

SURPLUS AND ACCESS: PROVISIONING AND MARKET PARTICIPATION BY ENSLAVED
LABORERS ON JAMAICAN SUGAR ESTATES

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A DISSERTATION

in

Anthropology

Presented to the Faculties of the University of Pennsylvania

in

Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

2015

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*To Sue and Lee Bates,
for their love and support*

ACKNOWLEDGMENTS

The success of this project would not have been possible without the following people and organizations. First is my advisor and committee chair, Robert L. Schuyler. I appreciate Dr. Schuyler's encouragement to pursue the research that I was interested in and his support of my path through the graduate program. I am proud to be counted among the many Ph.D. students you have guided at the University of Pennsylvania. I also express my gratitude to my other committee members. As professor, graduate group chair, and committee member, Deborah A. Thomas consistently challenged me to expand my perspective on anthropology and history in the Caribbean and beyond. I thank Dr. Thomas for her support and guidance through the grant application, proposal, and dissertation processes. Lauren Ristvet graciously contributed her time and effort to work through my initial chapters and provide a timeline which was an invaluable resource for writing. I thank Dr. Ristvet for her patience and encouragement.

This project was made possible by generous financial support of the University of Pennsylvania's School of Art and Sciences, the UPenn Anthropology Department, and the Wenner-Gren Foundation. The archival research at the basis of this project was made possible by the staff at the National Library of Jamaica, the Jamaica National Heritage Trust, the University of the West Indies (Mona), Jamaica Archives and Records Department (Spanish Town Archives), and the National Archives (TNA). I especially thank Yvonne Fraser-Clarke and Bernadette Worrell at the NLJ Special Collections; Dorrick Gray, Audene Brooks, Anne-Marie Howard Brown, Rosie Whittaker, and Michelle Topping at the JNHT; and James Robertson, Kathleen Monteith, and Karen Spence in the UWI Mona History Department. Thanks also to Douglas V. Armstrong for allowing me to reanalyze the Drax Hall and Seville estate records and collections. I am grateful to Suzanne Francis-Brown and Ivor Conolley for facilitating my research in Jamaica and encouraging me to pursue the integration of history and archaeology. Thanks to Rim Patterson, Clive Grey, and Chris Graham for being my island guides!

I would not have continued my career in anthropology and archaeology without the support of Stephen Plog, Rachel Most, Fraser D. Neiman, and Jillian E. Galle. Thanks to Dr. Plog for seeing my potential, cultivating my interest in archaeology, and allowing me to work on the Chaco Digital Initiative. Thanks to Dr. Most for being a wonderful friend and mentor throughout my time at the University of Virginia and graduate school. Thanks to Dr. Neiman for tolerating my ignorance in the way of statistics and consistently assisting my independent research. Thanks to Dr. Galle for giving me an opportunity to develop my research in Jamaica and for your guidance throughout my graduate career. Numerous friends and colleagues have also supported my endeavors during this time. I am grateful for the assistance and friendship of current and former DAACS and Monticello archaeology staff: Leslie Cooper, Beth Sawyer, Michelle Sivilich, Beth Bollwerk, Bea Arendt, Sara Bon-Harper, Derek Wheeler, and Jesse Sawyer. Thanks also to my phenomenal cohort (GOAT) who frequently eased my concerns during course work and beyond. I appreciate the support of Robert Philpott and Matt Reilly for their willingness to respond to frantic emails and phone calls. I am grateful to Carrie Heitman, Abby Holeman, and Emily Cubbon, for accepting a hist arch in their midst – we'll always have Bonito! Thanks to Jordan Pickrell, Kristen Fellows, and Elizabeth Clay, for being the best friends an archaeologist could ask for.

None of this would have been possible without the love and support of my family and friends. I am lucky to have friends like Caitlin Golden and Laura Clark to listen to the ups and downs of graduate student life. I am also grateful for the love and support of Beau Burwell during this process. Thanks to my siblings for never asking too many questions about the progress of “my paper” and for excusing my infrequent attempts at communication. Finally, to my parents, thank you for inspiring me to be the best that I can be and accepting me for who I am.

ABSTRACT

SURPLUS AND ACCESS: PROVISIONING AND MARKET PARTICIPATION BY ENSLAVED LABORERS ON JAMAICAN SUGAR ESTATES

Lynsey Ann Bates

Robert L. Schuyler

Examining the variability of enslaved life across the Atlantic World during the seventeenth, eighteenth, and nineteenth centuries is increasingly possible with the availability of comparable data. This project explores the complex networks that slaves developed between the fields of the plantation and spaces beyond its borders. Throughout the eighteenth and early nineteenth centuries, enslaved people living and working on sugar estates across the Caribbean cultivated their own subsistence food crops. In Jamaica, planters implemented this cost-cutting system of self-provisioning in areas unsuitable for sugar cane agriculture. A comparative, quantitative approach elucidates the conditions that facilitated enslaved people's cultivation of surplus in these areas and their access to markets that fostered Jamaica's internal market economy. To systematically examine surplus and access, this project integrates documentary and archaeological sources germane to provision ground suitability and the acquisition of costly market goods. GIS (Geographic Information Systems) analysis of cartographic data drawn from historic survey maps of sugar estates defines the areas available for provision cultivation. Assemblages recovered from slave village contexts on four estates provide a broad sample of goods that enslaved people acquired in the market. The results suggest that the hypothesis that enslaved people with access to a larger amount of provision grounds with favorable conditions had greater access to the markets holds for this dataset. While the areas for surplus production were poor relative to the cane fields, variation between estates in conditions and observable

artifact attributes indicate the investment in ceramic vessels based on cost. More broadly, the evidence demonstrates the connections that enslaved people established to turn an exploitative system to their advantage.

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CHAPTER 1: INTRODUCTION

Understanding slave lifeways through anthropological, archaeological, and historical lenses has produced comprehensive descriptions of the actions of enslaved people in the Atlantic world from the beginning of the slave trade to emancipation. The specific information garnered from archaeological investigations and documentary analysis has led to the formation of a wide body of literature concerning not only the legal and moral qualities of the institution of slavery in the Americas, but also detailed interpretations of the daily life of enslaved laborers. Primary areas of analysis include housing, yard spaces, foodways, religious practices, labor demands, and marketing and consumption patterns of enslaved people in plantation and urban settings. Following these examinations at the local and regional level, the challenge now is to develop substantive comparisons between datasets to understand variability in daily life and thereby the complex strategies that enslaved people devised to survive the brutal regime of slavery. The value of examinations of single houses or plantations greatly expands by contextualization within a colony, colonial regime, or the region as a whole. While this goal is no small or simple task, the benefits clearly outweigh the difficulties in constructing these comparisons.

This project employs comparative analysis to examine variability in enslaved people's strategies to turn an exploitative system of forced labor to their advantage. I develop a model which addresses enslaved people's management of their domestic and cultivated spaces, and the influence of those actions on their engagement in local markets. This model thus includes two related concepts which characterize the connection between cultivation and marketing: surplus and access. Surplus in the following project specifically refers to the non-subsistence foodstuffs grown by enslaved people for sale to traveling merchants or in local markets; on a broader level, it includes any marketable goods they produced, whether food or crafts, for barter or sale. Access refers to the opportunities that enslaved people seized to participate in the market, generated from the conditions available to produce a surplus. Access to the market in this case does not

imply any particular motivation for participation in market activities, but rather refers to the level of participation as represented by the remains of market goods. I analyze these two aspects of enslaved life as evidence of the strategies enslaved people developed to turn an exploitative system to their own advantage.

The analytical focus of this project is the provision ground system instituted by plantation owners throughout the British Caribbean during the late seventeenth and eighteenth centuries that required enslaved people to procure their own subsistence in assigned cultivation plots. Many planters considered this scheme as a beneficial cost-cutting measure that relieved their dependence on imported provisions and that utilized land unsuitable for cash crop production. For enslaved people, this additional burden of time and labor to cultivate their daily subsistence necessarily added to the stresses of forced labor and limited resources that they experienced. Despite these overwhelming expectations, enslaved people produced, controlled, and distributed the surplus foodstuffs that fueled the development of internal markets of many islands. On the island of Jamaica, the jewel of the Crown's sugar production during the second half of the eighteenth century, the provision ground system developed to its greatest extent in the British Caribbean. The establishment of large plantations and the prevalence of mountainous terrain led to the allocation of provision ground plots on many properties. As such, Jamaica was also the proving ground for British colonial policies that attempted to control the provisioning and movement of slaves, as well as internal commodity markets. These factors facilitate an investigation of surplus and access within the Jamaican provision ground system.

My research evaluates environmental and spatial parameters that influenced the ability of enslaved communities to actively engage in local markets. I test the hypothesis that enslaved people who cultivated a larger acreage of provision grounds, under favorable cultivation conditions and minimal travel distances, generated more surplus provisions and thus had greater access to the market and the goods therein. To evaluate this hypothesis, I employ quantitative methodological techniques to systematically analyze data from four Jamaican sugar estates

active during the eighteenth and nineteenth centuries prior to emancipation (Figure 1.01). This approach necessarily draws on documentary and archaeological sources to examine the established connections between the plantation and the marketplace. Spatial data is gleaned from the overlay of cartographic representations of the estates with modern topographic and soil maps to estimate conditions for sugar and provision production. Archaeological data consists of assemblages excavated from village contexts of each estate, with a focus on imported ceramic materials as a proxy for market access.



Figure 1.01 Map of Jamaica with Sites in the Analysis Noted. Base map courtesy of DAACS.

The four estates noted in Figure 1.01 were selected for several reasons. First, environmental comparison is addressed given that Seville, Stewart Castle, and Drax Hall represent large estates with topographic variability of the north coast of the island, while Papine illustrates south coast estates on flood plains proximal to the port city of Kingston. Second, artifacts excavated from the four slave village contexts and the associated excavation records have been catalogued by the Digital Archaeological Archive of Comparative Slavery (DAACS) project. Identical protocols and measurements were applied to the records and artifacts, facilitating direct comparison across assemblages. Finally, three of the estates, Drax Hall, Stewart Castle, and Papine, have a detailed, dated plat map with a legend and an associated archaeological assemblage from the slave village. Seville Estate contains similar archaeological

materials from several village house areas, though no complete plat of the estate is extant. I include Seville materials in order to predict the conditions of the provision grounds available on this estate based on the surplus and access patterns from the other estates. Taken together, the systematic excavation and categorization of these materials that date from the late seventeenth to late nineteenth century facilitate a diachronic analysis of life in sugar estate villages.

The integration of these two data sets thus sheds light on the beginning of the provision ground system, the cultivation of surplus foodstuffs, and the culmination of the system in the discard of market goods. This synthesis of historical and archaeological information suggests the analytical power of a model-based approach that tests hypotheses with measurable attribute data.

Summary of Content

In Chapter 2, I review several bodies of literature which address the three primary themes in this project: anthropological study of enslaved communities and their descendants in the Caribbean; historical archaeology as a discipline focused on the complex and challenging integration of historical sources and archaeological evidence; and the study of the relationship between people, space, and place within landscape archaeology. These lines of inquiry highlight the necessity for interdisciplinary approaches to reconstruct the lives of people in the past.

Pioneers in the anthropology of the Caribbean argued that this region was not simply a disparate collection of static and homogeneous enclaves, but rather a region comprised of dynamic, interactive communities rooted in the historical realities of empire and continually reformed in the postcolonial era. This emphasis on the Caribbean as a viable area of research also applies to examinations of slavery and plantations. Historically, anthropological analyses of the colonial plantation complex here have addressed it as a totalizing economic system which influenced the types of dominant labor organization (Beckford 1972; Levitt and Best 1975; Mintz 1983a; Mintz and Price 1992[1976]; Wagley 1957). Within this framework, studies that challenge

the dichotomy of colonizer/colonized in their analysis of social and material inequalities suggest that slaves subverted colonial and planter ideologies in ways they perceived to be advantageous (Mintz 1998; Mullins and Paynter 2000; Stewart 2007). While forced agricultural labor limited the scope of slaves' social and economic lives, the local markets, and the provision grounds that supplied them, served as locations of interaction and participation beyond the cash crop fields (Besson 1979; Besson and Monsen 1987; Carnegie 1987; Mintz 1979; Mintz and Hall 1960; Trouillot 1982).

Historical archaeology is the archaeological study of the modern era, from 1400 to the present day. Within the broad scope of this subdiscipline, archaeological examination of slavery and descendant communities has been a primary field of study for the past fifty years. Influenced by the Civil Rights movement, the archaeology of plantation and urban slavery expanded the previously narrow focus of work on famous historical sites and the houses of well-known, historical figures. Since the 1970s, historical archaeologists have studied diasporic populations forcibly removed from all areas of Africa and enslaved in various New World contexts. Interpretive models borrowed from anthropology and other disciplines have been applied to questions about the changing material strategies of African diaspora populations (Howson 1990). These models include, but are not limited to: acculturation, assimilation, creolization, ethnogenesis, and transculturation (see discussion in Dawdy 2000). Archaeologists examine the conditions of slave life according to these various models borrowed from anthropology. Several different though interrelated foci within this sub-discipline concern the historical archaeology of slavery, the historical archaeology of plantations and the historical archaeology of the Atlantic World system. Regionally, these investigations encompass West Africa, South Africa, the Caribbean, parts of South and Central America, and the U.S.

Landscape studies related to the institution of slavery address how planters and other elites in slave societies (Berlin 2004) shaped landscapes to establish, maintain, and reinforce their status and power over members of the lower class, including enslaved people who inhabited

these delineated spaces (Hall 2000; Isaac 1982; Leone 1987; Kelso and Most 1990; Satchell 2011; Shackel 2003; Upton 1984; Vlach 1993; Yamin and Metheny 1996; Yentsch 1994). Others discuss how plantation design in particular was a function of the planter's commitment to economic efficiency and surveillance of labor (Higman 1987; Lewis 1985; Orser 1988b; Orser and Nekola 1985; Ryden 2000). These studies outline the planter's institution of a compact, nucleated, and centralized settlement plan focused on division of labor, minimization of movement, and maximization of work time. More recent work explores how the landscape was divided and occupied by various social groups, and utilizes Foucault's theory of the panopticon and visual observation to investigate the plantation built environment (Delle 1998, 1999, 2000; Epperson 1999, 2000, 2001; Lenik 2009; Singleton 2001, 2014). Other recent studies trace diachronic spatial change through archaeological investigation of the organization of the worker's village from slavery through emancipation, including the influx of other forms of labor (Armstrong 1990, 1992; Armstrong and Hauser 2004; Armstrong and Kelly 2000; Heath and Bennett 2000; Delle 2009).

A focus on plantation slavery, specifically examinations of slaves' economic activities, has produced a series of local and regional analyses of the conditions under which enslaved peoples engaged in informal marketing and purchase of goods (Berlin and Morgan 1995; Galle 2011; Hauser 2008; Howson 1995; McDonald 1993; Mintz 1961, 1974; Reeves 1997, 2011). Intricately tied to notions of autonomy, these studies address how slaves generated surplus foodstuffs, craft goods, animal product, and ultimately currency with which to barter for or purchase other goods. In many cases, enslaved individuals sold planter-distributed rations, or produce from allotted gardens and plots, or a combination of the two schemes. While marketing in the U.S. was limited to interactions with local communities, owners, and plantation stores, the internal markets of the Caribbean were open to enslaved people for the acquisition of imported goods in the same spaces as free men. Integrating these approaches to plantation space and market participation is a central goal of this project.

Chapter 3 addresses the history of Jamaica during the period pertaining to the estate data in this analysis, 1750 to 1838, with respect to the rise and decline of the sugar industry. The establishment of sugar estates began along the coastlines, primarily in the south, and steadily expanded into the interior during the eighteenth century. Trade in sugar and rum provided the economic backbone for the growth of merchant houses in burgeoning ports such as Kingston, Ocho Rios, and Falmouth. Despite the success of the colony's sugar barons, the provisioning of the large enslaved workforce was a constant concern. Storms and drought plagued enslaved people's provisions as much as the cash crops of their owners. Interruptions in trade with the American war for independence and the Seven Year's war severely limited the importation of rationed food, primarily salted fish, flour, and corn, which planters distributed. During these uncertain periods, the Jamaican Assembly advocated the practice of self-provisioning, encouraging planters to set aside further acreage for communal and individual provision plots. While it is difficult to assess whether these measures were followed, the labor of enslaved individuals in the provision grounds continued to fuel the internal markets of the colony into the nineteenth century. Slaves' participation in large Sunday markets was also a concern for colonial officials who sought to curb gatherings of slaves outside the plantation, particularly following internal rebellions and the Haitian Revolution. This contextual background for the provision ground system sets the stage for tracing the landscape variables that facilitated market participation across the island.

Chapter 4 includes a model for plantation landscape organization that draws on the planter's goal to maximize cash crop profits and control over the enslaved workforce, as well as the work of enslaved people to produce surplus foodstuffs. I begin by outlining the concept of surplus in terms of self-provisioning and the provision ground system that was present across the Caribbean. Previous historical and archaeological studies of this system suggest potential factors that influenced the production of surplus including cultivation conditions, the demands of cash crop labor in terms of energy expenditure and time to cultivate, and potential inequality within communities based on surplus. I develop a two-part model that examines these conditions for

surplus in light of a spatial organization designed to benefit the planter and exploit the laborer. The set of expectations within this model are drawn from previous research and the observations of contemporary planters and historians, the majority of which refer to Jamaican sugar production. I summarize the spatial parameters underlying these expectations into four categories: suitability, proximity, centrality and surveillance. To establish a baseline of plantation landuse trends, I begin by examining the relationship between agricultural sectors, including acreage, production, and size of the enslaved workforce for a sample of estates. With this comparative data in hand, I examine the optimal conditions as outlined in the profit/control/surplus model on three estates active during the eighteenth and nineteenth centuries. The results of this in-depth analysis indicate variability in suitable provisioning conditions between the three estates, suggesting potential differences in surplus production among the enslaved communities.

Given the results of the spatial analysis, in Chapter 5, I establish expectations for slaves' access to the market based on favorable conditions for surplus production. I argue that enslaved people's acquisition of costly ceramic vessels can serve as a proxy for their access to the internal market economy. I examine the presence of costly ceramic vessels in slave village assemblages associated with the three estates, and an additional estate as a test case for the relationship between provision conditions, surplus production, and market access. After reviewing the excavation strategies associated with each site, I develop chronologies for the occupational phases present within each site or house area. This approach ensures that time is a controlled variable such that any patterns discerned in the assemblages most likely reflect actual differences, rather than a time-averaged or accumulated dataset. The two attributes of the refined ceramics most relevant to this analysis are vessel form and decorative technique, two measurable attributes that vary according to cost. Variation in vessel form suggests the extent to which enslaved people invested in costlier ceramics including those associated with tea-drinking (e.g., teacups, saucers, teapots) and the serving of food (e.g. pitchers, tureens), rather than everyday dining (e.g., plates and bowls). In terms of decoration, a wide range of techniques and colors were available; beginning in the late eighteenth century, the popularity of decorative

categories rose and fell with the introduction of new techniques and patterns. By examining each attribute separately, I identify patterns in the frequency of costlier forms and applied decorations, indicating levels of investment in ceramics across the communities. I then examine the intersection of form and decoration to determine whether the same patterns are evident. The results indicate a degree of variability in ceramic investment between sites, and even within a single village, and suggest that access was a function of surplus production.

Chapter 6 builds on the surplus and access analysis results to evaluate the hypothesis that enslaved people farming under favorable provisioning conditions had the opportunity to produce a greater surplus than their counterparts and thereby benefit from the provision ground system to a greater extent. I use a fourth estate, Seville, as a test case to assess whether provisioning conditions were favorable based on the material culture pattern recovered in four house areas. My approach is fundamentally rooted in the observed spatial and material attributes available from documentary, cartographic, and archaeological sources. I review the benefits of this approach based on recent studies of the provision grounds and slaves' survival strategies. The standardization and comparability of data is essential to mapping the potential variability in spatial organization and material record. On a broader level, the actions of enslaved people to capitalize on an inordinate expectation in self-provisioning is one way in which they attempted to make lives of their own and to express fully their humanity (Marshall 1991:60, 63 citing Mintz 1974, 1983a). This effort underscores the contradictions inherent in forced labor and exemplifies the strategies that slaves employed to survive under an oppressive regime.

This project is designed to make critical interventions into historical and archaeological understandings of plantation spatial organization and the market economies of Atlantic World colonies through its focus on a quantitative, comparative assessment of enslaved laborers' maintenance of space and investment in market goods. These two poles of the internal marketing system – cultivation and marketing, spaces and artifacts – facilitate evaluation of variability in the strategies developed by enslaved people. In this way, we can assess cultivation and market

activities as fundamental components of daily life under similar conditions of forced labor. This approach broadens the scope of anthropological studies of slavery to understand the activities of enslaved people as adaptive responses that vary along social, economic, and ecological conditions. Beyond this particular context, this project addresses the strategies that groups and individuals develop to improve their daily lives through the spaces that they inhabit, the landscapes they shape, and the materials they acquire.

CHAPTER 2: HISTORICAL ARCHAEOLOGY, LANDSCAPE ARCHAEOLOGY, AND ANTHROPOLOGY OF THE CARIBBEAN

This review addresses three primary bodies of literature that are incorporated into this project, including methodological and theoretical questions more broadly relevant to archaeology and anthropology. The origins of historical archaeology are a fitting starting point. Tracing how scholars have theorized the relationship between texts and artifacts highlights deeper questions about data and interpretation. The debate over whether archaeological materials are considered an analogous data set or merely a “handmaiden” to the historical narrative speaks to the inherent necessity of addressing this relationship. The question of data relevance leads to the more recent conception of “landscape” and “space” as material objects constructed by communities and individuals, and thereby worthy of study in the same way as traditionally conceived artifacts.

