0	0.03	0
Bone	1.18	3.36	10.8
Ceramic	93.73	81.46	84.22
Ferrous	0.18	0.01	0.03
Glass	0	0	0.02
Lithic	4.72	14.55	4.74
Plant	0.19	0.58	0.19

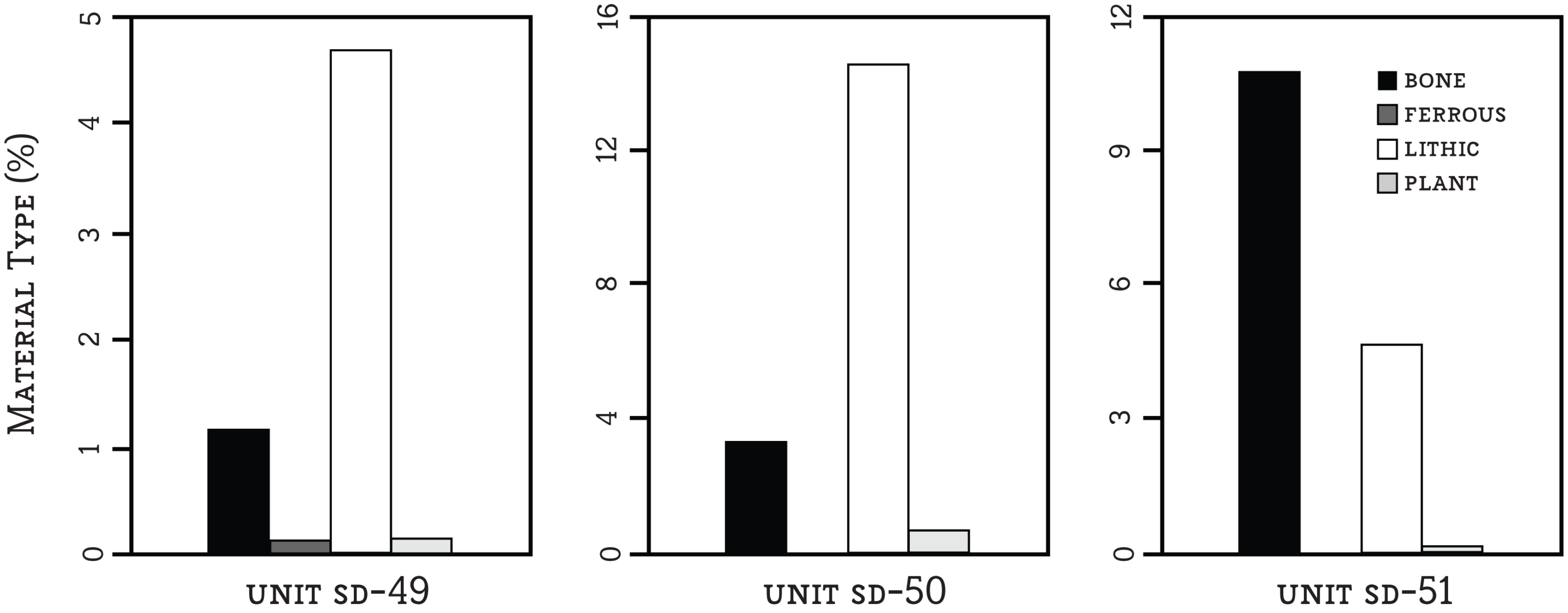

Figure 3.5. Comparison of weights (g) of material types (excluding ceramics) recovered from Units SD-49, -50, and -51, Pre-Biscuitware, Biscuitware, and Historic Phases combined, excluding ceramics.

only bead identified in all heavy fraction samples is present in the Biscuitware Phase deposit of Unit SD-50.

Summary

Based on the composition of material types, units excavated on middens in the domestic context represent routine disposal activities. Although definitive residential structures and hearth features have not yet been identified at Sitio Drago, some differences in material composition suggest the contexts can be characterized as general accumulation from difference domestic structures. A distinct shift in material composition during the Historic Phase is unsurprising. During this era, the Playa Drago area was developed by the United Fruit Company to transport bananas to the mainland (Cramer 2013; Stephens 1989, 1997; Thampy 2014). Substantial changes in land use, including new disposal activities, may drive these data patterns.

Comparison of Recovery Methods

Archaeological recovery methods impact the amount and types of information that can be gleaned from samples of faunal and floral remains. Over the past few decades, an increasing number of studies have compared the advantages and disadvantages of dry-screening, wet-screening, and flotation (Chiou et al. 2013; Shaffer 1992; Tolar et al. 2010). Many of these projects experiment with different recovery methods in dry, sandy versus wet, clayey conditions and offer insight into how archaeological projects can modify their archaeobotanical processing strategies to ensure optimal recovery. Past experimental studies and archaeological projects in the New World have shown that different screen mesh sizes influence recovery; fine-mesh screens recover more remains of more small-bodied animal taxa than coarser-mesh (Gordon 1993; Lyman 2012; MacKinnon 2002:17–20; Shaffer and Sanchez 1994:525). Similarly, screening produces more material than hand-picking alone. To explore the effect of recovery methods on the number of taxa type recovered from a sample, I compare the densities of plant and animal specimens collected from wet-screening, flotation light fraction, and flotation heavy fraction.

Floral Specimens

I examined differences in recovery rates of plant specimens and wood charcoal from samples hand-picked from the screen, the light fraction, and the heavy fraction. With this comparison, we can see if particular types of plant materials are recovered more effectively by sorting through midden recovered in light fraction flotation samples, heavy fraction flotation samples, or wet-screened samples. First, I produced a set of bar graphs comparing densities of plant specimens (total count divided by total volume of soil) recovered from screen, light fraction, and heavy fraction samples in Units SD-60 and -61 (Figure 3.6 and Table 3.5). Results indicate that substantially more plant specimens overall are recovered by sorting heavy fraction materials. One plant type, pimiento (*Myrcia gatunensis*: Myrtaceae), is recovered at a higher rate by sorting light fraction materials. Plant specimens are recovered from hand-picked screened materials at a significantly lower rate. Most carbonized plant remains are water-logged and sink to the bottom of the flotation tank. This is likely due to plant specimens being smaller than the 1/8-inch mesh used in wet-screening and fragmentation of seeds and endocarps that occurs while sifting sediments at the screen.

I produced a similar set of bar graphs comparing densities of wood charcoal types recovered from screen, light fraction, and heavy fraction samples; weights (g) are standardized by total volume of soil (Figure 3.7 and Table 3.6). Again, the vast majority of wood charcoal is recovered from heavy fraction samples. Palm (Arecaceae) wood is recovered at a slightly higher rate when removed from heavy fraction than by any other method. Unlike recovery of plant

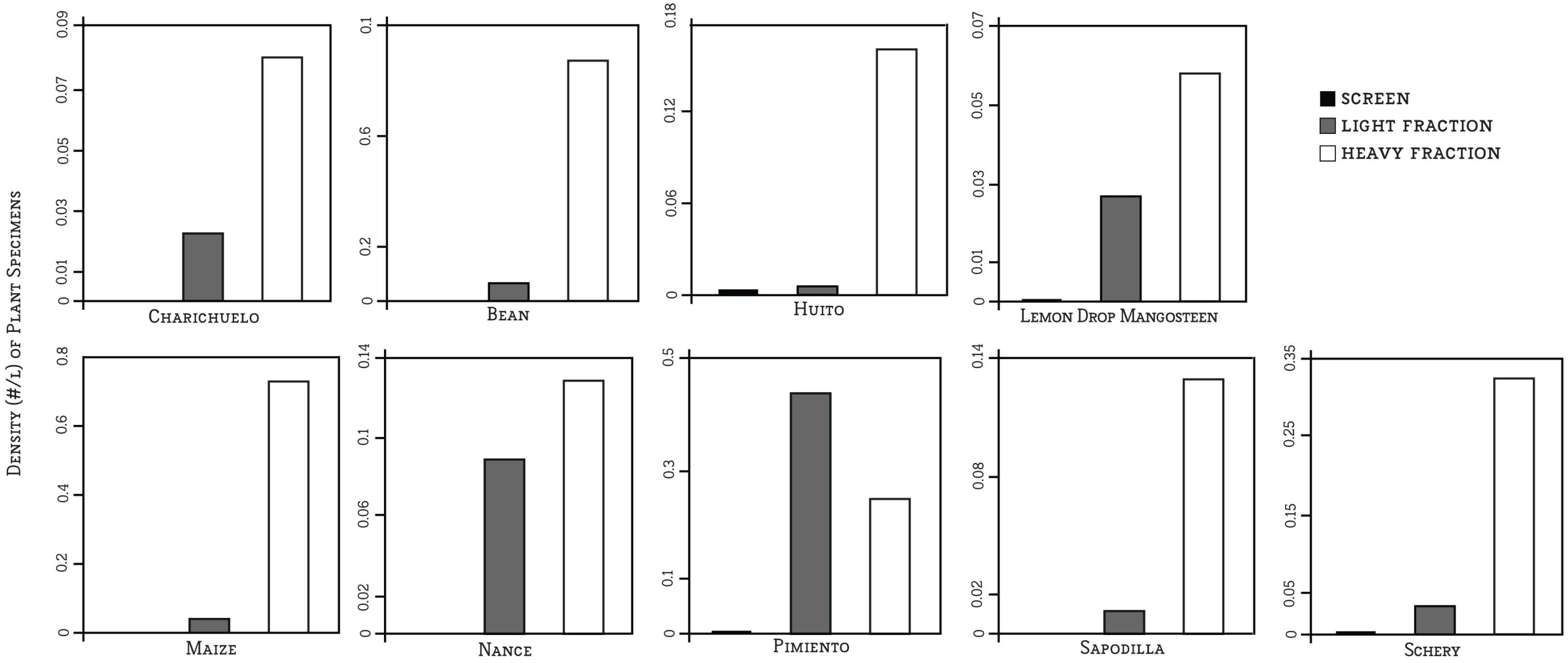

Figure 3.6. Comparison of densities of plant specimens (total count divided by total volume of soil) recovered from screen, light fraction, and heavy fraction samples from Units SD-49, -50, and -51 with all phases combined.

Table 3.5. Densities of Plant Specimens (Total Count Divided by Total Volume of Soil) Recovered from Screen, Light Fraction, and Heavy Fraction Samples from Units SD-49, -50, and -51 with All Phases Combined.

Taxon	**Screen**	**Light Fraction**	**Heavy Fraction**
Charichuelo (*Garcinia madruno*: Clusiaceae)	0	0.0221	0.0797
Bean genus (*Phaseolus* sp.: Fabaceae)	0	0.0059	0.0871
Huito (*Genipa americana*: Rubiaceae)	0.0026	0.0044	0.1609
Lemon drop mangosteen (*Garcinia intermedia*: Clusiaceae)	0.0005	0.0266	0.0576
Maize (*Zea mays*: Poaceae)	0.0003	0.0369	0.7322
Nance (*Byrsonima crassifolia*: Malpighiaceae)	0	0.0886	0.1284
Pimiento (*Myrcia gatunensis*: Myrtaceae)	0.0005	0.4384	0.2465
Sapodilla (*Manilkara zapota*: Sapotaceae)	0	0.0118	0.1284
Schery (*Xylopia bocatorena*: Annonaceae)	0.0012	0.0325	0.3248
Unidentified	0.0117	0.0989	0.9581
Total Density	*0.0167*	*0.7662*	*2.9037*

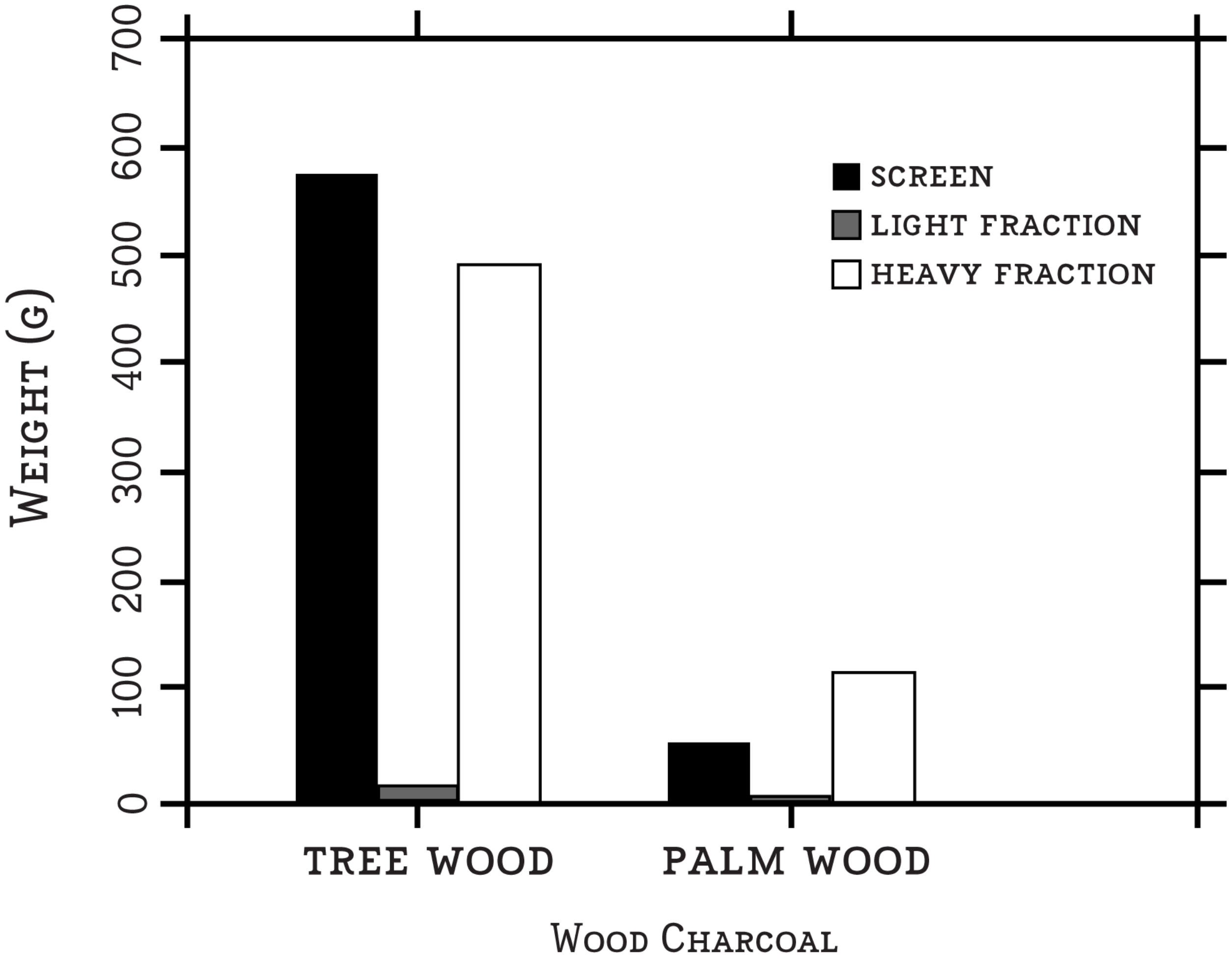

Figure 3.7. Comparison of tree and palm wood charcoal weight (g) recovered from screen, light fraction, and heavy fraction samples from Units SD-49, -50, and -51, all phases combined.

Table 3.6. Tree and Palm Wood Charcoal Weights (g) Recovered from Screen, Light Fraction, and Heavy Fraction Samples from Units SD-49, -50, and -51, All Phases Combined.

Wood Type	**Screen (g)**	**Light Fraction (g)**	**Heavy Fraction (g)**	**Total Weight (g)**
Tree Wood	573.16	7.96	483.5	*1064.62*
Palm Wood	45.17	2.99	112.58	*160.74*
Total Weight (g)	*618.33*	*10.95*	*596.08*	*1225.36*

specimens, hand-picking from wet-screened materials is more effective than light fraction. This is likely due to the majority of wood sinking to the bottom of the flotation tank; only heavily fragmented pieces are buoyant enough to float to the light fraction.

Faunal Specimens

It is similarly helpful to analyze recovery of faunal remains from different sampling procedures in effort to improve zooarchaeological recovery methods (Grayson 2014; Lyman 2012; Poteate and Fitzpatrick 2013). Use of two different recovery methods for obtaining faunal specimens from Units SD-60 and -61 provides an excellent opportunity to assess the efficacy of each sampling strategy. During summer 2014 excavations, field crew removed 30x30 cm flotation samples from inside each 1x1 m excavation unit. First, excavation crew hand-picked bone from the screen while wet-screening sediments taken from each level outside the 30x30 cm flotation sample. Smaller, less visible bone left unnoticed on the screen was bagged with general midden and stored for future analysis. Second, I hand-picked bone from cleaned heavy fractions that were exported to the Zooarchaeological Laboratory at UCLA for this project's paleoethnobotany analysis. Thus, processing the 30-x-30-cm flotation sample sediments allowed us to recover a greater abundance of small faunal specimens than was possible during wet-screening in the field. However, these specimens were also subject to additional agitation during the water flotation procedure that took place at Playa Drago.

Recovery rates of bone hand-picked from screen on site (not including smaller bone fragments that will be sorted from bagged midden materials in the future) and those taken from the heavy fraction at UCLA are compared here with a set of bar graphs contrasting NISP of vertebrate taxa by class from each sample type (Figure 3.8 and Table 3.7). All classes have a greater proportion of specimens in the screen samples. Bird, mammal, and amphibian counts are

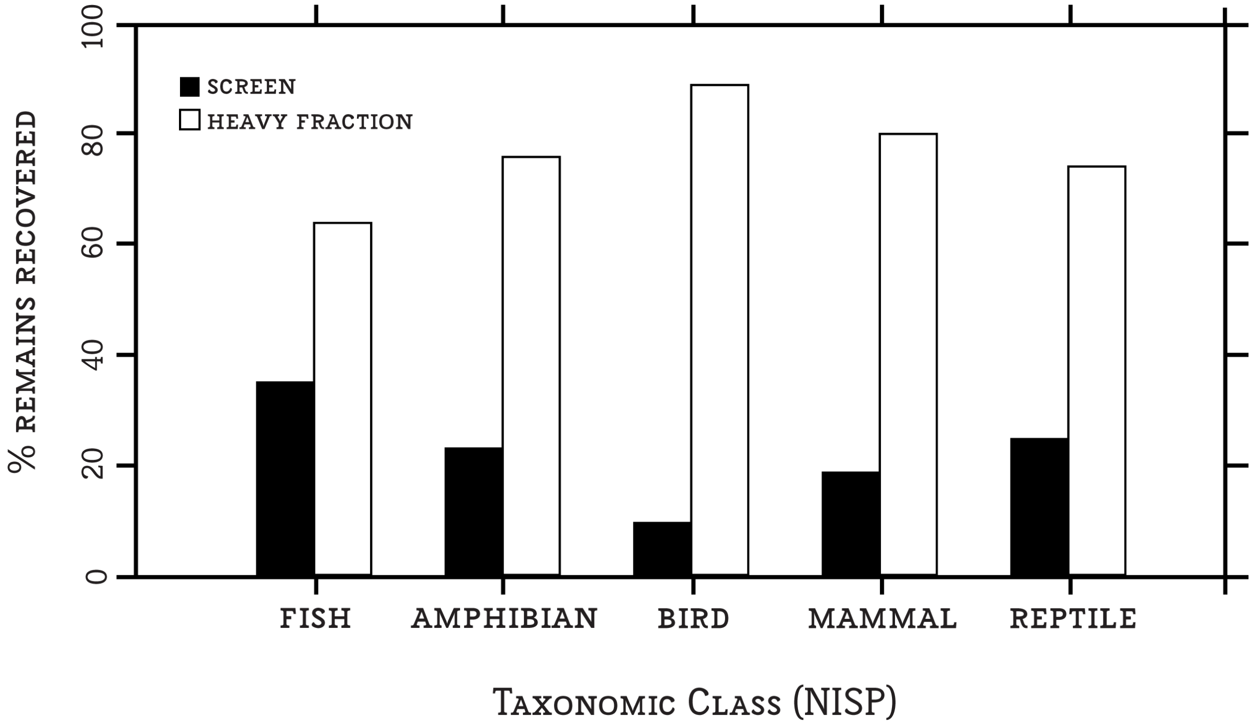

Figure 3.8. Relative abundance of vertebrate taxa NISP by class recovered from heavy fraction and screen samples from Units SD-60 and -61, all phases combined.

Table 3.7. Vertebrate Taxa NISP by Class Recovered from Heavy Fraction and Screen Samples from Units SD-60 and -61, All Phases Combined.

Class	Screen	Heavy Fraction
Fish	1346	2476
Amphibian	34	113
Bird	3	28
Mammal	84	359
Reptile	278	840
Total Number of Specimens	*1745*	*3816*

represented by heavy fraction samples to greater degree than fish and reptile. This suggests that small bird, mammal, and amphibian skeletal elements are more difficult to detect in the screen, particularly in comparison to larger fish bones. Since all screened midden materials are collected for future sorting and identification, forthcoming zooarchaeological analyses at Sitio Drago will provide an unprecedented level of comprehensive recovery in lower Central America.

Summary

Several important observations emerge from this comparison of recovery rates. Recent experiments with recovery methods of macrobotanical remains suggests that a combination of techniques, especially dry- and wet-screening, is necessary to recover a higher diversity of plant types (Chiou et al. 2013). Unfortunately, the moist, sandy soils dominating matrices on Isla Colón make dry-screening an impractical recovery method. First, sample sizes of wood charcoal and typically non-buoyant charred plant parts are greatly increased by picking specimens from the heavy fraction. In fact, the light fractions from Sitio Drago produced significantly fewer plant specimens overall than the heavy fractions. These figures highlight the need to hand-pick carbonized materials from the heavy fraction in addition to the light fraction. Second, hand-picking animal bone from the heavy fraction mesh produces more numerous small bones. This corroborates recent observation that limiting sorting to the screen in the field can bias recovery of particular types of materials (Graesch 2009). Our work at Sitio Drago demonstrates the benefits of maximum recovery techniques, or at least sub-sampling of units for finer screening, to improve size and diversity of specimens in faunal and floral assemblages.

Optimizing Recovery of Plant and Animal Remains in the Neotropics

The methods used in this doctoral project are designed to maximize recovery of different types of ecofacts representing a multitude of plant and animal resources likely exploited at Sitio

Drago. Rather than relying on one type of data, procuring and analyzing multiple lines of evidence representing ancient foodways produces a more comprehensive account of villagers' farming, foraging, and hunting activities. Quantifications of plant remains excavated from sequential prehistoric and historic occupations yields data relevant to analyzing temporal patterns. Integrating these multiple lines of evidence brings together information on different patterns that are not visible independently in each assemblage (see Messner and Stinchcomb 2014; VanDerwarker and Peres 2010). Cross-site and intra-regional comparability is becoming increasingly important with a rise in multi-scalar archaeological investigations of social dynamics and environmental impacts (Lock and Molyneaux 2006; Ryzewski 2012; Stevens 2014; VanDerwarker et al. 2014). I use standard recovery, processing, quantifying, and reporting procedures to ensure the results presented in this dissertation can be reliably evaluated with comparable datasets and repeated in future sampling of archaeological sites.

As recommended by Pearsall (2001) and Chiou et al. (2013), archaeological field research design needs to take into account recovery concerns particular to especially dry, sandy or wet, clayey matrices. In previous research seasons at Sitio Drago, subsamples of sediment were collected and analyzed using dry sieving, wet sieving, and a bucket water flotation system. Water flotation, aided by deflocculates such as detergent, recovered the most plant specimens and wood charcoal. However, carbonized plant remains, which compose the majority of the archaeobotanical assemblage, did not float due to their water-logged condition in the wet, tropical soils. I adjusted my recovery strategy to recover sinking, non-buoyant carbonized plant specimens by using an extra fine heavy fraction mesh at the bottom of the flotation tank. Faunal specimens are well-preserved in the midden deposits at Sitio Drago and easily recovered using standard bulk excavation methods followed by a wet sieving procedure. While this suite of recovery methods proved to be more labor and time intensive in the field, it produced a substantial collection of floral and faunal specimens varied in size and type.

CHAPTER IV

PALEOETHNOBOTANICAL RESULTS

Introduction

The intensification of food production involves fundamental changes to the organization of subsistence-related labor and the way people interact with their environment. Understanding a food production system requires knowledge of the ways in which people interact with local ecology, as well as the social, political, and economic causes and consequences of their manipulations of the environment. Archaeologically, we can explore these issues through examination of plant and animal remains within the context of ecological and social dynamics. As people begin nurturing particular plants valued as food, medicine, or building materials, we see an increase in disposal of these preferred plants. Routine plant cultivation activities likely coincided with clearing of less desirable plant taxa. An increase in elite activities related to trade, exchange, and feasting may influence the type and quantity of plant food resources that people routinely exploit. Paleoethnobotanical analysis thus provides an important baseline for exploring the environmental changes and social developments as Late Ceramic people increasingly engaged in supraregional elite activities.

This chapter examines these issues through a quantitative analysis of archaeobotanical data (see Appendix A for complete dataset). I consider changes in foraging, farming, and tree cropping activities through comparison of plant remains from Pre-Biscuitware (AD 800 to 1200), Biscuitware (AD 1200 to 1450), and Historic (AD 1600 to 1900) phases. Temporal changes in the relationship between people and plants in the Neotropical forest can be viewed as a form of secondary succession, the replacement of organisms by other types of organisms. Anthropogenic disturbance in the rainforest has a reputation of impoverishing soils and decreasing biodiversity. However, soils in lowland Neotropic secondary forests are often significantly more fertile than those of primary forests, and human-mediated forest mosaics typically contain a higher rate of plant and animal diversity. When maintained over multiple generations, this human signature on the landscape is often clearly expressed in the archaeobotanical assemblage and can be tied to ecological and social developments (Denham et al. 2009; Erickson 2003; Heckenberger 2008, 2014; Iriarte et al. 2004; Iriarte et al. 2012). In this chapter I present an overview of plants identified in the archaeobotanical assemblage from Sitio Drago. After a discussion of plant life histories, habitat preferences, and usefulness to human communities, I present basic summary statistics (e.g., ubiquity, density, seasonality, etc.) of plant taxa through time. This information informs my assessment of how Late Ceramic people managed house gardens and forest mosaics on Isla Colón. Next, I develop a reconstruction of exploitation strategies in terms of diversity and relative abundance, calculated as percentages and ratios, for each phase. These measures and analyses inform my discussion of the relationship between settlement, farming, agroforestry, local environmental change, and sociopolitical dynamics.

The Study Assemblages

In any archaeological site, plant and animal assemblages represent only a small fraction of what people used and discarded. Natural and cultural factors can significantly modify organic remains, resulting in recovered assemblages that provide a snapshot of food production activities differing considerably from what actually transpired. As discussed in the previous chapter, paleoethnobotanists examine assemblages that have been subjected to numerous processes, from the initial selection of plants by humans, to food processing, cooking, discard, scavenging by animals and insects, burial, decay, and weathering. Further, successful recovery of plant food remains can be highly variable based on soil conditions, volume of sediment sampled, and method of extracting carbonized specimens from soil. Archaeobotanical data do not provide a precise, comprehensive account of every plant exploited by past people, particularly for plants lacking elements that are cooked and thus preserved with charring. However, archaeobotanical assemblages can provide a general representation useful in discussing ways in which people changed landscapes and what types of labor organization would have supported these practices. Quantitative comparison of floral data across sites, contexts, and phases is possible when taphonomic histories of each deposit are assessed and specimen counts are standardized into density measures.

This study examines 105 macrobotanical[1] samples collected from five units at Sitio Drago and one unit at Sitio Teca, the earliest documented site on Isla Colón (Table 4.1 and Table 4.2). Materials derive from screened (n=29) and flotation (n=76) samples of general midden deposits excavated from mortuary and domestic contexts. These samples cumulatively span the two prehistoric and one historic occupation on Isla Colón, from the Pre-Biscuitware through the Historic Phases. These analyses only use floated specimens and exclude plant remains recovered by wet-screening. Particular attention will be paid to differences between the Pre-Biscuitware and Biscuitware assemblages. Demographic expansion and shifts in sociopolitical organization during the later prehistoric phase might be related to changes in farming and foraging practices. Analysis addressing potential resource variability and spatial context will focus on comparison of Biscuitware and Pre-Biscuitware Phase flotation samples excavated from domestic contexts (Units SD-49, -50, and -51) with those excavated from a mortuary context (Units SD-60 and -

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[1] In summers 2012 and 2014, I collected sediment samples from all levels of Units SD-49, -50, -51, -60, and -61 for extraction of microfossil remains (e.g., phytoliths and starch grains). Unfortunately, microbotanical analysis of these samples proved too lengthy to include in this dissertation. Sediment samples are housed at the UCLA Paleoethnobotanical Laboratory, where I plan to analyze microfossils during the next stage of research.

Table 4.1. Number of Flotation Samples by Unit and Phase Obtained from Isla Colón.

Unit	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*	*Total Number of Samples*
SD-49	10	2	8	*20*
SD-50	7	4	0	*11*
SD-51	18	4	4	*26*
SD-60	6	3	0	*9*
SD-61	6	3	0	*9*
ST-1	1	0	0	*1*
Total # of Samples	*48*	*16*	*12*	*76*

Table 4.2. Number of Screened Samples by Unit and Phase Obtained from Isla Colón.

Unit	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*	*Total Number of Samples*
SD-49	4	1	2	*7*
SD-50	6	4	0	*10*
SD-51	9	2	1	*12*
SD-60	0	0	0	*0*
SD-61	0	0	0	*0*
ST-1	1	0	0	*0*
Total # of Samples	*20*	*7*	*3*	*29*

61). If people consumed and disposed of plant foods differently in the two site areas, we would expect to see patterning in presence and/or relative abundance of specific plant types. The single Pre-Biscuitware sample from test unit ST-1 at Sitio Teca will be briefly discussed, but has little importance to these statistical analyses due to its small sample size. However, Sitio Teca represents the oldest Pre-Biscuitware occupation documented on Isla Colón. Future excavation on Isla Colón may expand this dataset by obtaining more samples from this earlier occupation in the island's interior. For now, the dataset obtained from Sitio Drago provides an excellent opportunity to establish baseline patterns in plant resource use and forest management by the Late Ceramic phase occupants of Isla Colón.

Overview of Specimens

To understand foraging and farming activities we need to know which plants were collected and cultivated, in what ecological niches these food sources typically thrive, and what techniques can be used to intensify the harvest of these plants. As discussed in Chapter II, throughout the Holocene human populations on Isla Colón have had access to several important vegetation communities containing food-producing plants, including closed deciduous forest, secondary forest, palm forest, liana forest, savanna, and wetlands. Subtle human disturbances over time, such as weeding, transplanting, cultivating, fertilizing, and seeding, encourage certain species over others and may have had a noticeable impact on these vegetation communities. Did these Late Ceramic people exploit certain zones more than others? Did they alter these zones to increase overall plant biomass and biodiversity, or did they focus on clearing fields for a few select cultigens? How did these practices change as sociopolitical complexity increased? To address these issues, I provide a list of species identified in the study assemblage (Table 4.3 and Table 4.4) and discuss relevant habitat and ethnobotanical information.

Table 4.3. Common and Taxonomic Names of Useful Plants Organized by Binomial Nomenclature Identified from Pre-Biscuitware through Historic Phase Deposits at Units SD-49, -50, -51, -60, -61, and ST-1.

Scientific Name	***Common Name***
DICOTYLEDONAE	
Magnoliales	
Xylopia bocatorena: Annonaceae	Schery
Theales	
Garcinia intermedia: Clusiaceae	Lemon drop mangosteen
Garcinia madruno: Clusiaceae	Charichuelo
Violales	
Carica papaya: Caricaceae	Papaya
Ebenales	
Manilkara zapota: Sapotaceae	Sapodilla
Pouteria sapota: Sapotaceae	Sapote
Sapotaceae	Sapotaceae family
Myrtales	
Myrcia gatunensis: Myrtaceae	Pimiento
Sapindales	
Melicoccus bijugatus: Sapindaceae	Mamoncillo
Polygalales	
Byrsonima crassifolia: Malpighiaceae	Nance
Umbellales	
Eryngium foetidum: Apiaceae	Culantro
Dendropanax arboreus: Araliaceae	Palo de agua
Polemoniales	
Cestrum latifolium: Solanaceae	Cestrum
Cordia spinescens: Boraginaceae	Bejuco
Rubiales	
Coccocypselum sp.: Rubiaceae	Coccocypselum genus
Genipa americana: Rubiaceae	Huito
Psychotria sp.: Rubiaceae	Psychotria genus
Randia armata: Rubiaceae	Jagua macho
Rubiaceae	Coffee family
MONOCOTYLEDONAE	
Poales	
Phaseolus sp.: Poaceae	Bean genus
Zea mays: Poaceae	Maize
Zygia longifolia: Poaceae	Guabito de río
Arecales	
Astrocaryum standleyanum: Arecaceae	Palma negra
Bactris sp.: Arecaceae	Peach palm

Table 4.4. Common and Taxonomic Names of Useful Plants Organized by Functional Category Identified from Pre-Biscuitware through Historic Phase Deposits at Units SD-49, -50, -51, -60, -61, and ST-1.

Common Name	***Taxon***
Garden Crops	
Bean genus	*Phaseolus* sp.: Fabaceae
Maize	*Zea mays*: Poaceae
Tree Fruits	
Papaya	*Carica papaya*: Caricaceae
Charichuelo	*Garcinia madruno*: Clusiaceae
Lemon drop mangosteen	*Garcinia intermedia*: Clusiaceae
Mamoncillo	*Melicoccus bijugatus*: Sapindaceae
Nance	*Byrsonima crassifolia*: Malpighiaceae
Sapodilla	*Manilkara zapota*: Sapotaceae
Sapote	*Pouteria sapota*: Sapotaceae
Sapotaceae family	Sapotaceae
Palm Fruits	
Palma negra	*Astrocaryum standleyanum*: Arecaceae
Peach palm	*Bactris* sp.: Arecaceae
Shrub Fruits	
Bejuco	*Cordia spinescens*: Boraginaceae
Guabito de río	*Zygia longifolia*: Fabaceae
Huito	*Genipa americana*: Rubiaceae
Jagua macho	*Randia armata*: Rubiaceae
Coffee family	Rubiaceae
Coccocypselum genus	*Coccocypselum* sp.: Rubiaceae
Psychotria genus	*Psychotria* sp.: Rubiaceae
Miscellaneous Food Plants	
Culantro	*Eryngium foetidum*: Apiaceae
Pimiento	*Myrcia gatunensis*: Myrtaceae
Schery	*Xylopia bocatorena*: Annonaceae
Non-Food Plants	
Cestrum	*Cestrum latifolium*: Solanaceae
Palo de agua	*Dendropanax arboreus*: Araliaceae

A variety of plants were identified in the Sitio Drago assemblage, including trees, shrubs, palms, and garden plants. I identified 32 distinct taxa from 21 families (see Table 4.3 and Table 4.4; Figure 4.1, Figure 4.2, Figure 4.3, and Figure 4.4). A diverse array of edible and medicinal plants, including eight tree fruits, five shrub fruits, two palm fruits, two garden crops, and one garden herb, suggests villagers practiced several plant collection and cultivation activities in both house gardens and forests on Isla Colón. In addition, the assemblage contains two non-food plants that are noted for utilitarian value in ethnographic and ethnohistoric accounts. Tree fruit taxa (n=7) represent the overwhelming majority of plant resources identified to the level of species. The abundance of tree fruit taxa in general midden deposits suggests that tree cropping may have been an important cultivation activity in ancient Sitio Drago, as noted elsewhere in the Neotropics (Denevan 2006; VanDerwarker 2005). The large number of tree fruit taxa could also be an effect of the seeds enduring comparatively better in the archaeological record and being easier to identify taxonomically. Shrub fruit (n=4) are the second most abundant plant type identified to the level of species. Many of these plants are prevalent in forest understory and secondary growth; their strong presence suggests villagers foraged for plant resources in various niches on Isla Colón, perhaps including fallowed field plots. Tree and shrub fruits are most abundant in samples from Units SD-49, -50, and -51, which represent historic and prehistoric domestic refuse. The 2014 excavation of Units SD-60 and -61 produced the majority of palm fruit types (n=2), garden crop (n=2), and garden herb species (n=1). In addition, the two non-food plant species identified at Sitio Drago appear only in samples from Units SD-60 and -61, the midden deposits located adjacent to a prehistoric cemetery.

Tree Fruits

Fruit-bearing trees are important sources of carbohydrates, vitamins, and fiber or culinary

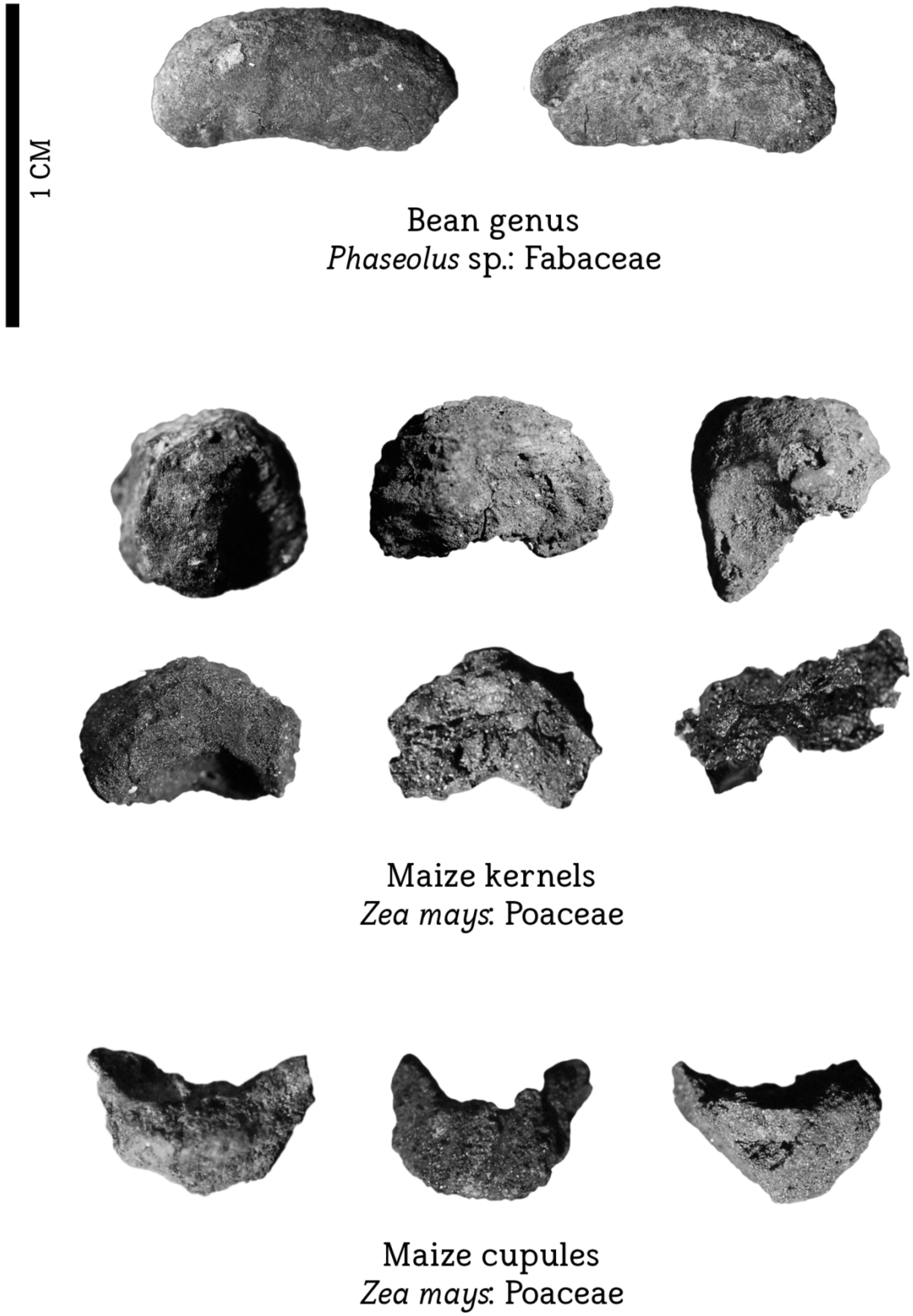
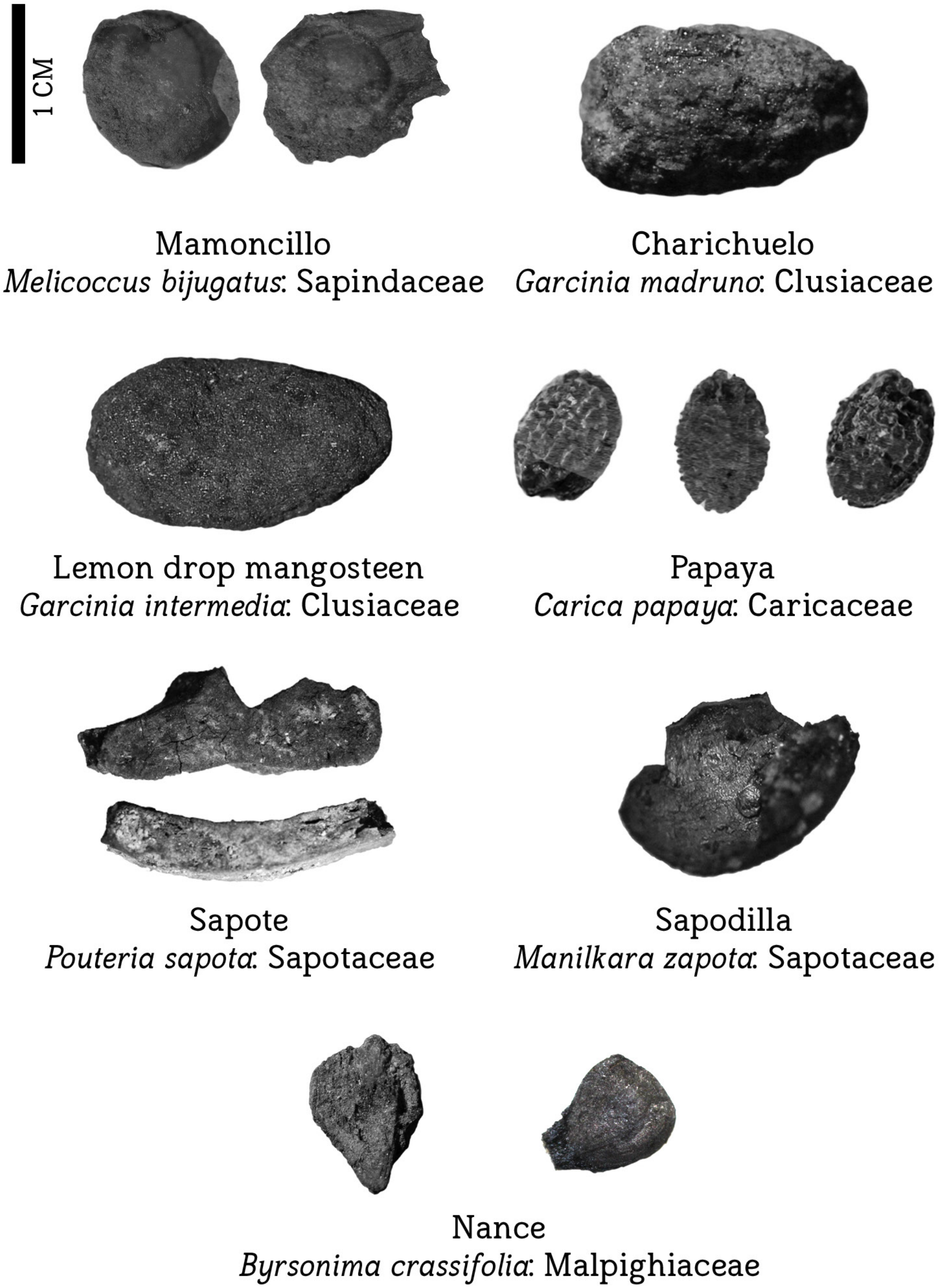


Figure 4.1. Examples of carbonized macrobotanical remains representing identified garden crops from the Sitio Drago archaeobotanical assemblage. Photographs by Lana S. Martin.



Mamoncillo
Melicoccus bijugatus: Sapindaceae

Charichuelo
Garcinia madruno: Clusiaceae

Lemon drop mangosteen
Garcinia intermedia: Clusiaceae

Papaya
Carica papaya: Caricaceae

Sapote
Pouteria sapota: Sapotaceae

Sapodilla
Manilkara zapota: Sapotaceae

Nance
Byrsonima crassifolia: Malpighiaceae

Figure 4.2. Examples of carbonized macrobotanical remains representing identified tree fruits from the Sitio Drago archaeobotanical assemblage. Photographs by Lana S. Martin.

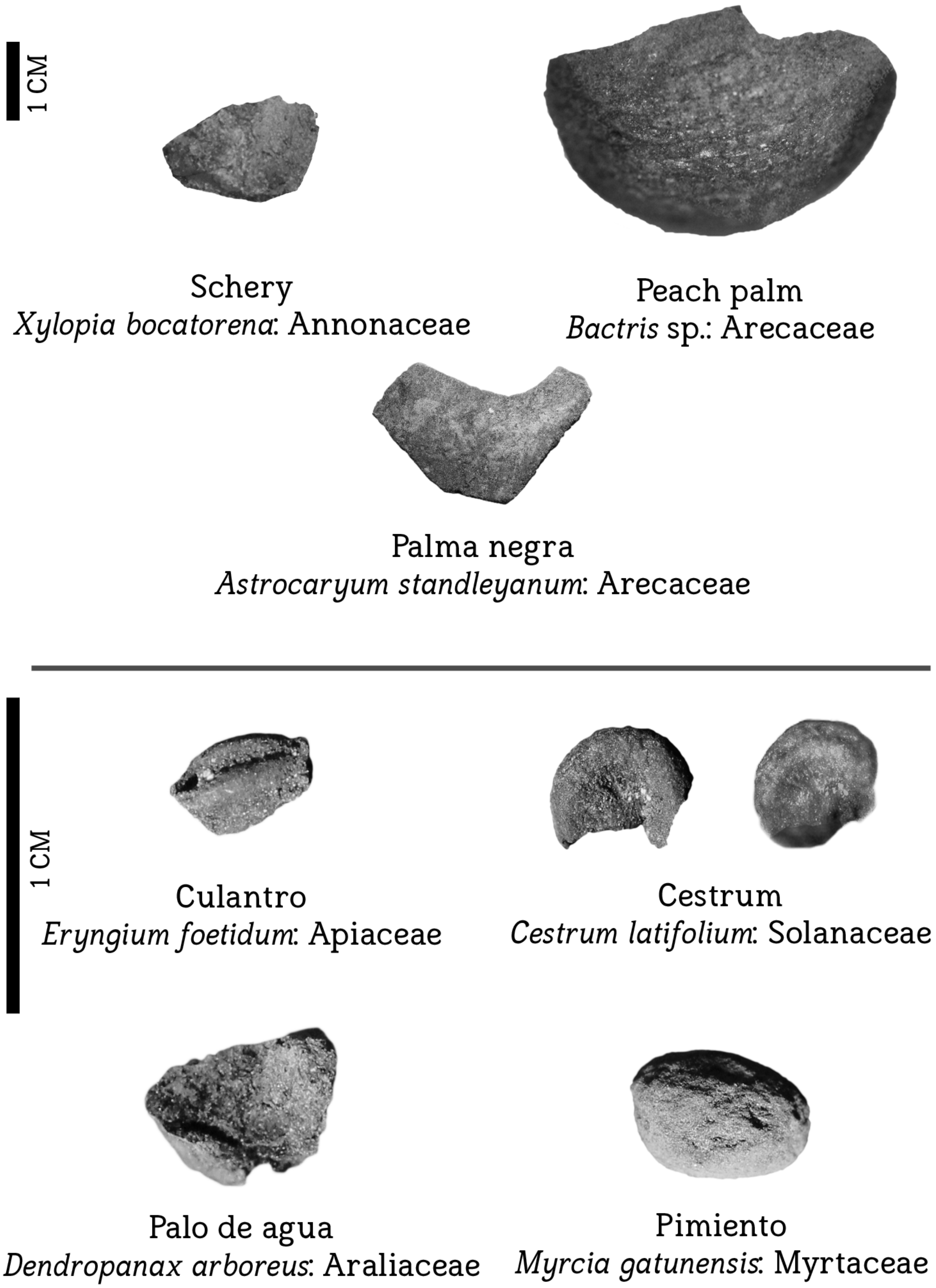


Figure 4.3. Examples of carbonized macrobotanical remains representing identified palm fruits, miscellaneous food plants, and non-food plants from the Sitio Drago archaeobotanical assemblage. Photographs by Lana S. Martin.

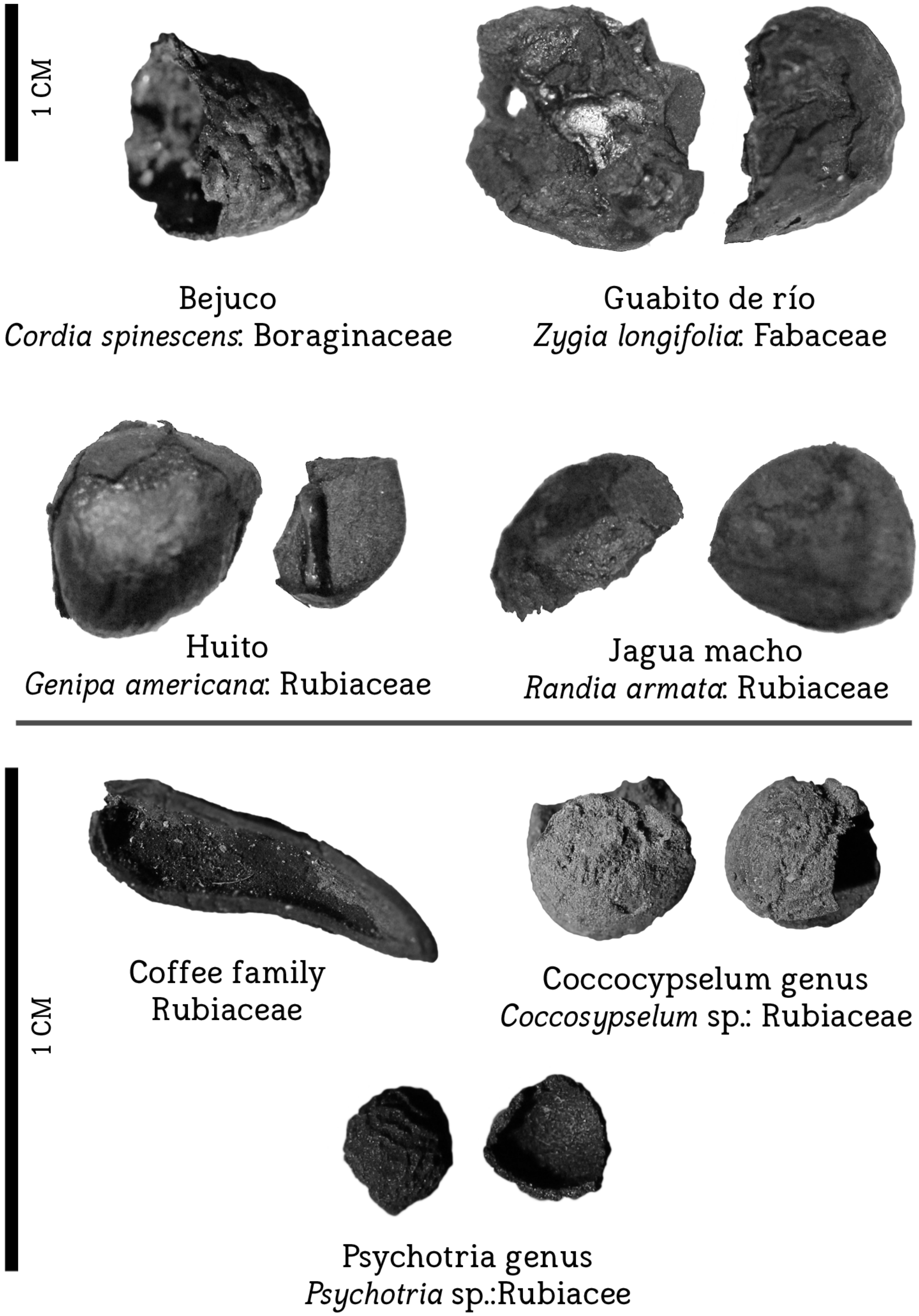


Figure 4.4. Examples of carbonized macrobotanical remains representing identified shrub fruits from the Sitio Drago archaeobotanical assemblage. Photographs by Lana S. Martin.

spices for people living in the Neotropics. Of the tree fruit taxa identified in the study assemblage, many have multiple economic uses as foods, medicines, and construction materials. The identified tree fruit taxa are native to the Central American Neotropics and thrive as cultivated tree crops or unmanaged understory plants. Several tree fruits are prolific cultivars in ancient Neotropical societies. Nance (*Byrsonima crassifolia*: Malpighiaceae) is deciduous during dry seasons and grows in lowland moist forest. Mature trees produce an edible fruit, are found in large stands, and are often cultivated or left standing during forest clearing events. Nance fruits preserve well post-harvest and are rich in antioxidant properties, vitamin C, fatty acids, vitamin A, carbohydrates, calcium, and phosphorus. Ripe fruits are eaten raw, consumed as juice, and used to make *pesada* (a custard-like dessert) and *chicha* (a fermented beverage) (Kermath et al. 2014:154). Pulp of the nance fruit can be processed to dye cotton cloth green; fresh bark has tannins to treat skin diseases; and the wood is commonly used as firewood and to make charcoal (Carrasquilla 2008:294-295). Nance is noted as a prominent tree crop in archaeobotanical records from coastal Mayan sites in Belize (McKillop 1994), observed ethnographically as food and medicine in Guatemala (Cáceres et al. 1993) and Honduras (Lentz 1986), and is a popular modern tree cropping species in central Panama (Aguilar and Condit 2001).

The sapodilla (*Manilkara zapota*: Sapotaceae) tree is native to the Neotropical forest throughout Central America and grows naturally along the edges of humid forests in rich, well-drained, sandy loams (Kermath et al. 2014:522). Similar to nance in size and nutritional quality, sapodilla fruits are yellowish-brown, rough-skinned, and juicy with a sweet flavor reminiscent of pear. Sapodilla is noted in ethnographic sources as a popular cultivar; while fruits are mainly sought after for their flavor, they also contain *chicle* (a white latex-like substance) which today is the main source of natural latex for commercial chewing gum (Quijada et al. 2005). The seeds can be ground into a powder for various medicinal applications. Sapodilla wood is an ideal construction material as it is hard and resistant to rotting. The fruit is also a favorite food of howler monkeys, tapirs, peccaries, and bats, which are attracted to stands (Lim 2012c:111-113).

A comparatively less frequent tree crop in ancient societies is papaya (*Carica papaya*: Caricaceae), which is indigenous to Neotropical forests of Mexico, Central America, and northern South America. The tree grows best in sandy loams but is adaptable to the acidic sulphate soils endemic on Isla Colón. Papaya fruits are highly nutritious and flavorful and eaten fresh when ripe or cooked when unripe. In addition, the seeds are toasted and ground for use as a peppery spice in culinary dishes (Kermath et al. 2014:184). In addition to fruit, papaya trees bear numerous edible and otherwise economically useful parts. The roots can be boiled with sucrose and eaten as gruel; and leaves, inflorescences, young stems, and flowers are edible when cooked whole. In addition, ethnobotanical sources describe the leaves, roots, and seeds as having medicinal applications. Latex derived from papaya fruit contains *papain*, an enzyme that is used to tenderize meat, brew fermented beverages, and tan animal skins (Lim 2012a:693).

Lemon drop mangosteen (*Garcinia intermedia*: Clusiaceae) is most commonly in modern evergreen understory forest habitats but is also occasionally maintained in cultivated stands (Kermath et al. 2014:380). The species is native to Mexico and Central America and most often found in mature, primary lowland forests. Lemon drop mangosteen fruits are orange when ripe, edible, and have a slightly tangy taste. Mature trees grow up to 12 m in height and bear fruit around the end of the rainy season and beginning of the dry season; thus, sporadically throughout the year in Bocas del Toro province. Wood from the lemon drop mangosteen is resistant to termites and noted in ethnographic accounts as a preferred construction material (Lim 2012b:62-

63). Ripe fruits are also consumed by monkeys and peccaries; managed stands may have served a dual purpose to attract prey as well as produce crops (Carrasquilla 2008:120-121).

Similarly, sapote (*Pouteria sapota*: Sapotaceae) trees thrive naturally in mature forest understory but are sometimes cultivated in stands. Sapote tolerates exceptionally clayey, acidic, and calcium carbonate-enriched soils, making it adaptable to upland Caribbean island landscapes. The Guaymí of western Panama refer to these fruits as *ninhércri* and forage for them in the forest (Hazlett 1986). Ripe fruits are commonly foraged and eaten uncooked. The flavor of sapote pulp is sweet and often described as similar to squash, almond, or sweet potato and honey (Bayuelo-Jiménez et al. 2007; Lim 2012c:138-140). The fruits are high in vitamin and mineral content, particularly nutritious in comparison to other tropical tree fruits. Oil from sapote has analgesic properties and is used in traditional indigenous medicine to treat alopecia and ear pain. Sapote fruits also contain a latex-like substance that is used locally with *chicle* to make chewing gum. When toasted, seeds have a flavor similar to almonds and are ground for use in flavoring sauces (Kermath et al. 2014:696) and medicinally to treat kidney stones, rheumatism and digestive disorders (Alia-Tejacal et al. 2007).

Several fruit tree taxa identified in the macrobotanical assemblage are primarily found in understory forest growth and are not known to be cultivated by people. Mamoncillo (*Melicoccus bijugatus*: Sapindaceae) is a deciduous tree common to Caribbean islands that grows approximately 10 m high and bears fruit December through April. Ripe fruits are yellow-brown with a sweet-tart flavor often compared to that of green seedless grape. They are eaten raw by biting off the exocarp and sucking the pulp off the seed. Unripe, green fruits have a thin, tart aril (fleshy outgrowth covering the seed casing) which is eaten fresh (Kermath et al. 2014:529). Seeds can be roasted and consumed, and are high in fiber and vitamins. Various parts of the mamoncillo tree provide comestible, medicinal, and construction resources. The bark and ripe fruits can be used as soap, as their tissue contains 30% saponins that produce abundant suds when mixed with water. Seeds are moderately toxic and used to stun fishes, as an insecticide, and in herbal infusions that are used to treat snakebites, stingray envenomation, colds, and flus. In addition, dried seeds have a unique appearance and are used as beads in necklaces and as buttons (Carrasquilla 2008:402-403). Leaves from mamoncillo trees reportedly repel sandflies (Francis 1992).

Charichuelo (*Garcinia madruno*: Clusiaceae) is another wild fruit tree with numerous economic uses. The species is indigenous to Central America and Amazonian South America and well-adapted to most soil conditions, commonly found in understory forest along riparian habitats (Kermath et al. 2014:381). Seed casings bear a whitish, translucent aril that, eaten uncooked, is a highly desired food item in traditional indigenous cuisine. The creamy flesh is slightly bittersweet and acidic, has a high potassium content and moderate calcium, phosphorous, and lipid contents (Chávez Cury et al. 2012). Sap from the charichuelo tree is used medicinally to treat skin sores and stomach ulcers. The wood is commonly collected for construction as it is hardy and particularly resistant to rot (Lim 2012b:71-72).

Jagua macho (*Randia armata*: Rubiaceae) is a deciduous tree that grows up to 20 m in height in lowlands of Central and South America. Jagua macho bears large (7 cm long) fruit that takes about a year to ripen, mainly during the rainy season. Seeds are embedded in a creamy pulp, edible when ripe and used to make fruit drinks and liquors. Fruits are particularly rich in iron, riboflavin, and antioxidant compounds (Carrasquilla 2008:376-377). Jagua macho has numerous non-comestible economic uses as well. The wood is hard and used in construction and the manufacture of furniture. Green fruits have a sap that turns dark blue when oxidized. Some

Neotropical indigenous people use this sap as a dye to paint their body and protect against insect bites. In Kuna Yala culture of northeast Panama, body painting with jagua macho sap is an important part of young women's week-long puberty ceremony (Kermath et al. 2014:738). The embroidered mola fabric panel, a part of the traditional outfit of Kuna women, developed from the long history of Kuna women painting intricate geometric patterns on their torso with the semi-permanent jagua macho fruit sap (Presilla 1996).

Schery (*Xylopia bocatorena*: Annonaceae) is a little-known tree that is abundant in closed-canopy wet lowland forest (Condit et al. 2011:60). Most information about its habitat and use pertains to other closely-related *Xylopia* species; it is endemic to the Bocas del Toro region of Panama. For example, the Guaymí of western Panama use boiled leaves of malagueto (*Xylopia frutescence*) as an anthelmintic, to expel parasites, and as an antipyretic, to reduce fever (Joly et al. 1987; Hazlett 1986). Fruits are purportedly foraged for their seeds rather than flesh. Ground schery seeds are used to spice culinary dishes with a pungent flavor similar to that of black pepper (Kermath et al. 2014:930).

Shrub Fruits

Botanists working with Neotropical ecosystems refer to shrubs as small trees that typically occupy the understory of primary or secondary canopy rainforest, cleared edges along savannah, or riverine zones. Fruit-bearing shrubs are also important edible and medicinal resources, but ethnobotanical sources suggest people do not cultivate economically valuable shrubs as frequently as they do trees. Not surprisingly, a number of shrub fruit taxa were identified in the Sitio Drago assemblage.

Bejuco (*Cordia spinescens*: Boraginaceae) is a shrub 2 m in height which thrives in lowlands and fruits year-round, even during the dry season. Pulp of the ripe bejuco fruit is sweet and eaten raw or used to make juice. The shrub is an important bee foraging plant and is often incorporated in landscapes as ornamental foliage or live fencing. Flowers and leaves are used as home remedies in some traditional indigenous cultures. The pulp of bejuco fruit has adhesive properties and is used as glue (Carrasquilla 2008:90-91).

Another shrub, the guabito de río (*Zygia longifolia*: Fabaceae) bears a fruit which is a legume with flattened, curved pods approximately 30 cm long. The long fruit pods ripen during the end of the dry season and beginning of the rainy season and are edible but infrequently selected by foragers (Kermath et al. 2014:943-944). The roots, on the other hand, are more commonly gathered for medicinal purposes. Guabito de río is commonly found on the banks of rivers and creeks. Stands with ripe fruit are known to attract birds, monkeys, and other mammals and may have been a popular place to hunt prey (Carrasquilla 2008:217).

Huito (*Genipa americana*: Rubiaceae) is a particularly valuable fruit-bearing shrub with multiple economic uses, widely distributed throughout the humid Neotropics from Mexico to Argentina and Caribbean islands. It is commonly found in secondary forests and in fields abandoned by shifting agriculture. A tree 15 to 20 years old can produce 400-600 fruits per year, making it an especially productive wild food source (Jøker et al. 2003). The sweet, aromatic fruits are eaten raw when ripe and used to make juice, liqueur, and fermented wine. Unripe fruits produce a brownish or blackish ink that is used by traditional indigenous people for body painting. While jagua macho is the tattoo fruit used by the Kuna of eastern Panama, huito is the tattoo fruit used in Bocas del Toro. Huito fruit, bark, and roots are all noted in ethnographic sources as containing medicinal properties used to treat respiratory disorders; the bark is reportedly rich in tannins and can be used to process plant foods and tan hides. Wood from the huito tree is strong and resistant and commonly used for construction and handicrafts (Keeler

1964; Kermath et al. 2014:387). The inhabitants of some indigenous communities in the Peruvian Amazon region apply the juice of unripe huito to their body as an insect repellent. The treated skin becomes stained dark blue for up to 12 days, and there is a belief that no sandflies will bite the treated individual. Indeed, a recent study found the unripe juice to have repellant affect against sandflies of the genera *Lutzomyia* and *Phlebotomus*, vectors of leishmaniasis, bartonellosis, and other protozoan, bacterial and viral diseases (Enrique Pérez et al. 2006).

Carbonized seeds from the pimiento (*Myrcia gatunensis*: Myrtaceae) shrub, a perennial commonly found in secondary lowland forests, are also present in the study assemblage. Pimiento berries ripen between March and August in the Atlantic watershed of Panama. They are edible and sweet-tasting, although purportedly somewhat astringent. People forage these fruits to flavor culinary dishes rather than for direct consumption. Pimiento wood is also used for construction (Carrasquilla 2008:340-341).

Palm Fruits

Surprisingly few palm taxa appear in the study assemblage considering the location of Sitio Drago alongside swamp, where many palms thrive. A variety of palms bearing useful fruits, nuts, and wood are present on the island today, and recovery of 20 complete carbonized swamp palm *(Raffia taedigera*: Arecaceae) *in situ* during excavation of Mound 6 established the swamp palm's pre-Columbian presence and use in the Neotropics (Wake 2006; see also Urquhart 1997). While the samples considered for this study did not produce identifiable swamp palm specimens, they yielded fragmented endosperms of peach palm and palma negra. Peach palm (*Bactris* sp.: Arecaceae) is a domesticated member of the Arecaceae family native to the tropical forests of South and Central America. Peach palm has been identified as an important food source in archaeological and ethnographic studies situated throughout Central America (Bennett 1992;

Clement 1989; Coe and Anderson 1996; DeWalt et al. 1999; Davis and Yost 1983; Duke 1970; Hazlett 1986; McKillop 1996; Macía 2004; Marcote-Ríos and Bernal 2001). Domesticated peach palm is an important component of modern agroforestry systems in the humid Neotropics (Clement 1989; Clement and Mora Urpí 1987; Kermath et al. 2014:116). A mature palm of about seven years produces fruits that contain a starchy mesocarp that is rich in protein, carbohydrates, vitamin A, and lipids. The fruit is eaten boiled and mashed, either alone or added to other foods, and contains an edible oil and juice that is made into *chicha*. Peach palm is also harvested for its heart of palm (a vegetable harvested from the inner core of young shoots), that is rich in calcium and is a commodity in the modern international agricultural industry. Ethnographic reports indicate some indigenous groups add boiled inflorescences (complete flower head of a plant including stems, stalks, bracts, and flowers) as a seasoning to other dishes. The inner bark of peach palm trunks is burned for ash salt (a vegetable salt-like spice) by indigenous groups in the Colombian Amazon for culinary and ritual purposes (Echeverri and Román-Jitdutjaaño 2011). People following traditional food preparation techniques in tropical regions use basin milling stones, similar to those documented at Sitio Drago, for pounding tubers as well as to squeeze the oil from palm nuts (Atinmo and Taiwo Bakre 2013:353; Balick 1979:13).

Palma negra (*Astrocaryum standleyanum*: Arecaceae) is an important part of the lowland forest ecosystem and contains numerous economically useful parts. The fruits are edible to people and other animals, although people select the pulp less frequently in comparison to the heart-of-palm (Kermath et al. 2014:102). Rather than eat the fruit directly, people suck on the sweet mesocarp of ripe fruits. Oil from the palma negra is heavily sought-after. When ripe, the inner layer of the fruit's endosperm hardens to the consistency of coconut meat. Indigenous people in Amazonian Ecuador boil the fruit, then skim the oil that rises to the top of the water as the pot cools (Fadiman 2008). Spiny rat (*Proechimys semispinosus*), a large rat identified in the Sitio Drago zooarchaeological assemblage, preys heavily on palma negra fruits and functions as an effective seed disperser (Hoch and Adler 1997). The average mature palm produces 300-400 fruits annually, weighing about 25 kg each (Leigh 1999), attracting many of the top-ranked mammals in the Neotropical diet such as domesticated pig (*Sus scrofa*), peccary (Tayassuidae family), agouti (*Dasyprocta punctata*), and paca (*Cuniculus paca*). Fibers are used by Emberá-Wounaan people of eastern Panama to weave baskets, plates, masks, and animal figurines. Palm wood is particularly durable and is used to make arrows and blowgun tubes (Chízmar et al. 2009:27-30; Runk 2001).

Garden Crops

As discussed in Chapter II, the presence of numerous basin milling stones in the island interior suggests Isla Colón people ground palm fruits and nuts, seeds, maize kernels, or tubers into flour and other food products. Manioc (*Manihot esculenta*: Euphorbiaceae), *achira* (*Canna edulis*: Cannaceae), arrowroot (*Maranta arundinacea*: Marantaceae), sweet potato (*Ipomoea batatas*: Convolvulaceae), and the New World domesticated yam (*Dioscorea trifida*: Dioscoreaceae) have been identified in microbotanical assemblages from western Panama in contexts dating prior to the Late Ceramic phase occupation of Sitio Drago (Dickau 2010; Dickau et al. 2007). While we expect to find other garden plant foods processed in a similar manner, the absence of these taxa in the macrobotanical assemblage is unsurprising given the challenges of tuber preservation. Several cultigens, however, are present in the study assemblage. Beans (*Phaseolus* sp.: Fabaceae) and maize (*Zea mays*: Poaceae), the two garden crops I identified in the assemblage, are important components of swidden agriculture systems in the Neotropical forest. Historically, maize has been of central concern for archaeologists who are interested in the emergence of agriculture in the New World. Farmers in ancient Panama began cultivating maize by 2500 BP in house gardens alongside small plots of early domesticated plants such as manioc, arrowroot, and tree fruits (Piperno and Pearsall 1998). This strategy supplemented a long-standing tradition of foraging for wild fruits, legumes, and tubers (Hladik et al. 1993). During the Early and Middle Ceramic phases, people developed swidden agriculture systems by clearing forests for larger fields located further away from their homes (Piperno et al. 2004). In other Neotropical settings, tree cropping emerged alongside house gardens and swidden fields (VanDerwarker 2005). Late Ceramic phase farmers in large, nucleated villages may have engaged in agricultural intensification through an increase in labor input or change in technology (Morrison 1994:115). In reality, many prehistoric subsistence economies in the Neotropics likely occupied a "middle ground" between foraging and intensive agricultural production.

Garden Herbs

One herbaceous plant common to house gardens in the region appears in the macrobotanical assemblage. Culantro (*Eryngium foetidum*: Apiaceae) is an herb closely related to cilantro (coriander) and indigenous to the continental Neotropics and the West Indies. Culantro grows naturally in shaded moist heavy soils near cleared fields and along edges of disturbed forest. Under cultivation, the plant thrives best under acidic soils (pH 5.5–6.5) and can be harvested year-round (Singh et al. 2014). Leaves and roots are used as seasonings and are known for providing a unique pungent aroma and essential oil. Although the plant closely resembles cilantro in appearance and morphology, the leaf aroma of culantro is deeper and stronger than its relative. It is used for garnishing, marinating, flavorings, and seasoning of culinary dishes such as soups, sauces, and meat dishes (Kermath et al. 2014:341-342). The leaves and roots are rich in calcium, iron, carotene, and riboflavin. Both parts are used as a tea for flu, diabetes, constipation, and fevers in traditional indigenous medicine. Today, the plant is increasingly becoming a crop of international trade (Ramcharan 1999).

Non-Food Plants

In addition to these edible and medicinal plants, I identified two non-food-bearing plants with economic value to traditional societies in the Neotropics. Cestrum (*Cestrum latifolium*: Solanaceae) is an evergreen shrub native to Central America. All plant parts are toxic when consumed by humans and other animals, and the plant is considered a noxious species in areas with livestock. The plant has hallucinogenic properties; the Krahô people of Amazonian Brazil have been recorded consuming a tea composed of cestrum leaves and twigs to induce shamanic visions (Rodrigues and Carlini 2006).

The other non-food plant I identified is palo de agua (*Dendropanax arboreus*: Araliaceae), a deciduous shrub that grows in the humid lowland forests. Its sprouts can be used in maize porridge for human consumption (Vásquez 1982), but it is most commonly planted for live fences and used for wood for construction (Carrasquilla 2008:56-57).

Assessment of Seasonality

In the context of studying subsistence regimes, seasonality refers to when or during which season(s) a particular event occurred. Timing of plant resource availability provides important information relevant to assessing settlement occupation and reliance on food storage as a subsistence strategy (Pearsall 2000:2). Seasonality is a qualitative assessment represented visually with a chart displaying months of bloom for each plant type identified in the assemblage. Information about phases of bloom was obtained from Smithsonian Tropical Research Institute's plant guide available on the internet (http://biogeodb.stri.si.edu/biodiversity/) and references cited in the overview of specimens section of this chapter. An assessment of seasonality for plants identified for Sitio Drago indicates that harvesting and collection of plant resources took place year-round (Table 4.5). Blooming and ripening of fruits in the Neotropical lowlands corresponds with wet and dry seasons, which in Bocas del Toro is represented by lower mean rainfall from January to April and higher mean rainfall from April to December. Maize in the Caribbean watershed of Panama can be harvested during two phases, at the beginning and end of the wet season, from April to June and October to December. Ripening of sapodilla fruits takes place during a similar timeframe. The most ubiquitous plant food and medicinal resources are harvested during the local rainy season, including jagua macho, lemon drop mangosteen, nance, and sapote fruits. Three economically useful fruits, bejuco, charichuelo, and palma negra, are harvested during the brief dry season. Bean, one of two garden crops identified in the samples, is also harvested during the drier months of January through March. Villagers on Isla Colón may have foraged for and practiced tree-cropping of plant types with various months of bloom to maintain year-round availability of plant food and medicinal resources important to their diet and healing traditions, without need for mobile foraging or storage facilities.

Absolute Counts, Densities, and Weights

Identification of plant remains in the study assemblage strongly suggests Late Ceramic people at Sitio Drago engaged in numerous foraging and cultivation activities. Recent discourse on the subsistence economies of traditional societies has acknowledged that the either/or conceptual dichotomy of hunter-gatherers and agriculturalists is a gross oversimplification (Smith 2001; see also Michon 2012). It is likely, however, that people depended more heavily on some plant food procurement methods than others. The ways in which people obtain plant food are heavily dependent on community organization in terms of space, availability of labor, and

Table 4.5. Approximate Harvest Seasons for Economic Parts of All Identified Plants from Unit SD-49, -50, -51, -60, and -61.

Taxon	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
	DRY SEASON				*WET SEASON*							
Jagua macho							x	x	x	x	x	x
Maize				x	x	x				x	x	x
Cestrum							x	x	x	x	x	
Peach palm								x	x	x		
Pimiento								x	x			
Mamoncillo							x	x	x	x		
Guabito de río						x	x	x				
Huito					x	x	x					
Lemon drop mangosteen					x	x	x	x	x			
Palo de agua					x	x	x	x	x			
Nance			x	x	x	x	x	x	x	x		
Sapote			x	x	x	x	x	x	x	x		
Sapodilla		x	x	x						x	x	x
Palma negra	x	x	x									
Charichuelo	x	x	x									
Bean genus	x	x	x	x								
Schery	x	x	x	x							x	x
Bejuco	x	x	x	x								
Carica papaya	x	x	x	x	x	x	x	x	x	x	x	x
Culantro	x	x	x	x	x	x	x	x	x	x	x	x

hierarchy. For example, elite demand for special luxury foods and domestic surplus crops requires expansion and control of cleared fields designated for these tasks. Fluctuations in population size and elite involvement in routine subsistence activities of ordinary people create changes in food production strategies. To understand these strategies we must quantify the floral assemblage.

Unstandardized counts provide a quick overview of specimen richness. Combining absolute counts from all samples shows that 3,117 carbonized plant specimens from the screen and flotation samples are present in the study assemblage. Of these specimens, the majority (n=3059) of carbonized plant remains could be identified to the taxonomic level of Family, Genus, and/or Species based on appearance of seed morphology or plant tissue structure. Although this study reports plant specimens from flotation (n=3041; Table 4.6 and Table 4.7) and screened (n=76; Table 4.8 and Table 4.9) samples, analyses will use only materials from the flotation samples unless otherwise noted. A sufficiently large number of specimens present in each time phase are needed to assess foraging and farming activities. Flotation sampling at Sitio Drago successfully produced a comparatively large study assemblage given the challenges of recovering macrobotanical specimens in Neotropical soils. Across all five units, flotation samples from the Pre-Biscuitware Phase yielded 1479 plant specimens, samples from the Biscuitware Phase yielded 744 plant specimens, and samples from the Historic Phase yielded 818 plant specimens (see Table 4.6 and Table 4.8).

In addition to changing preference for particular foodstuff, people may change their patterns of food discard in quantity and location. Adjusted for total liters of soil excavated, densities of plant specimens are highest in flotation samples recovered from Units SD-49 and -50, which are situated along the well-developed general midden deposit in the domestic context

Table 4.6. Flotation Samples, Seed Counts, Seed Densities, and Wood Charcoal Weights by Unit, All Phases Combined.

Unit	*Total # of Samples*	*Total Sediment Volume (L)*	*Total Seed Count**	*Density per Liter*	*Total Charcoal Wood Weight (g)*	*Wood Density*
SD-49	20	174.6	843	4.83	39.18	0.2244
SD-50	11	127.2	863	6.78	291.14	2.2888
SD-51	26	210.6	735	3.49	182.23	0.8653
SD-60	9	81	289	3.57	52.87	0.6527
SD-61	9	81	293	3.62	37.65	0.4648
ST-1	1	3	18	6.00	3.96	1.32
Total	*76*	*677.4*	*3041*	*4.83*	*607.03*	*0.2244*

*Excludes unidentifiable seeds and fragments.

Table 4.7. Flotation Samples, Seed Counts, Seed Densities, and Wood Charcoal Weights by Phase, All Sites Combined.

Phase	*Total # of Samples*	*Total Sediment Volume (L)*	*Total Seed Count**	*Density per Liter*	*Total Charcoal Wood Weight (g)*	*Wood Density*
Historic	12	84.6	818	9.67	912.27	10.7833
Biscuitware	16	147.6	744	5.04	896.64	6.0748
Pre-Biscuitware	48	445.2	1479	3.32	1927.52	4.3296
Total	*76*	*677.4*	*3041*	*4.49*	*3736.43*	*5.5158*

*Includes unidentifiable seeds and fragments.

Table 4.8. Screened Samples, Seed Counts, Seed Densities, and Wood Charcoal Weights by Unit, All Phases Combined.

Unit	*Total # of Samples*	*Total Sediment Volume (L)*	*Total Seed Count**	*Density per Liter*	*Total Charcoal Wood Weight (g)*	*Wood Density*
SD-49	7	1500	7	0.0046	45.11	0.0301
SD-50	11	4750	65	0.0137	400.02	0.0842
SD-51	12	4860	4	0.0008	173.2	0.0356
SD-60	0	0	0	0	0	0
SD-61	0	0	0	0	0	0
ST-1	0	0	0	0	0	0
Total	*30*	*11,110*	*76*	*0.0068*	*618.33*	*0.0557*

*Excludes unidentifiable seeds and fragments.

Table 4.9. Screened Samples, Seed Counts, Seed Densities, and Wood Charcoal Weights by Phase, All Site Combined.

Phase	*Total # of Samples*	*Total Sediment Volume (L)*	*Total Seed Count**	*Density per Liter*	*Total Charcoal Wood Weight (g)*	*Wood Density*
Historic	3	800	2	0.0025	42.38	0.053
Biscuitware	7	3110	54	0.0173	284.43	0.0915
Pre-Biscuitware	20	7200	20	0.0028	291.52	0.0405
Total	*30*	*11,110*	*76*	*0.0068*	*618.33*	*0.0557*

*Includes unidentifiable seeds and fragments.