The regional focus of this project is also critical: historically, the role of the Caribbean region in the Atlantic World system has been overlooked not only in anthropology, but also in archaeology and history. Anthropological inquiry conducted in the Caribbean is a fairly recent phenomenon when considered in the context of the foundational foci of the discipline. This review is focused on the examination of the origins of colonial society in the Caribbean. Some scholars argue that, as a parallel to plantation economies, slavery and servitude gave rise to common characteristics such as landed peasantries, racialized class hierarchies, and creolized identities. Archaeological investigations of slave life in the British Caribbean examine the “cultural strategies” (Mintz 1996) that enslaved people developed prior to emancipation. These contexts provide a baseline for a systematic approach to evaluating provisioning and market participation in Jamaica.

Historical Archaeology as a Discipline

The origin of historical archaeology as a discipline includes initial excavation of Native American sites with contact period contexts, as well as the sites of major events in colonial history

and the homes of historical figures. Understanding the material culture as evidence of interactions between Native American groups and various colonial regimes required a familiarity with trade goods and manufactured items sold by individual traders and colonial settlers. Excavations were undertaken at Jamestown and Fort Necessity, supported by state and federal funding, with the goal of preserving and restoring the primary architectural features of these sites. Between the 1930s and 1950s, academic archaeology in the U.S. and Canada focused on prehistoric remains, with little training offered in the study of historic material culture. Thus, a majority of the initial pioneers of the discipline, such as Ed Jelks and J.C. Harrington, were trained as prehistorians, and most of the artifact analysis was left to the museum staff. In addition, excavation reports served as the basis of restoration projects in order to document the general location of finds (Russell 1967).

As more prehistorians began to discover and excavate sites, momentum for the formal establishment of a distinct discipline increased. Debates began as to the role of archaeology in the face of the historical record (e.g., Dollar 1968; Fontana 1965; Harrington 1952, 1978[1955]; South 1968). Robert Schuyler (1970) addressed this question by suggesting the formation of Historic Sites archaeology which would take the archaeology of the modern world as its focus, while Historical Archaeology would remain the archaeology of history based on the preservation and restoration of important sites. While the syntactic shift did not occur, many scholars supported Schuyler's emphasis of the global processes of change as the subject matter of historical archaeology. Others, such as J.C. Harrington (1978[1955]) and Ivor Noel Hume (1964), questioned whether historical archaeology should be considered a distinct discipline, rather than a tool or method that contributes to the goals of history and documentary research.

The debate surrounding this area of study touched on a formative question that continues to undermine the relevance of the discipline on a broader scale, namely, why is archaeology necessary if documents exist? Fundamentally, this question strikes at the heart of historical archaeology: the nature of the relationship between the archaeological record and the written

record, and how historical archaeologists differ in their approach to understanding that relationship. Anders Andren (1998) focused his investigation of global trends in historical archaeology by outlining five categories of approach: classification, identification, correlation, association, and contrast. Capturing varying degrees of dependency on the documentary record, Andren's categories reinforce the strict boundary between texts and archaeological materials. The recognition that documents do not provide an unbiased assessment of or window into the past supports the idea of using texts and archaeological data together to produce a more coherent interpretation of change over time. Barbara Little (1992) explored this idea by proposing "text-aided" archaeology, in which the documentary record is seen as a tool used by archaeologists to interpret the past. More recent postmodern formulations of this relationship suggest the interconnected nature of the information gleaned from the archaeological record and historical documents as evidence of similar cultural contexts (e.g., Hall 2000).

New perceptions on the relationship between material culture and text have also shaped current debates in the field (more recent review in Carver 2002; Moreland 2006). The material component of the interconnectedness of actors and actions suggests that objects have their own social trajectory, as outlined by Arjun Appadurai in *The Social Life of Things* (1988). The cultural use of objects in everyday tasks allows one to reconstruct these trajectories through the different realms in which they were utilized. Despite the clear utility of these object-focused ideas, within historical archaeology, the number of successful applications of Appadurai's discussion of the meaning attributed to objects and their role in the maintenance of social ties remains limited (for exceptions see Buchli 1999; Miller 1998).

This project addresses the often contentious relationship between the documentary and archaeological records, as imagined by those within and outside the discipline of historical archaeology. The analysis focuses on the alternate trajectories of traditionally elite objects, including plantation maps and imported, costly goods. The experiences of enslaved communities are captured indirectly in the surveyed plats, the original purpose of which was to document the

cash crop that slaves were forced to cultivate and process. In conjunction with other documentary sources and the topographic conditions of the property, analysis of these maps suggests the domestic and work areas that enslaved people inhabited on a daily basis. Through quantitative analysis, the plans do not merely provide information about an extractive labor system, but rather shed light on the landscape of slavery in a concrete way (Delle 1998; Higman 1988).

In a similar way, market goods manufactured and marketed within colonial regimes have been traditionally associated with elite consumption in the metropole, emulation of these practices by elites, and the rise of a merchant class in the colonies (e.g., Robert A. Leath's discussion (1999) of Charleston, South Carolina). Evidence of enslaved people's acquisition of similar goods, such as imported ceramics, glass bottles, and adornment items, in market settings has changed the way in which archaeologists view the economy and social practices of slaves since the work of John Otto (1984). By placing their activities in the same setting as free settlers visiting weekly markets, we can examine how enslaved people negotiated their subjugated status through the purchase of non-essential goods and movement beyond the plantation.

Integrating these sets of data precludes the question of whether historical archaeology should focus on the archaeological record as supporting the historical narrative (even an alternate or non-dominant narrative), or on the documents governing interpretation of the archaeological evidence. As demonstrated in the early, persuasive works in the discipline (e.g., Armstrong 1990; Beaudry and Mrozowski 1987, 2001; Dethlefsen and Deetz 1966; Leone 1984), broader anthropological topics, such as culture change, ethnicity, gender, and class, are best examined through the synthesis of multiple lines of evidence from both sources. The following analysis adopts this approach to address questions about the lives of enslaved laborers in eighteenth and nineteenth century Jamaica.

During the academic grounding of the discipline, Robert L. Schuyler (1970, 1978) argued that the scope of historical archaeology should be the study of global phenomena during the modern period, 1400 CE to the present. The underlying epistemological and methodological

issues implied here raise the question of how practicing historical archaeologists accomplish the lofty goal of tying their local or even regional site analysis into broader economic, social and political global trends. This issue has also plagued cultural anthropologists seeking to deepen their ethnographic analysis to understand the connections between the global and local without reifying the oppositional binary of these entities (e.g., Mintz 1985). Historical archaeologists also face an added difficulty since a defining principle of the practice is the study of global phenomena. Charles E. Orser Jr. aptly summarizes this difficulty: “a major challenge facing historical archaeologists interested in large-scale analysis and interpretation is to find ways of conducting research that is both site-specific and transcontinental in scope” (1994:7). Thus, the creation of applicable, interdisciplinary studies relevant to archaeologists, cultural anthropologists and historians alike continues to be one of the goals of the discipline as a whole.

Archaeology of the African diaspora is one arena in which analyses examine global phenomena in local or regional settings. Spurred by the Civil Rights Movement of the 1960s, the investigation of slave-related contexts across the U.S. South echoed the sentiments of social action of the period by providing voices for those erased from historical narratives (Ferguson 1992; Singleton 1995; Agbe-Davies 2007). Robert Ascher and Charles Fairbanks’ (1971) now famous summary of excavations conducted on a plantation on Cumberland Island, Georgia was one of the first systematic accounts of archaeological investigation on a slave quarter site. Other preliminary investigations of slave quarter sites include Kingsley (Fairbanks 1974), Kingsmill (Kelso 1984), Cannon’s Point (Otto 1984) and Monticello (Kelso 1997), and free black communities such as Sandy Ground (Schuyler 1974) and Parting Ways (Deetz 1996[1977]). These studies addressed anthropological questions about the inhabitants of these communities through an examination of spatial configuration of the settlement, the identification of structures, and the delineation of special activity areas.

Multiple models have been employed to address the connections between material culture found on domestic sites and the daily lives of diasporic populations. One of the first

systematic attempts to address this relationship was John Otto's investigation of Cannon's Point plantation. Otto advocates the comparison of patterns amongst assemblages from occupants of various statuses, such as slaves, overseers, and planters, by establishing indices for each group. Otto's model and its usage by William Adams and Sarah Boling (1989) and Joseph W. Joseph (1989) were critiqued for their ineffective recognition of change over time and the model's questionable application to other sites where status was indeterminate prior to excavation (Orser 1989). On a broader level, Jean Howson argues that Otto's approach to subjugation via "status" did not address power as relation in the context of social interactions, specifically "how domination operates and how responses to it are enacted" (1990:88). The ongoing, often contentious debates surrounding the elaboration and application of Otto's and other models suggest the extent to which the relationship between theory, material data, and historical accounts remains unsettled (see special issue of *Historical Archaeology* Vol. 38, No. 1, 2004).

Following the suggestion of Posnansky and DeCorse (1986), recent scholarship attempts to address historical ties within the Atlantic World, resulting in productive dialogues about the social and cultural similarities, as well as differences. Contemporary goals of African diaspora archaeology include an emphasis on comparative analysis (e.g., Farnsworth 2001; Ogundiran and Falola 2007), the inclusion and participation of descendant communities in future projects' planning and analysis (e.g., Mullins 2008; Singleton 1999), the development of local archaeology and heritage studies (e.g., McDavid 1997), and the comparative value in examining slavery from different locations and time periods (e.g., Marshall 2014). Employment of a multiscale approach to local, regional and global questions is also a recent trend (e.g., Hauser 2009b; Wilkie and Farnsworth 2005). As Christopher Fennell (2008) concludes, the global, integrative nature of African diaspora archaeology is one line of inquiry that is indicative of the interdisciplinary future of historical archaeology.

This project attempts to meet the challenge of comparatively studying global phenomena, specifically slavery, subsistence, and marketing in two primary ways. First, the provision ground

system is viewed as intimately dependent on broader changes occurring on Jamaica and in the British Atlantic at large. The high price and demand of sugar after the mid-18th century encouraged Jamaican sugar planters to acquire smaller estates, develop sprawling estates and purchase large numbers of enslaved individuals (Ward 1988). With the loss of the American colonies, the abolition of the slave trade, and wavering prices, sugar estates in Jamaica battled production, profit, and population decline. Taking these Atlantic shifts into account, this project examines these time periods from the perspective of the enslaved communities adapting to changing economic conditions. This broader, comparative view avoids the pitfall of assuming that a site or region operated in a vacuum, or that a single site, however exemplary, embodies the slave experience under forced labor. In this way, synthesis of information from the documentary record with the archaeological evidence is crucial to successful analysis of this kind.

The discussion of the relationship between the historical record, material culture, and substantive analysis leads to a consideration of landscape and space as additional forms of materiality that inform our understanding of people's exploitation of their surroundings.

Theory and Archaeology of Landscape

Viewed as the father of American geography, Carl Sauer (1925) theorized an explicit engagement with landscape as substantive, not simply scenery or physical surroundings, but constitutive of economic and social norms. David Lowenthal and other students of Sauer sought to combine his ideas and those of his critic Richard Harstshorne (1939) to understand perceptions of the environment and how the landscape as conceived shaped individuals and societies (Lowenthal 1972; Tuan 1974, 1977). The American school of geography became focused on "peopling" the landscape, both historically and contemporaneously, exploring human creativity (Tuan 1977), and inequality and poverty (Baker 1972). In addition, the "new" cultural geography in Britain brought a focus on vision, perception and symbolic representation as primary topics of humans' interaction with their surroundings, as Denis Cosgrove and Steven Daniels's edited volume *Iconography of Landscape* attests (1988).

Drawing on Foucault and Lefebvre, postmodern critiques of these “new” geographies incorporated feminist and Marxist positions to generate new forms of spatial thinking (Blake 2002b). David Harvey (1973), Edward Soja (1989, 1996) and others generated what is now referred to as the “spatial turn,” an effort to illustrate the importance of space to social change. This ‘turn’ greatly impacted spatial analysis in archaeology resulting in an engagement with postmodern theorists and multiple attempts to understand space as “lived in” (Lefebvre 1992). In an interview with archaeologist Emma Blake, Soja summarizes the postmodern critique as a recognition of the “space in which we actually live, where history grates on us and erodes our lives, a space of complete experience, of the unseen and incomprehensible as well as the tangible and everyday” (Blake 2002b:141).

Archaeological investigation of space and landscape was first evident in Julian Steward’s cultural ecology, which focused on human subsistence patterns and the corresponding environmental conditions that allowed for successful hunting and gathering (1955). Given the array of resources available in a particular area, patterns of seasonal or yearly settlement could be distinguished in the archaeological record. Grahame Clark (1939) and Gordon Willey (1953) wrote two of the initial widely read reports that set out archaeological methodologies for recovering and comparing settlement patterns.

With the development of the New Archaeology, quantitative examination of spatial patterning became a central realm of study, with specific focus on the spatial distribution of artifacts, the reconstruction of networks of sites, and the modeling of settlement requirements (Hodder and Orton 1976; Wobst 1974). Within this set of methodologies, both space and the landscape were viewed as neutral, passive entities in/on which human actions occurred (Ashmore 2002b: 258). Stemming from earlier quantitative studies, processual approaches emphasized settlement systems that utilized predictive models based on a set of rules governing settlement of a particular location by a particular group (Binford 1982; Flannery 1976; Rossignol and Wandsnider 1992). Regional analysis was also a primary mode of investigation that focused

on location, allocation and network analysis, common methods used by contemporary geographers.

Within these material-based approaches, however, Kent Flannery and others brought the social into the spatial, such that units of analysis were defined by social categories like households or “places” rather than individual sites or catchment areas (Hodder 1982; Wilk and Ashmore 1988). Carole Crumley (1979) also critiques the lack of nonmaterial factors in the processual models and the role of central place theory within her examination of settlements on the regional scale (see also Ashmore 2002a). Other studies shifted the focus from settlement patterning and resource allocation to the symbolic marking of the landscape and the recovery of changing spatial organization over time as evidence of social relations (Donley 1982; Moore 1982; Paynter 2000; Zedeño 1997).

James Deetz was an early proponent of landscape rather than settlement pattern, preferring to divide ecological, ritual and ethnic concerns within human use of space at specific times and over time (1990:176). Those who continued to study how groups occupied the landscape focused on a site-less methodology that considered the broad distribution of artifacts rather than a focus on ‘site’ as the primary interpretive category (Dunnell 1992; Ebert 1992; Ebert et al. 1996). Other analytical critiques of processual approaches include the ways in which space was constructed to reinforce social boundaries and hierarchical relations of power (Leone 1984; Shanks and Tilley 1987). Following Mark Leone, these approaches have primarily characterized the treatment of space in historical archaeology, with perhaps an overemphasis on colonial gardens (Kelso and Most 1990; Leone 1988; Shackel 2003; Williamson 1999; Yamin and Metheny 1996). A few exceptions include investigations of the contested spaces of organized plantation landscapes via the connections between people, space, and status (Armstrong et al. 2000; Delle 1998, 1999, 2014; Orser 1988b).

Following similar trends in cultural geography and anthropology, more recent landscape studies in archaeology have drawn on the theories of Michel Foucault (1977), Pierre Bourdieu

(1970, 1977), Anthony Giddens (1984), and Henri Lefebvre (1992). As an initial investigation of meaning and space, Bourdieu's classic study (1970) of the organization of the Kabyle house and its internal oppositions illustrates how a sense of place is derived from the intimate joining of technical organization, social action and symbolic meaning. Recent archaeological studies address this concern for the recovery of meaning, focusing on the importance of the experiential moments of the inhabitation of space and the manipulation of landscape for individuals (Lawrence and Low 1990; Thomas 2001). For example, Barbara Bender applies ideas of structural Marxism to investigate social inequality and political memory as embedded in local surroundings, as well as the fluidity of ideas about landscape (Bender 2001, 2002; also Bender et al. 1997).

Christopher Tilley explores how a phenomenological approach, a sense of being in the world, can improve our archaeological understanding of places as created and maintained, as well as challenged and reinvented (1994, 2004, 2008; see also review by Johnson 2012). Finally, historical archaeologists have also employed Foucauldian frameworks as well as feminist critiques to understand power as embedded in landscapes (Casella 2001; De Cunzio 1995, 2001; Spencer-Wood 2002, 2010). Other recent analyses explore the naturalization of social hierarchies via spatial structuring (Bradley 1998, 2000; Lenik 2009), the role of agency in understanding landscapes as constitutive of social practice (Barrett 1994, 1999), and a reassessment of the materiality of artifacts and landscapes, specifically the resources and constraints of the surrounding environment (Hind 2004).

With the rise of landscape archaeology as a sub-discipline, conceptions of the relationship between space, place, and landscape differed among archaeologists. Perhaps the most common view is that given in Robertson et al. 2006: space is "an empirically neutral series of relationships between objects and the environment;" place "is the meaningfully constituted and culturally constructed space that people dwell in," and landscape is "the phenomenological and ideological relationships between people, cultures and their respective environments" (XVII-XVIII). Taken as a whole, these three sets of interrelated phenomena express the relations between people and their surroundings. The benefits of this perspective are two-fold. First, it is

explicit as to what each term references, and to some extent the broad connections between them. All too often archaeologists conflate two or three of these terms without acknowledging how they are being employed (Pauls 2006:72-78; critique in Llobera 2006). In this case, elements such as environment, agriculture, and spatial organization are interchangeable with “landscape” and/or place (e.g., Spencer-Wood and Baugher 2010). The opposite trend is also common, resulting in the discussion of various “spaces” as independent from place, or as loosely and cumulatively constitutive of a “landscape” (e.g., Deetz 1990). Second, the definitions reflect both the material and ideological qualities under investigation; surroundings are neither passive nor do they exist solely in the mind.

For those who explore these three concepts as their primary analytical goal, the definitions in Robertson et al. (2006) may leave something to be desired. Space and place often present conflicting descriptions. For example, Cynthia Robin and Nan Rothschild (2002) suggest a study of “lived space” that includes the material and symbolic, as well as people’s daily experiences through which they “create, transform and experience space and place” (161). Though Robin and Rothschild call for “spatial analysis” (citing Low 1996), it is unclear from their outline what is involved in this methodology. Harkening back to Sauer, viewing place and landscape as active is another common theme (e.g., Gosden 1989); in this view space is merely material, physical or even natural prior to its transformation and assignment of meaning by people (e.g., Anschuetz et al. 2001:161).

Other conceptions suggest that place, rather than landscape, is the central idea of landscape archaeology, since places within landscapes are created and represent the merging of the “inner” imagined and “outer” material that Tim Ingold (1993) outlined (Kantner 2008; Whitridge 2004). Thus, the assignment of meaning via place recognition is a particularly frequent theme of analysis (Ashmore 2002b; Ashmore and Knapp 1999; Bradley 1998; Thomas 2001; Layton and Ucko 2003). Under this approach, the role of landscape, other than as a decontextualized collection of places, is difficult to clarify.

In addition to this essentialized conception, “landscape(s) of” has become a common reference to identify other social and cultural phenomena, such as “meaning, memory, identity, social order, morality and social transformation” (Ashmore 2002b). The danger thus becomes the decontextualized usage of “landscape” and “place” to discuss these cultural constructs without ever analyzing their relationship to designed spaces or inhabited landscapes. In other words, space, place and landscape become borrowed terms to address questions about social change without accompanying analysis of the connections between social relations and these three concepts. Despite these alternative usages, landscape is a valuable cross-disciplinary heuristic for understanding the use of space, perception of surroundings, and the embeddedness of time through the integration of “previously overlooked archaeological data” (Snead et al. 2009). The benefits of the ongoing relationship with the discipline of geography and the narrowing gap between British and American approaches both point to the necessity of Soja’s (1989) argument to “put space first.”

One methodological ‘solution’ to understanding landscape perception is the application of Geographic Information Systems (GIS) technology. While not allowing for the immediate recovery of the meanings of spaces and places, GIS applications provide a suite of options for visualizing and manipulating spatial data. Beginning in the mid-1980s, archaeologists developed geographic-based datasets to address questions about resource availability and topographic barriers (Aldenderfer and Maschner 1996; Allen et al. 1990; Burrough 1986; Kvamme 1989, 1995; Lock and Stančič 1995; Savage 1990). Burrough notes the three benefits of GIS analysis for investigating places and landscapes: first, data is entered according to a coordinate system, standardizing comparison across sites; second, GIS can accommodate non-spatial information such as the delineation of sacred space or the incidents of crime in an area.; third, GIS retains the spatial relations of object and is ideal for creating distribution maps of various artifact categories without a pre-defined ‘site’ boundary (1986).

Given the analytical power of GIS, avenues of research have included not only locating sites, but also the creation of predictive models for adaptation and site catchment, as well as simulations of resource usage (e.g., Altschul 1988). Specific tools within GIS have proven beneficial to archaeologists seeking to answer more experiential questions about how individuals and groups navigated and manipulated historical landscapes. Cost surface analysis allows for the identification of various obstacles and advantages of the terrain traversed by people in the past (for examples see Conolly and Lake 2006; Kantner and Hobgood 2003; Kvamme 1999; Surface-Evans and White 2012). Viewshed and other visibility tools can reveal how the organization of the landscape or built environment reflects societal structures (Kvamme 1999; van Leusen 2002; Wheatley 1995). These tools also raise important theoretical and methodological concerns (Church et al. 2000), specifically regarding perception (Fitzjohn 2007; Ingold 2000) and the supremacy of visual knowledge (Llobera 2007).

Despite the critiques of applying GIS to questions in spatial archaeology (see Lake and Woodman 2003; Thomas 2004; Wheatley and Gillings 2002), the analytical benefits outweigh the epistemological drawbacks if several factors are clear at the outset. First, clearly defining the type of data available to assess research objectives is necessary in order to avoid unquestioned acceptance of GIS outputs. While the systems provide useful presentations and analyses of input data, the ultimate conglomeration of the outputs and interpretation falls to the researcher. In this case, GIS is a tool for data analysis, not a Rosetta Stone to questions of spatiality. Second, given that GIS is only one of many available tools, multiple forms of analysis should be carried out to verify or disprove interpretations based on GIS outputs. For example, Llobera's in-depth summary of co-visibility among Bronze Age barrows, is careful to acknowledge his conclusions as "preliminary" and the potential for further study to validate assumptions in the research design (2007:65). This approach is one that others do not always follow, and those unfamiliar with the theoretical components of GIS merely view it as an easy solution to difficult problems. As with any data processing engine, from radio carbon dating to predictive modeling, the process and assumptions must be understood prior to interpretation. Third, it is necessary to avoid "button-

pushing” in utilizing GIS techniques. This tendency stems from the ease with which GIS can handle large sets of spatial data in a relatively short amount of time, and the generation of outputs that may in fact be meaningless. The danger here is once again applying spatial analysis tools without understanding the relationship between input data,

In short, the broader critiques of GIS, including its emphasis on visual data (Thomas 2004), are as much a product of the misuse of the systems as they are inherent in its design. The quantitative focus of GIS analysis allows for the effective consolidation and manipulation of data to address many of the debates reviewed in this statement. For example, comparison of the usage of different spaces in relation to one another, whether topographically or socially, can shed light on the importance of some spaces over others depending on given variables. Imagining or embodying the “lived-in”/thirdspace of Lefebvre and Soja remains beyond the grasp of these techniques. However, quantifiably modeling spatial organization, exploitation of resources or the physical marking of places, for example, allows us as present day researchers to reconstruct the potential ways in which humans interacted with the landscapes they shaped. Recent attempts to bridge the gap between phenomenological approaches and quantitative techniques suggest a possibility for modeling human experiences on the landscape (McEwan and Millican 2012).

In terms of the postmodern influences on landscape studies, the collection and presentation of spatial data is a primary concern. This project incorporates advances made in the use of GIS (Geographic Information Systems) and other data processing techniques to fully engage with the spaces at hand, rather than prehistoric or historic landscapes as imagined. While these techniques and their applications are not infallible, they can aid in the formation of testable hypotheses about spatial relationships and human manipulation of landscapes that phenomenology and other “methodologies” cannot.

Caribbean Anthropology: Plantations, Peasantries, and Creolization

The Caribbean as a region of historical and anthropological inquiry only recently gained acknowledgment from the academic community as a source of potential insights into broader topics such as Atlantic World slavery and economy, culture change, globalization and nationalist ideologies. Before this recognition, the region was viewed as a literal and figurative backwater. Both currently and historically, the physical characteristics of multiple island chains and the potential inclusion of mainland former colonies placed the region in a geographic and sociopolitical gray area. For example, in academic settings, archaeological studies of the Caribbean are often grouped with “Latin America” or “North America” based on topic and time period in question.

Prior to the 1930s, the Caribbean did not warrant even comparative study since its inhabitants were not “native” enough, their societies not “Western” enough, despite the diversity of cultural groups within and between the islands (Trouillot 1992:20). Notwithstanding this stigma, the earliest ethnographic engagements with the Caribbean sought to identify commonalities in the struggles of people of African descent in the Atlantic World (Herskovits 1941; Slocum and Thomas 2003). Later studies countered the negative evaluation of the region’s fragmentary nature by advocating models that directly addressed the “presumed ambiguities of Caribbean cultural identity” (Safa 1987:117). Further work outlined the analytical potential of the region based on the sociological characteristics that typify it (Clifford 1988; Mintz 1971, 1974; Trouillot 1983), or through the nature of relations between groups (Austin 1983). Others argued that the slippage between categories in the region constitutes its defining feature (Price 1990). More recently, there is a renewed interest in the region with scholars exploring transnationalism, globalization, hybridity, and creolization through a Caribbean lens (see critiques in Palmié 2006, and Sheller 2003).

Plantations and Peasantries

One focus of anthropological study stemming from the history of enslavement and forced labor in the region is the plantation system and the formation of peasantries within Caribbean societies. Given the history of plantation slavery and the consistent labor shortage post-emancipation, many view the plantation as an economic system which influenced the types of labor organization dominant in the region (Beckford 1972; Best 1968; Levitt and Best 1975; Mintz 1961, 1974, 1978; Wagley 1957; Wolf 1971; Wolf and Mintz 1957; see review by Berleant-Schiller 1981). The plantation system on a broader level encompasses the social and economic hierarchies that supported forced labor for the maximization of profits from cash crop cultivation (see Curtin 1998 and Tomich 2004 for historical analyses of the plantation complex). A majority of the scholarship has focused on the rise of local peasantries as a function of the social and racial discrimination on which the plantation system was based. Sidney Mintz explored the roots of peasantries in his extended analysis of the impact of sugar on the Caribbean and the beginnings of the industrial revolution (1961, 1983b, 1985). Identifying the enslaved workforce as a “proto-peasantry,” Mintz (1985) argues that the “primitive accumulation” that characterized slavery and the colonial exploitation was a necessary precursor to the capitalist system that evolved in Britain and elsewhere.

In early conceptions of Afro-Caribbean peoples, peasantries are necessarily linked to their origins in the enslaved communities of the plantation. George Beckford critiques the perpetuation of the labor and production models of plantations by arguing that they directly result in “persistent underdevelopment,” including unemployment, malnutrition and the underutilization of land (1972:177). Dedication of resources to plantations and the dependence on plantation outputs for economic success further entrenches the centrality of plantation interests even after independence. Beckford concludes that diversification is needed in order to create an economic system that is beneficial to the whole of plantation society, not only the non-local owner or overseas company. The opposition between the plantation and the peasantry within Beckford's

analysis is also addressed in Mintz's arguments for understanding the "reconstituted" nature of Caribbean peasantries, which formed from a resistance to the imposed regime (Mintz 1961). However, Mintz (1983b) later argues that, as an outgrowth of resistance to the plantation system, the peasantry is able to and does impact the plantation sector via the management of seasonal labor and the internal market systems of the islands.

These studies focus on the control of land, crop production, and marketing of produce by the peasants, and their relationship to the plantocracy, urban centers, and the colonial government. Family land is a concept that reflects the common Caribbean practice of the cultivation of common acreage among cognates. Significant debate surrounds the origin of this system of land tenure, with some asserting that it was an African retention (Clarke 1966; Carnegie 1987; see next section), while others argue that it was a response to the post-emancipation plantation society that sought to control land and labor (Besson 1984, 1987a, 1987b, 2002; Besson and Momsen 1987). Jean Besson's extensive research into family land and customary land tenure in Jamaica and other islands indicates that this unrestricted system of land use is a fundamental component of the rise of the free village as a symbolic action of breakage with the exploitative slave system across the region.

Marketing is also a key component of the development of a peasantry and its connection to the wider society. Early studies of modern market participants examine the role of country higgler¹ in the distribution of produce from rural locations to urban market centers (Katzin 1960). The work of Handler (1971) and Hauser (2008) on the production and sale of locally-made coarse earthenwares suggests that higgler played a central role in the distribution of these everyday ceramics, which serve as tangible historical evidence of the predecessors to Katzin's modern higgler. Mintz also historically links these activities of cultivators traveling to market and intermediary higgler to the role of slaves and their descendants in accumulating capital through

¹ "Higgler" is a Jamaican term for itinerant marketers, often women, who served as crucial mediators between the inland and rural enslaved communities and the markets (Lewis 1845; McDonald 1993; Simmonds 2002; Hauser 2006, 2008, 2009a). Present-day marketers who carry produce between the hinterland and local markets are also referred to as higgler (Katzin 1960).

the sale of produce and crafts, an “economic maneuver hardly to be expected under such circumstances” (1983:114). It is important to note here that these links are not linear; the emancipated slaves who continued to tend provision grounds and sell their surplus produce did not turn into peasants overnight. The complex development of the peasantry throughout the Caribbean also must be viewed in the context of changes that occurred after emancipation (Berleant-Schiller 1981:404-406).

Michel-Rolph Trouillot (1984, 1988) further explored the modern Caribbean peasantry with respect to the government and the globalizing world economy in his arguments for the micro-level study of conditions under which rural groups engaged in the “peasant labor process,” an heuristic to center the analysis of peasantries on the activities of production and the relationships therein. In studying Dominican banana farmers, Trouillot argues that the peasant labor process was integrated with a system of valorization in which the labor power of the peasant is essentially sold through the state to global corporations. These Marxist interpretations continue to influence more recent investigations of peasantries and their proletarianization with respect to the plantation and processes of globalization.

Retentions and Creolization

Anthropological treatments of African retentions and creolization within slave society in the Caribbean directly inform interpretations of modern social organization. Initial investigations of slave society began with the debate between E. Franklin Frazier and Melville Herskovits in the early 1940s in the context of popular discussions of the “inferior” African-American family and its roots in similarly non-conformist patterns in Africa. Frazier (1939) argued that there was no concrete evidence that African culture had any influence on the current status of the Negro family, though “survivals” could be found in the Caribbean and Latin America. Herskovits (1941) countered these arguments by stating that the confluence of enslavement and the persistence of African cultural patterns led to the survival of various African cultural traits in the Americas. The

influence of this debate was widespread and generated investigations of family, social structure, “survivals” and the impact of slavery in the Caribbean.

Historically, the term “creole” applied to the two largest populations in the Caribbean during the slavery period: the locally-born slaves or freedmen of African descent in the colonies; and the locally-born merchant and elite populations of European descent. This terminology signaled differentiation from metropolitan Europeans and from indigenous populations. Slaves born in the Spanish islands were fully socialized through their Afro-Caribbean culture as creole (Palmié 2006). In two early studies, Harmannus Hoetink (1967, 1973) argued that the Spanish islands produced greater cultural homogenization due to the larger population of “mixed” groups, a reflection of the intimacy between black and white, rather than the relatively milder practices of slavery on these islands. Though he does not link the categorization of creole with racial hierarchy, Hoetink’s study characterized the view of the Spanish colonies as more fully integrated than other colonial societies. The term creole was also applied to subsequent subordinate populations of locally-born, indentured workers of Indian descent. In the post-independence era, the term became part of the nationalist discourse of the middle class to promote unity among populations of African descent regardless of economic standing.

Kamau Braithwaite (1971) was one of the first scholars to apply the concept of “creole” to the study of social relations in the Caribbean. In contrast to M. G. Smith’s pluralist view, Braithwaite uses the term creole society to argue that slaves, free blacks and white planters engaged in interactions that created interdependency among the three groups. Creolization involved both external aspects of white domination and colonialism, and internal adaptation of African traditions; this process resulted in an emergent Jamaican society. The important focal points are not survivals or retentions, but rather the social relations in which people engage in activities as responses to the environment and each other (Bolland 1998).

Building on Braithwaite’s work, Sidney Mintz and Richard Price’s 1976 seminal paper reinforced the creation of community which the African slaves directly shaped (7). Mintz and Price

argue that, rather than solely building on abstract “African” cultural traditions, enslaved communities established normative patterns of behavior based on social interactions. In their subsequent work (1992), they note the creation of new forms of cultural beliefs and practices among African diaspora populations based on shared “grammatical” principles of West African origin, thus forming a theory of creolization on a linguistic model. Linguistic studies of certain “subaltern vernaculars” sought to characterize the types of languages found in the Caribbean and the processes by which culture contact produced these languages, namely creolization. The difficulty of reliance on these studies is their preliminary nature and the dependence on ethnographic and historical data in their hypotheses, thus resulting in an awkward feedback loop of model formation (Palmié 2006). Critiques of the creolization model include its limited discussion of continued connections between Africa and diasporic populations (Lovejoy 1997). As recently as 2001, however, Richard Price has defended the model as one which acknowledges and incorporates ideas of African cultural diversity that influenced syncretism and creolization (2001:41). Other scholars have also attempted to define creolization in light of Braithwaite’s original thesis (e.g., Benitez-Rojo and Maraniss 1998; Glissant 1995; Trouillot 1998).

Several questions are evident in the broader context of the debate over African retentions and creolization as it pertains to people of African descent in the Caribbean. First, the role of historical relationships in understanding later post-emancipation and post-colonial dynamics is critical, particularly in terms of the often overlooked categories of economy and labor. Second, if the Caribbean is to be viewed as a unique testing ground for creolization processes, what Aisha Khan (2001) refers to as a site of “hyper diversity,” then the “creole” category cannot become a static straw man to other global case studies (Khan 2007). Third, the political context of national dialogues concerning creole identity must be recognized in light of the struggles for authenticity of various groups across the Caribbean. The adoption of creolization theory with respect to the Caribbean is thus both inhibiting and beneficial for future scholarship. While an emphasis on hybridization without the foundational historicity and context of the processes (Slocum and Thomas 2007:9) and the disregard for its current political usage are detrimental (Palmié 2006),

the analytical value of viewing power in society through the categories such as gender, race, and class is significant (Slocum and Thomas 2003:557).

Historical Archaeology in the British Caribbean

The following review of historical archaeology of slavery and plantations in the British Caribbean touches on these major debates within Caribbean anthropology and the role of space in the plantation hierarchy. Other research topics not considered here are: the reconstruction of religious and spiritual systems of enslaved communities (e.g., Handler 1997); burial and cemetery analysis (Armstrong and Fleischman 1993; Corruccini et al. 1982; Handler 1994, 1996; Handler and Corruccini 1983; Handler and Lange 1978; Goodwin and Pantel 1978; Mann et al. 1987; Watters 1987, 1994); industrial archaeology of plantation works and other outbuildings (e.g., Goodwin 1994); and maroon communities (e.g., Agorsah 1992, 1994). I review the beginnings of historical archaeology in the region, applications of creolization and ethnogenesis theory particularly in the study of locally-made coarse earthenwares, and spatial analysis of plantation landscapes. These trends point to the capacity for archaeological investigation to address broader questions of group formation and “resistance” through the production and use of material culture.

Pioneering studies in British Caribbean historical archaeology include detailed analyses of a given plantation site based on long term projects. The methodological problem facing historical archaeologists studying slavery throughout the New World colonies also applied to the Caribbean, namely, how to locate domestic sites of occupation with little to no surface presence. Jerome S. Handler and Frederick W. Lange’s seminal work (1978) on the search for slave villages in Barbados was one of the first attempts to address this problem. Their subsequent investigation of Newton slave cemetery was one of the first to combine historical and archaeological data of plantation contexts in the British Caribbean. Despite the ephemeral nature of slave life in the seventeenth and early eighteenth century, Handler and Lange successfully

demonstrate that the material record of slavery was recoverable in some form in Caribbean contexts.

In Jamaica, Barry W. Higman integrated archaeological, historical and demographic data from Montpelier sugar estate (1974, 1975, 1976, 1998). Upon full publication in 1998, Higman's Montpelier study was another influential examination of a single site. His thorough assessment of the plantation's history, its landscape, the composition of the enslaved workforce, and the material record of the village revealed how the dynamics of one plantation community shifted over time. He persuasively argues that the shift was due to the interconnected nature of internal plantation factors, such as infant mortality rates, and external colonial factors, such as the rise and fall of sugar prices.

Spurred by the survey of Handler and Lange, as well as Higman's Montpelier data, Douglas V. Armstrong performed similar documentary research and archaeological testing of slave village areas in Jamaica (1983, 1985, 1991a, 1991b). Selecting Drax Hall as his case study, Armstrong examined the laborers' village during slavery, the "transitional" labor period, and the free labor period, to identify potential "Afro-Jamaican cultural patterns" and their change over time (1983:7-15, 1990). In addition, excavations at Great House contexts provided additional comparative data for evaluating village patterns. Armstrong's Drax Hall analysis was significant in its focus on the developmental processes of Afro-Jamaican culture as expressed in the material and historical records. He employed a similar approach in the Seville Afro-Jamaican project, excavating households in earlier and later villages on the estate (Armstrong 1998, 1999). Several studies stemming from the Seville excavations investigate the differences between these two villages including spatial organization (Armstrong and Kelly 2000), burials (Armstrong and Fleischman 2003), and a possible East Indian laborer's house (Armstrong and Hauser 2004; see also Armstrong 2011 for a summary of his work in Jamaica).

Another series of broad examinations of a single plantation include those on Galways estate in Montserrat (e.g., Goodwin 1987; Howson 1995; Pulsipher 1991; Pulsipher and Goodwin

1999). These studies include data from archaeology, geography, botany, oral history, cartography and the documentary record. The Galways analyses indicate how multiple lines of evidence can inform a more nuanced study of the relationship between people and space in the context of the Caribbean plantation.

Building on these intensive studies, more recent work on plantations in the British Caribbean is thematically or methodologically driven, and strives to compare data within and across colonial holdings. One consistent theme in the study of Caribbean plantation life is the process of creolization and its application to the lifeways or strategies developed by enslaved individuals in this setting. Drawing on Braithwaite (1971) and Mintz and Price (1992[1976]), these authors sought to infer from the material record how slaves maintained or adapted African cultural practices to plantation life. Not restricted to communities in the British Caribbean, the implementation of a creolization approach is an ongoing theoretical trend in historical archaeology of the African diaspora. Early studies (e.g., Armstrong 1990) argued against the linear transfer of West African practices by enslaved people to the New World. While slaves drew on a knowledge base of familiar practices, they adapted these strategies in innovative ways (e.g., Armstrong and Kelly 2000). Others adopting the creolization approach, such as Leland Ferguson (1992) and the contributors to a special issue of the journal *Historical Archaeology* (Vol. 34, No. 3, 2000), emphasize how enslaved people's "African sensibility," prescribed the activities, choices and meanings they ascribed in new surroundings (Wilkie 2000:11). More recent scholarship continues to emphasize the "African" elements of enslaved people's cultural values, particularly in the materiality of space, architecture and religion (e.g., Davidson 2004; Fennell 2003, 2011; Landon and Bulger 2013; Lenik 2012).

Other applications of creolization do not follow the essentializing tropes "African" or "West African." James A. Delle's treatment of creolization (2000) is a more nuanced acknowledgment of the relationship between groups in British Caribbean slave society. He traces the origin of the word creole, including its reference to people of European descent born in the Caribbean

colonies. Delle concludes that both Afro- and Euro-creoles negotiated elements of their identity through material culture related to space, foodways, health and hygiene. Studies like this one remind us that colonial societies included a range of individuals who modified their cultural practices as it suited them.

One large body of scholarship which has evolved out of the debates on creolization and African retentions is the production and use of locally-made coarse earthenware. Identified by particular island designations, such as *yabbas*, or broad categorizations, such as “Afro-Caribbean,” these hand-built, low-fired wares often are cited as evidence of “West African” traditions of pottery manufacture. One of the earliest attempts to describe local production was Jerome S. Handler’s ethnohistorical examination of pottery in Antigua (1964). In this study, he noted the common qualities of red slip, fire clouding, coarse paste, and a low-luster burnish on local pots. Focusing on similar attributes, Duncan Mathewson examined the form, manufacture and function of “Afro-Jamaican” sherds recovered from excavations at the Old King’s House, Spanish Town, Jamaica (1972, 1973). Unlike later studies, Mathewson argued that these wares exhibited European and indigenous (“Arawak”) traits that had been passed on to enslaved populations. While more recent analyses object to these claims (e.g., Meyers 1999), Mathewson was one of the few Caribbean ceramic researchers not to attribute local production to a solely “African” origin. Taking a slightly different approach to the question of Afro-Caribbean manufacture, Barbara Heath (1988) conducted an attribute-based study of sherds recovered on St. Eustatius, testing evidence of ethnic attribution and creating a subsequent local typology. Though the composition of the Statia material cannot be distinguished from that of other nearby volcanic islands, Heath demonstrates that paste attributes are linked to form/function and possibly manufacture. Surface treatments, however, were not linked to form or manufacture, which may suggest choice by female potters in the community. Heath’s attribute-based typology is one of the most systematic attempts to address function and construction of local pottery.

Heath's compositional approach was expanded on by Mark W. Hauser in his work with Armstrong (1999) on Seville materials, and in his comprehensive investigation of Jamaican markets, and the production, transport and sale of low-fired earthenwares (2001, 2006, 2008, 2009b, 2011). Hauser (2006, 2008) employs a comparative, compositional analysis in his multiscalar study of Jamaican *yabbas*. His initial typology is based on surface treatment: glazed, slipped, and untreated (2008:140-150). Chemical (NAA) and petrographic analysis indicates that groupings were represented consistently in north coast, central and south coast contexts. This data suggests that similar clay recipes were found throughout the island, and therefore that the wares of a limited number of potters were sold in the major markets "for three centuries" (2008:190-191). Despite change over time in decoration and form, Hauser concludes that similarities in the recovered sherds question the presumed localization of independent craft production, and support the interconnected nature of marketing and exchange in Jamaica.

The marketing behavior and consumption patterns have also been an avenue of research pursued by archaeologists working on plantation contexts in the British Caribbean. Roderick McDonald's historical comparative study of sugar slave societies in Louisiana and Jamaica was influential in these studies (1991, 1993). In his comparison, McDonald argues for the economic autonomy that slaves employed in producing saleable goods and participation in local, "internal" markets.

Jean Howson's study (1995) of a Montserrat slave village was one of the first to address the frequency of European market goods recovered in these settings. In her analysis of pre- and post-Emancipation contexts at Galways and Delvins plantations, Howson demonstrates an increase in imported "dishes" over time, in decorative styles similar to those acquired by European colonial residents (1995:218-221). She frames this data according to British colonial debates concerning whether slaves could prosper after emancipation. Since Montserrat had limited open land, former slaves largely remained on estates, earning wages from provision grounds, paying rent and purchasing relatively expensive market goods. Howson concludes that

continuity in community, work and independence, as signaled through market participation and consumer choice, characterize the values of freed men and women in Montserrat (1995:320).