(see Table 4.6). In comparison, samples from Unit SD-51, located in the domestic deposit, and Units SD-60 and -61, located in the mortuary context, produced fewer specimens per liter of soil. Densities of particular plant types are also unevenly distributed across units (Table 4.10). For example, charichuelo is present in all units except SD-60 and ranges in value from 0.01 to 0.26. Culantro, which is present only in the Historic Phase palimpsest deposits of units SD-49 and -51, is present in density values of 0.12 and 0.01, respectively. Variation in plant densities recovered from domestic contexts (Units SD-49, -50, and -51) may be an effect of villagers utilizing different parts of the site for distinctly separate disposal activities.

Density measures can be used to assess abundance of plant materials as they were incorporated in the archaeological record or recovered during excavation. Across all five units, the total density of plant remains recovered from flotation samples steadily decreases from Historic through Pre-Biscuitware Phase samples (see Table 4.11). This pattern is notable as the number of samples substantially increases from Pre-Biscuitware through Historic Phase deposits. Densities of several food and medicinal plant resources steadily increase with time, including bejuco, charichuelo, lemon drop mangosteen, nance, pimiento, schery, and specimens assigned to Psychotria and Pumpwood genera. A few plant types are notable for their distinct variation across phases. Density of maize peaks during the Biscuitware Phase and drops off during the Historic Phase. Some plant types notably disappear during the Historic Phase, including jagua de macho, palo de agua, peach palm, sapodilla, and specimens assigned to the nightshade family. Huito, a foraged fruit, maintains a consistent density value across all three phases. Results point to observable variation in plant types incorporated in deposits associated with different contexts and time phases.

Table 4.10. Absolute Counts (#) and Densities (ρ), Total Seed count Divided by Total Soil Volume, of Seed Remains Recovered from Flotation Samples Excavated from All Units at Sitio Drago.

Taxon	*Domestic*						*Mortuary*			
	SD-49		SD-50		SD-51		SD-60		SD-61	
	#	ρ	#	ρ	#	ρ	#	ρ	#	ρ
Garden Crops										
Bean genus	7	0.04	29	0.23	15	0.07	4	0.05	10	0.12
Maize	59	0.34	82	0.64	81	0.38	119	1.47	180	2.22
Tree Fruits										
Carica papaya							5	0.06		
Charichuelo	16	0.09	33	0.26	3	0.01			17	0.21
Lemon drop mangosteen	13	0.07	30	0.24	14	0.07				
Mamoncillo							3	0.04		
Nance	24	0.14	33	0.26	82	0.39	3	0.04	5	0.06
Sapodilla	12	0.07	32	0.25					51	0.63
Sapote							1	0.01		
Sapotaceae family							42	0.52		
Palm Fruits										
Palma negra									1	0.01
Peach palm							3	0.04		
Shrub Fruits										
Bejuco	5	0.03			1	<0.01				
Guabito de río									1	0.01
Huito	3	0.02	39	0.31	64	0.3	2	0.02		
Jagua macho							6	0.07	2	0.02
Coffee family	25	0.14	217	1.71	106	0.5	17	0.21		
Coccocypselum genus	12	0.07	123	<0.01	50	0.24	5	0.06		
Psychotria genus	251	1.44	138	1.08	122	0.58			3	0.04
Other Food Plants										
Culantro	21	0.12			3	0.01				
Pimiento	213	1.22	1	0.01	21	0.1	27	0.33		
Schery	33	0.19	93	0.73	115	0.55				
Non-Food Plants										
Cestrum							5	0.06		
Palo de agua							22	0.27		
Miscellaneous Plant Taxa										
Buckthorn family							2	0.02		
Jagua genus									14	0.17
Knotweed family							3	0.04	3	0.04
Nightshade family							10	0.12	6	0.07
Pumpwood genus	149	0.85	13	0.1	58	0.28				
Total # of Seeds	*843*		*863*		*735*		*289*		*293*	
Total Volume of Soil	*174.6*		*127.2*		*210.6*		*81*		*81*	

Table 4.11. Absolute Counts (#) and Densities (ρ), Total Seed Count Divided by Total Soil Volume, of Seed Remains Recovered from Flotation Samples Representing All Phases at Sitio Drago.

Taxon	*Pre-Biscuitware*		*Biscuitware*		*Historic*	
	#	ρ	#	ρ	#	ρ
Garden Crops						
Bean genus	23	0.05	37	0.25	6	0.07
Maize	316	0.71	198	1.34	7	0.08
Tree Fruits						
Carica papaya	5	0.01				
Charichuelo	16	0.04	36	0.24	17	0.2
Lemon drop mangosteen	25	0.06	17	0.12	15	0.18
Mamoncillo	3	0.01				
Nance	35	0.08	15	0.1	97	1.15
Sapodilla	26	0.06	69	0.47		
Sapote	1	<0.01				
Sapotaceae family	28	0.06	14	0.09		
Palm Fruits						
Palma negra	1	<0.01				
Peach palm	2	<0.01	1	0.01		
Shrub Fruits						
Bejuco	4	0.01	1	0.01	1	0.01
Guabito de río	1	<0.01				
Huito	95	0.21	11	0.07	6	0.07
Jagua macho	4	0.01	4	0.03		
Coffee family	241	0.54	107	0.72	17	0.2
Coccocypselum genus	119	0.27	67	0.45	14	0.17
Psychotria genus	221	0.5	75	0.51	250	2.96
Miscellaneous Food Plants						
Culantro					24	0.28
Pimiento	26	0.06	11	0.07	199	2.35
Schery	178	0.4	28	0.19	36	0.43
Non-Food Plants						
Cestrum	5	0.01				
Palo de agua	9	0.02	13	0.09		
Miscellaneous Plant Taxa						
Buckthorn family	2	<0.01				
Jagua genus	14	0.03				
Knotweed family	6	0.01				
Nightshade family	12	0.03	4	0.03		
Pumpwood genus	61	0.14	36	0.24	129	1.52
Total # of Seeds	*1479*		*744*		*818*	
Total Soil Volume	*445.2*		*147.6*		*84.6*	

Unit ST-1

The single sample from Sitio Teca (Unit ST-1) provides a surprisingly high density of identifiable plant remains in comparison to Sitio Drago samples (Table 4.12). This phenomenon may be an effect of the unique treatment the ST-1 flotation sample received during in-field processing (a discussion of this issue is presented at the end of this chapter). The single sample will not be included in subsequent analyses as it represents an older occupation phase located inland rather than on the coast of Isla Colón. However, identification of plant specimens in this sample provides important information on the plant types used by the earliest documented people on the island. I identified a single specimen as belonging to the genus *Phaseolus*, which post-dates the earliest known presence of domesticated bean in western Panama (Piperno and Smith 2012:151). The sample also contains two foraged fruits, huito and schery, which are important plant food resources. In addition, I identified pimiento, the wild berry used for flavoring culinary dishes. The sample also contains several specimens identified as possibly belonging to the *Psychotria* and pumpwood genera. Recovery of relatively abundant plant materials from the ST-1 sample provides encouraging results in regards to future sampling of older deposits located in the inland portions of Isla Colón.

Ubiquity Indices

Human communities are the prime movers in ecosystems they inhabit and, as such, political and economic changes can leave visible signatures in the landscape. Environmental impacts and socially-driven preference for particular plant foods and animal foods can appear as the presence and absence of plant taxa in the archaeobotanical record. The presence and absence of plant taxa by unit with phases combined shows that some plant types are present exclusively in certain deposits while others appear in groupings of units (Table 4.13). Bean, maize, nance,

Table 4.12. Absolute Counts (#) and Densities (*ρ*)* of Seed Remains Recovered from a Single Flotation Sample Excavated from a Deposit at Sitio Teca Dating Prior (AD 60-450) to the Pre-Biscuitware Phase.

Taxon	*ST-1*	
	#	**ρ**
Bean genus	1	0.33
Huito	4	1.33
Pimiento	1	0.33
Psychotria genus	5	1.67
Pumpwood genus	6	1.5
Schery	1	0.33
Total # of Seeds	*18*	
Total # of Samples	*1*	
Total Soil Volume (L)	*3*	

* Total number of seed remains divided by total sediment volume.

Table 4.13. Presence and Absence of Identified Plants Recovered from Units SD-49, -50, -51, -60, And -61, All Phases Combined.

Taxon	*Domestic*			*Mortuary*	
	SD-49	*SD-50*	*SD-51*	*SD-60*	*SD-61*
Garden Crops					
Bean genus	x	x	x	x	x
Maize	x	x	x	x	x
Tree Fruits					
Carica papaya				x	
Charichuelo	x	x	x		x
Lemon drop mangosteen	x	x	x		
Mamoncillo				x	x
Nance	x	x	x	x	x
Sapodilla	x	x			x
Sapote				x	
Sapotaceae family				x	
Palm Fruits					
Palma negra					x
Peach palm				x	
Shrub Fruits					
Bejuco	x		x		
Guabito de río					x
Huito	x	x	x	x	
Jagua macho				x	x
Coffee family	x	x	x	x	
Coccocypselum genus	x	x	x	x	
Psychotria genus	x	x	x	x	x
Miscellaneous Food Plants					
Culantro	x		x		
Pimiento	x	x	x		
Schery	x	x	x		
Non-Food Plants					
Cestrum				x	
Palo de agua				x	
Miscellaneous Plant Taxa					
Buckthorn family				x	
Jagua genus					x
Knotweed family				x	x
Nightshade family				x	x
Pumpwood genus	x	x	x		
Total # of Taxa	*15*	*13*	*14*	*19*	*13*
Total # of Seeds	*843*	*863*	*735*	*289*	*293*
Total # of Samples	*20*	*11*	*26*	*9*	*9*
Total Sediment Volume (L)	*174.6*	*127.2*	*210.6*	*81*	*81*

and specimens assigned to the *Psychotria* genus, are present in all units, suggesting a consistent presence as food refuse throughout the village. Presence and absence of plant types across mortuary (SD-60 and -61) and domestic (SD-49, -50, and -51) contexts allows us to broadly assess potential preference for disposal of plant food types in each area of the site. People appear to have disposed the majority of plant foods and medicinal resources in both contexts. However, ten taxa are present exclusively in deposits associated with the prehistoric cemetery, including important food and fermented beverage resources sapote, guabito de río, palma negra, mamoncillo, and jagua macho. Two of these taxa, papaya and peach palm, are represented in the study assemblage by particularly low counts. Middens located in the domestic context, distanced from the prehistoric cemetery, contain five taxa that were not identified in the cemetery-area middens. Only two are major plant food resources (bejuco and lemon drop mangosteen), and the other three (culantro, pimiento, and schery) are used primarily for flavoring and seasoning culinary dishes.

The chart comparing deposits by unit (see Table 4.10) suggests people incorporated more condiment foods and lower-ranked plant foods (e.g., pimiento, culantro, schery) in the domestic middens. Presence and absence of plant taxa by phase with units combined allows us to broadly address change in plant resource preference through different cultural phases and phases of demographic change (Table 4.14). Roughly half of identified plant taxa are present in samples from all three time phases, including crops such as bean and maize and fruit trees bejuco, charichuelo, huito, lemon drop mangosteen, and nance. The presence of pimiento, a berry used to infuse a peppery flavor in culinary dishes, is also ubiquitous across all three time phases. Several patterns do indicate people disposed of some plant foods only in particular time phases. Four high-ranked tree fruits (papaya, guabito de río, mamoncillo, and sapote) are present only in

Table 4.14. Presence and Absence of Identified Plants Recovered from Pre-Biscuitware, Biscuitware, and Historic Phase Deposits in Units SD-49, -50, -51, -60, and -61.

Taxon	*Pre-Biscuitware*	*Biscuitware*	*Historic*
Garden Crops			
Bean genus	x	x	x
Maize	x	x	x
Tree Fruits			
Carica papaya	x		
Charichuelo	x	x	x
Lemon drop mangosteen	x	x	x
Mamoncillo	x		
Nance	x	x	x
Sapodilla	x	x	x
Sapote	x		
Sapotaceae family	x	x	
Palm Fruits			
Palma negra	x		
Peach palm	x	x	
Shrub Fruits			
Bejuco	x	x	x
Guabito de río	x		
Huito	x	x	x
Jagua macho		x	
Coffee family	x	x	x
Coccocypselum genus	x	x	x
Psychotria genus	x	x	x
Miscellaneous Food Plants			
Culantro			x
Pimiento	x	x	x
Schery	x	x	
Non-Food Plants			
Cestrum	x		
Palo de agua	x	x	
Miscellaneous Plant Taxa			
Buckthorn family	x		
Jagua genus	x		
Knotweed family	x		
Nightshade family	x	x	
Pumpwood genus	x	x	x
Total # of Taxa	*26*	*19*	*14*
Total # of Seeds	*1479*	*744*	*818*
Total # of Samples	*48*	*16*	*12*
Total Sediment Volume (L)	*445.2*	*147.6*	*84.6*

the Pre-Biscuitware phase deposits. Cestrum, the non-food plant resource possibly used for construction or ritual, also appears exclusively in samples representing the oldest phase. Jagua macho, the edible tree fruit, is present only in Biscuitware Phase samples. Culantro does not appear in samples until the Historic Phase. Interestingly, the number of plant types present steadily decreases with each successive time phase, from 27 in Pre-Biscuitware, to 20 in Biscuitware, and 14 in Historic Phase deposits.

Ubiquity Values

Based on the identified plant remains, Late Ceramic people at Sitio Drago engaged in a wide breadth of plant food collection and cultivation activities. Routine resource creation and management likely produced a domesticated landscape with implications for the diversity, distribution, and availability of local species. Tree-cropping, for example, requires culling from the forest patch trees that have little economic use, that drain the fertility of soils, or that cover and block sunlight from shorter cultivated trees.

Calculation of ubiquity values for the entire Sitio Drago assemblage, combining all units and time phases, provides a broad overview of preference for plant resources on Isla Colón (Table 4.15). Taxa with ubiquity values higher than 10% include either garden crops (maize, bean) or tree and shrub fruits (schery, nance, pimiento, huito, charichuelo, lemon drop mangosteen, and sapodilla). Quite notably, maize has the highest ubiquity value, and other highly-ranked plant food and medicinal resources are (in descending order of ubiquity) schery, nance, pimiento, bean, huito, charichuelo, lemon drop mangosteen, and sapodilla. These garden crops and tree/shrub fruits are featured prominently as sources of food and medicine in ethnohistoric accounts of people living in the Central American lowland Neotropical forests. However, maize and domesticated bean have not been previously documented in the

Table 4.15. Ubiquity Ranking of Identified Plants by Presence and Percentage from All Phases Combined at Units SD-49, -50, -51, -60, and -61.

Rank	*Taxon*	*# Samples Present*	*% of Samples Present*
	Garden Crops		
1	Maize	63	84
5	Bean genus	26	34.7
	Tree Fruits		
3	Nance	35	46.7
7	Charichuelo	21	28
8	Lemon drop mangosteen	19	25.3
9	Sapodilla	16	21.3
13	*Carica papaya*	1	1.3
13	Mamoncillo	1	1.3
13	Sapote	1	1.3
	Palm Fruits		
12	Peach palm	3	4
13	Palma negra	1	1.3
	Shrub Fruits		
6	Huito	22	29.3
10	Jagua macho	5	6.7
11	Bejuco	4	5.3
13	Guabito de río	1	1.3
	Miscellaneous Food Plants		
2	Schery	41	54.7
4	Pimiento	33	44
10	Culantro	5	6.7
	Non-Food Plants		
10	Palo de agua	5	6.7
13	Cestrum	1	1.3
Total Number of Samples		*76*	

archaeological record in the area. These results contradict assumptions that the Bocas del Toro area could not have supported agriculture, and dispels the myth that people living in this region depended exclusively on "vegeculture," a term coined for exploitation of domesticated root crops and wild tree crops (Linares 1976, 1977; Linares and Ranere 1980). In fact, Late Ceramic people at Sitio Drago apparently combined locally-available plant foods with cultigens to engage in a similar system of mixed food production.

Generating ubiquity values of identified taxa from each phase of occupation is useful to understand differences in floral deposition among the Pre-Biscuitware (Table 4.16), Biscuitware (Table 4.17), and Historic (Table 4.18) phase deposits. For example, maize is the top-ranked plant food resource across both prehistoric phases in terms of ubiquity values, with a decrease of about 60% during the Historic Phase. Two garden crops, maize and bean, increase substantially in ubiquity value from the Pre-Biscuitware to Biscuitware Phase samples, then decrease in the Historic Phase. While people living on Isla Colón likely continued to farm maize and beans well after European contact, results suggest a shift in individuals' access to the plants and/or producing, processing, and eating activities became more spatially restricted. Tree and shrub fruits present most frequently during the Pre-Biscuitware Phase are schery, huito, and nance. Huito and schery values remain consistent through time, but nance, charichuelo, and sapodilla ubiquity values increase noticeably during subsequent phases. These fruits may have been deposited more commonly in later occupational phases as people began expanding cultivation of tree stands in forest mosaics. Several notable changes take place in ubiquity value ranking during the Historic Phase; pimiento becomes the top-ranked plant food resource alongside nance, and culantro appears for the first time as a fourth-ranked resource. Long-term transformations of the landscape during the prehistoric phases followed by population decline and sudden shifts in land

Table 4.16. Ubiquity Ranking of Identified Plants by Presence and Percentage from Pre-Biscuitware Phase Deposits at Units SD-49, -50, -51, -60, and -61.

Rank	*Taxon*	*# Samples Present*	*% of Samples Present*
	Garden Crops		
1	Maize	39	83
5	Bean genus	12	25.5
	Tree Fruits		
4	Nance	13	27.7
6	Lemon drop mangosteen	9	19.1
7	Sapodilla	7	14.9
8	Charichuelo	6	12.8
12	*Carica papaya*	1	2.1
12	Mamoncillo	1	2.1
12	Sapote	1	2.1
	Palm Fruits		
11	Peach palm	2	4.3
12	Palma negra	1	2.1
	Shrub Fruits		
3	Huito	17	36.2
10	Jagua macho	3	6.4
11	Bejuco	2	4.3
12	Guabito de río	1	2.1
	Miscellaneous Food Plants		
2	Schery	25	53.2
4	Pimiento	13	27.7
	Non-Food Plants		
10	Palo de agua	3	6.4
12	Cestrum	1	2.1
	Miscellaneous Plant Taxa		
9	Jagua genus	5	10.6
Total Number of Samples		*47*	

Table 4.17. Ubiquity Ranking of Identified Plants by Presence and Percentage from Biscuitware Phase Deposits at Units SD-49, -50, -51, -60, and -61.

Rank	*Taxon*	*# Samples Present*	*% of Samples Present*
	Garden Crops		
1	Maize	16	100
2	Bean genus	10	62.5
	Tree Fruits		
3	Charichuelo	9	56.2
3	Sapodilla	9	56.2
4	Nance	7	43.8
5	Lemon drop mangosteen	5	31.3
	Palm Fruits		
8	Palma negra	2	12.5
	Shrub Fruits		
7	Huito	3	18.8
8	Jagua macho	2	12.5
9	Bejuco	1	6.3
	Miscellaneous Plant Foods		
4	Schery	7	43.8
6	Pimiento	4	25
	Non-Food Plants		
9	Palo de agua	1	6.3
Total Number of Samples		*16*	

Table 4.18. Ubiquity Ranking of Identified Plants by Presence and Percentage from Historic Phase Deposits at Units SD-49 and -51.

Rank	*Taxon*	*# Samples Present*	*% of Samples Present*
	Garden Crops		
5	Bean genus	4	33.3
5	Maize	4	33.3
	Tree Fruits		
1	Nance	14	100
3	Charichuelo	6	50
4	Lemon drop mangosteen	5	41.7
	Shrub Fruits		
6	Huito	2	16.7
7	Bejuco	1	8.3
	Miscellaneous Food Plants		
1	Pimiento	16	100
2	Schery	9	75
4	Culantro	5	41.7
Total Number of Samples		*12*	

use during the Historic Phase are one possible dynamic driving these patterns.

Landscape management can differ in use over discrete spatial areas as well as over phases of time. If patterns of plant food debris disposal on Isla Colón differed among separate sites areas, there may be differences in the number of specimens per sample of certain taxon. Generating ubiquity values of identified taxa from mortuary and domestic contexts helps in the identification of spatial differences in food debris deposition (Table 4.19). Maize is a top-ranked plant food in both contexts, but bean and sapodilla are present in comparatively more samples from mortuary deposits than domestic deposits. Several important tree and shrub fruits appear exclusively in the mortuary context, including peach palm, palma negra, and jagua macho. Results suggest that maize, bean, and sapodilla are more ubiquitous in samples from the mortuary context.

Assessment of Diversity

Species diversity is one of the principal foci in the historical-ecological study of landscape transformation (see Balée 2014). Modern conservation efforts have largely hinged on the assumption that a high rate of biotic diversity can be read as an indicator of habitat health. Similarly, archaeological studies of risk management traditionally interpret high biodiversity rate in resource procurement as a resilient strategy; low biodiversity rates suggest the people are, in effect, dangerously “putting all their eggs in one basket.” In New World ecosystems, the introduction of human and cultural activity to a previously “pristine” landscape, particularly the development of agricultural dependence, is correlated with declining rates of species biodiversity and, thus, habitat health (e.g., Denevan 2006; Erickson 2000, 2006, 2010; Fisher 2009; Fitzpatrick and Keegan 2007, etc.). Outside the interpretive lens shaped by these assumptions and similar models, measurements of species evenness and richness in archaeobotanical

Table 4.19. Ubiquity Ranking of Identified Plants by Presence and Percentage from Pre-Biscuitware and Biscuitware Domestic and Mortuary Context Deposits at Units SD-60 and -61.

# Samples Present	*% of Samples Present*	*Rank Domestic*	*Taxon*	*Rank Mortuary*	*# Samples Present*	*% of Samples Present*
			Garden Crops			
35	77.8	1	Maize	1	18	100
14	31.1	6	Common bean	2	8	44.4
			Tree Fruits			
8	17.8	8	Sapodilla	2	8	44.4
15	33.3	5	Nance	3	6	33.3
14	31.1	6	Lemon drop mangosteen			
12	26.7	7	Charichuelo	5	3	16.7
			Carica papaya	6	1	5.6
			Mamoncillo	6	1	5.6
			Sapote	6	1	5.6
			Palm Fruits			
			Peach palm	5	3	16.7
			Palma negra	6	1	5.6
			Shrub Fruits			
			Jagua macho	4	5	27.8
			Guabito de río	6	1	5.6
19	42.2	3	Huito	6	1	5.6
3	6.7	9	Bejuco			
			Miscellaneous Food Plants			
32	71.1	2	Schery			
17	37.8	4	Pimiento			
			Non-Food Plants			
			Cestrum	6	1	5.6
Total Number of Samples		*45*		*Total Number of Samples*		*18*

assemblages can suggest temporal changes in scale of farming and foraging activities and dietary breadth resulting from population expansion or agricultural intensification.

The results of the DIVERS computer simulation for Sitio Drago are presented in a plot of richness (Figure 4.5) and evenness (Figure 4.6) by sample size for each phase. The three lines on the plots are means and confidence intervals at each sample size. The center line in the DIVERS plot represents the mean expected evenness or richness value, and the lines around the center line project the mean 95% upper and lower confidence interval for expected values. In Figure 4.5, all three phases fall below the confidence interval for expected richness values given their sample sizes, suggesting the archaeobotanical assemblages are less diverse than expected in terms of richness. The Pre-Biscuitware Phase sample falls inside the confidence interval, while the Biscuitware Phase sample falls outside the confidence interval, suggesting a significant decrease in plant taxa richness from the Pre-Biscuitware to the Biscuitware Phase. This means that the plant-based diet is less rich than expected during all three phases if past people practiced the same subsistence activities across all three phases, assuming taphonomic processes were consistent.

In Figure 4.6, all of the three phases fall below the confidence interval for expected evenness values; these assemblages are less diverse than expected in terms of evenness. This means each assemblage is skewed towards a certain resource or set of resources. Densities calculated for plant types during each phase point to several specific resources (see Table 4.11). In the Pre-Biscuitware Phase samples, standardized counts for all plants are less than 0.15, while densities of maize (ρ=0.71), coffee family (ρ=0.54), schery (ρ=0.4), coccocypselum (ρ=0.27), and huito (ρ=0.21) are visibly higher. The Biscuitware Phase assemblage is skewed towards maize (ρ=1.34), coffee family (ρ=0.72), *Psychotria* (ρ=0.51), sapodilla (ρ=0.47), and

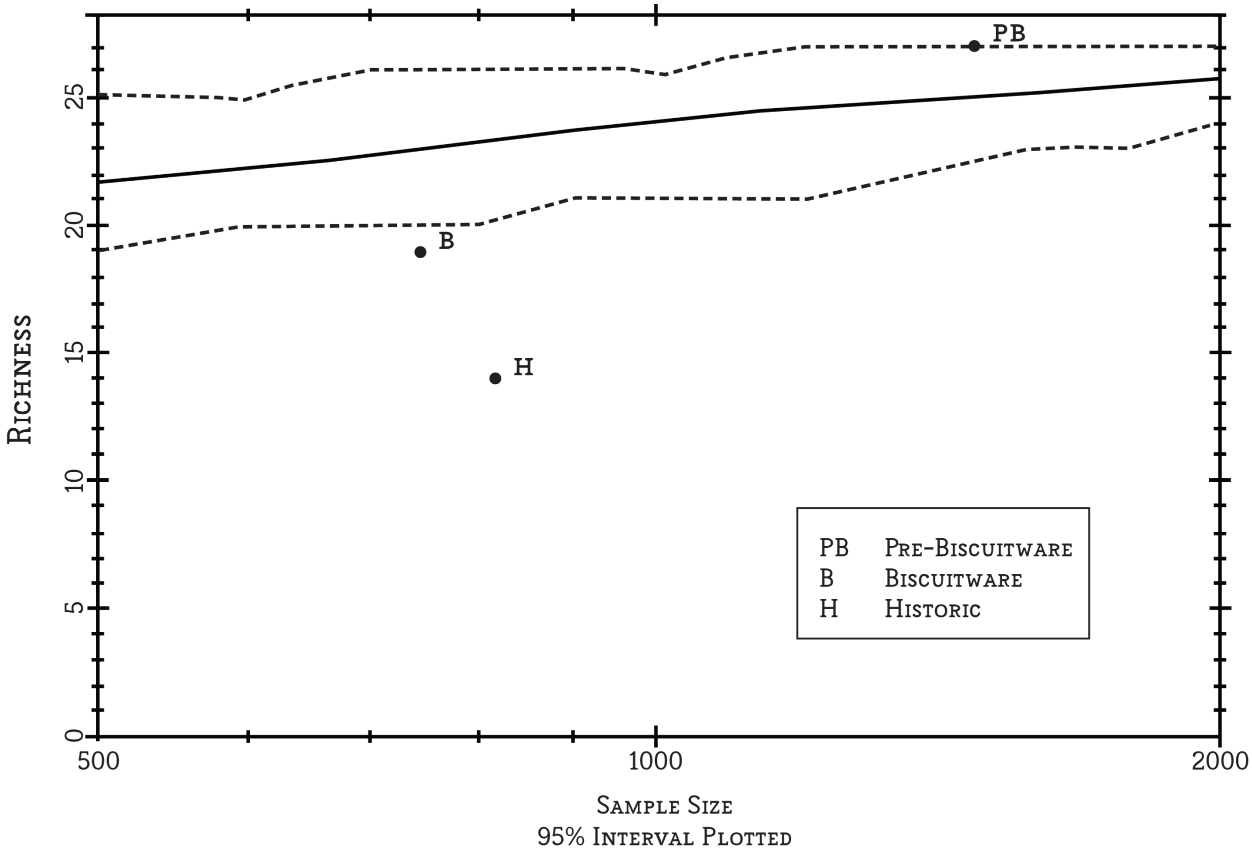


Figure 4.5. DIVERS richness plot of Sitio Drago plant remains by phase.

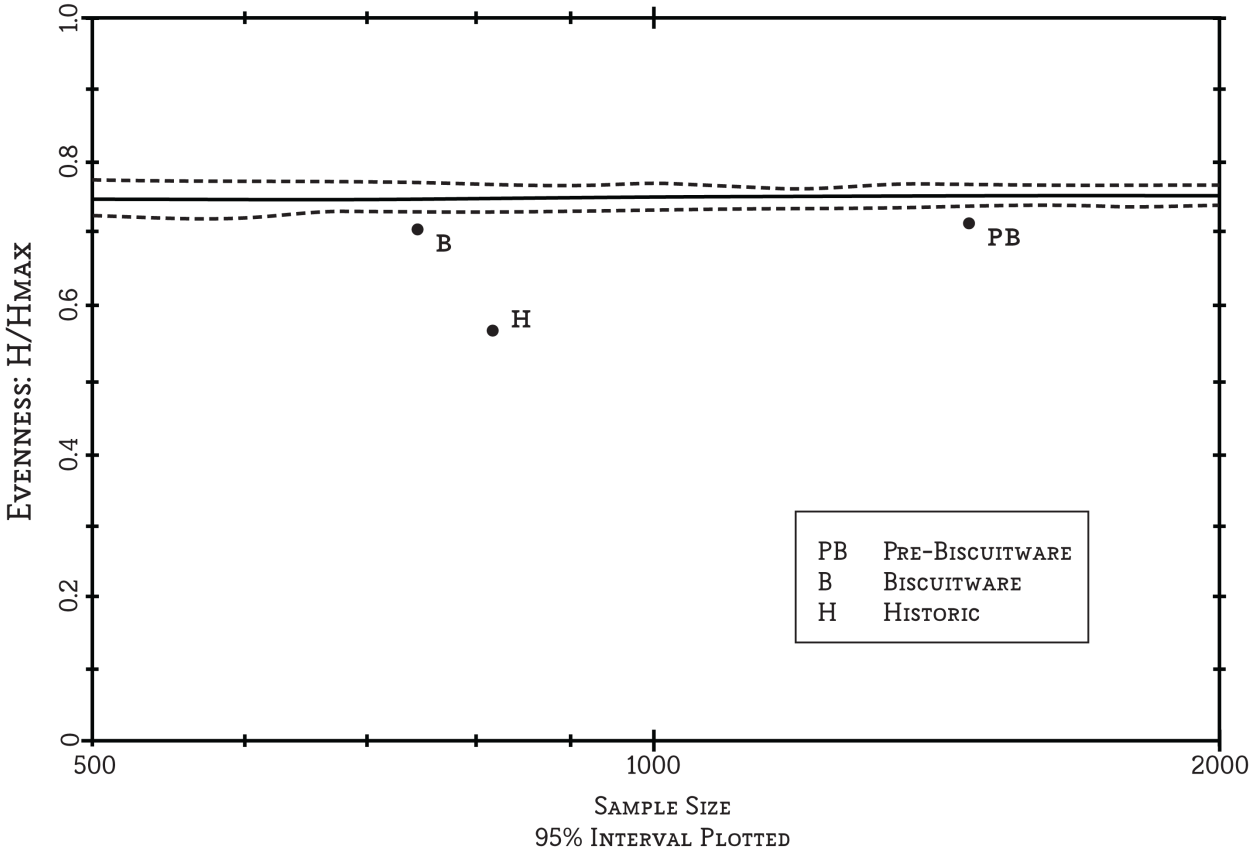


Figure 4.6. DIVERS evenness plot of Sitio Drago plant remains by phase.

coccocypselum (ρ=0.45), while the remaining taxa have density values lower than 0.25. During the Historic Phase, *Psychotria* (ρ=2.96), pimiento (ρ=2.35), pumpwood (ρ=1.52), and nance (ρ=1.15) have notably higher density values than other taxa (ρ =<0.5).

The Shannon-Weaver index calculates richness as an overall diversity index (H') and equitability (V'). Higher numeric values for H' indicate higher species diversity in terms of richness. Equitability values (V') range from 0 to 1, with a value of 1 indicating an even distribution of taxa, and lower values representing less even (more skewed) distributions. Calculation of H’ and V’ values of plant assemblages by time phase at Sitio Drago indicates a very diverse (richness) and unevenly distributed prehistoric diet (Figure 4.7 and Table 4.20). Diversity in terms of richness decreases significantly in the Historic Phase sample.

The results of DIVERS analysis and Shannon-Weaver index calculations on the archaeobotanical assemblage from Sitio Drago point to a relatively diverse yet unevenly distributed plant-based diet. The DIVERS analysis shows a significant decrease in richness during the Biscuitware Phase, and all methods indicate that plant diversity plummets again during the Historic Phase. People living at Sitio Drago seem to have narrowed types of plant foods procured with each successive occupation. The following presentation of relative abundances and ratios will focus on specific plant taxa and procurement activities in order to explore these changes in greater detail.

Individual Assessment of Taxa

The rankings and diversity analyses presented above provide a useful starting point for assessing variation between different plant resources through time. The calculation of ubiquity and diversity values, however, depends on how each taxon is represented in comparison to others within their assemblage. Here I use ratios of density measures (counts/soil volume per sample) to

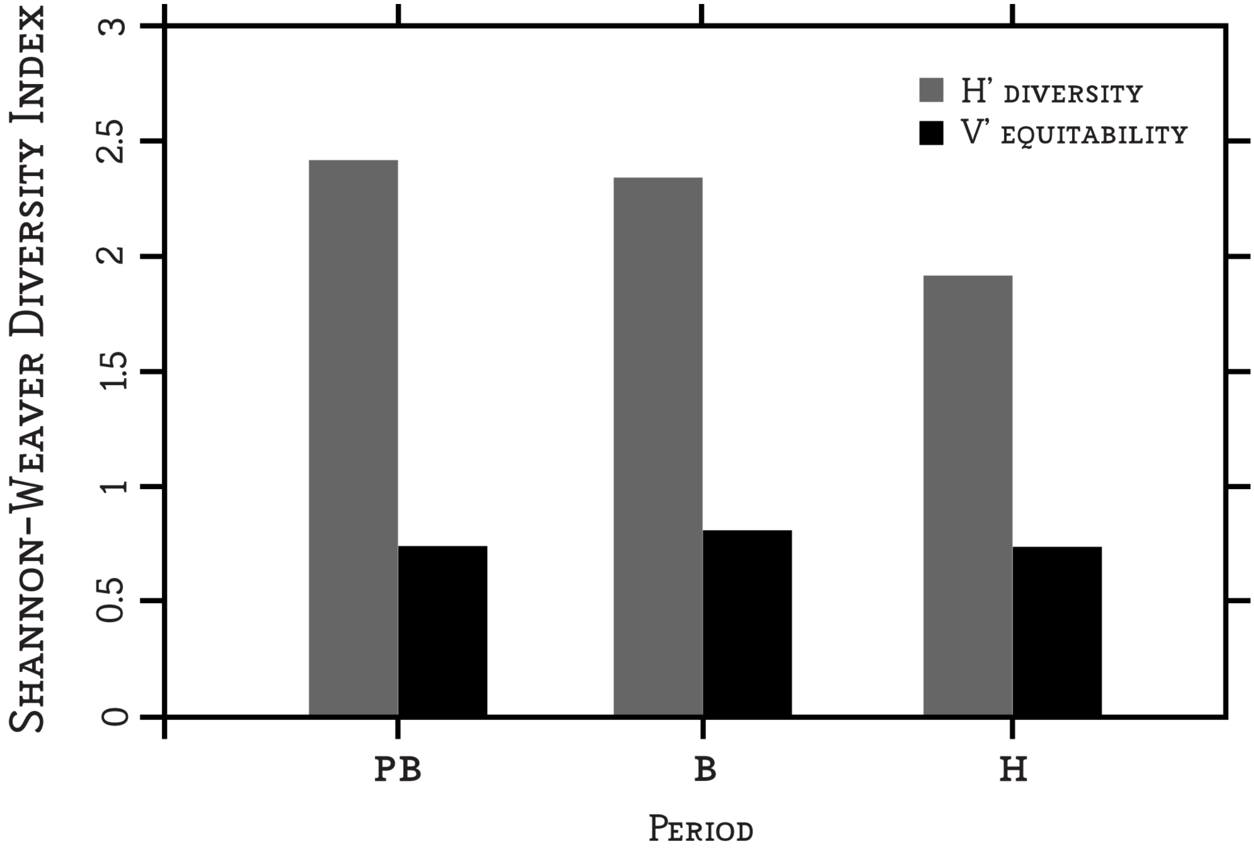


Figure 4.7. Shannon-Weaver diversity value plot of Sitio Drago plant remains by phase.

Table 4.20. Shannon-Weaver Diversity Values for Sitio Drago Plant Assemblage by Phase.

Value	*Pre-Biscuitware*	*Biscuitware*	*Historic*
H'	2.41	2.37	1.92
V'	0.73	0.81	0.73

consider how each plant resource changes in relative importance with each occupational phase. I present these values as distributions in the form of box plots. In these figures, the narrow waist that divides the box into two parts is the median (middle quartile) and marks the mid-point of the data. The box itself is thus composed of the upper quartile (75% of the scores) and the lower quartile (25% of the scores). The upper and lower vertical lines, or whiskers, represent scores outside the middle 50%. Notches—the vertical lines extending downward from the upper quartile and upward from the lower quartile—represent 97% confidence intervals. Outliers are represented with asterisks. If the notches of two box plots do not overlap, the medians are significantly different at about the 0.03 level (McGill et al. 1978:14; Scarry and Steponaitis 1997:113; VanDerwarker 2006:76).

An increase in abundance of tree fruits through time suggests people began or intensified existing management and cropping activities. Identification of taxa that increase, as well as those that decline, in relative importance informs additional analysis of broader subsistence strategies in terms of foraging versus farming. Of the top-ranked plant food resources analyzed, three tree fruits and one garden cultigen demonstrate a significant increase in importance from the Pre-Biscuitware to the Biscuitware Phase. The box plots presenting distributions of charichuelo (Figure 4.8), Sapotaceae (Figure 4.9), and nance (Figure 4.10) remains show statistically significant increases during the Biscuitware Phases, suggesting that people began managing and cropping them during the Pre-Biscuitware and intensified cultivation efforts during the Biscuitware Phase. In addition, abundance/density of *Phaseolus* remains is significantly higher during the Biscuitware Phase (Figure 4.11). Increased production of beans during a phase of demographic expansion is not surprising. In addition to increasing food supply for a larger island population, intensification of *Phaseolus* would improve the quality of soil that maize production

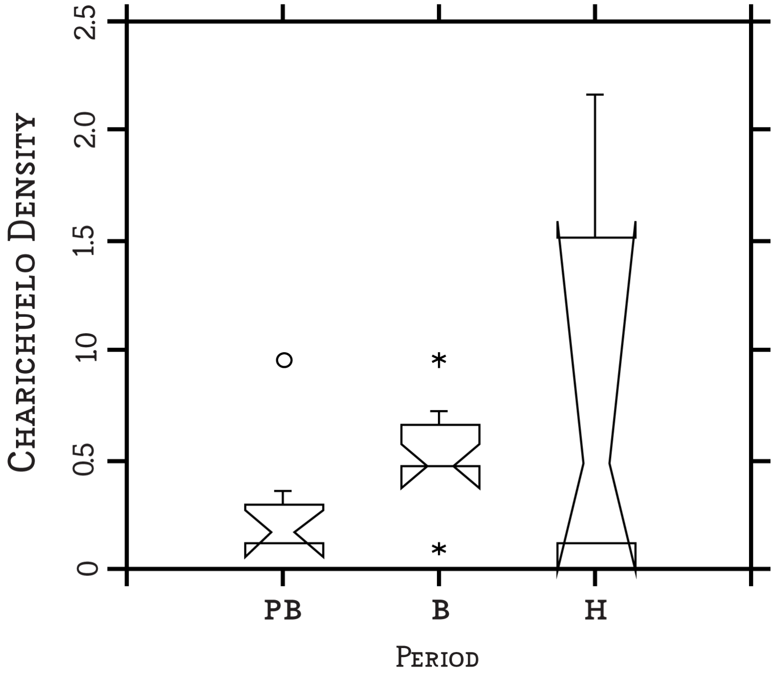


Figure 4.8. Box plots of standardized charichuelo counts (absolute counts/soil volume per sample) from Units SD-49, -50, -51, -60, and -61 by phase.

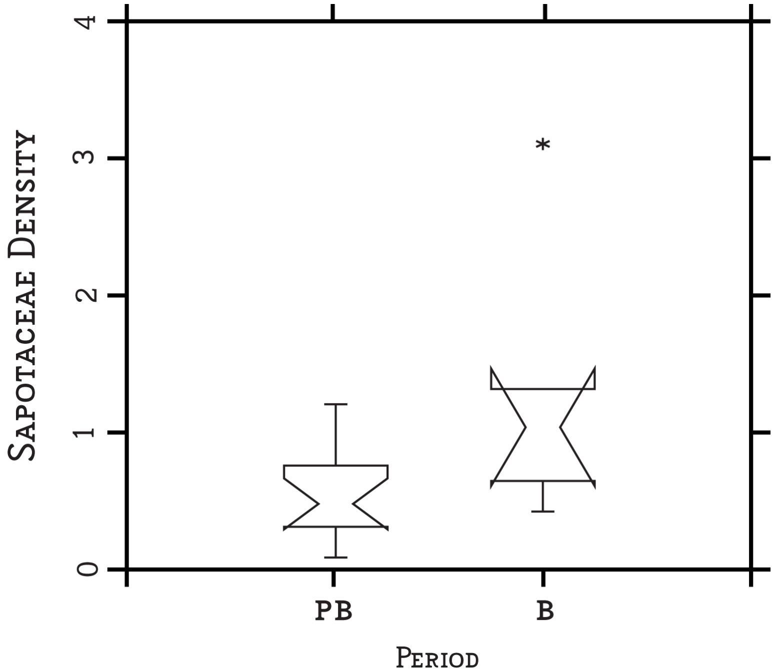


Figure 4.9. Box plots of standardized Sapotaceae counts (absolute counts/soil volume per sample) from Units SD-49, -50, -51, -60, and -61 by phase.

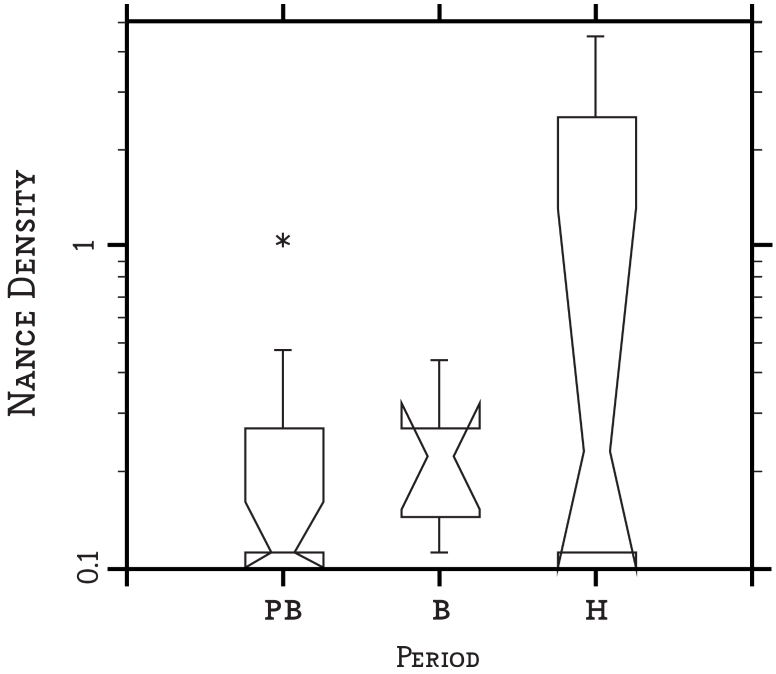


Figure 4.10. Box plots of standardized nance counts (absolute counts/soil volume per sample) from Units SD-49, -50, -51, -60, and -61 by phase (log 10).

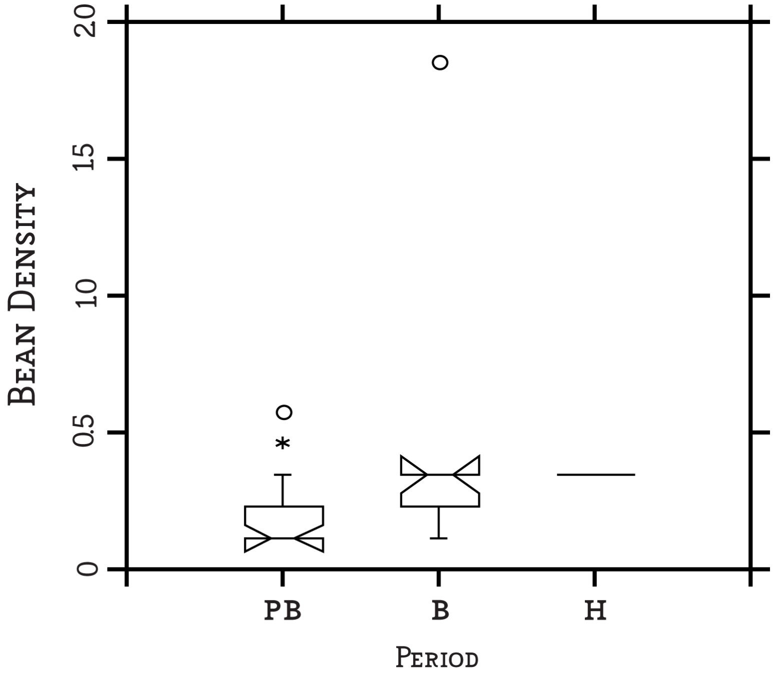


Figure 4.11. Box plots of standardized *Phaseolus* sp. counts (absolute counts/soil volume per sample) from Units SD-49, -50, -51, -60, and -61 by phase.

degrades. Box plots of standardized counts for all four taxa reveal a significant decrease during the Historic Phase, indicating a decline of production and consumption of these plant food resources on Isla Colón.

An observable—not ***statistically*** significant—increase in abundance during the Biscuitware Phase is represented in box plots for several top-ranked plant food resources. Increased importance of two shrub fruits, Coccocypselum (Figure 4.12) and Psychotria genus (Figure 4.13), and one berry used to flavor dishes, pimiento (Figure 4.14), indicates that people at Sitio Drago may have intensified foraging and management of these plants alongside those discussed above.

Box plots of standardized counts for the remaining top-ranked plant food resources—huito, lemon drop mangosteen, pumpwood, Rubiaceae, and schery—indicate no difference in relative abundance between both prehistoric time phases. Notably, the standardized counts of maize remains are consistent from the Pre-Biscuitware to Biscuitware Phase (Figure 4.15). Maize does increase with time in terms of ubiquity (see Table 4.16 and Table 4.17) from 84% in the Pre-Biscuitware Phase to 100% in the Biscuitware Phase. Stability in abundance of maize remains coupled with an increase in ubiquity suggests people produced, processed, and consumed the same amount of maize, but they incorporated the plant more routinely in preparation of beverages and/or culinary dishes.

Relative Abundance of Plant Types

Ubiquity and density values of plant remains represented in the study point broadly to a subsistence strategy of collecting tree and shrub fruits, cultivating maize and beans, and managing some large tree fruits. To address dietary preference and routine subsistence activities in more detail, ratios of plant types associated with specific subsistence activities are calculated

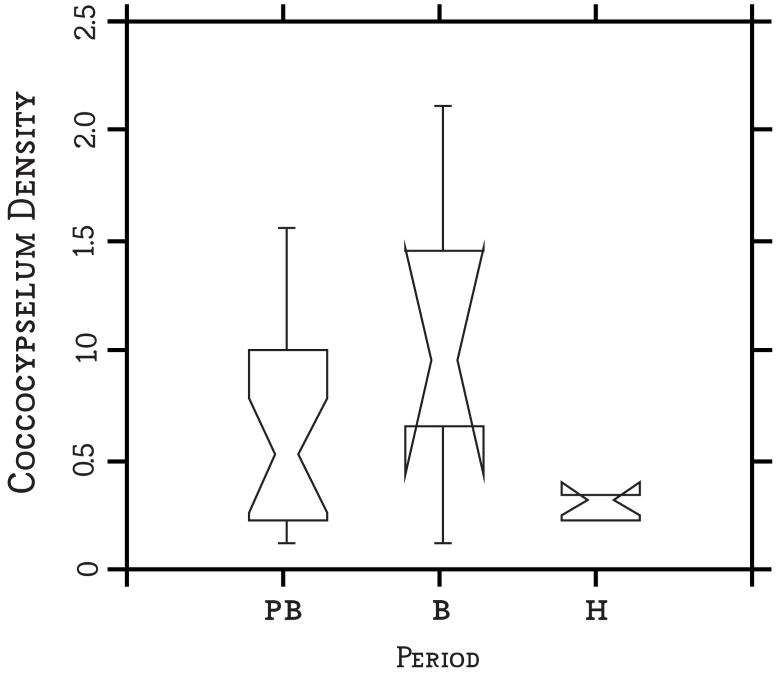


Figure 4.12. Box plots of standardized *Coccocypselum* counts (absolute counts/soil volume per sample) from Units SD-49, -50, -51, -60, and -61 by phase.

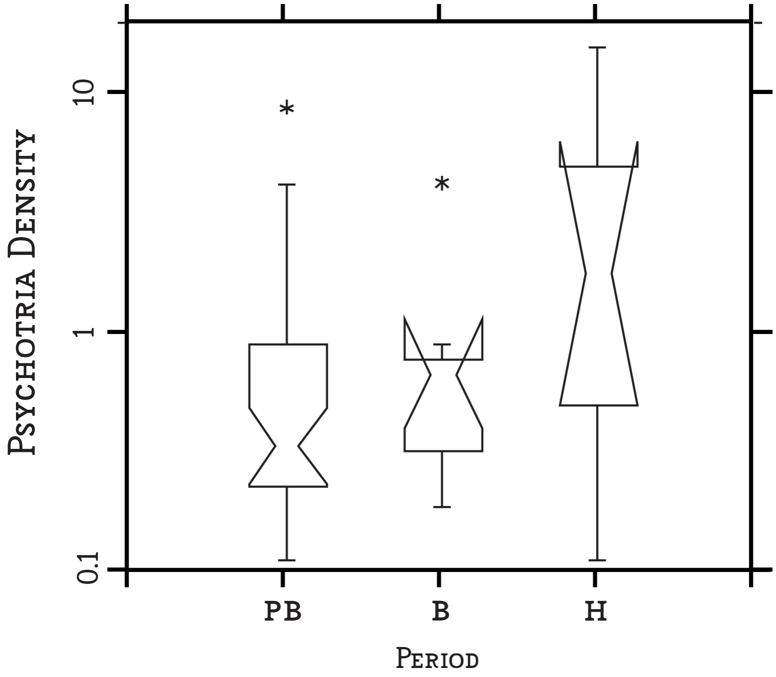


Figure 4.13. Box plots of standardized *Psychotria* counts (absolute counts/soil volume per sample) from Units SD-49, -50, -51, -60, and -61 by phase.

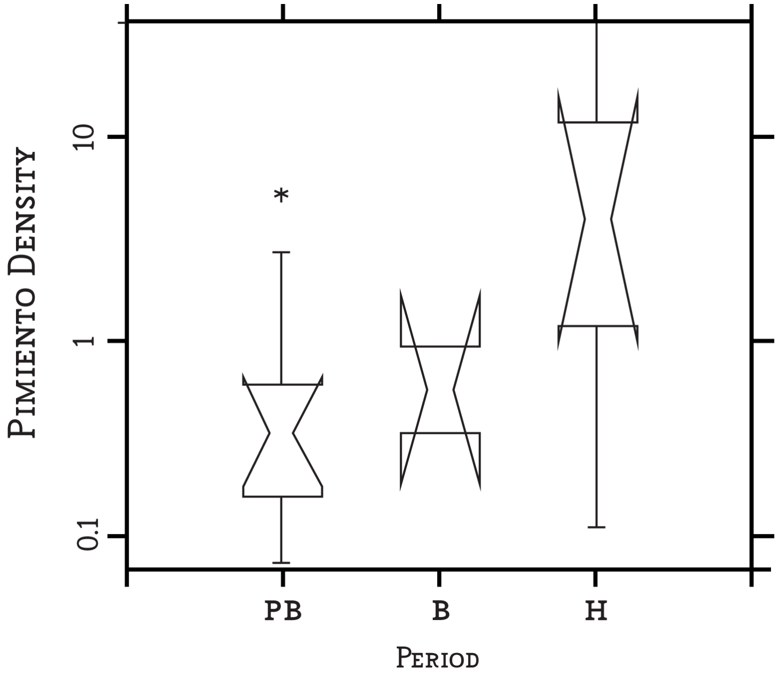


Figure 4.14. Box plots of standardized pimiento counts (absolute counts/soil volume per sample) from Units SD-49, -50, -51, -60, and -61 by phase.

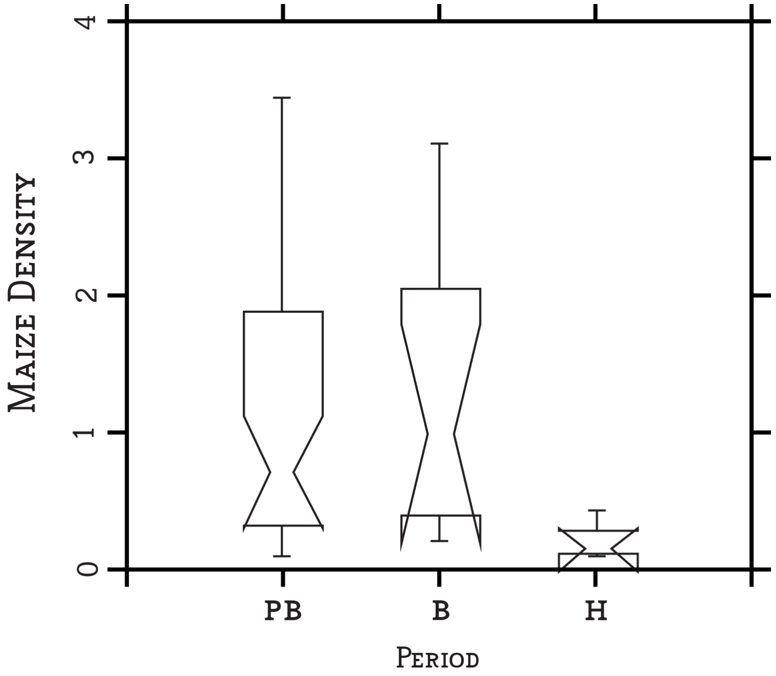


Figure 4.15. Box plots of standardized maize counts (absolute counts/soil volume per sample) from Units SD-49, -50, -51, -60, and -61 by phase.

using absolute counts of plant taxa combined within each category.

Managed versus Unmanaged Fruits

As discussed above, ratios based on standardized counts of charichuelo, nance, and Sapotaceae from Sitio Drago indicate a significant increase in importance of these fruits during the Biscuitware Phase. In addition, ubiquity analysis of the entire Sitio Drago archaeobotanical assemblage also reveals a broad pattern of increased tree-fruit harvesting during the Biscuitware Phase.

To further explore this pattern of increasing tree fruit exploitation in more detail, I aggregated absolute counts of fruit-bearing tree and shrub taxa into categories of managed and unmanaged fruits. The category of managed fruits is comprised of tree fruit types that increased significantly during the Biscuitware Phase, indicating that people increased harvesting and disposal of these fruits with time. First, I constructed a ratio of managed to unmanaged fruits for Sitio Drago. The ratio is calculated as follows:

$$\frac{\sum \text{counts of charichuelo, nance, and Sapotaceae}}{\sum \text{counts of remaining identified fruits}^{2}}$$

Ratios are presented as dot charts, and the graph clearly demonstrates an increase in the proportion of managed tree fruits relative to unmanaged tree and shrub fruits during the Biscuitware Phase (Figure 4.16 and Table 4.21). This trend does not necessarily indicate a declining importance in foraged fruits through time. Rather, it appears that residents of Sitio Drago intensified harvesting of managed tree fruits.

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[2] Rubiaceae, huito, lemon drop mangosteen, pimiento, *Psychotria*, schery, and *Coccocypselum*

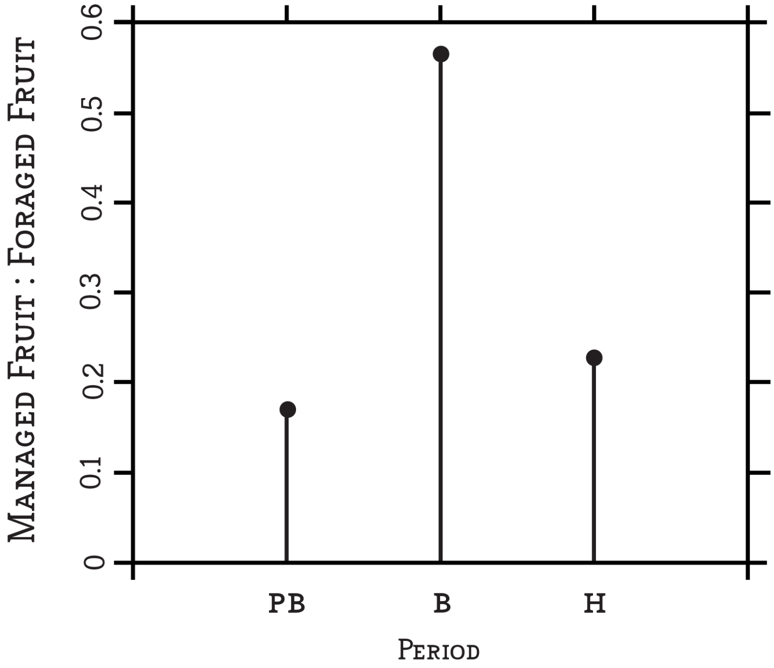

Figure 4.16. Ratio of managed fruit to foraged fruit counts from Sitio Drago by phase.

Table 4.21. Counts of Managed Fruit and Foraged Fruit Remains from Sitio Drago by Phase.

Fruit Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Managed	127	120	107
Foraged	1034	289	652
Ratio	*0.12*	*0.42*	*0.16*

Garden Cultigens versus Tree Crops

Generally, it appears that the residents of Sitio Drago processed and disposed of comparable amounts of maize throughout both prehistoric Phases. At the same time, people seem to have intensified production of managed tree fruits from the Pre-Biscuitware to the Biscuitware Phases. To explore this pattern of increasing tree fruit exploitation in relation to production of cultigens, I aggregated data into categories of cultigens, unmanaged fruits, and managed fruits. First, I produced a ratio of cultigens to unmanaged fruits across phases at the Sitio Drago. The ratio is calculated as follows:

$$\frac{\sum \text{counts of maize and bean genus}}{\sum \text{counts of unmanaged fruits[3]}}$$

Next, I constructed a ratio of cultigens to managed fruits. The ratio is calculated as follows:

$$\frac{\sum \text{counts of maize and bean genus}}{\sum \text{counts of charichuelo, nance, and Sapotaceae}}$$

The resulting dot charts demonstrate a dramatic increase through time in garden cultigens versus unmanaged tree and shrub fruits until the Historic Phase (Figure 4.17 and Table 4.22) and a dramatic decrease through time in garden cultigens versus managed tree fruits (Figure 4.18 and Table 4.23). Overall, the inverse trends presented here clearly indicate an increase in managed tree fruit crops during the Biscuitware Phase. This may not mean that the value of garden cultigens decreased in time for the residents of Sitio Drago. Rather, it indicates that management of tree fruits became an important part of the subsistence economy, alongside maintenance of gardens and fields, during the phase of population growth and renegotiation of supraregional

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[3] Rubiaceae, huito, lemon drop mangosteen, pimiento, *Psychotria*, schery, and *Coccocypselum*

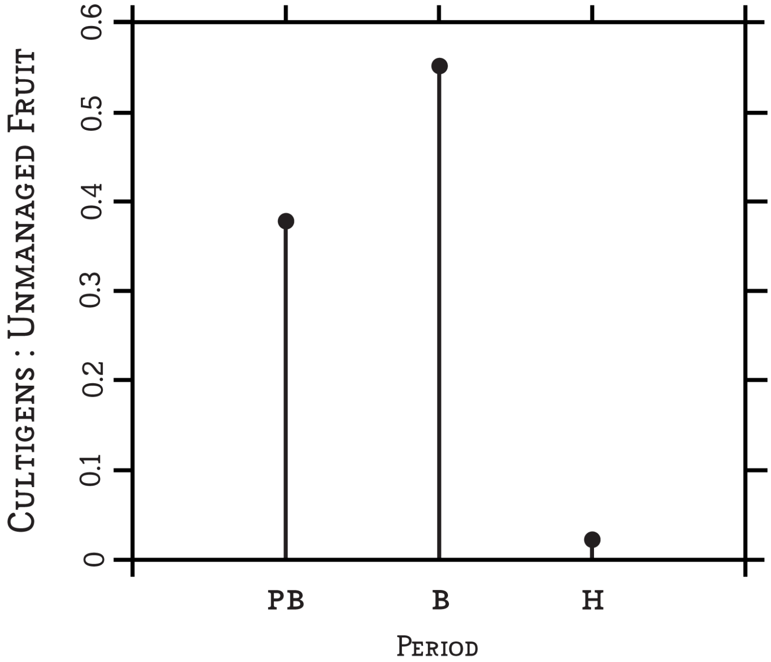

Figure 4.17. Ratio of cultigens to unmanaged fruit counts from Sitio Drago by phase.

Table 4.22. Counts of Cultigens and Unmanaged Fruit Remains from Sitio Drago by Phase.

Plant Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Cultigens	415	160	11
Unmanaged Fruit	1100	292	672
Ratio	*0.38*	*0.55*	*0.02*

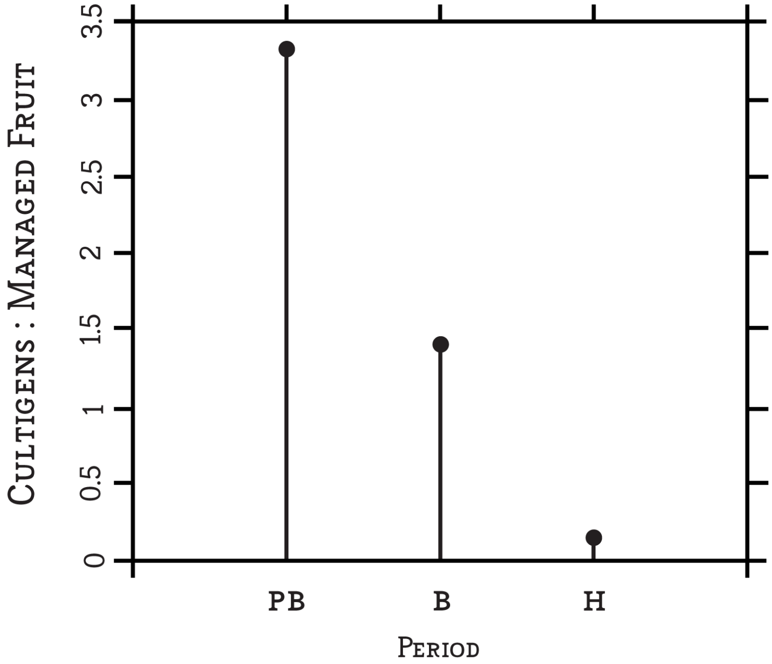

Figure 4.18. Ratio of cultigens to managed fruit counts from Sitio Drago by phase.

Table 4.23. Counts of Cultigens and Managed Fruit Remains from Sitio Drago by Phase.

Plant Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Cultigens	415	160	11
Managed Fruit	127	120	107
Ratio	*3.27*	*1.33*	*0.1*

political ties.

Relative Abundance of Garden Crops, Tree Fruit, and Shrub Fruit

Several methods presented above demonstrate that the Biscuitware Phase occupants of Sitio Drago increased production of garden cultigens and dramatically intensified management of three tree crops. Further, these measures indicate that procurement of shrub fruit declines in importance versus harvesting of both garden cultigens and cropped tree fruits. Additional data manipulations are useful to support patterns key to building an argument for discussion of subsistence practices in subsequent chapters. Relative abundance of plant types in the Sitio Drago archaeobotanical assemblage provides a rough assessment of dietary preference in each time phase. Here, I calculate relative abundance of garden crop, tree fruit, shrub fruit, and palm fruit with relative percentages within the assemblage representing each time phase (Table 4.24 and Figure 4.19). Bar graphs depicting relative percentages of these categories for each phase (omitting palm fruits due to the negligible number of remains recovered) show that, from Pre-Biscuitware to Biscuitware times, shrub fruits comprise approximately 26% less of the diet, while the relative abundance of tree fruits nearly doubles. Concurrent with the increase of tree fruits relative to other types of plants, garden cultigens demonstrate a 17% gain in relative importance. A remarkable change in relative abundance of plant types takes place during the Historic Phase. The significant drop in garden cultigens suggests people occupying Sitio Drago after 1500 either abandoned this traditional farming suite or disposed of food debris in a different location. Shrub fruits approximately double in their relative abundance in the assemblage, suggesting occupants of Sitio Drago may have moved back to a foraging diet during the Historic Phase.

This pattern holds when the data are presented in a slightly different way. Here, I added

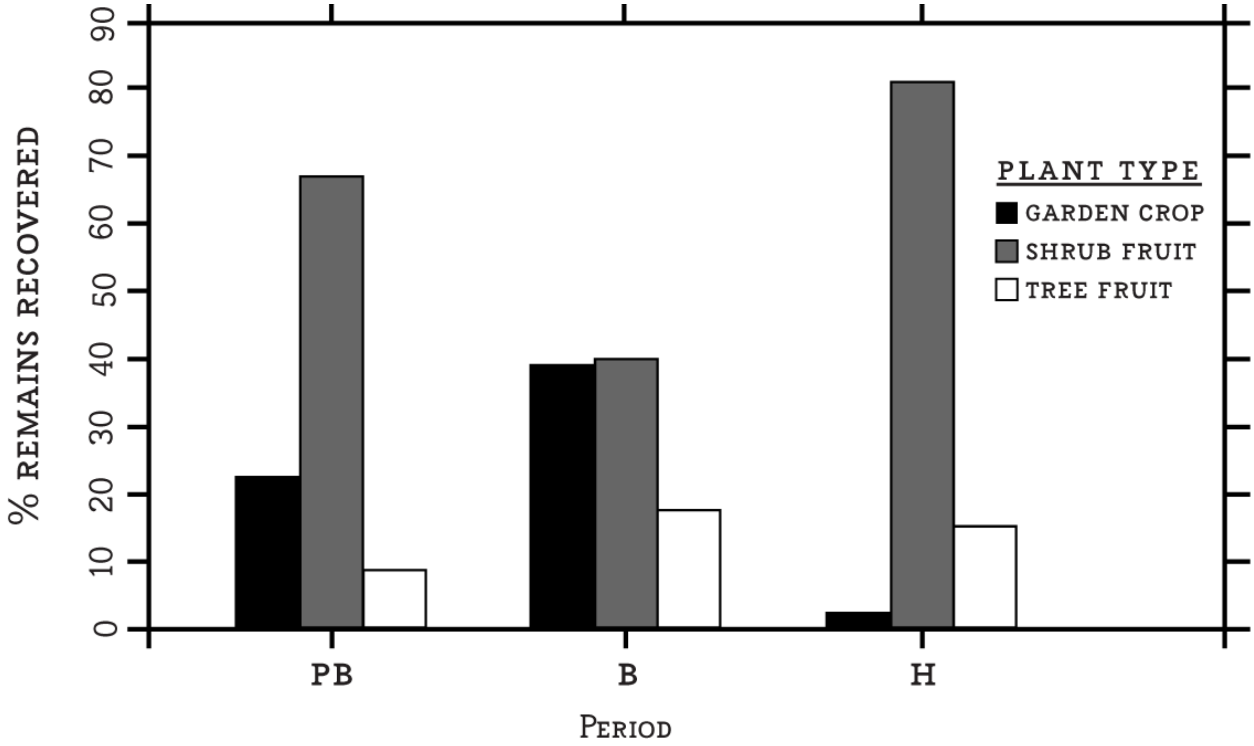

Figure 4.19. Bar charts of plant types aggregated by subsistence activity from Sitio Drago.

Table 4.24. Counts of Plant Types Aggregated by Subsistence Activity from Sitio Drago.

Plant Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Garden Crop	339	325	27
Palm Fruit	3	1	0
Shrub Fruit	978	344	652
Tree Fruit	139	151	129
Total # of Specimens	*1459*	*821*	*808*

counts standardized by soil volume in order to compare independent representation of garden crop, shrub fruit, and tree fruit taxa through time. When visualized with three separate bar charts (Figure 4.20), we see an increase in standardized counts (densities) of garden crop and tree fruit remains from the Biscuitware to Pre-Biscuitware Phases. This measure produces patterning similar to the one shown in Figure 4.19, in which garden cultigens decrease considerably, while tree fruits only decrease moderately during the Historic Phase. Visualizing standardized counts of shrub fruit remains through time (see Figure 4.20) shows a clear inverse pattern in relation to the garden crops and tree fruits. Overall, multiple manipulations of data suggest that people at Sitio Drago prioritized fruit cropping over fruit foraging during the Biscuitware Phase, integrating arboriculture with existing horticulture practices. Comparison of plant types recovered from the domestic versus mortuary contexts, however, reveals no clear pattern. While data presented here do not provide a basis for discussing social dynamics, these datasets provide a foundation for potential future spatial comparisons of plant remains from Sitio Drago when additional site areas have been excavated and sampled.

Assessment of Formation Processes

In addition to reconstructing plant food procurement and disposal, analysis of archaeobotanical remains can shed light on activities related to processing and cooking foodstuffs. Two assessments representing the formation of the archaeobotanical assemblage are considered here. First, I examine the archaeological residues of one of the initial stages of maize processing, that of shelling. Second, I examine the density of wood charcoal in the assemblage.

Maize Kernel-to-Cupule Ratio

Before maize can be ground into flour, the kernels must first be removed from the cob, leaving the cobs and cupules as byproducts of the removal process. Kernels represent the part of

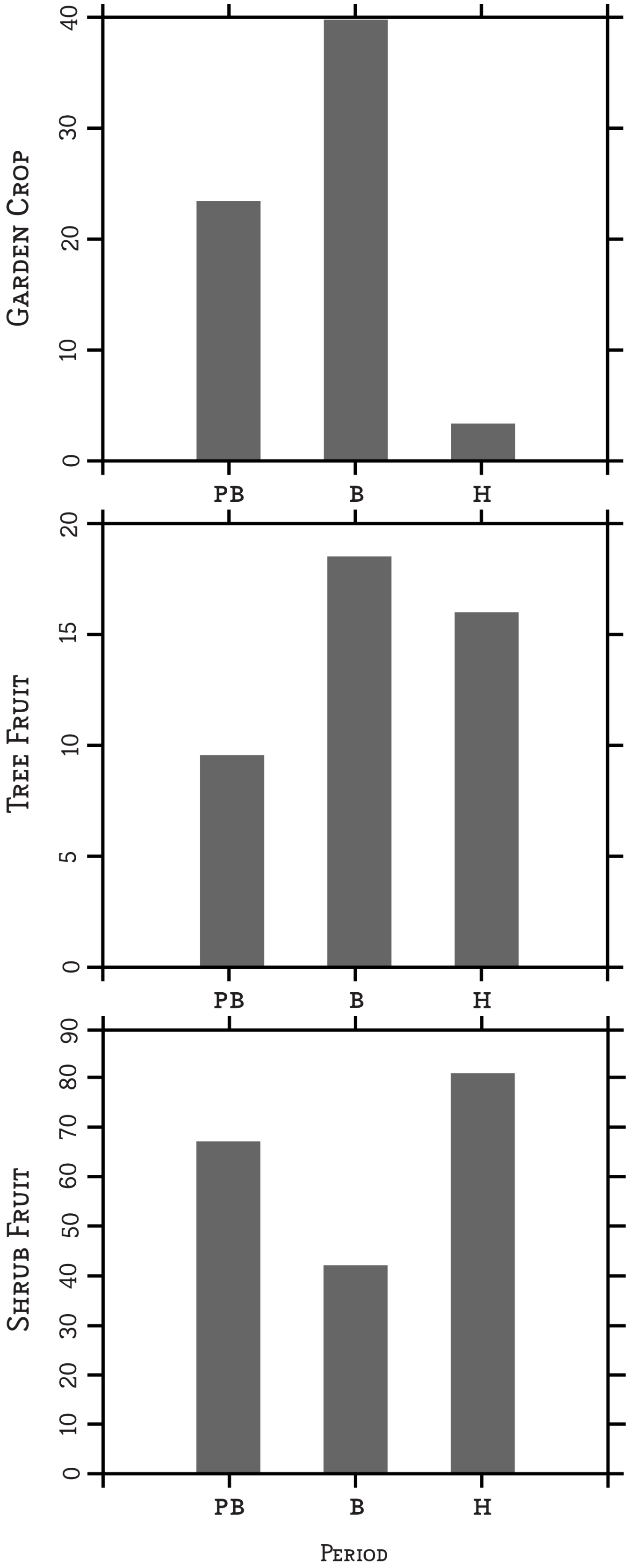

Figure 4.20. Bar charts of garden crop, tree fruit, and shrub fruit densities from Sitio Drago.

the maize plant meant for consumption, and cupules represent processing discard. Therefore, lower ratios of kernel counts to cupule counts in the maize assemblage would be indicative of elevated levels of maize processing near the disposal site (Knight 2004; Scarry 2003; Scarry and Steponaitis 1997:117; VanDerwarker 2005, 2006:102). For example, if we were to compare maize kernel-to-cupule ratios from different spatial locations or temporal contexts, we could determine the relative degree of maize consumption versus processing across space and/or time.

Using data collected from Units SD-49, -50, and -51, I calculated kernel-to-cupule ratios (Figure 4.21 and Table 4.25). In all phases, the maize kernel-to-cupule ratios are relatively low and indicate that the residents of Sitio Drago processed much of their maize in locations separate from the domestic area. The dot chart shows a steady decrease in maize kernels versus cupules from the Pre-Biscuitware to Biscuitware Phases. These ratios can be used to interpret changes in site formation processes. For example, VanDerwarker (2005) uses an infield/outfield model that is based on ethnographic accounts of modern-era farmers in the Sierra de Los Tuxtlas, located along the southeastern Veracruz Gulf coast in Eastern Mexico (Killion 1987, 1990, 1992). According to this model, people cultivate maize in two types of plots: infields, which are located near the residential structures, and outfields located farther away from houses. More maize harvesting and processing at infields results in disposal of more maize cupules than kernels in domestic trash heaps. On the other hand, intensification of outfields results in disposal of maize cupules in other locations (Killion 1987:433; VanDerwarker 2005:277).

Residents of Sitio Drago increased their processing activities in the domestic area during the Biscuitware Phase, suggesting a shift to more infield production (see Killion 1990; Pool 1997; VanDerwarker 2006:104). Together with the concurrent increase in tree fruit, this patterning points to an increased reliance on plant food management as the population at Sitio

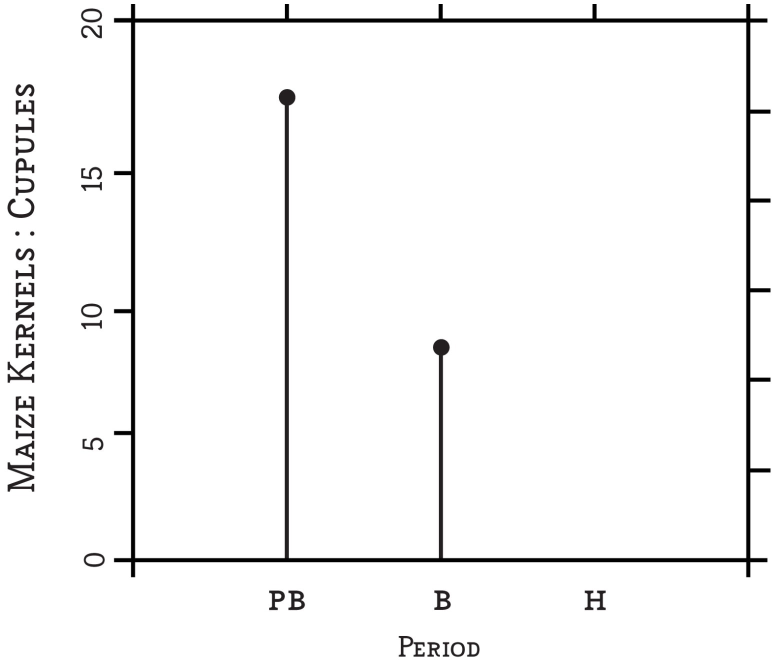

Figure 4.21. Ratio of maize kernels to cupules across Pre-Biscuitware, Biscuitware, and Historic Phase deposits from Units SD-49, -50, and -51.

Table 4.25. Counts and Ratios of Maize Kernels to Cupules across Pre-Biscuitware, Biscuitware, and Historic Phase Deposits from Units SD-49, -50, and -51.

Plant Part	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Kernels	299	175	7
Cupules	17	23	0
Ratio	*17.59*	*7.61*	*0*

Drago grew in size and expanded long-distance elite networking. Clearly, people actively managed the landscape over many generations in order to adapt to social and ecological changes. They found ways to manage forests and intensify plant food production without clear-cutting additional forests.

Wood Density

Comparison of wood types in the assemblage is another archaeobotanical measure that can shed light on the types of human activities that shaped the archaeological record. People select particular types of wood for different purposes, including heat radiation, heat durability, ease of ignition, and aroma (Théry-Parisot et al. 2010:144). In the Neotropics, shifts in preference for firewood may correspond with changes in landscape management. For example, increased use of palm endocarps and mesocarps as kindling may reflect intensified production and harvest of palm fruits and nuts (McSweeney 1995). Oil can also be extracted from palm kernels, after the nuts are dried in the sun or over a fire, causing them to crack. Mortars or stones are used for additional cracking. Production of mesocarp oil would leave behind large quantities of whole or nearly whole nuts and kernels. The leftover shells are collected and make an excellent slow burning fuel (Burkill 1997:364).

Extraction of kernel oil would thus result in a significant quantity of cracked endocarps, which if used for fuel would have a high preservation potential. Such high quality, slow burning fuel would have been well-suited for cooking and shells may have been set aside for such purposes (Logan and D'Andrea 2012). In some cases, the density of charcoal tends to vary inversely with that of oil palm depending on which fuel source is preferred. For example, charcoal use is at its lowest in the deposits where oil palm is most intensively used (D'Andrea et al. 2006:210-211; Gelabert et al. 2011). This may suggest that oil palm endocarps were a substitute for charcoal at times, as they are an excellent source of slow burning fuel (Burkill 1997:364; Stahl 1985:135).

In order to assess possible changes in preference for wood charcoal or oil palm for burning, I calculated the density of wood charcoal using weights. A series of box plots depicting the distribution of wood density across phases show a visible—yet not statistically significant—decline in wood density through time (Figure 4.22). This pattern may indicate a transition from unmanaged to managed forests (Stahl 1985:144). Arboriculture implies a changing relationship with the landscape; if effort is expended to insure the survival and florescence of trees, people tend to return to collect the fruits of their labors, rather than cutting them down.

Discussion

The descriptive and statistical analyses of archaeobotanical data presented in this chapter provide several key pieces of information about the paleoethnobotany of Isla Colón. All plants identified are native to the isthmus region of Central America and known to be economically useful as sources of food, medicine, and construction material. The types and ranking of plant resources provides insight on the farming and foraging activities practiced during the Late Ceramic phase. The abundance of plant food taxa known to thrive in cultivated patches indicates Pre-Biscuitware Phase villagers practiced at least small-scale horticulture. They likely created gardens beside dwellings and/or in forest gardens situated farther away from the cleared area surrounding the village. Roughly half of the tree and shrub fruits identified in the study assemblage appear in traditional Neotropical subsistence regimes as tree stands managed for surplus production rather than wild resources opportunistically gathered.