Matthew Reeves' scalar analysis (1997, 2011) of enslaved communities on Jamaican estates also addresses the acquisition of market goods. Reeves tests the hypothesis that slaves' household production was limited by the labor regime within which they toiled, in this case coffee versus sugar production. Under these conditions, he considers the frequency and variety of imported items as markers of access to market goods and as a proxy for above subsistence-level survival (1997:210-11). For example, the availability of local earthenware equivalents to European hollow tablewares suggests enslaved households with imported wares obtained "an expensive version of an item whose functional equivalent was free of cost" (1997:175). He also considers ceramic form as evidence of food production and therefore the amount of time available for activities such as cooking. The percentage of imported versus local goods, as well as variability in ceramic form, at the two sites indicates that there was a similar degree of access at the coffee plantation Juan de Bolas, but variable access at the sugar estate Thetford. Reeves concludes that resource availability, and the survival strategies slaves employed to cope with resource stress, were directly linked to work schedules and demands of the cash crop (1997:285-6; 2011:207).

In an attempt to address both consumption and creolization patterns, Laurie Wilkie expanded on previous conclusions of African continuities to argue that slaves at Clifton plantation in the Bahamas acquired European goods to enhance "their sense of Africanness" (2000:281). She cites decorative motifs and color palettes on imported ceramics, as well as decorative elements on tobacco pipes, to conclude that goods were selected for their similarity to an "African aesthetic" (2000:300). To a lesser extent than Meyers (1999), Wilkie only demonstrates a cursory link between decorative elements and African designs, in this case the oft-cited Bakongo cosmogram. She also makes little attempt to systematically associate these qualities to a particular group or region, beyond the common assumption of "African."

More recently, Jillian E. Galle (2011) explored potential similarities in consumption patterns between slaves living in the Chesapeake and in Jamaica during the eighteenth century. Galle employs signaling theory to test the hypothesis that measurable differences occur in the conspicuous display of imported items, namely metal buttons, refined ceramics, and glass tableware, by slaves in both colonies. As in Reeves (2011), these differences stem from the composition of the enslaved workforce (African- vs. island-born) and the agricultural diversification on the plantations. Galle's analysis indicates that these factors influenced the opportunities available to enslaved individuals, with those on diversified plantations in the Chesapeake and on a Jamaican coffee plantation discarding costly goods at a higher rate than their sugar estate counterparts. Over time, these opportunities increased on all three plantation types. This brief summary of consumption studies on British Caribbean plantations suggests the potential to examine the mechanisms that enslaved people exploited in order to access (and discard) imported goods.

The primary focus of spatial analyses in Caribbean historical archaeology is the relationship between the owner- and slave-controlled areas of plantation landscapes. Drawing on Mintz and Hall's examination of the Jamaican internal marketing system, initial anthropological examinations of Caribbean landscapes focused on the period of slavery and post-Emancipation era (Berleant-Schiller 1991; Craton 1978; Higman 1986, 1987, 1988, 1989; Olwig 1985). Pioneering the integration of archaeological, geographical, and ecological perspectives, Lydia M. Pulsipher's engagement with the gardens and villages of Montserrat emphasizes how enslaved people developed a sense of ownership over these spaces (1984, 1990, 1991, 1994). Pulsipher, in collaboration with Conrad M. Goodwin, explores the perception and use of space by the enslaved community and its descendants at Galways plantation (Pulsipher and Goodwin 1982, 1999, 2001).

Recent work draws on post-modern conceptions of power and control imposed by owners on the plantation. James Delle (1998, 1999, 2000, 2014) examines the Jamaican

plantation landscape in terms of social and racial hierarchies. He examines how space was employed by coffee planters and their agents to “elicit specific social responses” from slaves and other subordinate classes during a global crisis in capitalist markets (1998:36-37). One strategy Delle notes was the control over slaves’ actions through Benthamite surveillance methods (1998:156), an approach also adopted by other Caribbean archaeologists (Lenik 2012; Singleton 2001, 2014).

Other studies address changes in spatial organization of the worker’s village from slavery to emancipation and beyond (Armstrong 1990, 1992, 1999; Armstrong and Hauser 2004; Armstrong and Kelly 2000; Delle 2009; Hauser 2014b). Recent methodological advancements in recording and identifying broad scale change within a village or across multiple villages facilitate this analytical trend (Armstrong et al. 2009; Cooper et al. 2008; Galle et al. 2010). All of these previous works suggest that the ways in which enslaved people altered the planter-imposed spatial order can be reconstructed based on historical, archaeological, and ethnographic investigation.

This collection of critical studies across several disciplines points to the importance of interdisciplinary approaches to complex phenomena such as survival strategies, spatial organization, and the formation of social bonds between groups. Methodologically, the use of multiple lines of evidence from an integration of data sources is a powerful tool in evaluating hypotheses about human interactions with the landscape and material culture. Building on the work outlined here, I comparatively examine text, space, and artifact to test hypotheses about slaves’ actions in the context of the provision ground system, an essential component to daily life on historic sugar estates in Jamaica.

CHAPTER 3: HISTORICAL BACKGROUND OF JAMAICA: SUGAR, PROVISIONS, AND MARKETS

This chapter explores the historical context of eighteenth and nineteenth century Jamaica with a focus on sugar cane cultivation, the daily lives of enslaved people and the provision ground system on sugar plantations. The rise of sugar production on the island required continued settlement of the island, as well as the spread of knowledge among the British and creole elite who controlled these properties, their outputs, and the markets in which sugar was sold. Tracing the agricultural practices critical to the success of a given plantation reveals the components of the planter-imposed spatial order which enslaved people confronted. From this baseline, the places which slaves occupied, including the village and the negro grounds, are examined. Historical and archaeological evidence for slave settlements indicates clusters of houses and yards at the margins of the central processing areas. The provisioning of enslaved communities, including rations distributed by the owner and the produce of the negro grounds, indicates the importance of supplemental foods cultivated and raised by these communities. Current evidence for the workings of the provision ground system suggests both regional and diachronic variability in size and conditions.

The period from 1750 to full emancipation in 1838 in Jamaican history encompasses the peak of sugar production, as well as multiple fluctuations in sugar prices and market competition. Region-wide events during this time include the American Revolution, the Haitian Revolution, the abolition of the slave trade, debates about amelioration and the abolitionist movement, and finally apprenticeship and emancipation. The potential influence of these events on slaves' provisioning and marketing activities on three estates is addressed in Chapters 4 and 5.

Brief History of Jamaica Prior to 1750

Jamaica lies 90 miles south of Cuba in the western Caribbean, often referred to as the Greater Antilles (Figure 3.01). The first inhabitants of the island of Jamaica were Taino peoples likely traveling from Cuba or Hispaniola. Over time these settlers formed large towns, numbering

from several hundred to several thousand, primarily on the Northern and Eastern portions of the island (Rouse 1964, 1986, 1992). From the 1950s, archaeological excavations have provided a rich source of data that addresses the political and social complexities of these communities (Allsworth-Jones 2008; Atkinson 2006).



Figure 3.01 Modern Political Map of Jamaica (nationsonline.org 2011).

Christopher Columbus on his second voyage in 1494 sailed from Hispaniola and encountered Jamaica. Finding no gold and a hostile indigenous population, he continued on to the mainland. In 1503, on his return from Panama to Cuba, he was forced to land in Jamaica, losing two ships off the north coast in St. Ann's Bay at a site later called *Sevilla la Nueva* (Higman 2005:63, 67). In 1509, led by Juan de Esquivel, the Spanish seized the opportunity to control another large island in the Caribbean as a provisions supplier to their holdings in Cuba and Hispaniola (Morales Padron 2003; Renny 1807). They engaged in warfare with the Taino for control of the island and established a small settlement at New Seville, including a church and a

fortified “castle” (Deagan 1988). In the following decade, the Taino attempted to oust the Spanish and succeeded in forcing them to the South, where they settled a new capital known as St. Jago de la Vega, later Spanish Town. Despite this relocation, the colonial seat remained a backwater during its roughly 100 year existence under Spanish rule (Morales Padron 2003).

Under the aegis of Oliver Cromwell during the Interregnum period, British naval forces engaged Spanish troops on the North coast of Jamaica in 1655 (Renny 1807). After several repulsions of Spanish contingents from Cuba, British troops under Admiral Penn and General Venables succeeded in controlling the island by 1658 (Dunn 1972:152). Settlement of the island was sporadic over the next forty years, with naval ships docking at established colonies such as New England, St. Christopher, Nevis, and Barbados to persuade planters and merchants to settle in Jamaica (CSP Colonial Volume 1, 1656). To encourage further settlement, Charles II in December 1661 proclaimed that any person born in Jamaica would have the same rights as the “free-born subjects of England” (CSP Colonial Volume 5, 1661; Long 1774:I:9). Despite these measures, Jamaica as a sugar producer did not surpass Barbados until 1720, primarily due to the dispersed settlement pattern and struggle for control of the island between planters and buccaneers (Dunn 1972:21).

Seventeenth-century Jamaica was at best a tumultuous place for enterprising settlers. A majority of the population during this time was concentrated in two locations: Port Royal, on the peninsula bordering Kingston Harbor, and the former Spanish capital of Spanish Town (Dunn 1972:36). Port Royal became a large, bustling port that was dominated by illegal trade under the control of buccaneers like Henry Morgan (Marx 1967). Spanish Town remained the seat of the Assembly of Jamaica and the governor’s house (Robertson 2008). In June of 1692, a devastating earthquake collapsed nearly half of the town of Port Royal into Kingston Harbor. This catastrophic event, while almost permanently disrupting mercantile business in the largest port in the colony, also led to the investment in the city of Kingston as the colony’s marketing and shipping hub. Further hindrances in the development of Jamaica’s sugar industry occurred in 1694, when

French forces from St. Domingue invaded the island close to Morant Bay in St. Thomas, destroying sugar works and capturing slaves along the southeastern coast (Parker 2011:192-194). With the Treaty of Utrecht in 1713, outright military engagements became less common, though clandestine capture of trading vessels continued (Wiseman 1950).

Jamaica prior to 1750 could be characterized as rife with internal struggles. Numerous conflicts between the Jamaican Assembly, the Council, and the Governor exemplify the chaotic legislation of the island during this time (Parker 2011; Wood 1884). After nearly fifty years of disagreement, in 1728, the Assembly consented to grant the Crown a yearly revenue of 8000 pounds, at which point the laws passed by the Assembly at last were confirmed by the King (Edwards 1793:I:171; Renny 1807:51). After the Revenue Act, the government of the colony came to resemble the other British holdings in the region.

Simultaneous with the governmental battles in Spanish Town, military engagement with Maroon communities occurred beginning in the 1720s. The first Maroon war, as it was later known, was prompted by planter settlement along the north eastern coast, which effectively isolated the Windward Maroons in the main settlement of Nanny Town (Patterson 1970:301). The Maroons gradually damaged these new properties primarily through guerilla warfare. At the same time, the Leeward community led by Cudjoe continued similar practices of destruction on plantations in the west (Dallas 1803). Perhaps the most disconcerting aspect for the planter elite was the loss of slaves who fled from plantations and militia service to join the rebels. After numerous battles with British forces during this decade, Governor Trelawny approved negotiations with the Leeward Maroons, and a rather unprecedented treaty was signed March of 1739. Despite the additional prescription that all runaway slaves had to be returned to their masters, the Windward Maroons with resignation agreed to a similar treaty (Patterson 1970:311-313). Amidst the increasingly successful sugar monoculture, these events set the stage for a divisive social and economic atmosphere in the second half of the eighteenth century.

The Sugar Industry in Jamaica prior to Emancipation

The development of the sugar industry in the Caribbean has, more often than not, been characterized as a “revolution” (e.g., Higman 2000). Following successful experimentations with sugar cultivation in Madeira and Sao Tome, the Portuguese brought these agricultural techniques to the colony of Brazil, and export of sugar began in earnest in the early seventeenth century. The Spanish also planted sugar in their holdings of Hispaniola in the sixteenth century, though the scale of production was considerably less than the large *encomiendas* that would characterize nineteenth century Cuba (Higman 2011). The first island that became devoted wholly to sugar was Barbados. At first English elites who relocated to this colony purchased small tracts of land on which to grow crops such as cotton and tobacco (Handler and Lange 1978). Since the Dutch provided capital investment, cargo ships, and a market for sugar, a majority of Barbadian planters shifted to sugar cultivation in the 1650s and never looked back. With the Barbadian trajectory in mind, other British planters in the Lesser Antilles, including Nevis and St. Christopher, invested in small land claims focused on sugar production. Until the rise of Jamaica, Barbados was the Crown’s jewel in the Caribbean, with sugar exports exceeding 60 percent of the quantity shipped to England from the 1650s to the 1680s (Dunn 1972:202-3).

From the outset of Jamaica’s British rule, the goal of colonial officials and settlers was to achieve and exceed the success of Barbadian sugar cultivation. As noted above, any increase in the population and thereby reinforcement of the Crown’s hold on the island was difficult to achieve in the seventeenth century. While persuading servants who had completed their tenure was relatively easy, convincing seasoned planters and overseers remained a challenge. With minimal Crown oversight, Governor Thomas Modyford, in power from 1664 to 1671, was an early advocate for land grants and investment in sugar cultivation, hoping to persuade other prominent Barbadian planters to follow his example. Much of the suitable cane land along the coast was patented at this time, nearly 300,000 acres, since Modyford granted 30 acres to patent applicants and an additional 30 to each family member, servant and slave (Dunn 1972:154). The difficulty in

establishing an estate in Jamaica at this time is exemplified by the case of William Whaley, who struggled to manage an estate on the ground with his financial partner in London (Bennett 1966). After Modyford's tenure, the plantocracy's efforts for absolute control were thwarted by a series of Crown-appointed governors whose loyalty was to the metropole and the Royal African Company, which monopolized the market on the importation of enslaved people (Dunn 1972:160; 230-34).

During war with the French from 1689 to 1713, planters regained their foothold and courtly favor, along with increased military protection. Small scale planters, however, suffered extreme losses due to disease and the failure of other cash crops such as cotton, cacao, and indigo to compete with sugar. This near disappearance of small planters effectively secured the dominance of large landholders in the colony, a trajectory also noted in Barbados and Nevis (Olwig 1985). Some of the more notable planter families who relocated to Jamaica included Drax, Barrett, Lynch, Archbold, and Price (Parker 2011:107-8). Documentation of original land grants indicate that many of the plots were granted in the last quarter of the seventeenth century. Despite this early investment, however, a majority of these plots would not become the sprawling estates that epitomized the sugar industry in Jamaica until after the mid-eighteenth century. Privateering, open warfare, heavy taxes, disease, and the tremendous cost of clearing valuable land stunted the early expansion of sugar (Dunn 1972:177).

Between the 1750s and 1760s, the Jamaican sugar industry continued to grow in response to the high demand for sugar in the mother country, with prices nearly double the 1730s figures (Mintz 1985; Ward 1988). Consolidation of smaller estates, the establishment of new estates in the interior, and some percentage of absentee ownership became the primary components of sugar estate management. Despite the amount of debt to be paid to (primarily) London merchants, the wealth of Jamaican planters prior to the American Revolution points to their success in establishing control over the primary sources of wealth in the colony including slaves, land, and cash crops over a relatively short period of time (Burnard 2001). Trevor Burnard (2004) has raised the question of whether absenteeism was as common as suggested by Ragatz

(1928), Sheridan (1974), and Ward (1988) during the eighteenth century in Jamaica. His detailed research of property lists, deeds, and wills suggests that, while absentees were fewer in number than previously assumed, their influence in the sugar economy was significant in terms of production and advocacy for the West Indian lobby in Parliament (Burnard 2004:185-191). After this point, the colony experienced a number of tumultuous events that disrupted cash crop export and the power of the planter class in opposition to the Crown's policies.

From the view of the planters in the British Caribbean, losing control of importations from North America was a primary concern in the ongoing conflict between the American rebels and the Crown. With the restrictive application of the Navigation Acts to American vessels, and the banning of exports by the newly formed American Congress to Britain and her colonies, British merchants in the West Indies were forced to turn to free ports on French and other islands to purchase North American goods such as flour, bread, wheat, rice, corn, salted fish, and lumber (Carrington 1988, 1996; O'Shaughnessy 1996; Ragatz 1928). Historian Selwyn H. H. Carrington cites planter Simon Taylor's concerns over the shortage of food caused by the importation bans: "we must throw up the sugar estates into Provision Grounds and Penns or Migrate with our Negroes to the French Islands" (1996:154 citing Simon Taylor to Jack (Sir John) Taylor, 4 August 1784). Friction between local officials and the Crown also led to the periodic closing and reopening of British West Indian ports to goods from the United States from 1782 to 1807, with local governors and the Jamaican Assembly challenging colonial mandates (Carrington 1996:157-162). The continued disruption led to significant increases in the price of imported foods and thereby a severe scarcity in rationed foodstuffs for enslaved people. Historiographical debate about the influence of the American Revolution on the provisioning of the British Caribbean colonies centers on the level of investment in self-sufficiency and local production of food. Richard Sheridan (1976) argues that the introduction of food crops from abroad, including the mango and ackee, point to the planters' need to supplement rations during the interruption in trade. Cartographic evidence of surveyed plats dating after 1790 suggest that the provision ground system remained a widespread practice into the 1830s.

While provisioning conditions did not improve much, the 1790s saw some increase in prosperity for West Indian planters with the rebellion and independence of Saint Domingue in 1791 and Britain's renewed conflict with France in 1793. The decrease in competition for sugar from the Caribbean's largest exporter clearly improved the fortunes of Jamaican estates whose soils were becoming exhausted. Conflict with France was a benefit and a disadvantage; while the flow of trade was often interrupted, the defeat of Napoleon reopened the European market to British sugar products, with few competitors. By 1815, sugar prices rose to the highest level seen since the 1750s (Ward 1988:43). This success, however, also meant the British acquisition of several smaller islands in the Caribbean, open for sugar cultivation, as well as Mauritius off the coast of Madagascar, creating new competitors for Jamaican sugar.

The Haitian Revolution was also a significant warning to the complacent Jamaican planters. The idea that enslaved people across nearly every estate could successfully organize the disruption of the slave system and colonial rule put fear in the hearts of estate owners in Jamaica. The end of slave trade in 1807 served as a milestone event in the disruption of Jamaican planters' success during the eighteenth century. Owners could no longer afford to merely replace enslaved laborers who had died under severe working conditions from exhaustion, malnutrition, injury, or disease. Some planters at this time turned to measures of amelioration to preserve their enslaved workforce including improvements in housing, rationed goods, and the abolishment of the whip in punishments. Several owners published proslavery treatises at this time to attest to the beneficial aspects of slave status for creoles and Africans (e.g., Collins 1803; Foulks 1833). Legislative attempts to improve the conditions of slavery included an (unsuccessful) bill to institute task work on Jamaican estates, while disciplinary efforts increased to curb congregation of enslaved people (Gosse 2004).

At a time when abolitionists successfully moved the question of slavery to the forefront of British politics, and the image of planters' in the metropole was irrevocably damaged (Burnard 2011), planters faced rising labor and hiring costs in their quest to supply the needs of the home

and European markets. Despite the rising prices of sugar noted above, the consistently rising costs of running one or more estates and the rising debts to London creditors increasingly forced estates into mortgage and assumed ownership by agents. As Delle argues, the rise in coffee cultivation filled a niche in the declining sugar industry at this time, with new estates established in the hilly terrain unsuitable for sugar (1998). The success of this crop with slave labor and high prices in the home market encouraged some investment by London merchants. The rapid growth of the coffee industry could not be sustained, however, and faced similar pressures to compete against other cash crop producers.

Traditionally, the emancipation of slaves across the empire between 1833 and 1838 was credited to abolitionist efforts to end the moral evil of slavery. With the publication of Eric William's influential thesis on the link between early British capitalism and slavery, historians acknowledged that economic interests coincided with the humanitarian sentiment in the country (1944). *Laissez-faire* capitalists in London and other industrial centers resented the West Indian lobby and their refusal to waver from an outmoded production system. While slavery was formally abolished across all British holdings in 1834, concern for the immediate abandonment of all sugar production and immediate rebellion led to the institution of an apprenticeship system that lasted until 1838 in Jamaica. As a form of *de facto* slavery, apprenticeship required slaves to pay rent on their houses and provision grounds, as well as medical costs. Slaves were paid a "wage" only after they worked a minimum number of hours. This system of "transition" brought a slow end to the institution that had characterized the Jamaican social and economic fabric since 1655.

Sugar Cultivation and Processing

Sugar cane was the dominant cash crop in the Caribbean soon after the establishment of plantations in northern Brazil with Dutch investment in the sixteenth century. The earliest island colony of Barbados adopted the crop by the 1640s, with further spread into the British Antilles into the 1670s. From this point on, the techniques for successful cultivation and processing were a constant source of conversation and debate, attested by the number of pamphlets and guidelines

in circulation in the eighteenth and nineteenth centuries. Slavery was the form of labor with which estate owners implemented these techniques.

The process of sugar cane cultivation evolved over time as planters shared and implemented new or modified strategies to improve the amount of sugar acquired from each plant. These shifts in agricultural practice were often necessitated by soil exhaustion or the presence of multiple soil varieties in a single piece. Drawing on knowledge from previous experiences in Barbados, Nevis and other islands in the Lesser Antilles, owners and overseers alike were uninformed and underprepared to properly address the contingencies of Jamaican sugar planting (Long 1774:1). Over several generations and the continued settlement of the much larger island, strategies for successful sugar cane cultivation developed as planters shared and implemented new or modified strategies to improve the amount of sugar acquired from each plant.

These innovations fall into two basic categories: improvements related to the cane plant itself and improvements in agricultural practice. With respect to the plant, one advance was the introduction of the Otaheite cane variety from southeast Asia in the 1780s (Fraginals 1976). While the juice of the Otaheite was not as rich or substantial as previous plants, planters soon discovered that its larger size yielded a greater amount of sugar per acre, nearly a hogshead² more according to James Stewart (1808:104). The plant also matured more quickly and its leaves provided better fuel than the Creole variety (Galloway 1985). The practice of ratooning was another strategy designed to stretch the productivity of the soil and still generate a viable crop. Ratoons are cut secondary plants that regrow after a first cutting. This method saves from replanting a field since the plants remain in place, and they mature more quickly, twelve rather than fourteen months (Stewart 1808:103). Planters, however, had to weigh these benefits against the smaller amount of sugar produced by each ratoon. Determining the most advantageous

² With respect to sugar production and shipment, a hogshead barrel was equivalent to 52.5 gallons (Barrett 1965).

combination of fields containing either plants or ratoons was a constant managerial question (Higman 2005).

The second set of improvements included new ways of planting and encouraging cane growth. One change was the use of the animal-driven plow to break up the soil prior to holing and to create drainage furrows within the cane pieces, rather than relying on hoeing by enslaved laborers. Plowing was a technique recommended in a variety of late eighteenth and early nineteenth century sources (Edwards 1793; Long 1774; Roughley 1823; Stewart 1808), and absent from earlier treatises (Leslie 1740). These authors stress how the plow reduced both the time and labor that readying a new cane piece entailed. Another innovation was the introduction of cane-holeing as a way to encourage several shoots to grow from a single planting, rather than simple trenching with the cane oriented perpendicularly to the surface (Leslie 1740; Watts 1993). According to planter J. B. Moreton, an acre of land contained 3555 holes measuring 3.5 feet square, which could be dug by forty laborers in one day (1790:43). Due to the back-breaking nature of this labor, it was usually performed by jobbing gangs rather than the owner's enslaved labor force (Moreton 1790:44). It is unclear how widespread this technique was employed in Jamaica, since soil fertility was not a primary concern until the nineteenth century in most cases. Finally, properly manuring the fields was a technique advocated by nearly every planting guide author (e.g., Long 1774:447; Ormrod 1979 has an excellent discussion of historic fertilization techniques). The soil infertility witnessed in Barbados was a constant reminder of the dangers of stripping the soil to the point of exhaustion (Thompson 2009).

Sugar cane in Jamaica generally was harvested in late January or February (Beckford 1790). To avoid harvesting in the rainy season, the regime required that the canes were planted in March and September (Stewart 1808), though some planters waited until November or early December. Several steps of maintenance are required as the canes mature. Young cane tops or ratoons need regular weeding, manuring (or dunging), and reinforcement with additional soil to reduce competition and to encourage growth and stability. During their growth cycle, they require

several episodes of “trashing,” during which the dry outer leaves of the plant are removed to encourage the production of sugar within the upper joints of the plant (Roughley 1823:232). These leaves are either built up for future support of the plant or saved for use as fuel. When the plant becomes heavy and unable to remain upright, it is ready for cutting (Roughley 1823). Possibly the most difficult task of cultivating sugar apart from holing occurs when the mature cane is cut at the bottom to encourage a future season of ratooning.

Once the canes are cut, the race against spoilage begins. Cane stalks should be ground as soon as possible to prevent fermentation (Edwards 1793:I:220; Galloway 1989:16). Thomas Roughley suggests that intervals within fields should be wide enough only to admit a wagon, so as not to lose valuable ground for cane (1823:221). Prompt transportation of the cut cane to the mill complex and constant grinding of the cane during harvest time ensures that little juice is lost in the process. Planters directed that the pieces farthest from the mill complex be cut first in order to decrease wear and tear on roads and intervals (Higman 2005), thereby avoiding potential hazards.

In eighteenth-century Jamaica, mills powered by cattle and water were most common. Windmills were far less common than in the Lesser Antilles where trade winds powered production (Sloane 1707). Water was the preferred source, with many successful planters investing large amounts of capital in constructing a mill along with aqueducts to carry water to the mill. Examples of this type of investment are the Barretts at Drax Hall replacing a windmill with a mill drawing water from the St. Ann's Great River, and the owners of Hope, Papine, and Mona estates agreeing to share an aqueduct system at the foothills of the Blue Mountains in St. Andrew. As Higman (1988) notes, water-powered mills had the benefit of constant flow without the additional investment for fodder or animal replacement. For those owners without access to a consistent water source, a single or double cattle mill served to process the cane. In all three cases, enslaved laborers fed the cut canes through a large set of rollers, with one or two workers feeding the cane and one or two on the other side feeding the canes back through a second time

(Figure 3.02). Feeding the cane was a particularly dangerous task, since the rollers were constantly moving and could not be stopped easily, or without loss of valuable time. From the mill, the extracted juice flowed in gutters to the boiling house.



(Moulin pour exprimer le jus des cannes, à la Martinique.)
Figure 3.02 Animal-Powered Sugar Mill, Martinique, 1835. *Le Magasin Pittoresque* (1835), p. 68. Image Reference Magasin2, as shown on www.slaveryimages.org, compiled by Jerome Handler and Michael Tuite, and sponsored by the Virginia Foundation for the Humanities and the University of Virginia Library.

Described in the earliest texts concerning French and British sugar islands, the production of clarified, crystalline sugar required several steps performed by skilled enslaved laborers and managed by the overseer (Labat 1742; Ligon 1657; Sloane 1707). The boiling house contained three large clarifiers, each ranging from 300 to 400 gallons, in which lime was added to neutralize the acids and attach to contaminants that collect in the bottom. The juice was

then transported to the first of five or more cast iron or copper boilers, or coppers, in which remaining contaminants rise to the surface and are removed with large skimmers. Once the syrup was heated to a particular temperature and reduced in volume, enslaved workers ladled it into progressively smaller coppers (Edwards 1793; Galloway 1989). In the final boiler, the syrup was “struck” when it exhibited a crystalline structure, at which point the syrup was transferred into large cooling vats (Britt 2010). To maintain consistent heat for boiling, an innovation later known as the “Jamaica train” system utilized the spent cane (*bagasse*) to fuel a large fire near the smallest copper and carried the heat to the other coppers through a common flue (Galloway 1985; Sloane 1707). This technique quickly spread through the Caribbean beginning in around 1700 due to the lack of wood for fuel that was required in a multiple-furnace system.

After cooling, the syrup was then placed either in a series of hogshead barrels (muscovado sugar), or in a series of earthenware molds (clayed sugar), depending on the desired level of separation (Edwards 1793). As a less intensive process, crystalline sugar placed in hogsheads took only one month for curing and could be shipped directly; clayed sugar cones formed in earthenware molds took four months and needed to be transferred to barrels (Leslie 1740). The additional refinement increased the price that this sugar garnered on the market. At the same time, planters debated as to whether too much sugar was lost in the water dilution in the claying process, such that the “difference in quality does not pay for the difference in quantity” (Edwards 1793:I:228). In the nineteenth century, the British government introduced increased taxes on clayed sugar in order to support refineries at home, and claying sugar became a rare practice in the colonies (Porter 1830).

A profitable spatial arrangement of the sugar estate clearly differed according to a host of variables such as climate cycles, topography of the region and property, soil characteristics, proximity to markets, transportation routes, etc. The planter goals of profit and control could not be achieved without consideration of the estate’s topography and ecological zones, particularly growing conditions for cash crops and sources of processing power. Planters examined the set of

local conditions, including slope, rainfall, soil composition and drainage, as a principal factor in the spatial positioning of fields, pastures, industrial areas, outbuildings and dwellings to capitalize on cultivation and production (Roughley 1823). They sought to locate centers of surveillance, such as the overseer's or manager's house, to maximize observation and policing of the primary areas of manufacture and habitation (Beckford 1790:I; Mintz 1985). The specifics needs of the sugar plant and processing requirements are reviewed in Chapter 4 as a part of the model for plantation organization instituted by estate owners.

Overview of Slave Life on Jamaican Sugar Estates

The following review of historical and archaeological evidence on Jamaican sugar estates highlights the expectations of labor and time in sugar cultivation, life in the estate village, and travel within and beyond the estate. These three components of daily life set the stage for the provisioning and marketing activities that comprised the provision ground system.

Labor extraction through maximization of work hours and division of the workforce was the primary goal of any Jamaican planter. Outside of harvest season, the work day schedule on a sugar estate required slaves to rise early and travel to a designated field, whether cane, guinea grass or other crop. Responding to the sounds of a conch shell or bell, slaves traveled back to the village for the midday meal, and after sunset at the end of the work day (Beckford 1790 Vol. 2:35). Work days out of harvest time often lasted ten hours on average. During crop-time, from the first field under cutting until the last of the juice was boiled, the tasks of harvesting and the processing the cane meant that labor was nearly constant (Ward 1988). Time in the provision grounds was restricted to one half day every two weeks and night shifts were instituted (Edwards 1793:158; see next section).

Composition of an enslaved workforce was based on gangs hierarchically arranged according to skill level, health and age. The first gang consisted of the strongest and healthiest

men and women of the estate who could withstand the pressures of physical labor in the sun and heat (Stewart 1808:230). Dr. Collins, a physician and planter, recommended that the first gang receive additional food allotments and other “indulgencies,” the most rewarding of which was time they could “enjoy to their own use” after the completion of assigned tasks (Collins 1803:178). More common in the rice-based agricultural regimes of South Carolina (Carney 1996), task work also suited sugar cultivation out of crop time or planting season, since a full day’s work was rarely necessary (Dunn 1972). Collins’ remarks also suggest the importance of time to enslaved individuals, more precious than additional food or rum. The second gang was comprised of “less able hands, and boys and girls,” who carried out tasks such as manuring and trashing of canes (Stewart 1808:230). The third gang included children under the age of 12 and adults over 60 who weeded the canes and collected fodder for oxen and mules. Pregnant women were expected to accompany this third gang in their tasks (Collins 1803:157-158).

Slave villages on eighteenth and nineteenth century sugar estates were comprised of several components that shed light on the social dynamics occurring within these spaces. Historic sources differ as to the extent of planned configuration of houses within the village, likely a reflection of the actual variability between Jamaican villages. William Beckford notes that the custom in Jamaica was to build the slave houses “in strait lines, constructed with some degree of uniformity and strength” (Beckford 1790:II:20), an arrangement which allowed “a free circulation of air” and communication between them (Collins 1803:138). Other observers describe the village as a “rustic village” (Stewart 1808:110) in which the houses are “seldom placed with much regard to order” (Edwards 1793:125). At Seville estate, Armstrong and Kelly argue that village depictions on estate plans and the corresponding archaeological evidence indicates the shift from neat orderly rows of houses to a more organic, circular arrangement, possibly African in origin (2000:380-390). Differences in management strategy thus directly influenced the living conditions on each plantation.

Village houses often were surrounded by introduced, intentionally planted fruit trees, and each house included a small garden (Beckford 1790:l:82, 227; Collins 1803:112; Madden 1835:185; Stewart 1808:110). While produce gathered from these areas was not the primary source of food, they represent a critical resource for survival during droughts or after hurricanes. Husbandry of goats, pigs, and chickens also took place within the village space (Stewart 1808:232). In addition, the production of items for market, including baskets, coarse earthenware ceramics and other crafts, occurred within the yard space (Hauser 2008). Houses were typically built to accommodate a single family or small group, rather than the barracks style seen in other sugar plantation contexts such as Cuba (Singleton 2001). These houses, constructed by enslaved people, were primarily post-in-ground with a cut or gathered limestone foundation. Walls were made of wattle and daub, sticks and branches woven together and packed with clay, then covered with plaster and sometimes white-washed (Armstrong 1990; Armstrong and Kelly 2000; Cooper 1824:23; Senior 1835:41; Stewart 1808:231). While some contemporary authors argue against the use of tile or shingles (Collins 1803:146) due to the cost of replacement, there is some archaeological evidence from Drax Hall that one or two houses were covered with slate tiles (Armstrong 1983). However, recent examination of these tiles suggests that they were too heavy to be roofing tiles and are more likely pavers. Most houses were thatched with palm or cane trash (*bagasse*). Floors were hard-packed dirt or wood planks (Edwards 1793:127). Houses often contained a single door to the exterior and two rooms, one for sleeping and one for food preparation and consumption, though most cooking was conducted outside. Archaeological evidence for partitions and interior doors between rooms is present at Drax Hall and Seville (Armstrong 1990; Armstrong and Kelly 2000).

Evidence for the social use of space within the village is primarily related to yard spaces and burial of ancestors beneath gardens and houses. Yard space in the villages was the arena of cooking and leisure activities often beyond view of owners and overseers. The absence of distinct artifact scatters in this area suggests the maintenance of yard spaces through consistent sweeping, also seen in house clusters in colonial Virginia (Bon-Harper 2010). In contrast, cooking

areas contained significant quantities of animal bone and occasional cooking pot or utensil fragments. While many archaeologists have attributed African origins to village yard spaces (e.g., Armstrong and Kelly 2000), direct evidence for correlations beyond a cursory similarity is necessary.

Documented burials of enslaved individuals in the Caribbean include Handler and Lange's (1978) seminal survey of Newtown Plantation in Barbados (also Handler 1989, 1997), as well as burial excavations in Suriname (Khudabux 1999) and Montserrat (Mann et al. 1987; Watters 1987). In addition to the cemeteries in Montserrat and Barbados, recent discovery of burials, observed by the author, within 100 yards of the enslaved laborer village at Papine Estate in St. Andrew suggest that more extensive burial grounds did exist and were close to habitation areas. Archaeological evidence for the burial of individuals in villages is limited to four burials excavated in Seville estate village house-yards, the only internments found in this particular context to date (Armstrong and Fleischman 2003). Historical evidence for burials within Jamaican villages is limited to Stewart (1823) who noted that, in house gardens, "the family deposit their dead, to whose memory they invariably, if they can afford it, erect a rude tomb" (267). Whether this practice was common or infrequent, the presence of these burials in the later village of Seville suggests a greater freedom of cultural expression in the organic village organization (Armstrong and Fleischman 2003), and a dynamic conception of space beyond daily activities.

Beyond the village, enslaved people traveled within the plantation primarily for labor purposes along the roads and intervals between fields. Given their remote position on the plantation landscape, travel to provision ground areas often required walking more than three miles one way. In some cases, the grounds themselves were not adjacent to the estate, as in Banks estate in St. Ann (National Library of Jamaica St. Ann 820). Planter acquisition of these areas, typically designated with the name of the estate and "mountain," was a common practice where hilly land was relatively cheap, and land suitable for cane was concentrated along the coast (Higman 1988). Additional travel may have included resource gathering along beaches and

rivers within the estate boundary. Further analysis of the distances traveled by slaves to these areas on the sample estates is addressed in Chapter 4.

Enslaved people traveled outside the boundaries of the plantation primarily on Sunday, the designated market day. From the earliest slave codes adopted in Jamaica in 1688, slaves were required to carry tickets granting permission to travel beyond these boundaries written by the manager or overseer and denoting date, time and destination. This requirement was one of the reasons that planters strongly argued against educating slaves in any context since it would provide them with the skills to forge travel tickets. It was not until the passage of the Consolidated Slave Act of Jamaica, in March of 1792, that enslaved people were allowed to travel without a ticket on market days. The law states that:

“No slave, such only excepted as are going, with firewood, grass, fruit, provisions, or small stock and other goods, which they may lawfully sell, to market, and returning therefrom, shall hereafter be suffered or permitted to go out of his or her master or owner’s plantation or settlement, or to travel from one town or place to another” (Edwards 1793:II:156, italics denote change from previous statutes).

This shift suggests the frequency of market travel for numerous slaves and the inability for managers or officials to regulate this weekly occurrence.

Several contemporary authors note that the distances traveled ranged from five to ten miles to reach country or parish markets (Cooper 1824:5), and twenty or more to reach large centers such as Kingston, Port Antonio, or Montego Bay (Bickell 1825:204). This particular factor may have limited enslaved people’s access to non-essential goods if large centers were not reachable in a single day’s or even overnight travel. Further archaeological work on interior estates is necessary to test this hypothesis.

Provisioning and Marketing

In this section, I discuss historical evidence for the ways in which slaves were provisioned, provision ground characteristics, and market practices. Slave provisioning in Jamaica primarily took two forms: rationed staples such as corn (maize) meal (or wheat flour) and salt fish (primarily imported from the New England colonies and then Canada following the American Revolution); and the cultivation of basic foodstuffs such as corn, yams, plantains, and potatoes by enslaved people in house gardens and delineated “Negro grounds.” The cost-cutting measure instituted by planters and institutionalized by the colonial government also created an opportunity that slaves exploited to participate in the internal market economy (Mintz and Hall 1960). The internal market system was dependent on the “off time” labor of enslaved people, primarily people laboring in provision ground plots and selling surplus foodstuffs in local markets. This labor provided the avenue by which enslaved people acquired market goods, which they eventually discarded in their villages.

Drawing on previous colonial laws, the Consolidated Slave Act of 1792 stated that “every master, owner, or possessor...shall allot and appoint a sufficient quantity of land for every slave...in order to provide, him, her, or themselves, with sufficient provisions for his, her, or their, maintenance” (Edwards 1793:II:145). An additional clause required planters to set aside “at least one acre of land for every ten negroes...over and above the negro-grounds aforesaid; which lands shall be kept up in a planter-like condition” (II:145). The consolidated act included a new clause related to provision grounds, namely the planter, overseer or manager “shall personally inspect into the condition of such negro-grounds once in every month at the least, in order to see that the same are cultivated and kept up in a proper manner” (II:146). Clearly these prescriptions must be taken with a grain of salt as to whether Jamaican planters followed them. The addition of the new clause to the 1788 laws suggests that little oversight was being carried out to ensure that these areas were of the necessary size or were maintained as explicitly outlined.

There is also evidence that this process of provisioning varied diachronically and regionally. In his account of Jamaica published in 1740, Charles Leslie states that the law was “one Acre of Ground well planted with Provisions for every five Negroes” (233). It is likely with the increase of the enslaved population that the statute changed to allow planters more leeway in providing for their slaves. Regional variability in the presence or size of provisioning areas is exemplified in David Ryden’s (2000) study of a St. Andrew parish survey. This document indicates that planters reserved 68 acres for growing provisions on average, though eight of the twenty-five owners did not indicate that any portion of their property was devoted to food production. This example suggests the degree of differential management practices even at very small scales. Assessing the variability in the ways in which slaves were provisioned, as well as how they provided for themselves, is a central goal of this project.

The process of self-provisioning by enslaved people in allotted “negro ground” spaces was one way in which planters and colonial officials attempted to stave off food shortages that accompanied climactic events and disruptions in trade. With the British loss of the North American colonies, the Jamaican Assembly encouraged more emphasis on this practice, and the metropolitan government drew on its widespread colonial network to transport food-bearing plants to the Caribbean holdings (Sheridan 1976). In this way, the tenuous sustainability of the large Jamaican enslaved workforce, nearly 162,000 people in 1754 (Burnard 2011; Ryden 2009), was a consistent concern for owners and their agents throughout the period of slavery.

On some Jamaican estates, enslaved people were entirely provisioned by their owners with imported goods and local supplies. The 1792 Consolidated Slave Act stated that, if “proper” lands are not available, then the master must “make good and ample provision for all such slaves...equal to the value of two shillings and six-pence currency per week for each slave” (Edwards 1793:II:146). Some planters supplemented their slaves with an additional weekly allowance during times of scarcity. Moreton notes the quantity as “corn or flour, (two or three quarts) and five or six herrings” (1790:150). Beckford recommends thirty barrels of herrings for

every 100 enslaved individuals for one year, what he terms a “generous” supply (1790:207).

Other food-related items distributed by the planter included iron pots, which may have been used as incentives or given to drivers or other slaves with greater status (McDonald 1993:107).

Within small planter-controlled plots, known as plantain walks, slaves were assigned the task of cultivating provisions that were distributed among the entire enslaved population. Often this practice was employed in areas where a majority of the land could be placed under sugarcane cultivation, such as the parish of Vere to the south of Clarendon (Higman 1984). On these drier, southern estates, primarily Guinea corn (sorghum?) or other grains were grown in these areas. Contemporary planter Bickell suggests that this lowland practice was also a function of the inability to grow the typical array of vegetables that comprised a slave’s diet, namely yams or plantains, in areas like Vere (1825:10). In addition, Guinea corn and beans withstood the “poverty of soil and drought” (Stewart 1823:65) on the south side of the island. Whatever the impetus, planters implementing this practice sought to maximize their local resources to produce both a cash crop and basic staples, and avoid reliance on imported foods.

An additional provisioning strategy implemented by planters involves setting aside a separate plot within the negro grounds that supported “pot-gang.” These members of the enslaved community included small children, the infirm, the elderly and newly arrived individuals who took their daily meals from one or two large pots (Collins 1803:93; Senior 1835:57). Overseen by the driver, this plot was cultivated by the newly arrived individuals before the planter granted them a separate piece of ground (Collins 1803:104). It should be noted here that, unlike the agriculture of islands such as Barbados, Jamaican planters argued against the practice of intercropping food crops within sugarcane fields (Moreton 1790). The infrequent practice of rationing local produce does not discount the important role of sugarcane, the distribution of which was a common strategy to maintain the energy levels of laborers and reward their additional labor time during the cane harvest. Rum played a similar role as an incentive for when tasks were completed (Smith 2005).

The primary crops that enslaved laborers grew in ground plots were root vegetables that took the place of the corn and wheat starches in American slavery contexts (Genovese 1976). Jamaican root vegetables indigenous to the island include arrow root, cassava, dasheen (for its leaves), and sweet potato. Arrowroot was grown for its medicinal as well as starch qualities by the Taino (Handler 1971). Root crops introduced by the Spanish include yams (one New World and one African), eddoes, and Irish potatoes. Despite its relatively intensive water and cultivation needs, the yam was by far the most important root crop for enslaved people (Parry 1955:13), due to its natural protection from storms and slow spoilage rate after picking.