The relatively high abundance of maize and bean suggests garden crops by this time were

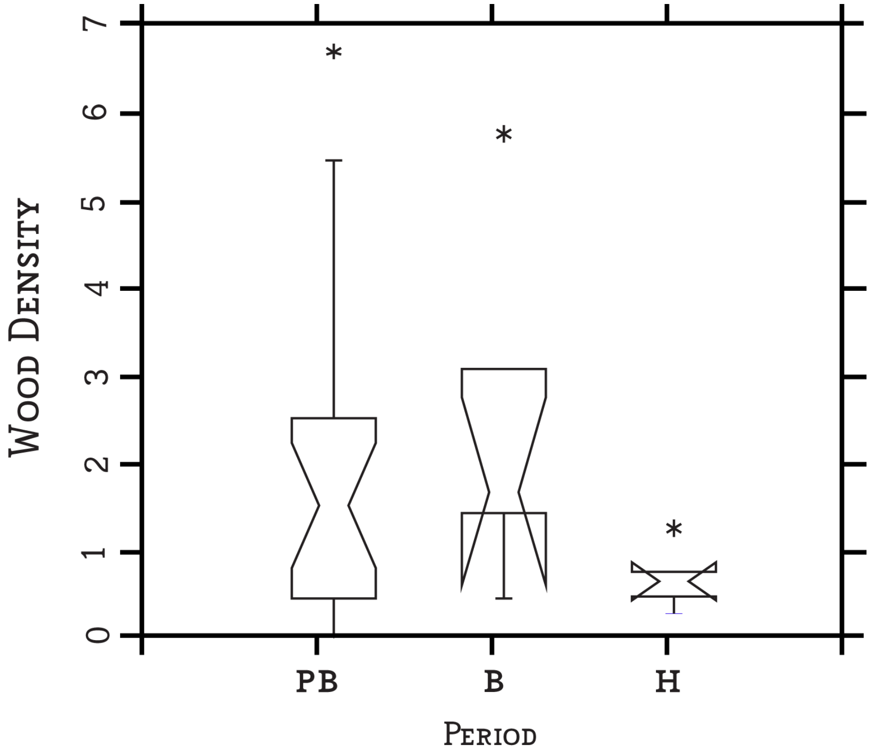

Figure 4.22. Box plots of standardized wood weights (g/l) from Sitio Drago by phase.

not a marginal, experimental part of the local diet. Maize and bean, the two domesticates identified in the study assemblage, were already in the Western Caribbean region by 800 BC (Piperno and Pearsall 1998). These cultigens appear in deposits at Sitio Drago around AD 800, well after their known introduction to the region. Further, the presence of a single carbonized bean specimen in Sitio Teca (see Table 4.12) provides evidence of plant cultivation in a human occupation, ca. AD 60-450, which pre-dates the Pre-Biscuitware Phase at Sitio Drago. During the mid- to late twentieth century, Olga Linares characterized Bocas del Toro as a backwater region host to marginal prehistoric populations, devoid of maize agriculture due to its tropical climate and a presumed isolation of the population from the rest of lower Central America (Linares 1977:311, 1980:67). Evidence of maize and bean cultivation at Sitio Drago negates this assumption and strongly implies a well-developed tradition of maize farming in the Bocas del Toro region by the Late Ceramic phase.

Almost all maize plant parts recovered from deposits in both spatial areas of Sitio Drago are kernels rather than cupules. A high kernel-to-cupule ratio represents disposal of food debris that has already been cooked, suggesting people were processing maize at a different part of the site. These activities could have taken place around the cluster of basin milling stones located in nearby forest, although people may have also used these large *metates* to process root crops that do not typically appear in the macrobotanical assemblage. The strong presence of cultivated garden and tree plant foods, combined with procurement of plant resources strongly associated with uncultivated understory growth, points to a mixed plant-based subsistence system spanning the major vegetation communities present on Isla Colón.

Archaeobotanical remains recovered from the single sediment sample taken at Sitio Teca provide some insight into the types of plants people procured during an occupation that pre-dates

Sitio Drago (Wake 2008). The presence of a single bean specimen suggests that people who lived in the island interior domesticated plant taxa by AD 60. Results from the single Sitio Teca sample also provide insight helpful in guiding future archaeobotanical projects in the area, as the sediments provided a higher density of plant fragments than did samples taken from Sitio Drago. This could be due to the different way in which the Sitio Teca sample was processed; excavators collected sediments during the 2010 field season. Dr. Wake then stored the sample in a covered bucket, and the soil thoroughly dried by the time PASD crew floated it in 2012. Allowed sediments to dry prior to floating may increase recovery of plant specimens, a process that could easily be expedited with air conditioned facilities at the STRI research station in Bocas Town. Either way, the success in recovering plant remains from this small sample demonstrates the value of future flotation sampling in interior locales.

Comparison of Domestic and Mortuary Contexts

As discussed in Chapter II, archaeological investigations at Sitio Drago have identified two general areas, domestic and mortuary, of the site. These areas are defined by the presence and absence of human burials. Although quantitative analysis has not yet been performed on the materials excavated from these contexts, field crew have made several qualitative assessments of differences in material culture. Middens located along the coastline of Playa Drago, where no formal burials have been found, appear to represent a space of domestic household refuse dominated by plain, undecorated ceramic wares. In contrast, middens surrounding the four coral slab-lined tombs excavated a few hundred meters further inland bear a denser ceramic assemblage comprised of vessels imported from locales as far away as present-day Nicaragua and the Pacific coast of Panama. Only excavations in the mortuary-area middens have produced luxury items associated with elite status in ancient Panama, such as carved bead pendants, small (3 mm diameter) shell beads, and ceramics adorned with zoomorphological appliqués.

If this observed difference in debris represents differential use of the two site areas, we expect to see strong quantitative patterns in plant data. For example, if middens surrounding the tombs represent mortuary feasting deposits, we may expect to see lower diversity and higher relative abundance of specific foods in comparison to middens from other site areas. Or, the mortuary-area middens could reflect refuse from households with higher social status. In this case, we would expect to see a higher abundance of luxury foods items—perhaps certain tree fruits and maize—in comparison to deposits located elsewhere. Basic measures presented here do not point to strong patterning between domestic and mortuary contexts (see Table 4.19). Excavation of additional site areas, and more detailed analyses of other data types such as ceramic typology and faunal taphonomy, is necessary in order to understand spatial differences in midden use at Sitio Drago.

Changes in Plant Exploitation through Time

Several important temporal patterns are evident through comparisons of densities of key plant resources within the assemblage. These results support the expectation that demographic expansion and shifts in sociopolitical organization during the Biscuitware Phase might be tied to changes in farming and foraging practices, which are reflected in the archaeobotanical assemblage. An increase in densities of plant types associated with house gardens and tree-cropping (see Figure 4.19), and concurrent significant decrease in species richness (see Figure 4.5), suggests villagers invested more effort in cultivation of food and medicinal plant resources during the height of political complexity. Biscuitware Phase people narrowed the types of plant foods exploited as cultivated patches became more efficient and reliable. Relative abundance of shrub fruit, which today are less commonly managed in cultivated stands, slightly decreases in the Biscuitware Phase and dramatically increases during the Historic Phase (see Figure 4.19). Together these patterns suggest increased dependence on cultivated plant foods during the height of political complexity. Drastic changes in relative abundance during a phase of European colonization are unsurprising, when new populations arrived at Isla Colón and began using these areas for distinctly different industries.

However, people occupying Sitio Drago during the last few hundred years of supraregional chiefly integration do not appear to have become reliant on a few select crops such as maize. Perhaps people sought a variety of tastes in their plant food resources, or perhaps they maintained a diverse array of carbohydrate sources as a risk management strategy. Elites in the paramount chiefdoms of lower Central America developed social connections and political power through participation in feasting events. People at Sitio Drago may have used cultivation of a wide variety of tree and shrub fruits, as well as condiments used to season culinary dishes, to indirectly promote individual or group prestige. Historic Phase deposits demonstrate a dramatic decrease in maize and most of the tree fruits that were highly ranked during prehistoric phases (see Figure 4.19 and Table 4.14). Human population of Isla Colón underwent substantial change after colonization by Europeans, Some plant food traditions may have persisted as both indigenous and foreign elite management mingled, but once the local population suffered a demographic collapse their gardens appear to have been largely abandoned in favor of land clearing for pasturing cows and pigs.

CHAPTER V

ZOOARCHAEOLOGICAL RESULTS

Introduction

Human intervention with the landscape to intensify or change types of plant food production also impacts the way people interact with animals. In the previous chapter, I discussed ways Late Ceramic phase people at Sitio Drago manipulated the local vegetation community as the village population grew and elite interaction with supraregional networking expanded. These routine practices of landscape transformation likely coincided with changes in hunting and fishing activities and affected local distribution of fauna.

This chapter examines these issues through a quantitative analysis of the vertebrate and shell zooarchaeological data (see Appendix B for complete dataset). Through comparison of Pre-Biscuitware (AD 800 to 1200), Biscuitware (AD 1200 to 1450), and Historic (AD 1600 to 1900) phases, I consider changes in landscape management and preference for animal foods. Clearing fields and cultivating stands of palm and fruit trees in forest mosaics alters dynamics between local floral and faunal communities. Anthropogenic disturbance of secondary growth rainforest may eliminate or interrupt growth of some plant taxa, particularly those less desirable for use as food, medicine, or construction materials. When consistently developed over decades, these new habitats attract higher numbers of animal taxa desiring the same plant foods and those prone to inhabit cleared-edge forest areas. Comparing analyses of archaeobotanical and zooarchaeological data can reveal correlations between changes in faunal and floral communities. First, I present an overview of animals identified in the three study phases. After a discussion of relevant life histories and habitat preferences, I present basic summary statistics (e.g., MNI, NISP, etc.) of faunal taxa through time. Next, I develop a reconstruction of exploitation strategies in terms of diversity and relative abundance within each phase. These statistical measures and analyses inform my discussion of the relationship between foraging, farming, hunting, and local environmental change.

The Study Assemblages

Interpretation of past animal exploitation depends on careful consideration of archaeological context and taphonomic processes involved in site formation. Food debris recovered and studied from midden contexts, as with any archaeological material, does not precisely reflect what materials were originally used and discarded. As discussed in Chapter III, zooarchaeological methods are used to infer from bone and shell what types of animals were part of the diet, and to calculate how much certain taxa were consumed in relation to other taxa. While zooarchaeological data do not account for every animal procured or consumed by ancient people, it provides a general representation useful in discussing which niches people exploited. Quantitative comparison of faunal data across sites, contexts, and phases is possible when taphonomic histories of each deposit are assessed and calculations of MNI and NISP are adjusted to take this effect into account.

Assessment of changes or stability in animal procurement through time requires blanket sampling of these contexts. This study examines 62 faunal samples excavated from five units at Sitio Drago (Table 5.1). Samples derive from screened midden (n=62), and include a subset of 18 heavy fractions taken from flotation samples from two vertical column samples of general midden deposits excavated in mortuary (n=38) and domestic (n=24) contexts. These samples span the Pre-Biscuitware through the Historic Phases. Analysis addressing potential resource variability and demographic change will focus on comparison of samples excavated from

Table 5.1. Number of Faunal Samples by Unit and Phase Obtained from Sitio Drago.

Unit	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*	*Total*
SD-49	6	1	4	*11*
SD-50	12	2	0	*14*
SD-51	9	2	2	*13*
SD-60	8	4	0	*12*
SD-61	8	4	0	*12*
Total # of Samples	*43*	*13*	*6*	*62*

deposits dating to Pre-Biscuitware, Biscuitware, and Historic Phases from all units combined.

Faunal specimens, including fish bones and scales, recovered from middens at Sitio Drago exhibit remarkably little weathering and appear to be consistently well preserved due to the neutral pH level of the well-drained matrix in the shell heaps (Figure 5.1 and Table 5.2). It is important to note that all faunal specimens were hand-picked from screens of excavated sediments and from the heavy fraction component of flotation samples. Identification of animals in this assemblage was made only on specimens larger than approximately 2 cm. While crew collected and saved all bulk midden materials larger than the 1/8" screen size, these smaller faunal samples have not yet been processed. Excluding bone smaller than 2 cm potentially omits identification of numerous smaller-boned fish, rodents, and birds. However, we identified all bone from the heavy fraction components (caught with fine mesh window screen) of flotation samples procured from Units SD-60 and -61. Identifying bone from the miniscule midden materials recovered in these samples provides a more comprehensive account of faunal remains (see discussion in Chapter II for an account of results from that study). Despite this overall bias toward larger-boned animals, zooarchaeological data are consistent in effects of taphonomy and provide an excellent opportunity to establish basic patterns of faunal resource use that can be correlated with patterns in the paleoethnobotanical dataset.

Overview of Specimens

To understand hunting and fishing activities we need to know which animals were caught and where people would have caught them. As discussed in Chapter II, people have lived on Isla Colón for at least 2000 years. The island itself is host to closed-canopy rainforest, riparian, marine coastal, and mangrove swamp niches, and the location of Sitio Drago is ideal for exploiting off-shore, deep-sea marine resources as well as animals found on the nearby

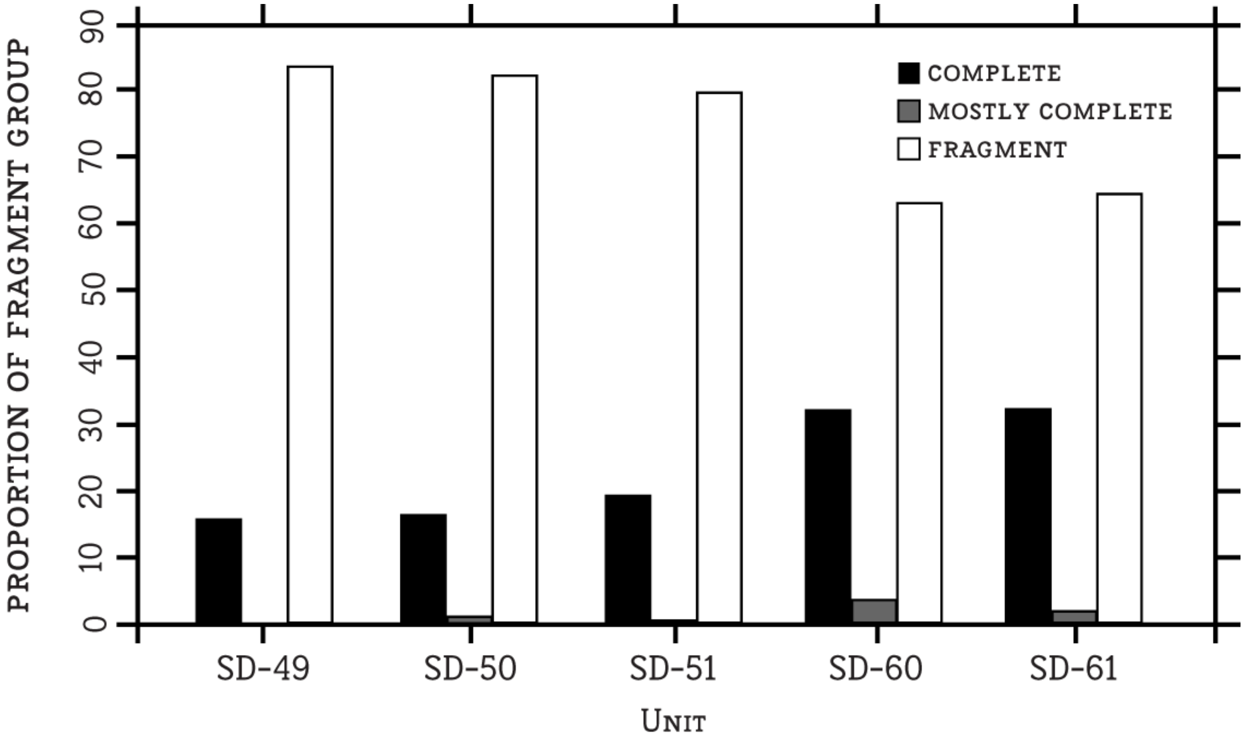

Figure 5.1. Relative percentage of faunal specimens by element portion in samples obtained from Sitio Drago.

Table 5.2. Counts of Faunal Specimens by Element Portion in Samples Obtained from Sitio Drago*.

Unit	*Complete*	*Mostly Complete*	*Fragment*	*Total*
SD-49	19	0	101	*120*
SD-50	785	33	3952	*4770*
SD-51	837	2	3454	*4293*
SD-60	1260	148	2474	*3882*
SD-61	1016	54	2044	*3114*
Total # of Specimens	*3917*	*237*	*12,025*	*16,179*

* Includes unidentified specimens.

mainland. Did these Late Ceramic people exploit just one of these zones or many? Did they narrow or widen their choice of niches as sociopolitical complexity increased and plant food production intensified? What type of technological innovation or resource exploitation scheduling was required to hunt and fish? To begin addressing these questions, I provide a list of species identified in the study assemblage (Table 5.3).

A variety of animals were identified, including sharks, rays, bony fish, amphibians, reptiles, birds, and mammals. Dr. Wake and I examined 16,179 bone specimens from the samples considered in this study, 15,876 of which could potentially be identified to the taxonomic level of class based on appearance of morphology or bone tissue structure (Table 5.4). Approximately 50% of specimens (n=7499) could be further identified to the level of order, family, genus, and/or species. Further, we were able to assign skeletal element and left or right side to 5495 of those specimens. Pre-Biscuitware deposits produced the greatest number of specimens, perhaps an effect of this phase being represented by the deepest deposits. In contrast, the Historic Phase deposit provides the least number of specimens, not surprising given this phase is represented by only two units (SD-49 and -51). Units SD-50, -60, and -61 provide the best perspective on possible changes in villagers' hunting and fishing activities during the transition from Pre-Biscuitware to Biscuitware Phase. Densities of faunal remains are highest at Units SD-50 and -51, which are situated along the well- developed general midden deposit outside of the cemetery. Unit SD-49, which is located between these middens and the shoreline, yielded substantially fewer faunal remains. Across all five units, samples from the Pre-Biscuitware Phase yielded 6545 identifiable bone fragments, the Biscuitware Phase yielded 7507 specimens, and the Historic Phase yielded 1824 specimens.

Table 5.3. Common and Taxonomic Names of Animals Identified from Pre-Biscuitware through Historic Phase Deposits at Units SD-49, -50, -51, -60, and -61.

Scientific Name	Common Name
Shark and Rays	
Carcharhinus leucas	Bull shark
Sphyrnidae	Hammerhead sharks
Aetobatus narinari	Spotted eagle ray
Rajiformes	Rays
Bony Fish	
Albula vulpes	Bonefish
Megalops atlanticus	Atlantic tarpon
Megalops sp.	Tarpon genus
Clupeidae	Herring
Arius felis	Hardhead catfish
Bagre marinus	Gafftopsail catfish
Cathorops sp.	Central American catfish genus
Ariidae	Sea catfish
Opsanus sp.	Western Atlantic toadfish genus
Batrachoididae	Toadfish
Tylosurus crocodilus	Crocodile needlefish
Belonidae	Needlefish
Epinephelus sp.	Grouper genus
Mycteroperca sp.	Black grouper genus
Serranidae	Sea bass
Centropomus sp.	Snook genus
Centropomidae	Snook
Caranx sp.	Jack genus
Chloroscombrus chrysurus	Atlantic bumper
Mugil sp.	Mullet genus
Oligoplites sp.	Leatherjacket genus
Seriola sp.	Amberjack genus
Sphyraena barracuda	Great barracuda
Sphyraena sp.	Barracuda genus
Carangidae	Jacks and bumpers
Auxis rochei	Bullet tuna
Euthynnus sp.	Tuna genus
Scomberomorus concolor	Gulf sierra
Scomberomorus sp.	Spanish mackerel genus
Scombridae	Tunas and mackerels
Haemulon sp.	Grunt genus

Lutjanus sp.	Snapper genus
Haemulidae	Grunts
Archosargus probatocephalus	Sheepshead
Calamus sp.	Porgy genus
Pagrus pagrus	Red porgy
Sparidae	Porgies
Larimus breviceps	Shorthead drum
Micropogonias furnieri	Whitemouth croaker
Sciaenidae	Croakers
Gerres sp.	Mojarra genus
Gerreidae	Marine mojarras
Kyphosus sectatrix	Bermuda sea chub
Kyphosus sp.	Sea chub genus
Kyphosidae	Sea chubs
Bodianus sp.	Wrass genus
Scarus sp.	Parrotfish genus
Sparisoma sp.	Western Atlantic parrotfish genus
Scaridae	Parrotfish
Acanthurus sp.	Surgeonfish genus
Acanthuridae	Surgeonfish
Balistes sp.	Triggerfish genus
Balistidae	Triggerfish
Diodon antennatus	Porcupinefish
Diodontidae	Porcupinefish
Muraenidae	Moray eel family
Tetraodontidae	Pufferfish family
Teleostei	Bony fish
Amphibians	
Bufo marinus	Cane toad
Bufonidae	Toads
Leptodactylus pentadactylus	Smoky jungle frog
Leptodactylidae	Neotropical true frogs
Reptiles	
Crocodylus acutus	American crocodile
Crocodylus sp.	Crocodile genus
Crocodylidae	Crocodiles
Caiman crocodilus	Spectacled caiman
Alligatoridae	Alligators
Caretta caretta	Loggerhead sea turtle
Chelonia mydas	Green sea turtle
Eretmochelys imbricata	Hawksbill sea turtle

Cheloniidae	Sea turtles
Rhinoclemmys funerea	Black river turtle
Rhinoclemmys sp.	Neotropical wood turtle genus
Emydidae	Marsh turtles
Kinosternon sp.	Mud turtle genus
Kinosternidae	Mud turtles
Iguana iguana	Green iguana
Iguanidae	Iguanid lizards
Leptodeira septentrionalis	Banded cat-eyed snake
Colubridae	Non-venomous snakes
Birds	
Pandion haliaetus	Osprey
Pandionidae	Osprey
Mammals	
Trichechus manatus	West Indian manatee
Trichechidae	Manatees
Dasypus novemcinctus	Nine-banded armadillo
Dasypodidae	Armadillos
Oryzomys sp.	Rice rat genus
Sigmodon sp.	Cotton rat genus
Cricetidae	New World rats and mice
Philander opossum	Gray four-eyed opossum
Didelphidae	Opossums
Cuniculus paca	Lowland paca
Cuniculidae	Pacas
Dasyprocta punctata	Central American agouti
Dasyproctidae	Agoutis and acouchis
Proechimys semispinosus	Central American spiny rat
Echimyidae	Neotropical spiny rats
Sus scrofa	Domestic pig
Suidae	Hogs and pigs
Pecari tajacu	Collared peccary
Tayassuidae	Peccaries
Mazama americana	Red brocket deer
Odocoileus virginianus	White-tailed deer
Cervidae	Deer
Leopardus pardalis	Ocelot
Felidae	Cats

Table 5.4. Counts of Identified Faunal Specimens by Taxonomic Class Obtained from Units SD-49, -50, -51, -60, and -61.

Class	*SD-49*	*SD-50*	*SD-51*	*SD-60*	*SD-61*	*Total*
Fish	234	1729	3593	2613	1701	*9870*
Amphibian	0	1	23	88	102	*214*
Bird	8	7	5	16	23	*59*
Mammal	117	2249	107	340	356	*3169*
Reptile	338	384	360	647	935	*2664*
Total # of Specimens	*697*	*4370*	*4088*	*3704*	*3114*	*15,976*

We identified 90 distinct taxa (genus and family) from all seven major vertebrate classes among the specimens from the samples considered for this study (Table 5.5). A diverse array of taxa, including 52 fishes, 19 mammals, 16 reptiles, two amphibians, and one bird taxon, suggests that villagers likely procured food from a multitude of niches on Isla Colón to produce a broad-spectrum diet. Fish (n=9848) represent the overwhelming majority of identified animal types in the assemblage. The frequent occurrence of fish in general midden deposits is most likely an effect of fish being a heavily exploited food source by prehistoric people at Sitio Drago. The large quantity of fish specimens could also be influenced by the numerous bones per individual skeleton; a fish typically contains up to 300 bones while mammals have roughly 200 bones. However, the majority of fish bones is smaller than the screened material analyzed here. Mammal (n=3069) and reptile (n=2664) are the second and third most numerous classes of specimens present, respectively. The majority of mammal specimens are in Unit SD-50, while Units SD-60 and -61 provide the most reptile bones. The 2014 excavations of Units SD-60 and -61 substantially increased the abundance of amphibian (n=214) and bird (n=59) specimens present in the samples considered for this study. A small number of shark vertebrae and cartilage fragments (n=19) and ray teeth (n=3) appear in the assemblage. The lower representation of amphibians, birds, sharks, and crustaceans is more likely the result of under-representation in the zooarchaeological assemblage due to few bony parts and small bone size, rather than being a marginalized part of the occupants' hunting and trapping activities.

An examination of bone element alteration and fragmentation suggests the general midden deposits were formed by relatively consistent anthropogenic and taphonomic processes. Only 162 specimens appear carbonized, suggesting burning of faunal specimens prior to

Table 5.5. Counts of Distinct Identified Faunal Taxa by Taxonomic Class Obtained from Units SD-49, -50, -51, -60, and -61.

Class	*Number of Taxa (Genus and Family)*	*Number of Specimens*
Fish	52	*9870*
Amphibian	2	214
Bird	1	59
Mammal	19	3169
Reptile	16	2664
Total	*90*	*15,976*

inclusion in the archaeological record was an infrequent occurrence (Table 5.6). Even less common is the appearance of incised bone: 33 specimens bear cuts resembling butcher marks, 19 specimens contain gnawing marks (likely created by rodents), and 13 specimens are incised in a particular pattern that suggests they were worked as part of tool or ornament production. Most specimens are preserved in an unaltered, yet moderately fragmented, condition (see Figure 5.1 and Table 5.2). The majority of specimens in the assemblage are categorized as "fragments," with or without potentially identifiable portions of the distal, proximal, anterior, posterior, shaft, or epiphyseal portion intact (n=12,025). Approximately 25% of all specimens are complete (n=3917) and a small amount are mostly complete (n=237), lacking only insignificant portions of the element. All vertebrate bones, including fish specimens, are remarkably well-preserved and show little signs of erosion, decay, and damage from gnawing.

Fishes

We expect island and mainland coastal communities would focus a large part of their subsistence strategy on procuring marine resources. Indeed, a wide variety of fish from both inshore and offshore marine environments are present in the assemblage. The majority of fish we identified are primarily inshore taxa that congregate around coral reefs. Most of these fish are recognized as desirable foodfish and are important in the modern artisanal commercial fishing industry. Most fish taxa we identified belong to the order Perciformes, which is also the largest taxonomic order of the vertebrates, containing over 160 families and comprising almost half of all bony fishes around the world (Carpenter 2002b:657-663). The most frequently represented fishes in these samples represent the jack family (Carangidae). These medium- to large-sized predators occupy a wide variety of habitats, from shallow nearshore reefs to deep offshore waters (Carpenter 2002c:1426). Other perciform fish identified include Atlantic bumper

Table 5.6. Counts of Faunal Specimens by Type of Element Alteration Obtained from Units SD-49, -50, -51, -60, and -61.*

Element Alteration	*Total Number of Specimens*
Burned	162
Incised	33
Gnawed	19
Worked	13
Unmodified	15,725
Total Number of Specimens	*16,179*

* Includes unidentified specimens.

(*Chloroscombrus chrysurus*), whitemouth croaker (*Micropogonias furnieri*), shorthead drum (*Larimus breviceps*), sheepshead (*Archosargus probatocephalus*), sea bass family (Serranidae), and the following genera: porgy (*Calamus* sp.), wrasse (*Bodianus* sp.), and snook (*Centropomus* sp.), sea chub (*Kyphosus* sp.), grouper (*Epinephelus* sp.), snapper (*Lutjanus* sp.), amberjack (*Seriola* sp.), grunt (*Haemulon* sp.), leatherjacket (*Oligoplites* sp.), parrotfish (*Scarus* sp.), and surgeonfish (*Acanthurus* sp.). Not all inshore perches occupy reefs; fishes in the *Kyphosus* and mojarra genera form small schools inhabiting shallow coastal waters in open sandy areas and seagrass beds nearby reefs (Carpenter 2002c:1506).

In addition, we identified inshore fishes belonging to eight smaller orders associated with a variety of habitats. These include two bottom-feeding orders, the Siluriformes, carnivorous catfish (Carpenter 2002b:619), Batrachoidiformes, and omnivorous toadfish (Carpenter 2002b:634). Bonefish, Albuliformes, shift between pelagic and benthic zones (Carpenter 2002b:683). Mugiliformes (mullets) form schools over sandy bottoms and feed primarily on algae and detritus (Carpenter 2002b:638). Coral-dwelling Tetraodontiformes are a remarkable group, including triggerfish (*Balistes* sp.), the pufferfish family (Tetraodontidae), and porcupinefish (*Diodon antennatus*), which feed on crustacean and other marine invertebrates and are slow-moving but protected with spiny scales (Carpenter 2002b:669). Two orders, Beloniformes, needlefish (Carpenter 2002b:639), and Elopiformes, tarpon (Carpenter 2002b:612), are carnivorous fish that live close to the surface of the water and feed on zooplankton and smaller fishes.

In comparison to the abundance of inshore taxa, we identified only seven offshore taxa. These fish are all considered to be excellent foodfish, are marketed as fresh and salted today, and are of considerable importance in the modern commercial fishery industry. Two of these fish dwell well offshore and tend to be caught from boats with traps, trawls, and hook-and-line. Fish in the mackerel (Scombridae) family are medium- to large-sized (up to 3-m in length) and are found in coastal and oceanic waters 150 to 5000 m in depth (Carpenter 2002c:1836). Red porgy (*Pagrus pagrus*) is a small- to medium-sized fish found primarily in rocky or hard-sand bottoms up to 250 m in depth (Carpenter 2002c:1575). Fish in the herring (Clupeiformes) family are typically small-sized, silvery, and swim in large schools of hundreds of individuals in open water along the continental shelf or in mangroves (Carpenter 2002b:804). The bullet tuna (member of *Auxis*, a Scombridae genus) inhabits inshore waters near islands, where they feed on small fishes and are more easily caught with hooks or nets (Carpenter 2002c:1843). The Spanish mackerel and gulf sierra are primarily pelagic fishes, but sporadically form large schools and enter tidal estuaries in search of crustaceans and smaller fish (Carpenter 2002c:1849-1850). We identified one specimen of moray eel, a carnivorous fish that spends most of its time concealed inside crevices and alcoves at depths up to several hundred meters. The tuna (member of *Euthynnus*, a true tuna genus) are small- to large-sized fish that vary in habitat from far offshore to inland pelagic water, are fast-swimming predators, and are valuable commodities often caught at the surface (Carpenter 2002c:1853-1857).

We also identified two rays that are prized for their meat, both dwelling in shallow coastal waters where they feed on bottom-dwelling prey such as snails, clams, oysters, and crustaceans. The spotted eagle ray (*Aetobatus narinari*) ventures out to surface waters and can swim and briefly fly above the water surface (Carpenter 2002a:580). Members of the whiptail stingray (Dasyatidae) family stick to shallow coastal waters, lagoons, and estuaries, where they hide in sand. Stingray flesh is highly esteemed as food (Carpenter 2002a:562). Shark vertebrae and cartilage fragments belonging to the requiem shark (Carcharhinidae) family and the bull shark (*Carcharhinus leucas*) are present in the faunal assemblage. A smaller (250-300 cm in length) bottom-dwelling predator, the bull shark forages for a wide food spectrum in coastal shallow waters, especially in bays and river estuaries. Bull shark is hunted and used for meat, hide, fins, liver oil (which is very rich in Vitamin A), and fish meal (Carpenter 2002a:482). All of the marine and terrestrial animals identified in the study assemblage can be found on or in the vicinity of Isla Colón; many of these valuable animal resources were more abundant in eras prior to modern industrialized impacts on the region.

Mammals

Many of the terrestrial and marine mammals identified here are also noted in other Bocas del Toro region zooarchaeological analyses (Grayson 1973; Linares 1976; Linares and White 1980; Wake 2014; Wake et al. 2013) and ethnographic observations (Gordon 1982; Smith 2005). We identified four native artiodactyls, the even-toed ungulates (hoofed mammals) that provide a substantial source of meat to indigenous people of the New World. Collared peccary (*Pecari tajacu*) is smaller (~16-25 kg) and forages in smaller herds of two to 50. This species forages in a broader range of habitats for softer fruits and seeds, and they would have been more likely to mingle along cleared fields, house gardens, and disturbed grasslands (Reid 1997:281). Similarly, two deer species present in the assemblage typically occupy distinct niches; the smaller, more gracile red brocket deer (*Mazama americana*) roams mature forest for fruit and foliage while the larger, more robust white-tailed deer (*Odocoileus virginianus*) prefers disturbed niches with harder foods such as fruits, nuts, twigs, and leaves (Reid 1997:283-285).

We identified two large and three small rodent taxa. The lowland paca (*Cuniculus paca*) is a stocky (~6-12 kg) nocturnal rodent that roams primary and secondary forests while foraging for roots, seeds, and fruits. Typically they burrow in steep banks along creeks, swamps, and rivers located near agricultural zones. The Central American agouti (*Dasyprocta punctata*) is a smaller (~3-4 kg) diurnal rodent that forages secondary forest and disturbed forest edges for seeds and fruits. Both species frequent fruiting trees and may be particularly attracted to tree orchards in the tropical forest (Reid 1997:243-245). One rat taxa present in the assemblage is relatively small but could have provided a dependable source of meat protein. Central American spiny rat (*Proechimys semispinosus*) is nocturnal and dwells in lowland evergreen forest and riparian corridors where it forages for fruits and seeds (Reid 1997:246). Ethnographic accounts note that the frugivorous spiny rat is exceptionally tasty and a prized meat among traditional hunters in Costa Rica (Carrillo et al. 2000), Colombia (Orejuela 1992), Ecuador (Suárez et al. 1995), and Panama (Goldman 1920:120). Numerous specimens have been identified as belonging to the cotton rat (*Sigmodon* sp.) and rice rat (*Oryzomys* sp.) genera. These smaller rats inhabit wet areas of secondary forests, fields, and marshes. The cotton rat is larger, diurnal, and more prone to forage for crop fruits in gardens (Reid 1997:213). The rice rat is smaller, nocturnal, semiaquatic, and frequently trapped near water in riparian corridors (Reid 1997:207). While not a prized foodstuff like the spiny rat, both cotton and rice rats are known to inhabit structures and are found in the domestic contexts at the Formative phase site Paso de la Amada in the Soconusco region of Mesoamerica (Wake 2014, personal communication).

Several mammals are present in much lower frequencies. The gray four-eyed opossum (*Philander opossum*) is terrestrial and arboreal, a nocturnal marsupial that nests on the ground in closed forest and forages for fruits and small vertebrates in secondary growth forest, gardens, and riparian zones (Reid 1997:45). We identified one xenarthran, the nine-banded armadillo (*Dasypus novemcinctus*). A nocturnal forest-dweller that burrows in the banks of streams, swims easily, and forages in thorn scrub, cleared savannah, and riparian zones for arthropods and small vertebrates, the armadillo is often encountered in gardens (Reid 1997:61). We also identified one marine mammal, the West Indian Manatee (*Trichechus manatus*). These large (~200-400 kg) sea cows migrate along the Caribbean coast, enter brackish estuarine water, and prefer freshwater accessible from the sea. West Indian manatees were frequently hunted as they graze on seagrass and aquatic vegetation around inland lagoons and rivers (Reid 1997:267). The only domesticated animal identified in the assemblage is confined to the Historic Phase palimpsest. The domestic pig (*Sus scrofa*) was introduced to Panama from Europe during the sixteenth century. These ungulate omnivores were likely bred and managed on Isla Colón mainly for primary (e.g., meat, lard) products.

Reptiles

Reptiles, especially sea turtles, are an important source of protein, fat, and secondary products in coastal Neotropical environments. Most sea turtle specimens were heavily fragmented and not identified beyond family (Cheloniidae). Three species commonly hunted along the Caribbean coast are identified. Green sea turtle (*Chelonia mydas*) is the largest in carapace length (~102 cm) and weight (~136 kg) and mainly inhabits shallow seagrass beds where it feeds on mainly algae and seagrass (Carpenter 2002c:2024). Loggerhead sea turtle (*Caretta caretta*) is medium-sized (~86-105 cm; 115 kg) and seasonally enters estuaries to feed on large, benthic invertebrates such as crabs, crustaceans, and mollusks (Carpenter 2002c:2023). The smallest (~53-115 cm; 36-77 kg), hawksbill sea turtle (*Eretmochelys imbricata*), feeds on sponges and other marine invertebrates in shallow reef areas (Carpenter 2002c:2025). Terrestrial turtles appear less frequently in the assemblage. We identified specimens belonging to the mud turtle genus (*Kinosternon* sp.), a group of omnivorous mud and musk turtles that forage the muddy edges of marshes, swamps, and streams for arthropods and vegetation (Guyer and

Donnelly 2004:110-112). The black river turtle (*Rhymoclemmys funera*), a member of the Neotropical wood turtle genus (*Rhinoclemmys* sp.), forages terrestrially along river edges at night (Guyer and Donnelly 2004:115-116).

Two species identified to the crocodilian order. Humans are the only predator of animals belonging to this class that live on Isla Colón. The American crocodile (*Crocodylus acutus*) is larger (300-370 kg) and dwells in saline, brackish, and freshwater habitats, while the spectacled caiman (*Caiman crocodilus*) is smaller (120-183 kg) and more common to lowland wetlands, rivers, marshes, ponds (Henderson 2010:164-165). The only snake identified in the assemblage is the banded cat-eyed snake (*Leptodeira septentrionalis*), a medium-length (~100 cm) snake common to both Caribbean and Atlantic watersheds, that dwells in vegetation at edges of lowland ponds where amphibians breed (Reid 1997:185). Locally known in Costa Rica as the "chicken of the tree" for its prized meat, the green iguana (*Iguana iguana*) can be caught at sites overlooking rivers, canals, and wetlands (Henderson 2010:120-121).

Amphibians

We identified several amphibians. The cane toad (*Bufo marinus*), aptly called *sapo grande* in Panama, is a large (85-175 mm) nocturnal toad that prefers secondary growth, open fields, and disturbed habitats. Cane toad meat is poisonous to ingest unless processed properly (Savage 2002:199-201). Similar in size (106-185 mm) to the cane toad, the smoky jungle frog (*Leptodactylus pentadactylus*) is more common near streams in closed forest. The frog meat is not poisonous, but its excretions cause a skin rash if handled directly (Savage 2002:219-220).

Birds

While bird is modestly represented in the samples considered for this study, only one specimen was identified to species. The osprey (*Pandion haliaetus*) is a generalist, opportunistic predator that feeds on terrestrial and marine prey (Ridgely and Gwynne 1989:85-86).

Calculations of NISP and MNI

Based on the identified vertebrate remains, Late Ceramic phase occupants at Sitio Drago engaged in a wide array of animal food procurement activities. Harvesting different animals as foods or raw materials requires a variety of skills depending on the species being harvested and the circumstances under which they are being taken. Deep-sea fishing, for example, requires considerably more investment in developing maritime technology and coordinating labor for fishing trips than does trapping or near-shore fishing. The ways in which people hunt change depending on the organization of plant food production (Blaikie and Brookfield 1987; Smith 2005). Intensification of cultigens more vulnerable to pests, such as grains and tubers, encourages people to hunt and trap smaller prey located near house gardens and fields (Linares 1976; VanDerwarker 2006). These deer, rodents, and birds are also desirable foodstuffs and may become dominant in their vertebrate animal-based diet as people become increasingly dependent on growing crops. To understand what types of hunting and fishing activities dominated procurement practices we must first quantify the faunal assemblage.

Combining specimens from all phases and units to estimate NISP and MNI produces virtually identical rankings of ten top-ranked higher vertebrate (i.e., mammals, birds, and reptiles) food resources but with differing values (Table 5.7). Using the NISP measure, the top-ranked resources are smoky jungle frog, agouti, green sea turtle, cotton rat, paca, white-tailed

Table 5.7. NISP and MNI of Higher-Level Vertebrate Taxa Identified from Pre-Biscuitware through Historic Phase Deposits at Units SD-49, -50, -51, -60, and -61.

Common Name	*NISP*	*Common Name*	*MNI*
Smoky jungle frog	207	Cotton rat	17
Agouti	202	Agouti	8
Green sea turtle	104	Smoky jungle frog	6
Cotton rat	101	Green sea turtle	5
Paca	79	Paca	4
White-tailed deer	57	White-tailed deer	4
Rice rat	44	Rice rat	4
Domesticated pig	33	Spiny rat	2
Spiny rat	27	Red brocket deer	2
Black river turtle	26	Loggerhead sea turtle	2
Red brocket deer	20	New World rat	2
West Indian manatee	14	Collared peccary	2
American crocodile	12	Domesticated pig	1
Loggerhead sea turtle	7	Black river turtle	1
Marsh turtle	5	West Indian manatee	1
New World rat	5	American crocodile	1
Collared peccary	4	Marsh turtle	1
Mud turtle	4	Mud turtle	1
Green iguana	3	Green iguana	1
Banded cat-eyed snake	2	Banded cat-eyed snake	1
Nine-banded armadillo	2	Nine-banded armadillo	1
Ocelot	1	Ocelot	1
Spectacled caiman	1	Spectacled caiman	1
Cane toad	1	Cane toad	1
Osprey	1	Osprey	1
Four-eyed opossum	1	Four-eyed opossum	1
Neotropical wood turtle	1	Neotropical wood turtle	1

deer, rice rat, domestic pig (confined to the Historic Phase palimpsest), spiny rat, and red brocket deer. Standardizing abundance with MNI produces lower values of similar taxa, including cotton rat, agouti, smoky jungle frog, green sea turtle, paca, white-tailed deer, rice rat, spiny rat, red brocket deer, and collared peccary. Consistent identification of top-ranked resources, despite biases associated with each measure, strongly suggests that people procured this set of animals throughout Sitio Drago's occupation.

Generating NISP and MNI values of identified taxa from each phase of occupation by unit are useful to understand differences in faunal deposition among contexts. Results from Units SD-49 (Table 5.8), -50 (Table 5.9), -51 (Table 5.10), -60 (Table 5.11), and -61 (Table 5.12) show that assemblage sizes are directly correlated with MNI values. For example, Unit SD-49 has a particularly small total number of specimens and, likewise, produced small MNI values. Taxa with ubiquitous representation across all five excavation units (also see Table 5.7) include: agouti, green sea turtle, sea turtle, and white-tailed deer. These animals are found in every excavation unit, suggesting they were a commonly-disposed foodstuff at Sitio Drago.

An expansion of this set has ubiquitous representation across all phases: agouti, spiny rat, cotton rat, jack, rice rat, sea turtle, smoky jungle frog, snapper, tuna, and white-tailed deer (also see Table 5.7). As these vertebrates are found in every time phase represented at Sitio Drago, they were likely consumed by occupants throughout the site's history. Certain animal food resources appear only in prehistoric deposits, such as black river turtle, cane toad, collared peccary, four-eyed opossum, paca, mud turtle, Neotropical wood turtle, nine-banded armadillo, red brocket deer, and West Indian manatee. Specimens identified as the one domesticated animal taxa present in the study assemblage, the domesticated pig, appear in two Historic Phase deposits in Unit SD-51 and the uppermost level of the Biscuitware Phase deposit in Unit SD-49.

Table 5.8. NISP and MNI of Faunal Taxa Identified from Unit SD-49, by Phase.

Phase	*Taxon*	*NISP*	*MNI*
Historic	Bird	2	1
	Agouti	3	1
	Spiny rat	9	3
	Green iguana	3	1
	New World rat	1	1
	Sea turtle	75	1
	White-tailed deer	1	1
	Fish, unidentified	90	
	Mammal, unidentified	5	
	Unidentified bone	1	
	Total Number of Specimens	*190*	
Biscuitware	Bird	2	2
	Domesticated pig	30	1
	Human	4	1
	Sea turtle	162	2
	West Indian manatee	1	1
	Fish, unidentified	18	
	Mammal, unidentified	31	
	Total Number of Specimens	*248*	
Pre-Biscuitware	Bird	4	1
	Agouti	2	1
	Green sea turtle	3	2
	Human	14	1
	Loggerhead sea turtle	2	1
	Ocelot	1	1
	Sea chub	1	1
	Sea mammal	1	1
	Sea turtle	94	1
	White-tailed deer	4	1
	Fish, unidentified	125	
	Mammal, unidentified	8	
	Reptile, unidentified	1	
	Total Number of Specimens	*260*	
Total Number of Specimens for Unit 49		*698*	

Table 5.9. NISP and MNI of Faunal Taxa Identified from Unit SD-50, by Phase.

Phase	*Taxon*	*NISP*	*MNI*
Biscuitware	Atlantic bumper	52	3
	Atlantic tarpon	1	1
	Banded cat-eyed snake	2	1
	Barracuda	13	1
	Bermuda sea chub	1	1
	Bird	2	1
	Bonefish	5	1
	Bull shark	1	1
	Cane toad	1	1
	Catfish	27	3
	Agouti	2	1
	Spiny rat	2	1
	Cotton rat	20	3
	Crab	2	1
	Domesticated pig	1	1
	Gafftopsail catfish	11	3
	Green sea turtle	2	1
	Grouper	1	1
	Grunt	24	10
	Hawksbill sea turtle	1	1
	Herring	7	1
	Jack	318	13
	Jack mackerel	23	1
	Leatherjacket	9	1
	Mackerel	15	1
	Mojarra	3	2
	Moray eel	1	1
	Needlefish	17	1
	Osprey	1	1
	Parrotfish	10	2
	Requiem shark	1	1
	Sea bass	2	1
	Sea turtle	334	5
	Shorthead drum	11	6
	Snapper	115	22
	Spanish mackerel	4	1
	Surgeonfish	1	1
	Toadfish	2	1
	Tuna	3	1
	Whitemouth croaker	3	1
	White-tailed deer	1	1

	Wrass	15	5
	Fish, unidentified	793	
	Mammal, unidentified	2209	
	Unidentified bone	31	
	Total Number of Specimens	*4100*	
Pre-Biscuitware	Barracuda	3	1
	Bird	4	1
	Catfish	6	1
	Agouti	2	1
	Cotton rat	5	1
	Gafftopsail catfish	2	1
	Green sea turtle	1	1
	Jack	15	1
	Jack mackerel	9	1
	Needlefish	2	1
	Sea turtle	43	1
	Shorthead drum	1	1
	Snapper	2	1
	Spanish mackerel	3	1
	Triggerfish	1	1
	Tuna	1	1
	Wrass	1	1
	Fish, unidentified	194	
	Mammal, unidentified	8	
	Unidentified bone	67	
	Total Number of Specimens	*370*	
Total Number of Specimens for Unit 50		*4470*	

Table 5.10. NISP and MNI of Faunal Taxa Identified from Unit SD-51, by Phase.

Phase	*Taxon*	*NISP*	*MNI*
Historic	Bird	2	1
	Spiny rat	5	2
	Cotton rat	7	2
	Domesticated pig	2	1
	Human	2	1
	Jack	184	8
	Marsh turtle	4	1
	Rice rat	8	1
	Sea turtle	133	5
	Smoky jungle frog	1	1
	Snake	1	1
	Snapper	12	1
	Tuna	20	1
	Whiptail stingray	1	1
	Fish, unidentified	1249	
	Mammal, unidentified	4	
	Unidentified bone	2	
	Total Number of Specimens	*1637*	
Biscuitware	Catfish	1	1
	Agouti	2	1
	Green sea turtle	5	2
	Jack	82	4
	Marsh turtle	1	1
	Mud turtle	1	1
	Neotropical wood turtle	1	1
	Red brocket deer	1	1
	Reptile	1	1
	Rice rat	2	1
	Sea turtle	113	3
	Smoky jungle frog	3	1
	Snapper	18	1
	Tuna	4	1
	Fish, unidentified	630	
	Mammal, unidentified	26	
	Unidentified bone	133	
	Total Number of Specimens	*1024*	
Pre-Biscuitware	Bird	3	1
	Agouti	8	3
	Spiny rat	1	1
	Collared peccary	2	1

	Green sea turtle	2	1
	Human	1	1
	Jack	277	12
	Loggerhead sea turtle	1	1
	Paca	4	1
	New World rat	1	1
	Parrotfish	14	1
	Porcupinefish	119	1
	Red brocket deer	2	2
	Requiem shark	5	1
	Rice rat	6	2
	Sea turtle	96	3
	Smoky jungle frog	19	3
	Snapper	35	2
	Spectacled caiman	1	1
	Toadfish	1	1
	Triggerfish	1	1
	Tuna	31	2
	White-tailed deer	11	1
	Fish, unidentified	909	
	Mammal, unidentified	12	
	Unidentified bone	70	
	Total Number of Specimens	*1632*	
Total Number of Specimens for Unit 50		*4293*	

Table 5.11. NISP and MNI of Faunal Taxa Identified from Unit SD-60, by Phase.

Phase	*Taxon*	*NISP*	*MNI*
Biscuitware	Atlantic tarpon	6	1
	Bird	2	1
	Black river turtle	1	1
	Bullet tuna	1	1
	Agouti	21	3
	Spiny rat	2	1
	Cotton rat	2	2
	Four-eyed opossum	1	1
	Great barracuda	11	1
	Green sea turtle	6	4
	Grouper	10	1
	Grunt	18	1
	Hardhead catfish	6	2
	Human	31	1
	Jack	321	12
	Leatherjacket	1	1
	Paca	16	1
	Needlefish	2	1
	Nine-banded armadillo	1	1
	Parrotfish	15	1
	Porcupinefish	1	1
	Red porgy	1	1
	Rice rat	1	1
	Sea turtle	329	3
	Sheepshead	1	1
	Smoky jungle frog	33	2
	Snapper	29	3
	Spanish mackerel	50	3
	Surgeonfish	17	2
	Tarpon	1	1
	Triggerfish	12	1
	Tuna	81	4
	Collared peccary	2	2
	Wrass	5	1
	Fish, unidentified	303	
	Mammal, unidentified	12	
	Total Number of Specimens	*1352*	
Pre-Biscuitware	Amberjack	1	1
	American crocodile	12	1
	Atlantic tarpon	5	1

	Barracuda	13	2
	Bermuda sea chub	1	1
	Bird	14	3
	Black river turtle	21	2
	Agouti	61	3
	Spiny rat	1	1
	Cotton rat	26	8
	Crocodile	1	1
	Frog	3	1
	Great barracuda	17	2
	Green sea turtle	17	2
	Grouper	4	1
	Grunt	4	1
	Gulf sierra	1	1
	Hardhead catfish	12	2
	Hawksbill sea turtle	2	2
	Herring	3	1
	Human	1	1
	Jack	460	15
	Loggerhead sea turtle	4	1
	Paca	31	2
	Mackerel	1	1
	Moray eel	4	1
	Mullet	1	1
	Needlefish	34	3
	New World rat	3	2
	Nine-banded armadillo	1	1
	Parrotfish	25	2
	Porcupinefish	5	1
	Porgy	6	2
	Red brocket deer	1	1
	Requiem shark	4	1
	Rice rat	8	2
	Sea chub	3	1
	Sea turtle	254	4
	Smoky jungle frog	52	5
	Snapper	67	3
	Snook	6	1
	Spanish mackerel	17	1
	Spotted eagle ray	1	1
	Surgeonfish	15	1
	Tarpon	1	1
	Triggerfish	4	2
	Tuna	40	2
	West Indian manatee	4	1

	White-tailed deer	8	1
	Wrass	1	1
	Fish, unidentified	965	
	Mammal, unidentified	6	
	Total Number of Specimens	*2252*	
Total Number of Specimens for Unit 60		*3604*	

Table 5.12. NISP and MNI of Faunal Taxa Identified from Unit SD-61, by Phase.

Phase	*Taxon*	*NISP*	*MNI*
Biscuitware	Atlantic bumper	1	1
	Bermuda sea chub	1	1
	Bird	3	2
	Agouti	26	3
	Spiny rat	5	2
	Cotton rat	1	1
	Frog	1	1
	Great barracuda	2	1
	Green sea turtle	7	1
	Grouper	1	1
	Hardhead catfish	1	1
	Human	66	1
	Jack	248	9
	Paca	6	1
	Needlefish	3	1
	Parrotfish	2	1
	Porgy	4	2
	Red brocket deer	2	1
	Rodent	1	1
	Sea turtle	293	2
	Smoky jungle frog	8	2
	Snapper	23	1
	Spanish mackerel	24	1
	Surgeonfish	5	1
	Tuna	27	2
	West Indian manatee	1	1
	Whiptail stingray	1	1
	White-tailed deer	10	2
	Wrass	1	1
	Fish, unidentified	164	
	Mammal, unidentified	9	
	Total Number of Specimens	*947*	
Pre-Biscuitware	Amberjack	3	1
	Atlantic bumper	2	1
	Bermuda sea chub	1	1
	Bird	20	3
	Black river turtle	4	1
	Agouti	75	4
	Spiny rat	2	1
	Cotton rat	40	9

	Crocodile	2	1
	Deer	4	1
	Frog	2	1
	Great barracuda	10	1
	Green sea turtle	61	3
	Grouper	2	1
	Grunt	4	1
	Hardhead catfish	17	2
	Human	5	1
	Jack	457	16
	Leatherjacket	3	1
	Paca	22	2
	Mackerel	1	1
	Mud turtle	3	1
	Needlefish	9	1
	Parrotfish	13	2
	Porcupinefish	17	1
	Porgy	7	3
	Pufferfish	1	1
	Red brocket deer	14	4
	Rice rat	19	3
	Rodent	4	1
	Sea turtle	565	4
	Smoky jungle frog	91	6
	Snapper	18	2
	Spanish mackerel	43	2
	Spotted eagle ray	5	1
	Surgeonfish	17	1
	Tarpon	6	1
	Triggerfish	3	1
	Tuna	23	2
	West Indian manatee	8	1
	Collared peccary	2	1
	White-tailed deer	22	4
	Fish, unidentified	528	
	Mammal, unidentified	12	
	Total Number of Specimens	*2167*	
Total Number of Specimens for Unit 61		*3114*	

Quantifying the study assemblage by occupation phase, with samples combined from all units, provides a clear overview of patterns in animal exploitation through time (Table 5.13). The Pre-Biscuitware assemblage contains the greatest number of specimens and produces the highest values calculated by MNI. Rats, smoky jungle frog, and agouti are the highest-ranking taxa by MNI in this earliest phase of occupation. The Biscuitware Phase assemblage demonstrates an increase in NISP of sea turtle. Despite an overall decrease in MNI values, rats, smoky jungle frog, agouti, and paca continue to appear as highly-ranked food sources as local population expanded and regional political integration increased (Wake 2014). Dramatic changes in the assemblage occur in Historic Phase samples, which show an increase in NISP and MNI of rats and smoky jungle frog. Red brocket deer and paca disappear, while agouti and white-tailed deer are each present merely with MNI values of one.

Comparisons of NISP and MNI values reveal several patterns relevant to understanding taphonomic processes involved in the formation and preservation of these deposits. Fishes, sea turtle, and smoky jungle frog are represented by high NISP values and proportionally low MNI values. Fish are typically over-represented by specimen number due to the exceptionally high number of bones per individual skeleton. On the other hand, fish tend to be under-represented by MNI as their skeletons contain few bones that can be used to estimate number of individuals; the vomer and ultimate vertebra count as one individual, while other cranial elements such as premaxilla, maxilla, and dentary can be sided as left or right to estimate MNI. Sea turtle is present in large numbers of specimens because its porous bones are easily fragmented during butchering, cooking, disposal, post-depositional processes, and/or recovery occurs at a higher rate. The bulk of sea turtle specimens are heavily fractured and identifiable to the order of sea turtle based on the appearance of bone structure rather than morphological features.

Table 5.13. NISP and MNI of Higher-Level Vertebrate Taxa Identified from Units SD-49, -50, -51, -60, and -61, by Phase.

Taxon	*Pre-Biscuitware Phase*		*Biscuitware Phase*		*Historic Phase*	
	NISP	*MNI*	*NISP*	*MNI*	*NISP*	*MNI*
Cotton rat	71	16	23	2	7	2
Agouti	148	6	51	3	3	1
Smoky jungle frog	162	7	44	2	1	1
Green sea turtle	84	2	20	5	0	0
Paca	57	4	22	2	0	0
White-tailed deer	45	2	11	1	1	1
Rice rat	33	4	3	1	8	2
Spiny rat	4	1	9	2	14	2
Red brocket deer	17	3	3	1	0	0
Loggerhead sea turtle	7	2	0	0	0	0
New World rat	4	2	0	0	1	1
Collared peccary	4	1	2	2	0	0
Total # of Specimens	*636*		*188*		*35*	

On the other hand, the smoky jungle frog has very few bones per animal, typically fewer than one hundred elements, making their presence in large number of specimens particularly notable. Most smoky jungle frog bones are shaft fragments of long bones and ilium lacking diagnostic distal or proximal metaphysis and epiphysis fragments. These amphibians live in the forest, breed in freshwater, and have a very toxic skin secretion (Savage 2002:219-220). Given the high ubiquity of smoky jungle frog, combined with the presence of the cane toad, which also has a toxic skin secretion, prehistoric occupants at Sitio Drago likely ate a lot of frog meat and had developed specialized skinning techniques. Similarly, higher vertebrates such as agouti, paca, and white-tailed deer are represented mainly by vertebrae, teeth, and rib and long bone shaft fragments that are difficult to use for MNI calculations. Cotton rat, an animal that prefers to nest in shelters, is uniquely well represented by complete leg bone specimens and produces a high MNI value.

Relative Abundance of Taxa

NISP and MNI represented in the study assemblage point to a broad subsistence strategy of fishing and hunting taking place in most available ecological niches on Isla Colón. Grouping vertebrate taxa by taxonomic class provides a broad overview of subsistence strategies in different temporal contexts. To address dietary preference and routine subsistence activities in more detail, relative abundances of food resources are calculated based on MNI and NISP values of animal taxa aggregated in meaningful qualitative categories. Here, I calculate relative abundance of amphibian, bird, fish, mammal, and reptile with relative percentages based on NISP values within the assemblage representing each time phase (Figure 5.2 and Table 5.14). Bar graphs depicting relative percentages of these categories for each phase show that, from Pre-Biscuitware to Biscuitware times, fish and mammal have an inverse relationship in patterning.

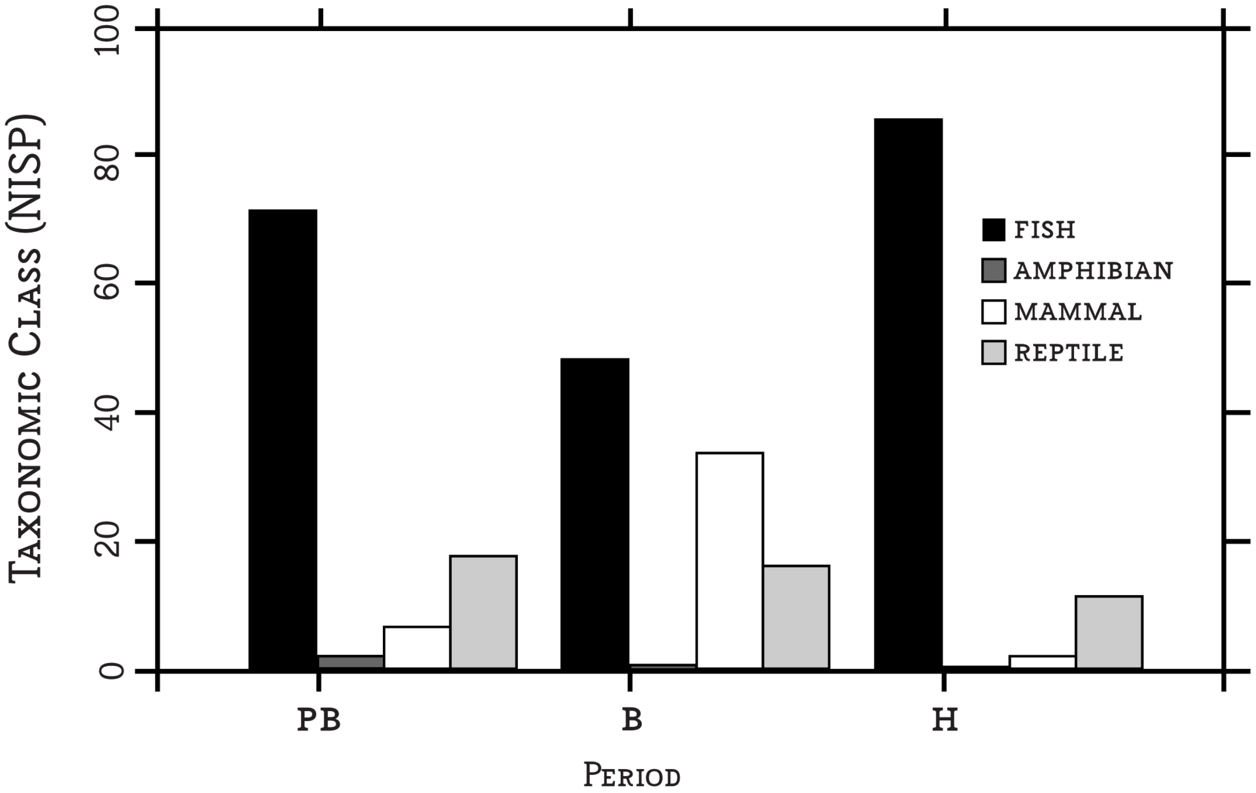

Figure 5.2. Relative abundance of faunal specimens by taxonomic class across Units SD-49, -50, -51, -60, and -61 with all phases combined (NISP).

Table 5.14. Counts of Faunal Specimens by Taxonomic Class across Units SD-49, -50, -51, -60, and -61 with All Phases Combined (NISP).

Class	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Fish	4654	3639	1555
Reptile	1189	1259	216
Mammal	475	2548	47
Amphibian	167	46	1
Bird	45	10	4
Total NISP	*6530*	*7502*	*1823*

Mammal increase 27% during the Biscuitware Phase and decrease 31% during the Historic Phase. Fish, on the other hand, decrease 23% during the Biscuitware Phase and increase 37% during the Historic Phase. Relative abundance of amphibian and reptile specimens decrease with each successive phase. The patterning may suggest that villagers at Sitio Drago intensified exploitation of mammals relative to fish during the Biscuitware Phase. However, the increase in mammal recovered from the Biscuitware Phase is likely do to the large number of unidentified mammal bone identified in Unit SD-50 (see Table 5.9). Comparison of specific mammals associated with cleared or forested landscapes will more accurately reflect potential shifts in preference of animal food type. People occupying Sitio Drago after AD 1500 either abandoned the terrestrial hunting practices—perhaps an effect of focusing on commercial fishing and pig production—or disposed of food debris in a different location. The consistent proportion of reptile relative to other taxonomic classes is likely due to the substantial presence of sea turtle specimens during all phases.

This pattern holds when the data are presented in a slightly different way. Here, I calculate relative abundance of marine and terrestrial vertebrate resources with relative percentages based on NISP values from each phase (Figure 5.3 and Table 5.15). This analysis includes only specimens that could be identified to the level of class and assigned a designation of land- or sea-dwelling. The bar graphs show that terrestrial animal resources increase 24% during the Biscuitware Phase, while marine resources decrease by the same amount. This patterning could reflect villagers' increased focus on hunting and trapping terrestrial prey attracted to intensified gardening and tree-copping during the later phase.

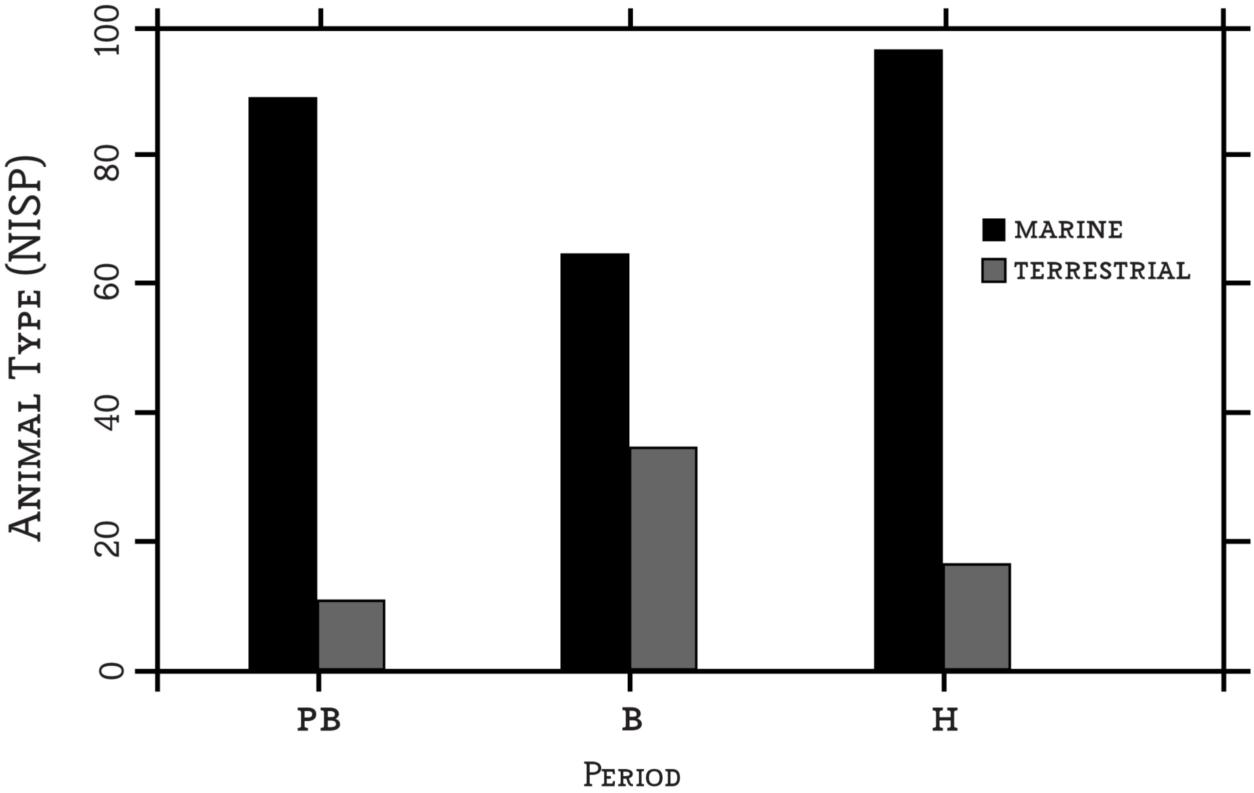

Figure 5.3. Relative abundance of faunal specimens by habitat type across Units sd-49, -50, -51, -60, and -61 with all phases combined (NISP).

Table 5.15. Counts of Faunal Specimens by Habitat Type across Units SD-49, -50, -51, -60, and -61 with All Phases Combined (NISP).

Habitat Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Marine	5826	4896	1764
Terrestrial	695	2608	60
Total NISP	*6521*	*7504*	*1824*

Ratios of Taxa by Habitat Preference

To address hunting activities in more detail, ratios of animal types associated with specific animal procurement activities and/or landscape transformations are calculated using NISP of animal taxa combined within each category. Generally, it appears that the residents of Sitio Drago decreased procurement of marine relative to terrestrial animal resources from the Pre-Biscuitware to the Biscuitware Phases. To explore whether the type of fishing activities changed during the two prehistoric Phases, I aggregated NISP values of specimens identified to level of family, genus, or species, and that have a clear habitat preference for coastal or oceanic habitats into categories of offshore fishes (found in waters at least 150 m in depth) to nearshore fishes (typically found within a few dozen meters of shoreline). I produced a ratio of offshore to inshore fish across phases at the Sitio Drago. The ratio is calculated as follows:

$$\frac{\sum \text{NISP of offshore fish}^{4}}{\sum \text{NISP of nearshore fish}^{5}}$$

Ratios are presented as dot charts, and the graph demonstrates a relatively even proportion of offshore fish relative to nearshore among phases (Figure 5.4 and Table 5.16). It appears that residents of Sitio Drago continued exploiting offshore fish, the latter of which requires more investment in boating technology and labor organization, at the same rate while fishing activities decreased in overall importance. During all phases, inshore fishes represent the majority of fish specimens identified in all phases at Sitio Drago.

If people at Sitio Drago dramatically changed routine landscape management practices in

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[4] Bullet tuna, Gulf sierra, Herring, Mackerel, Red porgy, Spanish mackerel, and Tuna

[5] Carangidae family, Centropomidae order, Clupeidae order, Gafftopsail catfish, Hardhead catfish, Grunt genus, Sheepshead, Porgy genus, Sciaenidae order, Surgeonfish genus, Triggerfish genus, Mojarra genus, Wrass genus, Parrotfish genus, Kyphosidae order, Porcupinefish, Teleostei order, Belonidae order, Western Atlantic toadfish genus, Serranidae family, and Scombridae family

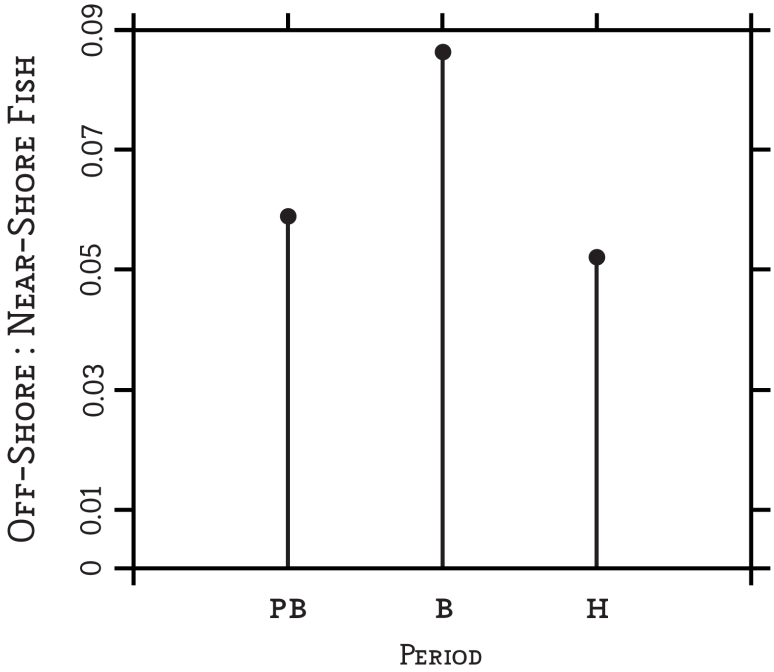

Figure 5.4. Ratio of off-shore to near-shore fish specimens by phase from Units SD-49, -50, -51, -60, and -61.

Table 5.16. Counts of Off-Shore to Near-Shore Fish Specimens by Phase from Units SD-49, -50, -51, -60, and -61.

Habitat Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Off-Shore	164	217	20
Near-Shore	2810	2582	393
Ratio	*0.06*	*0.08*	*0.05*

order to intensify plant food production, we would expect to see an increase of animal taxa that prefer disturbed, open-edge habitats versus those that prefer closed forest habitats. Further, the expansion of tree cropping would increase the appearance of animal taxa attracted to the fruits and nuts cultivated by humans, rather than those preferring closed-canopy habitats. Five species in the Sitio Drago faunal assemblage are important indicator taxa for forest clearing activities. Red brocket deer, collared peccary, and paca are nocturnal species that prefer closed-canopy forest. A set of similar species – the white-tailed deer and agouti – are diurnal species drawn to cleared forest edges. Several small rodent species are drawn to distinctly different habitats in a similar manner. The spiny rat, which eats fruit, and the cotton rat, which likes shelter, are both attracted to human-disturbed environments. The native rice rat prefers foraging in riparian habitats. I produced a ratio of disturbed-edge to forest animals across phases at the Sitio Drago. The ratio is calculated as follows:

$$\frac{\sum \text{NISP of disturbed-edge animals}^{6}}{\sum \text{NISP of forest animals}^{7}}$$

Ratios are presented as dot charts, and the graph clearly demonstrates a substantial increase in the proportion of disturbed-edge to forest prey during the Biscuitware Phase (Figure 5.5 and Table 5.17). This trend suggests that small, easily-accessible prey became a more frequent part of the villagers' diet during a phase of intensified crop production.

To explore this signature in more detail, I produced a set of dot charts comparing the ratios of white-tailed deer to red brocket deer, agouti to paca, and the spiny rat/cotton rat aggregate to the rice rat. The dot charts in Figure 5.6 show that two of three indicator taxa for

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[6] White-tailed deer, agouti, spiny rat, and cotton rat

[7] Red-brocket deer, collared peccary, paca, and rice rat

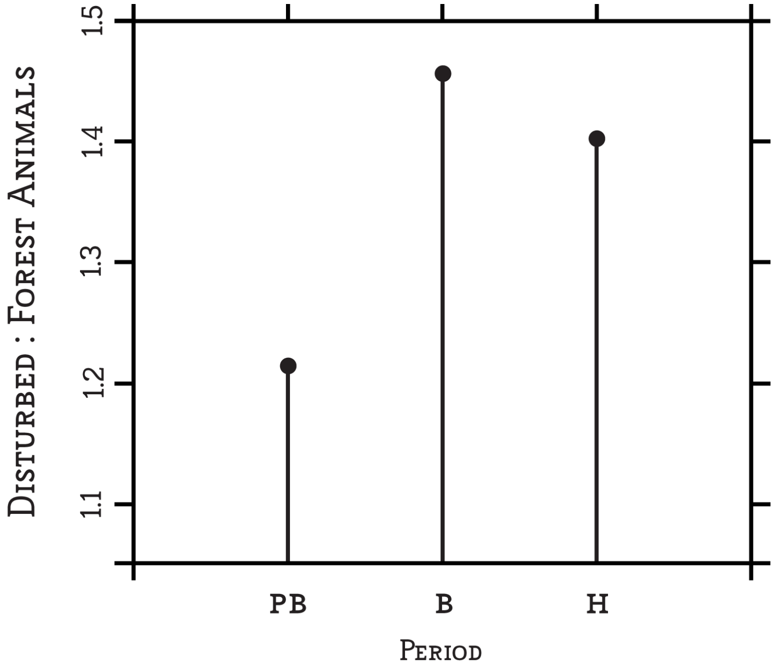

Figure 5.5. Ratio of disturbed-edge to forest terrestrial vertebrate specimens by phase from Units SD-49, -50, -51, -60, and -61.

Table 5.17. Counts of Disturbed-Edge to Forest Terrestrial Vertebrate Specimens by Phase from Units SD-49, -50, -51, -60, and -61.

Habitat Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*	*Historic Phase*
Disturbed-Edge	300	119	21
Forest	248	82	15
Ratio	*1.21*	*1.45*	*1.4*

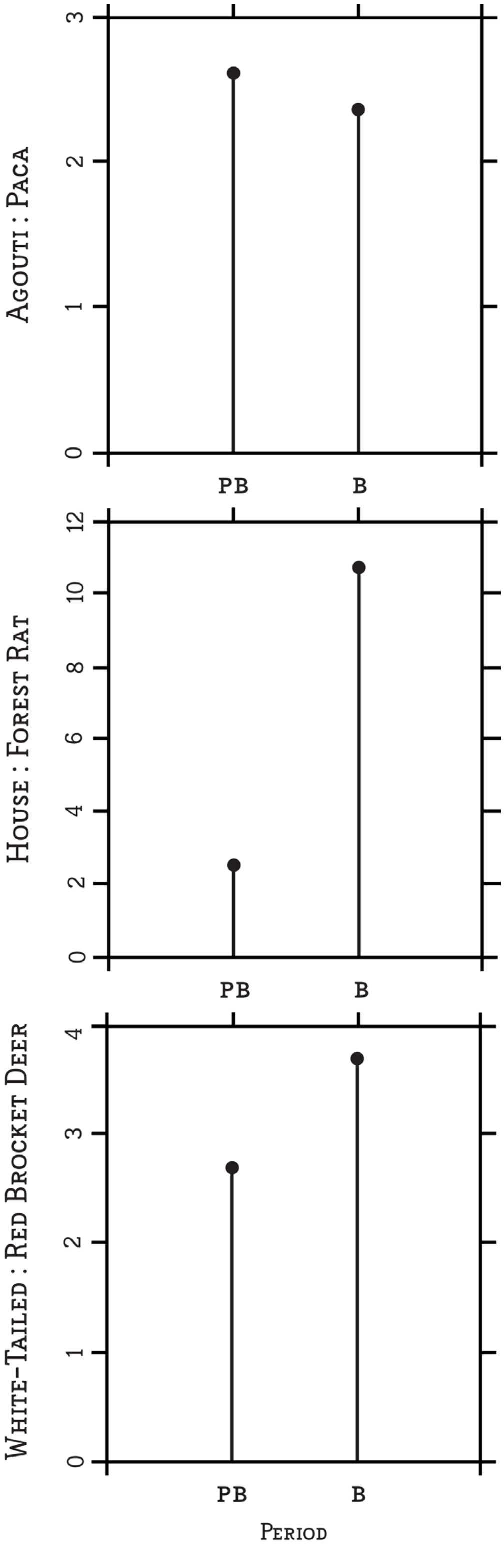

Figure 5.6. Ratios of disturbed-edge to forest terrestrial vertebrate specimens, presented by small rodent, large rodent, and deer type by phase from Units SD-49, -50, -51, -60, and -61.

Table 5.18. Counts of Agouti to Paca (Large Rodent) Specimens by Phase from Units SD-49, -50, -51, -60, and -61.

Habitat Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*
Agouti	148	51
Paca	57	22
Ratio	*2.60*	*2.32*

Table 5.19. Counts of House- to Forest-Rat (Small Rodent) Specimens by Phase from Units SD-49, -50, -51, -60, and -61.

Habitat Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*
House Rat	75	32
Forest Rat	33	3
Ratio	*2.27*	*10.67*

Table 5.20. Counts of White-Tailed to Red-Brocket Deer Specimens by Phase from Units SD-49, -50, -51, -60, and -61.

Habitat Type	*Pre-Biscuitware Phase*	*Biscuitware Phase*
White-Tailed Deer	45	11
Red Brocket Deer	17	3
Ratio	*2.65*	*3.67*

disturbed-edge forest increase in comparison to closed canopy forest prey during the Biscuitware Phase (see also Table 5.18, Table 5.19, and Table 5.20). White-tailed deer increases visibly in relative importance to red brocket deer from the Pre-Biscuitware to Biscuitware Phase. In comparison to the forest-dwelling rice rat, the cotton rat/spiny rat aggregate substantially increases during the two prehistoric phases. Conversely, the dot graph demonstrates a slight decline in the ratio of paca to agouti across phases. Overall, this patterning may be an effect of sudden changes in land use and/or disposal patterns as historic development of Isla Colón took place.

Assessment of Diversity

Diversity measures can be used to measure the expected changes in hunting scale and diet breadth resulting from population expansion or agricultural intensification. Specifically, measurements of species evenness and richness in zooarchaeological assemblages can suggest temporal changes in scale of hunting and fishing activities and dietary breadth resulting from population expansion or resource intensification.

The results of the DIVERS computer simulation for Sitio Drago are presented in a plot of richness (Figure 5.7) and evenness (Figure 5.8) by sample size for each phase. In Figure 5.7, two phases fall within the confidence interval for expected richness values given their sample sizes, suggesting the richness of the zooarchaeological assemblages is within the expected range. In contrast, the Historic Phase sample falls below the confidence interval, suggesting the zooarchaeological assemblage is less diverse than expected in terms of richness. In Figure 5.8, the Pre-Biscuitware and Biscuitware Phase zooarchaeological assemblages fall above the confidence internal for expected evenness values given their sample size. The Historic Phase assemblage falls below the confidence interval for expected evenness values. This means there is no significant difference between the two prehistoric Phases, but the Historic Phase assemblage is skewed towards a certain resource or set of resources. NISP values calculated for animal taxa during each phase point to three rat species (see Table 5.13). In the Historic Phase samples, all NISP values for animal taxa are equal to or less than three, while the spiny rat (n=14), rice rat (n=8), and cotton rat (n=7) dominate the assemblage.