The Spanish also introduced several fruit-bearing trees, namely citrus (orange and lemon), banana and plantain. In similar fashion to the yam, plantain became a staple food due to its starch-like quality and ability to grow in difficult terrain. Several indigenous tree crops, including the star apple, guava, and papaw, likely supplemented slave diets in locales with standing forests (Parry 1955:8). While its origins remain vague, the coconut tree was also an integral part of the diet, providing much-needed oils and fats since meat was scarce. In their detailed review of slave diet and deficiency diseases, Kenneth Kiple and Virginia Kiple (1980) note that supplemental foods, grown in gardens and provision grounds, coupled with salted meat and corn rations did provide “most of the basic nutrients” for enslaved individuals (202). Several deficiencies, notably in calcium, fat, vitamin A and thiamine, however, likely contributed to the high frequency of diseases such as dropsy, beriberi, and high infant mortality. Thus, the crops consumed as a result of self-provisioning were crucial to preventing these and other fatal conditions in plantation communities.

In general, enslaved people focused their energy on the staple starches of bananas, plantains, yams, cassava and potato, with occasional plantings of maize and sorghum (Edwards 1793:II:124; Parry 1955, 1962). Starches were commonly prepared in a single pot dish known as pepper-pot, spiced with local ingredients including pimento and Scotch Bonnet peppers (Leslie 1740:322; Stewart 1808 232). Today in Jamaica one can order “ground provision” or “food,” often

as a side dish, which consists of boiled yam, banana and potato. Additional food sources mostly consisted of protein resources acquired through husbandry, market transactions and fishing. It was a common practice for slaves to raise chickens, pigs and goats to supplement their rations of salted fish. Others sold their herring ration in the market in order to purchase salted pork (Stewart 1823:268). The meat and eggs from these animals were often sold by women on market day (Bush 1990; Stewart 1823:99).

The Consolidated Slave Act of 1792 required that slaves should be “allowed one day in every fortnight, to cultivate their own provision grounds, exclusive of Sundays, except during the time of crop” (Edwards 1793:II:158). The total number in the days a year apart from Sundays allotted to enslaved people for provisioning or other activities was twenty six (Bickell 1825:7; Cooper 1824:7). As noted in the previous section, time was a precious commodity in the daily cycles of labor required in the cane fields and the mill yard (Collins 1803). Finding an hour or two during the week to cultivate crops was a difficulty even out of crop time. These restrictions forced enslaved people to divide rare “off-days” between working the grounds and traveling to and from the market. In this way, partnerships such as marriages ensured that one person was tending the crops while another went to market (Bush 1990). Conflicts over additional cultivation time only increased with the abolitionist movement’s attempts to shut down markets held on Sundays.

According to contemporary observers, the land allotted for “Negro grounds” was rocky, uneven, unsuitable for sugarcane, guinea grass or other marketable crops, and geographically peripheral to sugar processing areas. Since a majority of slaves relied upon their own labor to produce the greater part of their caloric intake, they were subject to the same overall environmental pressures as their owners, including soil quality, rainfall, poor weather events and disruptions in trade with other British colonies.

The “sufficient quantity of land” called for in the Consolidated Slave Act of 1792 does not suggest any specifications for the overall area of the provision grounds or the size of the plot assigned to an individual. Planter treatises, often in answer to abolitionist sentiment, suggest that

the “industrious” among the enslaved population could easily cultivate their grounds within the current sugar regime. Whether he or she worked “a few square yards” (Collins 1803:36) or “a rood to an acre” (Senior 1835:41), these authors argue that the time and space to cultivate was only determined by an enslaved person’s initiative. This point is illustrated by Bickell’s assertion that members of the first gang, “upon large estates belonging to wealthy and humane proprietors,” could influence other slaves to work the grounds for them, and thereby produce a larger surplus (1825:11). The general assumption in these treatises is that, on larger estates, slaves had access to a greater acreage of grounds, with the possibility of relocating for “fresh land, every year,” if necessary (Edwards 1793:II:124).

The space of the provision ground also provides evidence for the social dynamics within an enslaved community. Married slaves, or those in other partnerships, could choose to “unite their grounds, and conjointly labour for themselves and families,” affording greater opportunities for surplus cultivation (Bickell 1825:9; see also Moreton 1790:150). Bickell also notes that members of the first gang, “upon large estates belonging to wealthy and humane proprietors,” could persuade other slaves to work the grounds for them, and thereby produce a larger surplus (1825:11). Despite their distance from the cane fields, the provision grounds served as an arena in which slaves negotiated the labor hierarchy and other social relationships.

The customary property rights imbued in the allotment of provision grounds present a unique confluence of owner and slave strategies within the plantation landscape. On the one hand, planters argued that encouraging slaves to invest in their grounds, as well as the village, reduced the possibility of runaways and engendered in the enslaved population a general sense of the benefits of their position. This sentiment is aptly summarized by Bryan Edwards: “The Negro who has acquired by his own labour a property in his master's land, has much to lose; and is therefore less inclined to desert his work” (Edwards 1793:II:124). Beneath this superficial justification for the exploitative requirement that slaves provide their own subsistence lays the contradictory nature of the system itself. Another Jamaican planter, Thomas Roughley, asserts

that the provisioning system assured slaves' attachment "to the property he belongs to," concluding that "the property cannot thrive without him, or he exist without the property" (1823:78). This observation portrays slaves' inextricable ties to the land as a mutually beneficial relationship between two properties, rather than between a man and his land. In this case, a very human aspect of a person's behavior, his desire to invest in the land and provide for his family, becomes construed as a way to perpetuate his status as chattel property, on the same level as oxen or a mule.

At the same time, it is within these provision grounds that the customary property rights were most exercised. Though not recognized by law, these rights guaranteed not only usage of the land and ownership of the produce cultivated therein, but also rights to protection authorized by the planter, to transfer a given area to another slave or family member, and to carry on work unmolested by the surveillance that otherwise governed his every move. William Beckford recommended that owner and overseer should not meddle in this area, noting the "destructive" consequences of the "removal of negroes from their accustomed grounds, from those grounds that have been delivered down from father to son" (1790:II:91-92). Beyond the acknowledgment of a slave's right to occupy and bequeath this land, Barclay (1826) notes that each slave "considers the portion of land he occupies just as much his property, while a slave on the domain, as the cane-field is the property of his master" (261). This assertion is supported by Jamaican overseer Edmund Sharp who testified to the House of Lords that, "as regards his houses and provision grounds, [the slave] sells, exchanges, or wills it to any one upon the same estate, and that without any objection, that I ever heard of, upon the part of the master" (Hume Tracts 1833:59). *De facto* control of provision ground plots was an accepted reality for slaves and owners alike.

Enslaved people's restructuring of plantation spaces undermines static conceptions of planter's exclusive authority over the landscape and of space as a passive backdrop. The idea of property ownership, and its relationship to the planter's ownership of the slave, indicates that the

provision grounds were a unique space in which slaves controlled their time, activities and interactions. For these reasons, this project examines this sense of ownership through the observable production of surplus foods and participation in the internal market economy by enslaved people.

Documentary evidence points to the “circumstances” of slaves as both sellers and consumers in Jamaica and other islands. The markets that enslaved people frequented were primarily those of large port towns along the coast, including Kingston, a burgeoning city during the eighteenth century that served as the center of trade for the island by the turn of the century (Higman 1991; Simmonds 2002). A few inland markets also grew over time, with the former Spanish capital, renamed Spanish Town, being the foremost (Robertson 2008). Given the vast distances between estates and coastal commercial centers, some enslaved people, primarily women, worked as higglers. While higglering was essential to the success of the internal markets, any material signature is difficult to trace since higglers’ weekly set of goods varied considerably. A notable exception is Hauser’s analysis of locally-made coarse earthenwares which were likely distributed by female higglers to plantation villagers (2006, 2008, 2009a). Other enslaved marketers who ran stalls in the market centers sold the produce, animal products, and crafts carried to market by higglers or individuals from estates.

Early attempts by the Jamaican Assembly to curb the market practices of “pedlars” did not succeed, suggesting the difficulty in regulating the informal economy established in the early eighteenth century (Hauser 2008:57-63). Legal restrictions on slave marketing also targeted sellers in terms of produce prices and the types of goods they were allowed to sell. As early as 1659 on Montserrat, planters sought to curb the behavior of slaves on Sunday, not over concern for recognition of the Sabbath, but rather to control the prices of produce and to support white farmers struggling to compete with enslaved marketers (Pulsipher 1990:28). In Jamaica, independent, free merchants and shopkeepers protested the sale of imported goods and

plantation staples by enslaved people (Higman 1984; Marshall 1991). Export staples primarily consisted of sugar, rum, coffee, and pimento.

The Sunday markets in urban centers served as the chief avenue by which slaves acquired cash (McDonald 1993:30; Senior 1835:41; Simmonds 2002:279). While bartering was still prevalent in the eighteenth century, by the nineteenth century payment in cash in exchange for goods was the primary transaction type (Higman 1996:228). Edward Long's now famous assertion that slaves controlled a significant portion of the coin in circulation on the island, however exaggerated, indicates the extent of the market participation of slaves (1774:I:537). Few references to this assertion discuss Long's additional comments on introducing a "small coin" minted in England "accomodated" to the dealings between "Negroes, who supply the market with small stock, and other necessaries" and the "white families supplied from those markets" (1774:I:571). These remarks on the marketing activity of the enslaved was acknowledged and even encouraged to the extent that the mother country should support its continuance.

Evidence of slaves marketing suggests that they primarily purchased goods from Jewish merchants and free people of color in the market centers (Bickell 1825; Reeves 2011). Accounts of slaves as consumers emphasize that they not only supplemented their diet with imported foodstuffs, but also purchased "little necessities or comforts" (Cooper 1824:4; Marshall 1991). The former included any of the following "salt pork and beef, cod fish, butcher's meat, rice, flour, bread, rum..." (Mathison 1811:2). The "comforts" generally consisted of clothing (Barclay 1826:27; Edwards 1793:II:124; McDonald 1993:126-128). Other goods included furniture, crockery, glass (De La Beche 1825), and in some cases "plates and dishes of Queen's or Staffordshire ware" (Edwards 1793:II:127). It is difficult to know how common these investments were for the average enslaved individual on a sugar estate. McDonald argues that individuals did not purchase "more than the bare essentials in household goods" until they had "sufficient food and clothing" (McDonald 1993:104). Planters commenting on the practice of the sale of provisions remark that only the "industrious" among the enslaved community, who worked their grounds

efficiently, profited from their additional labor (Beckford 1790:II:153). Archaeological evidence recovered from slave village contexts suggests that slaves invested in imported goods like “crockeryware” and other articles purchased in markets. One question broached by Reverend Thomas Cooper is why slaves did not spend the money that they acquired on purchasing their own freedom. He responds that those who generate the most money are the most industrious and usually the best hands, and implies that their owners are unwilling to grant their freedom regardless of how much cash they accumulate (Cooper 1824:26). These contradictory lines of evidence are further addressed in Chapter 5.

Social ties between enslaved individuals across plantations were bolstered by weekly visits to the markets, which momentarily released them from the trials of the estate, plantation, and pen.³ While planters and colonial officials may have considered this the most dangerous element to marketing, the opportunity to congregate beyond the plantation boundaries surely contributed to enslaved individuals’ investment in time and labor to produce a surplus and acquire goods in a social setting. In addition to this acquisition that “often gave expression to the autonomy they had wrested from their state of bondage,” the chance to escape the estate and inhabit a space outside the view of the planter and overseer may have also contributed to a feeling of autonomy, however limited.

The parameters that facilitated opportunities to market a surplus are key to understanding the potential variability in access between enslaved communities. As one of the few activities that can be viewed as a “breach in the slave system” (Mintz 1983a:113), the participation by enslaved people within internal market, and more broadly the provision ground system, reflects the transformation of an exploitative expectation of self-provisioning to their advantage. The following chapter explores the landscape attributes, within the planter’s scheme of profit and control that supported the growth of surplus provisions under the customary rights of the enslaved people.

³ In Jamaica, farms which produced cattle for internal sale and basic staples such as corn were often called pens or penns (Higman 1989; 2001). Also see Verene Shepard’s cogent discussion of Jamaica’s cattle economy (2009).

CHAPTER 4: SURPLUS AND SPATIAL ORGANIZATION

Variability in the daily lives of enslaved people on Jamaican estates may derive from the conditions available to them to produce a surplus. Documentary evidence indicates that enslaved people maintained the spaces assigned to them by planters and their agents to produce subsistence and surplus crops. Intersite variation in cultivation conditions, such as the size of the areas available and soil quality within those areas, may suggest differences in the *potential* for surplus production between plantation communities. This chapter explores the landscape organization of Jamaican sugar estates in order to assess the conditions under which enslaved people cultivated provisions within estate boundaries. Rather than simply consulting surveyed plats and contemporary accounts, this analysis delves into the specific attributes of landscapes organized to maximize sugar production, control a large population of enslaved laborers, and provide areas of provisioning for those laborers. Data gleaned from the intersection of historic estate maps and topographic variables suggest that these three requirements did not result in identical organizations. Plantation owners and their agents had to balance the needs of sugar cultivation with the topography and soil types present on their property. In addition, the capacity for sugar production at a given estate, including the number of enslaved workers and the size of the mill and processing buildings, led to differing landuse strategies. In order to evaluate the differences, I develop a set of expectations based on historic and modern criteria; the model of expected conditions provides a systematic framework I employ to analyze my sample data.

I begin by summarizing the relationship between the provision ground system in the British Caribbean and the surplus which enslaved people produced within those grounds according to previous research. This work informs my definition of surplus which I refer to throughout the analysis. In the following section, I outline a model of spatial organization that draws on theories of profit, control, and surplus that archaeologists and historians have developed to define plantation spaces. I refine this model to sugar estates and the provisioning system in Jamaica through the observations of contemporary planters and historians, and

develop the quantified, optimal conditions for four related spatial parameters: suitability, centrality, proximity, and surveillance.

To establish baseline trends in the organization of sugar estates, I adopt Barry W. Higman's approach (1987, 1988) of comparing particular spatial attributes across a sample of sugar estates. This comparison explores the arrangement of designated cane field and provisioning areas on sugar estates of varying size from 1760 to 1834. This brief overview of the trends in landuse schemes as identified on survey plats suggests the factors that may have governed the size and relationship between areas of sugar planting, provisioning, and other marginal spaces. These trends provide necessary contextual evidence for the three in-depth case studies that follow.

I apply the profit/control/surplus model to actual estates through GIS analysis of modern topographic and soils data with historic plat maps of each estate. I assess suitability, centrality, proximity, and surveillance with respect to both sugar and provision cultivation. The results of this comparative analysis suggest that the conditions available for provisioning differed across three estates active during the eighteenth and nineteenth centuries, suggesting potential variability in surplus production.

Previous Research of Provisioning and Surplus in the Caribbean

...so productive is the soil, where it is good and the seasons regular, that this spot will not only furnish him with sufficient food for his own consumption, but an over-plus to carry to market (Stewart 1823:267).

Historic accounts abound with similar references to the cultivation of basic and surplus provisions, often concluding that the only limitations in slaves' production of surplus are the seasonal conditions and their "industry" in maintaining provision grounds (Barclay 1826:69; Collins 1803:72, 139; De La Beche 1825:11; Edwards 1793:II:124). Contemporary observations and the seminal work of Sidney Mintz and Douglas Hall (1960) influenced later examinations of the cultivation of "over-plus" and slaves' fundamental role in the creation of an internal marketing

system on several islands. Studies of provisioning and surplus production address several themes, including plant knowledge and cultivation techniques, the energy expenditure required in cultivation, slaves' customary rights to the land and produce, and the internal variation within enslaved communities based on opportunities to cultivate surplus. These studies inform the concept of surplus referenced in the model of plantation organization that I propose in the following section.

Mintz and Hall's examination of the provision ground and internal marketing systems was the first to identify the fundamental connection between these systems and the opportunities that enslaved people exploited to produce a surplus and dispose of that surplus in their "free time" in market centers (1960). They point to the historic and topographic details of islands across the region that resulted in disparate forms of provisioning from rations to allotted provision grounds, and thereby variation in the size and importance of the internal markets. Their early work on this avenue of potential autonomy among enslaved communities spurred others to investigate the details of these systems and the role they played in defining slaves as a "proto-peasantry" (Mintz 1961; 1983b).

Lydia Pulsipher's surveys of slave gardens and their relationship to modern gardening practices in the lesser Antilles, primarily on Montserrat, suggest that extensive knowledge of food crops, soil preservation, and water collection was passed down through generations in local communities (Berleant-Schiller and Pulsipher 1986; Pulsipher 1986, 1990, 1991; Pulsipher and Goodwin 1999). Tracing common crops and techniques across the Antilles, Berleant-Schiller and Pulsipher's field study of subsistence plots on Barbuda and Montserrat highlights the flexibility of modern gardeners in planting "cash and subsistence crops" (1986:31). Their study suggests that people's decisions about which crops to plant are based on their "education" and the potential for the transport to and sale in the market (1986:21). Pulsipher also notes the historic distinction between crops and techniques in provision grounds, usually located on steep slopes and requiring contour banking of soil, and the house gardens in which daily tending was more

frequent, and conditions were similar to those in the cane fields (1990:30-32; see also Sauer 1954 and Pulsipher 1991). While it is difficult to map cultivators' knowledge in historic case studies, Pulsipher's work indicates the importance of growing conditions including slope and soil fertility to the success of planting, tending, and harvesting food crops.

Woodville Marshall and Roderick McDonald both discuss the considerable energy expenditure required to cultivate provision ground plots and its relationship to the regime of forced labor. Examining historic accounts of provisioning on the Windward islands, Marshall focuses on the time required to walk to the grounds, which decreased labor time in the plots, as well as the "natural constraints" of the land allotted, namely forested and rocky terrain with steep slopes subject to erosion (1991:51-52). These constraints restricted the amount of acreage cultivated as well as which crops slaves selected, and thereby "limited time and energy to optimize returns" (Marshall 1991:54-55, 60). He concludes that the requirements for successful provisioning in addition to the expectations of plantation labor must be considered in inferences about provision cultivation as a form of slaves' expression of humanity (citing Mintz 1974, 1983). McDonald also notes how the grueling labor expectations in the cane fields necessarily decreased both time and energy to cultivate and "enervated both their spirits and their strength" (1993:105). These studies caution that slaves' opportunity to cultivate a surplus must be viewed in the context of the forced labor which was their daily reality.

Access, customary rights, and the control of produce were also crucial elements of surplus production. McDonald draws the distinction between the *de facto* and *de jure* ownership of provisioning land and the profit from sales of surplus. While slaves did not have legal claim to house, land, or produce, the internal marketing system was dependent on planters' tacit recognition of customary rights and the slaves' control over crops and their own personal gains (McDonald 1993:16-28). James Delle also explores the concept of enslaved people's *de facto* economic property, arguing that the dialectic conflict between planter and slave modes of production generated the fundamental shift to the end of slavery (1999:144; 2014). As evidence

of the beginning of this change, Delle also discusses the practice of *petit maroonage* in which slaves established houses beyond the village boundary, close to their fields; this practice was tolerated by planters (see also Fellows and Delle 2015). These discussions of customary rights note the importance of control and decision-making on the part of enslaved people to turn their labor into a surplus for market.

Since slaves often controlled the management of plots, several studies also explore the potential for internal variation within the provision grounds and subsequent differentiation between enslaved households. Citing a published account book of the Old and New Montpelier estates in St. James, Jamaica, McDonald notes the differences in size and condition of the plots as recorded in the document (1993:23). Barry Higman examines the details of this document, including the acreage managed by each household and the crops grown on each plot, concluding that inequality existed between enslaved families (1976; 1998:194-199). Higman's in-depth study of the Montpelier documentary and archaeological record was one of the first attempts to directly link the labor and provision conditions to the materials recovered in village spaces. Matthew Reeves also addressed this connection and internal variability in enslaved communities in his study of two estates, Thetford and Juan de Bolas in St. Thomas. Reeves' analysis of materials recovered from the two villages suggests that enslaved people at Thetford, whose work conditions in the cane fields was more demanding, had less time to invest in subsistence and thereby more limited surplus production (1997, 2011). The potential competition for resources within communities may have influenced the opportunities to produce crops beyond the subsistence level.

More recently, Mark Hauser (2014a) analyzes the concept of surplus in land, labor, and things as part and parcel of the exploitative economic system that characterized sugar and other cash crop production in the eighteenth- and nineteenth-century Caribbean. He argues that the tensions inherent in surplus, including slaves' production of wealth for their owners and themselves, reveal the ways in which institutions "overlap, intersect, and compete" (2014a:50). In

his case study of two sugar estates in Dominica, he suggests that differences in the cultivation knowledge base of newly-arrived slaves (“newcomers”) and long-term residents led to differences in surplus production and variability in the “quality and quantity of goods recovered from [village] house yards” (2014a:62). Following the initial argument of Mintz and Hall (1960), Higman, Delle, Reeves, and Hauser demonstrate the possibility of integrating the documentary and archaeological records to understand variability in the production and sale of surplus.

On the whole, this research suggests several labor and cultivation conditions that facilitated the production of surplus in the form of marketable food crops: daily labor expectations, knowledge of plant needs and farming techniques, control over land and produce, and the conditions of provision plots. My approach to studying these factors is to evaluate a model of spatial organization that considers the planter’s arrangement of the landscape and slaves’ access to suitable provisioning areas within that landscape. Given the previous studies of surplus in plantation contexts, I test the hypothesis that enslaved people with access to a greater amount of provisioning acreage per person, shorter travel distances, and favorable cultivation conditions were able to produce a greater surplus than their counterparts. By developing a set of expectations based on previous studies and historical accounts, I comparatively assess cash crop and provisioning conditions across three Jamaican estates through quantitative, spatial analysis. In this way, I measure the amount of relative variation in these conditions and develop a second set of expectations for the sale of surplus and access to market goods by members of these enslaved communities.

A Model of Plantation Organizations: Profit, Control, and Surplus

As Theresa Singleton (2005, 2014) and others have suggested, examining how planters envisioned and developed the landscape is essential to any understanding of the use of space by enslaved people living and working in those contexts. Previous plantation analyses (Delle 1998,

2014; Epperson 1999; Higman 1988; Orser and Nekola 1985) suggest that planters organized the landscape as a strategy to maintain the tenuous balance between profit and control. Planters organized agricultural, industrial, and domestic spaces to achieve these goals in two primary ways: through the minimization of movement of both laborers and cash crops to processing areas (e.g., Orser and Nekola 1985), and through the surveillance of spaces occupied by enslaved people to maintain control, maximize labor extraction, and reaffirm their owner status (e.g., Epperson 1999; Delle 1998). Arguably, there were also spaces beyond the fields and processing areas, spaces of negotiation between planters and their agents who sought to achieve the goals noted above, and enslaved people who sought to carve out their own places on the landscape. These locations include the enslaved laborer's village or quarter, consisting of houses, gardens, and yard spaces, and uncultivated land to which slaves had access that served as provisioning areas and alternate housing locations. Slaves' maintenance of these spaces suggest the potential for their role in other strategies such as food production, marketing activities, and the reinforcement of social bonds.

I propose a two-part model that incorporates the maintenance of space by planters and enslaved people within the boundaries of an estate. I argue that planters implemented a spatial organization that maximized suitability, proximity, centrality, and visibility between and within areas of the estate to achieve the goals of profit and control. Conformity to or deviation from this organization does not imply that the planters either succeeded or failed, but rather suggests constraints on the choices they made to alter the landscape to fit their needs. For enslaved laborers, the planter-imposed spatial order necessarily restricted both access to and the quality of arable land available to them, and placed their actions under the gaze of the agent or overseer. The four aspects of organization thus also govern the maintenance of space by enslaved people who sought to turn this organization to their own advantage through surplus production. The conditions under which slaves produced this surplus are thereby a function of the centrality of sugar production and processing. Favorable conditions would have facilitated slaves'

conservation of resources and investment in goods from local markets (Higman 1998). The associated material outcomes of this surplus production are examined in the following chapter.

Mapping variability in the observable conditions through an assessment of this model provides a more nuanced understanding of these plantation landscapes. Similar to studies by Delle (2014), Hauser (2014b), and Singleton (2001, 2014), the most promising investigations of contested spaces within organized landscapes are those rooted in the comparison of properties managed by different owners and agents. In-depth dissections of a single location based on historical correspondence and observation clearly provide unique insights into the actions of individual owners. Broadening the scope through comparison, however, positions the choices of these actors not only in the context of the local environment, but also within the colonial and Atlantic World events that influenced sugar production and profit. We cannot understand variability in the responses of planters, agents, and enslaved people to these ecological, social, and economic pressures without first comparing a sample of landscapes.

Beyond a descriptive comparison of estate A to estate B, a substantive analysis of spatial organization must be centered on observable, quantifiable data. In this manner, assumptions about spatial relationships, including proximity between points on the landscape, centralization of buildings and processing, and surveillance by planters or overseers, can be assessed on any given plantation. Only by establishing and comparing quantified values of these attributes can we explore organization within and between plantations.

This chapter includes a systematic evaluation of the profit/control/surplus model with spatial data from three Jamaican sugar estates active during the eighteenth and nineteenth centuries: Drax Hall, Stewart Castle, and Papine. This approach to plantation analysis is useful in two ways. First, as Singleton (2014) suggests, examining how planters envisioned and developed the (built) plantation landscape is essential to any understanding of the use of space by enslaved people within those contexts. On the surface, this may appear to be a structural rather than an agentic approach. By examining the restrictive system under which enslaved people lived and

worked, however, we gain a better understanding of the strategies they employed to modify an exploitative system to their benefit. Second, this type of comparative, quantitatively-based approach, which moves beyond descriptive inferences from estate records, is one way to systematically investigate the spaces that enslaved people and owners occupied. In this way, we avoid the risk of assuming that one instance of a phenomenon reflects the experiences of communities across a parish, an island, or a region. Furthermore, the analytical value of comparison is greatly reduced without contextualization and incorporation of observable data.

The method outlined below draws on published primary documents, archival cartographic materials, and current topographic data pertaining to the sample of three sugar estates. I refine the assumptions of the profit/control/surplus model, as delineated in modern studies, to Jamaican sugar cultivation by extracting a set of optimal parameters from the recommendations of eighteenth- and nineteenth-century planters and travelers. These published observations capture several categories of organization, such as soil conditions, and thus present guidelines for the management of sugar production and observations on cultivation in house gardens and provisioning areas. In their published form, however, they remain descriptive suggestions that are not applicable to any available spatial data. Quantitative estimations of these suggestions are necessary to examine the organizing principles of suitability, centrality, proximity, and visibility on estates that vary temporally and topographically.

Historic Accounts of Sugar and Provision Cultivation Conditions

A review of contemporary eighteenth-century sources allows us to establish the conditions particular to historic sugar cultivation in the British West Indies.⁴ These guidelines

⁴ The conditions proposed by contemporaries are optimal for sugar estates across the British Caribbean for several reasons. First, the physical requirements of sugarcane cultivation are consistent across time and space. Second, the circulation of these tracts and of the ideas therein is apparent through several lines of evidence. Several authors make specific references to previous texts, including those by Sloane (1707) and Edwards (1793), typically with respect to the nature of slavery prior to the abolition of the slave trade in 1807 (e.g., Cooper 1824). Many of

denote the primary spatial concerns of the day to institute an efficient system of sugar cultivation, processing, and control over the enslaved workforce. Since these concerns reflect the planters' motives of profit and control, they provide a baseline for identifying and quantifying specific principles of sugar-estate design. Sources reviewed here include how-to guides for building a sugar estate, travelers' accounts of the islands, and histories of British colonization and governance of the islands. Though my concern here is with eighteenth-century materials, it is important to note that many of these tracts incorporated language and instructions from the traditions established by the earlier planters of Barbados, such as Henry Drax (Thompson 2009), William Belgrove, and others. Their ideas spread through publication (Belgrove 1755) and the movement of planter families from Barbados to other British holdings, such as Jamaica (e.g., Drax family).

The authors of these works suggest several key points for establishing a profitable sugar estate, including landuse divisions and acreage, minimal slope of cultivated land, a centralized mill complex, and the close proximity of the laborers' village. The number of acres to plant in cane and ratoons was a topic of some debate in contemporary accounts. In general, Bryan Edwards's calculated costs of establishing a sugar estate provide some guidance (1793:II). He notes that "on a survey of the general run of the sugar estates in Jamaica," land planted in cane "commonly constitutes one-third of the plantation" (Edwards 1793:II:240). His example is one of the few suggestions for the amount of provision grounds allotted by planters. He suggests that one third of the estate should be "appropriated for pasturage and the cultivation of provisions," though it is likely this land also included communal areas from which produce was distributed to the planter household and the enslaved workforce (Edwards 1793:II:240). For Edwards, one third of the

these authors were prominent figures in exploration (e.g., Sloane) and in colonial discourses about sugar cultivation and investment (e.g., Beckford, Edwards). The topics of efficiency, production, and control were also the subject of debate in colonial newspapers, such as the Kingston Gazette, and at meetings of gentlemen's agricultural societies within the colonies (Stewart 1808). The previous instructions of Barbadian planters, the published form of the reviewed sources, and the movement of planters and agents between the colony and the metropole, all suggest the broad circulation of these ideas within the British West Indian planter class (see also Dunn 1972).

hypothetical estate would be 300 acres, with a workforce of 250 enslaved people (1793:II:241, 245). It remains to be seen whether this suggestion is applicable to the data at hand (see following section).

Recommendations for ideal conditions of sugarcane production abound in the published accounts. Many authors note the type of land suitable for growth. In terms of soil types, contemporary accounts suggest the best soils for cane were “brick clays” (Long 1774) or “brick mold” (Edwards 1793). Rockier soils prone to erosion and water loss often remained tree-covered and uncultivated, and thus were potential areas for provision ground plots. William Beckford recommends the “black mould” soil of the mountains for provisioning crops of plantain, coco, and yam (Beckford:II:258). If this soil is unavailable, any with a “clayey bottom” is sufficient (Beckford:II:259). In terms of slope, Edward Long states that furrows or drains should be implemented to remove “superfluous water” from the sugarcane fields (Long 1774:444). Other authors support this statement, claiming that sugarcane grows best on land with a “level” or “gentle” elevation that allows water to drain and reduces the potential for erosion (Edwards 1793:II:201; Roughley 1823:218; Stewart 1808:106). In contrast, Jamaican planter Thomas Roughley states that hilly land requires more attention from the planter given its “various inequalities,” including a greater potential “to be broken into chasms,” and the loss of high-quality soil due to heavy rain (Roughley 1823:257). The inability of slopes to hold fertilizer was also a concern since many poorer soils required sustained fertilization for the growth of young cane (Long 1774:447; Moreton 1790:44; Stewart 1808:19; see Ormrod 1979 for historic fertilization techniques). Cultivation of hilly fields added stress to the transport of cut canes by oxen-drawn wagons, increasing transport time and requiring frequent repair to roads and intervals (Long 1774:472; Stewart 1808:107). The planter had to implement additional measures if he wished to produce a viable crop in these areas. These steps included combining juice from canes grown on flat and irregular slopes to produce better sugar, as noted by Hans Sloane (1707:I:LXII), or creating areas of level ground through cost-intensive terracing (Long 1774:447). Clearly, the ideal

was flat land that could be planted for multiple seasons and that retained manure without the hazard of soil exhaustion or erosion.

In terms of the works complex, Stewart and Roughley both indicate that the works preferably be located centrally among the cane fields (Stewart 1808:107; Roughley 1823:183). Any loss of crop, in the form of spoilage, due to distance to the mill was the definitive outcome of a poor spatial arrangement. Roughley also suggests that the overseer's house be placed so "that all the works can be seen from it, and not far from the boiling-house" and that other structures, such as stables, not obstruct the view of the works (1823:184–185). Similarly, William Beckford indicates that the "custom" of the plantations was to locate the overseer's house "upon an eminence" in order to overlook the various shops, the "negro-houses," and the works (1790:II:14).

As suggested by Beckford, the location of the laborers' village was central to the organization of labor and control of the workforce. Some observers, such as James Stewart (1808:109), note that slave houses were isolated from other buildings on the estate, often on a slope, or in an "unfrequented valley" (Madden 1835:185). Other authors suggest that the village should not be too far from the works (Edwards 1793:II:125), the owner's house (Collins 1803:137; McNeill 1788:2), or beyond the sight of the overseer (Beckford 1790:II:20). Close proximity of the village and works would minimize travel and thereby decrease overall processing time during harvest and facilitate observation of the nearby village from the works yard (Beckford 1790:II:20). While the size of the works buildings should be proportionate to the estate's output, the centrality of the works complex dictated its situation on the landscape and took precedence over other structures, including the great house. The conflicting requirements of sugar production, namely minimized travel time of the labor force to the works and fields versus the maximization of suitable land for sugar cultivation, presumably led to the relegation of these villages to areas such as those described by Madden.

In terms of village size, few authors note the approximate dimensions or number of houses, but rather suggest a general size given the presence of animal pens, sties, kitchen

gardens, and cooking areas (McDonald 1993:106). In her examination of modern village gardens in Montserrat, Pulsipher notes that these areas tended to be in drier zones with conditions similar to those of the cane fields, but unsuitable for cane agriculture (1990:32). Plants grown here differed from those in the provision grounds and included those that needed daily tending or frequent weeding such as herbs, greens, pulses, and European vegetables. The planting of fruit trees was also a common occurrence around the perimeter or within the village (Beckford 1790:I:82, 227; Stewart 1808:108-109; Stewart 1823:267). Evidence of this practice is discernible on the Papine estate in the standing mango and ackee trees within the village (Figure 4.01).



Figure 4.01 Ackee Trees Near the Aqueduct at Papine Estate, St Andrew. Photo by Author.

Provisioning spaces were essential to the survival of enslaved people and in turn the production of sugar on a yearly basis. To the planters, the system of self-provisioning was “a happy coalition of interests between the master and the slave” (Edwards 1793:II:123). The amount and quality of provisioning land associated with each estate was highly variable. The “sufficient quantity of land” called for in the Consolidated Slave Act of 1792 does not suggest any specifications for the overall area of the provision grounds or the size of the plot assigned to an individual. The extent of this space ranges in the documents from “half an acre,” to “eight to ten acres,” to “as much as he can cultivate” per enslaved individual (Foulks 1833: 107; McNeill 1788:3; Stewart 1823:267). In some cases, contemporary observers noted that “if the owner’s

territory is sufficiently extensive, the Negroes make it a practice to enlarge their own grounds, or exchange them for fresh land, every year" (Edwards 1793:124; see also Senior 1835:41). In terms of acreage, no legal stipulation for the size of allotted provision grounds is recorded. In addition to the grounds already in place, laws did require slaveowners to set aside an additional ten acres (Consolidated Slave Act 1788) and later four acres (Consolidated Slave Act 1816) per 100 slaves for emergency supplies. It is unlikely, however, that slaveowners followed these proscriptions, particularly on established estates (McDonald 1993).

Despite the legal and fundamental necessity of provision grounds, it is clear that Jamaican sugar planters organized the landscape according to the needs of the sugarcane crop and its processing into unrefined sugar and rum. In that sense, from the planter's perspective, growing conditions of the provision grounds and villages were dependent on what was "unsuitable" for cane cultivation. As with any agricultural endeavor, cultivation of basic and surplus produce was dependent on whether "the soil and seasons are favourable" (Stewart 1808:100). Since labor in the provision grounds was in addition to their required workload, the energy that enslaved people expended to cultivate these lands was certainly substantial (Marshall 1991; Mintz 1983). For example, William Beckford observed, "If the land be hilly, it is generally broken by rocks, or encumbered with stones; the first they cannot displace, but the last they gently remove as they proceed in their work, and thus make a bed for the deposit of the plantain-sucker and the coco, or of the corn and yam" (1790:II:155).

In terms of proximity, contemporary observations suggest that slaves potentially traveled several miles to reach provision ground plots, and a more considerable distance to transport surplus food to market (Beckford 1790:II:153; Bickell 1825:204; Cooper 1824:5). Beckford argues that it is an "obvious" advantage to locate the grounds close to the estate to limit the exertions of the "old and infirm" and children in traveling to distant grounds (Beckford 1790:II:153-4). His recommendation points to the practice of locating provision grounds beyond the border of the estate in mountain land. Thomas De La Beche (1825) provides an account of his own sugar

estate, Halse Hall in Clarendon, wherein the slaves cultivated grounds “within five minutes’ walk from their houses” during the luncheon hour, and also land in the “Mocho mountains, about ten miles from the estate’s works” during off-hours (5; 9). Minimizing travel costs during their “off-time” in different locations, the enslaved people living at Halse Hall generated “an immense return,” according to De La Beche (1825:9). While his statements must be understood in the context of a pro-slavery tract during the period of strong abolitionist sentiment, his detailed account does suggest the degree of variety in cultivation strategies within one enslaved community.

While provision cultivation may have been supervised by overseers to deter stealing between individuals or to protect the space of newly arrived slaves (Collins 1803), it was more likely that older male slaves served as watchmen (Higman 1998). In this case, I do not consider the potential direct supervision within the provision grounds as occurring to the same degree employed in the millyard and the fields by planter’s agent and overseers (see Delle 2014 for further discussion of provision ground dynamics). Overall, beneficial conditions in suitability and proximity would increase enslaved people’s opportunity to produce surplus foodstuffs to sell or barter in local markets for their own benefit (Mintz and Hall 1960; Reeves 1997). Poor soil conditions and significant travel distances between village and provision grounds would increase greatly the energy expenditure of individuals in producing surplus crops.

Taken together, the evidence from the contemporary accounts suggests four related attributes of plantation organization. These conditions are: the slope and soil conditions (suitability) of the sugarcane fields and provisioning areas; the centrality of the works complex; the proximity of the slave village to the works and to the provision grounds, as well as the distance to market centers; and the visibility from the planter’s and the overseer’s houses to the works and village.

Quantification of Plantation Organizing Principles

In order to evaluate the profit/control/surplus model with observable data from historic plantations actively producing sugar, each condition suggested by contemporaries must be measured quantitatively. With this approach, the spatial layouts from diverse estates are systematically evaluated using the same criteria and, thereby, comparable beyond a cursory level. It is important to note that the analysis that follows does not take into account all aspects of sugar processing, such as the type of mill, or proximity to transport sites (main roads, wharves, and ports). While these aspects clearly influenced the organization presented in the plats, my analysis is limited to the four organizing principles outlined above.

I define relative suitability by three related attributes: acreage, average slope values, and soil conditions. Following Edwards' hypothetical example, the following section examines the relationship between cane field acreage and provision ground acreage, as well as sugar production and size of enslaved workforce from 33 estates. In terms of slope, contemporary accounts note that "flat" areas of the estate should be planted in sugarcane. Clearly, the difficulty here is to quantify the attribute "flat" by considering the most advantageous growing conditions for sugarcane. While most historic authors cite the contrast between hilly and flat (or gentle) land, or between plain and mountain fields, they clearly did not propose any measurable slope equivalent to "flat." Modern analyses of the most advantageous conditions for current cane cultivation shed light on possible quantifiable aspects of those conditions. From several of these sources, I defined a series of categories of suitability based on slope (Table 4.01; see also Bates 2014). Since cane requires the drainage of surface water and is susceptible to the loss of soil due to erosion, the most suitable areas present a slope of 1°–3°. Lower slope values present only a moderate suitability due to the problem of drainage (Meyer et al. 2011). Land with a 3°–5° slope is more susceptible to erosion (Chartres 1981), requires additional fertilization, and increases transport costs without the use of mechanized equipment. These conditions worsen with any increase in slope, and any land with slope greater than 15° is considered unsuitable for sugarcane cultivation (Chartres 1981).

Slope Category (degrees)	Values Employed in this Analysis
0 - 1	Moderate suitability (Meyer et al. 2011)
1 - 3	High suitability (Chartres 1981; Meyer et al. 2011)
3 - 5	Moderate suitability (Chartres 1981)
5 - 10	Low suitability (Chartres 1981; Meyer et al. 2011)
10 - 15	Limited suitability (Meyer et al. 2011; Pinto et al 2003)
15 - 20	Unsuitable (Chartres 1981)
20 - 25	Unsuitable (Chartres 1981)
Greater than 25	Non-arboreal agriculture unsuitable (Sheng 1972)

Table 4.01 Sugar Cane Suitability according to Slope.

For the estates discussed below, the primary areas of sugarcane cultivation are those with high suitability (1°-3°), and the secondary areas are those with moderate suitability (0°-1° and 3°-5°). Two measures reflect to what extent these two characteristics coincided: the percentage of flat land designated as cane fields and the percentage of cane acreage that was flat. These values also shed light on what we can expect for provisioning areas. If they are proximal to the mill and cane fields, it is likely that village soils shared similar conditions for cane cultivation, though presumably with less than optimal conditions. Marginal areas such as provision grounds are expected to exhibit slopes greater than 5°, conditions unsuitable for cane. In addition, in modern-day Jamaica, any land with a slope greater than 25° is considered unsuitable for any agriculture except fruit or other crop trees (Sheng 1972). While it is difficult to determine exactly where individual provision plots were located for the estates in this sample, I expect that there were few areas with slopes greater than 25° delineated for provisioning. Suitable plots would not exceed 15° to reduce the investment of time and labor in terracing or other erosion control measures.

Soil suitability for cane cultivation and the production of food crops is highly variable according to slope, soil fertility (including pH and water retention), and overall elevation. As noted above, contemporary accounts recommended “brick clays” that retained water and nurtured young cane plants. Cultivation of rockier soils at higher elevations was risky due to limited fertility and erosion potential, and these areas were often reserved for logging and provisioning. In this analysis, I compare soil types based on observations recorded by the University of the West Indies geological survey.

The second attribute requires the investigation of the centrality of the mill, for which several possible analytical avenues are available. To reduce spoilage, sugarcane needed to be transported to the mill soon after it was cut. Thus a centralized mill would minimize transport time during the synchronized processes of harvest and production (Mintz 1985). To measure mill centrality, Higman (1987:25) employed a ratio of the distance from the mill to the nearest property boundary to the distance from the mill to the farthest property boundary. Here the ideal value would be 1.0, wherein the mill was equidistant from both boundaries (Higman 1987:27). Given that the primary concern of the placement of the mill was central to the cane fields themselves, an additional, alternative way in which to measure centrality involves distance to the farthest fields. In this approach, I identify multiple concentric areas that signify distance from the mill complex and compare them with the location of the cane fields to estimate the amount of cane acreage within each distance category. Building on Higman’s measure, this form of calculation approximates a planter’s concerns about the placement of the mill to process the crop efficiently.

Under the third organizing principle, proximity refers to the relative position of the village, works, and provision grounds on the landscape. Many contemporary authors indicated that the village should be “close” to the works. Given the difficulty in quantifying this proximity, evaluation of this condition requires comparison to values from other estates. Higman’s study (1987) provides average distances for Jamaican sugar estates in ten-year time blocks beginning in 1760. This data is useful to compare a particular distance to the average for a range of time periods. A

related goal of a village close to the works was observation of the mill complex and the village from the overseer's house and the owner's or manager's house. Estimation of this variable requires the use of an ArcGIS spatial analyst tool (viewshed) that determines visibility of the landscape from a given observer point. This tool provides a visual summary of the intervisibility among plantation elements and thereby reflects opportunities for surveillance from the overseer's and the owner's houses.

Distances to potential provisioning areas from the village is also considered as a factor in the energy expended by slaves in surplus cultivation. These values are compared to data in the larger estate sample, where information on the grounds is available. In addition, rather than only measuring overland distance, I also approximate the distance that enslaved laborers traveled along roads and intervals between agricultural fields. This measurement more accurately reflects the relationship between the placement of the village and travel time.