The Shannon-Weaver index calculates richness as an overall diversity index (H') and equitability (V'). Higher numeric values for H' indicate higher species diversity in terms of richness. Equitability values (V') range from 0 to 1, with a value of 1 indicating an even distribution of taxa, and lower values representing less even (more skewed) distributions. Calculation of H’ and V’ values of animal assemblages by time phase at Sitio Drago indicates a very diverse (richness) and unevenly distributed prehistoric diet (Figure 5.9 and Table 5.21). Diversity in terms of richness decreases successively in time with each phase’s sample, from the Pre-Biscuitware to Biscuitware Phases and the Biscuitware to Historic Phases.

The results of DIVERS analysis and Shannon-Weaver index calculations on the zooarchaeological assemblage from Sitio Drago point to a very diverse and equitable, evenly distributed animal-based diet during the Pre-Biscuitware Phase. People living at Sitio Drago seem to have narrowed types of animal foods procured with each successive occupation.

Dietary Contribution of Shellfish Exploitation

Mollusks represent a large portion of the faunal remains encountered at Sitio Drago and were likely a substantial source of protein for people living in the region. While mollusks are the most common invertebrate remains found at many archaeological sites, the role that shellfish collection plays in shaping local environments is undetermined. Archaeomalacology (the study of mollusks in archaeological contexts) has become essential in studying the role of shellfish in

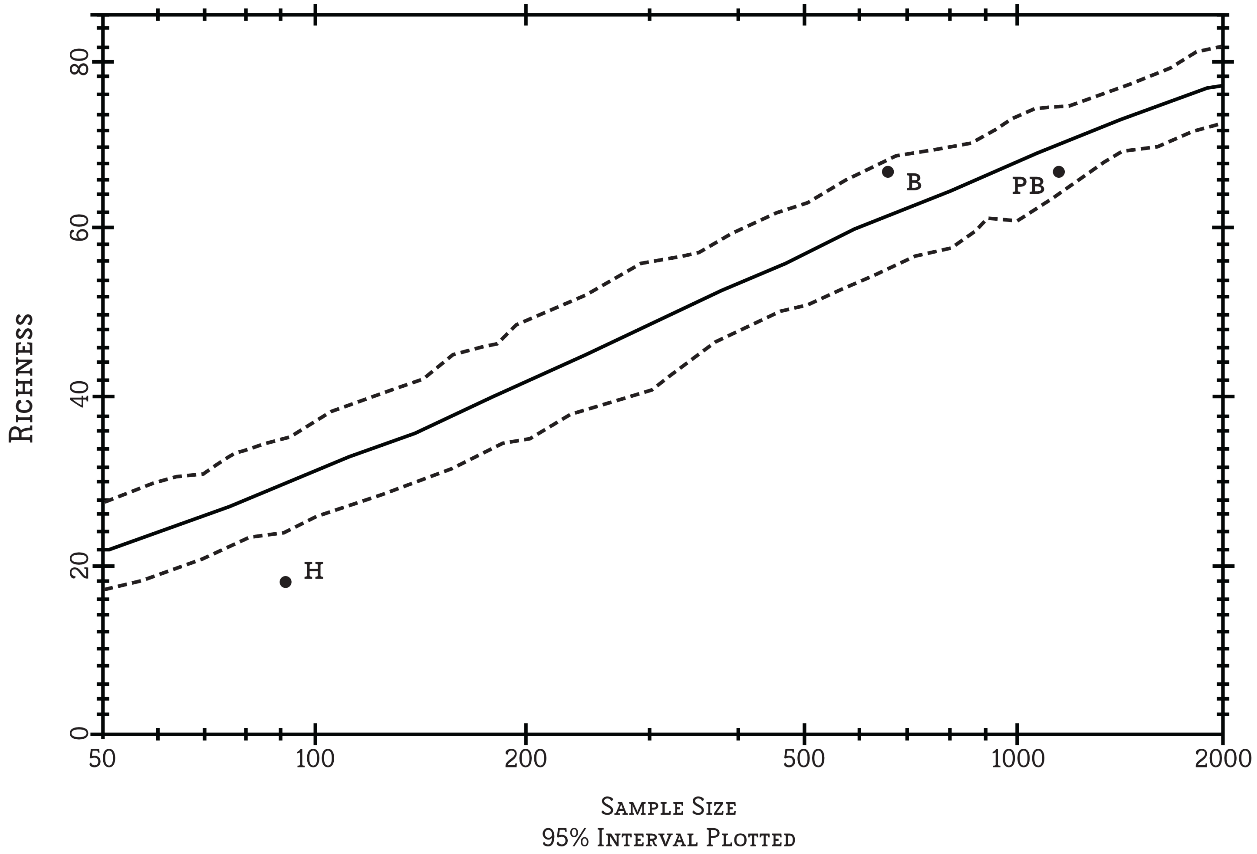

Figure 5.7. DIVERS richness plot of Sitio Drago faunal remains by phase.

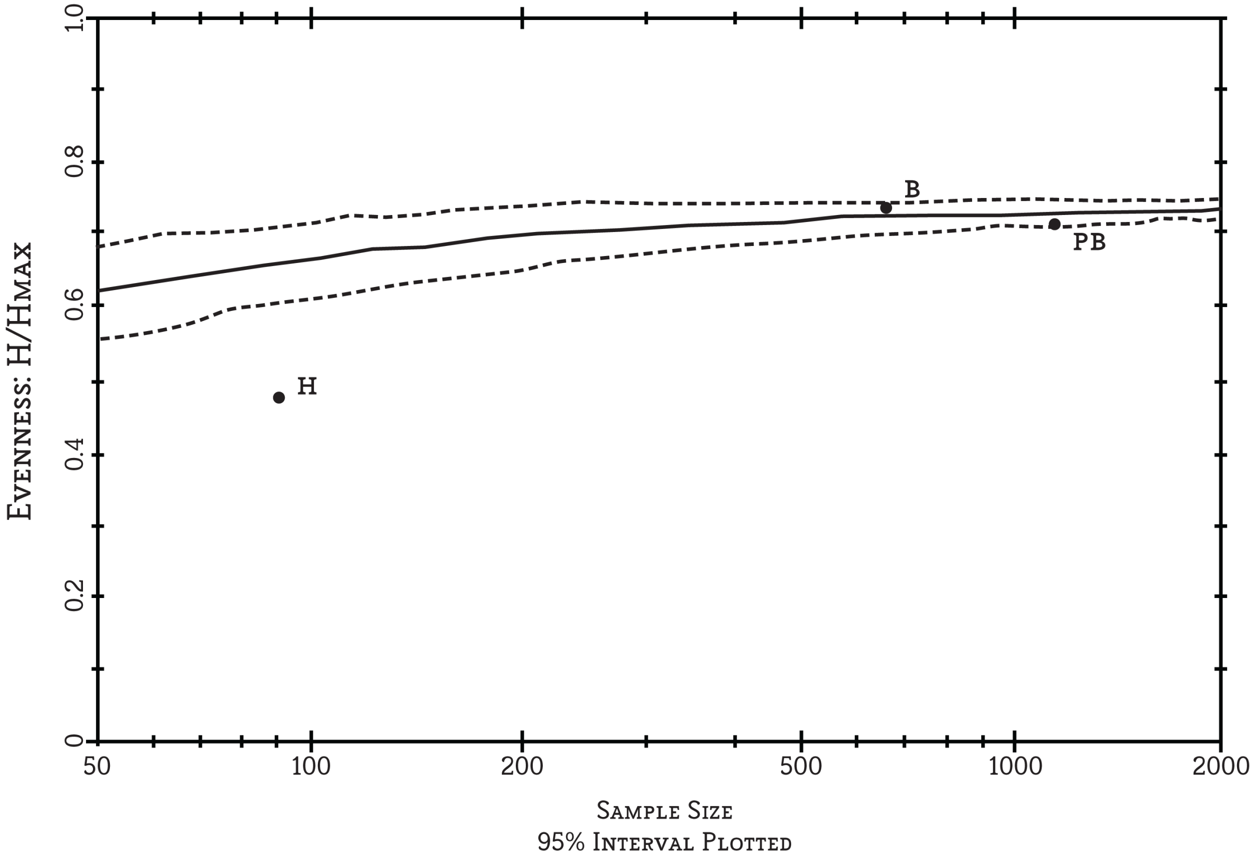

Figure 5.8. DIVERS evenness plot of Sitio Drago faunal remains by phase.

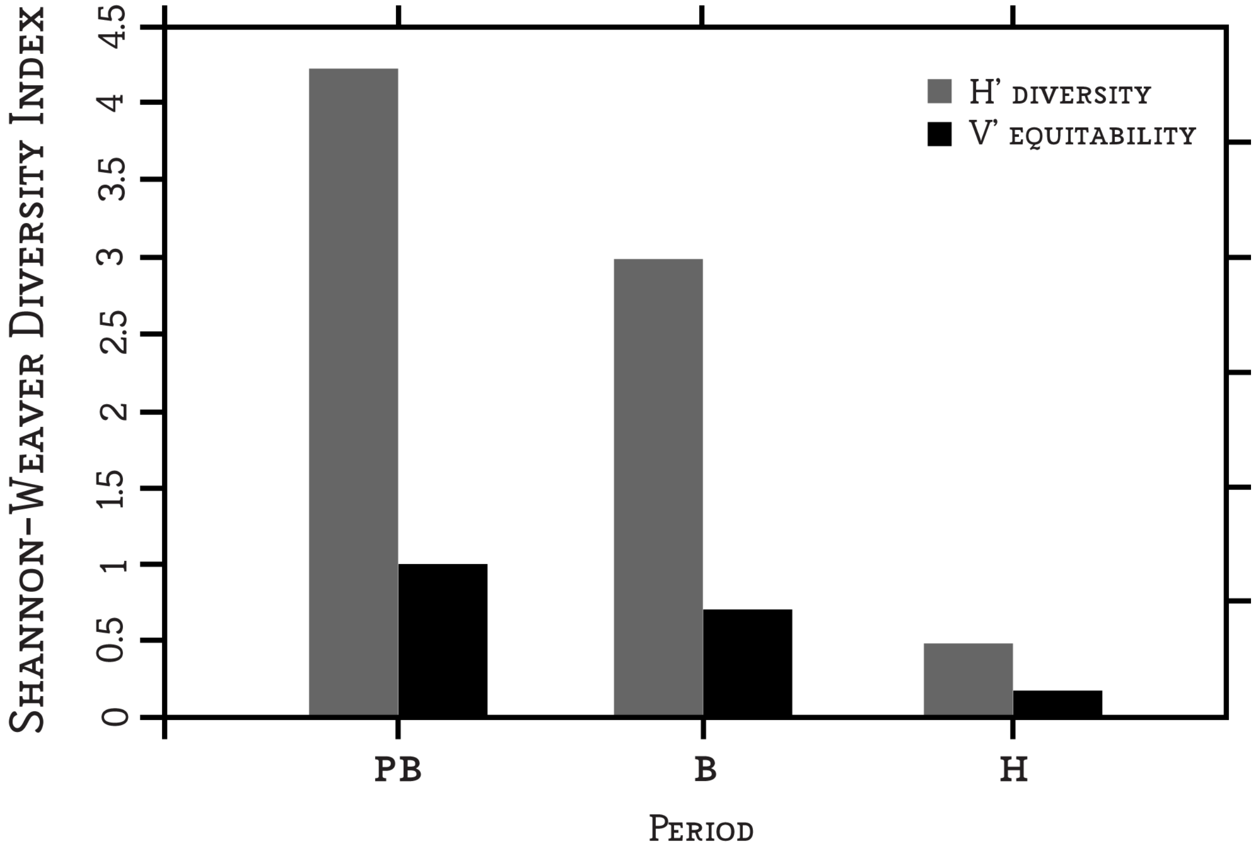

Figure 5.9. Shannon-Weaver diversity value plot of Sitio Drago faunal assemblage by phase.

Table 5.21. Shannon-Weaver Diversity Values for Sitio Drago Faunal Assemblage by Phase.

Value	*Pre-Biscuitware*	*Biscuitware*	*Historic*
H'	4.21	2.97	0.49
V'	1	0.71	0.17

human diet and is useful as a proxy for human impacts on the environment (O'Dea et al. 2014; Szabó et al. 2014; Thomas 2015). Doughty examined shells from prehistoric components of Units SD-1, -14, and -22, all located in the mortuary area of Sitio Drago (Doughty 2011; Wake et al. 2013). The occupants of Sitio Drago focused their shellfish exploitation on sandy beaches, shallow water reef flats, and mangroves – ecological niches overlapping with the exploited fishes identified in this chapter. Of the 86 genera and 76 species of mollusks identified in these three units, 15 taxa represent approximately 90% of the shell assemblage (Table 1 in Wake et al. 2013:6). The top-ranked mollusks include species known to require specialized collection techniques and processing implements, such as tools for forced removal of sessile bivalves (*Arca zebra* and *Anadara* spp.), stripping of mangrove roots (*Crassostrea rhizophorae* and *Isognomon alatus*), and bulk harvesting with rakes or openwork baskets (*Chione cancellata*, *Donax variabilis*, *Anomalocardia cuneimeris*). Although the vast majority of shell taxa examined are prized today as food, a few species were likely harvested for decorative beads (*Ancilla* sp., *Cyphoma gibbosum*, *Conus* spp., *Cypraea* sp., *Oliva reticularis*), and dyes (*Purpura patula*). Two top-ranked mollusk taxa (*Lobatus gigas* and *Charonia variegata*) are very large and tasty, and are used to make trumpets. To the people of Sitio Drago, mollusks represented a bounty of food as well as a means to create material expressions of status and wealth (O'Dea et al. 2014).

Late Ceramic phase people living on Isla Colón clearly invested considerable labor and material resources in procuring mollusks. What percentage of the overall animal diet was comprised of shellfish? Did these people intensify exploitation and consumption of shellfish as the population grew? What effects, if any, did shellfish exploitation have on the mollusk community? To address these issues, several archaeologists have analyzed patterns of relative abundance and change in specimen size in three mollusk assemblages obtained from Sitio Drago and off-site locations predating human occupation of the New World (O'Dea et al. 2014; Wake et al. 2013). The sheer volume of shell in comparison to vertebrate faunal remains indicates that mollusks must have been a substantial part of the Late Ceramic phase subsistence regime. Scholars working with shell recovered from Sitio Drago have not conducted formal analysis of shell and vertebrate bone weights to estimated meat weight. Dietary reconstruction at some shell-bearing midden sites in marine coastal environments of California suggests that shellfish provided roughly 85% to 90% of the edible meat represented in given faunal assemblages, while vertebrates provided only about 10% or 15% (Erlandson et al. 1999; Raab 1992; Rick et al. 2006; Yesner 1980). Comprehensive dietary reconstruction is not the main goal of this project, but analysis of the potential contributions of shellfish meat to the diet at Sitio Drago represents an excellent future research project.

We do know that the 15 top-ranked shellfish taxa are nearly ubiquitous in Sitio Drago mollusk assemblages, but several shifts in relative frequency can be observed through time (Figure 3, Doughty 2011; O'Dea et al. 2014). Top-ranked oyster (*Crassostrea rhizophorae*, *Isognomon alatus*, and *Pinctada imbricata*) and mobile clam (*Chione*) resources significantly decline in relative frequency during the Biscuitware Phase. At the same time, lower-ranked sessile clam (*Arca zebra* and *Anadara notabilis*) resources spike in relative abundance when oysters became less numerous. A similar dynamic is observed in snail taxa, with a shift away from the more preferable hawk-wing conch (*Lobatus raninus*) to the less preferable fighting conch (*Strombus pugilis*) taking place during the Biscuitware Phase (O'Dea et al. 2014:5; Wake et al. 2013:8). During the same time, O'Dea et al. (2014:8) estimate that fighting conch meat weight decreased by about 50% per specimen by the modern phase. These patterns suggest human exploitation of preferred mollusk foods resulted in resource depression, which may have pushed villagers to seek less preferable shellfish at a time when the local population appears to have both expanded and increased supraregional elite networking. Despite fluctuations in preferred or readily available taxa, mollusk exploitation was probably a major activity at Sitio Drago, particularly in comparison to inland Sitio Teca. Procurement of the top-ranked shellfish likely involved minimal preparation of specific materials and could have taken place alongside fishing for near-shore, reef-dwelling fishes and capturing of small mammals, reptiles, and amphibians.

Discussion

The results of numerical and statistical analyses conducted for this study provide several important observations about the zooarchaeological assemblage in Units SD-49, -50, -51, -60, and -61 at Sitio Drago. The types and rankings of animal resources identified here are in general accordance with results of zooarchaeology and ethnographic studies previously conducted in the region (Gordon 1982; Grayson 1973; Linares 1976; Smith 2005). The abundance of marine vertebrates, even without calculating the exact dietary contribution of shellfish, suggests Late Ceramic phase villagers developed an animal-based subsistence strategy focused on the rich marine resources available in Almirante Bay and the Caribbean Sea. Comprising a comparatively smaller portion of the overall assemblage, terrestrial vertebrates appear to have been key components of prehistoric subsistence. The abundance of mammals, reptiles, and amphibians found in closed and cleared-edge forest, riverine, and shoreline habitats suggests people at Sitio Drago exploited most island niches. Analysis of the zooarchaeological assemblage from all three occupational phases points to a broad-spectrum subsistence strategy that depended on a wide variety of collecting, fishing, hunting, and trapping practices.

Fishery maintenance would have been an important point of interaction between Late Ceramic people and the local environment. The abundance of reef fishes, rather than off-shore fishes, in the study assemblage demonstrates a clear preference for marine vertebrates that can be procured most efficiently in and around the well-developed coral reefs surrounding Isla Colón. In general, near-shore reefs and pelagic zones provide a wealth of food and material resources for prehistoric people. Future sorting and identification of general midden collected during excavation will provide more information on smaller fish, bird, and rodent taxa.

Changes in Animal Exploitation through Time

Several important temporal patterns are evident through comparisons of relative abundance of animal resources. These results support the expectation that hunting practices taking place during different occupational phases would yield different abundances of animal remains. Among vertebrate food sources, the presence of dominant animal resource taxa remains relatively consistent, suggesting that by the Pre-Biscuitware Phase, people had developed consistent hunting, fishing, and trapping routines. Sudden discontinuity of top-ranked animal foods does not take place until the Historic Phase, when taxa such as red brocket deer disappear from the faunal assemblage.

Human impacts on marine ecosystems are a significant source of concern for conservation biologists today. Long-term impacts of prehistoric human populations can cause resource depletion and even species extinction. A general decline in species diversity with each successive occupational phase has already been documented at Sitio Drago. This trend corresponds with evidence of over-fishing and over-harvesting of mollusks in faunal assemblages recovered from Biscuitware Phase deposits (Kay 2010; O’Dea et al. 2014; Wake et al. 2013). An increase in abundance of mammals preferring cleared-edge habitats during the

Biscuitware Phase, an occupation phase marked by demographic expansion and increased interaction with outside groups, suggests a shift in focus toward terrestrial resources.

CHAPTER VI

ANCIENT COMPLEXITY AND ADAPTATION ON ISLA COLÓN

Introduction

This first attempt at constructing a subsistence history of the lowland coastline in present-day Bocas del Toro yields several important insights into how early populations engineered the landscape to support sociopolitical complexity. Assessment of data presented in previous chapters shows that villagers were able to intensify procurement of specific plant and animal resources in order to support a growing population during the Biscuitware Phase (AD 1200 to 1450). The primary goal of this project was to produce a narrative of the long-term developments and unique historical contexts at play in shaping subsistence at Sitio Drago. In doing so, I addressed the three main objectives introduced in Chapter I.

First, I recovered and identified plant and animal remains from five excavation units representing domestic trash heaps spanning three occupation phases. Archaeobotanical data presented here provide unprecedented evidence of prehistoric farming and foraging in western Caribbean Panama. Identification of 32 distinct plant taxa, including cultigens such as maize (*Zea mays*: Poaceae), bean (*Phaseolus* sp.: Fabaceae), and culantro (*Eryngium foetidum*: Apiaceae) in Sitio Drago deposits refutes the notion that prehistoric occupants of the low-lying western Caribbean region were unable to develop successful horticultural systems (c.f. Linares 1976, 1977; Linares and Ranere 1980; Meggers 1971, 1979). Zooarchaeological data presented here enable the first integration of plant and animal remains in this region and demonstrate preference for medium- and small-sized terrestrial animals attracted to disturbed environments.

Second, although people farmed several domesticated plant foods—including maize and bean—during both the Pre-Biscuitware (AD 800 to 1200) and Biscuitware Phases, foraging of wild fruits and nuts continued to represent the bulk of plant food procurement. People continued to forage for small fruits and plants useful for flavoring dishes during the Biscuitware Phase, the same time during which they intensified production of managed tree fruits.

Third, I assessed changes in plant and animal resource procurement and disposal during the Biscuitware Phase, when the population grew and elites expanded political ties throughout lower Central America. From AD 1200 to 1450, people at Sitio Drago focused on a wider breadth of plant and animal taxa, intensified production of managed tree fruits, and increased capture of cleared-edge forest animals in comparison to fishing. While use of maize became more widespread, people continued to forage for a large part of their diet. Both plant and animal assemblages demonstrate noticeable changes during the Historic Phase (AD 1600 to 1900), when European settlers began using Isla Colón for global commercial enterprise.

In the following sections, I connect results of analyses presented in Chapters IV and V to broader social, political, and ecological themes discussed in Chapters I and II. First, I present a synthesis of patterns in plant and animal data in order to provide a comprehensive snapshot of subsistence at Sitio Drago. Next, I consider the specific ways that people living on Isla Colón maintained this subsistence regime. The Sitio Drago archaeobotanical assemblage provides data necessary for comparing plant procurement in central and western Panama. Finally, I consider possible roles that Isla Colón played in ancient paramount chiefdoms of lower Central America.

Late Ceramic Phase Subsistence at Sitio Drago

Investigations at Sitio Drago give us a glimpse into the choices people made in shaping island ecology. First, soils in Isla Colón's karst topography are poorly suited for growing seed and tuber crops traditionally associated with chiefly settlements in the Neotropics (e.g., Roosevelt 1980). Second, the absence of tool-quality stone raw materials on the island was a challenge to food production. Lithic tools were essential to procurement, processing, and cooking of many plant and animal foods at Sitio Drago. Aside from these challenges, island ecology does present resources predisposed for intensification. The abundance of several fruit-bearing trees native to the island points to a third investment people made in the landscape. We can think of sociopolitical complexity at Sitio Drago emerging in coordination with investment in soils, importation of stone, and exploitation of certain tree fruits.

Plant Procurement at Sitio Drago

By the Pre-Biscuitware Phase, people on Isla Colón used a variety of wild and domesticated plants for producing staple foods, seasonings, beverages, and medicines. Two domesticates identified in the Sitio Drago assemblage, maize and bean, were likely brought into western Panama after initial domestication took place elsewhere in Central America. A bean specimen identified in the single sample from Sitio Teca (ca. AD 60 to 450), pre-dates deposits excavated from Sitio Drago (ca. AD 800 to 1900), and indicates people on the island cultivated plants by the first century AD. Overall, the plant-based diet during both prehistoric Phases was diverse, and it perhaps reflects a subsistence strategy of buffering against risk of disease and pest invasion of favored plant foods. There is high competition for survival within biotic communities of warmer, less seasonally dry regions of the Neotropics; based on prior experience of failure of cultivated plant resources, people may have anticipated a need to have multiple plants on hand to fulfill the same dietary, seasoning, or medicinal need (Clawson 1985).

High diversity in the archaeobotanical assemblage from Sitio Drago points to a primarily horticultural plant food production system. As defined in Chapter I, horticultural systems in the Neotropics are comprised of smaller house gardens in which people cultivate a large number of plant types, rather than larger fields in which people farm a handful of taxa. In order to overcome limitations inherent to the karst landscape, people living in settlements pre-dating excavated deposits at Sitio Drago and Sitio Teca would have had to made incremental investments in these garden plots. The abundance of fish and shell in the local diet would have produced organic debris useful for managing the pH of highly acidic soils. In order to maintain soil volume and nutrients, people likely had to construct raised beds. Near the island shoreline, where Sitio Drago is located, this would be especially helpful to prevent flooding; in the hilly alluvial slopes of the interior island, where Sitio Teca is located, terraces would prevent erosion. Recently, the first evidence of pre-Hispanic raised fields in lower Central America has been identified in Chinina, Panama, a rural region located along the Pacific Gulf of Panama coast (Martin et al. 2015).

People accumulated considerable landesque capital in their gardens, fields, and orchards. These alterations provided adequate daily sustenance and opportunities for resource intensification, and allowed people to cultivate seed crops previously thought unlikely in the area (Linares 1976, 1977). We see this take place during the Biscuitware Phase, when village population increases in size and elites expand long-distance trade relations. After AD 1200, maize increases in ubiquity but does not increase in abundance. While this does not support a scenario of intensification of maize production for taxation or feasting, it does suggest an intensification of food production to meets the needs of a growing population. Maize farming on Isla Colón likely required development of deep, fertile soil horizons on the limestone-bedrock landscape bearing unproductive soils (Gosden 2013; Sitthaphanit et al. 2010). Changes in the abundance of other plant types can provide clues for how people managed nutrient depletion in soil due to maize farming. In the Sitio Drago assemblage, a significant increase in bean during the Biscuitware Phase suggests ancient farmers may have adopted the practice of bordering plots with legumes for nitrogen fixation (see Peoples et al. 1995).

During all three phases, people continued foraging small shrub and tree fruits, berries, and nuts from the forest and riparian zones on Isla Colón. Many of these plants, such as pimiento (*Myrcia gatunensis*: Myrtaceae), were not domesticated yet would have been important seasonings for foods. Wild plants found in the Sitio Drago assemblage are connected to medicinal recipes in ethnographic records. Past people likely harvested sapote (*Pouteria sapota*: Sapotaceae) for its oil, mamoncillo (*Melicoccus bijugatus*: Sapindaceae) leaves for herbal infusions, charichuelo (*Garcinia madruno*: Clusiaceae) sap and schery (*Xylopia bocatorena*: Annonaceae) leaves for headaches and fevers, jagua macho (*Randia armata*: Rubiaceae) sap and huito (*Genipa americana*: Rubiaceae) fruit for body ink.

Overall, changes in plant procurement taking place during the Biscuitware Phase suggest people adapted to the demands of a larger population by increasing investment in the existing food production system. People did not initiate a radical departure from the types of plant foods traditionally harvested; rather, they persisted with a similar—yet intensified—use of forest gardens. People narrowed diet breadth while increasing access to maize and intensifying specific tree fruits as the village grew. Their maize fields and tree fruit orchards may have been capable of future exploitation on a larger, more agricultural scale. However, changes in plant procurement taking place during the Historic Phase project an entirely different scenario. After AD 1600, many plant taxa disappear from the assemblage and diversity of plant resources plummets. The dramatic demographic changes taking place at Sitio Drago during the post-contact era may have led to a completely different use of the landscape, including locations of food debris disposal.

Animal Procurement at Sitio Drago

People at Isla Colón focused most of their animal food procurement on fishing and shellfish gathering, in a manner similar to the contemporaneous settlement at Cerro Brujo on the nearby mainland (Grayson 1973; Linares 1976, 1977). By the Pre-Biscuitware Phase, residents exploited vertebrate and non-vertebrate marine resources in reefs, shallow shorelines, and deep open water niches. Material evidence of fishing technology recovered by Proyecto Arqueológico Sitio Drago (PASD) investigations is limited to shell hooks and small stone net-weights with waists chipped or carved in the middle (Wake 2014). Most traditional fishing accoutrements people use in the Neotropics today are made from organic materials that would hardly preserve archaeologically unless confined to an anaerobic environment (e.g., completely waterlogged since deposition) (Palacio et al. 2006). Nonetheless, people at Sitio Drago would have developed and manufactured a variety of tools for these subsistence activities, including nets, lines, spears, and watercrafts ranging from rafts to boats of considerable size. In addition to the raw stone materials required to manufacture hunting implements, many of these items require raw materials that people would have had to acquire from other locations and/or through trade networks.

The faunal data suggest a continued focus on medium- and small-sized terrestrial animals that are attracted to cleared-edge forest and orchards. Large deep forest animals, such as tapir and white-lipped peccary, appear to have been an insignificant part of the animal-based diet. These animals, which often appear as powerful iconographic effigies on local ceramics, may have had significance as an occasional feasting item. While the majority of Late Ceramic people's diet was consistently marine animals, villagers appear to have increased procurement of terrestrial animals during the Biscuitware Phase. A decrease in faunal species diversity also suggests that farming had become a less risky subsistence strategy. Residents of Sitio Drago maximized their faunal returns while continuing to devote labor to their gardens and orchards. Patterning in faunal data thus suggests people became more committed to the horticultural system during the phase when the human population grew and human impacts on fish and shellfish communities become recognizable in the zooarchaeological record (Collin 2005; Cramer 2013; O'Dea et al. 2014).

Choices people make in the face of change could be successful in one context yet disastrous in another. At Sitio Drago, intensification of managed fruit trees and infield maize crops may have been a successful strategy for reducing risk of food shortage. People during the Biscuitware Phase would have been aware of the risks associated with adopting crops new to the area or clear-cutting large patches of forests for outfields. Intensifying production in existing systems promoted predictability (Winterhalder 1994:34). This choice maximized production of crops adapted to local disease and pests, and kept fields close to gardens that contain other targets for pests—presenting a clear advantage given the high competition in biotic communities of warmer, wetter tropical niches.

Domesticated Landscapes and Landesque Capital on Isla Colón

Faunal and floral data analyzed for this dissertation demonstrate that people at Sitio Drago transformed the island landscape through consistent management of natural resources. As discussed in Chapter I, patterning in data viewed through the perspective of historical ecology informs a nuanced reconstruction of human-environment dynamics, one which takes into account on-going social and natural processes as well as historic events. Data presented here show that past indigenous groups in the lowlands of western Panama impacted the landscape in specific ways that benefited people. Further, when coupled with previous studies on the effects of human exploitation of fish (Kay 2010) and mollusk (O'Dea et al. 2014) populations, analyses presented here show that people during the Biscuitware Phase responded in specific ways to the increased demand for food stimulated by a growing population.

From a deep-time perspective—or, when viewed as a longue durée—this snapshot of temporal change provides a glimpse into how sociopolitical complexity emerged in the area. During the same time that they overharvested and depleted specific fish and mollusk populations, Late Ceramic phase people at Sitio Drago increased biomass of terrestrial plant and animal communities through expansion of house gardens, infields, and orchards. Rather than introduce an entirely new suite of crops or subsistence practices, Biscuitware Phase people intensified production within their existing domesticated landscape. Most notably, intensification of maize production in infields and tree fruits in managed forests represents a resilient change that benefits from long-term investments in the landscape. The numerous semi-domesticated palm stands visible on the island today are durable signatures of the types of subsistence activities people intensified during the Biscuitware Phase.

Sitio Drago adds to a growing number of case studies in which complex societies develop within the tropical rainforest—not through sudden innovation, but with gradual improvements in the capability of the landscape to produce food (Balée 2014; Balée and Erickson 2006). As in the case of Sitio Drago, these groups relied on a continuation of traditional subsistence activities to amass landesque capital necessary to join a larger network of chiefly elites and support a growing population. In environmentally-sensitive biomes, such as karst islands with poor soils and limited tool-quality raw stone materials, a subsistence regime that mirrors the natural dynamics of the tropical forest may be the most resilient.

Assessment of the Garden-Hunting Model

As discussed in Chapter IV, the archaeobotanical assemblage considered in this study suggests a mixed plant economy of house garden cultivation and tree cropping in forest mosaics. Plant cultivation practices became more specialized and focused on fewer plant taxa by the end of the Pre-Biscuitware Phase. Long-term maintenance of house garden plots and forest patches would likely have had an effect on the surrounding biotic community. According to the garden hunting model, these changes improve the availability of game animals, particularly small ones that are easy to trap and catch. Several patterns apparent in the zooarchaeological assemblage suggest hunting and trapping activities may have shifted in focus from the closed-canopy forest to more local, human-disturbed areas during the Biscuitware Phase.

Increased dependence on cultivated crops and garden hunted prey has several possible implications for Late Ceramic phase social dynamics. VanDerwarker (2006) notes that garden hunting resolves scheduling issues and frees labor, particularly among men whose typical role in subsistence economies is hunting. Although maize cropping here does not seem to approach the level of intensity documented for Formative Period Mesoamerican villages, it was nonetheless a subsistence practice, and analogous effects of increased dependence on garden crops could take place at Sitio Drago. For example, labor freed by a more efficient hunting strategy could provision craft specialists working with shell beads. Although a space bearing evidence of craft production activities has not yet been identified at Sitio Drago, decorative beads made from locally-available mollusks are common in middens associated with burials. Status could have become more closely associated with subsistence roles than gender had been previously.

Animal domestication in the Old World is traditionally tied to the emergence of complexity in a similar way that domestication of maize is in the New World. People in ancient

Panamanian villages did not breed animals, other than dogs on the Pacific Coast (Cooke 1998:110; Cooke and Ranere 1989, 1992a:36-37; Cook et al. 2008:104; Koster 2009), but altering forest patches to attract larger quantities of more preferable types of prey (e.g., frugivorous rodents) may have achieved a similar effect of increasing available protein biomass. Luring prey to gather in agricultural or cleared fields could represent a form of human power; iconography in ancient Panamanian ceramics celebrates fierce animals, especially birds of prey. Decorated Bocas Brushed and Biscuitware ceramics at Sitio Drago typically bear painted or molded animal motifs, especially birds, fish, and marine organisms. While burials at Sitio Drago have no inclusions, offerings outside of the coral slab tombs include pierced caiman teeth, suggesting regional iconography was embedded locally in Bocas del Toro material culture. In the following discussion, results of paleoethnobotanical and zooarchaeological analyses will be integrated qualitatively in order to examine how local social-ecological dynamics fit in with political organization of chiefdoms in lower Central America.

Comparison of Plant Use in Central and Western Panama

Now that we know how Late Ceramic phase people at one village in Western Caribbean Panama managed the landscape for food production, we can compare broad patterns in use of plant types between the Sitio Drago data and data compiled from sites in the Central Pacific slope of Panama. The bulk of archaeological research (and archaeobotanical sampling) has taken place in Central Panama, a region known for fertile soils and more temperate climate, and suggests settlements there were supported by intense cultivation of maize and root crops (Cooke and Ranere 1992b). Three separate archaeological projects conducted in Central Panama recovered macrobotanical remains from 12 sites (Figure 6.1 and Table 6.1). These datasets, compiled by Ruth Dickau (2005, 2010) from peer-reviewed publications, grey literature, and

Figure 6.1. Archaeological sites in central and western Panama with available macrobotanical and microbotanical data.

Table 6.1. Summary of Archaeobotanical Samples by Site and Phase for Central Panama.

Site Name	**Early Preceramic**	**Late Preceramic**	**Early Ceramic**	**Middle to Late Ceramic**	**Total # of Samples**
Aguadulce	30	93	37	0	160
Caleveras	0	0	1	1	2
Carabalí	6	34	26	20	86
Cerro Juan Díaz	0	0	0	1	1
Corona	0	2	6	0	8
Ladrones	0	1	1	0	2
Lasquita	0	1	0	0	1
Los Santanas	0	0	4	0	4
Molejon	0	0	0	1	1
Rio Bermejito	0	0	0	3	3
Sitio Sierra	0	0	0	39	39
Vaca de Monte	0	17	0	0	17
Total # of Samples	*36*	*148*	*75*	*65*	*324*

personal communications, provide data useful to reconstructing subsistence activities within a span of 10,000 years at two Ceramic phase villages and 10 Preceramic through Ceramic phase rockshelters (see Table 6.1).

This assessment compares broad patterns in plant type use (e.g., palm, tree, garden crop) at Sitio Drago, representing Western Panama, with aggregate data from the 12 sites in Central Panama. An expansive network of trade for elite and non-elite goods spanned coast-to-coast across the cordilleran of present-day Panama. Individual chiefly polities increased in size and hierarchical organization from AD 200 to Spanish conquest. As the landscape filled with people, larger populations required more space, food, and other resources. Larger populations outgrew former subsistence strategies, impacting the biotic community with intensified harvesting. Elites around AD 500 became more competitive over control of luxury items and ore deposits. Conflict increased, as did fortification of larger settlements. What remains unknown are the ways less visible members of these chiefdoms responded to social and environmental disturbances associated with population growth and political expansion. Comparison of patterns in Late Ceramic phases in both areas may suggest regional adaptations as elite activities in the paramount chiefdom were most ambitious.

Even when preservation is poor, scholars have demonstrated that macrobotanical assemblages can provide valuable insight on ancient subsistence strategies through time (Pearsall 1988). One solution for dealing with the problems of variably poor preservation and inconsistent recovery within sites is to examine macrobotanical data from a regional perspective (Wagner 1988). Combining complementary datasets may limit analytical detail but does provide a useful foundation for examining broad trends in plant procurement. Even if specific field and lab techniques vary among projects, sufficient macrobotanical remains are often recovered to indicate important aspects of the diet. For example, changes in the relative ubiquity value of staple food to non-staple food plants, domesticated to wild plants, and tree crops to cereal crops are visible in these data.

Macrobotanical Data from Central Panama

Archaeobotanical data used in this analysis derive from three major regions of Central Pacific Panama, and the climate and geography of these valleys and foothills differ considerably from the lowland swamps of Isla Colón. The Río Santa María watershed, surveyed by Smithsonian Tropical Research Institute (STRI) staff scientists Richard Cooke and Anthony Ranere (1992) during the 1980s, produced charcoal samples from seven rockshelters and one village site in three subregions of the Río Santa María watershed. Sites excavated in upland areas of the watershed include Río Bermejíto, a rockshelter occupied from 5050 to 550 BC, and Vaca de Monte, a rockshelter located along the San Juan River that was occupied from 4050 to 1050 BC (Cooke and Ranere 1992c). Both sites are located within the Lake La Yeguada drainage basin, where lake sediment cores provide a 14,000-year paleoecological profile. An increase in pollen from tree taxa with concurrent decrease in pollen from shrub and weedy taxa suggest people began clearing forests around 3000 BC (Bush et al. 1992; Piperno et al. 1990). In addition, Cooke and Ranere excavated four rockshelters located in the inland foothills of the cordillera in the RSM watershed. The first maize phytolith evidence documented in Panama was recovered from Los Santanas, a smaller rockshelter occupied from 5000 to 2500 BC (Cooke and Ranere 1992b:123).

The Aguadulce rockshelter site and agricultural village, located 18 km from the Pacific coast, provides the most comprehensive macrobotanical and microbotanical record of early maize (*Zea mays*: Poaceae) cultivation in Panama. During the Late Preceramic, people occupied the site from 5000 BC to 2500 BC and relied on a broad-spectrum subsistence strategy. The zooarchaeological assemblage points to an early preference for freshwater vertebrates, especially fish and turtle (Linares 1979:31). In addition to the largest assemblage of carbonized plant remains currently recovered in Panama, Aguadulce provides an important collection of Monagrillo ceramics – the earliest pottery style in Panama that is associated with maize storage (Linares 1979:34). Located along Río Membrillar, Sitio Sierra is a 45 ha. agricultural village site located 12 km inland from the marine coastline. This nucleated settlement was occupied from 4000 BCE to Spanish contact (ca. AD 1500). Excavations recovered houses, middens, and cemeteries that provide important information on Middle to Late Ceramic phase society in Central Panama. Evidence of maize cultivation first appears at Sitio Sierra ca. 50 BC, and people appear to intensify production of and become reliant on maize as a dietary staple by ca. AD 250, based on the initial appearance of dental caries in human remains (Cooke and Ranere 1992b:123-124).

In 1992 STRI scientists conducted a separate archaeological project in the La Villa river valley in Parita Bay, located on the Azuero Peninsula (Cooke et al. 2003). Excavations recovered an agricultural village and cemetery important to regional political dynamics during the Ceramic phases. Cerro Juan Díaz is a large (100 ha.) nucleated village site and cemetery occupied from 10,500 to 1000 BC. Numerous houses, storage pits, ovens, and ceramic and metal artifacts were identified at the site, which is thought to have been an influential political center in Central Panama. The cemetery at Cerro Juan Díaz contains 76 burials with 208 individual human skeletons (Cooke et al. 2003:95). Presence of gold and copper ornaments in these burials pushed back the earliest known date for pre-Columbian metals in the isthmian region to AD 200 (Cooke et al. 2003). STRI crew systematically collected macrobotanical remains from oven features associated with three burials containing significant amounts of gold and copper metal artifacts (Cooke and Sánchez 2003; Cooke et al. 2003).

Data from the Central Caribbean foothills, the third region comprising the aggregate data representing Central Panama, was obtained by John Griggs while collecting data for his dissertation project at University of Texas at Austin (Griggs 2005). Situated in the lowest part of the Continental Divide where the climate is drier and more seasonal than most Caribbean zones due to lack of orographic rainfall, the environmental setting of these three rockshelters more closely resembles that of the Pacific watershed of Central Panama. The Calaveras rockshelter, located 28.5 km from the Caribbean coast, was occupied from 950 BC to the contact phase (ca. AD 1500) and contains four subterranean oven features (Griggs 2005:108). Griggs' crew identified maize starch on jasper and quartz microlithic tools and in sediment samples drawn from the site (Griggs 2005:335). Calaveras contains an impressive 3075 chipped stone artifacts, including microlithics tentatively identified as manioc shredders (Griggs 2005:175). Lasquita, a rockshelter site 23.5 km south of the marine coastline and 1.5 km west of the Indio River, contains plant remains that date to 5000 BC (Griggs 2005:304). The site contains several oven features built of imported river cobbles, as well as bipolar flakes, pottery, and polished stone axes (Griggs 2005:321). A much smaller rockshelter nearby, Moléjon, contains an occupation dating from 3050 BC to 1050 BC and a small assemblage of 151 lithic artifacts, including small bipolar flakes that may have been used in grater boards for processing palm nuts. All three rockshelters demonstrate similarities in flaked stone tool forms, amount of carbonized wood, and fire-cracked rock oven features that suggest regional unity in cooking and subsistence activities, as well as interaction with Central Pacific groups beginning in the preceramic phase (Griggs 2005:309).

Macrobotanical remains excavated from the sites describe above represent different depositional contexts (cooking, processing, and disposal) and multiple settlement types (temporary campsite, long-term rockshelter occupation, and permanent village) from four cultural phases in Central Panama. While variation in preservation quality and recovery techniques prevents analysis aimed at identifying intraregional variation, aggregate data can provide a broad picture of subsistence strategy through time throughout this cooler, drier Central region.

Plant Procurement in Central Panama

Similar to results of the Sitio Drago archaeobotany analysis, a variety of economically useful wild and domesticated plants were recovered from the 12 sites sampled throughout Central Panama (Table 6.2 and Table 6.3). First, in order to obtain a broad view of plants recovered from sites, I examine ubiquity values for data from all sites and phases combined in Central Panama (Table 6.4). Few ubiquity values calculated for this dataset are over 5%; this is likely due to small sample sizes caused by poor preservation and recovery techniques. Economic plant species with ubiquity values higher than 5% include palm, tree fruit crops, and maize. Results from all spatial and temporal contexts suggest that palm and tree crops were an important aspect of prehistoric cultivation systems in Central Panama.

Scholars identified a total of 22 plant types in the macrobotanical samples from the 12 sites excavated in Central Panama (see Table 6.2 and Table 6.3). Many of these plants have economic value noted in ethnobotanical literature. Five major palm types were identified, including species with known economic value as a construction material and a source of oil used in cooking and sap used for fermenting a wine-like beverage (Morcote-Ríos and Bernal 2001; Wake 2006). Nine tree and shrub species were identified, including several fruit trees important

Table 6.2. Plants Identified at Archaeological Sites in Central Panama Organized by Binomial Nomenclature.

Scientific Name	***Common Name***
DICOTYLEDONAE	
Malpighiales	
Byrsonima crassifolia: Malpighiaceae	Nance
Rosales	
Ficus sp.: Moraceae	Ficus genus
Ericales	
Sapotaceae	Sapotaceae family
Pouteria sapota: Sapotaceae	Mamey
Manilkara zapota: Sapotaceae	Sapodilla
Sapindales	
Sapindaceae	Soapberry family
Spondias mombin: Anacardiaceae	Spondias
Dilleniales	
Curatella americana: Dilleniaceae	Sandpaper tree
Malvales	
Malvaceae	Malvaceae family
Cochlospermum sp.: Cochlospermaceae	Yellow cotton tree genus
Cucurbitales	
Cucurbitaceae	Squash family
MONOCOTYLEDONAE	
Fabales	
Fabaceae	Bean family
Hymenaea courbaril: Fabaceae	Jatobá
Phaseolus vulgaris: Fabaceae	Common bean
Inga sp.: Fabaceae	Inga genus
Poales	
Zea mays: Poaceae	Maize
Caryophyllales	
Amaranthus sp.: Amaranthaceae	Amaranth genus
Arecales	
Elaeis oleifera: Arecaceae	Oil palm
Attalea butyracea: Arecaceae	Yagua palm
Bactris major: Arecaceae	Bactris major
Astrocaryum sp.: Arecaceae	Astrocaryum genus
Acrocomia aculeata: Arecaceae	Coyol palm

Table 6.3. Plants Identified at Archaeological Sites in Central Panama Organized by Functional Category.

Common Name	*Taxon*
Garden Crops	
Amaranth genus	*Amaranthus* sp.: Amaranthaceae
Bean genus	*Phaseolus* sp.: Fabaceae
Common bean	*Phaseolus vulgaris*: Fabaceae
Maize	*Zea mays*: Poaceae
Squash family	Cucurbitaceae
Tree Fruits	
Mamey	*Pouteria sapota*: Sapotaceae
Sapodilla	*Manilkara zapota*: Sapotaceae
Sapotaceae family	Sapotaceae
Nance	*Byrsonima crassifolia*: Malpighiaceae
Spondias	*Spondias mombin*: Anacardiaceae
Yellow cotton tree genus	*Cochlospermum* sp.: Cochlospermaceae
Palm Fruits	
Oil palm	*Elaeis oleifera*: Arecaceae
Yagua palm	*Attalea butyracea*: Arecaceae
Bactris major	*Bactris major*: Arecaceae
Astrocaryum genus	*Astrocaryum* sp.: Arecaceae
Coyol palm	*Acrocomia aculeata*: Arecaceae
Shrub Fruits	
Sandpaper tree	*Curatella americana*: Dilleniaceae
Soapberry family	Sapindaceae
Malvaceae family	Malvaceae
Non-Food Plants	
Jatobá	*Hymenaea courbaril*: Fabaceae
Ficus genus	*Ficus* sp.: Moraceae
Inga genus	*Inga* sp.: Fabaceae

Table 6.4. Ubiquity Values in Descending Order for Plants Identified in Central Panama.

Taxon	Samples Present	Total Samples	Ubiquity Value
Oil palm	83	324	25.6
Palm family	56	324	17.3
cf. Palm family	53	324	16.4
Ficus genus	32	324	9.9
Yagua palm	31	324	9.6
Coyol palm	30	324	9.3
Maize	25	324	7.7
Bactris major	20	324	6.2
Nance	18	324	5.6
cf. Yagua palm	10	324	3.1
cf. Bactris major	10	324	3.1
Sapotaceae family	9	324	2.8
Jatobá	7	324	2.2
Spondias	6	324	1.9
cf. Nance	4	324	1.2
cf. Maize	3	324	0.9
Sandpaper tree	3	324	0.9
Amaranth genus	2	324	0.6
cf. Oil palm	2	324	0.6
cf. Jatobá	2	324	0.6
cf. Bean family	3	324	0.9
Malvaceae family	2	324	0.6
cf. Grass family	2	324	0.6
Sandpaper tree	2	324	0.6
Common bean	2	324	0.6
Astrocarynum genus	1	324	0.3
cf. Mamey	1	324	0.3
cf. Spondias	1	324	0.3
Bean genus	1	324	0.3
Soapberry family	1	324	0.3
Yellow cotton tree genus	1	324	0.3
cf. Inga genus	1	324	0.3
Sapodilla	1	324	0.3
cf. Sapotaceae family	1	324	0.3
cf. Squash family	1	324	0.3

to forest tree cropping systems: nance (*Byrsonima crassifolia*: Malpighiaceae), mamey (*Pouteria sapota*: Sapotaceae), and spondias (*Spondias mombin*: Anacardiaceae) (Müller-Schwarze 2006). Three categories of grasses were identified in the assemblage, including amaranth genus (*Amaranthus* sp.: Amaranthaceae) and maize. Finally, six flowering plants were identified in the assemblage, including beans (*Phaseolus vulgaris*: Fabaceae), squash family (Cucurbitaceae), and soapberry family (Sapindaceae). Beans and squash are early cultigens that were likely incorporated in prehistoric house gardens. Soapberry is a native shrub of the Neotropical lowlands that produces a sap-like material containing saponins, a sudsy substance used in a variety of functional and medicinal applications (Hazlett 1986:348).

In order to examine patterns of broad plant use within the Central Panama region, I combined macrobotanical data from the 12 sites by the four cultural phases: Early Preceramic (8500-6000 BC; Table 6.5), Late Preceramic (6000-3300 BC; Table 6.6), Early Ceramic (3300-400 BC; Table 6.7), and Middle to Late Ceramic (400 BC-AD 1500; Table 6.8). One interesting pattern is the high ranking of oil palm (*Elaeis oleifera*: Arecaceae) and maize; both plant types are the top-ranked resources in all four phases (except the Late Preceramic phase, during which maize has a ubiquity value less than 5%). During the three earlier phases, oil palm is the most ubiquitous economic plant resource in the assemblages (Table 6.5; Table 6.6; Table 6.7). Maize becomes the top-ranked plant resource in terms of ubiquity values during the Middle to Late Ceramic phase (Table 6.8). Results of data aggregated by cultural phase are likely skewed by issues of preservation and recovery technique.

Food Production and the Development of Complexity in Central Panama

Ubiquity values tell us which archaeological plant remains are most commonly used, preserved, and recovered. First, ubiquity values for maize increase from Early Ceramic

Table 6.5. Ubiquity Values in Descending Order for Plants Identified in Early Preceramic Phase (8500 to 6000 BC) Contexts of Central Panama.

Taxon	Samples Present	Total Samples	Ubiquity Value
Oil palm	11	36	30.6
Ficus genus	6	36	16.7
Maize	1	36	2.8
Jatobá	1	36	2.8
cf. Palm family	1	36	2.8
cf. Yagua palm	1	36	2.8

Table 6.6. Ubiquity Values in Descending Order for Plants Identified in Late Preceramic Phase (6000 to 3300 BC) Contexts in Central Panama.

Taxon	Samples Present	Total Samples	Ubiquity Value
Oil palm	57	148	38.5
Palm family	56	148	37.8
cf. Ficus genus	22	148	14.9
Yagua palm	19	148	12.8
cf. Palm family	16	148	10.8
Bactris major	18	148	12.2
Nance	11	148	7.4
Coyol palm	10	148	6.8
cf. Yagua palm	8	148	5.4
cf. Bactris major	8	148	5.4
Sapotaceae family	8	148	5.4
Jatobá	4	148	2.7
cf. Nance	3	148	2
cf. Maize	2	148	1.4
Amaranth genus	2	148	1.4
cf. Oil palm	2	148	1.4
cf. Jatobá	2	148	1.4
Astrocarynum genus	1	148	0.7
cf. Bean genus	1	148	0.7
cf. Mamey	1	148	0.7
cf. Spondias	1	148	0.7
Sandpaper tree	1	148	0.7
Bean genus	1	148	0.7
Soapberry family	1	148	0.7
Malvaceae family	1	148	0.7

(Table 6.7) to Late Ceramic phases (Table 6.8). The contrast suggests a shift in subsistence strategy concurrent with increased ceramic production and population size at central Panama villages. Plant remains from the palm family (Arecaceae) consistently have high ubiquity rankings in central Panama aggregate data until the Middle to Late Ceramic phase (see Table 6.8). This suggests palms were important components of the central Panama subsistence economy and that palm endocarps preserve relatively well in the macrobotanical record. In contrast, palms have a substantially lower ubiquity ranking in both Late Ceramic phase components at Sitio Drago (see Table 6.9). This is a surprising difference, considering the economic value of palms.

Second, maize appears in Early Preceramic macrobotanical and microbotanical assemblages throughout central Panama (Dickau 2010), but does not have a high ubiquity ranking in macrobotanical assemblages until the Early Ceramic phase (80%; Table 6.7). Maize then becomes the top-ranked plant taxon in the Middle to Late Ceramic phase (27.69%; Table 6.8). This pattern suggests increased importance of maize in Late Ceramic phase diet as settlements become larger and more nucleated. Likewise, data representing a Ceramic Phase western Panama settlement demonstrates relatively high ubiquity values in comparison to palms and fruit trees. In fact, the ubiquity of maize in macrobotanical samples from Sitio Drago increases from the Pre-Biscuitware to Biscuitware Phase deposits (see Table 4.16 and Table 4.17). Of course, additional lines of evidence are necessary in order to support the claim that maize was a staple food in Ceramic phase societies in either central or western Panama. The consumption of a maize-dominant diet can only be directly confirmed with analysis of human skeletal isotope signatures, coupled with more extensive macrobotanical sampling.

Table 6.7. Ubiquity Values in Descending Order for Plants Identified in Early Ceramic Phase (3300 to 400 BC) Contexts in Central Panama.

Taxon	Samples Present	Total Samples	Ubiquity Value
cf. Palm family	27	75	36
Oil palm	15	75	20
Coyol palm	13	75	17.3
Maize	6	75	8
Yagua palm	5	75	6.7
Nance	5	75	6.7
Ficus genus	4	75	5.3
Bactris major	2	75	2.7
cf. Bactris major	2	75	2.7
cf. Grass family	2	75	2.7
Sandpaper tree	2	75	2.7
Jatobá	2	75	2.7
Spondias	2	75	2.7
cf. Yagua palm	1	75	1.3
cf. Nance	1	75	1.3
cf. Maize	1	75	1.3
Yellow cotton tree genus	1	75	1.3
cf. Inga genus	1	75	1.3
Sapotaceae family	1	75	1.3
Malvaceae family	1	75	1.3

Table 6.8. Ubiquity Values in Descending Order for Plants Identified in Middle to Late Ceramic (400 BC to AD 1500) Phase Contexts in Central Panama.

Taxon	Samples Present	Total Samples	Ubiquity Value
Maize	18	65	27.7
cf. Palm family	9	65	13.9
Yagua palm	7	65	10.8
Coyol palm	7	65	10.8
Spondias	4	65	6.2
cf. Grass family	4	65	6.2
Nance	2	65	3.1
Common bean	2	65	3.1
cf. Bean genus	2	65	3.1
Sapodilla	1	65	1.5
cf. Sapotaceae family	1	65	1.5

Table 6.9. Ubiquity Values in Descending Order for Plants Identified in Late Ceramic Phase (AD 800 to 1450) Contexts at Sitio Drago in Western Panama.

Taxon	Samples Present	Total Samples	Ubiquity Value
Maize	53	63	84.1
Bean family	37	63	58.7
Schery	32	63	50.8
Nance	21	63	33.3
Huito	20	63	31.8
Pimiento	17	63	27
Sapodilla	16	63	25.4
Charichuelo	15	63	23.8
Jagua macho	5	63	7.9
Peach palm	3	63	4.8
Bejuco	3	63	4.8
Carica papaya	1	63	1.6
Cestrum	1	63	1.6
Guabito de río	1	63	1.6
Mamoncillo	1	63	1.6
Palma negra	1	63	1.6
Sapote	1	63	1.6

Third, several important tree taxa (jatobá [*Hymenaea courbaril*: Fabaceae], ficus genus [*Ficus* sp.: Moraceae], nance, and spondias [*Spondias mombin*: Anacardiaceae]) are present with ubiquity values greater than 5% throughout all time phases in central Panama (see Table 6.5, Table 6.6, Table 6.7, and Table 6.8). Nance, spondias, and ficus trees produce fruit that may have been a valuable source of sugar and carbohydrates. Jatobá trees today are harvested for their valuable hardwood that is resistant to rot and ideal for long-term construction projects in the humid tropics (USDA 2007:22). In the western Panama dataset, tree fruits are also the most frequent taxon with ubiquity values higher than 10% (see Table 6.9). The ubiquitous presence of fruit trees in both assemblages suggests tree cropping was an important aspect of ancient Panamanian subsistence strategies on both sides of the isthmus, although settlements in each region focused cultivation efforts on different species. The gradual intensification of tree fruits alongside horticultural development has been observed elsewhere in the Neotropical lowlands (Clement 2006; Lentz 2000; Peters 2000). Finally, several flowering plants with economic value are represented in both macrobotanical assemblages. The ubiquity values of these plants are well below 5% in central Panama and 10% in western Panama. This low ranking may suggest problems with preservation and recovery rather than low relative importance in past human subsistence economy. These plants have been identified with higher frequencies in studies utilizing phytolith and starch grain analyses (see Dickau 2010).

Variation in Plant Use between Central and Western Panama

Calculation of ubiquity values reveals these broad patterns, but results do not point conclusively toward a particular system or scale of food production. In order to assess potential change through time in preference for major food types, I aggregated ubiquity values by palm, tree fruit, and maize. Here, the "tree fruit" category for Central Panama is comprised of all plants

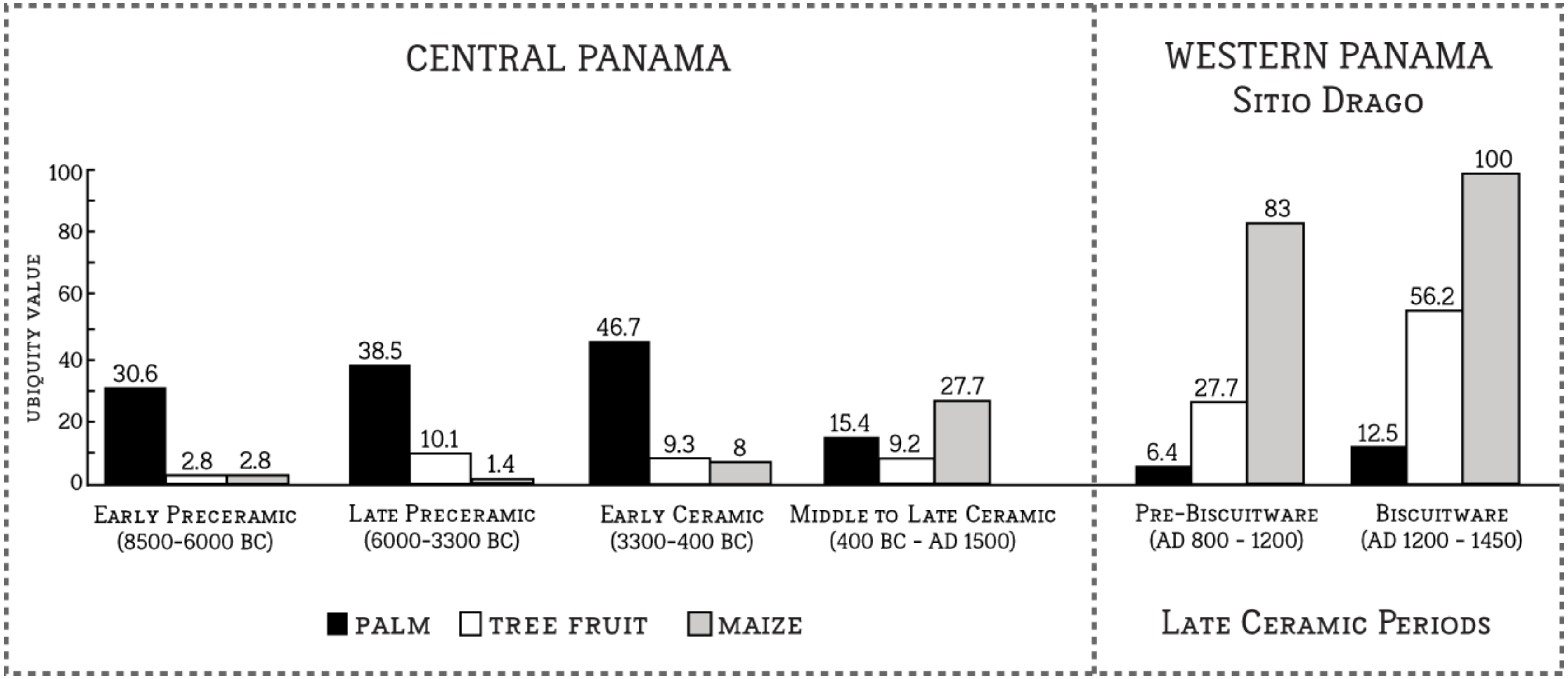

Figure 6.2. Comparison of ubiquity values of plant assemblages obtained from archaeological sites in central and western Panama.

Table 6.10. Ubiquity Values of Macrobotanical Datasets Obtained from Archaeological Sites in Central and Western Panama.

Central Panama	**Early Preceramic (8500 to 6000 BC)**				
	Taxon	*Samples Present*	*Total Samples*	*Ubiquity Value*	*Rank*
	Palm	11	36	30.6	1
	Fruit Tree	1	36	2.8	2
	Maize	1	36	2.8	2
	Late Preceramic (6000 to 3300 BC)				
	Taxon	*Samples Present*	*Total Samples*	*Ubiquity Value*	*Rank*
	Palm	57	148	38.5	1
	Fruit Tree	15	148	10.1	2
	Maize	2	148	1.4	3
	Early Ceramic (3300 to 400 BC)				
	Taxon	*Samples Present*	*Total Samples*	*Ubiquity Value*	*Rank*
	Palm	35	75	46.7	1
	Tree Fruit	7	75	9.3	2
	Maize	6	75	8	3
	Middle to Late Ceramic (400 BC to AD 1500)				
	Taxon	*Samples Present*	*Total Samples*	*Ubiquity Value*	*Rank*
	Palm	10	65	15.4	3
	Tree Fruit	6	65	9.2	2
	Maize	18	65	27.7	1
Western Panama (Sitio Drago)	**Late Ceramic/Pre-Biscuitware Phase (AD 800 to 1200)**				
	Taxon	*Samples Present*	*Total Samples*	*Ubiquity Value*	*Rank*
	Palm	3	47	6.4	3
	Tree Fruit	13	47	27.7	2
	Maize	39	47	83	1
	Late Ceramic/Biscuitware Phase (AD 1200 to 1450)				
	Taxon	*Samples Present*	*Total Samples*	*Ubiquity Value*	*Rank*
	Palm	2	16	12.5	3
	Tree Fruit	9	16	56.2	2
	Maize	16	16	100	1

identified as tree fruits in Table 6.3, including mamey, sapodilla, Sapotaceae family, nance, spondias, and Yellow cotton tree genus. The "tree fruit" category for Western Panama is comprised of both foraged and managed tree fruits (see Table 4.4). Based on the presence of several major cultigens (e.g., beans, squash), it appears that in both regions Ceramic phase people practiced horticulture in house gardens and/or intercropped these domesticated plants in agricultural outfields (Figure 6.2 and Table 6.10). Ubiquitous presence of maize during Ceramic phases in both regions suggests settlements in both seasonally drier and moister ecosystems maintained staple crop production. However, yield could differ substantially between the two climates – a marker not measurable with ubiquity value comparisons. Arguments for Ceramic phase staple and surplus food production would be strengthened with other lines of evidence, particularly identification of storage pits and processing centers.

One trend present in Sitio Drago that stands out is the high ubiquity of fruits in comparison to palms and maize, which increases during the Biscuitware Phase (see Figure 6.2). A large amount of tree fruit procurement is puzzling since fruits comprise a comparatively negligible part of the overall diet. Bulk production of tree fruits is common in Neotropical societies that host feasting events. At a Late Classic (AD 300-800) Maya settlement in northwestern Belize, Hageman and Goldstein observed an unusually high abundance of fruits present in middens associated with feasting areas (Goldstein and Hageman 2010:429). Fermented fruit pulp can be stored for months and preserves better than palm nuts and fruits, which contain oils prone to becoming rancid (Clement 2006:170-171). There are numerous ways that alcohol has been used by elites to obtain power and legitimize authority in hierarchical societies of all levels (Bray 2003; Dietler 1990, 2001; Dietler and Hayden 2001). In groups with formalized yet flexible leadership roles, serving alcohol to guests may help an individual climb a hierarchical ladder or indebt others in his or her favor (Dietler 2006:237). Further, intensely tree-cropped forest mosaics are special areas that can be controlled by individuals either in terms of labor organization for maintenance and harvesting, or restricted access to the plot (Lepofsky 1999).

If people at Sitio Drago were heavily utilizing tree fruits to produce fermented beverages, they may have preferred to burn these seeds along with other organic debris before disposing of the refuse. Sporadic production of fermented beverages would appear in a midden as temporally discreet deposits. However, routine production for smaller events could produce the consistent deposition that appears in the archaeobotanical assemblage at Sitio Drago. Assuming taphonomic processes are not severely skewing this broad pattern, fruit trees may simply have been a crop better suited for intense cultivation in the tropical lowlands. Archaeological research at several Classic Maya sites suggests that tree cropping, together with a maritime-based food economy, is a specialized adaptation well suited to the limited arable land on karst offshore islands (McKillop 1994). Wild Cane Cay, an island occupied ca. AD 900-1500, had an economy driven by its role as a major trading port. McKillop (1994:129) notes that comparison of coastal and inland Maya sites shows a greater reliance on tree crops on island sites; a similar, larger-scale, pattern may emerge as more archaeobotanical data from coastal and island locales in lower Central America becomes available.

The ubiquity value of maize is much higher at Sitio Drago than in aggregate data representing sites located in central Panama. While this could reflect a comparatively higher importance of maize in the plant-based diet at Sitio Drago, it most likely is a reflection of different taphonomic processes and preservation of plant remains. Sitio Drago samples were all excavated from middens located in a village. Conversely, many of samples comprising the central Panama assemblage were taken from different site areas (e.g., household floors) and reflect different site types (e.g., rockshelters, small camps). Thus, the relationship between types of plants—maize, tree fruit, and palm—within each regional aggregate may be more helpful in assessing different adaptations in farming and foraging.

Scholars working in other regions of the New World have shown that multi-scalar subsistence data reveals both broad regional trends and intraregional variation (Anderson and Sassaman 2012; Menzies and Haller 2012; Scarry 1993; Schwadron 2010). We know there is great variety in size and nature of sites in central Panama, and it would not be unreasonable to assume subsistence economies likewise varied to some extent in western Caribbean Panama. Settlement types ranged from dispersed, rural hamlets and villages lacking material wealth or signs of social inequality to large, nucleated villages replete with the types of luxury items associated with complex chiefdoms in lower Central America. The degree to which each of these prehistoric settlements depended upon surplus food production, staple crops such as maize and starchy roots and tubers, and tree cropping is difficult to determine without standardized macrobotanical data. Patterning shows that people in western Panama were able to remake the landscape and participate in elite-tier activities in ways analogous to settlements in central Panama. Societies in the western Caribbean area were far from the isolated groups imagined by mid-twentieth century scholars who worked in the region (see Linares 1976, 1977; Linares and Ranere 1980).

Isla Colón within a Supraregional Perspective

Compared to the amount of scholarship produced on ancient societies in other regions of Central America, we presently know little of political organization in the lowland Caribbean coast of western Panama. A ceramic chronology has not yet been established for the vessels excavated at Sitio Drago. Few surveys and excavations have been conducted in the region, and investigations at Sitio Drago have yet to yield households and production centers. For now, plant and animal data analyzed in this dissertation provide a foundation on which to build discussions of regional social, political, and economic systems as scholars produce more archaeological evidence from the area.

Development of Complexity on Isla Colón

The most difficult challenge in constructing the historical ecology of any prehistoric region is to interpret the interplay between cultural systems and the environment. Landscape reconstructions discussed in this chapter indicate that a society of considerable size occupied Isla Colón well before the Late Ceramic phase. The depth, density, and taphonomic consistency of deposits excavated at Sitio Drago suggest the site may have been particularly important to the development of complexity in the area. In order to begin teasing apart the relationship between food, the environment, and social complexity, we can view plant and animal procurement at Sitio Drago through the “platforms of societal dynamics” discussed in Chapter I (Arnold et al. 2015:1-2). Results of analyses presented here point to several possible ways that foodways could have played an important role in specific dynamics shaping complexity.

Small-scale societies, including chiefdoms, depend on multiple generations of traditional ecological knowledge to improve productivity of wild resources, begin cultivating plants, and intensify food production. At Sitio Drago, this “articulation of ecology and subsistence” (Arnold et al. 2015:36) informed continual development of a successful food production system that could be intensified or shifted in focus without producing lasting environmental degradation. Several plant types present in the Sitio Drago assemblage are potential candidates for intensification, and an increase in production of each plant type would have different ecological consequences. People living at Sitio Drago during the Biscuitware Phase must have faced a need to produce more plant foods. Significantly expanding maize fields would involve cutting larger patches of forest and investing more materials and effort into soil maintenance. Maize cultivation slightly (but not significantly) expands after AD 1200, with a concurrent increase in nitrogen-fixing beans. They did intensify tree fruit production, which merely rearranges tree taxa and preserves forest cover.

Social differentiation can provide the "seeds of inequality" that enable individuals with earned or ascribed higher rank to latch onto the mechanisms of complexity such as control of labor or food resources (Arnold et al. 2015:22). Evidence for hierarchy in early complex societies often comes from differentiation in burial practice. The partially-excavated cemetery at Sitio Drago represents a promising area for future research into the dynamics of social differentiation on Isla Colón. Preliminary evidence indicates middens associated with one particular cluster of burials contain an exceptionally rich assemblage of elaborate imported ceramics and shell beads. Future expansion of plant and animal datasets representing the domestic and mortuary areas of the site would enable a more detailed assessment of this theme.

Possible Sources of Elite Power at Sitio Drago

If Sitio Drago represents a trade center managed by elites and chiefs aspiring to advance their political status, where did these aspiring elites get their chiefly wealth and power? Smaller chiefdoms within paramount chiefdoms were connected by practices involving the exchange of valuables, but hostility was purportedly strong among groups (Helms 1979:90; Hoopes 2007). Potential for treachery pervaded these chiefdoms; intergroup alliances were usually temporary, as were their leaders, and easily overturned. Sitio Drago is located at a strategic point worthy of aspiring to control. Reef fisheries present an abundance of marine resources to which access could be restricted. The narrow Canal de Drago is the last waterway to cross through before heading along the Caribbean coast northward to Costa Rica. Production centers of ceramic, gold, and stone artifacts have not yet been identified on the Bocas del Toro islands or coastal mainland; displays of chiefly wealth and power may have taken place primarily through display of wealth objects and elaborate feasts.

Like any chiefdom in the ancient Panamanian world, chiefly processes played an important role in the development of Sitio Drago. Several historical and locale-specific factors may have directed its pathways to complexity, including investment in soils, importation of stone, and exploitation of tree fruits. A settlement of any size could not be constructed on Isla Colón without importation of large amounts of rock. Success of early settlements, therefore, depended on intensive landscape domestication from the very beginning. This importation of stone, across water channels as narrow as 2 km or as long as 150 km, required at least temporary organization of labor and the maintenance of nearby sociopolitical connections. Chiefs may not have controlled food production; rather, they could have effectively established local authority by managing materials and labor necessary for procuring plant and animal foods. In addition to the large basin ground stones necessary for processing seeds and tubers, many of the top-ranked animal food resources were hunted with lithic darts (e.g., large rodents, deer). Chiefs living at Sitio Drago may also have controlled the spiritual realm through ceremony, ritual, and acquisition of esoteric knowledge and exotic items. By maintaining an alliance with the spiritual realm, chiefs in lower Central America ensured that routine activities such as farming and hunting would be done in a proper, productive way (Hoopes 2007:286).

Viewing the development of Sitio Drago from a long-term perspective provides some insight into specific ways that it may have developed as chiefly center. Villagers developed a food production system that mimics the anthropogenically- undisturbed cycling of canopy forests. Avoiding extensive clear-cutting of forest and instead relying on a diverse base of foods proved to be a sustainable, resilient food system despite intensification. Individuals created and altered this system through their routine interactions with plants and soils. The cumulative re-arrangement of forest mosaics encouraged growth of desirable plant resources, and weeding of undesired plants increased the productivity of the island landscape. This, in turn, secured year-round availability of protein sources by increasing the local population and concentration of preferred animal prey. Although people occupying the village during the Biscuitware Phase impacted local fisheries and the coral reefs, the long-term development of the landscape meant there were enough resources to shift focus when the population of a particularly desirable food source declined in productivity.

Abundance of valuable commodities can stimulate sociopolitical complexity, as well as human response to ecological limitations. Intensification of foraging and cultivating appears during the Biscuitware Phase, when the abundance of tree fruits charichuelo (*Garcinia madruno*: Clusiaceae), nance (*Byrsonima crassifolia*: Malpighiaceae), and the Sapotaceae family, increase significantly. Why would Biscuitware Phase people produce this apparent surplus production of tree fruits? One compelling explanation is that villagers used these fruits for brewing fermented wines. Descriptions of palm and tree fruit wine are common in the ethnographic record of the Neotropics (Balick 1990; Buriticá Céspedes and Régulo Cartagena Valenzuela 2015; Clement et al. 2008:101), and intensification of tree fruits may have been easier to manage than intensification of maize in the wet, lowland environment. While expansion of maize fields for excess consumption would require clear-cutting forest—thus contributing to loss of soil volume and nutrients—orchards maintain garden soils and protect understory plants what are important parts of the plant-based diet.

Conclusions

The purpose of this study is to provide some insight into prehistoric people's forest management strategies in lower Central America. At Sitio Drago, landesque capital appears to be the primary form of accumulation, as Hornborg et al. notes is the case for most societies between the Neolithic and the Industrial Revolution (Hornborg et al. 2014:216). In this historical circumstance, the people made the forest a faunal enclave to encourage year-round availability of meat, and produced fruits that may have provided access to political connections. Sitio Drago provides an example of people creating, transforming, and managing anthropogenic landscapes to suit their purposes. This unique manifestation adds to the canon of ancient Neotropical societies observed to be doing just that (see Balée 2013; Clement 2006; Piperno and Pearsall 1998; Erickson 2006b; among others).

My goal at the beginning of this project was to establish the types of plants and animals exploited by Late Ceramic phase villagers, the frequency of their exploitation, and trace changes in subsistence patterns during a key demographic shift. I also wanted to determine the extent to which these people relied on wild versus domesticated food resources and explore how foodway-related human disturbance of landscape shaped routine life for everyday people in this hierarchical village. I have made a qualitative hypothesis that people on Isla Colón changed the environment in order to carve their own niche in the supraregional interaction network.

Through collaborative research, PASD is beginning to piece together a picture of the history of human manipulation of the environment in the lowlands of Bocas del Toro province. Sediment core samples from neighboring watersheds provide proxy evidence of human presence and disturbance of the landscape beginning around 11,000 years ago (Behling 2000; Bush et al. 1992). From zooarchaeological analyses of fish specimens we have evidence for the probable anthropogenic depression of marine resources as early as AD 700 (Wake et al. 2013). New evidence presented in this dissertation shows that plants known to be cultivated or managed by humans, as well as animals known to be increased in number as a result of these modifications, are present at least as early as AD 60 (see discussion in Chapter IV). Further, the pattern of higher relative abundance of cultivated plant foods and cleared-edge prey becomes more pronounced over the next few hundred years until the sixteenth century demographic collapse of indigenous groups on Isla Colón.

Reconstructions of subsistence economies based on multiple lines of evidence can broaden our assumptions about the role and type of food production systems that allowed competitive chiefdoms to develop and acquire political power. Based on current archaeological evidence, Middle to Late Ceramic phase society in both Central and Western Panama was characterized by social inequality and competition amongst elites for power and luxury goods. What role, if any, did staple or surplus production of maize and starchy root and tuber crops play in this development? Were farmers in rural hinterlands subject to meeting material demands from powerful elites (analogous to the Mayan tribute system) or did these farmers live in autonomous units with their own system of subsistence and political economy? Answering these questions will be an essential step toward developing a more comprehensive—and thus globally comparative—understanding of lower Central American social and political organization.

APPENDIX A

ARCHAEOBOTANICAL DATA

Explanation of Column Labels and Acronyms:

Site	Name of site samples were excavated from
Phase	Occupation assigned to excavation level: PB=Pre-Biscuitware Phase (AD 800 to 1200) B=Biscuitware Phase (AD 1200 to 1450) H=Historic Phase (AD 1600 to 1900)
FS#	Field specimen number recorded during excavation
Unit	Unit name: SD-49, -50, -51, -60, -61 or ST-1
Wall	Wall or other location of sample excavation: N=North E=East S=South W=West SE=Southeast SW=Southwest A=”Feature A” AL=ash lens F=fill (screened samples)
Level (cm)	Level in centimeters below depth
Soil Volume (l)	Liters of soil in sample
Sample Type	LF=Light fraction HF=Heavy fraction S=Screened
Sieve Size	Sieve size in millimeters; screen size in inches
Scientific Name	Binomial nomenclature of specimen identified
Plant Part	Part of plant identified
Count (#)	Absolute number of specimens identified
Weight (g)	Weight of wood charcoal in grams
Density (#/l)	Standardized value; number of specimens divided by sample soil volume in liters

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4337	49	E	0-5	4.5	HF	>2	Myrcia Gatunensis	Seed	5		1.11
Drago	H	4337	49	E	0-5	4.5	HF	>2	Garcinia Madruno	Seed	1		0.22
Drago	H	4337	49	E	0-5	4.5	HF	>2	Cecropia	Seed casing	2		0.44
Drago	H	4337	49	E	0-5	4.5	HF	>2	Xylopia Bocatorena	Seed casing	1		0.22
Drago	H	4337	49	E	0-5	4.5	HF	>2	Unidentified	Nutshell	1		0.22
Drago	H	4337	49	E	0-5	4.5	HF	>2	Moraceae	Wood		0.01	0.00
Drago	H	4337	49	E	0-5	4.5	HF	>1	Myrcia Gatunensis	Seed	48		10.67
Drago	H	4337	49	E	0-5	4.5	HF	>1	Unidentified	Nutshell	1		0.22
Drago	H	4337	49	E	0-5	4.5	HF	>1	Rubiaceae Psychotria	Seed casing	4		0.89
Drago	H	4337	49	E	0-5	4.5	HF	>1	Rubiaceae Coccocypselum	Seed	1		0.22
Drago	H	4337	49	E	0-5	4.5	HF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4337	49	E	0-5	4.5	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	H	4337	49	E	0-5	4.5	HF	>0.5	Myrcia Gatunensis	Seed	1		0.22
Drago	H	4338	49	E	5-10	4.5	HF	>2	Myrcia Gatunensis	Seed	4		0.89
Drago	H	4338	49	E	5-10	4.5	HF	>2	Rubiaceae Coccocypselum	Seed	3		0.67
Drago	H	4338	49	E	5-10	4.5	HF	>2	Poaceae Zea mays	Kernel	1		0.22
Drago	H	4338	49	E	5-10	4.5	HF	>2	Arecaceae	Wood		0.08	0.00
Drago	H	4338	49	E	5-10	4.5	HF	>2	Moraceae	Wood		0.03	0.00
Drago	H	4338	49	E	5-10	4.5	HF	>1	Myrcia Gatunensis	Seed	19		4.22
Drago	H	4338	49	E	5-10	4.5	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	3		0.67
Drago	H	4338	49	E	5-10	4.5	HF	>1	Rubiaceae Psychotria	Seed casing	1		0.22
Drago	H	4338	49	E	5-10	4.5	HF	>1	Arecaceae	Wood		0.05	0.00
Drago	H	4338	49	E	5-10	4.5	HF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4339	49	E	10-20	9	HF	>2	Myrcia Gatunensis	Seed	1		0.11
Drago	H	4339	49	E	10-20	9	HF	>2	Boraginaceae Cordia spinescens	Seed	1		0.11
Drago	H	4339	49	E	10-20	9	HF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	H	4339	49	E	10-20	9	HF	>2	Arecaceae	Wood		0.01	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4339	49	E	10-20	9	HF	>2	Moraceae	Wood		1.25	0.00
Drago	H	4339	49	E	10-20	9	HF	>1	Myrcia Gatunensis	Seed	7		0.78
Drago	H	4339	49	E	10-20	9	HF	>1	Cecropia	Seed casing	1		0.11
Drago	H	4339	49	E	10-20	9	HF	>1	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	H	4339	49	E	10-20	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	H	4339	49	E	10-20	9	HF	>1	Rubiaceae	Seed	2		0.22
Drago	H	4339	49	E	10-20	9	HF	>1	Arecaceae	Wood		0.03	0.00
Drago	H	4339	49	E	10-20	9	HF	>1	Moraceae	Wood		0.56	0.00
Drago	H	4340	49	E	20-27	6.3	HF	>2	Unidentified	Nutshell	1		0.16
Drago	H	4340	49	E	20-27	6.3	HF	>2	Arecaceae	Wood		0.19	0.00
Drago	H	4340	49	E	20-27	6.3	HF	>2	Moraceae	Wood		0.18	0.00
Drago	H	4340	49	E	20-27	6.3	HF	>1	Myrcia Gatunensis	Seed	12		1.90
Drago	H	4340	49	E	20-27	6.3	HF	>1	Cecropia	Seed casing	3		0.48
Drago	H	4340	49	E	20-27	6.3	HF	>1	Xylopia Bocatorena	Seed	4		0.63
Drago	H	4340	49	E	20-27	6.3	HF	>1	Arecaceae	Wood		0.14	0.00
Drago	H	4340	49	E	20-27	6.3	HF	>1	Arecaceae	Wood		0.19	0.00
Drago	H	4340	49	E	20-27	6.3	HF	>0.5	Cecropia	Seed casing	5		0.79
Drago	B	4341	49	E	27-37	9	HF	>2	Unidentified	Nutshell	1		0.11
Drago	B	4341	49	E	27-37	9	HF	>2	Poaceae Zea mays	Kernel	5		0.56
Drago	B	4341	49	E	27-37	9	HF	>2	Rubiaceae Psychotria	Seed casing	1		0.11
Drago	B	4341	49	E	27-37	9	HF	>2	Arecaceae	Wood		0.31	0.00
Drago	B	4341	49	E	27-37	9	HF	>2	Moraceae	Wood		1.07	0.00
Drago	B	4341	49	E	27-37	9	HF	>1	Myrcia Gatunensis	Seed	1		0.11
Drago	B	4341	49	E	27-37	9	HF	>1	Poaceae Zea mays	Cupule	1		0.11
Drago	B	4341	49	E	27-37	9	HF	>1	Poaceae Zea mays	Kernel	3		0.33
Drago	B	4341	49	E	27-37	9	HF	>1	Xylopia Bocatorena	Seed	1		0.11
Drago	B	4341	49	E	27-37	9	HF	>1	Garcinia Intermedia	Seed	1		0.11
Drago	B	4341	49	E	27-37	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4341	49	E	27-37	9	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	B	4341	49	E	27-37	9	HF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4341	49	E	27-37	9	HF	>0.5	Cecropia	Seed	1		0.11
Drago	PB	4342	49	E	37-47	9	HF	>2	Myrcia Gatunensis	Seed	3		0.33
Drago	PB	4342	49	E	37-47	9	HF	>2	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	PB	4342	49	E	37-47	9	HF	>2	Unidentified	Nutshell	2		0.22
Drago	PB	4342	49	E	37-47	9	HF	>2	Poaceae Zea mays	Kernel	4		0.44
Drago	PB	4342	49	E	37-47	9	HF	>2	Arecaceae	Wood		0.3	0.00
Drago	PB	4342	49	E	37-47	9	HF	>2	Moraceae	Wood		0.47	0.00
Drago	PB	4342	49	E	37-47	9	HF	>1	Myrcia Gatunensis	Seed	2		0.22
Drago	PB	4342	49	E	37-47	9	HF	>1	Cecropia	Seed	3		0.33
Drago	PB	4342	49	E	37-47	9	HF	>1	Unidentified	Seed	1		0.11
Drago	PB	4342	49	E	37-47	9	HF	>1	Garcinia Intermedia	Seed	2		0.22
Drago	PB	4342	49	E	37-47	9	HF	>1	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4343	49	E	47-57	9	HF	>2	Garcinia Intermedia	Seed	1		0.11
Drago	PB	4343	49	E	47-57	9	HF	>2	Poaceae Zea mays	Kernel	5		0.56
Drago	PB	4343	49	E	47-57	9	HF	>2	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4343	49	E	47-57	9	HF	>2	Unidentified	Fruit pit	2		0.22
Drago	PB	4343	49	E	47-57	9	HF	>2	Unidentified	Nutshell	1		0.11
Drago	PB	4343	49	E	47-57	9	HF	>2	Arecaceae	Wood		0.08	0.00
Drago	PB	4343	49	E	47-57	9	HF	>2	Moraceae	Wood		0.26	0.00
Drago	PB	4343	49	E	47-57	9	HF	>1	Rubiaceae	Seed	1		0.11
Drago	PB	4343	49	E	47-57	9	HF	>1	Poaceae Zea mays	Kernel	2		0.22
Drago	PB	4343	49	E	47-57	9	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4343	49	E	47-57	9	HF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4343	49	E	47-57	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4344	49	E	57-67	9	HF	>2	Cecropia	Seed	3		0.33
Drago	PB	4344	49	E	57-67	9	HF	>2	Xylopia Bocatorena	Seed	2		0.22

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4344	49	E	57-67	9	HF	>2	Poaceae Zea mays	Kernel	2		0.22
Drago	PB	4344	49	E	57-67	9	HF	>2	Unidentified	Nutshell	2		0.22
Drago	PB	4344	49	E	57-67	9	HF	>2	Arecaceae	Wood		0.75	0.00
Drago	PB	4344	49	E	57-67	9	HF	>2	Moraceae	Wood		0.26	0.00
Drago	PB	4344	49	E	57-67	9	HF	>1	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	PB	4344	49	E	57-67	9	HF	>1	Rubiaceae Coccocypselum	Seed	2		0.22
Drago	PB	4344	49	E	57-67	9	HF	>1	Rubiaceae	Seed	5		0.56
Drago	PB	4344	49	E	57-67	9	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4344	49	E	57-67	9	HF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4344	49	E	57-67	9	HF	>0.5	Rubiaceae	Seed	2		0.22
Drago	PB	4345	49	E	67-77	9	HF	>2	Boraginaceae Cordia spinescens	Seed	2		0.22
Drago	PB	4345	49	E	67-77	9	HF	>2	Unidentified	Fruit pit	3		0.33
Drago	PB	4345	49	E	67-77	9	HF	>2	Unidentified	Nutshell	2		0.22
Drago	PB	4345	49	E	67-77	9	HF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	PB	4345	49	E	67-77	9	HF	>2	Arecaceae	Wood		2.45	0.00
Drago	PB	4345	49	E	67-77	9	HF	>2	Moraceae	Wood		2.86	0.00
Drago	PB	4345	49	E	67-77	9	HF	>1	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4345	49	E	67-77	9	HF	>1	Boraginaceae Cordia spinescens	Seed	1		0.11
Drago	PB	4345	49	E	67-77	9	HF	>1	Rubiaceae	Seed	3		0.33
Drago	PB	4345	49	E	67-77	9	HF	>1	Poaceae Zea mays	Kernel	2		0.22
Drago	PB	4345	49	E	67-77	9	HF	>1	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4345	49	E	67-77	9	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4345	49	E	67-77	9	HF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4345	49	E	67-77	9	HF	>0.5	Rubiaceae	Seed	1		0.11
Drago	PB	4346	49	E	77-87	9	HF	>2	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4346	49	E	77-87	9	HF	>2	Sapotaceae Manilkara zapota	Seed	2		0.22
Drago	PB	4346	49	E	77-87	9	HF	>2	Unidentified	Fruit pit	4		0.44
Drago	PB	4346	49	E	77-87	9	HF	>2	Unidentified	Nutshell	6		0.67

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4346	49	E	77-87	9	HF	>2	Arecaceae	Wood		0.67	0.00
Drago	PB	4346	49	E	77-87	9	HF	>2	Moraceae	Wood		0.23	0.00
Drago	PB	4346	49	E	77-87	9	HF	>1	Myrcia Gatunensis	Seed	3		0.33
Drago	PB	4346	49	E	77-87	9	HF	>1	Xylopia Bocatorena	Seed	1		0.11
Drago	PB	4346	49	E	77-87	9	HF	>1	Sapotaceae Manilkara zapota	Seed	1		0.11
Drago	PB	4346	49	E	77-87	9	HF	>1	Poaceae Zea mays	Kernel	5		0.56
Drago	PB	4346	49	E	77-87	9	HF	>1	Poaceae Zea mays	Cupule	3		0.33
Drago	PB	4346	49	E	77-87	9	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4346	49	E	77-87	9	HF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4347	49	E	87-97	9	HF	>2	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4347	49	E	87-97	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4347	49	E	87-97	9	HF	>2	Sapotaceae Manilkara zapota	Seed	2		0.22
Drago	PB	4347	49	E	87-97	9	HF	>2	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	PB	4347	49	E	87-97	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	PB	4347	49	E	87-97	9	HF	>2	Garcinia Intermedia	Seed	2		0.22
Drago	PB	4347	49	E	87-97	9	HF	>2	Rubiaceae	Seed	4		0.44
Drago	PB	4347	49	E	87-97	9	HF	>2	Poaceae Zea mays	Kernel	6		0.67
Drago	PB	4347	49	E	87-97	9	HF	>2	Arecaceae	Wood		1.67	0.00
Drago	PB	4347	49	E	87-97	9	HF	>2	Moraceae	Wood		2.3	0.00
Drago	PB	4347	49	E	87-97	9	HF	>1	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4347	49	E	87-97	9	HF	>1	Sapotaceae Manilkara zapota	Seed	6		0.67
Drago	PB	4347	49	E	87-97	9	HF	>1	Garcinia Intermedia	Seed	1		0.11
Drago	PB	4347	49	E	87-97	9	HF	>1	Poaceae Zea mays	Kernel	3		0.33
Drago	PB	4347	49	E	87-97	9	HF	>1	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4347	49	E	87-97	9	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4347	49	E	87-97	9	HF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4347	49	E	87-97	9	HF	>0.5	Cecropia	Seed	1		0.11
Drago	PB	4347	49	E	87-97	9	HF	>0.5	Arecaceae	Wood		0.01	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4558	50	E	0-10	9	HF	>2	Poaceae Zea mays	Kernel	12		1.33
Drago	B	4558	50	E	0-10	9	HF	>2	Poaceae Zea mays	Cupule	7		0.78
Drago	B	4558	50	E	0-10	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	11		1.22
Drago	B	4558	50	E	0-10	9	HF	>2	Sapotaceae Manilkara zapota	Seed	9		1.00
Drago	B	4558	50	E	0-10	9	HF	>2	Rubiaceae Psychotria	Seed	21		2.33
Drago	B	4558	50	E	0-10	9	HF	>2	Arecaceae	Endocarp	2		0.22
Drago	B	4558	50	E	0-10	9	HF	>2	Unidentified	Nutshell	9		1.00
Drago	B	4558	50	E	0-10	9	HF	>2	Arecaceae	Wood		1.03	0.00
Drago	B	4558	50	E	0-10	9	HF	>2	Moraceae	Wood		5.84	0.00
Drago	B	4558	50	E	0-10	9	HF	>1	Fabaceae Phaseolus vulgaris	Seed	5		0.56
Drago	B	4558	50	E	0-10	9	HF	>1	Xylopia Bocatorena	Seed	1		0.11
Drago	B	4558	50	E	0-10	9	HF	>1	Rubiaceae Psychotria	Seed	17		1.89
Drago	B	4558	50	E	0-10	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	4		0.44
Drago	B	4558	50	E	0-10	9	HF	>1	Garcinia Intermedia	Seed	9		1.00
Drago	B	4558	50	E	0-10	9	HF	>1	Rubiaceae Coccocypselum	Seed	19		2.11
Drago	B	4558	50	E	0-10	9	HF	>1	Unidentified	Nutshell	6		0.67
Drago	B	4558	50	E	0-10	9	HF	>1	Garcinia Madruno	Seed	2		0.22
Drago	B	4558	50	E	0-10	9	HF	>1	Rubiaceae	Seed	12		1.33
Drago	B	4558	50	E	0-10	9	HF	>1	Arecaceae	Wood		0.63	0.00
Drago	B	4558	50	E	0-10	9	HF	>1	Moraceae	Wood		2.06	0.00
Drago	B	4558	50	E	0-10	9	HF	>0.5	Cecropia	Seed	3		0.33
Drago	B	4558	50	E	0-10	9	HF	>0.5	Rubiaceae	Seed	2		0.22
Drago	B	4558	50	E	0-10	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	B	4559	50	E	10-20	9	HF	>2	Garcinia Madruno	Seed	2		0.22
Drago	B	4559	50	E	10-20	9	HF	>2	Poaceae Zea mays	Kernel	3		0.33
Drago	B	4559	50	E	10-20	9	HF	>2	Malpighiaceae Byrsonima crassifolia	Seed	2		0.22
Drago	B	4559	50	E	10-20	9	HF	>2	Unidentified	Nutshell	8		0.89
Drago	B	4559	50	E	10-20	9	HF	>2	Arecaceae	Wood		0.61	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4559	50	E	10-20	9	HF	>2	Moraceae	Wood		5.13	0.00
Drago	B	4559	50	E	10-20	9	HF	>1	Fabaceae Phaseolus vulgaris	Seed	3		0.33
Drago	B	4559	50	E	10-20	9	HF	>1	Sapotaceae Manilkara zapota	Seed	7		0.78
Drago	B	4559	50	E	10-20	9	HF	>1	Rubiaceae	Seed	5		0.56
Drago	B	4559	50	E	10-20	9	HF	>1	Rubiaceae Psychotria	Seed	8		0.89
Drago	B	4559	50	E	10-20	9	HF	>1	Garcinia Madruno	Seed	1		0.11
Drago	B	4559	50	E	10-20	9	HF	>1	Rubiaceae Coccocypselum	Seed	7		0.78
Drago	B	4559	50	E	10-20	9	HF	>1	Unidentified	Fruit pit	1		0.11
Drago	B	4559	50	E	10-20	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	B	4559	50	E	10-20	9	HF	>1	Arecaceae	Wood		0.24	0.00
Drago	B	4559	50	E	10-20	9	HF	>1	Moraceae	Wood		2.19	0.00
Drago	B	4559	50	E	10-20	9	HF	>0.5	Cecropia	Seed	2		0.22
Drago	B	4559	50	E	10-20	9	HF	>0.5	Rubiaceae	Seed	3		0.33
Drago	B	4559	50	E	10-20	9	HF	>0.5	Garcinia Madruno	Seed	1		0.11
Drago	B	4559	50	E	10-20	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	B	4560	50	E	20-30	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	2		0.22
Drago	B	4560	50	E	20-30	9	HF	>2	Unidentified	Nutshell	5		0.56
Drago	B	4560	50	E	20-30	9	HF	>2	Unidentified	Fruit pit	5		0.56
Drago	B	4560	50	E	20-30	9	HF	>2	Sapotaceae Manilkara zapota	Seed	5		0.56
Drago	B	4560	50	E	20-30	9	HF	>2	Rubiaceae	Seed	8		0.89
Drago	B	4560	50	E	20-30	9	HF	>2	Poaceae Zea mays	Kernel	2		0.22
Drago	B	4560	50	E	20-30	9	HF	>2	Poaceae Zea mays	Cupule	4		0.44
Drago	B	4560	50	E	20-30	9	HF	>2	Arecaceae	Wood		0.93	0.00
Drago	B	4560	50	E	20-30	9	HF	>2	Moraceae	Wood		11.26	0.00
Drago	B	4560	50	E	20-30	9	HF	>1	Rubiaceae	Seed	23		2.56
Drago	B	4560	50	E	20-30	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	2		0.22
Drago	B	4560	50	E	20-30	9	HF	>1	Rubiaceae Coccocypselum	Seed	5		0.56
Drago	B	4560	50	E	20-30	9	HF	>1	Garcinia Madruno	Seed	6		0.67

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4560	50	E	20-30	9	HF	>1	Sapotaceae Manilkara zapota	Seed	5		0.56
Drago	B	4560	50	E	20-30	9	HF	>1	Unidentified	Nutshell	9		1.00
Drago	B	4560	50	E	20-30	9	HF	>1	Poaceae Zea mays	Kernel	7		0.78
Drago	B	4560	50	E	20-30	9	HF	>1	Poaceae Zea mays	Cupule	4		0.44
Drago	B	4560	50	E	20-30	9	HF	>1	Arecaceae	Wood		1.65	0.00
Drago	B	4560	50	E	20-30	9	HF	>1	Moraceae	Wood		2.46	0.00
Drago	B	4560	50	E	20-30	9	HF	>1	Unidentified	Seed	8		0.89
Drago	B	4560	50	E	20-30	9	HF	>0.5	Rubiaceae Coccocypselum	Seed	8		0.89
Drago	B	4560	50	E	20-30	9	HF	>0.5	Unidentified	Seed	4		0.44
Drago	B	4560	50	E	20-30	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	B	4561	50	E	30-40	9	HF	>2	Rubiaceae	Seed	15		1.67
Drago	B	4561	50	E	30-40	9	HF	>2	Garcinia Intermedia	Seed	3		0.33
Drago	B	4561	50	E	30-40	9	HF	>2	Rubiaceae Coccocypselum	Seed	7		0.78
Drago	B	4561	50	E	30-40	9	HF	>2	Unidentified	Stem	1		0.11
Drago	B	4561	50	E	30-40	9	HF	>2	Unidentified	Nutshell	4		0.44
Drago	B	4561	50	E	30-40	9	HF	>2	Unidentified	Fruit pit	2		0.22
Drago	B	4561	50	E	30-40	9	HF	>2	Xylopia Bocatorena	Seed	5		0.56
Drago	B	4561	50	E	30-40	9	HF	>2	Garcinia Madruno	Seed	2		0.22
Drago	B	4561	50	E	30-40	9	HF	>2	Unidentified	Seed	7		0.78
Drago	B	4561	50	E	30-40	9	HF	>2	Arecaceae	Wood		2.45	0.00
Drago	B	4561	50	E	30-40	9	HF	>2	Moraceae	Wood		7.49	0.00
Drago	B	4561	50	E	30-40	9	HF	>1	Rubiaceae	Seed	7		0.78
Drago	B	4561	50	E	30-40	9	HF	>1	Garcinia Madruno	Seed	2		0.22
Drago	B	4561	50	E	30-40	9	HF	>1	Rubiaceae Coccocypselum	Seed	3		0.33
Drago	B	4561	50	E	30-40	9	HF	>1	Xylopia Bocatorena	Seed casing	5		0.56
Drago	B	4561	50	E	30-40	9	HF	>1	Unidentified	Nutshell	6		0.67
Drago	B	4561	50	E	30-40	9	HF	>1	Unidentified	Seed	12		1.33
Drago	B	4561	50	E	30-40	9	HF	>1	Arecaceae	Wood		0.93	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4561	50	E	30-40	9	HF	>1	Moraceae	Wood		1.02	0.00
Drago	B	4561	50	E	30-40	9	HF	>0.5	Rubiaceae	Seed	4		0.44
Drago	B	4561	50	E	30-40	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4562	50	E	40-50	9	HF	>2	Rubiaceae	Seed	2		0.22
Drago	PB	4562	50	E	40-50	9	HF	>2	Sapotaceae Manilkara zapota	Seed	1		0.11
Drago	PB	4562	50	E	40-50	9	HF	>2	Rubiaceae Psychotria	Seed casing	3		0.33
Drago	PB	4562	50	E	40-50	9	HF	>2	Garcinia Intermedia	Seed	2		0.22
Drago	PB	4562	50	E	40-50	9	HF	>2	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	PB	4562	50	E	40-50	9	HF	>2	Unidentified	Nutshell	5		0.56
Drago	PB	4562	50	E	40-50	9	HF	>2	Unidentified	Fruit pit	4		0.44
Drago	PB	4562	50	E	40-50	9	HF	>2	Unidentified	Seed	1		0.11
Drago	PB	4562	50	E	40-50	9	HF	>2	Arecaceae	Wood		1.11	0.00
Drago	PB	4562	50	E	40-50	9	HF	>2	Moraceae	Wood		2.55	0.00
Drago	PB	4562	50	E	40-50	9	HF	>1	Rubiaceae	Seed	3		0.33
Drago	PB	4562	50	E	40-50	9	HF	>1	Rubiaceae Psychotria	Seed casing	2		0.22
Drago	PB	4562	50	E	40-50	9	HF	>1	Unidentified	Seed	2		0.22
Drago	PB	4562	50	E	40-50	9	HF	>1	Arecaceae	Wood		0.23	0.00
Drago	PB	4562	50	E	40-50	9	HF	>1	Moraceae	Wood		0.78	0.00
Drago	PB	4562	50	E	40-50	9	HF	>0.5	Rubiaceae	Seed	2		0.22
Drago	PB	4562	50	E	40-50	9	HF	>0.5	Garcinia Madruno	Seed	1		0.11
Drago	PB	4562	50	E	40-50	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4563	50	E	50-60	9	HF	>2	Rubiaceae	Seed	3		0.33
Drago	PB	4563	50	E	50-60	9	HF	>2	Malpighiaceae Byrsonima crassifolia	Seed	2		0.22
Drago	PB	4563	50	E	50-60	9	HF	>2	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	PB	4563	50	E	50-60	9	HF	>2	Unidentified	Seed	3		0.33
Drago	PB	4563	50	E	50-60	9	HF	>2	Arecaceae	Wood		3.22	0.00
Drago	PB	4563	50	E	50-60	9	HF	>2	Moraceae	Wood		5.73	0.00
Drago	PB	4563	50	E	50-60	9	HF	>1	Rubiaceae Genipa americana	Seed	9		1.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4563	50	E	50-60	9	HF	>1	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4563	50	E	50-60	9	HF	>1	Xylopia Bocatorena	Seed	2		0.22
Drago	PB	4563	50	E	50-60	9	HF	>1	Rubiaceae Coccocypselum	Seed	3		0.33
Drago	PB	4563	50	E	50-60	9	HF	>1	Fabaceae Phaseolus vulgaris	Seed	4		0.44
Drago	PB	4563	50	E	50-60	9	HF	>1	Poaceae Zea mays	Kernel	5		0.56
Drago	PB	4563	50	E	50-60	9	HF	>1	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4563	50	E	50-60	9	HF	>1	Unidentified	Seed	4		0.44
Drago	PB	4563	50	E	50-60	9	HF	>1	Arecaceae	Wood		0.68	0.00
Drago	PB	4563	50	E	50-60	9	HF	>1	Moraceae	Wood		1.98	0.00
Drago	PB	4563	50	E	50-60	9	HF	>0.5	Rubiaceae Psychotria	Seed	7		0.78
Drago	PB	4563	50	E	50-60	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4564	50	E	60-70	9	HF	>2	Rubiaceae	Seed	8		0.89
Drago	PB	4564	50	E	60-70	9	HF	>2	Rubiaceae Genipa americana	Seed	1		0.11
Drago	PB	4564	50	E	60-70	9	HF	>2	Xylopia Bocatorena	Seed	2		0.22
Drago	PB	4564	50	E	60-70	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	2		0.22
Drago	PB	4564	50	E	60-70	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4564	50	E	60-70	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4564	50	E	60-70	9	HF	>2	Garcinia Intermedia	Seed	1		0.11
Drago	PB	4564	50	E	60-70	9	HF	>2	Unidentified	Nutshell	5		0.56
Drago	PB	4564	50	E	60-70	9	HF	>2	Unidentified	Seed	9		1.00
Drago	PB	4564	50	E	60-70	9	HF	>2	Arecaceae	Wood		3.15	0.00
Drago	PB	4564	50	E	60-70	9	HF	>2	Moraceae	Wood		22.79	0.00
Drago	PB	4564	50	E	60-70	9	HF	>1	Rubiaceae	Seed	15		1.67
Drago	PB	4564	50	E	60-70	9	HF	>1	Rubiaceae Psychotria	Seed	12		1.33
Drago	PB	4564	50	E	60-70	9	HF	>1	Garcinia Intermedia	Seed	6		0.67
Drago	PB	4564	50	E	60-70	9	HF	>1	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4564	50	E	60-70	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	3		0.33
Drago	PB	4564	50	E	60-70	9	HF	>1	Xylopia Bocatorena	Seed	7		0.78

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4564	50	E	60-70	9	HF	>1	Unidentified	Nutshell	5		0.56
Drago	PB	4564	50	E	60-70	9	HF	>1	Unidentified	Fruit pit	2		0.22
Drago	PB	4564	50	E	60-70	9	HF	>1	Arecaceae	Wood		0.9	0.00
Drago	PB	4564	50	E	60-70	9	HF	>1	Moraceae	Wood		3.65	0.00
Drago	PB	4564	50	E	60-70	9	HF	>0.5	Rubiaceae	Seed	4		0.44
Drago	PB	4564	50	E	60-70	9	HF	>0.5	Garcinia Madruno	Seed	3		0.33
Drago	PB	4564	50	E	60-70	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4565	50	E	70-80	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	PB	4565	50	E	70-80	9	HF	>2	Rubiaceae Coccocypselum	Seed	3		0.33
Drago	PB	4565	50	E	70-80	9	HF	>2	Rubiaceae	Seed	6		0.67
Drago	PB	4565	50	E	70-80	9	HF	>2	Poaceae Zea mays	Kernel	2		0.22
Drago	PB	4565	50	E	70-80	9	HF	>2	Rubiaceae Psychotria	Seed casing	2		0.22
Drago	PB	4565	50	E	70-80	9	HF	>2	Xylopia Bocatorena	Seed	5		0.56
Drago	PB	4565	50	E	70-80	9	HF	>2	Unidentified	Seed	1		0.11
Drago	PB	4565	50	E	70-80	9	HF	>2	Arecaceae	Wood		11.09	0.00
Drago	PB	4565	50	E	70-80	9	HF	>2	Moraceae	Wood		31.86	0.00
Drago	PB	4565	50	E	70-80	9	HF	>1	Garcinia Madruno	Seed	2		0.22
Drago	PB	4565	50	E	70-80	9	HF	>1	Rubiaceae	Seed	9		1.00
Drago	PB	4565	50	E	70-80	9	HF	>1	Rubiaceae Coccocypselum	Seed	7		0.78
Drago	PB	4565	50	E	70-80	9	HF	>1	Xylopia Bocatorena	Seed	2		0.22
Drago	PB	4565	50	E	70-80	9	HF	>1	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4565	50	E	70-80	9	HF	>1	Rubiaceae Psychotria	Seed	8		0.89
Drago	PB	4565	50	E	70-80	9	HF	>1	Unidentified	Nutshell	5		0.56
Drago	PB	4565	50	E	70-80	9	HF	>1	Unidentified	Seed	9		1.00
Drago	PB	4565	50	E	70-80	9	HF	>1	Arecaceae	Wood		1.06	0.00
Drago	PB	4565	50	E	70-80	9	HF	>1	Moraceae	Wood		5.57	0.00
Drago	PB	4565	50	E	70-80	9	HF	>0.5	Rubiaceae	Seed	3		0.33
Drago	PB	4565	50	E	70-80	9	HF	>0.5	Unidentified	Seed	8		0.89

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4565	50	E	70-80	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4566	50	E	80-90	9	HF	>2	Rubiaceae	Seed	11		1.22
Drago	PB	4566	50	E	80-90	9	HF	>2	Garcinia Intermedia	Seed	1		0.11
Drago	PB	4566	50	E	80-90	9	HF	>2	Rubiaceae Coccocypselum	Seed	5		0.56
Drago	PB	4566	50	E	80-90	9	HF	>2	Rubiaceae Genipa americana	Seed	2		0.22
Drago	PB	4566	50	E	80-90	9	HF	>2	Xylopia Bocatorena	Seed	13		1.44
Drago	PB	4566	50	E	80-90	9	HF	>2	Unidentified	Seed	2		0.22
Drago	PB	4566	50	E	80-90	9	HF	>2	Arecaceae	Wood		8.01	0.00
Drago	PB	4566	50	E	80-90	9	HF	>2	Moraceae	Wood		23.75	0.00
Drago	PB	4566	50	E	80-90	9	HF	>1	Rubiaceae	Seed	9		1.00
Drago	PB	4566	50	E	80-90	9	HF	>1	Rubiaceae Coccocypselum	Seed	7		0.78
Drago	PB	4566	50	E	80-90	9	HF	>1	Xylopia Bocatorena	Seed	12		1.33
Drago	PB	4566	50	E	80-90	9	HF	>1	Unidentified	Seed	12		1.33
Drago	PB	4566	50	E	80-90	9	HF	>1	Arecaceae	Wood		0.78	0.00
Drago	PB	4566	50	E	80-90	9	HF	>1	Moraceae	Wood		4.79	0.00
Drago	PB	4566	50	E	80-90	9	HF	>0.5	Garcinia Madruno	Seed	8		0.89
Drago	PB	4566	50	E	80-90	9	HF	>0.5	Unidentified	Seed	5		0.56
Drago	PB	4566	50	E	80-90	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4567	50	E	90-100	9	HF	>2	Unidentified	Seed	3		0.33
Drago	PB	4567	50	E	90-100	9	HF	>2	Unidentified	Seed	5		0.56
Drago	PB	4567	50	E	90-100	9	HF	>2	Rubiaceae	Seed	5		0.56
Drago	PB	4567	50	E	90-100	9	HF	>2	Xylopia Bocatorena	Seed	2		0.22
Drago	PB	4567	50	E	90-100	9	HF	>2	Unidentified	Nutshell	6		0.67
Drago	PB	4567	50	E	90-100	9	HF	>2	Arecaceae	Wood		2.7	0.00
Drago	PB	4567	50	E	90-100	9	HF	>2	Moraceae	Wood		15.3	0.00
Drago	PB	4567	50	E	90-100	9	HF	>1	Garcinia Madruno	Seed	1		0.11
Drago	PB	4567	50	E	90-100	9	HF	>1	Rubiaceae	Seed	12		1.33
Drago	PB	4567	50	E	90-100	9	HF	>1	Xylopia Bocatorena	Seed	3		0.33

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4567	50	E	90-100	9	HF	>1	Unidentified	Seed	6		0.67
Drago	PB	4567	50	E	90-100	9	HF	>1	Unidentified	Seed	2		0.22
Drago	PB	4567	50	E	90-100	9	HF	>1	Rubiaceae Coccocypselum	Seed	7		0.78
Drago	PB	4567	50	E	90-100	9	HF	>1	Rubiaceae Genipa americana	Seed	4		0.44
Drago	PB	4567	50	E	90-100	9	HF	>1	Unidentified	Seed	2		0.22
Drago	PB	4567	50	E	90-100	9	HF	>1	Arecaceae	Wood		0.76	0.00
Drago	PB	4567	50	E	90-100	9	HF	>1	Moraceae	Wood		2.88	0.00
Drago	PB	4567	50	E	90-100	9	HF	>0.5	Rubiaceae Coccocypselum	Seed	5		0.56
Drago	PB	4567	50	E	90-100	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4359	50	A	40-50	6.45	HF	>2	Rubiaceae Psychotria	Seed	2		0.31
Drago	PB	4359	50	A	40-50	6.45	HF	>2	Unidentified	Nutshell	4		0.62
Drago	PB	4359	50	A	40-50	6.45	HF	>2	Unidentified	Seed	4		0.62
Drago	PB	4359	50	A	40-50	6.45	HF	>2	Arecaceae	Wood		0.35	0.00
Drago	PB	4359	50	A	40-50	6.45	HF	>2	Moraceae	Wood		2.56	0.00
Drago	PB	4359	50	A	40-50	6.45	HF	>1	Rubiaceae	Seed	6		0.93
Drago	PB	4359	50	A	40-50	6.45	HF	>1	Rubiaceae Psychotria	Seed	5		0.78
Drago	PB	4359	50	A	40-50	6.45	HF	>1	Rubiaceae Psychotria	Seed	7		1.09
Drago	PB	4359	50	A	40-50	6.45	HF	>1	Unidentified	Seed	3		0.47
Drago	PB	4359	50	A	40-50	6.45	HF	>1	Arecaceae	Wood		0.05	0.00
Drago	PB	4359	50	A	40-50	6.45	HF	>1	Moraceae	Wood		0.62	0.00
Drago	PB	4359	50	A	40-50	6.45	HF	>0.5	Rubiaceae Coccocypselum	Seed	1		0.16
Drago	PB	4359	50	A	40-50	6.45	HF	>0.5	Unidentified	Seed	3		0.47
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Poaceae Zea mays	Kernel	6		0.35
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Poaceae Zea mays	Cupule	2		0.12
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Fabaceae Phaseolus	Seed	1		0.06
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Malpighiaceae Byrsonima crassifolia	Seed	5		0.29
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Xylopia Bocatorena	Seed	8		0.46
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Unidentified	Nutshell	9		0.52

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Unidentified	Seed	1		0.06
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Garcinia Intermedia	Seed	1		0.06
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Arecaceae	Wood		5.9	0.00
Drago	PB	4360	50	A	50-60	17.25	HF	>2	Moraceae	Wood		32.19	0.00
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.06
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Garcinia Intermedia	Seed	6		0.35
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Xylopia Bocatorena	Seed	7		0.41
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	12		0.70
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Rubiaceae Coccocypselum	Seed	11		0.64
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Rubiaceae Genipa americana	Seed	15		0.87
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Xylopia Bocatorena	Seed	12		0.70
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Poaceae Zea mays	Kernel	5		0.29
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Poaceae Zea mays	Cupule	7		0.41
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Unidentified	Nutshell	8		0.46
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Unidentified	Seed	2		0.12
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Arecaceae	Wood		2.37	0.00
Drago	PB	4360	50	A	50-60	17.25	HF	>1	Moraceae	Wood		10.39	0.00
Drago	PB	4360	50	A	50-60	17.25	HF	>0.5	Rubiaceae	Seed	8		0.46
Drago	PB	4360	50	A	50-60	17.25	HF	>0.5	Rubiaceae Psychotria	Seed	11		0.64
Drago	PB	4360	50	A	50-60	17.25	HF	>0.5	Arecaceae	Wood		0.05	0.00
Drago	PB	4360	50	A	50-60	17.25	HF	>0.5	Moraceae	Wood		0.38	0.00
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Myrcia Gatunensis	Seed	1		0.07
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Rubiaceae Genipa americana	Seed	5		0.37
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Rubiaceae	Seed	11		0.81
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Rubiaceae Coccocypselum	Seed	8		0.59
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Rubiaceae Psychotria	Seed	7		0.52
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Unidentified	Seed	3		0.22
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Poaceae Zea mays	Kernel	5		0.37

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Poaceae Zea mays	Cupule	6		0.44
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Unidentified	Seed	12		0.89
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Unidentified	Nutshell	1		0.07
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Arecaceae	Wood		4.3	0.00
Drago	PB	4361	50	A	60-70	13.5	HF	>2	Moraceae	Wood		17.99	0.00
Drago	PB	4361	50	A	60-70	13.5	HF	>1	Rubiaceae	Seed	14		1.04
Drago	PB	4361	50	A	60-70	13.5	HF	>1	Rubiaceae Psychotria	Seed	11		0.81
Drago	PB	4361	50	A	60-70	13.5	HF	>1	Rubiaceae Coccocypselum	Seed	13		0.96
Drago	PB	4361	50	A	60-70	13.5	HF	>1	Unidentified	Seed	1		0.07
Drago	PB	4361	50	A	60-70	13.5	HF	>1	Arecaceae	Wood		0.98	0.00
Drago	PB	4361	50	A	60-70	13.5	HF	>1	Moraceae	Wood		4.37	0.00
Drago	PB	4361	50	A	60-70	13.5	HF	>0.5	Rubiaceae	Seed	5		0.37
Drago	PB	4361	50	A	60-70	13.5	HF	>0.5	Rubiaceae Psychotria	Seed	4		0.30
Drago	PB	4361	50	A	60-70	13.5	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4361	50	A	60-70	13.5	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	H	4348	49	W	0-5	4.5	HF	>2	Myrcia Gatunensis	Seed	7		1.56
Drago	H	4348	49	W	0-5	4.5	HF	>2	Xylopia Bocatorena	Seed	4		0.89
Drago	H	4348	49	W	0-5	4.5	HF	>2	Apiaceae Eryngium foetidum	Seed	6		1.33
Drago	H	4348	49	W	0-5	4.5	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.22
Drago	H	4348	49	W	0-5	4.5	HF	>2	Rubiaceae Psychotria	Seed	1		0.22
Drago	H	4348	49	W	0-5	4.5	HF	>2	Moraceae	Wood		0.71	0.00
Drago	H	4348	49	W	0-5	4.5	HF	>1	Myrcia Gatunensis	Seed	16		3.56
Drago	H	4348	49	W	0-5	4.5	HF	>1	Apiaceae Eryngium foetidum	Seed	5		1.11
Drago	H	4348	49	W	0-5	4.5	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	6		1.33
Drago	H	4348	49	W	0-5	4.5	HF	>1	Rubiaceae Psychotria	Seed casing	8		1.78
Drago	H	4348	49	W	0-5	4.5	HF	>1	Xylopia Bocatorena	Seed casing	4		0.89
Drago	H	4348	49	W	0-5	4.5	HF	>1	Unidentified	Seed	3		0.67
Drago	H	4348	49	W	0-5	4.5	HF	>1	Arecaceae	Wood		0.04	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4348	49	W	0-5	4.5	HF	>1	Moraceae	Wood		0.27	0.00
Drago	H	4348	49	W	0-5	4.5	HF	>0.5	Myrcia Gatunensis	Seed	1		0.22
Drago	H	4348	49	W	0-5	4.5	HF	>0.5	Moraceae	Wood		0.09	0.00
Drago	H	4349	49	W	5-10	4.5	HF	>2	Myrcia Gatunensis	Seed	2		0.44
Drago	H	4349	49	W	5-10	4.5	HF	>2	Xylopia Bocatorena	Seed casing	1		0.22
Drago	H	4349	49	W	5-10	4.5	HF	>2	Rubiaceae Psychotria	Seed	3		0.67
Drago	H	4349	49	W	5-10	4.5	HF	>2	Unidentified	Seed casing	1		0.22
Drago	H	4349	49	W	5-10	4.5	HF	>2	Unidentified	Seed	1		0.22
Drago	H	4349	49	W	5-10	4.5	HF	>2	Arecaceae	Wood		0.05	0.00
Drago	H	4349	49	W	5-10	4.5	HF	>2	Moraceae	Wood		1.45	0.00
Drago	H	4349	49	W	5-10	4.5	HF	>1	Myrcia Gatunensis	Seed	12		2.67
Drago	H	4349	49	W	5-10	4.5	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	3		0.67
Drago	H	4349	49	W	5-10	4.5	HF	>1	Apiaceae Eryngium foetidum	Seed	5		1.11
Drago	H	4349	49	W	5-10	4.5	HF	>1	Rubiaceae Psychotria	Seed	3		0.67
Drago	H	4349	49	W	5-10	4.5	HF	>1	Unidentified	Nutshell	3		0.67
Drago	H	4349	49	W	5-10	4.5	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	H	4349	49	W	5-10	4.5	HF	>1	Moraceae	Wood		0.38	0.00
Drago	H	4349	49	W	5-10	4.5	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	H	4350	49	W	10-20	9	HF	>0.5	Apiaceae Eryngium foetidum	Seed	3		0.33
Drago	H	4350	49	W	10-20	9	HF	>0.5	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	H	4350	49	W	10-20	9	HF	>0.5	Moraceae	Wood		0.05	0.00
Drago	H	4351	49	W	20-27	6.3	HF	>2	Cecropia	Seed casing	1		0.16
Drago	H	4351	49	W	20-27	6.3	HF	>2	Rubiaceae Psychotria	Seed	1		0.16
Drago	H	4351	49	W	20-27	6.3	HF	>2	Unidentified	Nutshell	2		0.32
Drago	H	4351	49	W	20-27	6.3	HF	>2	Arecaceae	Wood		0.85	0.00
Drago	H	4351	49	W	20-27	6.3	HF	>2	Moraceae	Wood		2.61	0.00
Drago	H	4351	49	W	20-27	6.3	HF	>1	Myrcia Gatunensis	Seed	5		0.79
Drago	H	4351	49	W	20-27	6.3	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.16

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4351	49	W	20-27	6.3	HF	>1	Rubiaceae Psychotria	Seed	1		0.16
Drago	H	4351	49	W	20-27	6.3	HF	>1	Rubiaceae Genipa americana	Seed	1		0.16
Drago	H	4351	49	W	20-27	6.3	HF	>1	Cecropia	Seed casing	12		1.90
Drago	H	4351	49	W	20-27	6.3	HF	>1	Cecropia	Seed	3		0.48
Drago	H	4351	49	W	20-27	6.3	HF	>1	Poaceae Zea mays	Kernel	1		0.16
Drago	H	4351	49	W	20-27	6.3	HF	>1	Rubiaceae Psychotria	Seed	1		0.16
Drago	H	4351	49	W	20-27	6.3	HF	>1	Unidentified	Nutshell	3		0.48
Drago	H	4351	49	W	20-27	6.3	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	H	4351	49	W	20-27	6.3	HF	>1	Moraceae	Wood		0.56	0.00
Drago	H	4351	49	W	20-27	6.3	HF	>0.5	Cecropia	Seed casing	4		0.63
Drago	H	4351	49	W	20-27	6.3	HF	>0.5	Cecropia	Seed	9		1.43
Drago	H	4351	49	W	20-27	6.3	HF	>0.5	Garcinia Madruno	Seed	5		0.79
Drago	H	4351	49	W	20-27	6.3	HF	>0.5	Moraceae	Wood		0.08	0.00
Drago	B	4352	49	W	27-37	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	B	4352	49	W	27-37	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	B	4352	49	W	27-37	9	HF	>2	Xylopia Bocatorena	Seed	1		0.11
Drago	B	4352	49	W	27-37	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	B	4352	49	W	27-37	9	HF	>2	Unidentified	Nutshell	1		0.11
Drago	B	4352	49	W	27-37	9	HF	>2	Arecaceae	Wood		0.9	0.00
Drago	B	4352	49	W	27-37	9	HF	>2	Moraceae	Wood		1.19	0.00
Drago	B	4352	49	W	27-37	9	HF	>1	Myrcia Gatunensis	Seed	3		0.33
Drago	B	4352	49	W	27-37	9	HF	>1	Myrcia Gatunensis	Seed	2		0.22
Drago	B	4352	49	W	27-37	9	HF	>1	Cecropia	Seed casing	5		0.56
Drago	B	4352	49	W	27-37	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	B	4352	49	W	27-37	9	HF	>1	Rubiaceae Genipa americana	Seed	1		0.11
Drago	B	4352	49	W	27-37	9	HF	>1	Unidentified	Nutshell	7		0.78
Drago	B	4352	49	W	27-37	9	HF	>1	Poaceae Zea mays	Kernel	2		0.22
Drago	B	4352	49	W	27-37	9	HF	>1	Fabaceae Phaseolus vulgaris	Seed	3		0.33

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4352	49	W	27-37	9	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	B	4352	49	W	27-37	9	HF	>1	Moraceae	Wood		0.6	0.00
Drago	B	4352	49	W	27-37	9	HF	>0.5	Rubiaceae Psychotria	Seed	2		0.22
Drago	B	4352	49	W	27-37	9	HF	>0.5	Cecropia	Seed	6		0.67
Drago	B	4352	49	W	27-37	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4353	49	W	37-47	9	HF	>2	Poaceae Zea mays	Kernel	3		0.33
Drago	PB	4353	49	W	37-47	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4353	49	W	37-47	9	HF	>2	Unidentified	Seed	2		0.22
Drago	PB	4353	49	W	37-47	9	HF	>2	Moraceae	Wood		0.7	0.00
Drago	PB	4353	49	W	37-47	9	HF	>1	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4353	49	W	37-47	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	PB	4353	49	W	37-47	9	HF	>1	Unidentified	Nutshell	5		0.56
Drago	PB	4353	49	W	37-47	9	HF	>1	Unidentified	Seed	3		0.33
Drago	PB	4353	49	W	37-47	9	HF	>1	Moraceae	Wood		0.64	0.00
Drago	PB	4353	49	W	37-47	9	HF	>0.5	Cecropia	Seed	1		0.11
Drago	PB	4353	49	W	37-47	9	HF	>0.5	Cecropia	Seed casing	1		0.11
Drago	PB	4353	49	W	37-47	9	HF	>0.5	Moraceae	Wood		0.14	0.00
Drago	PB	4354	49	W	47-57	9	HF	>2	Unidentified	Seed	1		0.11
Drago	PB	4354	49	W	47-57	9	HF	>2	Unidentified	Seed casing	1		0.11
Drago	PB	4354	49	W	47-57	9	HF	>2	Unidentified	Nutshell	1		0.11
Drago	PB	4354	49	W	47-57	9	HF	>2	Moraceae	Wood		0.73	0.00
Drago	PB	4354	49	W	47-57	9	HF	>1	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4354	49	W	47-57	9	HF	>1	Cecropia	Seed casing	1		0.11
Drago	PB	4354	49	W	47-57	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	PB	4354	49	W	47-57	9	HF	>1	Xylopia Bocatorena	Seed	2		0.22
Drago	PB	4354	49	W	47-57	9	HF	>1	Unidentified	Seed	3		0.33
Drago	PB	4354	49	W	47-57	9	HF	>1	Moraceae	Wood		0.3	0.00
Drago	PB	4354	49	W	47-57	9	HF	>0.5	Myrcia Gatunensis	Seed	1		0.11

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4354	49	W	47-57	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4355	49	W	57-67	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4355	49	W	57-67	9	HF	>2	Rubiaceae Genipa americana	Seed	1		0.11
Drago	PB	4355	49	W	57-67	9	HF	>2	Unidentified	Nutshell	2		0.22
Drago	PB	4355	49	W	57-67	9	HF	>2	Unidentified	Seed	1		0.11
Drago	PB	4355	49	W	57-67	9	HF	>2	Moraceae	Wood		0.97	0.00
Drago	PB	4355	49	W	57-67	9	HF	>1	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4355	49	W	57-67	9	HF	>1	Rubiaceae	Seed	2		0.22
Drago	PB	4355	49	W	57-67	9	HF	>1	Unidentified	Seed	1		0.11
Drago	PB	4355	49	W	57-67	9	HF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4355	49	W	57-67	9	HF	>1	Moraceae	Wood		0.44	0.00
Drago	PB	4355	49	W	57-67	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4356	49	W	67-77	9	HF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	PB	4356	49	W	67-77	9	HF	>2	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4356	49	W	67-77	9	HF	>2	Arecaceae	Wood		0.78	0.00
Drago	PB	4356	49	W	67-77	9	HF	>2	Moraceae	Wood		0.99	0.00
Drago	PB	4356	49	W	67-77	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	PB	4356	49	W	67-77	9	HF	>1	Xylopia Bocatorena	Seed	1		0.11
Drago	PB	4356	49	W	67-77	9	HF	>1	Poaceae Zea mays	Kernel	2		0.22
Drago	PB	4356	49	W	67-77	9	HF	>1	Moraceae	Wood		0.33	0.00
Drago	PB	4356	49	W	67-77	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4357	49	W	77-87	9	HF	>2	Myrcia Gatunensis	Seed	3		0.33
Drago	PB	4357	49	W	77-87	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	PB	4357	49	W	77-87	9	HF	>2	Arecaceae	Wood		0.59	0.00
Drago	PB	4357	49	W	77-87	9	HF	>2	Moraceae	Wood		1.99	0.00
Drago	PB	4357	49	W	77-87	9	HF	>1	Xylopia Bocatorena	Seed	2		0.22
Drago	PB	4357	49	W	77-87	9	HF	>1	Cecropia	Seed casing	1		0.11
Drago	PB	4357	49	W	77-87	9	HF	>1	Unidentified	Fruit pit	1		0.11

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4357	49	W	77-87	9	HF	>1	Arecaceae	Wood		0.54	0.00
Drago	PB	4357	49	W	77-87	9	HF	>1	Moraceae	Wood		0.43	0.00
Drago	PB	4357	49	W	77-87	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4358	49	W	87-97	9	HF	>2	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	PB	4358	49	W	87-97	9	HF	>2	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4358	49	W	87-97	9	HF	>2	Arecaceae	Wood		0.9	0.00
Drago	PB	4358	49	W	87-97	9	HF	>2	Moraceae	Wood		1.16	0.00
Drago	PB	4358	49	W	87-97	9	HF	>1	Myrcia Gatunensis	Seed	2		0.22
Drago	PB	4358	49	W	87-97	9	HF	>1	Unidentified	Seed casing	1		0.11
Drago	PB	4358	49	W	87-97	9	HF	>1	Unidentified	Seed	1		0.11
Drago	PB	4358	49	W	87-97	9	HF	>1	Moraceae	Wood		0.06	0.00
Drago	PB	4358	49	W	87-97	9	HF	>0.5	Unidentified	Seed	1		0.11
Drago	H	4514	51	N	0-10	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	H	4514	51	N	0-10	9	HF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	H	4514	51	N	0-10	9	HF	>2	Unidentified	Nutshell	3		0.33
Drago	H	4514	51	N	0-10	9	HF	>2	Unidentified	Fruit pit	2		0.22
Drago	H	4514	51	N	0-10	9	HF	>2	Arecaceae	Wood		0.75	0.00
Drago	H	4514	51	N	0-10	9	HF	>2	Moraceae	Wood		1.86	0.00
Drago	H	4514	51	N	0-10	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed casing	22		2.44
Drago	H	4514	51	N	0-10	9	HF	>1	Rubiaceae	Seed	8		0.89
Drago	H	4514	51	N	0-10	9	HF	>1	Fabaceae Phaseolus vulgaris	Seed	2		0.22
Drago	H	4514	51	N	0-10	9	HF	>1	Poaceae Zea mays	Kernel	3		0.33
Drago	H	4514	51	N	0-10	9	HF	>1	Cecropia	Seed casing	5		0.56
Drago	H	4514	51	N	0-10	9	HF	>1	Xylopia Bocatorena	Seed	10		1.11
Drago	H	4514	51	N	0-10	9	HF	>1	Rubiaceae Psychotria	Seed	9		1.00
Drago	H	4514	51	N	0-10	9	HF	>1	Unidentified	Seed	7		0.78
Drago	H	4514	51	N	0-10	9	HF	>1	Unidentified	Nutshell	3		0.33
Drago	H	4514	51	N	0-10	9	HF	>1	Arecaceae	Wood		0.02	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4514	51	N	0-10	9	HF	>1	Moraceae	Wood		0.88	0.00
Drago	H	4514	51	N	0-10	9	HF	>0.5	Cecropia	Seed casing	1		0.11
Drago	H	4514	51	N	0-10	9	HF	>0.5	Xylopia Bocatorena	Seed	2		0.22
Drago	H	4514	51	N	0-10	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	H	4515	51	N	10-20	9	HF	>2	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	H	4515	51	N	10-20	9	HF	>2	Unidentified	Nutshell	3		0.33
Drago	H	4515	51	N	10-20	9	HF	>2	Unidentified	Seed	5		0.56
Drago	H	4515	51	N	10-20	9	HF	>2	Moraceae	Wood		3.86	0.00
Drago	H	4515	51	N	10-20	9	HF	>1	Rubiaceae Coccocypselum	Seed	2		0.22
Drago	H	4515	51	N	10-20	9	HF	>1	Rubiaceae	Seed	7		0.78
Drago	H	4515	51	N	10-20	9	HF	>1	Apiaceae Eryngium foetidum	Seed	3		0.33
Drago	H	4515	51	N	10-20	9	HF	>1	Unidentified	Nutshell	2		0.22
Drago	H	4515	51	N	10-20	9	HF	>1	Unidentified	Seed	8		0.89
Drago	H	4515	51	N	10-20	9	HF	>1	Moraceae	Wood		0.97	0.00
Drago	H	4515	51	N	10-20	9	HF	>0.5	Unidentified	Seed	2		0.22
Drago	H	4515	51	N	10-20	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	4516	51	N	20-30	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	B	4516	51	N	20-30	9	HF	>2	Xylopia Bocatorena	Seed	2		0.22
Drago	B	4516	51	N	20-30	9	HF	>2	Rubiaceae	Seed	5		0.56
Drago	B	4516	51	N	20-30	9	HF	>2	Unidentified	Seed	4		0.44
Drago	B	4516	51	N	20-30	9	HF	>2	Moraceae	Wood		7.93	0.00
Drago	B	4516	51	N	20-30	9	HF	>1	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	B	4516	51	N	20-30	9	HF	>1	Xylopia Bocatorena	Seed	5		0.56
Drago	B	4516	51	N	20-30	9	HF	>1	Rubiaceae Psychotria	Seed	3		0.33
Drago	B	4516	51	N	20-30	9	HF	>1	Poaceae Zea mays	Kernel	2		0.22
Drago	B	4516	51	N	20-30	9	HF	>1	Unidentified	Seed	8		0.89
Drago	B	4516	51	N	20-30	9	HF	>1	Arecaceae	Wood		1.73	0.00
Drago	B	4516	51	N	20-30	9	HF	>1	Moraceae	Wood		5.69	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4516	51	N	20-30	9	HF	>0.5	Arecaceae	Wood		0.06	0.00
Drago	B	4516	51	N	20-30	9	HF	>0.5	Moraceae	Wood		0.26	0.00
Drago	B	4517	51	N	30-42	10.8	HF	>2	Rubiaceae	Seed	2		0.19
Drago	B	4517	51	N	30-42	10.8	HF	>2	Unidentified	Fruit pit	1		0.09
Drago	B	4517	51	N	30-42	10.8	HF	>2	Unidentified	Seed	1		0.09
Drago	B	4517	51	N	30-42	10.8	HF	>2	Moraceae	Wood		1.17	0.00
Drago	B	4517	51	N	30-42	10.8	HF	>1	Unidentified	Seed	4		0.37
Drago	B	4517	51	N	30-42	10.8	HF	>1	Arecaceae	Wood		0.9	0.00
Drago	B	4517	51	N	30-42	10.8	HF	>1	Moraceae	Wood		0.35	0.00
Drago	B	4517	51	N	30-42	10.8	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4518	51	N	42-52	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	PB	4518	51	N	42-52	9	HF	>2	Xylopia Bocatorena	Seed	2		0.22
Drago	PB	4518	51	N	42-52	9	HF	>2	Unidentified	Seed	5		0.56
Drago	PB	4518	51	N	42-52	9	HF	>2	Arecaceae	Wood		1.12	0.00
Drago	PB	4518	51	N	42-52	9	HF	>2	Moraceae	Wood		4.03	0.00
Drago	PB	4518	51	N	42-52	9	HF	>1	Poaceae Zea mays	Kernel	5		0.56
Drago	PB	4518	51	N	42-52	9	HF	>1	Xylopia Bocatorena	Seed	4		0.44
Drago	PB	4518	51	N	42-52	9	HF	>1	Rubiaceae	Seed	6		0.67
Drago	PB	4518	51	N	42-52	9	HF	>1	Unidentified	Seed	2		0.22
Drago	PB	4518	51	N	42-52	9	HF	>1	Arecaceae	Wood		1.19	0.00
Drago	PB	4518	51	N	42-52	9	HF	>1	Moraceae	Wood		2.17	0.00
Drago	PB	4518	51	N	42-52	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4519	51	N	52-62	9	HF	>2	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4519	51	N	52-62	9	HF	>2	Xylopia Bocatorena	Seed	5		0.56
Drago	PB	4519	51	N	52-62	9	HF	>2	Unidentified	Seed	9		1.00
Drago	PB	4519	51	N	52-62	9	HF	>2	Arecaceae	Wood		3.78	0.00
Drago	PB	4519	51	N	52-62	9	HF	>2	Moraceae	Wood		6.92	0.00
Drago	PB	4519	51	N	52-62	9	HF	>1	Xylopia Bocatorena	Seed	8		0.89

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4519	51	N	52-62	9	HF	>1	Rubiaceae	Seed	5		0.56
Drago	PB	4519	51	N	52-62	9	HF	>1	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4519	51	N	52-62	9	HF	>1	Unidentified	Seed	2		0.22
Drago	PB	4519	51	N	52-62	9	HF	>1	Arecaceae	Wood		1.1	0.00
Drago	PB	4519	51	N	52-62	9	HF	>1	Moraceae	Wood		2.22	0.00
Drago	PB	4519	51	N	52-62	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4520	51	N	62-72	9	HF	>2	Xylopia Bocatorena	Seed	3		0.33
Drago	PB	4520	51	N	62-72	9	HF	>2	Rubiaceae	Seed	2		0.22
Drago	PB	4520	51	N	62-72	9	HF	>2	Unidentified	Seed	9		1.00
Drago	PB	4520	51	N	62-72	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	PB	4520	51	N	62-72	9	HF	>2	Arecaceae	Wood		2.1	0.00
Drago	PB	4520	51	N	62-72	9	HF	>2	Moraceae	Wood		11.6	0.00
Drago	PB	4520	51	N	62-72	9	HF	>1	Rubiaceae	Seed	9		1.00
Drago	PB	4520	51	N	62-72	9	HF	>1	Xylopia Bocatorena	Seed	7		0.78
Drago	PB	4520	51	N	62-72	9	HF	>1	Poaceae Zea mays	Kernel	3		0.33
Drago	PB	4520	51	N	62-72	9	HF	>1	Unidentified	Seed	2		0.22
Drago	PB	4520	51	N	62-72	9	HF	>1	Arecaceae	Wood		0.96	0.00
Drago	PB	4520	51	N	62-72	9	HF	>1	Moraceae	Wood		2.46	0.00
Drago	PB	4520	51	N	62-72	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4521	51	N	72-82	9	HF	>2	Xylopia Bocatorena	Seed	2		0.22
Drago	PB	4521	51	N	72-82	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	PB	4521	51	N	72-82	9	HF	>2	Poaceae Zea mays	Kernel	2		0.22
Drago	PB	4521	51	N	72-82	9	HF	>2	Unidentified	Seed	2		0.22
Drago	PB	4521	51	N	72-82	9	HF	>2	Arecaceae	Wood		1.95	0.00
Drago	PB	4521	51	N	72-82	9	HF	>2	Moraceae	Wood		7.88	0.00
Drago	PB	4521	51	N	72-82	9	HF	>1	Xylopia Bocatorena	Seed	8		0.89
Drago	PB	4521	51	N	72-82	9	HF	>1	Rubiaceae Coccocypselum	Seed	3		0.33
Drago	PB	4521	51	N	72-82	9	HF	>1	Rubiaceae	Seed	5		0.56

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4521	51	N	72-82	9	HF	>1	Unidentified	Seed	3		0.33
Drago	PB	4521	51	N	72-82	9	HF	>1	Arecaceae	Wood		0.86	0.00
Drago	PB	4521	51	N	72-82	9	HF	>1	Moraceae	Wood		2.19	0.00
Drago	PB	4521	51	N	72-82	9	HF	>0.5	Unidentified	Seed	3		0.33
Drago	PB	4521	51	N	72-82	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4522	51	N	82-92	9	HF	>2	Unidentified	Fruit pit	3		0.33
Drago	PB	4522	51	N	82-92	9	HF	>2	Rubiaceae	Seed	3		0.33
Drago	PB	4522	51	N	82-92	9	HF	>2	Xylopia Bocatorena	Seed	6		0.67
Drago	PB	4522	51	N	82-92	9	HF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	PB	4522	51	N	82-92	9	HF	>2	Rubiaceae Coccocypselum	Seed	2		0.22
Drago	PB	4522	51	N	82-92	9	HF	>2	Unidentified	Seed	8		0.89
Drago	PB	4522	51	N	82-92	9	HF	>2	Arecaceae	Wood		1.96	0.00
Drago	PB	4522	51	N	82-92	9	HF	>2	Moraceae	Wood		7.73	0.00
Drago	PB	4522	51	N	82-92	9	HF	>1	Unidentified	Nutshell	2		0.22
Drago	PB	4522	51	N	82-92	9	HF	>1	Fabaceae Phaseolus vulgaris	Seed	3		0.33
Drago	PB	4522	51	N	82-92	9	HF	>1	Poaceae Zea mays	Kernel	6		0.67
Drago	PB	4522	51	N	82-92	9	HF	>1	Poaceae Zea mays	Cupule	4		0.44
Drago	PB	4522	51	N	82-92	9	HF	>1	Rubiaceae Coccocypselum	Seed	7		0.78
Drago	PB	4522	51	N	82-92	9	HF	>1	Xylopia Bocatorena	Seed	16		1.78
Drago	PB	4522	51	N	82-92	9	HF	>1	Rubiaceae	Seed	15		1.67
Drago	PB	4522	51	N	82-92	9	HF	>1	Rubiaceae Genipa americana	Seed	3		0.33
Drago	PB	4522	51	N	82-92	9	HF	>1	Unidentified	Seed	8		0.89
Drago	PB	4522	51	N	82-92	9	HF	>1	Arecaceae	Wood		0.9	0.00
Drago	PB	4522	51	N	82-92	9	HF	>1	Moraceae	Wood		2.3	0.00
Drago	PB	4522	51	N	82-92	9	HF	>0.5	Unidentified	Seed	3		0.33
Drago	PB	4522	51	N	82-92	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4523	51	N	92-102	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	5		0.56
Drago	PB	4523	51	N	92-102	9	HF	>2	Poaceae Zea mays	Kernel	2		0.22

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4523	51	N	92-102	9	HF	>2	Poaceae Zea mays	Cupule	5		0.56
Drago	PB	4523	51	N	92-102	9	HF	>2	Rubiaceae	Seed	2		0.22
Drago	PB	4523	51	N	92-102	9	HF	>2	Xylopia Bocatorena	Seed	8		0.89
Drago	PB	4523	51	N	92-102	9	HF	>2	Unidentified	Seed	3		0.33
Drago	PB	4523	51	N	92-102	9	HF	>2	Rubiaceae Coccocypselum	Seed	4		0.44
Drago	PB	4523	51	N	92-102	9	HF	>2	Rubiaceae Genipa americana	Seed	1		0.11
Drago	PB	4523	51	N	92-102	9	HF	>2	Arecaceae	Wood		1.56	0.00
Drago	PB	4523	51	N	92-102	9	HF	>2	Moraceae	Wood		7.12	0.00
Drago	PB	4523	51	N	92-102	9	HF	>1	Rubiaceae Genipa americana	Seed	3		0.33
Drago	PB	4523	51	N	92-102	9	HF	>1	Poaceae Zea mays	Cupule	5		0.56
Drago	PB	4523	51	N	92-102	9	HF	>1	Poaceae Zea mays	Kernel	4		0.44
Drago	PB	4523	51	N	92-102	9	HF	>1	Rubiaceae	Seed	7		0.78
Drago	PB	4523	51	N	92-102	9	HF	>1	Xylopia Bocatorena	Seed	9		1.00
Drago	PB	4523	51	N	92-102	9	HF	>1	Unidentified	Seed	9		1.00
Drago	PB	4523	51	N	92-102	9	HF	>1	Arecaceae	Wood		0.38	0.00
Drago	PB	4523	51	N	92-102	9	HF	>1	Moraceae	Wood		2.11	0.00
Drago	PB	4523	51	N	92-102	9	HF	>0.5	Rubiaceae Psychotria	Seed	2		0.22
Drago	PB	4523	51	N	92-102	9	HF	>0.5	Unidentified	Seed	1		0.11
Drago	PB	4523	51	N	92-102	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4363	51	A	102-112	9	HF	>2	Unidentified	Seed	1		0.11
Drago	PB	4363	51	A	102-112	9	HF	>2	Unidentified	Seed	1		0.11
Drago	PB	4363	51	A	102-112	9	HF	>2	Unidentified	Nutshell	3		0.33
Drago	PB	4363	51	A	102-112	9	HF	>2	Xylopia Bocatorena	Seed	1		0.11
Drago	PB	4363	51	A	102-112	9	HF	>2	Moraceae	Wood		0.36	0.00
Drago	PB	4363	51	A	102-112	9	HF	>1	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	4363	51	A	102-112	9	HF	>1	Rubiaceae Coccocypselum	Seed	2		0.22
Drago	PB	4363	51	A	102-112	9	HF	>1	Rubiaceae Genipa americana	Seed	3		0.33
Drago	PB	4363	51	A	102-112	9	HF	>1	Unidentified	Seed	6		0.67

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4363	51	A	102-112	9	HF	>1	Arecaceae	Wood		0.07	0.00
Drago	PB	4363	51	A	102-112	9	HF	>1	Moraceae	Wood		0.22	0.00
Drago	PB	4363	51	A	102-112	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4363	51	A	102-112	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4364	51	A	112-122	9	HF	>2	Rubiaceae	Seed	5		0.56
Drago	PB	4364	51	A	112-122	9	HF	>2	Unidentified	Seed	8		0.89
Drago	PB	4364	51	A	112-122	9	HF	>2	Unidentified	Nutshell	3		0.33
Drago	PB	4364	51	A	112-122	9	HF	>2	Arecaceae	Wood		1.82	0.00
Drago	PB	4364	51	A	112-122	9	HF	>2	Moraceae	Wood		4.29	0.00
Drago	PB	4364	51	A	112-122	9	HF	>1	Poaceae Zea mays	Kernel	9		1.00
Drago	PB	4364	51	A	112-122	9	HF	>1	Poaceae Zea mays	Cupule	5		0.56
Drago	PB	4364	51	A	112-122	9	HF	>1	Rubiaceae Genipa americana	Seed	8		0.89
Drago	PB	4364	51	A	112-122	9	HF	>1	Unidentified	Seed	2		0.22
Drago	PB	4364	51	A	112-122	9	HF	>1	Arecaceae	Wood		0.93	0.00
Drago	PB	4364	51	A	112-122	9	HF	>1	Moraceae	Wood		1.72	0.00
Drago	PB	4364	51	A	112-122	9	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4364	51	A	112-122	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	H	4504	51	S	0-10	9	HF	>2	Unidentified	Seed	5		0.56
Drago	H	4504	51	S	0-10	9	HF	>2	Unidentified	Seed	1		0.11
Drago	H	4504	51	S	0-10	9	HF	>2	Moraceae	Wood		1.33	0.00
Drago	H	4504	51	S	0-10	9	HF	>1	Unidentified	Seed	1		0.11
Drago	H	4504	51	S	0-10	9	HF	>1	Cecropia	Seed	7		0.78
Drago	H	4504	51	S	0-10	9	HF	>1	Unidentified	Seed casing	6		0.67
Drago	H	4504	51	S	0-10	9	HF	>1	Arecaceae	Wood		0.08	0.00
Drago	H	4504	51	S	0-10	9	HF	>1	Moraceae	Wood		0.85	0.00
Drago	H	4504	51	S	0-10	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	H	4505	51	S	10-20	9	HF	>2	Unidentified	Seed	2		0.22
Drago	H	4505	51	S	10-20	9	HF	>2	Malpighiaceae Byrsonima crassifolia	Seed casing	1		0.11

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4505	51	S	10-20	9	HF	>2	Unidentified	Seed casing	1		0.11
Drago	H	4505	51	S	10-20	9	HF	>2	Arecaceae	Wood		0.94	0.00
Drago	H	4505	51	S	10-20	9	HF	>2	Moraceae	Wood		2.27	0.00
Drago	H	4505	51	S	10-20	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed casing	4		0.44
Drago	H	4505	51	S	10-20	9	HF	>1	Unidentified	Seed	3		0.33
Drago	H	4505	51	S	10-20	9	HF	>1	Rubiaceae Psychotria	Seed	1		0.11
Drago	H	4505	51	S	10-20	9	HF	>1	Rubiaceae Genipa americana	Seed	5		0.56
Drago	H	4505	51	S	10-20	9	HF	>1	Unidentified	Seed	2		0.22
Drago	H	4505	51	S	10-20	9	HF	>1	Arecaceae	Wood		0.04	0.00
Drago	H	4505	51	S	10-20	9	HF	>1	Moraceae	Wood		0.67	0.00
Drago	H	4505	51	S	10-20	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	4506	51	S	20-30	9	HF	>2	Poaceae Zea mays	Kernel	2		0.22
Drago	B	4506	51	S	20-30	9	HF	>2	Unidentified	Seed	2		0.22
Drago	B	4506	51	S	20-30	9	HF	>2	Arecaceae	Wood		2.1	0.00
Drago	B	4506	51	S	20-30	9	HF	>2	Moraceae	Wood		5.68	0.00
Drago	B	4506	51	S	20-30	9	HF	>1	Rubiaceae Genipa americana	Seed	7		0.78
Drago	B	4506	51	S	20-30	9	HF	>1	Unidentified	Seed	1		0.11
Drago	B	4506	51	S	20-30	9	HF	>1	Poaceae Zea mays	Cupule	1		0.11
Drago	B	4506	51	S	20-30	9	HF	>1	Fabaceae Phaseolus vulgaris	Seed	2		0.22
Drago	B	4506	51	S	20-30	9	HF	>1	Arecaceae	Wood		0.78	0.00
Drago	B	4506	51	S	20-30	9	HF	>1	Moraceae	Wood		1.16	0.00
Drago	B	4506	51	S	20-30	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	4507	51	S	30-42	10.8	HF	>2	Rubiaceae Coccocypselum	Seed	2		0.19
Drago	B	4507	51	S	30-42	10.8	HF	>2	Boraginaceae Cordia spinescens	Seed	1		0.09
Drago	B	4507	51	S	30-42	10.8	HF	>2	Garcinia Intermedia	Seed	3		0.28
Drago	B	4507	51	S	30-42	10.8	HF	>2	Rubiaceae	Seed	5		0.46
Drago	B	4507	51	S	30-42	10.8	HF	>2	Poaceae Zea mays	Kernel	2		0.19
Drago	B	4507	51	S	30-42	10.8	HF	>2	Arecaceae	Wood		2.05	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4507	51	S	30-42	10.8	HF	>2	Moraceae	Wood		11.89	0.00
Drago	B	4507	51	S	30-42	10.8	HF	>1	Poaceae Zea mays	Kernel	2		0.19
Drago	B	4507	51	S	30-42	10.8	HF	>1	Poaceae Zea mays	Cupule	1		0.09
Drago	B	4507	51	S	30-42	10.8	HF	>1	Xylopia Bocatorena	Seed	3		0.28
Drago	B	4507	51	S	30-42	10.8	HF	>1	Rubiaceae Coccocypselum	Seed	5		0.46
Drago	B	4507	51	S	30-42	10.8	HF	>1	Rubiaceae	Seed	6		0.56
Drago	B	4507	51	S	30-42	10.8	HF	>1	Arecaceae	Wood		0.35	0.00
Drago	B	4507	51	S	30-42	10.8	HF	>1	Moraceae	Wood		1.59	0.00
Drago	B	4507	51	S	30-42	10.8	HF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	B	4507	51	S	30-42	10.8	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4508	51	S	42-52	9	HF	>2	Xylopia Bocatorena	Seed	4		0.44
Drago	PB	4508	51	S	42-52	9	HF	>2	Rubiaceae Coccocypselum	Seed	2		0.22
Drago	PB	4508	51	S	42-52	9	HF	>2	Poaceae Zea mays	Kernel	2		0.22
Drago	PB	4508	51	S	42-52	9	HF	>2	Unidentified	Seed	2		0.22
Drago	PB	4508	51	S	42-52	9	HF	>2	Moraceae	Wood		3.45	0.00
Drago	PB	4508	51	S	42-52	9	HF	>1	Poaceae Zea mays	Kernel	1		0.11
Drago	PB	4508	51	S	42-52	9	HF	>1	Xylopia Bocatorena	Seed	1		0.11
Drago	PB	4508	51	S	42-52	9	HF	>1	Rubiaceae Coccocypselum	Seed	4		0.44
Drago	PB	4508	51	S	42-52	9	HF	>1	Unidentified	Seed	3		0.33
Drago	PB	4508	51	S	42-52	9	HF	>1	Moraceae	Wood		1.59	0.00
Drago	PB	4508	51	S	42-52	9	HF	>0.5	Unidentified	Seed	1		0.11
Drago	PB	4508	51	S	42-52	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4509	51	S	52-62	9	HF	>2	Rubiaceae	Seed	3		0.33
Drago	PB	4509	51	S	52-62	9	HF	>2	Moraceae	Wood		2.96	0.00
Drago	PB	4509	51	S	52-62	9	HF	>1	Xylopia Bocatorena	Seed	1		0.11
Drago	PB	4509	51	S	52-62	9	HF	>1	Malpighiaceae Byrsonima crassifolia	Seed casing	1		0.11
Drago	PB	4509	51	S	52-62	9	HF	>1	Unidentified	Seed	2		0.22
Drago	PB	4509	51	S	52-62	9	HF	>1	Moraceae	Wood		1.2	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4509	51	S	52-62	9	HF	>0.5	Unidentified	Seed	2		0.22
Drago	PB	4509	51	S	52-62	9	HF	>0.5	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4509	51	S	52-62	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4510	51	S	62-72	9	HF	>2	Xylopia Bocatorena	Seed	3		0.33
Drago	PB	4510	51	S	62-72	9	HF	>2	Rubiaceae	Seed	1		0.11
Drago	PB	4510	51	S	62-72	9	HF	>2	Rubiaceae Genipa americana	Seed	3		0.33
Drago	PB	4510	51	S	62-72	9	HF	>2	Moraceae	Wood		1.93	0.00
Drago	PB	4510	51	S	62-72	9	HF	>1	Unidentified	Seed	3		0.33
Drago	PB	4510	51	S	62-72	9	HF	>1	Moraceae	Wood		0.71	0.00
Drago	PB	4510	51	S	62-72	9	HF	>0.5	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4510	51	S	62-72	9	HF	>0.5	Unidentified	Seed	5		0.56
Drago	PB	4510	51	S	62-72	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4511	51	S	72-82	9	HF	>2	Rubiaceae Genipa americana	Seed	5		0.56
Drago	PB	4511	51	S	72-82	9	HF	>2	Unidentified	Seed	6		0.67
Drago	PB	4511	51	S	72-82	9	HF	>2	Unidentified	Nutshell	1		0.11
Drago	PB	4511	51	S	72-82	9	HF	>2	Moraceae	Wood		10.22	0.00
Drago	PB	4511	51	S	72-82	9	HF	>1	Poaceae Zea mays	Kernel	5		0.56
Drago	PB	4511	51	S	72-82	9	HF	>1	Rubiaceae Genipa americana	Seed	6		0.67
Drago	PB	4511	51	S	72-82	9	HF	>1	Unidentified	Seed	1		0.11
Drago	PB	4511	51	S	72-82	9	HF	>1	Moraceae	Wood		1.18	0.00
Drago	PB	4511	51	S	72-82	9	HF	>0.5	Rubiaceae Psychotria	Seed	7		0.78
Drago	PB	4511	51	S	72-82	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4512	51	S	82-92	9	HF	>2	Unidentified	Nutshell	1		0.11
Drago	PB	4512	51	S	82-92	9	HF	>2	Poaceae Zea mays	Kernel	5		0.56
Drago	PB	4512	51	S	82-92	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	PB	4512	51	S	82-92	9	HF	>2	Rubiaceae Genipa americana	Seed	2		0.22
Drago	PB	4512	51	S	82-92	9	HF	>2	Unidentified	Seed	2		0.22
Drago	PB	4512	51	S	82-92	9	HF	>2	Moraceae	Wood		4.71	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4512	51	S	82-92	9	HF	>1	Rubiaceae Genipa americana	Seed	9		1.00
Drago	PB	4512	51	S	82-92	9	HF	>1	Rubiaceae	Seed	3		0.33
Drago	PB	4512	51	S	82-92	9	HF	>1	Rubiaceae Coccocypselum	Seed	2		0.22
Drago	PB	4512	51	S	82-92	9	HF	>1	Moraceae	Wood		1.74	0.00
Drago	PB	4512	51	S	82-92	9	HF	>0.5	Unidentified	Seed	1		0.11
Drago	PB	4512	51	S	82-92	9	HF	>0.5	Rubiaceae Psychotria	Seed	7		0.78
Drago	PB	4512	51	S	82-92	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4513	51	S	92-102	9	HF	>2	Unidentified	Fruit pit	2		0.22
Drago	PB	4513	51	S	92-102	9	HF	>2	Unidentified	Nutshell	5		0.56
Drago	PB	4513	51	S	92-102	9	HF	>2	Rubiaceae Genipa americana	Seed	6		0.67
Drago	PB	4513	51	S	92-102	9	HF	>2	Unidentified	Seed	9		1.00
Drago	PB	4513	51	S	92-102	9	HF	>2	Moraceae	Wood		4.51	0.00
Drago	PB	4513	51	S	92-102	9	HF	>1	Unidentified	Stem	1		0.11
Drago	PB	4513	51	S	92-102	9	HF	>1	Rubiaceae Genipa americana	Seed	3		0.33
Drago	PB	4513	51	S	92-102	9	HF	>1	Rubiaceae	Seed	7		0.78
Drago	PB	4513	51	S	92-102	9	HF	>1	Rubiaceae Coccocypselum	Seed	8		0.89
Drago	PB	4513	51	S	92-102	9	HF	>1	Moraceae	Wood		2.17	0.00
Drago	PB	4513	51	S	92-102	9	HF	>0.5	Rubiaceae Psychotria	Seed	4		0.44
Drago	PB	4513	51	S	92-102	9	HF	>0.5	Moraceae	Wood		0.01	0.00
Teca	PB	5003	ST1	F	10-20	100	HF	>2	Unidentified	Nutshell	1		0.01
Teca	PB	5003	ST1	F	10-20	100	HF	>2	Rubiaceae Genipa americana	Seed	3		0.03
Teca	PB	5003	ST1	F	10-20	100	HF	>2	Moraceae	Wood		2.12	0.00
Teca	PB	5003	ST1	F	10-20	100	HF	>1	Rubiaceae Genipa americana	Seed	1		0.01
Teca	PB	5003	ST1	F	10-20	100	HF	>1	Unidentified	Seed	5		0.05
Teca	PB	5003	ST1	F	10-20	100	HF	>1	Moraceae	Wood		1.73	0.00
Teca	PB	5003	ST1	F	10-20	100	HF	>0.5	Rubiaceae Psychotria	Seed	1		0.01
Drago	B	5689	61	SE	10-20	9	HF	>2	Arecaceae	Wood		0.03	0.00
Drago	B	5689	61	SE	10-20	9	HF	>2	Moraceae	Wood		0.84	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	5689	61	SE	10-20	9	HF	>2	Poaceae Zea mays	Cupule	2		0.22
Drago	B	5689	61	SE	10-20	9	HF	>2	Poaceae Zea mays	Kernel	26		2.89
Drago	B	5689	61	SE	10-20	9	HF	>2	Sapotaceae Manilkara zapota	Seed	5		0.56
Drago	B	5689	61	SE	10-20	9	HF	>2	Garcinia Madruno	Seed	4		0.44
Drago	B	5690	61	SE	20-30	9	HF	>2	Arecaceae	Wood		0.21	0.00
Drago	B	5690	61	SE	20-30	9	HF	>2	Moraceae	Wood		3.14	0.00
Drago	B	5690	61	SE	20-30	9	HF	>2	Poaceae Zea mays	Cupule	5		0.56
Drago	B	5690	61	SE	20-30	9	HF	>2	Poaceae Zea mays	Kernel	12		1.33
Drago	B	5690	61	SE	20-30	9	HF	>2	Sapotaceae Manilkara zapota	Seed	27		3.00
Drago	B	5690	61	SE	20-30	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	3		0.33
Drago	B	5690	61	SE	20-30	9	HF	>2	Garcinia Madruno	Seed	5		0.56
Drago	B	5690	61	SE	20-30	9	HF	>2	Unidentified	Fruit pit	3		0.33
Drago	B	5691	61	SE	30-40	9	HF	>2	Arecaceae	Wood		1.71	0.00
Drago	B	5691	61	SE	30-40	9	HF	>2	Moraceae	Wood		4.81	0.00
Drago	B	5691	61	SE	30-40	9	HF	>2	Poaceae Zea mays	Cupule	3		0.33
Drago	B	5691	61	SE	30-40	9	HF	>2	Poaceae Zea mays	Kernel	15		1.67
Drago	B	5691	61	SE	30-40	9	HF	>2	Sapotaceae Manilkara zapota	Seed	4		0.44
Drago	B	5691	61	SE	30-40	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	3		0.33
Drago	B	5691	61	SE	30-40	9	HF	>2	Unidentified	Fruit pit	2		0.22
Drago	B	5691	61	SE	30-40	9	HF	>2	Unidentified	Sugary tissue	1		0.11
Drago	B	5691	61	SE	30-40	9	HF	>2	Malpighiaceae Byrsonima crassifolia	Endocarp	2		0.22
Drago	B	5691	61	SE	30-40	9	HF	>2	Garcinia Madruno	Seed	8		0.89
Drago	PB	5692	61	SE	40-50	9	HF	>2	Arecaceae	Wood		0.6	0.00
Drago	PB	5692	61	SE	40-50	9	HF	>2	Moraceae	Wood		2.68	0.00
Drago	PB	5692	61	SE	40-50	9	HF	>2	Fabaceae Zygia longifolia	Seed	1		0.11
Drago	PB	5692	61	SE	40-50	9	HF	>2	Poaceae Zea mays	Cupule	2		0.22
Drago	PB	5692	61	SE	40-50	9	HF	>2	Poaceae Zea mays	Kernel	14		1.56
Drago	PB	5692	61	SE	40-50	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	5692	61	SE	40-50	9	HF	>2	Rubiaceae Randia armata	Seed	2		0.22
Drago	PB	5692	61	SE	40-50	9	HF	>2	Rubiaceae Genipa	Seed	5		0.56
Drago	PB	5692	61	SE	40-50	9	HF	>2	Polygonaceae Monnina	Seed	3		0.33
Drago	PB	5693	61	SE	50-60	9	HF	>2	Arecaceae	Wood		0.83	0.00
Drago	PB	5693	61	SE	50-60	9	HF	>2	Moraceae	Wood		3.43	0.00
Drago	PB	5693	61	SE	50-60	9	HF	>2	Poaceae Zea mays	Kernel	16		1.78
Drago	PB	5693	61	SE	50-60	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	PB	5693	61	SE	50-60	9	HF	>2	Rubiaceae Genipa	Seed	2		0.22
Drago	PB	5693	61	SE	50-60	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	5693	61	SE	50-60	9	HF	>2	Unidentified	Unknown	3		0.33
Drago	PB	5693	61	SE	50-60	9	HF	>2	Unidentified	Nutshell	2		0.22
Drago	PB	5694	61	SE	60-70	9	HF	>2	Arecaceae	Wood		0.88	0.00
Drago	PB	5694	61	SE	60-70	9	HF	>2	Moraceae	Wood		4.34	0.00
Drago	PB	5694	61	SE	60-70	9	HF	>2	Poaceae Zea mays	Cupule	4		0.44
Drago	PB	5694	61	SE	60-70	9	HF	>2	Poaceae Zea mays	Kernel	24		2.67
Drago	PB	5694	61	SE	60-70	9	HF	>2	Malpighiaceae Byrsonima crassifolia	Endocarp	1		0.11
Drago	PB	5694	61	SE	60-70	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	PB	5694	61	SE	60-70	9	HF	>2	Rubiaceae Genipa	Seed	3		0.33
Drago	PB	5694	61	SE	60-70	9	HF	>2	Unidentified	Seed	5		0.56
Drago	PB	5695	61	SE	70-80	9	HF	>2	Arecaceae	Wood		1.47	0.00
Drago	PB	5695	61	SE	70-80	9	HF	>2	Moraceae	Wood		4.97	0.00
Drago	PB	5695	61	SE	70-80	9	HF	>2	Poaceae Zea mays	Cupule	2		0.22
Drago	PB	5695	61	SE	70-80	9	HF	>2	Poaceae Zea mays	Kernel	23		2.56
Drago	PB	5695	61	SE	70-80	9	HF	>2	Sapotaceae Manilkara zapota	Seed	5		0.56
Drago	PB	5695	61	SE	70-80	9	HF	>2	Unidentified	Endocarp	1		0.11
Drago	PB	5695	61	SE	70-80	9	HF	>2	Unidentified	Seed	7		0.78
Drago	PB	5696	61	SE	80-90	9	HF	>2	Arecaceae	Wood		0.21	0.00
Drago	PB	5696	61	SE	80-90	9	HF	>2	Moraceae	Wood		3.38	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	5696	61	SE	80-90	9	HF	>2	Poaceae Zea mays	Cupule	1		0.11
Drago	PB	5696	61	SE	80-90	9	HF	>2	Poaceae Zea mays	Kernel	18		2.00
Drago	PB	5696	61	SE	80-90	9	HF	>2	Arecaceae Astrocaryum standleyanum	Fruit pit	1		0.11
Drago	PB	5696	61	SE	80-90	9	HF	>2	Rubiaceae Genipa	Seed	2		0.22
Drago	PB	5696	61	SE	80-90	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	5696	61	SE	80-90	9	HF	>2	Sapotaceae Manilkara zapota	Seed	3		0.33
Drago	PB	5696	61	SE	80-90	9	HF	>2	Solanaceae	Seed	4		0.44
Drago	PB	5696	61	SE	80-90	9	HF	>2	Unidentified	Seed	2		0.22
Drago	PB	5697	61	SE	90-100	9	HF	>2	Arecaceae	Wood		0.48	0.00
Drago	PB	5697	61	SE	90-100	9	HF	>2	Moraceae	Wood		3.08	0.00
Drago	PB	5697	61	SE	90-100	9	HF	>2	Poaceae Zea mays	Kernel	7		0.78
Drago	PB	5697	61	SE	90-100	9	HF	>2	Rubiaceae Genipa	Seed	2		0.22
Drago	PB	5697	61	SE	90-100	9	HF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	5697	61	SE	90-100	9	HF	>2	Sapotaceae Manilkara zapota	Seed coat	5		0.56
Drago	PB	5697	61	SE	90-100	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	PB	5697	61	SE	90-100	9	HF	>2	Unidentified	Endocarp	3		0.33
Drago	PB	5697	61	SE	90-100	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	PB	5697	61	SE	90-100	9	HF	>2	Unidentified	Seed	8		0.89
Drago	PB	5671	60	SW	10-20	9	HF	>2	Arecaceae	Wood		0.19	0.00
Drago	B	5671	60	SW	10-20	9	HF	>2	Moraceae	Wood		2.05	0.00
Drago	B	5671	60	SW	10-20	9	HF	>2	Poaceae Zea mays	Cupule	2		0.22
Drago	B	5671	60	SW	10-20	9	HF	>2	Poaceae Zea mays	Kernel	22		2.44
Drago	B	5671	60	SW	10-20	9	HF	>2	Rubiaceae	Seed	6		0.67
Drago	B	5671	60	SW	10-20	9	HF	>2	Sapotaceae	Seed coat	3		0.33
Drago	B	5671	60	SW	10-20	9	HF	>2	Rubiaceae Psychotria	Seed	4		0.44
Drago	B	5671	60	SW	10-20	9	HF	>2	Rubiaceae Randia armata	Seed	1		0.11
Drago	B	5671	60	SW	10-20	9	HF	>2	Unidentified	Seed	7		0.78
Drago	B	5672	60	SW	20-30	9	HF	>2	Arecaceae	Wood		1.2	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	5672	60	SW	20-30	9	HF	>2	Moraceae	Wood		4.79	0.00
Drago	B	5672	60	SW	20-30	9	HF	>2	Poaceae Zea mays	Cupule	1		0.11
Drago	B	5672	60	SW	20-30	9	HF	>2	Poaceae Zea mays	Kernel	18		2.00
Drago	B	5672	60	SW	20-30	9	HF	>2	Sapotaceae	Seed coat	11		1.22
Drago	B	5672	60	SW	20-30	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	B	5672	60	SW	20-30	9	HF	>2	Araliaceae Dendropanax arboreus	Seed	7		0.78
Drago	B	5672	60	SW	20-30	9	HF	>2	Rubiaceae Psychotria	Seed	5		0.56
Drago	B	5672	60	SW	20-30	9	HF	>2	Rubiaceae Coccocypselum	Seed	8		0.89
Drago	B	5672	60	SW	20-30	9	HF	>2	Rubiaceae Randia armata	Seed	3		0.33
Drago	B	5672	60	SW	20-30	9	HF	>2	Unidentified	Seed	5		0.56
Drago	B	5672	60	SW	20-30	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	B	5673	60	SW	30-40	9	HF	>2	Arecaceae	Wood		0.66	0.00
Drago	B	5673	60	SW	30-40	9	HF	>2	Moraceae	Wood		8.31	0.00
Drago	B	5673	60	SW	30-40	9	HF	>2	Poaceae Zea mays	Kernel	15		1.67
Drago	B	5673	60	SW	30-40	9	HF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	B	5673	60	SW	30-40	9	HF	>2	Fabaceae Phaseolus	Seed	2		0.22
Drago	B	5673	60	SW	30-40	9	HF	>2	Araliaceae Dendropanax arboreus	Seed	6		0.67
Drago	B	5673	60	SW	30-40	9	HF	>2	Rubiaceae Coccocypselum	Seed	2		0.22
Drago	B	5673	60	SW	30-40	9	HF	>2	Poaceae Zea mays	Cupule	1		0.11
Drago	B	5673	60	SW	30-40	9	HF	>2	Palmae Bactris	Endocarp	1		0.11
Drago	B	5673	60	SW	30-40	9	HF	>2	Solanaceae	Seed	4		0.44
Drago	B	5673	60	SW	30-40	9	HF	>2	Unidentified	Seed	5		0.56
Drago	PB	5674	60	SW	40-50	9	HF	>2	Arecaceae	Wood		2	0.00
Drago	PB	5674	60	SW	40-50	9	HF	>2	Moraceae	Wood		6.37	0.00
Drago	PB	5674	60	SW	40-50	9	HF	>2	Poaceae Zea mays	Cupule	3		0.33
Drago	PB	5674	60	SW	40-50	9	HF	>2	Poaceae Zea mays	Kernel	23		2.56
Drago	PB	5674	60	SW	40-50	9	HF	>2	Caricaceae Carica	Seed	5		0.56
Drago	PB	5674	60	SW	40-50	9	HF	>2	Sapotaceae	Seed	7		0.78

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	5674	60	SW	40-50	9	HF	>2	Rubiaceae Psychotria	Seed	8		0.89
Drago	PB	5674	60	SW	40-50	9	HF	>2	Polygonaceae Monnina	Seed	3		0.33
Drago	PB	5674	60	SW	40-50	9	HF	>2	Rubiaceae Randia armata	Seed	1		0.11
Drago	PB	5674	60	SW	40-50	9	HF	>2	Palmae Bactris	Endocarp	1		0.11
Drago	PB	5674	60	SW	40-50	9	HF	>2	Unidentified	Seed	6		0.67
Drago	PB	5674	60	SW	40-50	9	HF	>2	Unidentified	Stem	1		0.11
Drago	PB	5675	60	SW	50-60	9	HF	>2	Arecaceae	Wood		1.09	0.00
Drago	PB	5675	60	SW	50-60	9	HF	>2	Moraceae	Wood		4.23	0.00
Drago	PB	5675	60	SW	50-60	9	HF	>2	Poaceae Zea mays	Kernel	16		1.78
Drago	PB	5675	60	SW	50-60	9	HF	>2	Unidentified	Sugary tissue	1		0.11
Drago	PB	5675	60	SW	50-60	9	HF	>2	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	5675	60	SW	50-60	9	HF	>2	Solanaceae	Seed	5		0.56
Drago	PB	5675	60	SW	50-60	9	HF	>2	Araliaceae Dendropanax arboreus	Seed	3		0.33
Drago	PB	5675	60	SW	50-60	9	HF	>2	Sapotaceae	Seed	3		0.33
Drago	PB	5675	60	SW	50-60	9	HF	>2	Rubiaceae	Seed	5		0.56
Drago	PB	5675	60	SW	50-60	9	HF	>2	Unidentified	Seed	7		0.78
Drago	PB	5676	60	SW	60-70	9	HF	>2	Arecaceae	Wood		0.31	0.00
Drago	PB	5676	60	SW	60-70	9	HF	>2	Moraceae	Wood		4.78	0.00
Drago	PB	5676	60	SW	60-70	9	HF	>2	Unidentified	Fruit pit	1		0.11
Drago	PB	5676	60	SW	60-70	9	HF	>2	Malpighiaceae Byrsonima crassifolia	Endocarp	2		0.22
Drago	PB	5676	60	SW	60-70	9	HF	>2	Sapotaceae	Seed casing	4		0.44
Drago	PB	5676	60	SW	60-70	9	HF	>2	Unidentified	Endocarp	7		0.78
Drago	PB	5676	60	SW	60-70	9	HF	>2	Rubiaceae	Seed	3		0.33
Drago	PB	5676	60	SW	60-70	9	HF	>2	Unidentified	Seed	5		0.56
Drago	PB	5677	60	SW	70-80	9	HF	>2	Arecaceae	Wood		0.41	0.00
Drago	PB	5677	60	SW	70-80	9	HF	>2	Moraceae	Wood		3.73	0.00
Drago	PB	5677	60	SW	70-80	9	HF	>2	Poaceae Zea mays	Kernel	4		0.44
Drago	PB	5677	60	SW	70-80	9	HF	>2	Sapotaceae	Seed	5		0.56

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	5677	60	SW	70-80	9	HF	>2	Rubiaceae Randia armata	Seed	1		0.11
Drago	PB	5677	60	SW	70-80	9	HF	>2	Rubiaceae Psychotria	Seed	2		0.22
Drago	PB	5677	60	SW	70-80	9	HF	>2	Solanaceae	Seed	1		0.11
Drago	PB	5677	60	SW	70-80	9	HF	>2	Unidentified	Stem	2		0.22
Drago	PB	5678	60	SW	80-90	9	HF	>2	Arecaceae	Wood		1.41	0.00
Drago	PB	5678	60	SW	80-90	9	HF	>2	Moraceae	Wood		6.55	0.00
Drago	PB	5678	60	SW	80-90	9	HF	>2	Rubiaceae Coccocypselum	Seed	5		0.56
Drago	PB	5678	60	SW	80-90	9	HF	>2	Rubiaceae Genipa americana	Seed	2		0.22
Drago	PB	5678	60	SW	80-90	9	HF	>2	Sapindaceae Melicoccus bijugatus	Seed	3		0.33
Drago	PB	5678	60	SW	80-90	9	HF	>2	Sapotaceae Pouteria sapota	Endocarp	1		0.11
Drago	PB	5678	60	SW	80-90	9	HF	>2	Solanaceae Cestrum latifolium	Seed	5		0.56
Drago	PB	5678	60	SW	80-90	9	HF	>2	Sapotaceae	Seed	7		0.78
Drago	PB	5678	60	SW	80-90	9	HF	>2	Araliaceae Dendropanax arboreus	Seed	1		0.11
Drago	PB	5678	60	SW	80-90	9	HF	>2	Unidentified	Seed	4		0.44
Drago	PB	5679	60	SW	90-100	9	HF	>2	Arecaceae	Wood		0.41	0.00
Drago	PB	5679	60	SW	90-100	9	HF	>2	Moraceae	Wood		3.78	0.00
Drago	PB	5679	60	SW	90-100	9	HF	>2	Palmae Bactris	Endocarp	1		0.11
Drago	PB	5679	60	SW	90-100	9	HF	>2	Araliaceae Dendropanax arboreus	Seed	5		0.56
Drago	PB	5679	60	SW	90-100	9	HF	>2	Unidentified	Endocarp	1		0.11
Drago	PB	5679	60	SW	90-100	9	HF	>2	Unidentified	Sugary tissue	1		0.11
Drago	PB	5679	60	SW	90-100	9	HF	>2	Rubiaceae Psychotria	Seed	4		0.44
Drago	PB	5679	60	SW	90-100	9	HF	>2	Sapotaceae	Seed casing	2		0.22
Drago	PB	5679	60	SW	90-100	9	HF	>2	Unidentified	Seed	7		0.78
Drago	H	4365	49	E	0-5	4.5	LF	>2	Myrcia Gatunensis	Seed	35		7.78
Drago	H	4365	49	E	0-5	4.5	LF	>2	Garcinia Madruno	Seed	5		1.11
Drago	H	4365	49	E	0-5	4.5	LF	>2	Cecropia	Seed casing	6		1.33
Drago	H	4365	49	E	0-5	4.5	LF	>2	Garcinia Intermedia	Seed casing	1		0.22
Drago	H	4365	49	E	0-5	4.5	LF	>2	Moraceae	Wood		0.01	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4365	49	E	0-5	4.5	LF	>1	Myrcia Gatunensis	Seed	78		17.33
Drago	H	4365	49	E	0-5	4.5	LF	>1	Garcinia Intermedia	Seed casing	3		0.67
Drago	H	4365	49	E	0-5	4.5	LF	>1	Xylopia Bocatorena	Seed casing	4		0.89
Drago	H	4365	49	E	0-5	4.5	LF	>1	Cecropia	Seed casing	1		0.22
Drago	H	4365	49	E	0-5	4.5	LF	>1	Garcinia Madruno	Seed	3		0.67
Drago	H	4365	49	E	0-5	4.5	LF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4365	49	E	0-5	4.5	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	H	4365	49	E	0-5	4.5	LF	>0.5	Myrcia Gatunensis	Seed	5		1.11
Drago	H	4365	49	E	0-5	4.5	LF	>0.5	Cecropia	Seed casing	3		0.67
Drago	H	4366	49	E	5-10	4.5	LF	>2	Myrcia Gatunensis	Seed	6		1.33
Drago	H	4366	49	E	5-10	4.5	LF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.22
Drago	H	4366	49	E	5-10	4.5	LF	>2	Unidentified	Nutshell	1		0.22
Drago	H	4366	49	E	5-10	4.5	LF	>2	Arecaceae	Wood		0.01	0.00
Drago	H	4366	49	E	5-10	4.5	LF	>1	Myrcia Gatunensis	Seed	4		0.89
Drago	H	4366	49	E	5-10	4.5	LF	>1	Xylopia Bocatorena	Seed casing	1		0.22
Drago	H	4366	49	E	5-10	4.5	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	H	4366	49	E	5-10	4.5	LF	>0.5	Xylopia Bocatorena	Seed	2		0.44
Drago	H	4367	49	E	10-20	9	LF	>2	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	H	4367	49	E	10-20	9	LF	>2	Arecaceae	Wood		0.12	0.00
Drago	H	4367	49	E	10-20	9	LF	>1	Myrcia Gatunensis	Seed	1		0.11
Drago	H	4367	49	E	10-20	9	LF	>1	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	H	4367	49	E	10-20	9	LF	>1	Cecropia	Seed casing	4		0.44
Drago	H	4367	49	E	10-20	9	LF	>0.5	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	H	4367	49	E	10-20	9	LF	>0.5	Cecropia	Seed	6		0.67
Drago	H	4368	49	E	20-27	6.3	LF	>2	Myrcia Gatunensis	Seed	3		0.48
Drago	H	4368	49	E	20-27	6.3	LF	>2	Cecropia	Seed casing	1		0.16
Drago	H	4368	49	E	20-27	6.3	LF	>2	Xylopia Bocatorena	Seed	1		0.16
Drago	H	4368	49	E	20-27	6.3	LF	>1	Myrcia Gatunensis	Seed	1		0.16

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4368	49	E	20-27	6.3	LF	>1	Cecropia	Seed	6		0.95
Drago	H	4368	49	E	20-27	6.3	LF	>1	Rubiaceae Coccocypselum	Seed	2		0.32
Drago	H	4368	49	E	20-27	6.3	LF	>0.5	Myrcia Gatunensis	Seed	19		3.02
Drago	B	4369	49	E	27-37	9	LF	>2	Rubiaceae Psychotria	Seed casing	1		0.11
Drago	B	4369	49	E	27-37	9	LF	>1	Rubiaceae Psychotria	Seed casing	2		0.22
Drago	B	4369	49	E	27-37	9	LF	>1	Myrcia Gatunensis	Seed	1		0.11
Drago	B	4369	49	E	27-37	9	LF	>1	Unidentified	Nutshell	3		0.33
Drago	B	4369	49	E	27-37	9	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	B	4369	49	E	27-37	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4369	49	E	27-37	9	LF	>0.5	Myrcia Gatunensis	Seed	1		0.11
Drago	B	4369	49	E	27-37	9	LF	>0.5	Rubiaceae	Seed	1		0.11
Drago	PB	4370	49	E	37-47	9	LF	>2	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4370	49	E	37-47	9	LF	>1	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4370	49	E	37-47	9	LF	>0.5	Rubiaceae	Seed	1		0.11
Drago	PB	4371	49	E	47-57	9	LF	>1	Cecropia	Seed	1		0.11
Drago	PB	4371	49	E	47-57	9	LF	>1	Xylopia Bocatorena	Seed	1		0.11
Drago	PB	4371	49	E	47-57	9	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4371	49	E	47-57	9	LF	>0.5	Boraginaceae Cordia spinescens	Seed	1		0.11
Drago	PB	4371	49	E	47-57	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4372	49	E	57-67	9	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4372	49	E	57-67	9	LF	>0.5	Cecropia	Seed	1		0.11
Drago	PB	4373	49	E	67-77	9	LF	>2	Arecaceae	Wood		0.34	0.00
Drago	PB	4374	49	E	77-87	9	LF	>2	Sapotaceae Manilkara zapota	Seed	1		0.11
Drago	PB	4374	49	E	77-87	9	LF	>0.5	Rubiaceae	Seed	2		0.22
Drago	PB	4374	49	E	77-87	9	LF	>0.5	Rubiaceae Psychotria	Seed casing	2		0.22
Drago	PB	4375	49	E	87-97	9	LF	>2	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4375	49	E	87-97	9	LF	>1	Cecropia	Seed	1		0.11
Drago	PB	4375	49	E	87-97	9	LF	>1	Arecaceae	Wood		0.01	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4375	49	E	87-97	9	LF	>0.5	Rubiaceae	Seed	1		0.11
Drago	PB	4375	49	E	87-97	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	H	4376	49	W	0-5	4.5	LF	>2	Myrcia Gatunensis	Seed	54		12.00
Drago	H	4376	49	W	0-5	4.5	LF	>2	Apiaceae Eryngium foetidum	Seed	2		0.44
Drago	H	4376	49	W	0-5	4.5	LF	>2	Unidentified	Nutshell	2		0.44
Drago	H	4376	49	W	0-5	4.5	LF	>2	Garcinia Intermedia	Seed	2		0.44
Drago	H	4376	49	W	0-5	4.5	LF	>2	Arecaceae	Wood		0.09	0.00
Drago	H	4376	49	W	0-5	4.5	LF	>1	Myrcia Gatunensis	Seed	39		8.67
Drago	H	4376	49	W	0-5	4.5	LF	>1	Malpighiaceae Byrsonima crassifolia	Seed casing	1		0.22
Drago	H	4376	49	W	0-5	4.5	LF	>1	Rubiaceae Psychotria	Seed	13		2.89
Drago	H	4376	49	W	0-5	4.5	LF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4376	49	W	0-5	4.5	LF	>0.5	Rubiaceae Psychotria	Seed	48		10.67
Drago	H	4377	49	W	5-10	4.5	LF	>2	Myrcia Gatunensis	Seed	1		0.22
Drago	H	4377	49	W	5-10	4.5	LF	>2	Garcinia Madruno	Seed	1		0.22
Drago	H	4377	49	W	5-10	4.5	LF	>1	Myrcia Gatunensis	Seed	2		0.44
Drago	H	4377	49	W	5-10	4.5	LF	>1	Unidentified	Seed	1		0.22
Drago	H	4377	49	W	5-10	4.5	LF	>1	Rubiaceae Psychotria	Seed	24		5.33
Drago	H	4377	49	W	5-10	4.5	LF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4377	49	W	5-10	4.5	LF	>0.5	Rubiaceae Psychotria	Seed	25		5.56
Drago	H	4378	49	W	10-20	9	LF	>2	Myrcia Gatunensis	Seed	1		0.11
Drago	H	4378	49	W	10-20	9	LF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	H	4378	49	W	10-20	9	LF	>2	Moraceae	Wood		0.22	0.00
Drago	H	4378	49	W	10-20	9	LF	>2	Unidentified	Fruit pit	1		0.11
Drago	H	4378	49	W	10-20	9	LF	>2	Unidentified	Nutshell	1		0.11
Drago	H	4378	49	W	10-20	9	LF	>1	Garcinia Madruno	Seed	1		0.11
Drago	H	4378	49	W	10-20	9	LF	>1	Rubiaceae Psychotria	Seed	28		3.11
Drago	H	4378	49	W	10-20	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4378	49	W	10-20	9	LF	>0.5	Cecropia	Seed	4		0.44

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4378	49	W	10-20	9	LF	>0.5	Rubiaceae Psychotria	Seed	15		1.67
Drago	H	4378	49	W	10-20	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	H	4378	49	W	10-20	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	H	4379	49	W	20-27	6.3	LF	>2	Myrcia Gatunensis	Seed	2		0.32
Drago	H	4379	49	W	20-27	6.3	LF	>2	Moraceae	Wood		0.01	0.00
Drago	H	4379	49	W	20-27	6.3	LF	>2	Unidentified	Nutshell	1		0.16
Drago	H	4379	49	W	20-27	6.3	LF	>1	Myrcia Gatunensis	Seed	1		0.16
Drago	H	4379	49	W	20-27	6.3	LF	>1	Cecropia	Seed casing	3		0.48
Drago	H	4379	49	W	20-27	6.3	LF	>1	Cecropia	Seed	5		0.79
Drago	H	4379	49	W	20-27	6.3	LF	>0.5	Cecropia	Seed casing	2		0.32
Drago	H	4379	49	W	20-27	6.3	LF	>0.5	Cecropia	Seed	5		0.79
Drago	H	4379	49	W	20-27	6.3	LF	>0.5	Rubiaceae Psychotria	Seed	19		3.02
Drago	B	4380	49	W	27-37	9	LF	>2	Myrcia Gatunensis	Seed	3		0.33
Drago	B	4380	49	W	27-37	9	LF	>2	Cecropia	Seed casing	2		0.22
Drago	B	4380	49	W	27-37	9	LF	>2	Cecropia	Seed	2		0.22
Drago	B	4380	49	W	27-37	9	LF	>2	Unidentified	Fruit pit	1		0.11
Drago	B	4380	49	W	27-37	9	LF	>1	Cecropia	Seed casing	2		0.22
Drago	B	4380	49	W	27-37	9	LF	>1	Cecropia	Seed	5		0.56
Drago	B	4380	49	W	27-37	9	LF	>1	Rubiaceae Psychotria	Seed	1		0.11
Drago	B	4380	49	W	27-37	9	LF	>1	Unidentified	Nutshell	1		0.11
Drago	B	4380	49	W	27-37	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4380	49	W	27-37	9	LF	>0.5	Cecropia	Seed	6		0.67
Drago	PB	4381	49	W	37-47	9	LF	>0.5	Cecropia	Seed	2		0.22
Drago	PB	4382	49	W	47-57	9	LF	>0.5	Cecropia	Seed	3		0.33
Drago	PB	4382	49	W	47-57	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4383	49	W	57-67	9	LF	>0.5	Cecropia	Seed	2		0.22
Drago	PB	4384	49	W	67-77	9	LF	>1	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4384	49	W	67-77	9	LF	>0.5	Arecaceae	Wood		0.01	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4385	49	W	77-87	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4385	49	W	77-87	9	LF	>0.5	Cecropia	Seed	4		0.44
Drago	PB	4386	49	W	87-97	9	LF	>2	Myrcia Gatunensis	Seed	1		0.11
Drago	PB	4386	49	W	87-97	9	LF	>0.5	Cecropia	Seed	9		1.00
Drago	PB	4386	49	W	87-97	9	LF	>0.5	Rubiaceae Psychotria	Seed	37		4.11
Drago	B	4568	50	E	0-10	9	LF	>2	Unidentified	Nutshell	6		0.67
Drago	B	4568	50	E	0-10	9	LF	>2	Unidentified	Fruit pit	1		0.11
Drago	B	4568	50	E	0-10	9	LF	>2	Unidentified	Seed	4		0.44
Drago	B	4568	50	E	0-10	9	LF	>2	Arecaceae	Wood		0.38	0.00
Drago	B	4568	50	E	0-10	9	LF	>2	Moraceae	Wood		2.45	0.00
Drago	B	4568	50	E	0-10	9	LF	>1	Unidentified	Seed	1		0.11
Drago	B	4568	50	E	0-10	9	LF	>1	Arecaceae	Wood		0.06	0.00
Drago	B	4568	50	E	0-10	9	LF	>1	Moraceae	Wood		0.27	0.00
Drago	B	4568	50	E	0-10	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	4569	50	E	10-20	9	LF	>2	Garcinia Intermedia	Seed	1		0.11
Drago	B	4569	50	E	10-20	9	LF	>2	Rubiaceae	Seed	1		0.11
Drago	B	4569	50	E	10-20	9	LF	>2	Unidentified	Nutshell	1		0.11
Drago	B	4569	50	E	10-20	9	LF	>2	Arecaceae	Wood		0.93	0.00
Drago	B	4569	50	E	10-20	9	LF	>2	Moraceae	Wood		2.22	0.00
Drago	B	4569	50	E	10-20	9	LF	>1	Poaceae Zea mays	Kernel	2		0.22
Drago	B	4569	50	E	10-20	9	LF	>1	Cecropia	Seed	2		0.22
Drago	B	4569	50	E	10-20	9	LF	>1	Sapotaceae Manilkara zapota	Seed	5		0.56
Drago	B	4569	50	E	10-20	9	LF	>1	Unidentified	Seed	3		0.33
Drago	B	4569	50	E	10-20	9	LF	>1	Arecaceae	Wood		0.02	0.00
Drago	B	4569	50	E	10-20	9	LF	>1	Moraceae	Wood		0.13	0.00
Drago	B	4569	50	E	10-20	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	4570	50	E	20-30	9	LF	>2	Rubiaceae Genipa americana	Seed	1		0.11
Drago	B	4570	50	E	20-30	9	LF	>2	Moraceae	Wood		0.07	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4570	50	E	20-30	9	LF	>1	Rubiaceae Genipa americana	Seed	2		0.22
Drago	B	4570	50	E	20-30	9	LF	>1	Arecaceae	Wood		0.06	0.00
Drago	B	4570	50	E	20-30	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	4571	50	E	30-40	9	LF	>2	Unidentified	Nutshell	1		0.11
Drago	B	4571	50	E	30-40	9	LF	>2	Unidentified	Seed	1		0.11
Drago	B	4571	50	E	30-40	9	LF	>2	Moraceae	Wood		0.01	0.00
Drago	B	4571	50	E	30-40	9	LF	>1	Unidentified	Seed	1		0.11
Drago	B	4571	50	E	30-40	9	LF	>0.5	Rubiaceae Psychotria	Seed	2		0.22
Drago	PB	4572	50	E	40-50	9	LF	>2	Moraceae	Wood		0.03	0.00
Drago	PB	4572	50	E	40-50	9	LF	>1	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	PB	4572	50	E	40-50	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4572	50	E	40-50	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4573	50	E	50-60	9	LF	>2	Unidentified	Nutshell	1		0.11
Drago	PB	4573	50	E	50-60	9	LF	>1	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	PB	4573	50	E	50-60	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4574	50	E	60-70	9	LF	>2	Unidentified	Nutshell	1		0.11
Drago	PB	4574	50	E	60-70	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4576	50	E	80-90	9	LF	>1	Unidentified	Nutshell	1		0.11
Drago	PB	4576	50	E	80-90	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4577	50	E	90-100	9	LF	>2	Unidentified	Nutshell	2		0.22
Drago	PB	4577	50	E	90-100	9	LF	>0.5	Rubiaceae Psychotria	Seed	2		0.22
Drago	PB	4387	50	A	40-50	14.25	LF	>2	Unidentified	Seed	1		0.07
Drago	PB	4387	50	A	40-50	14.25	LF	>2	Poaceae Zea mays	Kernel	1		0.07
Drago	PB	4387	50	A	40-50	14.25	LF	>2	Moraceae	Wood		0.17	0.00
Drago	PB	4387	50	A	40-50	14.25	LF	>1	Rubiaceae Coccocypselum	Seed	1		0.07
Drago	PB	4387	50	A	40-50	14.25	LF	>1	Poaceae Zea mays	Kernel	1		0.07
Drago	PB	4387	50	A	40-50	14.25	LF	>1	Moraceae	Wood		0.02	0.00
Drago	PB	4387	50	A	40-50	14.25	LF	>0.5	Cecropia	Seed casing	2		0.14

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4387	50	A	40-50	14.25	LF	>0.5	Cecropia	Seed	4		0.28
Drago	PB	4387	50	A	40-50	14.25	LF	>0.5	Rubiaceae	Seed	1		0.07
Drago	PB	4387	50	A	40-50	14.25	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4387	50	A	40-50	14.25	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4388	50	A	50-60	13	LF	>2	Unidentified	Seed	1		0.08
Drago	PB	4388	50	A	50-60	13	LF	>2	Arecaceae	Wood		0.02	0.00
Drago	PB	4388	50	A	50-60	13	LF	>2	Moraceae	Wood		0.03	0.00
Drago	PB	4388	50	A	50-60	13	LF	>1	Xylopia Bocatorena	Seed	2		0.15
Drago	PB	4388	50	A	50-60	13	LF	>1	Unidentified	Seed	1		0.08
Drago	PB	4388	50	A	50-60	13	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4388	50	A	50-60	13	LF	>1	Moraceae	Wood		0.04	0.00
Drago	PB	4388	50	A	50-60	13	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4389	50	A	60-70	12	LF	>2	Moraceae	Wood		0.14	0.00
Drago	PB	4389	50	A	60-70	12	LF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4568	50	E	0-10	9	LF	>2	Garcinia Madruno	Seed	2		0.22
Drago	B	4568	50	E	0-10	9	LF	>2	Xylopia Bocatorena	Seed	5		0.56
Drago	B	4568	50	E	0-10	9	LF	>2	Arecaceae	Wood		0.01	0.00
Drago	B	4568	50	E	0-10	9	LF	>2	Moraceae	Wood		0.05	0.00
Drago	B	4568	50	E	0-10	9	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	B	4568	50	E	0-10	9	LF	>1	Moraceae	Wood		0.03	0.00
Drago	H	4533	51	N	0-10	9	LF	>2	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	H	4533	51	N	0-10	9	LF	>2	Garcinia Intermedia	Seed	2		0.22
Drago	H	4533	51	N	0-10	9	LF	>2	Moraceae	Wood		0.05	0.00
Drago	H	4533	51	N	0-10	9	LF	>1	Malpighiaceae Byrsonima crassifolia	Seed	17		1.89
Drago	H	4533	51	N	0-10	9	LF	>1	Rubiaceae Psychotria	Seed	15		1.67
Drago	H	4533	51	N	0-10	9	LF	>1	Rubiaceae Psychotria	Seed	1		0.11
Drago	H	4533	51	N	0-10	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4533	51	N	0-10	9	LF	>0.5	Rubiaceae Psychotria	Seed	7		0.78

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	H	4533	51	N	0-10	9	LF	>0.5	Rubiaceae Psychotria	Seed	12		1.33
Drago	H	4533	51	N	0-10	9	LF	>0.5	Rubiaceae Psychotria	Seed	1		0.11
Drago	H	4534	51	N	10-20	9	LF	>2	Malpighiaceae Byrsonima crassifolia	Seed	1		0.11
Drago	H	4534	51	N	10-20	9	LF	>2	Garcinia Intermedia	Seed	2		0.22
Drago	H	4534	51	N	10-20	9	LF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	H	4534	51	N	10-20	9	LF	>1	Garcinia Madruno	Seed	1		0.11
Drago	H	4534	51	N	10-20	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4534	51	N	10-20	9	LF	>0.5	Rubiaceae Psychotria	Seed	4		0.44
Drago	H	4534	51	N	10-20	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	4535	51	N	20-30	9	LF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.11
Drago	B	4535	51	N	20-30	9	LF	>2	Unidentified	Seed	1		0.11
Drago	B	4535	51	N	20-30	9	LF	>2	Arecaceae	Wood		0.01	0.00
Drago	B	4535	51	N	20-30	9	LF	>2	Moraceae	Wood		0.01	0.00
Drago	B	4535	51	N	20-30	9	LF	>1	Rubiaceae Psychotria	Seed	1		0.11
Drago	B	4535	51	N	20-30	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4535	51	N	20-30	9	LF	>0.5	Rubiaceae Psychotria	Seed	2		0.22
Drago	B	4535	51	N	20-30	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	4536	51	N	30-42	10.8	LF	>2	Unidentified	Fruit pit	1		0.09
Drago	B	4536	51	N	30-42	10.8	LF	>2	Moraceae	Wood		0.19	0.00
Drago	B	4536	51	N	30-42	10.8	LF	>1	Malpighiaceae Byrsonima crassifolia	Seed	2		0.19
Drago	B	4536	51	N	30-42	10.8	LF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4536	51	N	30-42	10.8	LF	>0.5	Garcinia Madruno	Seed	1		0.09
Drago	B	4536	51	N	30-42	10.8	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4537	51	N	42-52	9	LF	>2	Moraceae	Wood		0.01	0.00
Drago	PB	4537	51	N	42-52	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4537	51	N	42-52	9	LF	>0.5	Cecropia	Seed casing	1		0.11
Drago	PB	4537	51	N	42-52	9	LF	>0.5	Cecropia	Seed	3		0.33
Drago	PB	4537	51	N	42-52	9	LF	>0.5	Garcinia Madruno	Seed	1		0.11

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4537	51	N	42-52	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4538	51	N	52-62	9	LF	>2	Unidentified	Fruit pit	1		0.11
Drago	PB	4538	51	N	52-62	9	LF	>1	Unidentified	Seed	1		0.11
Drago	PB	4538	51	N	52-62	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4538	51	N	52-62	9	LF	>0.5	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4538	51	N	52-62	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4539	51	N	62-72	9	LF	>1	Unidentified	Fruit pit	1		0.11
Drago	PB	4539	51	N	62-72	9	LF	>0.5	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4539	51	N	62-72	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4540	51	N	72-82	9	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4540	51	N	72-82	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4540	51	N	72-82	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4541	51	N	82-92	9	LF	>1	Rubiaceae Coccocypselum	Seed	1		0.11
Drago	PB	4541	51	N	82-92	9	LF	>0.5	Rubiaceae Psychotria	Seed	2		0.22
Drago	PB	4541	51	N	82-92	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4542	51	N	92-102	9	LF	>2	Garcinia Intermedia	Seed	1		0.11
Drago	PB	4542	51	N	92-102	9	LF	>1	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4542	51	N	92-102	9	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4542	51	N	92-102	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4542	51	N	92-102	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4391	51	A	102-112	9	LF	>2	Arecaceae	Wood		0.01	0.00
Drago	PB	4391	51	A	102-112	9	LF	>2	Moraceae	Wood		0.01	0.00
Drago	PB	4391	51	A	102-112	9	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4391	51	A	102-112	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4391	51	A	102-112	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4391	51	A	102-112	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4392	51	A	112-122	9	LF	>2	Cecropia	Seed	1		0.11
Drago	PB	4392	51	A	112-122	9	LF	>2	Arecaceae	Wood		0.02	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4392	51	A	112-122	9	LF	>1	Arecaceae	Wood		0.01	0.00
Drago	PB	4392	51	A	112-122	9	LF	>0.5	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4392	51	A	112-122	9	LF	>0.5	Arecaceae	Wood		0.01	0.00
Drago	PB	4392	51	A	112-122	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	H	4523	51	S	0-10	9	LF	>2	Cecropia	Seed casing	2		0.22
Drago	H	4523	51	S	0-10	9	LF	>2	Malpighiaceae Byrsonima crassifolia	Seed casing	1		0.11
Drago	H	4523	51	S	0-10	9	LF	>2	Rubiaceae Psychotria	Seed	4		0.44
Drago	H	4523	51	S	0-10	9	LF	>2	Moraceae	Wood		0.01	0.00
Drago	H	4523	51	S	0-10	9	LF	>1	Unidentified	Seed	3		0.33
Drago	H	4523	51	S	0-10	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	H	4524	51	S	10-20	9	LF	>2	Myrcia Gatunensis	Seed	12		1.33
Drago	H	4524	51	S	10-20	9	LF	>2	Cecropia	Seed	5		0.56
Drago	H	4524	51	S	10-20	9	LF	>2	Cecropia	Seed casing	2		0.22
Drago	H	4524	51	S	10-20	9	LF	>2	Malpighiaceae Byrsonima crassifolia	Seed casing	16		1.78
Drago	H	4524	51	S	10-20	9	LF	>2	Unidentified	Seed	2		0.22
Drago	H	4524	51	S	10-20	9	LF	>2	Garcinia Intermedia	Seed casing	5		0.56
Drago	H	4524	51	S	10-20	9	LF	>2	Unidentified	Stem	1		0.11
Drago	H	4524	51	S	10-20	9	LF	>2	Unidentified	Fruit pit	1		0.11
Drago	H	4524	51	S	10-20	9	LF	>2	Xylopia Bocatorena	Seed	2		0.22
Drago	H	4524	51	S	10-20	9	LF	>2	Moraceae	Wood		0.19	0.00
Drago	H	4524	51	S	10-20	9	LF	>1	Myrcia Gatunensis	Seed	23		2.56
Drago	H	4524	51	S	10-20	9	LF	>1	Cecropia	Seed	14		1.56
Drago	H	4524	51	S	10-20	9	LF	>1	Malpighiaceae Byrsonima crassifolia	Seed casing	16		1.78
Drago	H	4524	51	S	10-20	9	LF	>1	Cecropia	Seed casing	7		0.78
Drago	H	4524	51	S	10-20	9	LF	>1	Rubiaceae Coccocypselum	Seed	3		0.33
Drago	H	4524	51	S	10-20	9	LF	>1	Unidentified	Stem	1		0.11
Drago	H	4524	51	S	10-20	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4525	51	S	20-30	9	LF	>2	Unidentified	Seed	1		0.11

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4525	51	S	20-30	9	LF	>2	Moraceae	Wood		0.21	0.00
Drago	B	4525	51	S	20-30	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4526	51	S	30-42	10.8	LF	>2	Unidentified	Seed casing	3		0.28
Drago	B	4526	51	S	30-42	10.8	LF	>1	Unidentified	Seed casing	1		0.09
Drago	B	4526	51	S	30-42	10.8	LF	>1	Moraceae	Wood		0.01	0.00
Drago	B	4526	51	S	30-42	10.8	LF	>0.5	Rubiaceae Psychotria	Seed	2		0.19
Drago	PB	4527	51	S	42-52	9	LF	>2	Xylopia Bocatorena	Seed	3		0.33
Drago	PB	4527	51	S	42-52	9	LF	>0.5	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4528	51	S	52-62	9	LF	>2	Garcinia Intermedia	Seed	1		0.11
Drago	PB	4528	51	S	52-62	9	LF	>1	Unidentified	Seed	1		0.11
Drago	PB	4528	51	S	52-62	9	LF	>0.5	Cecropia	Seed	2		0.22
Drago	PB	4528	51	S	52-62	9	LF	>0.5	Unidentified	Seed	1		0.11
Drago	PB	4528	51	S	52-62	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4529	51	S	62-72	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4529	51	S	62-72	9	LF	>0.5	Cecropia	Seed	1		0.11
Drago	PB	4529	51	S	62-72	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4530	51	S	72-82	9	LF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	PB	4530	51	S	72-82	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4530	51	S	72-82	9	LF	>0.5	Rubiaceae Psychotria	Seed	5		0.56
Drago	PB	4530	51	S	72-82	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4531	51	S	82-92	9	LF	>1	Unidentified	Seed	2		0.22
Drago	PB	4531	51	S	82-92	9	LF	>1	Unidentified	Seed casing	1		0.11
Drago	PB	4531	51	S	82-92	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4531	51	S	82-92	9	LF	>0.5	Rubiaceae Psychotria	Seed	6		0.67
Drago	PB	4531	51	S	82-92	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4532	51	S	92-102	9	LF	>2	Unidentified	Seed	1		0.11
Drago	PB	4532	51	S	92-102	9	LF	>2	Moraceae	Wood		0.27	0.00
Drago	PB	4532	51	S	92-102	9	LF	>1	Rubiaceae Coccocypselum	Seed	1		0.11

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4532	51	S	92-102	9	LF	>1	Unidentified	Seed	1		0.11
Drago	PB	4532	51	S	92-102	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4532	51	S	92-102	9	LF	>0.5	Cecropia	Seed	7		0.78
Drago	PB	4532	51	S	92-102	9	LF	>0.5	Rubiaceae Psychotria	Seed	3		0.33
Drago	PB	4532	51	S	92-102	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	PB	4390	51	AL	72-82	9	LF	>2	Moraceae	Wood		0.01	0.00
Drago	PB	4390	51	AL	72-82	9	LF	>1	Moraceae	Wood		0.01	0.00
Drago	PB	4390	51	AL	72-82	9	LF	>0.5	Rubiaceae Psychotria	Seed	1		0.11
Drago	PB	4390	51	AL	72-82	9	LF	>0.5	Moraceae	Wood		0.01	0.00
Teca	PB	5004	ST1	F	10-20	3	LF	>2	Fabaceae Phaseolus vulgaris	Seed	1		0.33
Teca	PB	5004	ST1	F	10-20	3	LF	>2	Unidentified	Seed	1		0.33
Teca	PB	5004	ST1	F	10-20	3	LF	>2	Moraceae	Wood		0.09	0.00
Teca	PB	5004	ST1	F	10-20	3	LF	>1	Myrcia Gatunensis	Seed	1		0.33
Teca	PB	5004	ST1	F	10-20	3	LF	>1	Xylopia Bocatorena	Seed	1		0.33
Teca	PB	5004	ST1	F	10-20	3	LF	>1	Moraceae	Wood		0.01	0.00
Teca	PB	5004	ST1	F	10-20	3	LF	>0.5	Cecropia	Seed	6		2.00
Teca	PB	5004	ST1	F	10-20	3	LF	>0.5	Rubiaceae Psychotria	Seed	4		1.33
Teca	PB	5004	ST1	F	10-20	3	LF	>0.5	Moraceae	Wood		0.01	0.00
Drago	B	5698	61	SE	10-20	9	LF	>2	Moraceae	Wood		0.09	0.00
Drago	B	5698	61	SE	10-20	9	LF	>2	Sapotaceae Manilkara zapota	Seed	1		0.11
Drago	B	5699	61	SE	20-30	9	LF	>2	Moraceae	Wood		0.1	0.00
Drago	B	5699	61	SE	20-30	9	LF	>2	Arecaceae	Wood		0.03	0.00
Drago	B	5699	61	SE	20-30	9	LF	>2	Sapotaceae Manilkara zapota	Seed	1		0.11
Drago	B	5699	61	SE	20-30	9	LF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	B	5700	61	SE	30-40	9	LF	>2	Arecaceae	Wood		0.02	0.00
Drago	B	5700	61	SE	30-40	9	LF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	PB	5701	61	SE	40-50	9	LF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	PB	5702	61	SE	50-60	9	LF	>2	Arecaceae	Wood		0.01	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	5702	61	SE	50-60	9	LF	>2	Poaceae Zea mays	Kernel	1		0.11
Drago	PB	5702	61	SE	50-60	9	LF	>2	Malpighiaceae Byrsonima crassifolia	Endocarp	1		0.11
Drago	PB	5702	61	SE	50-60	9	LF	>2	Solanaceae	Seed	2		0.22
Drago	PB	5703	61	SE	60-70	9	LF	>2	Arecaceae	Wood		0.01	0.00
Drago	PB	5703	61	SE	60-70	9	LF	>2	Poaceae Zea mays	Kernel	2		0.22
Drago	PB	5703	61	SE	60-70	9	LF	>2	Malpighiaceae Byrsonima crassifolia	Endocarp	1		0.11
Drago	PB	5703	61	SE	60-70	9	LF	>2	Unidentified	Unknown	1		0.11
Drago	PB	5705	61	SE	80-90	9	LF	>2	Moraceae	Wood		0.11	0.00
Drago	B	5680	60	SW	10-20	9	LF	>2	Poaceae Zea mays	Kernel	7		0.78
Drago	B	5680	60	SW	10-20	9	LF	>2	Arecaceae	Wood		0.14	0.00
Drago	B	5681	60	SW	20-30	9	LF	>2	Arecaceae	Wood		0.11	0.00
Drago	B	5681	60	SW	20-30	9	LF	>2	Moraceae	Wood		0.02	0.00
Drago	B	5681	60	SW	20-30	9	LF	>2	Poaceae Zea mays	Kernel	3		0.33
Drago	B	5682	60	SW	30-40	9	LF	>2	Arecaceae	Wood		0.09	0.00
Drago	B	5682	60	SW	30-40	9	LF	>2	Moraceae	Wood		0.14	0.00
Drago	B	5682	60	SW	30-40	9	LF	>2	Poaceae Zea mays	Kernel	2		0.22
Drago	B	5682	60	SW	30-40	9	LF	>2	Rubiaceae	Seed	2		0.22
Drago	B	5682	60	SW	30-40	9	LF	>2	Unidentified	Seed	1		0.11
Drago	PB	5683	60	SW	40-50	9	LF	>2	Arecaceae	Wood		0.05	0.00
Drago	PB	5683	60	SW	40-50	9	LF	>2	Malpighiaceae Byrsonima crassifolia	Endocarp	1		0.11
Drago	PB	5684	60	SW	50-60	9	LF	>2	Poaceae Zea mays	Cupule	2		0.22
Drago	PB	5685	60	SW	60-70	9	LF	>2	Arecaceae	Wood		0.22	0.00
Drago	PB	5685	60	SW	60-70	9	LF	>2	Moraceae	Wood		0.02	0.00
Drago	PB	5685	60	SW	60-70	9	LF	>2	Rubiaceae	Seed	1		0.11
Drago	PB	5686	60	SW	70-80	9	LF	>2	Rhamnaceae	Seed	2		0.22
Drago	PB	5688	60	SW	90-100	9	LF	>2	Rubiaceae Psychotria	Seed	1		0.11
Drago	H	4058	51	F	10-20	100	S	1/8 inch	Moraceae	Wood		6.25	0.00
Drago	H	4058	51	F	10-20	100	S	1/8 inch	Arecaceae	Wood		1.7	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4089	51	F	20-30	100	S	1/8 inch	Unidentified	Seed	3		0.03
Drago	B	4089	51	F	20-30	100	S	1/8 inch	Unidentified	Nutshell	2		0.02
Drago	B	4089	51	F	20-30	100	S	1/8 inch	Moraceae	Wood		19..14	0.00
Drago	B	4089	51	F	20-30	100	S	1/8 inch	Arecaceae	Wood		2.9	0.00
Drago	B	4120	51	F	30-42	120	S	1/8 inch	Unidentified	Seed	1		0.01
Drago	B	4120	51	F	30-42	120	S	1/8 inch	Moraceae	Wood		4.78	0.00
Drago	B	4120	51	F	30-42	120	S	1/8 inch	Arecaceae	Wood		0.4	0.00
Drago	PB	4137	51	F	42-52	100	S	1/8 inch	Rubiaceae	Seed	1		0.01
Drago	PB	4137	51	F	42-52	100	S	1/8 inch	Unidentified	Seed	1		0.01
Drago	PB	4137	51	F	42-52	100	S	1/8 inch	Unidentified	Nutshell	2		0.02
Drago	PB	4137	51	F	42-52	100	S	1/8 inch	Moraceae	Wood		4.62	0.00
Drago	PB	4137	51	F	42-52	100	S	1/8 inch	Arecaceae	Wood		2.3	0.00
Drago	PB	4165	51	F	52-62	100	S	1/8 inch	Unidentified	Seed	1		0.01
Drago	PB	4165	51	F	52-62	100	S	1/8 inch	Unidentified	Nutshell	1		0.01
Drago	PB	4165	51	F	52-62	100	S	1/8 inch	Moraceae	Wood		15.67	0.00
Drago	PB	4165	51	F	52-62	100	S	1/8 inch	Arecaceae	Wood		2.56	0.00
Drago	PB	4181	51	F	62-72	100	S	1/8 inch	Unidentified	Seed	17		0.17
Drago	PB	4181	51	F	62-72	100	S	1/8 inch	Unidentified	Nutshell	3		0.03
Drago	PB	4181	51	F	62-72	100	S	1/8 inch	Moraceae	Wood		36.45	0.00
Drago	PB	4181	51	F	62-72	100	S	1/8 inch	Arecaceae	Wood		8.3	0.00
Drago	PB	4223	51	F	72-82	100	S	1/8 inch	Unidentified	Seed	13		0.13
Drago	PB	4223	51	F	72-82	100	S	1/8 inch	Unidentified	Nutshell	2		0.02
Drago	PB	4223	51	F	72-82	100	S	1/8 inch	Unidentified	Fruit pit	1		0.01
Drago	PB	4223	51	F	72-82	100	S	1/8 inch	Moraceae	Wood		16.52	0.00
Drago	PB	4223	51	F	72-82	100	S	1/8 inch	Arecaceae	Wood		2.6	0.00
Drago	PB	4281	51	F	82-92	100	S	1/8 inch	Unidentified	Seed	3		0.03
Drago	PB	4281	51	F	82-92	100	S	1/8 inch	Unidentified	Stem	4		0.04
Drago	PB	4281	51	F	82-92	100	S	1/8 inch	Poaceae Zea mays	Kernel	2		0.02

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4281	51	F	82-92	100	S	1/8 inch	Poaceae Zea mays	Cupule	1		0.01
Drago	PB	4281	51	F	82-92	100	S	1/8 inch	Unidentified	Nutshell	6		0.06
Drago	PB	4281	51	F	82-92	100	S	1/8 inch	Moraceae	Wood		16.18	0.00
Drago	PB	4281	51	F	82-92	100	S	1/8 inch	Arecaceae	Wood		1.87	0.00
Drago	PB	4290	51	F	92-102	100	S	1/8 inch	Moraceae	Wood		4.93	0.00
Drago	PB	4290	51	F	92-102	100	S	1/8 inch	Arecaceae	Wood		0.3	0.00
Drago	PB	4300	51	F	102-112	100	S	1/8 inch	Unidentified	Seed	2		0.02
Drago	PB	4300	51	F	102-112	100	S	1/8 inch	Unidentified	Nutshell	1		0.01
Drago	PB	4300	51	F	102-112	100	S	1/8 inch	Moraceae	Wood		10.4	0.00
Drago	PB	4300	51	F	102-112	100	S	1/8 inch	Arecaceae	Wood		0.9	0.00
Drago	PB	4425	51	F	112-122	100	S	1/8 inch	Unidentified	Stem	1		0.01
Drago	PB	4425	51	F	112-122	100	S	1/8 inch	Unidentified	Seed	3		0.03
Drago	PB	4425	51	F	112-122	100	S	1/8 inch	Unidentified	Nutshell	1		0.01
Drago	PB	4425	51	F	112-122	100	S	1/8 inch	Moraceae	Wood		13.19	0.00
Drago	PB	4425	51	F	112-122	100	S	1/8 inch	Arecaceae	Wood		2.7	0.00
Drago	PB	4447	51	F	122-132	100	S	1/8 inch	Unidentified	Nutshell	1		0.01
Drago	PB	4447	51	F	122-132	100	S	1/8 inch	Moraceae	Wood		16.48	0.00
Drago	PB	4447	51	F	122-132	100	S	1/8 inch	Arecaceae	Wood		1.2	0.00
Drago	B	3895	50	F	0-5	50	S	1/8 inch	Unidentified	Seed	4		0.08
Drago	B	3895	50	F	0-5	50	S	1/8 inch	Unidentified	Nutshell	3		0.06
Drago	B	3895	50	F	0-5	50	S	1/8 inch	Moraceae	Wood		13.9	0.00
Drago	B	3908	50	F	0-10	100	S	1/8 inch	Unidentified	Seed	8		0.08
Drago	B	3908	50	F	0-10	100	S	1/8 inch	Moraceae	Wood		46.16	0.00
Drago	B	3908	50	F	0-10	100	S	1/8 inch	Arecaceae	Wood		2.56	0.00
Drago	B	3961	50	F	10-20	100	S	1/8 inch	Unidentified	Seed	2		0.02
Drago	B	3961	50	F	10-20	100	S	1/8 inch	Rubiaceae Genipa americana	Seed	8		0.08
Drago	B	3961	50	F	10-20	100	S	1/8 inch	Moraceae	Wood		54.44	0.00
Drago	B	3961	50	F	10-20	100	S	1/8 inch	Arecaceae	Wood		3.8	0.00

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	B	4008	50	F	20-30	100	S	1/8 inch	Myrcia Gatunensis	Seed	5		0.05
Drago	B	4008	50	F	20-30	100	S	1/8 inch	Xylopia Bocatorena	Seed	6		0.06
Drago	B	4008	50	F	20-30	100	S	1/8 inch	Garcinia Intermedia	Seed	2		0.02
Drago	B	4008	50	F	20-30	100	S	1/8 inch	Boraginaceae Cordia spinescens	Seed	3		0.03
Drago	B	4008	50	F	20-30	100	S	1/8 inch	Rubiaceae Genipa americana	Seed	8		0.08
Drago	B	4008	50	F	20-30	100	S	1/8 inch	Moraceae	Wood		98.51	0.00
Drago	B	4055	50	F	30-40	100	S	1/8 inch	Cecropia	Seed casing	3		0.03
Drago	B	4055	50	F	30-40	100	S	1/8 inch	Xylopia Bocatorena	Seed	6		0.06
Drago	B	4055	50	F	30-40	100	S	1/8 inch	Garcinia Intermedia	Seed	2		0.02
Drago	B	4055	50	F	30-40	100	S	1/8 inch	Boraginaceae Cordia spinescens	Seed	3		0.03
Drago	B	4055	50	F	30-40	100	S	1/8 inch	Rubiaceae Genipa americana	Seed	8		0.08
Drago	B	4055	50	F	30-40	100	S	1/8 inch	Unidentified	Nutshell	3		0.03
Drago	B	4055	50	F	30-40	100	S	1/8 inch	Moraceae	Wood		49.1	0.00
Drago	B	4055	50	F	30-40	100	S	1/8 inch	Arecaceae	Wood		6	0.00
Drago	PB	4077	50	F	40-50	100	S	1/8 inch	Rubiaceae Genipa americana	Seed	4		0.04
Drago	PB	4077	50	F	40-50	100	S	1/8 inch	Unidentified	Nutshell	4		0.04
Drago	PB	4077	50	F	40-50	100	S	1/8 inch	Moraceae	Wood		30.09	0.00
Drago	PB	4077	50	F	40-50	100	S	1/8 inch	Arecaceae	Wood		4.3	0.00
Drago	PB	4081	50	F	50-60	100	S	1/8 inch	Rubiaceae Genipa americana	Seed	1		0.01
Drago	PB	4081	50	F	50-60	100	S	1/8 inch	Moraceae	Wood		7.4	0.00
Drago	PB	4081	50	F	50-60	100	S	1/8 inch	Arecaceae	Wood		0.78	0.00
Drago	PB	4152	50	F	70-80	100	S	1/8 inch	Unidentified	Seed	6		0.06
Drago	PB	4152	50	F	70-80	100	S	1/8 inch	Fabaceae Phaseolus vulgaris	Seed			0.00
Drago	PB	4152	50	F	70-80	100	S	1/8 inch	Unidentified	Nutshell	2		0.02
Drago	PB	4152	50	F	70-80	100	S	1/8 inch	Moraceae	Wood		23.77	0.00
Drago	PB	4275	50	F	80-90	100	S	1/8 inch	Unidentified	Seed	5		0.05
Drago	PB	4275	50	F	80-90	100	S	1/8 inch	Moraceae	Wood		13.71	0.00
Drago	PB	4395	50	F	90-100	100	S	1/8 inch	Rubiaceae Coccocypselum	Seed	2		0.02

Site	Phase	FS#	Unit	Wall	Level (cm)	Soil Volume (l)	Sample Type	Sieve Size	Scientific Name	Plant Part	(#)	(g)	(#/l)
Drago	PB	4395	50	F	90-100	100	S	1/8 inch	Rubiaceae	Seed	3		0.03
Drago	PB	4395	50	F	90-100	100	S	1/8 inch	Unidentified	Nutshell	2		0.02
Drago	PB	4395	50	F	90-100	100	S	1/8 inch	Unidentified	Seed	3		0.03
Drago	PB	4395	50	F	90-100	100	S	1/8 inch	Moraceae	Wood		22.61	0.00
Drago	PB	4410	50	F	100-110	100	S	1/8 inch	Unidentified	Stem	1		0.01
Drago	PB	4410	50	F	100-110	100	S	1/8 inch	Unidentified	Seed	1		0.01
Drago	PB	4410	50	F	100-110	100	S	1/8 inch	Unidentified	Nutshell	2		0.02
Drago	PB	4410	50	F	100-110	100	S	1/8 inch	Rubiaceae	Seed	1		0.01
Drago	PB	4410	50	F	100-110	100	S	1/8 inch	Moraceae	Wood		18.26	0.00
Drago	PB	4171	50	A	70-80	100	S	1/8 inch	Unidentified	Seed	1		0.01
Drago	PB	4171	50	A	70-80	100	S	1/8 inch	Moraceae	Wood		4.63	0.00
Drago	H	3916	49	F	5-10	50	S	1/8 inch	Garcinia Intermedia	Seed	1		0.02
Drago	H	3916	49	F	5-10	50	S	1/8 inch	Unidentified	Seed	2		0.04
Drago	H	3916	49	F	5-10	50	S	1/8 inch	Unidentified	Nutshell	4		0.08
Drago	H	3916	49	F	5-10	50	S	1/8 inch	Moraceae	Wood		11.36	0.00
Drago	H	3990	49	F	10-20	100	S	1/8 inch	Unidentified	Nutshell	2		0.02
Drago	H	3990	49	F	10-20	100	S	1/8 inch	Unidentified	Seed	1		0.01
Drago	H	3990	49	F	10-20	100	S	1/8 inch	Garcinia Intermedia	Seed	1		0.01
Drago	H	3990	49	F	10-20	100	S	1/8 inch	Moraceae	Wood		23.07	0.00
Drago	B	4029	49	F	20-30	100	S	1/8 inch	Moraceae	Wood		1.88	0.00
Drago	PB	4189	49	F	47-57	100	S	1/8 inch	Moraceae	Wood		1.26	0.00
Drago	PB	4205	49	F	67-77	100	S	1/8 inch	Unidentified	Nutshell	2		0.02
Drago	PB	4205	49	F	67-77	100	S	1/8 inch	Moraceae	Wood		0.69	0.00
Drago	PB	4212	49	F	77-87	100	S	1/8 inch	Moraceae	Wood		2.22	0.00
Drago	PB	4263	49	F	87-97	100	S	1/8 inch	Unidentified	Nutshell	3		0.03
Drago	PB	4263	49	F	87-97	100	S	1/8 inch	Rubiaceae	Seed	4		0.04
Drago	PB	4263	49	F	87-97	100	S	1/8 inch	Xylopia Bocatorena	Seed	1		0.01
Drago	PB	4263	49	F	87-97	100	S	1/8 inch	Moraceae	Wood		4.63	0.00

APPENDIX B

ZOOARCHAEOLOGICAL DATA

Explanation of Column Labels and Acronyms:

Phase	Occupation assigned to excavation level: PB=Pre-Biscuitware Phase (AD 800 to 1200) B=Biscuitware Phase (AD 1200 to 1450) H=Historic Phase (AD 1600 to 1900)
FS#	Field specimen number recorded during excavation
Unit	Unit name: SD-49, -50, -51, -60, or -61
Level (cm)	Level in centimeters below depth
Sample Type	LF=Light fraction HF=Heavy fraction S=Screened
Scientific Name	Binomial nomenclature of specimen identified
Element	Part of skeleton identified
Portion	Part of element representing specimen
Side	Side identified: R=Right L=Left
Burnt (B)	Specimen is at least partially charred
Cut (C)	Specimen bears evidence of having been cut in the process of butchery
Gnawed (G)	Specimen has marks of rodent gnawing
Worked (W)	Specimen bears evidence of having been worked for use as a tool or decorative object (e.g., patterned carving, sharpened end point, smoothed and polished bone surface)

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	4035	49	27-37	S	Cheloniidae	Carapace	Fragment		18				
B	4035	49	27-37	S	Cheloniidae	Frontal	Fragment	R	1				
B	4035	49	27-37	S	Cheloniidae	Humerus	Shaft fragment		2		C		
B	4035	49	27-37	S	Cheloniidae	Plastron	Fragment		1				
B	4035	49	27-37	S	Cheloniidae	Radius	Shaft fragment		1				
B	4035	49	27-37	S	Cheloniidae	Carapace	Fragment		2				
B	4035	49	27-37	S	Homo sapiens	Molar	Proximal fragment		1				
B	4035	49	27-37	S	Mammalia	Bone	Fragment		28				
B	4035	49	27-37	S	Mammalia	Long bone	Proximal fragment		1				
B	4035	49	27-37	S	Sus scrofa	Incisor	Complete		1				
B	4106	49	27-37	S	Cheloniidae	Long bone	Fragment		1				
B	4106	49	27-37	S	Cheloniidae	Cranial	Fragment		2				
B	4106	49	27-37	S	Sus scrofa	Canine	Complete		1				
B	4106	49	27-37	S	Sus scrofa	Cranial	Fragment		19				
B	4106	49	27-37	S	Sus scrofa	Cranial	Fragment		1				
B	4106	49	27-37	S	Sus scrofa	Mandible	Fragment	R	1				
B	4106	49	27-37	S	Sus scrofa	Premolar	Complete		1				
B	4107	49	27-37	S	Actinopterygii	Mandible	Fragment		10				
B	4110	49	27-37	S	Aves	Humerus	Distal fragment		1				
B	4110	49	27-37	S	Aves	Rib	Fragment		1				
B	4110	49	27-37	S	Cheloniidae	Carapace	Fragment		116				
B	4110	49	27-37	S	Cheloniidae	Long bone	Fragment		5				
B	4110	49	27-37	S	Cheloniidae	Long bone	Fragment		9				
B	4110	49	27-37	S	Cheloniidae	Vertebra	Fragment		4				
B	4110	49	27-37	S	Homo sapiens	Cranial	Fragment		3				
B	4110	49	27-37	S	Mammalia	Bone	Fragment		1				
B	4110	49	27-37	S	Mammalia	Ulna	Proximal fragment		1				
B	4110	49	27-37	S	Sus scrofa	Lower premolar	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	4110	49	27-37	S	Sus scrofa	Mandible	Complete		1				
B	4110	49	27-37	S	Sus scrofa	Mandible	Fragment		1				
B	4110	49	27-37	S	Sus scrofa	Upper maxilla w/PM	Fragment		1				
B	4110	49	27-37	S	Sus scrofa	Upper fourth premolar	Complete	L	1				
B	4110	49	27-37	S	Sus scrofa	Upper incisor	Fragment	R	1				
B	4110	49	27-37	S	Actinopterygii	Bone	Fragment		8				
B	4110	49	27-37	S	Trichechus manatus	Rib	Shaft fragment		1				
B	3893	50	0-5	S	Cheloniidae	Bone	Fragment		6				
B	3893	50	0-5	S	Mammalia	Bone	Fragment		205				
B	3893	50	0-5	S	Mammalia	Long bone	Fragment		2				
B	3895	50	0-5	S	Bagre marinus	Otolith	Complete		1				
B	3895	50	0-5	S	Caranx sp.	Vertebra	Complete		1				
B	3895	50	0-5	S	Haemulon sp.	Otolith	Complete		4				
B	3895	50	0-5	S	Lutjanus sp.	Coracoid	Fragment		1				
B	3895	50	0-5	S	Lutjanus sp.	Dentary	Fragment		1				
B	3895	50	0-5	S	Lutjanus sp.	Mandible	Complete		1				
B	3895	50	0-5	S	Lutjanus sp.	Otolith	Complete		1				
B	3895	50	0-5	S	Lutjanus sp.	Bone	Fragment		1				
B	3895	50	0-5	S	Lutjanus sp.	Vertebra	Complete		6				
B	3895	50	0-5	S	Sigmodon sp.	Humerus	Proximal fragment	L	1				
B	3895	50	0-5	S	Actinopterygii	Bone	Fragment		37				
B	3895	50	0-5	S	Actinopterygii	Vertebra	Complete		9				
B	3895	50	0-5	S	Caranx sp.	Vertebra	Complete		25				
B	3895	50	0-5	S	Euthynnus sp.	Vertebra	Complete		2				
B	3895	50	0-5	S	Actinopterygii	Vertebra	Fragment		2				
B	3895	50	0-5	S	Unidentified	Bone	Fragment		6	B			
B	3906	50	0-10	S	Cheloniidae	Bone	Fragment		18				
B	3906	50	0-10	S	Cheloniidae	Vertebra	Fragment		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	3906	50	0-10	S	Mammalia	Bone	Fragment		5				
B	3906	50	0-10	S	Mammalia	Bone	Fragment		34				
B	3906	50	0-10	S	Actinopterygii	Bone	Fragment		6				
B	3908	50	0-10	S	Haemulon sp.	Otolith	Fragment		1				
B	3908	50	0-10	S	Mammalia	Bone	Fragment		28	B			
B	3908	50	0-10	S	Mammalia	Bone	Fragment		300				
B	3908	50	0-10	S	Scarus sp.	Dentary	Fragment		1				
B	3929	50	10-20	S	Cheloniidae	Long bone	Fragment		11				
B	3929	50	10-20	S	Cheloniidae	Bone	Fragment		99				
B	3929	50	10-20	S	Cheloniidae	Bone	Fragment		37				
B	3929	50	10-20	S	Odocoileus virginianus	Mandible	Fragment		1				
B	3931	50	10-20	S	Albula vulpes	Vertebra	Complete		1				
B	3931	50	10-20	S	Aves	Scapula	Fragment		1				
B	3931	50	10-20	S	Belonidae	Vertebra	Complete		5				
B	3931	50	10-20	S	Bodianus sp.	Otolith	Complete		2				
B	3931	50	10-20	S	Bufo marinus	Vertebra	Complete		1				
B	3931	50	10-20	S	Carangidae	Cranial pterygoid	Fragment		1				
B	3931	50	10-20	S	Carangidae	Scale	Complete		18				
B	3931	50	10-20	S	Carangidae	Vertebra	Complete		4				
B	3931	50	10-20	S	Caranx sp.	Articular	Proximal fragment	L	1				
B	3931	50	10-20	S	Caranx sp.	Maxilla	Anterior fragment	L	1				
B	3931	50	10-20	S	Caranx sp.	Premaxilla	Anterior fragment	L	1				
B	3931	50	10-20	S	Caranx sp.	Vertebra	Complete		15				
B	3931	50	10-20	S	Carcharhinus leucas	Tooth	Complete		1				W
B	3931	50	10-20	S	Carcharhinidae	Tooth	Complete		1				
B	3931	50	10-20	S	Cheloniidae	Carapace	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Carapace	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Carapace	Fragment		1	B			

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	3931	50	10-20	S	Cheloniidae	Carapace	Fragment		1	B			
B	3931	50	10-20	S	Cheloniidae	Carapace	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Carapace	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Carapace	Fragment		1		C		
B	3931	50	10-20	S	Cheloniidae	Carapace	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Dentary	Fragment		2				
B	3931	50	10-20	S	Cheloniidae	Humerus	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Long bone	Fragment		17				
B	3931	50	10-20	S	Cheloniidae	Phalange	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Phalange	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Plastron	Fragment		1		C		
B	3931	50	10-20	S	Cheloniidae	Plastron	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Plastron	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Plastron	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Plastron	Fragment		1		C		
B	3931	50	10-20	S	Cheloniidae	Plastron	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Plastron	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Tarsus	Complete		1				
B	3931	50	10-20	S	Cheloniidae	Bone	Fragment		1				
B	3931	50	10-20	S	Cheloniidae	Bone	Fragment		22				
B	3931	50	10-20	S	Cheloniidae	Bone	Fragment		2				
B	3931	50	10-20	S	Cheloniidae	Vertebra	Complete		1				
B	3931	50	10-20	S	Chloroscombrus chrysurus	Vertebra	Complete		5				
B	3931	50	10-20	S	Clupeidae	Vertebra	Complete		2				
B	3931	50	10-20	S	Epinephelus sp.	Dentary	Distal fragment		1				
B	3931	50	10-20	S	Euthynnus sp.	Vertebra	Complete		1				
B	3931	50	10-20	S	Haemulon sp.	Otolith	Complete		5				
B	3931	50	10-20	S	Kyphosus sectatrix	Dentary	Distal fragment	L	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	3931	50	10-20	S	Larimus breviceps	Otolith	Complete		1				
B	3931	50	10-20	S	Lutjanus sp.	Dentary	Distal fragment	L	3				
B	3931	50	10-20	S	Lutjanus sp.	Dentary	Distal fragment	R	1				
B	3931	50	10-20	S	Lutjanus sp.	Maxilla	Anterior fragment	L	2				
B	3931	50	10-20	S	Lutjanus sp.	Maxilla	Anterior fragment	R	3				
B	3931	50	10-20	S	Lutjanus sp.	Otolith	Complete		9				
B	3931	50	10-20	S	Lutjanus sp.	Premaxilla	Anterior fragment	R	1				
B	3931	50	10-20	S	Lutjanus sp.	Quadrate	Complete		1				
B	3931	50	10-20	S	Lutjanus sp.	Quadrate	Fragment		1				
B	3931	50	10-20	S	Lutjanus sp.	Vomer	Complete		1				
B	3931	50	10-20	S	Mammalia	Cranial	Fragment		1				
B	3931	50	10-20	S	Mammalia	Epiphysis	Distal fragment		1				
B	3931	50	10-20	S	Mammalia	Long bone	Fragment		1				
B	3931	50	10-20	S	Mammalia	Tooth	Distal fragment		1				
B	3931	50	10-20	S	Mammalia	Bone	Fragment		1				
B	3931	50	10-20	S	Mammalia	Bone	Fragment		1491				
B	3931	50	10-20	S	Mammalia	Bone	Fragment		58	B			
B	3931	50	10-20	S	Megalops atlanticus	Vertebra	Complete		1				
B	3931	50	10-20	S	Oligoplites sp.	Vertebra	Complete		4				
B	3931	50	10-20	S	Actinopterygii	Dorsal spine	Complete		1				
B	3931	50	10-20	S	Actinopterygii	Maxilla	Fragment		24				
B	3931	50	10-20	S	Actinopterygii	Pterygiophore	Mostly complete		2				
B	3931	50	10-20	S	Actinopterygii	Pterygiophore	Mostly complete		1				
B	3931	50	10-20	S	Actinopterygii	Quadrate	Fragment		1				
B	3931	50	10-20	S	Actinopterygii	Spine	Mostly complete		14				
B	3931	50	10-20	S	Actinopterygii	Bone	Fragment		1				
B	3931	50	10-20	S	Actinopterygii	Bone	Fragment		57				
B	3931	50	10-20	S	Actinopterygii	Bone	Fragment		15				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	3931	50	10-20	S	Actinopterygii	Bone	Fragment		28				
B	3931	50	10-20	S	Actinopterygii	Vertebra	Complete		19				
B	3931	50	10-20	S	Caranx sp.	Vertebra	Complete		55				
B	3931	50	10-20	S	Scomberomorus sp.	Vertebra	Complete		4				
B	3931	50	10-20	S	Scarus sp.	Articular	Proximal fragment	R	1				
B	3931	50	10-20	S	Scarus sp.	Mandible	Fragment		1				
B	3931	50	10-20	S	Scarus sp.	Maxilla	Anterior fragment	R	1				
B	3931	50	10-20	S	Scarus sp.	Maxilla	Fragment		1				
B	3931	50	10-20	S	Scarus sp.	Palatine	Fragment		1				
B	3931	50	10-20	S	Scombridae	Vertebra	Complete		6				
B	3931	50	10-20	S	Serranidae	Premaxilla	Anterior fragment	L	1				
B	3931	50	10-20	S	Sigmodon sp.	Bone	Fragment		3				
B	3931	50	10-20	S	Sphyraena sp.	Vertebra	Complete		2				
B	3931	50	10-20	S	Sus scrofa	Tooth	Fragment		1				
B	3931	50	10-20	S	Actinopterygii	Vertebra	Complete		1				
B	3931	50	10-20	S	Actinopterygii	Vertebra	Complete		8				
B	3931	50	10-20	S	Caranx sp.	Vertebra	Complete		46				
B	3931	50	10-20	S	Bodianus sp.	Vertebra	Complete		6				
B	3931	50	10-20	S	Unidentified	Bone	Fragment		1				
B	3931	50	10-20	S	Unidentified	Bone	Fragment		1				
B	3931	50	10-20	S	Unidentified	Bone	Fragment		1		C		
B	3961	50	10-20	S	Albula vulpes	Vertebra	Complete		2				
B	3961	50	10-20	S	Arius sp.	Cleithrum	Fragment	L	1				
B	3961	50	10-20	S	Arius sp.	Bone	Fragment		3				
B	3961	50	10-20	S	Bagre marinus	Otolith	Complete		2				
B	3961	50	10-20	S	Belonidae	Vertebra	Complete		5				
B	3961	50	10-20	S	Bodianus sp.	Otolith	Complete		2				
B	3961	50	10-20	S	Caranx sp.	Dentary	Fragment	L	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	3961	50	10-20	S	Caranx sp.	Operculum	Proximal fragment	L	1				
B	3961	50	10-20	S	Caranx sp.	Premaxilla	Fragment	L	1				
B	3961	50	10-20	S	Caranx sp.	Scale	Complete		9				
B	3961	50	10-20	S	Caranx sp.	Vertebra	Complete		8				
B	3961	50	10-20	S	Caranx sp.	Vertebra	Complete		8				
B	3961	50	10-20	S	Cathorops sp.	Cranial	Fragment		1				
B	3961	50	10-20	S	Cathorops sp.	Otolith	Complete		1				
B	3961	50	10-20	S	Chelonia mydas	Phalange	Fragment		1				
B	3961	50	10-20	S	Cheloniidae	Carapace	Fragment		1		C		W
B	3961	50	10-20	S	Cheloniidae	Bone	Fragment		42				
B	3961	50	10-20	S	Chloroscombrus chrysurus	Cranial pterygoid	Fragment		2				
B	3961	50	10-20	S	Chloroscombrus chrysurus	Vertebra	Complete		7				
B	3961	50	10-20	S	Dasyprocta punctata	Phalange	Complete		1				
B	3961	50	10-20	S	Haemulon sp.	Otolith	Complete		3				
B	3961	50	10-20	S	Haemulon sp.	Premaxilla	Fragment	L	1				
B	3961	50	10-20	S	Larimus breviceps	Otolith	Complete		2				
B	3961	50	10-20	S	Leptodeira septentrionalis	Vertebra	Complete		2				
B	3961	50	10-20	S	Lutjanus sp.	Basioccipital	Complete		1				
B	3961	50	10-20	S	Lutjanus sp.	Dentary	Mostly complete	L	2				
B	3961	50	10-20	S	Lutjanus sp.	Hyomandibula	Fragment	L	1				
B	3961	50	10-20	S	Lutjanus sp.	Maxilla	Fragment	R	1				
B	3961	50	10-20	S	Lutjanus sp.	Otolith	Complete		6				
B	3961	50	10-20	S	Lutjanus sp.	Quadrate	Complete		3				
B	3961	50	10-20	S	Mammalia	Long bone	Fragment		7				
B	3961	50	10-20	S	Mammalia	Bone	Fragment		1				
B	3961	50	10-20	S	Micropogonias furnieri	Vertebra	Complete		1				
B	3961	50	10-20	S	Scombridae	Vertebra	Complete		2				
B	3961	50	10-20	S	Scombridae	Vertebra	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	3961	50	10-20	S	Scombridae	Vertebra	Complete		2				
B	3961	50	10-20	S	Serranidae	Premaxilla	Fragment		1				
B	3961	50	10-20	S	Sigmodon sp.	Ilium	Fragment	R	1				
B	3961	50	10-20	S	Sigmodon sp.	Mandible	Distal fragment	L	1				
B	3961	50	10-20	S	Sigmodon sp.	Tooth	Complete		2				
B	3961	50	10-20	S	Sigmodon sp.	Bone	Fragment		3				
B	3961	50	10-20	S	Sigmodon sp.	Vertebra	Complete		1				
B	3961	50	10-20	S	Sparisoma sp.	Pharyngeal crown	Fragment		1				
B	3961	50	10-20	S	Sparisoma sp.	Premaxilla	Complete	R	1				
B	3961	50	10-20	S	Sphyraena sp.	Vertebra	Complete		5				
B	3961	50	10-20	S	Actinopterygii	Bone	Fragment		250				
B	3961	50	10-20	S	Actinopterygii	Vertebra	Complete		19				
B	3961	50	10-20	S	Caranx sp.	Vertebra	Complete		61				
B	3961	50	10-20	S	Cathorops sp.	Vertebra	Complete		12				
B	3978	50	20-30	S	Bagre marinus	Supraoccipital	Fragment		1				
B	3978	50	20-30	S	Cheloniidae	Carapace	Fragment		1				
B	3978	50	20-30	S	Cheloniidae	Carapace	Fragment		1				
B	3978	50	20-30	S	Cheloniidae	Carpal	Fragment		1				
B	3978	50	20-30	S	Cheloniidae	Phalange	Complete		1				
B	3978	50	20-30	S	Cheloniidae	Bone	Fragment		1				
B	3978	50	20-30	S	Cheloniidae	Bone	Fragment		4				
B	3978	50	20-30	S	Actinopterygii	Vertebra	Fragment		2				
B	3978	50	20-30	S	Unidentified	Bone	Fragment		22				
B	3982	50	20-30	S	Bodianus sp.	Otolith	Complete		3				
B	3982	50	20-30	S	Cathorops sp.	Otolith	Complete		2				
B	3982	50	20-30	S	Cheloniidae	Premaxilla	Fragment		1				
B	3982	50	20-30	S	Larimus breviceps	Otolith	Complete		2				
B	3982	50	20-30	S	Lutjanus sp.	Otolith	Complete		7				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	3982	50	20-30	S	Micropogonias furnieri	Otolith	Complete		1				
B	4006	50	20-30	S	Bagre marinus	Otolith	Complete		2				
B	4006	50	20-30	S	Bodianus sp.	Otolith	Complete		1				
B	4006	50	20-30	S	Cathorops sp.	Otolith	Complete		1				
B	4006	50	20-30	S	Chelonia mydas	Carpal	Complete	L	1				
B	4006	50	20-30	S	Cheloniidae	Carapace	Fragment		1				
B	4006	50	20-30	S	Cheloniidae	Carapace	Fragment		1				
B	4006	50	20-30	S	Eretmochelys imbricata	Jugal	Mostly complete	L	1				
B	4006	50	20-30	S	Haemulon sp.	Otolith	Complete		4				
B	4006	50	20-30	S	Larimus breviceps	Otolith	Complete		1				
B	4006	50	20-30	S	Lutjanus sp.	Otolith	Complete		9				
B	4008	50	20-30	S	Bodianus sp.	Otolith	Complete		1				
B	4008	50	20-30	S	Cathorops sp.	Otolith	Complete		1				
B	4008	50	20-30	S	Cheloniidae	Bone	Fragment		6				
B	4008	50	20-30	S	Larimus breviceps	Otolith	Complete		1				
B	4008	50	20-30	S	Lutjanus sp.	Otolith	Fragment		1				
B	4008	50	20-30	S	Mammalia	Bone	Fragment		72				
B	4008	50	20-30	S	Actinopterygii	Bone	Fragment		197				
B	4008	50	20-30	S	Actinopterygii	Vertebra	Complete		13				
B	4008	50	20-30	S	Caranx sp.	Vertebra	Complete		70				
B	4008	50	20-30	S	Lutjanus sp.	Vertebra	Complete		15				
B	4008	50	20-30	S	Actinopterygii	Vertebra	Complete		6	B			
B	4008	50	20-30	S	Sigmodon sp.	Femur	Proximal fragment	R	1				
B	4051	50	30-40	S	Cheloniidae	Humerus	Proximal fragment		1		C		
B	4052	50	30-40	S	Caranx sp.	Maxilla	Fragment		1				
B	4052	50	30-40	S	Cheloniidae	Carapace	Fragment		1				
B	4052	50	30-40	S	Cheloniidae	Femur	Fragment		1		C		
B	4052	50	30-40	S	Cheloniidae	Phalange	Mostly complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	4052	50	30-40	S	Dasyprocta punctata	Vertebra	Complete		1				
B	4052	50	30-40	S	Actinopterygii	Bone	Fragment		80				
B	4055	50	30-40	S	Acanthurus sp.	Vertebra	Complete		1				
B	4055	50	30-40	S	Albula vulpes	Vertebra	Complete		2				
B	4055	50	30-40	S	Arius sp.	Coracoid	Fragment		3				
B	4055	50	30-40	S	Arius sp.	Dorsal spine	Proximal fragment		1				
B	4055	50	30-40	S	Aves	Phalange	Complete		1	B			
B	4055	50	30-40	S	Bagre marinus	Cleithrum	Fragment		3				
B	4055	50	30-40	S	Bagre marinus	Supraoccipital	Fragment		1				
B	4055	50	30-40	S	Bagre marinus	Vomer	Complete		1				
B	4055	50	30-40	S	Batrachoididae	Vertebra	Complete		2				
B	4055	50	30-40	S	Belonidae	Vertebra	Complete		7				
B	4055	50	30-40	S	Caranx sp.	Maxilla	Proximal fragment	L	1				
B	4055	50	30-40	S	Caranx sp.	Vertebra	Complete		12				
B	4055	50	30-40	S	Cathorops sp.	Cleithrum	Proximal fragment	R	1				
B	4055	50	30-40	S	Cheloniidae	Bone	Fragment		33				
B	4055	50	30-40	S	Chloroscombrus chrysurus	Dentary	Mostly complete	R	2				
B	4055	50	30-40	S	Chloroscombrus chrysurus	Vertebra	Complete		36				
B	4055	50	30-40	S	Clupeidae	Vertebra	Complete		5				
B	4055	50	30-40	S	Gerres sp.	Dentary	Fragment	R	1				
B	4055	50	30-40	S	Gerres sp.	Vomer	Complete		2				
B	4055	50	30-40	S	Muraenidae	Vertebra	Complete		1				
B	4055	50	30-40	S	Haemulon sp.	Cranial	Complete		2				
B	4055	50	30-40	S	Haemulon sp.	Otolith	Complete		2				
B	4055	50	30-40	S	Haemulon sp.	Premaxilla	Proximal fragment		2				
B	4055	50	30-40	S	Larimus breviceps	Otolith	Complete		4				
B	4055	50	30-40	S	Lutjanus sp.	Articular	Complete	R	1				
B	4055	50	30-40	S	Lutjanus sp.	Dentary	Mostly complete		6				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	4055	50	30-40	S	Lutjanus sp.	Otolith	Complete		11				
B	4055	50	30-40	S	Lutjanus sp.	Premaxilla	Proximal fragment		4				
B	4055	50	30-40	S	Lutjanus sp.	Vertebra	Complete		6				
B	4055	50	30-40	S	Lutjanus sp.	Vertebra	Complete		3				
B	4055	50	30-40	S	Lutjanus sp.	Vomer	Complete		5				
B	4055	50	30-40	S	Mammalia	Long bone	Fragment		1				W
B	4055	50	30-40	S	Micropogonias furnieri	Otolith	Complete		1				
B	4055	50	30-40	S	Oligoplites sp.	Vertebra	Complete		5				
B	4055	50	30-40	S	Pandion haliaetus	Phalange	Complete		1				
B	4055	50	30-40	S	Proechimys semispinosus	Vertebra	Complete		2				
B	4055	50	30-40	S	Scarus sp.	Dentary	Fragment		1	B			
B	4055	50	30-40	S	Scarus sp.	Premaxilla	Complete	R	1				
B	4055	50	30-40	S	Scombridae	Dentary	Fragment		1				
B	4055	50	30-40	S	Scombridae	Vertebra	Complete		2				
B	4055	50	30-40	S	Scombridae	Vertebra	Complete		1				
B	4055	50	30-40	S	Sigmodon sp.	Long bone	Fragment		2				
B	4055	50	30-40	S	Sigmodon sp.	Mandible	Mostly complete	R	1				
B	4055	50	30-40	S	Sigmodon sp.	Vertebra	Complete		4				
B	4055	50	30-40	S	Sphyraena sp.	Premaxilla	Distal fragment		1				
B	4055	50	30-40	S	Sphyraena sp.	Vertebra	Complete		5				
B	4090	51	20-30	S	Mazama americana	Antler	Complete		1	B			W
B	4091	51	20-30	S	Cheloniidae	Carapace	Fragment		5				
B	4091	51	20-30	S	Cheloniidae	Carapace	Fragment		2				
B	4091	51	20-30	S	Cheloniidae	Carapace	Fragment		5				
B	4091	51	20-30	S	Cheloniidae	Phalange	Fragment		8				
B	4093	51	20-30	S	Arius sp.	Bone	Fragment		1				
B	4093	51	20-30	S	Cheloniidae	Bone	Fragment		17				
B	4093	51	20-30	S	Cheloniidae	Carapace	Fragment		22				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	4093	51	20-30	S	Cheloniidae	Long bone	Fragment		9				
B	4093	51	20-30	S	Cheloniidae	Phalange	Fragment		10				
B	4093	51	20-30	S	Cheloniidae	Vertebra	Complete		2				
B	4093	51	20-30	S	Kinosternon sp.	Plastron	Fragment		1				
B	4093	51	20-30	S	Leptodactylus pentadactylus	Bone	Fragment		3				
B	4093	51	20-30	S	Mammalia	Bone	Fragment		17				
B	4093	51	20-30	S	Oryzomys sp.	Upper incisor	Fragment		1				
B	4093	51	20-30	S	Rhinoclemmys sp.	Carapace	Fragment		1				
B	4093	51	20-30	S	Actinopterygii	Bone	Fragment		612				
B	4093	51	20-30	S	Unidentified	Bone	Fragment		87				
B	4119	51	30-40	S	Chelonia mydas	Humerus	Distal fragment		4				
B	4119	51	30-40	S	Chelonia mydas	Pelvis	Proximal fragment		1				
B	4119	51	30-40	S	Cheloniidae	Carapace	Fragment		19				
B	4119	51	30-40	S	Cheloniidae	Carpal	Complete		3				
B	4119	51	30-40	S	Cheloniidae	Phalange	Fragment		10				
B	4119	51	30-40	S	Cheloniidae	Vertebra	Complete		1				
B	4119	51	30-40	S	Dasyprocta punctata	Humerus	Distal fragment	R	1				
B	4119	51	30-40	S	Dasyprocta punctata	Incisor	Fragment		1				
B	4119	51	30-40	S	Emydidae	Carapace	Fragment		1				
B	4119	51	30-40	S	Mammalia	Bone	Fragment		9				
B	4119	51	30-40	S	Oryzomys sp.	Incisor	Fragment		1				
B	4119	51	30-40	S	Reptilia	Vertebra	Complete		1				
B	4119	51	30-40	S	Actinopterygii	Vertebra	Complete		18				
B	4119	51	30-40	S	Caranx sp.	Vertebra	Complete		82				
B	4119	51	30-40	S	Euthynnus sp.	Vertebra	Complete		4				
B	4119	51	30-40	S	Lutjanus sp.	Vertebra	Complete		18				
B	4119	51	30-40	S	Unidentified	Bone	Fragment		46				
B	5200	60	0-10	S	Aves	Bone	Fragment		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5200	60	0-10	S	Balistes sp.	Tooth	Complete		1				
B	5200	60	0-10	S	Caranx sp.	Premaxilla	Proximal fragment		3				
B	5200	60	0-10	S	Caranx sp.	Vertebra	Mostly complete		21				
B	5200	60	0-10	S	Cheloniidae	Bone	Fragment		37				
B	5200	60	0-10	S	Euthynnus sp.	Vertebra	Mostly complete		1				
B	5200	60	0-10	S	Haemulon sp.	Vertebra	Complete		6				
B	5200	60	0-10	S	Homo sapiens	Cranial	Fragment		1				
B	5200	60	0-10	S	Homo sapiens	Phalange	Mostly complete		1				
B	5200	60	0-10	S	Homo sapiens	Bone	Fragment		2				
B	5200	60	0-10	S	Leptodactylus pentadactylus	Coracoid	Mostly complete	R	1				
B	5200	60	0-10	S	Leptodactylus pentadactylus	Coracoid	Mostly complete	L	1				
B	5200	60	0-10	S	Leptodactylus pentadactylus	Femur	Proximal fragment		1				
B	5200	60	0-10	S	Leptodactylus pentadactylus	Humerus	Proximal fragment		1				
B	5200	60	0-10	S	Leptodactylus pentadactylus	Scapula	Mostly complete		1				
B	5200	60	0-10	S	Leptodactylus pentadactylus	Bone	Fragment		18				
B	5200	60	0-10	S	Leptodactylus pentadactylus	Vertebra	Mostly complete		10				
B	5200	60	0-10	S	Lutjanus sp.	Premaxilla	Proximal fragment		1				
B	5200	60	0-10	S	Lutjanus sp.	Vertebra	Mostly complete		3				
B	5200	60	0-10	S	Megalops atlanticus	Vertebra	Mostly complete		4				
B	5200	60	0-10	S	Oryzomys sp.	Femur	Proximal fragment	L	1				
B	5200	60	0-10	S	Actinopterygii	Bone	Fragment		23				
B	5200	60	0-10	S	Tylosurus crocodilus	Vertebra	Mostly complete		1				
B	5204	60	0-10	S	Homo sapiens	Canine	Complete		1				
B	5212	60	0-10	S	Caranx sp.	Vertebra	Complete		10				
B	5212	60	0-10	S	Cheloniidae	Bone	Fragment		18				
B	5212	60	0-10	S	Cuniculus paca	Cranial	Fragment		1				
B	5212	60	0-10	S	Dasyprocta punctata	Long bone	Fragment		1				
B	5212	60	0-10	S	Euthynnus sp.	Vertebra	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5212	60	0-10	S	Haemulon sp.	Vertebra	Complete		3				
B	5212	60	0-10	S	Homo sapiens	Cranial	Fragment		7				
B	5212	60	0-10	S	Homo sapiens	Bone	Fragment		10				
B	5212	60	0-10	S	Megalops atlanticus	Vertebra	Complete		1				
B	5212	60	0-10	S	Philander opossum	Lower mandible	Fragment	R	1				
B	5212	60	0-10	S	Rhymoclemmys funera	Plastron	Fragment		1				
B	5212	60	0-10	S	Actinopterygii	Bone	Fragment		8				
B	5218	60	0-10	S	Homo sapiens	Canine	Complete		1				
B	5218	60	0-10	S	Homo sapiens	Femur	Fragment		1				
B	5218	60	0-10	S	Homo sapiens	Molar	Complete	R	1				
B	5218	60	0-10	S	Homo sapiens	Phalange	Complete	R	1				
B	5233	60	0-10	S	Aves	Bone	Fragment		1				
B	5233	60	0-10	S	Balistes sp.	Tooth	Complete		1				
B	5233	60	0-10	S	Caranx sp.	Vertebra	Complete		4				
B	5233	60	0-10	S	Cheloniidae	Bone	Fragment		14				
B	5233	60	0-10	S	Dasyprocta punctata	Ilium	Fragment	R	1				
B	5233	60	0-10	S	Actinopterygii	Bone	Fragment		3				
B	5233	60	0-10	S	Tylosurus crocodilus	Vertebra	Complete		1				
B	5245	60	10-20	S	Balistes sp.	Tooth	Complete		1				
B	5245	60	10-20	S	Caranx sp.	Maxilla	Proximal fragment		4				
B	5245	60	10-20	S	Caranx sp.	Premaxilla	Proximal fragment		1				
B	5245	60	10-20	S	Caranx sp.	Vertebra	Complete		66				
B	5245	60	10-20	S	Cheloniidae	Phalange	Complete		3				
B	5245	60	10-20	S	Cheloniidae	Rib	Fragment		2				
B	5245	60	10-20	S	Cheloniidae	Bone	Fragment		68				
B	5245	60	10-20	S	Cheloniidae	Vertebra	Fragment		4				
B	5245	60	10-20	S	Cuniculus paca	Auditory bulla	Complete	L	1				
B	5245	60	10-20	S	Cuniculus paca	Femur	Proximal fragment	L	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5245	60	10-20	S	Cuniculus paca	Incisor	Complete		1				
B	5245	60	10-20	S	Cuniculus paca	Rib	Proximal fragment		1				
B	5245	60	10-20	S	Dasyprocta punctata	Ilium	Fragment	L	1				
B	5245	60	10-20	S	Dasypus novemcinctus	Osteoderm	Complete		1				
B	5245	60	10-20	S	Euthynnus sp.	Vertebra	Complete		5				
B	5245	60	10-20	S	Homo sapiens	Bone	Fragment		1	B			
B	5245	60	10-20	S	Homo sapiens	Bone	Fragment		3				
B	5245	60	10-20	S	Lutjanus sp.	Vertebra	Complete		5				
B	5245	60	10-20	S	Mammalia	Bone	Fragment		2	B			
B	5245	60	10-20	S	Mammalia	Bone	Fragment		7				
B	5245	60	10-20	S	Megalops atlanticus	Vertebra	Complete		1				
B	5245	60	10-20	S	Scarus sp.	Vertebra	Complete		2				
B	5245	60	10-20	S	Scomberomorus sp.	Maxilla	Proximal fragment		1				
B	5245	60	10-20	S	Scomberomorus sp.	Vertebra	Complete		10				
B	5245	60	10-20	S	Sigmodon sp.	Ilium	Fragment	L	1				
B	5245	60	10-20	S	Sphyraena barracuda	Tooth	Complete		1				
B	5245	60	10-20	S	Sphyraena barracuda	Vertebra	Complete		1				
B	5245	60	10-20	S	Actinopterygii	Bone	Fragment		28				
B	5248	60	10-20	S	Homo sapiens	Incisor	Complete		1				
B	5273	60	10-20	S	Arius felis	Otolith	Complete		1				
B	5273	60	10-20	S	Auxis rochei rochei	Vertebra	Complete		1				
B	5273	60	10-20	S	Caranx sp.	Premaxilla	Fragment	R	1				
B	5273	60	10-20	S	Caranx sp.	Vertebra	Complete		4				
B	5273	60	10-20	S	Cheloniidae	Bone	Fragment		4				
B	5273	60	10-20	S	Oligoplites sp.	Vertebra	Complete		1				
B	5273	60	10-20	S	Scomberomorus sp.	Vertebra	Complete		1				
B	5293	60	20-30	S	Cheloniidae	Bone	Fragment		2				
B	5293	60	20-30	S	Dasyprocta punctata	Vertebra	Mostly complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5293	60	20-30	S	Mammalia	Bone	Fragment		1				
B	5293	60	20-30	S	Actinopterygii	Bone	Fragment		9				
B	5293	60	20-30	S	Actinopterygii	Vertebra	Complete		2				
B	5314	60	20-30	S	Acanthurus sp.	Basioccipital	Complete		1				
B	5314	60	20-30	S	Acanthurus sp.	Hyomandibula	Complete	R	1				
B	5314	60	20-30	S	Acanthurus sp.	Hyomandibula	Complete	L	1				
B	5314	60	20-30	S	Acanthurus sp.	Vertebra	Complete		1				
B	5314	60	20-30	S	Caranx sp.	Hyomandibula	Mostly complete		1				
B	5314	60	20-30	S	Caranx sp.	Maxilla	Proximal fragment		1				
B	5314	60	20-30	S	Caranx sp.	Premaxilla	Proximal fragment		1				
B	5314	60	20-30	S	Caranx sp.	Vertebra	Complete		36				
B	5314	60	20-30	S	Caranx sp.	Vomer	Complete		1				
B	5314	60	20-30	S	Cheloniidae	Bone	Fragment		21				
B	5314	60	20-30	S	Cuniculus paca	Molar	Complete		3				
B	5314	60	20-30	S	Cuniculus paca	Radius	Proximal fragment		1				
B	5314	60	20-30	S	Cuniculus paca	Rib	Fragment		2				
B	5314	60	20-30	S	Cuniculus paca	Upper maxilla	Mostly complete	R	1				
B	5314	60	20-30	S	Cuniculus paca	Vertebra	Complete		1				
B	5314	60	20-30	S	Dasyprocta punctata	Astragalus	Complete		1				
B	5314	60	20-30	S	Dasyprocta punctata	Atlas	Complete		1				
B	5314	60	20-30	S	Diodon antennatus	Spine	Complete		1				
B	5314	60	20-30	S	Euthynnus sp.	Quadrate	Complete		1				
B	5314	60	20-30	S	Euthynnus sp.	Vertebra	Complete		5				
B	5314	60	20-30	S	Lutjanus sp.	Vertebra	Complete		1				
B	5314	60	20-30	S	Scarus sp.	Vertebra	Complete		3				
B	5314	60	20-30	S	Scomberomorus sp.	Vertebra	Complete		11				
B	5314	60	20-30	S	Tayassu pecari	Maxilla	Fragment	R	2				
B	5314	60	20-30	S	Actinopterygii	Bone	Fragment		23				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5345	60	30-40	S	Acanthurus sp.	Basioccipital	Mostly complete		1				
B	5345	60	30-40	S	Acanthurus sp.	Vertebra	Complete		6				
B	5345	60	30-40	S	Arius felis	Frontal	Mostly complete		1				
B	5345	60	30-40	S	Balistes sp.	Cranial	Fragment		1				
B	5345	60	30-40	S	Balistes sp.	Maxilla	Fragment		2				
B	5345	60	30-40	S	Balistes sp.	Maxilla	Proximal fragment	R	1				
B	5345	60	30-40	S	Balistes sp.	Maxilla	Proximal fragment	L	1				
B	5345	60	30-40	S	Caranx sp.	Dentary	Fragment		2				
B	5345	60	30-40	S	Caranx sp.	Hyomandibula	Fragment		2				
B	5345	60	30-40	S	Caranx sp.	Premaxilla	Fragment	R	2				
B	5345	60	30-40	S	Caranx sp.	Bone	Fragment		10				
B	5345	60	30-40	S	Caranx sp.	Vertebra	Complete		70				
B	5345	60	30-40	S	Caranx sp.	Vomer	Complete		4				
B	5345	60	30-40	S	Chelonia mydas	Humerus	Proximal fragment		1		C		
B	5345	60	30-40	S	Chelonia mydas	Maxilla	Fragment	R	5				
B	5345	60	30-40	S	Cheloniidae	Phalange	Complete		1				
B	5345	60	30-40	S	Cheloniidae	Phalange	Fragment		3				
B	5345	60	30-40	S	Cheloniidae	Rib	Fragment		3				
B	5345	60	30-40	S	Cheloniidae	Scapula	Fragment		3				
B	5345	60	30-40	S	Cheloniidae	Bone	Fragment		83				
B	5345	60	30-40	S	Cheloniidae	Vertebra	Fragment		4				
B	5345	60	30-40	S	Cuniculus paca	Auditory bulla	Complete		1				
B	5345	60	30-40	S	Cuniculus paca	Ilium	Fragment	L	1				
B	5345	60	30-40	S	Cuniculus paca	Sternal	Fragment		1				
B	5345	60	30-40	S	Dasyprocta punctata	Humerus	Distal fragment	L	1				
B	5345	60	30-40	S	Dasyprocta punctata	Humerus	Fragment		2				
B	5345	60	30-40	S	Dasyprocta punctata	Tibia	Distal fragment	R	1				
B	5345	60	30-40	S	Dasyprocta punctata	Tibia	Fragment		3				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5345	60	30-40	S	Dasyprocta punctata	Ulna	Proximal fragment	R	1				
B	5345	60	30-40	S	Dasyprocta punctata	Vertebra	Complete		1				
B	5345	60	30-40	S	Euthynnus sp.	Vertebra	Complete		28				
B	5345	60	30-40	S	Lutjanus sp.	Hyomandibula	Fragment		1				
B	5345	60	30-40	S	Lutjanus sp.	Mandible	Proximal fragment	L	1				
B	5345	60	30-40	S	Lutjanus sp.	Preopercular	Mostly complete	L	1				
B	5345	60	30-40	S	Lutjanus sp.	Preopercular	Mostly complete		1				
B	5345	60	30-40	S	Mammalia	Scapula	Fragment		1				
B	5345	60	30-40	S	Megalops sp.	Vertebra	Complete		1				
B	5345	60	30-40	S	Mycteroperca sp.	Hyomandibula	Mostly complete	R	1				
B	5345	60	30-40	S	Mycteroperca sp.	Vertebra	Complete		4				
B	5345	60	30-40	S	Pagrus pagrus	Premaxilla	Fragment		1				
B	5345	60	30-40	S	Scarus sp.	Pharyngeal	Complete		1				
B	5345	60	30-40	S	Scarus sp.	Quadrate	Mostly complete		1				
B	5345	60	30-40	S	Scarus sp.	Vertebra	Complete		2				
B	5345	60	30-40	S	Scarus sp.	Vertebra	Complete		2				
B	5345	60	30-40	S	Scomberomorus sp.	Vertebra	Complete		8				
B	5345	60	30-40	S	Actinopterygii	Bone	Fragment		78				
B	5671	60	10-20	HF	Acanthurus sp.	Vertebra	Complete		3				
B	5671	60	10-20	HF	Arius felis	Frontal	Mostly complete		1				
B	5671	60	10-20	HF	Caranx sp.	Vertebra	Complete		10				
B	5671	60	10-20	HF	Cheloniidae	Bone	Fragment		4				
B	5671	60	10-20	HF	Dasyprocta punctata	Ilium	Fragment	R	1				
B	5671	60	10-20	HF	Euthynnus sp.	Vertebra	Complete		5				
B	5671	60	10-20	HF	Haemulon sp.	Vertebra	Complete		1				
B	5671	60	10-20	HF	Lutjanus sp.	Vertebra	Complete		1				
B	5671	60	10-20	HF	Mammalia	Epiphysis	Fragment		1				
B	5671	60	10-20	HF	Proechimys semispinosus	Auditory bulla	Complete	R	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5671	60	10-20	HF	Proechimys semispinosus	Femur	Proximal fragment	L	1				
B	5671	60	10-20	HF	Scomberomorus sp.	Vertebra	Complete		1				
B	5671	60	10-20	HF	Actinopterygii	Bone	Fragment		24				
B	5672	60	20-30	HF	Acanthurus sp.	Vertebra	Complete		3				
B	5672	60	20-30	HF	Arius felis	Cranial	Complete		1				
B	5672	60	20-30	HF	Balistes sp.	Cranial	Complete		1				
B	5672	60	20-30	HF	Balistes sp.	Cranial	Complete		1				
B	5672	60	20-30	HF	Balistes sp.	Vertebra	Complete		2				
B	5672	60	20-30	HF	Bodianus sp.	Vertebra	Complete		5				
B	5672	60	20-30	HF	Caranx sp.	Cranial	Complete		2				
B	5672	60	20-30	HF	Caranx sp.	Vertebra	Complete		31				
B	5672	60	20-30	HF	Caranx sp.	Vomer	Complete		1				
B	5672	60	20-30	HF	Cheloniidae	Phalange	Complete		1				
B	5672	60	20-30	HF	Cheloniidae	Plastron	Fragment		5				
B	5672	60	20-30	HF	Cheloniidae	Bone	Fragment		13	B			
B	5672	60	20-30	HF	Cheloniidae	Bone	Fragment		13				
B	5672	60	20-30	HF	Cheloniidae	Vertebra	Fragment		3				
B	5672	60	20-30	HF	Euthynnus sp.	Vertebra	Complete		18				
B	5672	60	20-30	HF	Lutjanus sp.	Maxilla	Proximal fragment		2				
B	5672	60	20-30	HF	Lutjanus sp.	Vertebra	Complete		1				
B	5672	60	20-30	HF	Lutjanus sp.	Vertebra	Complete		1	B			
B	5672	60	20-30	HF	Scarus sp.	Vertebra	Complete		3				
B	5672	60	20-30	HF	Scomberomorus sp.	Vertebra	Complete		8				
B	5672	60	20-30	HF	Sparisoma sp.	Lower pharyngeal	Complete		1				
B	5672	60	20-30	HF	Sphyraena barracuda	Vertebra	Complete		2				
B	5672	60	20-30	HF	Actinopterygii	Bone	Fragment		47				
B	5673	60	30-40	HF	Archosargus probatocephalus	Cranial	Complete		1				
B	5673	60	30-40	HF	Arius felis	Cranial	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5673	60	30-40	HF	Caranx sp.	Cranial	Fragment		1				
B	5673	60	30-40	HF	Caranx sp.	Maxilla	Proximal fragment		3				
B	5673	60	30-40	HF	Caranx sp.	Premaxilla	Proximal fragment	L	1				
B	5673	60	30-40	HF	Caranx sp.	Vertebra	Complete		28				
B	5673	60	30-40	HF	Cheloniidae	Bone	Fragment		20				
B	5673	60	30-40	HF	Dasyprocta punctata	Carpal	Complete		1				
B	5673	60	30-40	HF	Dasyprocta punctata	Epiphysis	Fragment		1				
B	5673	60	30-40	HF	Dasyprocta punctata	Occipital condyle	Complete	R	1				
B	5673	60	30-40	HF	Dasyprocta punctata	Vertebra	Fragment		2				
B	5673	60	30-40	HF	Epinephelus sp.	Cranial	Fragment		4				
B	5673	60	30-40	HF	Epinephelus sp.	Vertebra	Complete		1				
B	5673	60	30-40	HF	Euthynnus sp.	Vertebra	Complete		16				
B	5673	60	30-40	HF	Haemulon sp.	Premaxilla	Proximal fragment	L	1				
B	5673	60	30-40	HF	Haemulon sp.	Vertebra	Complete		7				
B	5673	60	30-40	HF	Lutjanus sp.	Hyomandibula	Complete		1				
B	5673	60	30-40	HF	Lutjanus sp.	Maxilla	Proximal fragment		1				
B	5673	60	30-40	HF	Lutjanus sp.	Vertebra	Complete		8				
B	5673	60	30-40	HF	Scomberomorus sp.	Vertebra	Complete		10				
B	5673	60	30-40	HF	Sigmodon sp.	Ilium	Fragment	L	1				
B	5673	60	30-40	HF	Sphyraena barracuda	Vertebra	Complete		7				
B	5673	60	30-40	HF	Actinopterygii	Bone	Fragment		56				
B	5673	60	30-40	HF	Actinopterygii	Vertebra	Complete		2				
B	5220	61	0-10	S	Cheloniidae	Bone	Fragment		1				
B	5227	61	0-10	S	Caranx sp.	Vertebra	Complete		17				
B	5227	61	0-10	S	Cheloniidae	Bone	Fragment		26				
B	5227	61	0-10	S	Cuniculus paca	Molar	Complete		1				
B	5227	61	0-10	S	Dasyprocta punctata	Molar	Complete		2				
B	5227	61	0-10	S	Homo sapiens	Bone	Fragment		41				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5227	61	0-10	S	Scarus sp.	Pharyngeal	Fragment		1				
B	5227	61	0-10	S	Sigmodon sp.	Tibia	Proximal fragment	L	1				
B	5230	61	0-10	S	Homo sapiens	Molar	Complete		1				
B	5263	61	10-20	S	Caranx sp.	Vertebra	Complete		1				
B	5263	61	10-20	S	Cheloniidae	Bone	Fragment		9				
B	5263	61	10-20	S	Homo sapiens	Canine	Complete		1				
B	5263	61	10-20	S	Homo sapiens	Incisor	Complete		1				
B	5263	61	10-20	S	Homo sapiens	Bone	Fragment		11				
B	5263	61	10-20	S	Lutjanus sp.	Tooth	Complete		1				
B	5263	61	10-20	S	Actinopterygii	Bone	Fragment		5				
B	5275	61	10-20	S	Caranx sp.	Cranial	Fragment		1				
B	5275	61	10-20	S	Caranx sp.	Vomer	Complete		1				
B	5275	61	10-20	S	Cheloniidae	Bone	Fragment		12				
B	5275	61	10-20	S	Dasyprocta punctata	Incisor	Complete		1				
B	5275	61	10-20	S	Euthynnus sp.	Vertebra	Complete		1				
B	5275	61	10-20	S	Lutjanus sp.	Vertebra	Complete		1				
B	5275	61	10-20	S	Odocoileus virginianus	Metapodial	Distal fragment		1				
B	5302	61	10-20	S	Caranx sp.	Vertebra	Complete		8				
B	5302	61	10-20	S	Cheloniidae	Bone	Fragment		11				
B	5302	61	10-20	S	Epinephelus sp.	Vertebra	Complete		1				
B	5302	61	10-20	S	Homo sapiens	Bone	Fragment		5				
B	5302	61	10-20	S	Mazama americana	Vertebra	Complete		1				
B	5302	61	10-20	S	Sphyraena barracuda	Vertebra	Complete		1				
B	5302	61	10-20	S	Actinopterygii	Bone	Fragment		4				
B	5324	61	10-20	S	Caranx sp.	Cranial	Fragment		1				
B	5324	61	10-20	S	Caranx sp.	Vertebra	Complete		5				
B	5324	61	10-20	S	Cheloniidae	Bone	Fragment		12				
B	5324	61	10-20	S	Dasyprocta punctata	Femur	Proximal fragment	L	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5324	61	10-20	S	Dasyprocta punctata	Vertebra	Fragment		1				
B	5324	61	10-20	S	Homo sapiens	Occipital	Fragment		1				
B	5324	61	10-20	S	Actinopterygii	Dentary	Fragment		1				
B	5339	61	20-30	S	Caranx sp.	Vertebra	Complete		17				
B	5339	61	20-30	S	Cheloniidae	Frontal	Fragment	L	2				
B	5339	61	20-30	S	Cheloniidae	Humerus	Fragment		1				
B	5339	61	20-30	S	Cheloniidae	Phalange	Complete		1				
B	5339	61	20-30	S	Cheloniidae	Scapula	Fragment		1				
B	5339	61	20-30	S	Cheloniidae	Bone	Fragment		44				
B	5339	61	20-30	S	Cheloniidae	Vertebra	Fragment		2				
B	5339	61	20-30	S	Dasyprocta punctata	Humerus	Distal fragment	L	1				
B	5339	61	20-30	S	Dasyprocta punctata	Lower mandible	Fragment	L	1				
B	5339	61	20-30	S	Dasyprocta punctata	Lower mandible	Fragment	R	1				
B	5339	61	20-30	S	Dasyprocta punctata	Sacrum	Complete		1				
B	5339	61	20-30	S	Homo sapiens	Cranial	Fragment		1				
B	5339	61	20-30	S	Homo sapiens	Ulna	Fragment		1				
B	5339	61	20-30	S	Kyphosus sectatrix	Premaxilla	Fragment		1				
B	5339	61	20-30	S	Mammalia	Bone	Fragment		1				
B	5339	61	20-30	S	Odocoileus virginianus	Femur	Fragment		2				
B	5339	61	20-30	S	Odocoileus virginianus	Tibia	Epiphyseal plate		1				
B	5339	61	20-30	S	Actinopterygii	Bone	Fragment		5				
B	5364	61	20-30	S	Acanthurus sp.	Vertebra	Complete		2				
B	5364	61	20-30	S	Arius felis	Frontal	Mostly complete		1				
B	5364	61	20-30	S	Calamus sp.	Maxilla	Complete		1				
B	5364	61	20-30	S	Calamus sp.	Premaxilla	Proximal fragment		2				
B	5364	61	20-30	S	Caranx sp.	Maxilla	Proximal fragment		1				
B	5364	61	20-30	S	Caranx sp.	Premaxilla	Proximal fragment		1				
B	5364	61	20-30	S	Caranx sp.	Vertebra	Complete		37				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5364	61	20-30	S	Caranx sp.	Vomer	Complete		1				
B	5364	61	20-30	S	Chelonia mydas	Cranial	Fragment		1				
B	5364	61	20-30	S	Chelonia mydas	Femur	Proximal fragment	R	1		C		
B	5364	61	20-30	S	Chelonia mydas	Phalange	Mostly complete		2				
B	5364	61	20-30	S	Chelonia mydas	Scapula	Distal fragment		1				
B	5364	61	20-30	S	Chelonia mydas	Vertebra	Fragment		2				
B	5364	61	20-30	S	Cheloniidae	Bone	Fragment		69				
B	5364	61	20-30	S	Cuniculus paca	Cranial	Fragment		1				
B	5364	61	20-30	S	Dasyprocta punctata	Ilium	Fragment	R	1				
B	5364	61	20-30	S	Dasyprocta punctata	Ilium	Fragment	L	2				
B	5364	61	20-30	S	Dasyprocta punctata	Vertebra	Fragment		1				
B	5364	61	20-30	S	Euthynnus sp.	Vertebra	Complete		5				
B	5364	61	20-30	S	Homo sapiens	Incisor	Complete		1				
B	5364	61	20-30	S	Leptodactylus pentadactylus	Femur	Proximal fragment		1				
B	5364	61	20-30	S	Leptodactylus pentadactylus	Humerus	Proximal fragment		1				
B	5364	61	20-30	S	Leptodactylus pentadactylus	Bone	Fragment		3				
B	5364	61	20-30	S	Lutjanus sp.	Vertebra	Complete		6				
B	5364	61	20-30	S	Mammalia	Bone	Fragment		3				
B	5364	61	20-30	S	Odocoileus virginianus	Antler	Fragment		1		C		
B	5364	61	20-30	S	Rodentia	Tibia	Fragment		1				
B	5364	61	20-30	S	Actinopterygii	Bone	Fragment		32				
B	5364	61	20-30	S	Tylosurus crocodilus	Vertebra	Complete		2				
B	5370	61	30-40	S	Aves	Femur	Distal fragment		1				
B	5370	61	30-40	S	Bodianus sp.	Dentary	Fragment		1				
B	5370	61	30-40	S	Caranx sp.	Cranial	Fragment		7				
B	5370	61	30-40	S	Caranx sp.	Cranial	Fragment		1				
B	5370	61	30-40	S	Caranx sp.	Maxilla	Proximal fragment		5				
B	5370	61	30-40	S	Caranx sp.	Premaxilla	Proximal fragment		5				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5370	61	30-40	S	Caranx sp.	Vertebra	Complete		95				
B	5370	61	30-40	S	Caranx sp.	Vertebra	Mostly complete		1	B			
B	5370	61	30-40	S	Caranx sp.	Vomer	Complete		2				
B	5370	61	30-40	S	Cheloniidae	Phalange	Mostly complete		3				
B	5370	61	30-40	S	Cheloniidae	Plastron	Fragment		1				
B	5370	61	30-40	S	Cheloniidae	Bone	Fragment		36				
B	5370	61	30-40	S	Cheloniidae	Vertebra	Fragment		7				
B	5370	61	30-40	S	Chloroscombrus chrysurus	Vertebra	Complete		1				
B	5370	61	30-40	S	Cuniculus paca	Femur	Mostly complete	R	1				
B	5370	61	30-40	S	Cuniculus paca	Rib	Proximal fragment		1				
B	5370	61	30-40	S	Cuniculus paca	Sacrum	Fragment		1				
B	5370	61	30-40	S	Cuniculus paca	Vertebra	Fragment		1				
B	5370	61	30-40	S	Dasyprocta punctata	Auditory bulla	Complete	R	1				
B	5370	61	30-40	S	Dasyprocta punctata	Femur	Complete	L	2				
B	5370	61	30-40	S	Dasyprocta punctata	Lower mandible	Fragment	L	1				
B	5370	61	30-40	S	Dasyprocta punctata	Metacarpal	Complete		3				
B	5370	61	30-40	S	Dasyprocta punctata	Rib	Proximal fragment		1				
B	5370	61	30-40	S	Dasyprocta punctata	Tibia	Complete	R	1				
B	5370	61	30-40	S	Dasyprocta punctata	Vertebra	Mostly complete		2				
B	5370	61	30-40	S	Euthynnus sp.	Vertebra	Complete		2				
B	5370	61	30-40	S	Euthynnus sp.	Vertebra	Complete		12				
B	5370	61	30-40	S	Homo sapiens	Molar	Complete		1				
B	5370	61	30-40	S	Homo sapiens	Bone	Fragment		1				
B	5370	61	30-40	S	Lutjanus sp.	Cranial	Fragment		1				
B	5370	61	30-40	S	Lutjanus sp.	Maxilla	Proximal fragment		1				
B	5370	61	30-40	S	Lutjanus sp.	Vertebra	Complete		6				
B	5370	61	30-40	S	Mazama americana	Frontal	Fragment	L	1		C		
B	5370	61	30-40	S	Proechimys semispinosus	Calcaneus	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5370	61	30-40	S	Proechimys semispinosus	Femur	Complete	R	1				
B	5370	61	30-40	S	Proechimys semispinosus	Tibia	Proximal fragment	R	1				
B	5370	61	30-40	S	Proechimys semispinosus	Tibia	Distal fragment	R	1				
B	5370	61	30-40	S	Scarus sp.	Quadrate	Proximal fragment		1				
B	5370	61	30-40	S	Scomberomorus sp.	Maxilla	Proximal fragment		1				
B	5370	61	30-40	S	Scomberomorus sp.	Vertebra	Complete		13				
B	5370	61	30-40	S	Sphyraena barracuda	Vertebra	Complete		1				
B	5370	61	30-40	S	Actinopterygii	Bone	Fragment		73				
B	5370	61	30-40	S	Tylosurus crocodilus	Vertebra	Complete		1				
B	5379	61	30-40	S	Trichechus manatus	Rib	Fragment		1				
B	5689	61	10-20	HF	Calamus sp.	Maxilla	Complete		1				
B	5689	61	10-20	HF	Caranx sp.	Maxilla	Proximal fragment		2				
B	5689	61	10-20	HF	Caranx sp.	Vertebra	Complete		12				
B	5689	61	10-20	HF	Cheloniidae	Bone	Fragment		45				
B	5689	61	10-20	HF	Dasyatidae	Spine	Fragment		1				
B	5689	61	10-20	HF	Dasyprocta punctata	Metapodial	Complete		1				
B	5689	61	10-20	HF	Euthynnus sp.	Vertebra	Complete		4				
B	5689	61	10-20	HF	Leptodactylus pentadactylus	Femur	Proximal fragment		1				
B	5689	61	10-20	HF	Leptodactylus pentadactylus	Tibiofibula	Fragment		1				
B	5689	61	10-20	HF	Leptodactylus pentadactylus	Vertebra	Mostly complete		1				
B	5689	61	10-20	HF	Lutjanus sp.	Vertebra	Complete		7				
B	5689	61	10-20	HF	Mammalia	Long bone	Fragment		5				
B	5689	61	10-20	HF	Actinopterygii	Bone	Fragment		20				
B	5690	61	20-30	HF	Acanthurus sp.	Vertebra	Complete		1				
B	5690	61	20-30	HF	Amphibia	Tibiofibula	Proximal fragment		1				
B	5690	61	20-30	HF	Aves	Femur	Proximal fragment		1				
B	5690	61	20-30	HF	Aves	Humerus	Proximal fragment		1				
B	5690	61	20-30	HF	Caranx sp.	Cranial	Fragment		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
B	5690	61	20-30	HF	Caranx sp.	Dentary	Proximal fragment	R	1				
B	5690	61	20-30	HF	Caranx sp.	Premaxilla	Proximal fragment	L	1				
B	5690	61	20-30	HF	Caranx sp.	Vertebra	Complete		7				
B	5690	61	20-30	HF	Cheloniidae	Bone	Fragment		6				
B	5690	61	20-30	HF	Odocoileus virginianus	Cranial	Fragment		5				
B	5690	61	20-30	HF	Scomberomorus sp.	Vertebra	Complete		1				
B	5690	61	20-30	HF	Actinopterygii	Bone	Fragment		6				
B	5691	61	30-40	HF	Acanthurus sp.	Vertebra	Complete		2				
B	5691	61	30-40	HF	Caranx sp.	Maxilla	Proximal fragment		1				
B	5691	61	30-40	HF	Caranx sp.	Premaxilla	Proximal fragment		1				
B	5691	61	30-40	HF	Caranx sp.	Vertebra	Complete		15				
B	5691	61	30-40	HF	Cheloniidae	Bone	Fragment		4				
B	5691	61	30-40	HF	Dasyprocta punctata	Vertebra	Complete		1				
B	5691	61	30-40	HF	Euthynnus sp.	Vertebra	Complete		3				
B	5691	61	30-40	HF	Proechimys semispinosus	Femur	Complete	L	1				
B	5691	61	30-40	HF	Scomberomorus sp.	Vertebra	Complete		9				
B	5691	61	30-40	HF	Actinopterygii	Bone	Fragment		18				
H	3881	49	0-5	S	Cheloniidae	Carapace	Fragment		4				
H	3881	49	0-5	S	Actinopterygii	Bone	Fragment		8				
H	3915	49	5-10	S	Mammalia	Bone	Fragment		2				
H	3915	49	5-10	S	Actinopterygii	Bone	Fragment		7				
H	3915	49	5-10	S	Unidentified	Bone	Fragment		1				
H	3946	49	5-10	S	Cricetidae	Femur	Fragment		1				
H	3946	49	5-10	S	Actinopterygii	Bone	Fragment		10				
H	3946	49	5-10	S	Actinopterygii	Mandible	Fragment		1				
H	3946	49	5-10	S	Actinopterygii	Vertebra	Fragment		3				
H	3993	49	10-20	S	Aves	Long bone	Fragment		1				
H	3993	49	10-20	S	Aves	Sternum	Fragment		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
H	3993	49	10-20	S	Cheloniidae	Bone	Fragment		34				
H	3993	49	10-20	S	Cheloniidae	Bone	Fragment		1				
H	3993	49	10-20	S	Cheloniidae	Long bone	Fragment		1				
H	3993	49	10-20	S	Cheloniidae	Plastron	Fragment		3				
H	3993	49	10-20	S	Cheloniidae	Carapace	Fragment		15				
H	3993	49	10-20	S	Cheloniidae	Vertebra	Fragment		1				
H	3993	49	10-20	S	Dasyprocta punctata	Calcaneus	Fragment		1				
H	3993	49	10-20	S	Dasyprocta punctata	Canine	Fragment		2				
H	3993	49	10-20	S	Iguana iguana	Axis vertebra	Complete		1				
H	3993	49	10-20	S	Iguana iguana	Mandible	Fragment		2				
H	3993	49	10-20	S	Mammalia	Bone	Fragment		1				
H	3993	49	10-20	S	Odocoileus virginianus	Tooth	Complete		1				
H	3993	49	10-20	S	Proechimys semispinosus	Femur	Proximal fragment		1				
H	3993	49	10-20	S	Proechimys semispinosus	Femur	Proximal fragment		1				
H	3993	49	10-20	S	Proechimys semispinosus	Femur	Shaft fragment	L	1				
H	3993	49	10-20	S	Proechimys semispinosus	Femur	Proximal fragment		2				
H	3993	49	10-20	S	Proechimys semispinosus	Illium	Fragment	L	1				
H	3993	49	10-20	S	Proechimys semispinosus	Ischium	Fragment	L	1				
H	3993	49	10-20	S	Proechimys semispinosus	Premaxilla	Fragment		1				
H	3993	49	10-20	S	Proechimys semispinosus	Tibia	Shaft fragment		1				
H	3993	49	10-20	S	Actinopterygii	Bone	Fragment		44				
H	3997	49	10-20	S	Cheloniidae	Bone	Fragment		3				
H	3997	49	10-20	S	Actinopterygii	Bone	Fragment		3				
H	4027	49	20-27	S	Cheloniidae	Bone	Fragment		12				
H	4027	49	20-27	S	Cheloniidae	Plastron	Fragment		1				
H	4027	49	20-27	S	Mammalia	Bone	Fragment		2				
H	4027	49	20-27	S	Actinopterygii	Bone	Fragment		14				
H	3936	51	0-10	S	Cheloniidae	Bone	Fragment		27				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
H	3936	51	0-10	S	Actinopterygii	Bone	Fragment		7				
H	3936	51	0-10	S	Actinopterygii	Vertebra	Complete		18				
H	3936	51	0-10	S	Caranx sp.	Vertebra	Complete		82				
H	3936	51	0-10	S	Lutjanus sp.	Vertebra	Complete		12				
H	3936	51	0-10	S	Euthynnus sp.	Vertebra	Complete		20				
H	3964	51	0-10	S	Cheloniidae	Carapace	Fragment		7				
H	3964	51	0-10	S	Actinopterygii	Vertebra	Complete		2				
H	3964	51	0-10	S	Caranx sp.	Vertebra	Complete		25				
H	3964	51	0-10	S	Actinopterygii	Vomer	Complete		4				
H	3969	51	10-20	S	Aves	Digit	Fragment		1				
H	3969	51	10-20	S	Cheloniidae	Bone	Fragment		7				
H	3969	51	10-20	S	Cheloniidae	Carapace	Fragment		1				
H	3969	51	10-20	S	Colubrinae	Vertebra	Complete		1				
H	3969	51	10-20	S	Dasyatidae	Spine	Fragment		1				
H	3969	51	10-20	S	Actinopterygii	Bone	Fragment		25				
H	3969	51	10-20	S	Actinopterygii	Vertebra	Complete		12				
H	3969	51	10-20	S	Caranx sp.	Vertebra	Complete		77				
H	4019	51	10-20	S	Homo sapiens	Mandible	Fragment		1				
H	4022	51	10-20	S	Aves	Digit	Complete		1				
H	4022	51	10-20	S	Cheloniidae	Bone	Fragment		7				
H	4022	51	10-20	S	Cheloniidae	Carapace	Fragment		12				
H	4022	51	10-20	S	Cheloniidae	Long bone	Fragment		1				
H	4022	51	10-20	S	Cheloniidae	Scapula	Fragment		1				
H	4022	51	10-20	S	Leptodactylus pentadactylus	Bone	Fragment		1				
H	4022	51	10-20	S	Mammalia	Bone	Fragment		4				
H	4022	51	10-20	S	Oryzomys sp.	Bone	Fragment		3				
H	4022	51	10-20	S	Actinopterygii	Bone	Fragment		206				
H	4022	51	10-20	S	Unidentified	Bone	Fragment		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
H	4059	51	10-20	S	Cheloniidae	Bone	Fragment		30				
H	4059	51	10-20	S	Cheloniidae	Carapace	Fragment		1				
H	4059	51	10-20	S	Cheloniidae	Carapace	Fragment		1				
H	4059	51	10-20	S	Cheloniidae	Carapace	Fragment		3				
H	4059	51	10-20	S	Cheloniidae	Carpal	Fragment		1	B			
H	4059	51	10-20	S	Cheloniidae	Carpal	Complete		1				
H	4059	51	10-20	S	Cheloniidae	Humerus	Fragment		1		C		
H	4059	51	10-20	S	Cheloniidae	Long bone	Fragment		14				
H	4059	51	10-20	S	Cheloniidae	Mandible	Fragment		1				
H	4059	51	10-20	S	Cheloniidae	Pelvic girdle	Fragment		1				
H	4059	51	10-20	S	Cheloniidae	Rib	Fragment		2				
H	4059	51	10-20	S	Emydidae	Cranial	Fragment		4				
H	4059	51	10-20	S	Homo sapiens	Phalange I	Complete		1				
H	4059	51	10-20	S	Oryzomys sp.	Incisor	Fragment		4				
H	4059	51	10-20	S	Oryzomys sp.	Tibia	Fragment		1				
H	4059	51	10-20	S	Proechimys semispinosus	Femur	Distal fragment	R	1				
H	4059	51	10-20	S	Proechimys semispinosus	Femur	Proximal fragment	R	1				
H	4059	51	10-20	S	Proechimys semispinosus	Pelvis	Fragment	R	1				
H	4059	51	10-20	S	Proechimys semispinosus	Tibia	Proximal fragment	R	1				
H	4059	51	10-20	S	Proechimys semispinosus	Tooth	Fragment		1				
H	4059	51	10-20	S	Sigmodon sp.	Femur	Complete	L	1				
H	4059	51	10-20	S	Sigmodon sp.	Mandible	Fragment		3				
H	4059	51	10-20	S	Sigmodon sp.	Pelvis	Fragment	R	2				
H	4059	51	10-20	S	Sigmodon sp.	Tibia	Complete	R	1				
H	4059	51	10-20	S	Sus scrofa	Phalange	Complete		1				
H	4059	51	10-20	S	Sus scrofa	Tooth	Mostly complete		1				
H	4059	51	10-20	S	Actinopterygii	Bone	Fragment		726				
H	4059	51	10-20	S	Actinopterygii	Bone	Fragment		247				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
H	4059	51	10-20	S	Actinopterygii	Otolith	Fragment		1				
H	5101	51	10-20	S	Cheloniidae	Coracoid	Fragment		1				
H	5101	51	10-20	S	Cheloniidae	Long bone	Fragment		13				
H	5101	51	10-20	S	Actinopterygii	Bone	Fragment		1				
PB	4146	49	37-47	S	Aves	Long bone	Shaft fragment		1				
PB	4146	49	37-47	S	Aves	Synsacrum	Fragment		1				
PB	4146	49	37-47	S	Cheloniidae	Bone	Fragment		11				
PB	4146	49	37-47	S	Cheloniidae	Cervical vertebra	Fragment		1				
PB	4146	49	37-47	S	Cheloniidae	Phalange	Shaft fragment		1				
PB	4146	49	37-47	S	Cheloniidae	Long bone	Fragment		38				
PB	4146	49	37-47	S	Cheloniidae	Long bone	Shaft fragment		1				
PB	4146	49	37-47	S	Cheloniidae	Carapace	Fragment		22				
PB	4146	49	37-47	S	Cheloniidae	Vertebra	Complete		1				
PB	4146	49	37-47	S	Dasyprocta punctata	Incisor	Complete		1				
PB	4146	49	37-47	S	Dasyprocta punctata	Lower incisor	Complete		1				
PB	4146	49	37-47	S	Homo sapiens	Canine	Complete		1				
PB	4146	49	37-47	S	Homo sapiens	Illium	Fragment		1				
PB	4146	49	37-47	S	Homo sapiens	Incisor	Complete		1				
PB	4146	49	37-47	S	Homo sapiens	Molar	Complete		1				
PB	4146	49	37-47	S	Homo sapiens	Phalange	Fragment		1				
PB	4146	49	37-47	S	Homo sapiens	Phalange	Shaft fragment		1				
PB	4146	49	37-47	S	Homo sapiens	Premolar	Complete		1				
PB	4146	49	37-47	S	Homo sapiens	Radius	Proximal fragment		1				
PB	4146	49	37-47	S	Homo sapiens	Temporal	Fragment		1				
PB	4146	49	37-47	S	Homo sapiens	Temporal	Fragment	L	1		C		
PB	4146	49	37-47	S	Homo sapiens	Ulna	Shaft fragment		1				
PB	4146	49	37-47	S	Homo sapiens	Upper maxilla wM1	Fragment	R	1				
PB	4146	49	37-47	S	Homo sapiens	Upper molar	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	4146	49	37-47	S	Mammalia	Long bone	Fragment		1		C		
PB	4146	49	37-47	S	Mammalia	Long bone	Fragment		1				
PB	4146	49	37-47	S	Mammalia	Mandible	Fragment	L	1	B			
PB	4146	49	37-47	S	Mammalia	Rib	Fragment		1				
PB	4146	49	37-47	S	Mammalia	Vertebra	Fragment		1				
PB	4146	49	37-47	S	Odocoileus virginianus	Mandible	Distal fragment		1				
PB	4146	49	37-47	S	Odocoileus virginianus	Phalange	Complete		1				
PB	4146	49	37-47	S	Odocoileus virginianus	Zygomatic arch	Fragment	R	1		C		
PB	4146	49	37-47	S	Actinopterygii	Bone	Fragment		18				
PB	4190	49	47-57	S	Cheloniidae	Bone	Fragment		5				
PB	4190	49	47-57	S	Homo sapiens	Molar	Fragment		1				
PB	4190	49	47-57	S	Mammalia	Long bone	Fragment		1				
PB	4190	49	47-57	S	Reptilia	Vertebra	Fragment		1				
PB	4190	49	47-57	S	Actinopterygii	Bone	Fragment		10				
PB	4191	49	47-57	S	Aves	Coracoid	Fragment		1				
PB	4191	49	47-57	S	Aves	Humerus	Distal fragment		1				
PB	4191	49	47-57	S	Cheloniidae	Carapace	Fragment		2				
PB	4191	49	47-57	S	Mammalia	Cranial	Fragment		1				
PB	4191	49	47-57	S	Odocoileus virginianus	Antler	Fragment		1	B			
PB	4191	49	47-57	S	Actinopterygii	Bone	Fragment		30				
PB	4203	49	67-77	S	Chelonia mydas	Scapula	Fragment		3				
PB	4203	49	67-77	S	Mammalia	Femur	Complete		1				
PB	4203	49	67-77	S	Actinopterygii	Bone	Fragment		7				
PB	4203	49	67-77	S	Actinopterygii	Bone	Fragment		11				
PB	4210	49	77-87	S	Caretta caretta	Scapula	Fragment	L	1				
PB	4210	49	77-87	S	Cheloniidae	Bone	Fragment		12				
PB	4210	49	77-87	S	Mammalia	Bone	Fragment		1	B			
PB	4210	49	77-87	S	Actinopterygii	Bone	Fragment		1	B			

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	4210	49	77-87	S	Actinopterygii	Bone	Fragment		4				
PB	4210	49	77-87	S	Actinopterygii	Vertebra	Fragment		2				
PB	4262	49	87-97	S	Caretta caretta	Scapula	Fragment	L	1				
PB	4262	49	87-97	S	Kyphosus sp.	Mandible	Distal fragment	R	1				
PB	4262	49	87-97	S	Leopardus pardalis	Carpal	Complete		1				
PB	4262	49	87-97	S	Actinopterygii	Bone	Fragment		24				
PB	4262	49	87-97	S	Actinopterygii	Cranial	Fragment		2				
PB	4262	49	87-97	S	Actinopterygii	Vertebra	Fragment		16				
PB	4074	50	40-50	S	Caranx sp.	Sphenoid	Complete		1				
PB	4074	50	40-50	S	Caranx sp.	Vertebra	Complete		1				
PB	4074	50	40-50	S	Chelonia mydas	Frontal	Fragment	R	1				
PB	4074	50	40-50	S	Cheloniidae	Plastron	Fragment		4		C		
PB	4074	50	40-50	S	Cheloniidae	Plastron	Fragment		1				
PB	4074	50	40-50	S	Unidentified	Ilium	Fragment	R	1				
PB	4074	50	40-50	S	Unidentified	Bone	Fragment		19				
PB	4077	50	40-50	S	Bodianus sp.	Otolith	Complete		1				
PB	4077	50	40-50	S	Cheloniidae	Bone	Fragment		3				
PB	4077	50	40-50	S	Larimus breviceps	Otolith	Complete		1				
PB	4082	50	50-60	S	Arius sp.	Cranial	Fragment		4				
PB	4082	50	50-60	S	Arius sp.	Vertebra	Complete		2				
PB	4082	50	50-60	S	Balistes sp.	Hyomandibula	Mostly complete	L	1				
PB	4082	50	50-60	S	Belonidae	Vertebra	Complete		2				
PB	4082	50	50-60	S	Carangidae	Scale	Fragment		1				
PB	4082	50	50-60	S	Carangidae	Vertebra	Complete		8				
PB	4082	50	50-60	S	Caranx sp.	Articular	Complete	R	1				
PB	4082	50	50-60	S	Caranx sp.	Cranial pterygoid	Fragment		1				
PB	4082	50	50-60	S	Caranx sp.	Maxilla	Fragment	L	1				
PB	4082	50	50-60	S	Caranx sp.	Vertebra	Complete		10				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	4082	50	50-60	S	Cheloniidae	Bone	Fragment		1				
PB	4082	50	50-60	S	Dasyprocta punctata	Astragalus	Complete	R	1				
PB	4082	50	50-60	S	Dasyprocta punctata	Ilium	Proximal fragment	R	1				
PB	4082	50	50-60	S	Euthynnus sp.	Vertebra	Complete		1				
PB	4082	50	50-60	S	Lutjanus sp.	Dentary	Complete	L	1				
PB	4082	50	50-60	S	Lutjanus sp.	Vertebra	Complete		1				
PB	4082	50	50-60	S	Actinopterygii	Scale	Complete		1				
PB	4082	50	50-60	S	Actinopterygii	Vertebra	Complete		1				
PB	4082	50	50-60	S	Scomberomorus sp.	Vertebra	Complete		3				
PB	4082	50	50-60	S	Sigmodon sp.	Humerus	Mostly complete	R	1				
PB	4082	50	50-60	S	Sigmodon sp.	Ilium	Mostly complete		1				
PB	4082	50	50-60	S	Sigmodon sp.	Phalange	Fragment		1				
PB	4082	50	50-60	S	Sphyraena sp.	Vertebra	Complete		2				
PB	4082	50	50-60	S	Sphyraena sp.	Vomer	Complete		1				
PB	4082	50	50-60	S	Actinopterygii	Bone	Fragment		28				
PB	4082	50	50-60	S	Actinopterygii	Vertebra	Complete		17				
PB	4128	50	60-70	S	Bagre marinus	Frontal	Complete		1				
PB	4128	50	60-70	S	Cheloniidae	Vertebra	Complete		1				
PB	4128	50	60-70	S	Actinopterygii	Articular	Complete	L	1				
PB	4128	50	60-70	S	Actinopterygii	Bone	Fragment		13				
PB	4128	50	60-70	S	Actinopterygii	Bone	Fragment		12				
PB	4153	50	70-80	S	Aves	Phalange	Complete		1				
PB	4153	50	70-80	S	Aves	Ulna	Proximal fragment		1				
PB	4153	50	70-80	S	Aves	Bone	Fragment		1				
PB	4153	50	70-80	S	Actinopterygii	Bone	Fragment		1				
PB	4153	50	70-80	S	Actinopterygii	Vertebra	Complete		4				
PB	4153	50	70-80	S	Sigmodon sp.	Mandible	Complete	L	1				
PB	4170	50	70-80	S	Actinopterygii	Bone	Fragment		3				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	4274	50	80-90	S	Cheloniidae	Bone	Fragment		21				
PB	4274	50	80-90	S	Mammalia	Bone	Fragment		7				
PB	4394	50	90-100	S	Bagre marinus	Cleithrum	Fragment	L	1				
PB	4394	50	90-100	S	Cheloniidae	Bone	Fragment		3				
PB	4394	50	90-100	S	Cheloniidae	Vertebra	Complete		1				
PB	4394	50	90-100	S	Actinopterygii	Bone	Fragment		62				
PB	4394	50	90-100	S	Sigmodon sp.	Innominate	Proximal fragment	L	1				
PB	4397	50	40-50	S	Cheloniidae	Carapace	Fragment		6				
PB	4397	50	90-100	S	Actinopterygii	Bone	Fragment		26				
PB	4397	50	90-100	S	Actinopterygii	Bone	Fragment		25				
PB	4408	50	100-110	S	Aves	Tibia	Fragment		1				
PB	4408	50	100-110	S	Cheloniidae	Carapace	Fragment		1				
PB	4408	50	100-110	S	Cheloniidae	Phalange	Complete		1				
PB	4408	50	100-110	S	Mammalia	Phalange	Complete		1				
PB	4408	50	100-110	S	Testudines	Pelvis	Complete		1				
PB	4408	50	100-110	S	Unidentified	Bone	Fragment		46				
PB	4138	51	42-52	S	Cheloniidae	Bone	Fragment		13				
PB	4138	51	42-52	S	Cheloniidae	Carapace	Fragment		3				
PB	4138	51	42-52	S	Cheloniidae	Phalange	Fragment		3				
PB	4138	51	42-52	S	Cheloniidae	Vertebra	Complete		1				
PB	4138	51	42-52	S	Cuniculus paca	Premolar/PM3	Fragment		1				
PB	4138	51	42-52	S	Dasyprocta punctata	Phalange	Fragment		2				
PB	4138	51	42-52	S	Homo Sapiens	Molar	Fragment		1				
PB	4138	51	42-52	S	Leptodactylus pentadactylus	Bone	Fragment		7				
PB	4138	51	42-52	S	Leptodactylus pentadactylus	Femur	Shaft fragment		1				
PB	4138	51	42-52	S	Leptodactylus pentadactylus	Humerus	Fragment		1				
PB	4138	51	42-52	S	Mammalia	Long bone	Fragment		1				
PB	4138	51	42-52	S	Oryzomys sp.	Bone	Fragment		3				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	4138	51	42-52	S	Actinopterygii	Bone	Fragment		109				
PB	4138	51	42-52	S	Unidentified	Bone	Fragment		3				
PB	4158	51	52-62	S	Mammalia	Long bone	Fragment		1				W
PB	4161	51	52-62	S	Aves	Ulna	Fragment		1				
PB	4161	51	52-62	S	Aves	Vertebra	Complete		1				
PB	4161	51	52-62	S	Carcharhinidae	Dentary	Fragment		2				
PB	4161	51	52-62	S	Cheloniidae	Bone	Fragment		4				
PB	4161	51	52-62	S	Cheloniidae	Carapace	Fragment		1				
PB	4161	51	52-62	S	Cuniculus paca	Molar	Fragment		1				
PB	4161	51	52-62	S	Leptodactylus pentadactylus	Bone	Fragment		4				
PB	4161	51	52-62	S	Leptodactylus pentadactylus	Pelvis	Complete		2				
PB	4161	51	52-62	S	Mammalia	Rib	Fragment		1				
PB	4161	51	52-62	S	Oryzomys sp.	Pelvis	Fragment		2				
PB	4161	51	52-62	S	Oryzomys sp.	Upper incisor	Fragment		1				
PB	4161	51	52-62	S	Actinopterygii	Bone	Fragment		132			G	
PB	4161	51	52-62	S	Actinopterygii	Dentary	Fragment		6				
PB	4161	51	52-62	S	Actinopterygii	Otolith	Fragment		7			G	
PB	4161	51	52-62	S	Actinopterygii	Scale	Fragment		7				
PB	4161	51	52-62	S	Actinopterygii	Vertebra	Complete		4				
PB	4161	51	52-62	S	Caranx sp.	Vertebra	Complete		66				
PB	4161	51	52-62	S	Euthynnus sp.	Vertebra	Complete		19				
PB	4179	51	62-72	S	Aves	Humerus	Mostly complete	R	1				
PB	4179	51	62-72	S	Balistes sp.	Vertebra	Complete		1				
PB	4179	51	62-72	S	Carcharhinidae	Tooth	Fragment		1				
PB	4179	51	62-72	S	Carcharhinidae	Vertebra	Complete		1				
PB	4179	51	62-72	S	Cheloniidae	Bone	Fragment		5				
PB	4179	51	62-72	S	Cuniculus paca	Molar	Complete		1				
PB	4179	51	62-72	S	Actinopterygii	Vertebra	Complete		4				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	4179	51	62-72	S	Caranx sp.	Vertebra	Complete		88				
PB	4179	51	62-72	S	Euthynnus sp.	Vertebra	Complete		12				
PB	4179	51	62-72	S	Lutjanus sp.	Vertebra	Complete		10				
PB	4220	51	72-82	S	Diodon antennatus	Bone	Fragment		100				
PB	4220	51	72-82	S	Actinopterygii	Vertebra	Complete		1				
PB	4220	51	72-82	S	Unidentified	Bone	Fragment		1				
PB	4221	51	72-82	S	Carcharhinidae	Vertebra	Complete		1				W
PB	4221	51	72-82	S	Cheloniidae	Vertebra	Complete		1				
PB	4221	51	72-82	S	Dasyprocta punctata	Humerus	Fragment	R	3				
PB	4221	51	72-82	S	Dasyprocta punctata	Rib	Fragment						
PB	4221	51	72-82	S	Dasyprocta punctata	Vertebra	Fragment						
PB	4221	51	72-82	S	Diodon antennatus	Spine	Fragment		19				
PB	4221	51	72-82	S	Leptodactylus pentadactylus	Ilium	Fragment	L	1				
PB	4221	51	72-82	S	Leptodactylus pentadactylus	Ilium	Fragment	R	1				
PB	4221	51	72-82	S	Leptodactylus pentadactylus	Tibiofibula	Fragment		1				
PB	4221	51	72-82	S	Mammalia	Bone	Fragment		4				
PB	4221	51	72-82	S	Proechimys semispinosus	Tibia	Fragment		1				
PB	4221	51	72-82	S	Actinopterygii	Bone	Fragment		220				
PB	4221	51	72-82	S	Actinopterygii	Bone	Fragment		2				
PB	4221	51	72-82	S	Actinopterygii	Bone	Fragment		2				
PB	4221	51	72-82	S	Actinopterygii	Dentary	Fragment		7				
PB	4221	51	72-82	S	Actinopterygii	Spine	Fragment		14				
PB	4221	51	72-82	S	Actinopterygii	Vertebra	Complete		12				
PB	4221	51	72-82	S	Caranx sp.	Vertebra	Complete		63				
PB	4221	51	72-82	S	Scarus sp.	Vertebra	Complete		13				
PB	4221	51	72-82	S	Lutjanus sp.	Vertebra	Complete		25				
PB	4280	51	82-92	S	Cheloniidae	Carapace	Fragment		1				
PB	4280	51	82-92	S	Mazama americana	Femur	Proximal fragment		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	4280	51	82-92	S	Opsanus sp.	Mandible	Complete	R	1				
PB	4280	51	82-92	S	Actinopterygii	Bone	Fragment		57				
PB	4280	51	82-92	S	Actinopterygii	Dentary	Fragment		1				
PB	4280	51	82-92	S	Actinopterygii	Otolith	Fragment		3				
PB	4280	51	82-92	S	Actinopterygii	Vertebra	Complete		3				
PB	4280	51	82-92	S	Caranx sp.	Vertebra	Complete		31				
PB	4288	51	92-102	S	Cheloniidae	Carapace	Fragment		19				
PB	4288	51	92-102	S	Cheloniidae	Long bone	Fragment		4				
PB	4288	51	92-102	S	Cricetidae	Mandible	Fragment		1				
PB	4288	51	92-102	S	Leptodactylus pentadactylus	Bone	Fragment		1				
PB	4288	51	92-102	S	Mammalia	Bone	Fragment		1				
PB	4288	51	92-102	S	Actinopterygii	Bone	Fragment		106				
PB	4288	51	92-102	S	Unidentified	Bone	Fragment		44				
PB	4299	51	102-112	S	Cheloniidae	Carapace	Fragment		9				
PB	4299	51	102-112	S	Cheloniidae	Phalange	Fragment		3				
PB	4299	51	102-112	S	Cheloniidae	Vertebra	Complete		4				
PB	4299	51	102-112	S	Mammalia	Bone	Fragment		1				
PB	4299	51	102-112	S	Pecari tajacu	Tooth	Fragment		1				
PB	4299	51	102-112	S	Actinopterygii	Bone	Fragment		100				
PB	4299	51	102-112	S	Unidentified	Bone	Fragment		22				
PB	4308	51	wall	S	Cuniculus paca	Atlas	Fragment		1				
PB	4421	51	112-122	S	Cheloniidae	Bone	Fragment		10				
PB	4421	51	112-122	S	Cheloniidae	Pelvis	Fragment		2		C		
PB	4421	51	112-122	S	Cheloniidae	Sacrum	Complete		3				
PB	4421	51	112-122	S	Cheloniidae	Vertebra	Complete		1				
PB	4421	51	112-122	S	Dasyprocta punctata	Vertebra	Fragment		1				
PB	4421	51	112-122	S	Scarus sp.	Dentary	Fragment	R	1				
PB	4421	51	112-122	S	Actinopterygii	Bone	Fragment		23				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	4421	51	112-122	S	Actinopterygii	Vertebra	Complete		5				
PB	4421	51	112-122	S	Caranx sp.	Vertebra	Complete		29				
PB	4422	51	112-122	S	Caiman crocodilus	Tibia	Fragment		1				
PB	4422	51	112-122	S	Chelonia mydas	Humerus	Fragment		1	B			
PB	4422	51	112-122	S	Cheloniidae	Carapace	Fragment		3				
PB	4422	51	112-122	S	Cheloniidae	Vertebra	Complete		1				
PB	4422	51	112-122	S	Actinopterygii	Bone	Fragment		10				
PB	4437	51	80-122	S	Caretta caretta	Pelvis	Fragment		1				
PB	4437	51	80-122	S	Cheloniidae	Carapace	Fragment		2				
PB	4437	51	80-122	S	Odocoileus virginianus	Antler	Fragment		1			G	
PB	4437	51	80-122	S	Actinopterygii	Bone	Fragment		6				
PB	4437	51	80-122	S	Actinopterygii	Rib	Fragment		1				
PB	4437	51	80-122	S	Actinopterygii	Vertebra	Complete		7				
PB	4448	51	122-132	S	Chelonia mydas	Scapula	Fragment	R	1	B			
PB	4448	51	122-132	S	Cheloniidae	Bone	Fragment		2				
PB	4448	51	122-132	S	Cheloniidae	Cranial	Fragment		1				
PB	4448	51	122-132	S	Dasyprocta punctata	Femur	Shaft fragment		1			G	
PB	4448	51	122-132	S	Dasyprocta punctata	Humerus	Complete	L	1				
PB	4448	51	122-132	S	Mammalia	Rib	Fragment		3				
PB	4448	51	122-132	S	Odocoileus virginianus	Antler	Fragment		5			G	
PB	4448	51	122-132	S	Odocoileus virginianus	Cranial	Fragment		5			G	
PB	4448	51	122-132	S	Pecari tajacu	Phalange	Complete		1				
PB	4448	51	122-132	S	Actinopterygii	Bone	Fragment		25				
PB	4448	51	122-132	S	Actinopterygii	Vertebra	Complete		35				
PB	5386	60	40-50	S	Balistes sp.	Tooth	Complete		1				
PB	5386	60	40-50	S	Caranx sp.	Cranial	Mostly complete		1				
PB	5386	60	40-50	S	Caranx sp.	Mandible	Mostly complete	R	2				
PB	5386	60	40-50	S	Caranx sp.	Premaxilla	Mostly complete	L	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5386	60	40-50	S	Cheloniidae	Cranial	Fragment		3				
PB	5386	60	40-50	S	Cheloniidae	Phalange	Mostly complete		1				
PB	5386	60	40-50	S	Cheloniidae	Bone	Fragment		14				
PB	5386	60	40-50	S	Cheloniidae	Bone	Fragment		8				
PB	5386	60	40-50	S	Cheloniidae	Vertebra	Fragment		1				
PB	5386	60	40-50	S	Cricetidae	Femur	Complete	L	2				
PB	5386	60	40-50	S	Cricetidae	Humerus	Distal fragment	R	1				
PB	5386	60	40-50	S	Crocodylus	Tooth	Complete		1				W
PB	5386	60	40-50	S	Cuniculus paca	Incisor	Complete		1				
PB	5386	60	40-50	S	Dasyprocta punctata	Incisor	Complete		1				
PB	5386	60	40-50	S	Dasyprocta punctata	Phalange	Complete		2				
PB	5386	60	40-50	S	Dasyprocta punctata	Ulna	Proximal fragment	L	1				
PB	5386	60	40-50	S	Dasyprocta punctata	Vertebra	Fragment		1				
PB	5386	60	40-50	S	Kyphosus sp.	Mandible	Mostly complete	L	1				
PB	5386	60	40-50	S	Scarus sp.	Premaxilla	Mostly complete	R	1				
PB	5386	60	40-50	S	Sphyraena sp.	Mandible	Fragment		2				
PB	5386	60	40-50	S	Sphyraena sp.	Vertebra	Complete		2				
PB	5386	60	40-50	S	Actinopterygii	Dorsal spine	Mostly complete		5				
PB	5386	60	40-50	S	Actinopterygii	Maxilla	Fragment		6				
PB	5386	60	40-50	S	Actinopterygii	Bone	Fragment		120				
PB	5386	60	40-50	S	Actinopterygii	Bone	Fragment		231				
PB	5386	60	40-50	S	Actinopterygii	Vertebra	Mostly complete		2				
PB	5386	60	40-50	S	Caranx sp.	Vertebra	Complete		78				
PB	5386	60	40-50	S	Lutjanus sp.	Vertebra	Complete		12				
PB	5386	60	40-50	S	Sphyraena sp.	Vertebra	Complete		7				
PB	5390	60	40-50	S	Odocoileus virginianus	Antler	Mostly complete	L	1				
PB	5419	60	40-50	S	Caranx sp.	Ethmoid	Complete		1				
PB	5419	60	40-50	S	Caranx sp.	Vertebra	Complete		3				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5419	60	40-50	S	Cheloniidae	Phalange	Complete		1				
PB	5419	60	40-50	S	Cheloniidae	Bone	Fragment		2				
PB	5419	60	40-50	S	Dasyprocta punctata	Maxilla	Fragment	R	1				
PB	5419	60	40-50	S	Dasyprocta punctata	Phalange	Complete		1				
PB	5419	60	40-50	S	Actinopterygii	Dorsal spine	Mostly complete		3				
PB	5419	60	40-50	S	Actinopterygii	Bone	Fragment		23				
PB	5419	60	40-50	S	Actinopterygii	Bone	Fragment		10				
PB	5419	60	40-50	S	Actinopterygii	Vertebra	Mostly complete		44				
PB	5420	60	40-50	S	Cheloniidae	Carapace	Fragment		4				
PB	5420	60	40-50	S	Cheloniidae	Phalange	Complete		2				
PB	5420	60	40-50	S	Cheloniidae	Scapula	Fragment		1				
PB	5420	60	40-50	S	Dasyprocta punctata	Tibia	Complete	L	1				
PB	5420	60	40-50	S	Dasyprocta punctata	Vertebra	Mostly complete		1				
PB	5420	60	40-50	S	Scarus sp.	Pharyngeal	Complete		1				
PB	5420	60	40-50	S	Actinopterygii	Dorsal spine	Mostly complete		3				
PB	5420	60	40-50	S	Actinopterygii	Bone	Fragment		10				
PB	5420	60	40-50	S	Actinopterygii	Vertebra	Complete		18				
PB	5447	60	50-60	S	Acanthurus sp.	Vertebra	Complete		1				
PB	5447	60	50-60	S	Aetobatus narinari	Dentary	Complete		1				
PB	5447	60	50-60	S	Arius felis	Superoccipital	Mostly complete		1				
PB	5447	60	50-60	S	Caranx sp.	Hyomandibula	Fragment		1				
PB	5447	60	50-60	S	Caranx sp.	Maxilla	Proximal fragment		3				
PB	5447	60	50-60	S	Caranx sp.	Premaxilla	Fragment		1				
PB	5447	60	50-60	S	Caranx sp.	Bone	Fragment		4				
PB	5447	60	50-60	S	Caranx sp.	Vertebra	Complete		35				
PB	5447	60	50-60	S	Centropomus sp.	Bone	Fragment		3				
PB	5447	60	50-60	S	Centropomus sp.	Vertebra	Complete		2				
PB	5447	60	50-60	S	Cheloniidae	Phalange	Mostly complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5447	60	50-60	S	Cheloniidae	Bone	Fragment		13				
PB	5447	60	50-60	S	Clupeidae	Vertebra	Complete		3				
PB	5447	60	50-60	S	Cuniculus paca	Maxilla	Fragment		1				
PB	5447	60	50-60	S	Cuniculus paca	Vertebra	Complete		2				
PB	5447	60	50-60	S	Cuniculus paca	Vertebra	Fragment		2				
PB	5447	60	50-60	S	Dasyprocta punctata	Humerus	Epiphyseal plate	L	1				
PB	5447	60	50-60	S	Dasyprocta punctata	Humerus	Mostly complete	L	1				
PB	5447	60	50-60	S	Dasyprocta punctata	Metatarsal	Complete		1				
PB	5447	60	50-60	S	Dasyprocta punctata	Radius	Proximal fragment		1				
PB	5447	60	50-60	S	Dasyprocta punctata	Rib	Proximal fragment		1				
PB	5447	60	50-60	S	Dasyprocta punctata	Scapula	Proximal fragment	R	1				
PB	5447	60	50-60	S	Dasyprocta punctata	Tibia	Epiphyseal plate	R	1				
PB	5447	60	50-60	S	Dasyprocta punctata	Vertebra	Complete		1				
PB	5447	60	50-60	S	Diodon antennatus	Spine	Mostly complete		2				
PB	5447	60	50-60	S	Euthynnus sp.	Maxilla	Proximal fragment		1				
PB	5447	60	50-60	S	Euthynnus sp.	Bone	Fragment		2				
PB	5447	60	50-60	S	Euthynnus sp.	Vertebra	Complete		10				
PB	5447	60	50-60	S	Haemulon sp.	Lower pharyngeal	Mostly complete		1				
PB	5447	60	50-60	S	Haemulon sp.	Lower premaxilla	Proximal fragment	L	1				
PB	5447	60	50-60	S	Lutjanus sp.	Premaxilla	Proximal fragment	R	1				
PB	5447	60	50-60	S	Lutjanus sp.	Quadrate	Complete		1				
PB	5447	60	50-60	S	Scarus sp.	Vertebra	Complete		2				
PB	5447	60	50-60	S	Scomberomorus sp.	Vertebra	Complete		1				
PB	5447	60	50-60	S	Sigmodon sp.	Femur	Complete	L	1				
PB	5447	60	50-60	S	Sigmodon sp.	Femur	Proximal fragment	R	1				
PB	5447	60	50-60	S	Sigmodon sp.	Tibia	Complete	R	1				
PB	5447	60	50-60	S	Sphyraena sp.	Maxilla	Proximal fragment		1				
PB	5447	60	50-60	S	Actinopterygii	Bone	Fragment		58				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5481	60	20-30	S	Cheloniidae	Scapula	Fragment		1				
PB	5489	60	60-70	S	Calamus sp.	Maxilla	Complete		1				
PB	5489	60	60-70	S	Caranx sp.	Lower pharyngeal	Fragment		1				
PB	5489	60	60-70	S	Caranx sp.	Maxilla	Proximal fragment		1				
PB	5489	60	60-70	S	Caranx sp.	Premaxilla	Proximal fragment	R	1				
PB	5489	60	60-70	S	Caranx sp.	Vertebra	Complete		24				
PB	5489	60	60-70	S	Caranx sp.	Vomer	Complete		1				
PB	5489	60	60-70	S	Caranx sp.	Vomer	Fragment		2				
PB	5489	60	60-70	S	Cheloniidae	Phalange	Complete		1				
PB	5489	60	60-70	S	Cheloniidae	Bone	Fragment		7				
PB	5489	60	60-70	S	Cheloniidae	Vertebra	Fragment		3				
PB	5489	60	60-70	S	Dasyprocta punctata	Ilium	Fragment	R	1				
PB	5489	60	60-70	S	Dasyprocta punctata	Zygomatic arch	Fragment		1				
PB	5489	60	60-70	S	Euthynnus sp.	Vertebra	Complete		3				
PB	5489	60	60-70	S	Scomberomorus sp.	Vertebra	Complete		2				
PB	5489	60	60-70	S	Actinopterygii	Bone	Fragment		17				
PB	5528	60	70-80	S	Acanthurus sp.	Vertebra	Complete		2				
PB	5528	60	70-80	S	Arius felis	Cranial	Fragment		2				
PB	5528	60	70-80	S	Arius felis	Frontal	Complete		1				
PB	5528	60	70-80	S	Caranx sp.	Cranial	Fragment		1				
PB	5528	60	70-80	S	Caranx sp.	Hyomandibula	Fragment		1				
PB	5528	60	70-80	S	Caranx sp.	Maxilla	Fragment		2				
PB	5528	60	70-80	S	Caranx sp.	Premaxilla	Proximal fragment		1				
PB	5528	60	70-80	S	Caranx sp.	Bone	Complete		2				
PB	5528	60	70-80	S	Caranx sp.	Vertebra	Complete		39				
PB	5528	60	70-80	S	Caranx sp.	Vomer	Complete		2				
PB	5528	60	70-80	S	Cheloniidae	Epiphysis	Fragment		2				
PB	5528	60	70-80	S	Cheloniidae	Humerus	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5528	60	70-80	S	Cheloniidae	Plastron	Fragment		2	B			
PB	5528	60	70-80	S	Cheloniidae	Bone	Fragment		9				
PB	5528	60	70-80	S	Cheloniidae	Bone	Fragment		1	B			
PB	5528	60	70-80	S	Cheloniidae	Vertebra	Mostly complete		1				
PB	5528	60	70-80	S	Cuniculus paca	Astragalus	Complete		1				
PB	5528	60	70-80	S	Cuniculus paca	Tarsal	Complete		1				
PB	5528	60	70-80	S	Cuniculus paca	Vertebra	Complete		3				
PB	5528	60	70-80	S	Dasyprocta punctata	Incisor	Complete		1				
PB	5528	60	70-80	S	Dasyprocta punctata	Molar	Complete		1				
PB	5528	60	70-80	S	Euthynnus sp.	Vertebra	Complete		2				
PB	5528	60	70-80	S	Leptodactylus pentadactylus	Bone	Fragment		2				
PB	5528	60	70-80	S	Leptodactylus pentadactylus	Vertebra	Complete		1				
PB	5528	60	70-80	S	Lutjanus sp.	Cranial	Fragment		1				
PB	5528	60	70-80	S	Lutjanus sp.	Maxilla	Complete		1				
PB	5528	60	70-80	S	Lutjanus sp.	Premaxilla	Complete		1				
PB	5528	60	70-80	S	Lutjanus sp.	Vertebra	Complete		1				
PB	5528	60	70-80	S	Mammalia	Molar	Fragment		1				
PB	5528	60	70-80	S	Mammalia	Long bone	Fragment		1				
PB	5528	60	70-80	S	Mugil sp.	Vertebra	Complete		1				
PB	5528	60	70-80	S	Odocoileus virginianus	Phalange III	Complete		2				
PB	5528	60	70-80	S	Odocoileus virginianus	Phalange I	Complete		1				
PB	5528	60	70-80	S	Odocoileus virginianus	Phalange II	Complete		2				
PB	5528	60	70-80	S	Oryzomys sp.	Femur	Proximal fragment	L	1				
PB	5528	60	70-80	S	Proechimys semispinosus	Humerus	Distal fragment		1				
PB	5528	60	70-80	S	Scomberomorus sp.	Vertebra	Complete		1				
PB	5528	60	70-80	S	Seriola sp.	Cranial	Complete		1				
PB	5528	60	70-80	S	Sigmodon sp.	Ilium	Fragment	L	1				
PB	5528	60	70-80	S	Sigmodon sp.	Tibia	Complete	L	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5528	60	70-80	S	Sparisoma sp.	Dentary	Complete	L	2				
PB	5528	60	70-80	S	Sparisoma sp.	Maxilla	Proximal fragment		2				
PB	5528	60	70-80	S	Sparisoma sp.	Vertebra	Complete		1				
PB	5528	60	70-80	S	Actinopterygii	Bone	Fragment		65				
PB	5528	60	70-80	S	Tylosurus crocodilus	Dentary	Fragment		3				
PB	5528	60	70-80	S	Tylosurus crocodilus	Frontal	Fragment	C	1				
PB	5528	60	70-80	S	Tylosurus crocodilus	Frontal	Fragment	R	1				
PB	5563	60	90-100	S	Arius felis	Cranial	Fragment		1				
PB	5563	60	90-100	S	Aves	Bone	Fragment		2				
PB	5563	60	90-100	S	Balistes sp.	Cranial	Fragment		1				
PB	5563	60	90-100	S	Caranx sp.	Maxilla	Proximal fragment		1				
PB	5563	60	90-100	S	Caranx sp.	Premaxilla	Fragment		1				
PB	5563	60	90-100	S	Caranx sp.	Premaxilla	Proximal fragment	R	1				
PB	5563	60	90-100	S	Caranx sp.	Bone	Fragment		2				
PB	5563	60	90-100	S	Caranx sp.	Vertebra	Complete		2				
PB	5563	60	90-100	S	Caranx sp.	Vomer	Mostly complete		1				
PB	5563	60	90-100	S	Cheloniidae	Femur	Proximal fragment		1				
PB	5563	60	90-100	S	Cheloniidae	Scapula	Fragment		1				
PB	5563	60	90-100	S	Cheloniidae	Bone	Fragment		31				
PB	5563	60	90-100	S	Cheloniidae	Vertebra	Mostly complete		1				
PB	5563	60	90-100	S	Crocodylus acutus	Mandible	Fragment		2				
PB	5563	60	90-100	S	Crocodylus acutus	Bone	Fragment		3				
PB	5563	60	90-100	S	Cuniculus paca	Femur	Mostly complete	L	1				
PB	5563	60	90-100	S	Cuniculus paca	Tibia	Fragment		1				
PB	5563	60	90-100	S	Dasyprocta punctata	Incisor	Complete		1				
PB	5563	60	90-100	S	Dasyprocta punctata	Tibia	Distal fragment	R	1				
PB	5563	60	90-100	S	Diodon antennatus	Dentary	Mostly complete		1				
PB	5563	60	90-100	S	Leptodactylus pentadactylus	Humerus	Distal fragment	R	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5563	60	90-100	S	Leptodactylus pentadactylus	Ilium	Mostly complete		1				
PB	5563	60	90-100	S	Leptodactylus pentadactylus	Tarsal	Mostly complete		3				
PB	5563	60	90-100	S	Leptodactylus pentadactylus	Tibiofibula	Proximal fragment		1				
PB	5563	60	90-100	S	Rhinoclemmys funerea	Femur	Complete	R	1				
PB	5563	60	90-100	S	Rhinoclemmys funerea	Femur	Complete	L	1				
PB	5563	60	90-100	S	Rhinoclemmys funerea	Scapula	Fragment		2				
PB	5563	60	90-100	S	Rhinoclemmys funerea	Tarsal	Complete		1				
PB	5563	60	90-100	S	Rhinoclemmys funerea	Bone	Fragment		16				
PB	5563	60	90-100	S	Sigmodon sp.	Femur	Complete	R	2				
PB	5563	60	90-100	S	Actinopterygii	Bone	Fragment		26				
PB	5563	60	90-100	S	Trichechus manatus	Cervical vertebra	Mostly complete		1				
PB	5593	60	80-90	S	Acanthurus sp.	Vertebra	Complete		3				
PB	5593	60	80-90	S	Arius felis	Clethrum	Fragment	R	1				
PB	5593	60	80-90	S	Arius felis	Ethmoid	Fragment		1				
PB	5593	60	80-90	S	Arius felis	Superoccipital	Fragment		1				
PB	5593	60	80-90	S	Aves	Carpometacarpus	Complete	L	1				
PB	5593	60	80-90	S	Aves	Carpometacarpus	Complete	R	1				
PB	5593	60	80-90	S	Aves	Humerus	Proximal fragment	L	1				
PB	5593	60	80-90	S	Aves	Humerus	Proximal fragment	R	1				
PB	5593	60	80-90	S	Aves	Tarsometatarsus	Complete		1				
PB	5593	60	80-90	S	Aves	Ulna	Distal fragment		1				
PB	5593	60	80-90	S	Balistes sp.	Pterygiophore, 1st dorsal	Fragment		2				
PB	5593	60	80-90	S	Caranx sp.	Pterygiophore, anal	Complete		1				
PB	5593	60	80-90	S	Caranx sp.	Articular	Fragment	L	1				
PB	5593	60	80-90	S	Caranx sp.	Articular	Fragment	R	1				
PB	5593	60	80-90	S	Caranx sp.	Dentary	Fragment	R	1				
PB	5593	60	80-90	S	Caranx sp.	Exoccipital	Fragment	L	1				
PB	5593	60	80-90	S	Caranx sp.	Maxilla	Fragment	R	2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5593	60	80-90	S	Caranx sp.	Maxilla	Fragment	L	1				
PB	5593	60	80-90	S	Caranx sp.	Premaxilla	Fragment	R	1				
PB	5593	60	80-90	S	Caranx sp.	Vertebra	Complete		18				
PB	5593	60	80-90	S	Caranx sp.	Vomer	Complete		2				
PB	5593	60	80-90	S	Chelonia mydas	Caudal vertebra	Complete		1				
PB	5593	60	80-90	S	Chelonia mydas	Cervical vertebra	Complete		1				
PB	5593	60	80-90	S	Chelonia mydas	Femur	Distal fragment	L	1		C		
PB	5593	60	80-90	S	Chelonia mydas	Femur	Proximal fragment	L	1		C		
PB	5593	60	80-90	S	Chelonia mydas	Plastron	Fragment		1		C		
PB	5593	60	80-90	S	Chelonia mydas	Bone	Fragment		4				
PB	5593	60	80-90	S	Cuniculus paca	Femur	Proximal fragment	L	1		C		
PB	5593	60	80-90	S	Cuniculus paca	Molar	Complete		1				
PB	5593	60	80-90	S	Dasyprocta punctata	Calcaneus	Complete	L	1				
PB	5593	60	80-90	S	Dasyprocta punctata	Cranial	Fragment		3				
PB	5593	60	80-90	S	Dasyprocta punctata	Phalange	Complete		1				
PB	5593	60	80-90	S	Dasyprocta punctata	Thoracic vertebra	Fragment		1				
PB	5593	60	80-90	S	Diodon antennatus	Spine	Complete		1				
PB	5593	60	80-90	S	Euthynnus sp.	Vertebra	Complete		1				
PB	5593	60	80-90	S	Homo sapiens	Incisor	Complete		1				
PB	5593	60	80-90	S	Kyphosus sp.	Dentary	Fragment	R	1				
PB	5593	60	80-90	S	Kyphosus sp.	Maxilla	Fragment	L	1				
PB	5593	60	80-90	S	Kyphosus sectatrix	Cranial	Fragment		1				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Coracoid	Complete	L	1				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Cranial	Fragment		4				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Dentary	Fragment	L	2				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Femur	Complete		1				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Humerus	Proximal fragment	R	3				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Humerus	Proximal fragment	L	2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Ilium	Proximal fragment	L	4				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Ilium	Proximal fragment	R	5				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Radio-ulna	Fragment	L	2				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Radio-ulna	Fragment	R	2				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Tarsal	Complete		2				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Tibiofibula	Proximal fragment	L	2				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Tibiofibula	Proximal fragment	R	3				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Urostyle	Proximal fragment		1				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Vertebra	Complete		2				
PB	5593	60	80-90	S	Leptodactylus pentadactylus	Vertebra	Complete		3				
PB	5593	60	80-90	S	Lutjanus sp.	Dentary	Complete	L	1				
PB	5593	60	80-90	S	Lutjanus sp.	Vertebra	Complete		1				
PB	5593	60	80-90	S	Mammalia	Maxilla	Proximal fragment		1				
PB	5593	60	80-90	S	Oryzomys sp.	Mandible	Proximal fragment	L	1				
PB	5593	60	80-90	S	Scarus sp.	Cranial	Fragment		2				
PB	5593	60	80-90	S	Scarus sp.	Ultimate vertebra	Complete		1				
PB	5593	60	80-90	S	Scarus sp.	Vertebra	Complete		5				
PB	5593	60	80-90	S	Sigmodon sp.	Femur	Complete	R	3				
PB	5593	60	80-90	S	Sigmodon sp.	Femur	Complete	L	6				
PB	5593	60	80-90	S	Sigmodon sp.	Ilium	Fragment	R	2				
PB	5593	60	80-90	S	Sigmodon sp.	Incisor	Complete		1				
PB	5593	60	80-90	S	Sigmodon sp.	Tibia	Complete	L	3				
PB	5593	60	80-90	S	Sigmodon sp.	Tibia	Complete	R	1				
PB	5593	60	80-90	S	Sphyraena barracuda	Maxilla	Proximal fragment	R	1				
PB	5593	60	80-90	S	Actinopterygii	Bone	Fragment		34				
PB	5605	60	100-110	S	Caranx sp.	Maxilla	Proximal fragment		2				
PB	5605	60	100-110	S	Caranx sp.	Premaxilla	Fragment		2				
PB	5605	60	100-110	S	Caranx sp.	Vertebra	Complete		6				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5605	60	100-110	S	Carcharhinidae	Cartilage	Fragment		2				
PB	5605	60	100-110	S	Cheloniidae	Phalange	Fragment		1				
PB	5605	60	100-110	S	Cheloniidae	Bone	Fragment		8				
PB	5605	60	100-110	S	Cheloniidae	Vertebra	Fragment		3				
PB	5605	60	100-110	S	Crocodylus acutus	Maxilla	Fragment		3				
PB	5605	60	100-110	S	Cuniculus paca	Carpal	Complete		2				
PB	5605	60	100-110	S	Cuniculus paca	Cranial	Fragment		1				
PB	5605	60	100-110	S	Cuniculus paca	Phalange	Complete		1				
PB	5605	60	100-110	S	Dasyprocta punctata	Incisor	Complete		1				
PB	5605	60	100-110	S	Dasyprocta punctata	Metapodial	Complete		1				
PB	5605	60	100-110	S	Dasyprocta punctata	Metapodial	Proximal fragment		2				
PB	5605	60	100-110	S	Dasyprocta punctata	Vertebra	Complete		1				
PB	5605	60	100-110	S	Dasypus novemcinctus	Osteoderm	Complete		1				
PB	5605	60	100-110	S	Leptodactylus pentadactylus	Femur	Proximal fragment		1				
PB	5605	60	100-110	S	Leptodactylus pentadactylus	Bone	Fragment		2				
PB	5605	60	100-110	S	Lutjanus sp.	Premaxilla	Proximal fragment		1				
PB	5605	60	100-110	S	Megalops sp.	Premaxilla	Proximal fragment		1				
PB	5605	60	100-110	S	Megalops atlanticus	Vertebra	Fragment		1				
PB	5605	60	100-110	S	Oryzomys sp.	Femur	Complete	R	1				
PB	5605	60	100-110	S	Oryzomys sp.	Femur	Proximal fragment	R	1				
PB	5605	60	100-110	S	Oryzomys sp.	Humerus	Distal fragment	L	1				
PB	5605	60	100-110	S	Oryzomys sp.	Incisor	Complete		1				
PB	5605	60	100-110	S	Oryzomys sp.	Lower mandible	Fragment	R	1				
PB	5605	60	100-110	S	Oryzomys sp.	Tibia	Complete	R	1				
PB	5605	60	100-110	S	Scarus sp.	Dentary	Complete		1				
PB	5605	60	100-110	S	Scarus sp.	Lower pharyngeal	Complete		1				
PB	5605	60	100-110	S	Scomberomorus sp.	Vertebra	Complete		2				
PB	5605	60	100-110	S	Sigmodon sp.	Femur	Complete	L	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5605	60	100-110	S	Sigmodon sp.	Tibia	Complete	L	1				
PB	5605	60	100-110	S	Sphyraena barracuda	Premaxilla	Fragment		1				
PB	5605	60	100-110	S	Actinopterygii	Bone	Fragment		14				
PB	5605	60	100-110	S	Tylosurus crocodilus	Vertebra	Complete		1				
PB	5606	60	100-110	S	Amphibia	Bone	Fragment		1				
PB	5606	60	100-110	S	Aves	Femur	Complete	R	1				
PB	5606	60	100-110	S	Caranx sp.	Cranial	Fragment		3				
PB	5606	60	100-110	S	Caranx sp.	Maxilla	Fragment		2				
PB	5606	60	100-110	S	Caranx sp.	Maxilla	Mostly complete	R	1				
PB	5606	60	100-110	S	Caranx sp.	Premaxilla	Fragment	L	3				
PB	5606	60	100-110	S	Caranx sp.	Premaxilla	Fragment	R	1				
PB	5606	60	100-110	S	Carcharhinidae	Cartilage	Fragment		2				
PB	5606	60	100-110	S	Caretta caretta	Caudal vertebra	Complete		2				
PB	5606	60	100-110	S	Caretta caretta	Cervical vertebra	Complete		1				
PB	5606	60	100-110	S	Centropomus sp.	Suboperculum	Mostly complete		1				
PB	5606	60	100-110	S	Cheloniidae	Bone	Fragment		5				
PB	5606	60	100-110	S	Crocodylus acutus	Cranial	Fragment		2				
PB	5606	60	100-110	S	Crocodylus acutus	Maxilla	Fragment		1				
PB	5606	60	100-110	S	Cuniculus paca	Auditory bulla	Complete	R	1				
PB	5606	60	100-110	S	Cuniculus paca	Calcaneus	Complete	L	1				
PB	5606	60	100-110	S	Cuniculus paca	Humerus	Complete	L	1				
PB	5606	60	100-110	S	Cuniculus paca	Maxilla	Fragment	R	1				
PB	5606	60	100-110	S	Epinephelus sp.	Vertebra	Complete		1				
PB	5606	60	100-110	S	Eretmochelys imbricata	Lower dentary	Fragment		2				
PB	5606	60	100-110	S	Euthynnus sp.	Vertebra	Complete		1				
PB	5606	60	100-110	S	Lutjanus sp.	Vertebra	Complete		2				
PB	5606	60	100-110	S	Megalops atlanticus	Vertebra	Complete		2				
PB	5606	60	100-110	S	Megalops atlanticus	Vertebra	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5606	60	100-110	S	Odocoileus virginianus	Tibia	Distal fragment	R	1				
PB	5606	60	100-110	S	Scarus sp.	Vertebra	Complete		1				
PB	5606	60	100-110	S	Scomberomorus concolor	Vertebra	Complete		1				
PB	5606	60	100-110	S	Sphyraena sp.	Vertebra	Complete		1				
PB	5606	60	100-110	S	Actinopterygii	Dorsal spine	Complete		1				
PB	5606	60	100-110	S	Actinopterygii	Premaxilla	Proximal fragment		1				
PB	5606	60	100-110	S	Actinopterygii	Bone	Fragment		12				
PB	5606	60	100-110	S	Actinopterygii	Bone	Fragment		37				
PB	5606	60	100-110	S	Trichechus manatus	Rib	Fragment		1				
PB	5606	60	100-110	S	Trichechus manatus	Bone	Fragment		2				
PB	5639	60	110-120	S	Caranx sp.	Hyomandibula	Fragment		1				
PB	5639	60	110-120	S	Caranx sp.	Quadrate	Complete		1				
PB	5639	60	110-120	S	Caranx sp.	Vertebra	Complete		2				
PB	5639	60	110-120	S	Chelonia mydas	Articular	Mostly complete	L	1				
PB	5639	60	110-120	S	Chelonia mydas	Articular	Mostly complete	R	1				
PB	5639	60	110-120	S	Chelonia mydas	Frontal	Fragment	L	1				
PB	5639	60	110-120	S	Chelonia mydas	Humerus	Complete		1				
PB	5639	60	110-120	S	Chelonia mydas	Humerus	Fragment		1				
PB	5639	60	110-120	S	Chelonia mydas	Tibia	Proximal fragment		1		C		
PB	5639	60	110-120	S	Chelonia mydas	Ulna	Complete		1		C		
PB	5639	60	110-120	S	Chelonia mydas	Xiphisternum	Mostly complete		1				
PB	5639	60	110-120	S	Cheloniidae	Phalange	Complete		1				
PB	5639	60	110-120	S	Cheloniidae	Plastron	Fragment		4				
PB	5639	60	110-120	S	Cheloniidae	Bone	Fragment		23				
PB	5639	60	110-120	S	Cheloniidae	Vertebra	Fragment		5				
PB	5639	60	110-120	S	Mycteroperca sp.	Vertebra	Complete		2				
PB	5639	60	110-120	S	Scarus sp.	Hyomandibula	Fragment		1				
PB	5639	60	110-120	S	Scarus sp.	Vertebra	Complete		3				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5639	60	110-120	S	Actinopterygii	Bone	Fragment		7				
PB	5639	60	110-120	S	Tylosurus crocodilus	Frontal	Fragment		1				
PB	5640	60	100-110	S	Aves	Bone	Fragment		5				
PB	5640	60	100-110	S	Caranx sp.	Premaxilla	Proximal fragment	R	2				
PB	5640	60	100-110	S	Caranx sp.	Bone	Fragment		4				
PB	5640	60	100-110	S	Caranx sp.	Vertebra	Complete		23				
PB	5640	60	100-110	S	Caranx sp.	Vomer	Complete		1				
PB	5640	60	100-110	S	Caretta caretta	Caudal vertebra	Mostly complete		1				
PB	5640	60	100-110	S	Cheloniidae	Phalange	Complete		2				
PB	5640	60	100-110	S	Cheloniidae	Scapula	Mostly complete		1				
PB	5640	60	100-110	S	Cheloniidae	Ulna	Mostly complete		1				
PB	5640	60	100-110	S	Cheloniidae	Bone	Fragment		36				
PB	5640	60	100-110	S	Crocodylus acutus	Maxilla	Fragment		1				
PB	5640	60	100-110	S	Cuniculus paca	Maxilla	Fragment		5				
PB	5640	60	100-110	S	Cuniculus paca	Tibia	Proximal fragment	L	1				
PB	5640	60	100-110	S	Odocoileus virginianus	Metatarsal	Distal fragment		1				
PB	5640	60	100-110	S	Sigmodon sp.	Femur	Proximal fragment	R	1				
PB	5674	60	40-50	HF	Acanthurus sp.	Vertebra	Complete		4				
PB	5674	60	40-50	HF	Calamus sp.	Premaxilla	Proximal fragment	L	1				
PB	5674	60	40-50	HF	Caranx sp.	Dentary	Fragment		1				
PB	5674	60	40-50	HF	Caranx sp.	Hyomandibula	Fragment		1				
PB	5674	60	40-50	HF	Caranx sp.	Maxilla	Proximal fragment		3				
PB	5674	60	40-50	HF	Caranx sp.	Premaxilla	Proximal fragment	R	3				
PB	5674	60	40-50	HF	Caranx sp.	Premaxilla	Proximal fragment	L	2				
PB	5674	60	40-50	HF	Caranx sp.	Quadrate	Fragment		1				
PB	5674	60	40-50	HF	Caranx sp.	Vertebra	Complete		47				
PB	5674	60	40-50	HF	Caranx sp.	Vomer	Complete		1				
PB	5674	60	40-50	HF	Caranx sp.	Vomer	Fragment		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5674	60	40-50	HF	Cheloniidae	Bone	Fragment		33				
PB	5674	60	40-50	HF	Dasyprocta punctata	Occipital	Fragment	L	1				
PB	5674	60	40-50	HF	Dasyprocta punctata	Parietal	Fragment	L	2				
PB	5674	60	40-50	HF	Dasyprocta punctata	Parietal	Fragment	R	1				
PB	5674	60	40-50	HF	Diodon antennatus	Spine	Complete		1				
PB	5674	60	40-50	HF	Euthynnus sp.	Vertebra	Complete		11				
PB	5674	60	40-50	HF	Muraenidae	Vertebra	Complete		4				
PB	5674	60	40-50	HF	Haemulon sp.	Vertebra	Complete		2				
PB	5674	60	40-50	HF	Lutjanus sp.	Vertebra	Complete		23				
PB	5674	60	40-50	HF	Scomberomorus sp.	Vertebra	Complete		6				
PB	5674	60	40-50	HF	Sphyraena barracuda	Cranial	Fragment		1				
PB	5674	60	40-50	HF	Sphyraena barracuda	Lower mandible	Fragment		1				
PB	5674	60	40-50	HF	Sphyraena barracuda	Premaxilla	Proximal fragment		1				
PB	5674	60	40-50	HF	Sphyraena barracuda	Vertebra	Complete		10				
PB	5674	60	40-50	HF	Actinopterygii	Bone	Fragment		78				
PB	5674	60	40-50	HF	Tylosurus crocodilus	Cranial	Fragment		4				
PB	5675	60	50-60	HF	Acanthurus sp.	Vertebra	Complete		3				
PB	5675	60	50-60	HF	Arius felis	Bone	Fragment		1				
PB	5675	60	50-60	HF	Caranx sp.	Maxilla	Proximal fragment		1				
PB	5675	60	50-60	HF	Caranx sp.	Premaxilla	Complete	L	1				
PB	5675	60	50-60	HF	Caranx sp.	Quadrate	Fragment		1				
PB	5675	60	50-60	HF	Caranx sp.	Vertebra	Complete		23				
PB	5675	60	50-60	HF	Cheloniidae	Rib	Fragment		1				
PB	5675	60	50-60	HF	Cheloniidae	Vertebra	Fragment		1				
PB	5675	60	50-60	HF	Dasyprocta punctata	Auditory bulla	Complete	R	1				
PB	5675	60	50-60	HF	Dasyprocta punctata	Cranial	Fragment		10				
PB	5675	60	50-60	HF	Dasyprocta punctata	Humerus	Complete	L	1				
PB	5675	60	50-60	HF	Dasyprocta punctata	Molar	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5675	60	50-60	HF	Dasyprocta punctata	Occipital	Complete	R	1				
PB	5675	60	50-60	HF	Dasyprocta punctata	Upper maxilla	Fragment	L	1				
PB	5675	60	50-60	HF	Euthynnus sp.	Vertebra	Complete		7				
PB	5675	60	50-60	HF	Lutjanus sp.	Hyomandibula	Fragment		1				
PB	5675	60	50-60	HF	Lutjanus sp.	Maxilla	Proximal fragment		1				
PB	5675	60	50-60	HF	Lutjanus sp.	Premaxilla	Complete		1				
PB	5675	60	50-60	HF	Lutjanus sp.	Vertebra	Complete		7				
PB	5675	60	50-60	HF	Mammalia	Vertebra	Fragment		1				
PB	5675	60	50-60	HF	Mazama americana	Vertebra	Complete		1				
PB	5675	60	50-60	HF	Scomberomorus sp.	Vertebra	Complete		2				
PB	5675	60	50-60	HF	Scombridae	Bone	Fragment		1				
PB	5675	60	50-60	HF	Sphyraena barracuda	Vertebra	Complete		1				
PB	5675	60	50-60	HF	Actinopterygii	Bone	Fragment		24				
PB	5675	60	50-60	HF	Tylosurus crocodilus	Bone	Fragment		1				
PB	5676	60	60-70	HF	Acanthurus sp.	Vertebra	Complete		2				
PB	5676	60	60-70	HF	Arius felis	Cranial	Complete		1				
PB	5676	60	60-70	HF	Calamus sp.	Dentary	Fragment		1				
PB	5676	60	60-70	HF	Calamus sp.	Premaxilla	Proximal fragment	R	1				
PB	5676	60	60-70	HF	Calamus sp.	Premaxilla	Proximal fragment	L	1				
PB	5676	60	60-70	HF	Calamus sp.	Bone	Fragment		1				
PB	5676	60	60-70	HF	Caranx sp.	Cranial	Fragment		1				
PB	5676	60	60-70	HF	Caranx sp.	Hyomandibula	Fragment		1				
PB	5676	60	60-70	HF	Caranx sp.	maxilla	Proximal fragment		1				
PB	5676	60	60-70	HF	Caranx sp.	Parietal	Complete		2				
PB	5676	60	60-70	HF	Caranx sp.	Premaxilla	Proximal fragment	L	1				
PB	5676	60	60-70	HF	Caranx sp.	Quadrate	Complete		1				
PB	5676	60	60-70	HF	Caranx sp.	Vertebra	Complete		24				
PB	5676	60	60-70	HF	Cheloniidae	Plastron	Fragment		3				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5676	60	60-70	HF	Cuniculus paca	Atlas	Complete		1				
PB	5676	60	60-70	HF	Dasyprocta punctata	Basioccipital	Complete		1				
PB	5676	60	60-70	HF	Dasyprocta punctata	Cranial	Fragment		1				
PB	5676	60	60-70	HF	Dasyprocta punctata	Parietal	Complete	L	1				
PB	5676	60	60-70	HF	Epinephelus sp.	Vertebra	Complete		1				
PB	5676	60	60-70	HF	Euthynnus sp.	Vertebra	Complete		1				
PB	5676	60	60-70	HF	Lutjanus sp.	Vertebra	Complete		4				
PB	5676	60	60-70	HF	Scarus sp.	Lower pharyngeal	Complete		1				
PB	5676	60	60-70	HF	Scomberomorus sp.	Vertebra	Complete		1				
PB	5676	60	60-70	HF	Actinopterygii	Bone	Fragment		19				
PB	5677	60	70-80	HF	Caranx sp.	Vertebra	Complete		4				
PB	5677	60	70-80	HF	Cheloniidae	Bone	Fragment		2				
PB	5677	60	70-80	HF	Dasyprocta punctata	Auditory bulla	Complete	L	1				
PB	5677	60	70-80	HF	Actinopterygii	Bone	Fragment		29				
PB	5677	60	70-80	HF	Tylosurus crocodilus	Vertebra	Complete		6				
PB	5678	60	80-90	HF	Amphibia	Long bone	Fragment		1				
PB	5678	60	80-90	HF	Arius felis	Cranial	Complete		2				
PB	5678	60	80-90	HF	Bodianus sp.	Lower mandible	Fragment		1				
PB	5678	60	80-90	HF	Caranx sp.	Cranial	Complete		4				
PB	5678	60	80-90	HF	Caranx sp.	Vertebra	Complete		15				
PB	5678	60	80-90	HF	Cheloniidae	Bone	Fragment		9				
PB	5678	60	80-90	HF	Dasyprocta punctata	Atlas	Complete		1				
PB	5678	60	80-90	HF	Dasyprocta punctata	Radio-ulna	Proximal fragment	R	1				
PB	5678	60	80-90	HF	Euthynnus sp.	Vertebra	Complete		1				
PB	5678	60	80-90	HF	Leptodactylus pentadactylus	Tibiofibula	Proximal fragment		1				
PB	5678	60	80-90	HF	Lutjanus sp.	Vertebra	Complete		2				
PB	5678	60	80-90	HF	Mammalia	Epiphysis	Fragment		2				
PB	5678	60	80-90	HF	Scomberomorus sp.	Vertebra	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5678	60	80-90	HF	Actinopterygii	Bone	Fragment		38				
PB	5678	60	80-90	HF	Tylosurus crocodilus	Vertebra	Complete		2				
PB	5679	60	90-100	HF	Amphibia	Long bone	Fragment		1				
PB	5679	60	90-100	HF	Caranx sp.	Cranial	Mostly complete		4				
PB	5679	60	90-100	HF	Caranx sp.	Dentary	Proximal fragment		1				
PB	5679	60	90-100	HF	Caranx sp.	Premaxilla	Proximal fragment		1				
PB	5679	60	90-100	HF	Caranx sp.	Vertebra	Complete		15				
PB	5679	60	90-100	HF	Cheloniidae	Bone	Fragment		2				
PB	5679	60	90-100	HF	Cuniculus paca	Humerus	Complete	L	1				
PB	5679	60	90-100	HF	Dasyprocta punctata	Cranial	Fragment		1				
PB	5679	60	90-100	HF	Dasyprocta punctata	Incisor	Complete		1				
PB	5679	60	90-100	HF	Lutjanus sp.	Vertebra	Complete		5				
PB	5679	60	90-100	HF	Sphyraena barracuda	Vertebra	Complete		1				
PB	5679	60	90-100	HF	Actinopterygii	Bone	Fragment		30				
PB	5679	60	90-100	HF	Tylosurus crocodilus	Vertebra	Complete		14				
PB	5376	61	40-50	S	Caranx sp.	Pharyngeal	Complete		1				
PB	5376	61	40-50	S	Caranx sp.	Vertebra	Complete		6				
PB	5376	61	40-50	S	Caranx sp.	Vomer	Complete		1				
PB	5376	61	40-50	S	Cheloniidae	Bone	Fragment		16				
PB	5376	61	40-50	S	Chloroscombrus chrysurus	Vertebra	Complete		2				
PB	5376	61	40-50	S	Dasyprocta punctata	Vertebra	Complete		1				
PB	5376	61	40-50	S	Lutjanus sp.	Vertebra	Complete		2				
PB	5376	61	40-50	S	Scomberomorus sp.	Vertebra	Complete		1				
PB	5376	61	40-50	S	Actinopterygii	Bone	Fragment		9				
PB	5376	61	40-50	S	Tylosurus crocodilus	Cranial	Fragment		1				
PB	5395	61	40-50	S	Calamus sp.	Maxilla	Complete		1				
PB	5395	61	40-50	S	Caranx sp.	Premaxilla	Complete	L	1				
PB	5395	61	40-50	S	Caranx sp.	Vertebra	Complete		11				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5395	61	40-50	S	Cervidae	Long bone	Fragment		1				W
PB	5395	61	40-50	S	Cheloniidae	Bone	Fragment		9				
PB	5395	61	40-50	S	Dasyprocta punctata	Ulna	Proximal fragment	R	1				
PB	5395	61	40-50	S	Mazama americana	Femur	Distal fragment	L	1				
PB	5395	61	40-50	S	Megalops sp.	Vertebra	Fragment		1				
PB	5395	61	40-50	S	Seriola sp.	Vertebra	Complete		3				
PB	5395	61	40-50	S	Actinopterygii	Bone	Fragment		6				
PB	5395	61	40-50	S	Actinopterygii	Bone	Fragment		1	B			
PB	5410	61	40-50	S	Acanthurus sp.	Cranial	Fragment		1				
PB	5410	61	40-50	S	Acanthurus sp.	Vertebra	Complete		2				
PB	5410	61	40-50	S	Caranx sp.	Premaxilla	Proximal fragment		1				
PB	5410	61	40-50	S	Caranx sp.	Vertebra	Complete		29				
PB	5410	61	40-50	S	Cheloniidae	Phalange	Fragment		3				
PB	5410	61	40-50	S	Cheloniidae	Bone	Epiphyseal plate		1				
PB	5410	61	40-50	S	Cheloniidae	Bone	Fragment		52				
PB	5410	61	40-50	S	Cheloniidae	Vertebra	Fragment		4				
PB	5410	61	40-50	S	Dasyprocta punctata	Calcaneus	Complete		1				
PB	5410	61	40-50	S	Dasyprocta punctata	Femur	Shaft fragment	R	2				
PB	5410	61	40-50	S	Dasyprocta punctata	Humerus	Proximal fragment	R	1				
PB	5410	61	40-50	S	Dasyprocta punctata	Ilium	Fragment	R	1				
PB	5410	61	40-50	S	Dasyprocta punctata	Metatarsal	Complete		1				
PB	5410	61	40-50	S	Dasyprocta punctata	Tibia	Epiphyseal plate	R	1				
PB	5410	61	40-50	S	Dasyprocta punctata	Vertebra	Complete		1				
PB	5410	61	40-50	S	Mammalia	Ilium	Fragment	R	1				
PB	5410	61	40-50	S	Mammalia	Bone	Fragment		1				
PB	5410	61	40-50	S	Mammalia	Bone	Fragment		4				
PB	5410	61	40-50	S	Sigmodon sp.	Tibia	Complete	L	1				
PB	5410	61	40-50	S	Actinopterygii	Premaxilla	Proximal fragment		3				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5410	61	40-50	S	Actinopterygii	Bone	Fragment		21				
PB	5410	61	40-50	S	Trichechus manatus	Vertebra	Fragment		1				
PB	5455	61	50-60	S	Arius felis	Cranial	Complete		1				
PB	5455	61	50-60	S	Arius felis	Frontal	Complete		2				
PB	5455	61	50-60	S	Aves	Femur	Complete		1				
PB	5455	61	50-60	S	Aves	Bone	Fragment		2				
PB	5455	61	50-60	S	Caranx sp.	Cranial	Fragment		1				
PB	5455	61	50-60	S	Caranx sp.	Cranial	Fragment		1				
PB	5455	61	50-60	S	Caranx sp.	Hyomandibula	Fragment		1				
PB	5455	61	50-60	S	Caranx sp.	Maxilla	Proximal fragment		3				
PB	5455	61	50-60	S	Caranx sp.	Premaxilla	Proximal fragment		2				
PB	5455	61	50-60	S	Caranx sp.	Vertebra	Complete		22				
PB	5455	61	50-60	S	Cheloniidae	Humerus	Proximal fragment		1				
PB	5455	61	50-60	S	Cheloniidae	Phalange	Fragment		1				
PB	5455	61	50-60	S	Cheloniidae	Bone	Fragment		25				
PB	5455	61	50-60	S	Cheloniidae	Vertebra	Fragment		2				
PB	5455	61	50-60	S	Dasyprocta punctata	Cranial	Fragment		2				
PB	5455	61	50-60	S	Dasyprocta punctata	Femur	Proximal fragment	R	1				
PB	5455	61	50-60	S	Dasyprocta punctata	Humerus	Distal fragment	L	1				
PB	5455	61	50-60	S	Dasyprocta punctata	Metacarpal	Mostly complete		2				
PB	5455	61	50-60	S	Dasyprocta punctata	Phalange	Complete		2				
PB	5455	61	50-60	S	Dasyprocta punctata	Radius	Proximal fragment	L	1				
PB	5455	61	50-60	S	Dasyprocta punctata	Radius	Proximal fragment	R	1				
PB	5455	61	50-60	S	Dasyprocta punctata	Rib	Proximal fragment		2				
PB	5455	61	50-60	S	Dasyprocta punctata	Scapula	Proximal fragment	L	1				
PB	5455	61	50-60	S	Dasyprocta punctata	Tibia	Distal fragment	L	1				
PB	5455	61	50-60	S	Dasyprocta punctata	Ulna	Proximal fragment	L	1				
PB	5455	61	50-60	S	Odocoileus virginianus	Phalange	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5455	61	50-60	S	Rhinoclemmys funerea	Carapace	Pleural		4				
PB	5455	61	50-60	S	Scarus sp.	Maxilla	Proximal fragment		1				
PB	5455	61	50-60	S	Sphyraena barracuda	Vertebra	Complete		1				
PB	5455	61	50-60	S	Actinopterygii	Premaxilla	Proximal fragment		1				
PB	5455	61	50-60	S	Actinopterygii	Bone	Fragment		41				
PB	5463	61	60-70	S	Acanthurus sp.	Vertebra	Complete		3				
PB	5463	61	60-70	S	Aetobatus narinari	Dentary	Complete		1				
PB	5463	61	60-70	S	Aves	Bone	Complete		3				
PB	5463	61	60-70	S	Balistes sp.	Tooth	Complete		1				
PB	5463	61	60-70	S	Calamus sp.	Dentary	Complete		1				
PB	5463	61	60-70	S	Calamus sp.	Maxilla	Complete		1				
PB	5463	61	60-70	S	Calamus sp.	Tooth	Complete		2				
PB	5463	61	60-70	S	Caranx sp.	Dentary	Fragment		1				
PB	5463	61	60-70	S	Caranx sp.	Hyomandibula	Mostly complete		3				
PB	5463	61	60-70	S	Caranx sp.	Maxilla	Proximal fragment		5				
PB	5463	61	60-70	S	Caranx sp.	Premaxilla	Proximal fragment	L	2				
PB	5463	61	60-70	S	Caranx sp.	Premaxilla	Proximal fragment	R	2				
PB	5463	61	60-70	S	Caranx sp.	Bone	Fragment		4				
PB	5463	61	60-70	S	Caranx sp.	Vertebra	Complete		37				
PB	5463	61	60-70	S	Caranx sp.	Vomer	Complete		5				
PB	5463	61	60-70	S	Chelonia mydas	Carapace	Fragment		1				
PB	5463	61	60-70	S	Chelonia mydas	Scapula	Fragment		1				
PB	5463	61	60-70	S	Cheloniidae	Carpal	Complete		1				
PB	5463	61	60-70	S	Cheloniidae	Phalange	Complete		4				
PB	5463	61	60-70	S	Cheloniidae	Bone	Fragment		1	B			
PB	5463	61	60-70	S	Cheloniidae	Bone	Fragment		65				
PB	5463	61	60-70	S	Cheloniidae	Vertebra	Fragment		6				
PB	5463	61	60-70	S	Cuniculus paca	Incisor	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5463	61	60-70	S	Cuniculus paca	Upper maxilla	Fragment	L	1				
PB	5463	61	60-70	S	Cuniculus paca	Upper maxilla	Fragment	R	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Astragalus	Complete	R	2				
PB	5463	61	60-70	S	Dasyprocta punctata	Calcaneus	Complete	L	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Humerus	Distal fragment	L	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Ilium	Fragment	R	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Molar	Complete		1				
PB	5463	61	60-70	S	Dasyprocta punctata	Occipital	Fragment	L	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Orbital	Fragment	L	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Parietal	Fragment	L	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Parietal	Fragment	R	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Rib	Proximal fragment		1				
PB	5463	61	60-70	S	Dasyprocta punctata	Upper maxilla	Fragment	L	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Upper maxilla	Fragment	R	1				
PB	5463	61	60-70	S	Dasyprocta punctata	Vertebra	Mostly complete		1				
PB	5463	61	60-70	S	Dasyprocta punctata	Vertebra	Mostly complete		1				
PB	5463	61	60-70	S	Euthynnus sp.	Maxilla	Proximal fragment		1				
PB	5463	61	60-70	S	Euthynnus sp.	Vertebra	Complete		2				
PB	5463	61	60-70	S	Lutjanus sp.	Dentary	Proximal fragment	R	1				
PB	5463	61	60-70	S	Lutjanus sp.	Dentary	Proximal fragment	L	1				
PB	5463	61	60-70	S	Lutjanus sp.	Vertebra	Complete		2				
PB	5463	61	60-70	S	Mammalia	Bone	Fragment		3				
PB	5463	61	60-70	S	Mammalia	Bone	Fragment		2	B			
PB	5463	61	60-70	S	Mazama americana	Antler	Fragment		1	B			
PB	5463	61	60-70	S	Megalops sp.	Vertebra	Fragment		1				
PB	5463	61	60-70	S	Rodentia	Humerus	Proximal fragment	R	1				
PB	5463	61	60-70	S	Scomberomorus sp.	Vertebra	Complete		5				
PB	5463	61	60-70	S	Sphyraena barracuda	Vertebra	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5463	61	60-70	S	Tayassu pecari	Humerus	Fragment	L	1				
PB	5463	61	60-70	S	Tayassu pecari	Tibia	Proximal fragment	R	1				
PB	5463	61	60-70	S	Actinopterygii	Maxilla	Proximal fragment		1				
PB	5463	61	60-70	S	Actinopterygii	Bone	Fragment		75				
PB	5463	61	60-70	S	Tylosurus crocodilus	Vertebra	Complete		3				
PB	5490	61	60-70	S	Caranx sp.	Premaxilla	Proximal fragment	R	1				
PB	5490	61	60-70	S	Caranx sp.	Vertebra	Complete		1				
PB	5490	61	60-70	S	Chelonia mydas	Plastron	Fragment		3				
PB	5490	61	60-70	S	Dasyprocta punctata	Metapodial	Complete		1				
PB	5490	61	60-70	S	Actinopterygii	Bone	Fragment		7				
PB	5490	61	60-70	S	Tylosurus crocodilus	Vertebra	Complete		1				
PB	5494	61	70-80	S	Arius felis	Frontal	Fragment		3				
PB	5494	61	70-80	S	Arius felis	Bone	Fragment		3				
PB	5494	61	70-80	S	Caranx sp.	Hyomandibula	Fragment		1				
PB	5494	61	70-80	S	Caranx sp.	Premaxilla	Complete		1				
PB	5494	61	70-80	S	Caranx sp.	Bone	Complete		1				
PB	5494	61	70-80	S	Caranx sp.	Vertebra	Complete		26				
PB	5494	61	70-80	S	Caranx sp.	Vomer	Complete		1				
PB	5494	61	70-80	S	Cheloniidae	Phalange	Complete		1				
PB	5494	61	70-80	S	Cheloniidae	Bone	Fragment		4				
PB	5494	61	70-80	S	Cheloniidae	Vertebra	Fragment		1				
PB	5494	61	70-80	S	Cuniculus paca	Auditory bulla	Complete	L	1				
PB	5494	61	70-80	S	Cuniculus paca	Vertebra	Complete		1				
PB	5494	61	70-80	S	Mazama americana	Metatarsal	Proximal fragment		8	B			
PB	5494	61	70-80	S	Sigmodon sp.	Femur	Proximal fragment	L	1				
PB	5494	61	70-80	S	Sphyraena barracuda	Vertebra	Complete		2				
PB	5494	61	70-80	S	Actinopterygii	Bone	Fragment		19				
PB	5522	61	70-80	S	Arius felis	Frontal	Mostly complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5522	61	70-80	S	Caranx sp.	Cranial	Complete		1				
PB	5522	61	70-80	S	Caranx sp.	Vertebra	Complete		16				
PB	5522	61	70-80	S	Cervidae	Metapodial	Fragment		1	B			
PB	5522	61	70-80	S	Chelonia mydas	Femur	Mostly complete		1				
PB	5522	61	70-80	S	Chelonia mydas	Plastron	Fragment		2				
PB	5522	61	70-80	S	Chelonia mydas	Vertebra	Mostly complete		1				
PB	5522	61	70-80	S	Cheloniidae	Bone	Fragment		7				
PB	5522	61	70-80	S	Cuniculus paca	Frontal	Fragment		1				
PB	5522	61	70-80	S	Diodon antennatus	Spine	Complete		5				
PB	5522	61	70-80	S	Euthynnus sp.	Vertebra	Complete		1				
PB	5522	61	70-80	S	Mycteroperca sp.	Vertebra	Complete		1				
PB	5522	61	70-80	S	Sphyraena barracuda	Vertebra	Complete		1				
PB	5522	61	70-80	S	Actinopterygii	Bone	Fragment		12				
PB	5538	61	80-90	S	Odocoileus virginianus	Antler	Mostly complete		1	B			
PB	5567	61	90-100	S	Aetobatus narinari	Vertebra	Complete		3				
PB	5567	61	90-100	S	Aves	Humerus	Mostly complete		1				
PB	5567	61	90-100	S	Aves	Bone	Fragment		3				
PB	5567	61	90-100	S	Caranx sp.	Premaxilla	Proximal fragment		1				
PB	5567	61	90-100	S	Caranx sp.	Vertebra	Complete		8				
PB	5567	61	90-100	S	Caranx sp.	Vomer	Complete		1				
PB	5567	61	90-100	S	Chelonia mydas	Phalange	Complete		2				
PB	5567	61	90-100	S	Chelonia mydas	Scapula	Complete		1		C		
PB	5567	61	90-100	S	Cheloniidae	Cranial	Fragment		3				
PB	5567	61	90-100	S	Cheloniidae	Bone	Fragment		7				
PB	5567	61	90-100	S	Cuniculus paca	Lower mandible	Mostly complete	L	1				
PB	5567	61	90-100	S	Dasyprocta punctata	Molar	Complete		4				
PB	5567	61	90-100	S	Dasyprocta punctata	Tibia	Fragment	R	1				
PB	5567	61	90-100	S	Dasyprocta punctata	Upper maxilla	Fragment	L	1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5567	61	90-100	S	Diodon antennatus	Spine	Complete		1				
PB	5567	61	90-100	S	Homo sapiens	Molar	Fragment		1				
PB	5567	61	90-100	S	Leptodactylus pentadactylus	Coracoid	Complete	R	1				
PB	5567	61	90-100	S	Leptodactylus pentadactylus	Femur	Proximal fragment	L	3				
PB	5567	61	90-100	S	Leptodactylus pentadactylus	Femur	Proximal fragment	R	1				
PB	5567	61	90-100	S	Leptodactylus pentadactylus	Humerus	Complete		2				
PB	5567	61	90-100	S	Leptodactylus pentadactylus	Tibiofibula	Complete		3				
PB	5567	61	90-100	S	Leptodactylus pentadactylus	Bone	Fragment		13				
PB	5567	61	90-100	S	Leptodactylus pentadactylus	Vertebra	Complete		3				
PB	5567	61	90-100	S	Mazama americana	Long bone	Fragment		3	B			W
PB	5567	61	90-100	S	Mazama americana	Metatarsal	Proximal fragment	R	1				
PB	5567	61	90-100	S	Odocoileus virginianus	Cranial	Fragment		1				
PB	5567	61	90-100	S	Oryzomys sp.	Femur	Proximal fragment	L	1				
PB	5567	61	90-100	S	Oryzomys sp.	Humerus	Complete	R	1				
PB	5567	61	90-100	S	Oryzomys sp.	Ilium	Fragment	R	2				
PB	5567	61	90-100	S	Oryzomys sp.	Incisor	Complete		1				
PB	5567	61	90-100	S	Oryzomys sp.	Lower mandible	Mostly complete	R	2				
PB	5567	61	90-100	S	Oryzomys sp.	Tibia	Fragment		1				
PB	5567	61	90-100	S	Oryzomys sp.	Tibia	Complete	L	2				
PB	5567	61	90-100	S	Oryzomys sp.	Vertebra	Complete		1				
PB	5567	61	90-100	S	Sigmodon sp.	Femur	Proximal fragment	R	1				
PB	5567	61	90-100	S	Sigmodon sp.	Incisor	Complete		2				
PB	5567	61	90-100	S	Sigmodon sp.	Lower mandible	Complete	L	1				
PB	5567	61	90-100	S	Sparisoma sp.	Dentary	Complete		1				
PB	5567	61	90-100	S	Sphyraena barracuda	Premaxilla	Distal fragment	L	1				
PB	5567	61	90-100	S	Sphyraena barracuda	Vertebra	Fragment		1				
PB	5567	61	90-100	S	Actinopterygii	Bone	Fragment		10				
PB	5589	61	90-100	S	Acanthurus sp.	Vertebra	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5589	61	90-100	S	Aves	Bone	Fragment		9				
PB	5589	61	90-100	S	Caranx sp.	Maxilla	Proximal fragment		2				
PB	5589	61	90-100	S	Caranx sp.	Vertebra	Complete		5				
PB	5589	61	90-100	S	Cervidae	Metapodial	Fragment		2				
PB	5589	61	90-100	S	Cheloniidae	Bone	Fragment		7				
PB	5589	61	90-100	S	Crocodylus	Maxilla	Fragment		2				
PB	5589	61	90-100	S	Cuniculus paca	Molar	Complete		5				
PB	5589	61	90-100	S	Dasyprocta punctata	Cranial	Fragment		2				
PB	5589	61	90-100	S	Dasyprocta punctata	Molar	Complete		3				
PB	5589	61	90-100	S	Dasyprocta punctata	Ulna	Proximal fragment	L	1				
PB	5589	61	90-100	S	Dasyprocta punctata	Vertebra	Complete		2				
PB	5589	61	90-100	S	Dasyprocta punctata	Zygomatic arch	Fragment	R	1				
PB	5589	61	90-100	S	Diodon antennatus	Lower pharyngeal	Complete		1				
PB	5589	61	90-100	S	Diodon antennatus	Spine	Complete		1				
PB	5589	61	90-100	S	Euthynnus sp.	Vertebra	Complete		1				
PB	5589	61	90-100	S	Haemulon sp.	Vertebra	Complete		3				
PB	5589	61	90-100	S	Kinosternon sp.	Plastron	Fragment		3				
PB	5589	61	90-100	S	Leptodactylus pentadactylus	Coracoid	Mostly complete		3				
PB	5589	61	90-100	S	Leptodactylus pentadactylus	Femur	Proximal fragment	R	1				
PB	5589	61	90-100	S	Leptodactylus pentadactylus	Humerus	Proximal fragment	L	2				
PB	5589	61	90-100	S	Leptodactylus pentadactylus	Radius	Complete		2				
PB	5589	61	90-100	S	Leptodactylus pentadactylus	Bone	Complete		8				
PB	5589	61	90-100	S	Leptodactylus pentadactylus	Bone	Fragment		14				
PB	5589	61	90-100	S	Leptodactylus pentadactylus	Vertebra	Fragment		1				
PB	5589	61	90-100	S	Oryzomys sp.	Femur	Complete	L	1				
PB	5589	61	90-100	S	Oryzomys sp.	Femur	Complete	R	1				
PB	5589	61	90-100	S	Oryzomys sp.	Incisor	Complete		1				
PB	5589	61	90-100	S	Scarus sp.	Vertebra	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5589	61	90-100	S	Sigmodon sp.	Femur	Complete	R	4				
PB	5589	61	90-100	S	Sigmodon sp.	Femur	Complete	L	2				
PB	5589	61	90-100	S	Sigmodon sp.	Ilium	Fragment	L	2				
PB	5589	61	90-100	S	Sigmodon sp.	Ilium	Fragment	R	1				
PB	5589	61	90-100	S	Sigmodon sp.	Lower mandible	Complete	R	2				
PB	5589	61	90-100	S	Sigmodon sp.	Lower mandible	Complete	L	1				
PB	5589	61	90-100	S	Sigmodon sp.	Tibia	Complete	L	3				
PB	5589	61	90-100	S	Sigmodon sp.	Tibia	Complete	R	2				
PB	5589	61	90-100	S	Actinopterygii	Bone	Fragment		11				
PB	5592	61	80-90	S	Acanthurus sp.	Vertebra	Complete		1				
PB	5592	61	80-90	S	Arius felis	Frontal	Mostly complete		2				
PB	5592	61	80-90	S	Arius felis	Vertebra	Fragment		1				
PB	5592	61	80-90	S	Calamus sp.	Maxilla	Complete		1				
PB	5592	61	80-90	S	Caranx sp.	Vertebra	Complete		30				
PB	5592	61	80-90	S	Caranx sp.	Vomer	Complete		1				
PB	5592	61	80-90	S	Chelonia mydas	Cranial	Fragment		3				
PB	5592	61	80-90	S	Chelonia mydas	Humerus	Complete		1		C		
PB	5592	61	80-90	S	Chelonia mydas	Vertebra	Fragment		4				
PB	5592	61	80-90	S	Chelonia mydas	Vertebra	Fragment		1		C		
PB	5592	61	80-90	S	Cheloniidae	Bone	Distal fragment		15				
PB	5592	61	80-90	S	Cuniculus paca	Metacarpal	Epiphyseal plate		1				
PB	5592	61	80-90	S	Cuniculus paca	Vertebra	Fragment		1				
PB	5592	61	80-90	S	Dasyprocta punctata	Scapula	Fragment	L	1				
PB	5592	61	80-90	S	Dasyprocta punctata	Vertebra	Mostly complete		1				
PB	5592	61	80-90	S	Dasyprocta punctata	Vertebra	Mostly complete		1	B			
PB	5592	61	80-90	S	Diodon antennatus	Spine	Fragment		2				
PB	5592	61	80-90	S	Euthynnus sp.	Premaxilla	Proximal fragment		1				
PB	5592	61	80-90	S	Euthynnus sp.	Vertebra	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5592	61	80-90	S	Leptodactylus pentadactylus	Tibiofibula	Fragment		3				
PB	5592	61	80-90	S	Mammalia	Bone	Fragment		1	B			W
PB	5592	61	80-90	S	Megalops sp.	Vertebra	Complete		1				
PB	5592	61	80-90	S	Odocoileus virginianus	Cranial	Fragment		8				
PB	5592	61	80-90	S	Scomberomorus sp.	Vertebra	Complete		2				
PB	5592	61	80-90	S	Sigmodon sp.	Femur	Proximal fragment	R	1				
PB	5592	61	80-90	S	Sigmodon sp.	Tibia	Complete	R	1	B			
PB	5592	61	80-90	S	Sparisoma sp.	Dentary	Mostly complete	L	1				
PB	5592	61	80-90	S	Actinopterygii	Bone	Fragment		48				
PB	5607	61	100-110	S	Trichechus manatus	Vertebra	Complete		2				
PB	5608	61	100-110	S	Arius felis	Frontal	Mostly complete		1				
PB	5608	61	100-110	S	Balistes sp.	Vertebra	Complete		2				
PB	5608	61	100-110	S	Caranx sp.	Dentary	Proximal fragment	L	4				
PB	5608	61	100-110	S	Caranx sp.	Maxilla	Proximal fragment		1				
PB	5608	61	100-110	S	Caranx sp.	Premaxilla	Proximal fragment	R	2				
PB	5608	61	100-110	S	Caranx sp.	Vertebra	Complete		37				
PB	5608	61	100-110	S	Chelonia mydas	Cranial	Fragment		4				
PB	5608	61	100-110	S	Chelonia mydas	Femur	Fragment		1				
PB	5608	61	100-110	S	Chelonia mydas	Frontal	Fragment		2				
PB	5608	61	100-110	S	Chelonia mydas	Humerus	Distal fragment		1				
PB	5608	61	100-110	S	Chelonia mydas	Phalange	Mostly complete		7				
PB	5608	61	100-110	S	Chelonia mydas	Scapula	Fragment		1				
PB	5608	61	100-110	S	Chelonia mydas	Ulna	Complete	R	1				
PB	5608	61	100-110	S	Chelonia mydas	Ulna	Complete	L	1				
PB	5608	61	100-110	S	Chelonia mydas	Bone	Fragment		12				
PB	5608	61	100-110	S	Chelonia mydas	Vertebra	Fragment		8				
PB	5608	61	100-110	S	Cheloniidae	Bone	Fragment		95				
PB	5608	61	100-110	S	Cheloniidae	Bone	Fragment		2	B			

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5608	61	100-110	S	Cuniculus paca	Auditory bulla	Complete	R	1				
PB	5608	61	100-110	S	Cuniculus paca	Radius	Proximal fragment	L	1				
PB	5608	61	100-110	S	Dasyprocta punctata	Cranial	Fragment		2				
PB	5608	61	100-110	S	Dasyprocta punctata	Humerus	Proximal fragment	R	1	B	C		
PB	5608	61	100-110	S	Dasyprocta punctata	Tibia	Distal fragment	R	1				
PB	5608	61	100-110	S	Dasyprocta punctata	Tibia	Proximal fragment	R	1				
PB	5608	61	100-110	S	Dasyprocta punctata	Ulna	Fragment	R	1				
PB	5608	61	100-110	S	Homo sapiens	Bone	Fragment		1				
PB	5608	61	100-110	S	Leptodactylus pentadactylus	Femur	Distal fragment		1				
PB	5608	61	100-110	S	Homo sapiens	Parietal	Fragment		1				W
PB	5608	61	100-110	S	Odocoileus virginianus	Cranial	Fragment		1				
PB	5608	61	100-110	S	Rodentia	Bone	Fragment		1				
PB	5608	61	100-110	S	Scarus sp.	Lower pharyngeal	Complete		1				
PB	5608	61	100-110	S	Scomberomorus sp.	Vertebra	Complete		1				
PB	5608	61	100-110	S	Sigmodon sp.	Femur	Proximal fragment	R	1				
PB	5608	61	100-110	S	Sphyraena barracuda	Vertebra	Complete		1				
PB	5608	61	100-110	S	Actinopterygii	Bone	Fragment		37				
PB	5633	61	100-110	S	Aetobatus narinari	Vertebra	Complete		1				
PB	5633	61	100-110	S	Caranx sp.	Dentary	Proximal fragment		1				
PB	5633	61	100-110	S	Caranx sp.	Maxilla	Proximal fragment		1				
PB	5633	61	100-110	S	Caranx sp.	Premaxilla	Proximal fragment	R	1				
PB	5633	61	100-110	S	Caranx sp.	Bone	Fragment		6				
PB	5633	61	100-110	S	Caranx sp.	Vertebra	Complete		12				
PB	5633	61	100-110	S	Caranx sp.	Vomer	Complete		1				
PB	5633	61	100-110	S	Cheloniidae	Bone	Fragment		24				
PB	5633	61	100-110	S	Cuniculus paca	Cranial	Fragment		2				
PB	5633	61	100-110	S	Cuniculus paca	Lower mandible	Mostly complete	L	1				
PB	5633	61	100-110	S	Diodon antennatus	Spine	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5633	61	100-110	S	Euthynnus sp.	Vertebra	Complete		2				
PB	5633	61	100-110	S	Leptodactylus pentadactylus	Coracoid	Complete	L	1				
PB	5633	61	100-110	S	Lutjanus sp.	Maxilla	Proximal fragment		1				
PB	5633	61	100-110	S	Lutjanus sp.	Vertebra	Complete		2				
PB	5633	61	100-110	S	Odocoileus virginianus	Long bone	Fragment		2				
PB	5633	61	100-110	S	Odocoileus virginianus	Tibia	Distal fragment	L	2				
PB	5633	61	100-110	S	Sigmodon sp.	Tibia	Complete	R	1				
PB	5633	61	100-110	S	Sphyraena barracuda	Vertebra	Complete		1				
PB	5633	61	100-110	S	Actinopterygii	Bone	Fragment		26				
PB	5633	61	100-110	S	Tylosurus crocodilus	Vertebra	Complete		1				
PB	5654	61	110-120	S	Caranx sp.	Hyomandibula	Mostly complete		1				
PB	5654	61	110-120	S	Caranx sp.	Maxilla	Proximal fragment		2				
PB	5654	61	110-120	S	Caranx sp.	Premaxilla	Fragment		3				
PB	5654	61	110-120	S	Caranx sp.	Vertebra	Complete		17				
PB	5654	61	110-120	S	Caranx sp.	Vomer	Complete		1				
PB	5654	61	110-120	S	Chelonia mydas	Scapula	Fragment		2				
PB	5654	61	110-120	S	Cheloniidae	Carapace	Fragment		23				
PB	5654	61	110-120	S	Cheloniidae	Carpal	Complete		2				
PB	5654	61	110-120	S	Cheloniidae	Phalange	Mostly complete		7				
PB	5654	61	110-120	S	Cheloniidae	Bone	Fragment		42				
PB	5654	61	110-120	S	Cheloniidae	Bone	Fragment		1	B			
PB	5654	61	110-120	S	Cheloniidae	Vertebra	Fragment		10				
PB	5654	61	110-120	S	Cuniculus paca	Orbital	Fragment	R	1				
PB	5654	61	110-120	S	Diodon antennatus	Spine	Complete		1				
PB	5654	61	110-120	S	Euthynnus sp.	Vertebra	Complete		1				
PB	5654	61	110-120	S	Leptodactylus pentadactylus	Femur	Proximal fragment		1				
PB	5654	61	110-120	S	Leptodactylus pentadactylus	Bone	Fragment		3				
PB	5654	61	110-120	S	Odocoileus virginianus	Tibia	Proximal fragment	L	2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5654	61	110-120	S	Odocoileus virginianus	Tibia	Fragment		3				
PB	5654	61	110-120	S	Rodentia	Cranial	Fragment		2				
PB	5654	61	110-120	S	Scomberomorus sp.	Vertebra	Complete		1				
PB	5654	61	110-120	S	Sigmodon sp.	Humerus	Complete	R	1				
PB	5654	61	110-120	S	Sigmodon sp.	Ilium	Fragment	R	1				
PB	5654	61	110-120	S	Sigmodon sp.	Tibia	Complete	R	1				
PB	5654	61	110-120	S	Actinopterygii	Bone	Fragment		18				
PB	5654	61	110-120	S	Actinopterygii	Vertebra	Complete		2				
PB	5661	61	110-120	S	Caranx sp.	Premaxilla	Proximal fragment	L	2				
PB	5661	61	110-120	S	Caranx sp.	Vertebra	Complete		9				
PB	5661	61	110-120	S	Cheloniidae	Bone	Fragment		10				
PB	5661	61	110-120	S	Dasyprocta punctata	Vertebra	Fragment		1				
PB	5661	61	110-120	S	Diodon antennatus	Spine	Fragment		4				
PB	5661	61	110-120	S	Lutjanus sp.	Maxilla	Proximal fragment		1				
PB	5661	61	110-120	S	Odocoileus virginianus	Vertebra	Epyhisus fragment		1				
PB	5661	61	110-120	S	Oryzomys sp.	Femur	Complete	R	1				
PB	5661	61	110-120	S	Oryzomys sp.	Humerus	Distal fragment	L	1				
PB	5661	61	110-120	S	Oryzomys sp.	Incisor	Complete		1				
PB	5661	61	110-120	S	Oryzomys sp.	Lower mandible	Mostly complete	R	1				
PB	5661	61	110-120	S	Sigmodon sp.	Femur	Complete	L	1				
PB	5661	61	110-120	S	Sigmodon sp.	Tibia	Complete	L	1				
PB	5661	61	110-120	S	Actinopterygii	Bone	Fragment		7				
PB	5661	61	110-120	S	Tylosurus crocodilus	Vertebra	Complete		1				
PB	5692	61	40-50	HF	Acanthurus sp.	Vertebra	Complete		5				
PB	5692	61	40-50	HF	Caranx sp.	Hyomandibula	Fragment		1				
PB	5692	61	40-50	HF	Caranx sp.	Vertebra	Complete		16				
PB	5692	61	40-50	HF	Caranx sp.	Vomer	Complete		1				
PB	5692	61	40-50	HF	Cheloniidae	Carpal	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5692	61	40-50	HF	Cheloniidae	Phalange	Complete		1				
PB	5692	61	40-50	HF	Cheloniidae	Plastron	Fragment		2				
PB	5692	61	40-50	HF	Cheloniidae	Rib	Fragment		1				
PB	5692	61	40-50	HF	Cheloniidae	Bone	Fragment		12				
PB	5692	61	40-50	HF	Cheloniidae	Vertebra	Fragment		4				
PB	5692	61	40-50	HF	Euthynnus sp.	Vertebra	Complete		4				
PB	5692	61	40-50	HF	Homo sapiens	Canine	Complete		1				
PB	5692	61	40-50	HF	Lutjanus sp.	Vertebra	Complete		1				
PB	5692	61	40-50	HF	Proechimys semispinosus	Vertebra	Complete		1				
PB	5692	61	40-50	HF	Scomberomorus sp.	Vertebra	Complete		1				
PB	5692	61	40-50	HF	Actinopterygii	Bone	Fragment		15				
PB	5693	61	50-60	HF	Acanthurus sp.	Vertebra	Complete		1				
PB	5693	61	50-60	HF	Amphibia	Long bone	Fragment		1				
PB	5693	61	50-60	HF	Caranx sp.	Hyomandibula	Complete		1				
PB	5693	61	50-60	HF	Caranx sp.	Maxilla	Proximal fragment		1				
PB	5693	61	50-60	HF	Caranx sp.	Pharyngeal	Fragment		1				
PB	5693	61	50-60	HF	Caranx sp.	Vertebra	Complete		14				
PB	5693	61	50-60	HF	Cheloniidae	Bone	Fragment		35				
PB	5693	61	50-60	HF	Cuniculus paca	Humerus	Distal fragment	L	1				
PB	5693	61	50-60	HF	Dasyprocta punctata	Carpal	Complete		1	B			
PB	5693	61	50-60	HF	Euthynnus sp.	Maxilla	Proximal fragment		1				
PB	5693	61	50-60	HF	Euthynnus sp.	Vertebra	Complete		5				
PB	5693	61	50-60	HF	Haemulon sp.	Bone	Complete		1				
PB	5693	61	50-60	HF	Homo sapiens	Incisor	Complete		1				
PB	5693	61	50-60	HF	Kyphosus sectatrix	Premaxilla	Proximal fragment	R	1				
PB	5693	61	50-60	HF	Lutjanus sp.	Vertebra	Complete		1				
PB	5693	61	50-60	HF	Oligoplites sp.	Vertebra	Complete		3				
PB	5693	61	50-60	HF	Scarus sp.	Dentary	Complete		1				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5693	61	50-60	HF	Scarus sp.	Lower pharyngeal	Complete		1				
PB	5693	61	50-60	HF	Scarus sp.	Vertebra	Complete		2				
PB	5693	61	50-60	HF	Scarus sp.	Vertebra	Complete		3				
PB	5693	61	50-60	HF	Scombridae	Operculum	Complete		1				
PB	5693	61	50-60	HF	Sigmodon sp.	Ilium	Fragment	L	1				
PB	5693	61	50-60	HF	Sphyraena barracuda	Vertebra	Complete		1				
PB	5693	61	50-60	HF	Actinopterygii	Bone	Fragment		37				
PB	5693	61	50-60	HF	Actinopterygii	Vertebra	Complete		4				
PB	5694	61	60-70	HF	Acanthurus sp.	Vertebra	Complete		1				
PB	5694	61	60-70	HF	Arius felis	Frontal	Mostly complete		1				
PB	5694	61	60-70	HF	Calamus sp.	Dentary	Complete		1				
PB	5694	61	60-70	HF	Caranx sp.	Vertebra	Complete		25				
PB	5694	61	60-70	HF	Cheloniidae	Bone	Fragment		2				
PB	5694	61	60-70	HF	Dasyprocta punctata	Scapula	Proximal fragment	R	1				
PB	5694	61	60-70	HF	Dasyprocta punctata	Bone	Fragment		2				
PB	5694	61	60-70	HF	Epinephelus sp.	Vertebra	Complete		1				
PB	5694	61	60-70	HF	Scomberomorus sp.	Vertebra	Complete		2				
PB	5694	61	60-70	HF	Sigmodon sp.	Tibia	Complete	L	1				
PB	5694	61	60-70	HF	Actinopterygii	Bone	Fragment		31				
PB	5694	61	60-70	HF	Tylosurus crocodilus	Vertebra	Complete		1				
PB	5695	61	70-80	HF	Acanthurus sp.	Vertebra	Complete		1				
PB	5695	61	70-80	HF	Amphibia	Long bone	Fragment		1				
PB	5695	61	70-80	HF	Arius felis	Frontal	Mostly complete		1				
PB	5695	61	70-80	HF	Arius felis	Otolith	Complete		1				
PB	5695	61	70-80	HF	Caranx sp.	Cranial	Fragment		2				
PB	5695	61	70-80	HF	Caranx sp.	Maxilla	Proximal fragment		1				
PB	5695	61	70-80	HF	Caranx sp.	Vertebra	Complete		28				
PB	5695	61	70-80	HF	Cheloniidae	Bone	Fragment		9				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5695	61	70-80	HF	Dasyprocta punctata	Carpal	Complete		1				
PB	5695	61	70-80	HF	Dasyprocta punctata	Scapula	Proximal fragment	L	1				
PB	5695	61	70-80	HF	Scomberomorus sp.	Bone	Fragment		26				
PB	5695	61	70-80	HF	Scomberomorus sp.	Vertebra	Complete		2				
PB	5695	61	70-80	HF	Actinopterygii	Bone	Complete		7				
PB	5696	61	80-90	HF	Acanthurus sp.	Vertebra	Complete		1				
PB	5696	61	80-90	HF	Aves	Ulna	Complete		1				
PB	5696	61	80-90	HF	Caranx sp.	Parietal	Complete		3				
PB	5696	61	80-90	HF	Caranx sp.	Vertebra	Complete		9				
PB	5696	61	80-90	HF	Cheloniidae	Plastron	Fragment		5				
PB	5696	61	80-90	HF	Cheloniidae	Bone	Fragment		23				
PB	5696	61	80-90	HF	Cheloniidae	Bone	Fragment		1	B			
PB	5696	61	80-90	HF	Dasyprocta punctata	Cranial	Fragment		2				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Basisphenoid	Complete		1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Clavicle	Complete	R	1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Clavicle	Complete	L	1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Coracoid	Complete	R	2				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Coracoid	Complete	L	1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Eurostyle	Complete		1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Femur	Proximal fragment	L	3				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Femur	Proximal fragment	R	1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Humerus	Complete		1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Ilium	Complete		1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Ischium	Complete		1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Radio-ulna	Complete		1				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Bone	Fragment		4				
PB	5696	61	80-90	HF	Leptodactylus pentadactylus	Vertebra	Complete		2				
PB	5696	61	80-90	HF	Lutjanus sp.	Vertebra	Complete		2				

Phase	FS #	Unit	Level (cm)	Sample Type	Scientific Name	Element	Portion	Side	#	B	C	G	W
PB	5696	61	80-90	HF	Oryzomys sp.	Tibia	Complete	R	1				
PB	5696	61	80-90	HF	Proechimys semispinosus	Sacrum	Complete		1				
PB	5696	61	80-90	HF	Sigmodon sp.	Femur	Complete	R	2				
PB	5696	61	80-90	HF	Sigmodon sp.	Femur	Complete	L	1				
PB	5696	61	80-90	HF	Sigmodon sp.	Ilium	Fragment	L	1				
PB	5696	61	80-90	HF	Sigmodon sp.	Lower mandible	Complete	L	1				
PB	5696	61	80-90	HF	Sigmodon sp.	Tibia	Complete	R	1				
PB	5696	61	80-90	HF	Actinopterygii	Bone	Fragment		47				
PB	5696	61	80-90	HF	Tylosurus crocodilus	Vertebra	Complete		1				
PB	5697	61	90-100	HF	Caranx sp.	Cranial	Fragment		1				
PB	5697	61	90-100	HF	Caranx sp.	Premaxilla	Proximal fragment		1				
PB	5697	61	90-100	HF	Caranx sp.	Quadrate	Complete		1				
PB	5697	61	90-100	HF	Caranx sp.	Vertebra	Complete		14				
PB	5697	61	90-100	HF	Cheloniidae	Bone	Fragment		12				
PB	5697	61	90-100	HF	Cheloniidae	Bone	Fragment		4	B			
PB	5697	61	90-100	HF	Dasyprocta punctata	Auditory bulla	Complete	L	1				
PB	5697	61	90-100	HF	Euthynnus sp.	Quadrate	Complete		1				
PB	5697	61	90-100	HF	Euthynnus sp.	Vertebra	Complete		2				
PB	5697	61	90-100	HF	Leptodactylus pentadactylus	Maxilla	Complete		1				
PB	5697	61	90-100	HF	Leptodactylus pentadactylus	Tibiofibula	Proximal fragment		2				
PB	5697	61	90-100	HF	Leptodactylus pentadactylus	Vertebra	Complete		1				
PB	5697	61	90-100	HF	Lutjanus sp.	Vertebra	Complete		4				
PB	5697	61	90-100	HF	Megalops sp.	Vertebra	Complete		3				
PB	5697	61	90-100	HF	Scomberomorus sp.	Vertebra	Complete		2				
PB	5697	61	90-100	HF	Actinopterygii	Bone	Fragment		32				
PB	5697	61	90-100	HF	Tetraodontidae	Dentary	Complete		1				
PB	5697	61	90-100	HF	Trichechus manatus	Bone	Fragment		5				

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