By systematically examining spatial data related to these four attributes, I determine whether the organizations of three Jamaican sugar estates conform to the profit/control/surplus model. In this model, optimal conditions for the maximization of sugarcane production relegated provisioning areas to the margins of the estate. As a result, enslaved laborers faced less than ideal conditions for cultivating a surplus. I examine these conditions on a relative basis between three of the estates introduced in the following section: Drax Hall, Papine, and Stewart Castle. This approach to plantation spatial organization facilitates systematic comparison of suitability, centrality, proximity, and surveillance.

Comparative Analysis of Sugar Estate Landuse

Identifying patterns in the relationship between provisioning land and the overall organization of a sugar plantation landscape requires in-depth analysis of spatial data at

the estate level. To establish a baseline for spatial attribute comparison between Jamaican sugar estates active during 1750 to 1838, I examine the acreage and landuse divisions of 33 estates across the island. Data for this analysis is drawn from surveyed plats that depict the boundaries, fields, and buildings present on each estate at the time of the survey. Each plat includes a legend with acreage values for each land-use type on the estate. In his extensive catalog and analysis of Jamaican estate maps, Higman (1988:78) emphasizes that plats of this kind were primarily utilitarian in that surveyors were hired by planters or attorneys to provide an “accuracy of representation and measurement” regarding the owner’s holdings. Planters required precise calculation of the acreage of sugar or other crops, since that acreage influenced their estimates of total yield for the year, the level of productivity they could expect, and the costs of planting and harvesting particular fields (Higman 1988). A plat of named and numbered fields was consequently beneficial to the manager and overseer to efficiently monitor the progress of cane growth within each sector. In addition, the usage of these surveys in legal disputes over boundaries, trespasses, land patents, and transfers required reliable representations of distances, acreage, and position of elements (Delle 2014; Senior 1835).

I examine landuse divisions according to the acreage planted in cane and acreage allotted for provisioning as a function of the total size of the estate. Tracing the relationship between these spatial attributes, the size of the enslaved workforce, and the production of sugar/rum is key to understanding the potential pressures on enslaved people to produce a surplus. For example, was provisioning acreage correlated with estate size or enslaved population size? It is also possible that estates located inland on more mountainous terrain contained a greater amount of provision grounds on average

than coastal plain estates. In addition, many historians have argued that the size of provision grounds increased over time due to two factors: large estate owners' consolidation of smaller properties and acquisition of uncultivated land in the interior; and the colonial government's emphasis on self-sufficiency during war time while closing ports to American foodstuffs (Sheridan 1976, 1985; Marshall 1991; Barickman 1994). Finally, differences in management practices despite similarities in location and topography also resulted in the variability in the presence or size of provisioning areas. David Ryden's (2000) study of a St. Andrew parish survey indicates that planters reserved 68 acres for growing provisions on average, though eight of the twenty-five owners did not indicate that any portion of their property was devoted to food production. I examine several of these variables below with respect to provisioning acreage.

In addition to the data gleaned from the 33 survey plats, I incorporate data from Barry Higman's (1987) spatial analysis of Jamaican sugar estates, some of which may contain data from the plats which I studied. It is difficult to discern the exact overlap, however, since Higman concatenates his data by ten year intervals beginning in 1750. I also incorporate provision ground information from Old Montpelier and New Montpelier in St. James parish, compiled by Higman in his intensive study of the Montpelier estates (1998). Since there is virtually no extant comparable data, I do not address the individual variation in household plots evident at Montpelier (McDonald 1993:Appendices 1, 2, 3).

In analyzing the plats, three notable obstacles occur in identifying any relationships between the size of provision grounds and other landuse components such as village size, cane acreage, or overall estate size. First, as noted in Chapter 3, some of the surveyed plats include only small areas identified solely as "Negro Grounds" or "Provision Grounds." These estates also include areas recorded variously as

“Woodland,” “Ruinate,” or “Rocky Mountain Land.” Based on the association of these other landuse identifiers with provisioning on many of the estate maps, it is possible that these spaces were open to enslaved people for the cultivation of surplus crops. To account for this potentiality, I have included an additional category of “marginal.” In the estate sample, I include woodland and rocky mountain land in the category of marginal; I do not include areas only marked ruinate since these were likely reclaimed as pasture or even cane land at a later point. In most cases, marginal areas would require a greater amount of energy expenditure for the same return since they would not have been cleared to the same extent as identified provision grounds.

The second obstacle is the potential existence of areas beyond the boundaries of the primary estate, often known as “mountains,” that may have been alternate locations of provision cultivation for smaller estates. Higman discusses this practice based on the fact that many of the “mountains” share the same name as nearby estates (1988:261-276). In my research, I have found similar evidence for Banks estate (Figure 4.02), Llandovery, and Flat Point estates in St. Ann. There is no evidence that the owners controlled additional land beyond the boundaries outlined in the plats for the three estates examined in the next section. For the other estates referred to in this section, it is not known whether additional provisioning areas existed beyond the borders apart from Banks and Llandovery.

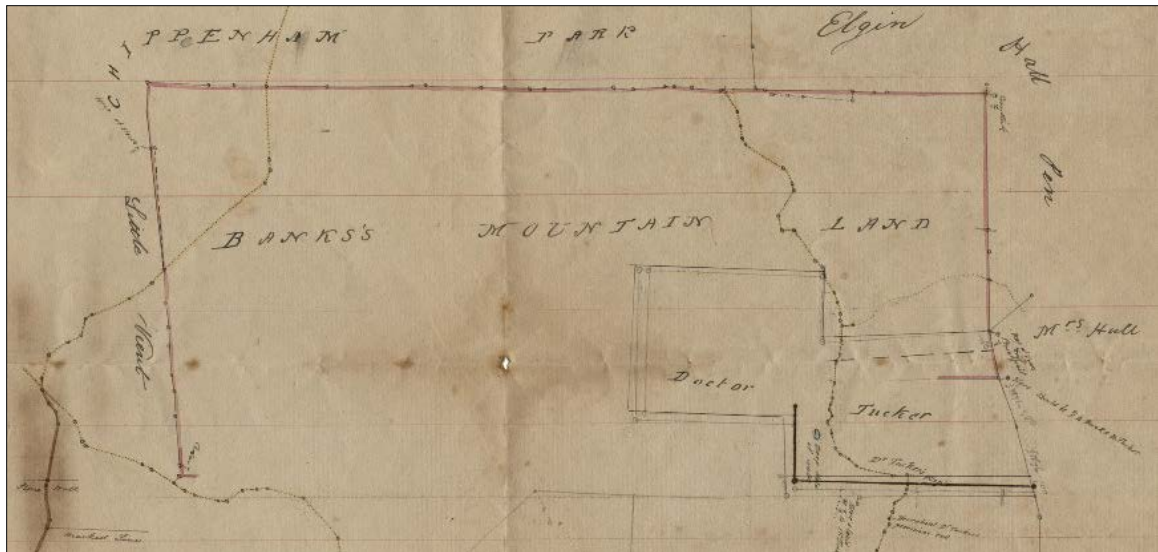


Figure 4.02 Banks Mountain Land, Trelawny, Jamaica (National Library of Jamaica #820).

Finally, the presence of auxiliary areas of food crop production such as those called for in the Consolidated Slave Acts are not marked on any of the plats in this sample. As noted previously, after 1792, owners were required to set aside up to ten acres of land “for every hundred negroes, over and above the negroes’ grounds and plantain walks,” which was “intended as a resource against famine or scarcity, in case of a hurricane” (Stewart 1808:100). It is possible that these additional lands were merely incorporated into areas marked negro grounds or mountain land.

Estate Data

The total acreage of the 33 estates ranges from 413 to 2340, with an average of 1217 acres, and cane acreage ranging from 263 to 586 acres, with an average of 314 acres. Higman’s study suggested that cultivated areas were to some degree a function of the total area available, with the percentage of land use in cane relatively constant around 25% of total acreage (1987:32). I predict a linear relationship between these two variables with total acreage (explanatory variable) as a predictor of cane acreage (response variable). I use the log of the original acreage values as a more robust way to portray the shape of the distribution and thereby the relationship between the variables; the percent difference between data points is approximated by the log

function (Hamilton 2014). In this case, the amount of variation in cane acreage that is explained by the fitted regression line is .2197, or about 22% of the sample's variance, by using information about total acreage to predict cane acreage, with a p-value of .003. This result suggests a weak correlation that is distinguishable from random chance, but most of the variation in cane acreage is not due to total acreage (Figure 4.03).

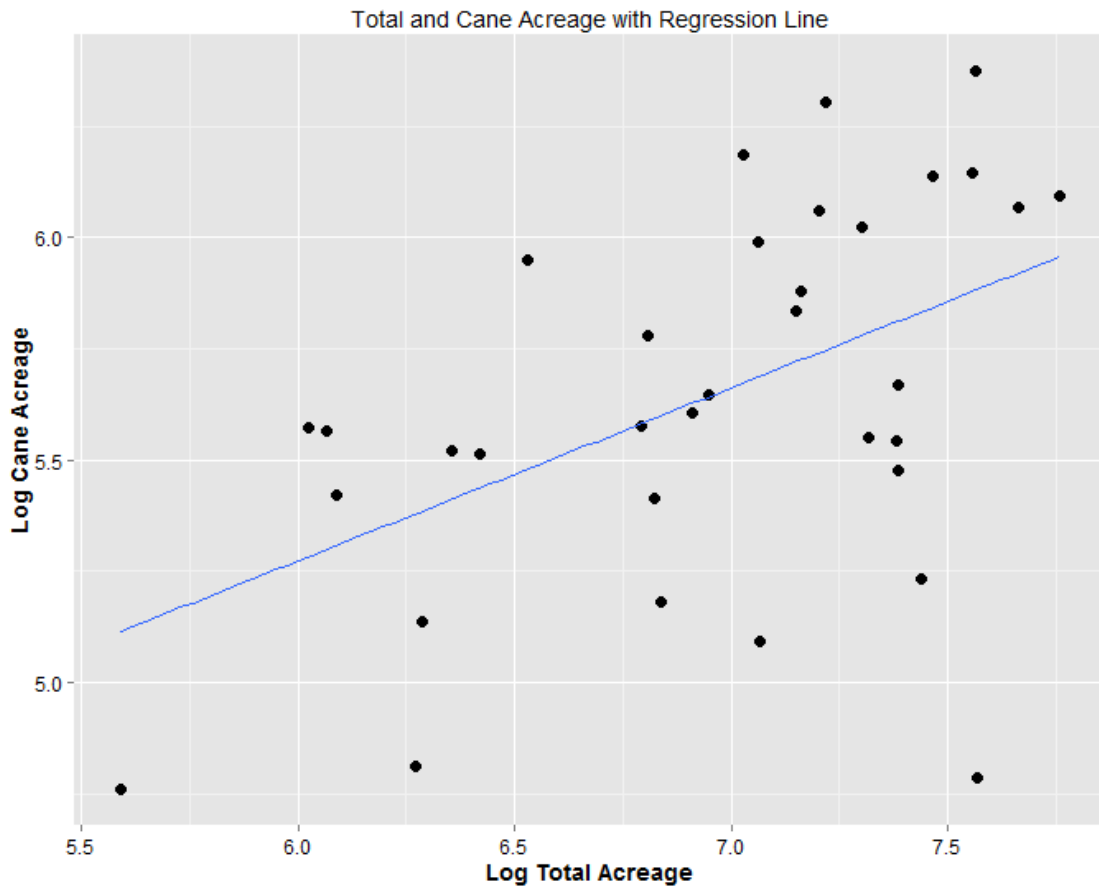


Figure 4.03 XY Scatter Plot of Cane Acreage and Total Acreage, $R^2=0.2197$, $p=0.003$.

A majority of the plats examined here are the only detailed surveys that exist for the given estates, making diachronic analysis of landscape change difficult. Given this limitation, I use the date of surveyed plat as proxy for time. This assumption obviously carries the caveat that change occurred on any given estate before or after the survey date. Seven of the plats in this sample were undated, and therefore removed from this test. In this case, I predict a linear relationship

with year of the plat as a predictor of cane acreage, with an expectation that cane acreage decreased over time with continuing pressures on owners to reduce production with falling sugar prices. The result of the regression analysis indicate little to no relationship between date of plat and cane acreage ($R^2 = 0.04745$). This result must be considered in light of the small sample size and potential regional variation rather than taken as definitive evidence of no relationship between cane acreage and time.

Five of the estate maps do not list any areas as “Negro Grounds,” suggesting an absence of allotted plots on the estate and the possible use of other marginal land. On two of these estates, Belmont in Trelawny and Banks in St. Ann, modern place names suggest that there may have been nearby “mountains” noted above for these estates. I removed these two estates from this regression analysis since I do not have data on those potential provisioning areas. In addition, one estate has identified woodland on the map, but no acreage provided in the legend or within the area on the plat. As noted above, the frequent inclusion of provision grounds with woodland and mountain land suggests they may have been available to slaves for cultivation. In this sample, I consider areas marked woodland and mountain land as marginal locations for provisioning, particularly for estate maps where no “Negro Grounds” were identified. Given this concatenation, I created a new acreage category of “Marginal” to include both identified provision grounds and other marginal areas. The R^2 value for total acreage as a predictor of marginal acreage is .4898, with a p-value of nearly 0, suggesting a moderately positive linear relationship between these two variables such that an increase in total acreage resulted in an increase in potential provisioning acreage (Appendix 1: Figure A1.01). Larger estates typically encompass a more diverse ecological landscape and thereby contained more areas unsuitable for cane cultivation. It is possible that enslaved people living on larger estates in Jamaica may have had access to a greater amount of marginal land even if the allocated provision grounds were small.

For those estates with provision grounds explicitly identified, the R^2 value is .2897, with p-value of .0018, suggesting a moderate positive relationship between provision grounds and total

acreage (Figure 4.04). The first output plot clearly suggests that a majority of the identified provision grounds fall below 200 acres despite the overall size of the estate property. In this sample of 29 estates, 72.4 percent contained grounds of less than 200 acres. This evidence suggests that allotted or sanctioned plots may not have correlated with the total acreage. In addition, the relationship between designated provision grounds and cane fields is a very weak negative correlation ($R^2 = -0.03628$), such that cane acreage is not considered a predictor of provision ground acreage (p-value = 0.817).

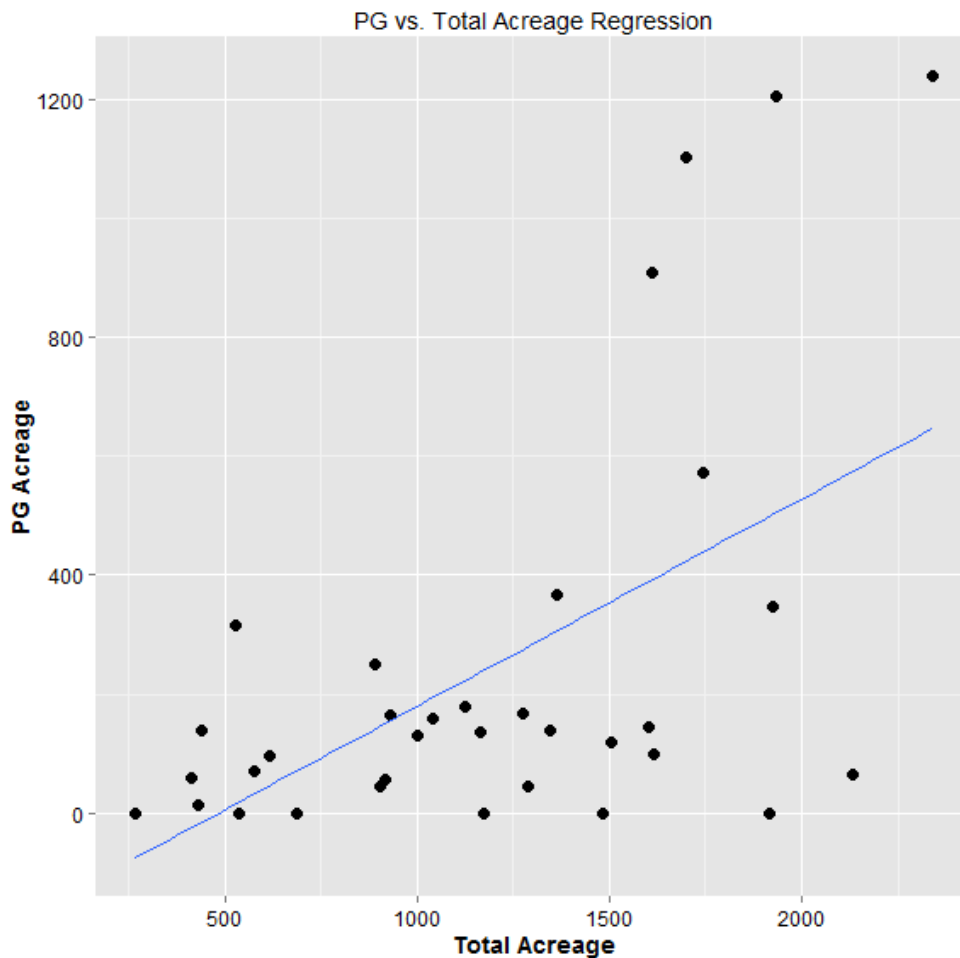


Figure 4.04 XY Scatter Plot of Identified Provision Grounds and Total Acreage ($R^2=0.2897$, $p=0.0018$).

An intriguing sample within this set of estates with identified provision grounds is the group of small sugar estates in the parish of Vere (now Clarendon) that contain identified “Negro

grounds.” Higman in his extensive survey of slavery in the British Caribbean noted that no provision grounds existed in Vere (1984). Cartographic evidence ($n = 6$) suggests that on Vere estates three areas were most likely utilized as provision acreage: plantain walk; Guinea corn; and Negro grounds. Of the six estates reviewed, three contained plantain walks, all less than four acres. The other three estates contained Guinea corn acreage ranging from 8.1 to 21.5 percent of the total estate acreage. The presence of sizable portions of the estate dedicated to Guinea corn cultivation suggests that these owners may have been producing for an internal market or distribution to their other land/estates elsewhere on the island. Five of the six estates include areas marked “Negro grounds,” encompassing up to ten percent of the total estate acreage. Interestingly, with a plat dated 1787, the one estate without provision grounds, Amity Hall, contained the smallest acreage (685 acres) by nearly 180 acres. This evidence indicates that even within the arguably distinct region of the dry, southern coastal plains, the provisioning of enslaved people was primarily a function of their own labor within their grounds, a pattern similar to other parts of the island. In turn, it suggests that topography (flat coastal plain) and climate were not necessarily the determining factors in the presence of acreage devoted to Negro grounds.

Since the delineated grounds fall below 200 acres for many of the estates despite variability in total size and cane field acreage, it is possible that this value correlates with a non-spatial factor such as the size of the enslaved workforce. While this acreage is not the only land available to enslaved people for provision cultivation, I investigate the identified provision grounds as depicted on the surveyed plats to understand the configuration of these presumably sanctioned places of cultivation in the planter’s landscape.

For thirteen estates, I obtained total enslaved populations for three years: 1810, 1817, and 1835. The 1810 and 1835 data is based on published yearly Jamaica Almanacs. These almanacs contain location, ownership, acreage, and population data for a majority of the estates in operation during a given year. The 1817 population data was gleaned from the Returns of the

Slave Registration. This registration was a mandated recording of all slave populations on the island that began in 1817 after the passage of an Act by the Jamaican House of Assembly in 1816 (Higman 1976:45). This survey was implemented in each British colony in three year increments, with 1832 being the final survey year. I further refine the population data for two estates, Papine and Drax Hall, in order to find a population figure closer to the plat's survey data. In the case of Papine, the date of the plat is 1834; I assume that this plat represents the estate's organization prior to the apprenticeship program which was instituted in that year through 1838. For this reason, I take the data from the 1832 slave registry that lists the total population as 134 individuals (the population total from the 1835 Almanac is 142). For Drax Hall, the population information from a 1779 slave list was transcribed and summarized by Armstrong (1990:36); this date is much closer to the date of the plat (1765), and the list was recorded under the possession of William Beckford who owned the property in 1765.

To trace a possible relationship between provision grounds and the enslaved population, I test the hypothesis that enslaved population size is a predictor of the allotted provision grounds. Though the sample with population information and identified grounds is admittedly small ($n=12$), there is a weak positive relationship ($R^2 = .1745$) between these factors, with a p-value slightly greater than .05 (p-value = .0982). This regression suggests that the 17.5 percent of the variation in identified provision ground acreage is explained by using enslaved population size as a predictor (Appendix 1: Figure A.02). In summary, the variation in provision ground size does not correlate with sugar cane acreage or enslaved population, but is more likely a function of total estate size, though that regression only explains 30 percent of the variation in the larger sample of 29 estates.

In their analysis of the Old and New Montpelier account books, Higman (1976, 1998) and McDonald (1993) address the size of provision grounds and gardens per household. At Old Montpelier in 1825, 310.2 acres were allotted to 400 individuals in 135 households (McDonald 1993:Appendix 3). This data indicates an approximate provision ground acreage per household of

2.34 acres and per individual of 0.738 acres. In addition, Higman discusses another Old Montpelier account book which records 36 households who cultivated 102 separately listed provision ground plots, with an average of 2.83 plots per household (1998:195). At New Montpelier, 157 acres were allotted to 320 individuals in 94 households (McDonald 1993:Appendix 3). This data indicates a decrease in provision ground acreage per household to 1.75 acres and per individual to 0.491 acres.

Unfortunately, this kind of detailed provision ground data is rare in the documentary record. Given this fact, I incorporate total population size to discuss the acreage available to enslaved people on the estates in my sample. While the total population size may include individuals unable to work their own plots, such as children, the infirm, the elderly, and newly arrived slaves, the available data on the composition of enslaved populations is such that the total number of individuals must be considered as the counting unit rather than household or families. Given this fact, I rely on acreages divided by the total population size as measure of the identified and potential acreage available to enslaved people on the estates.

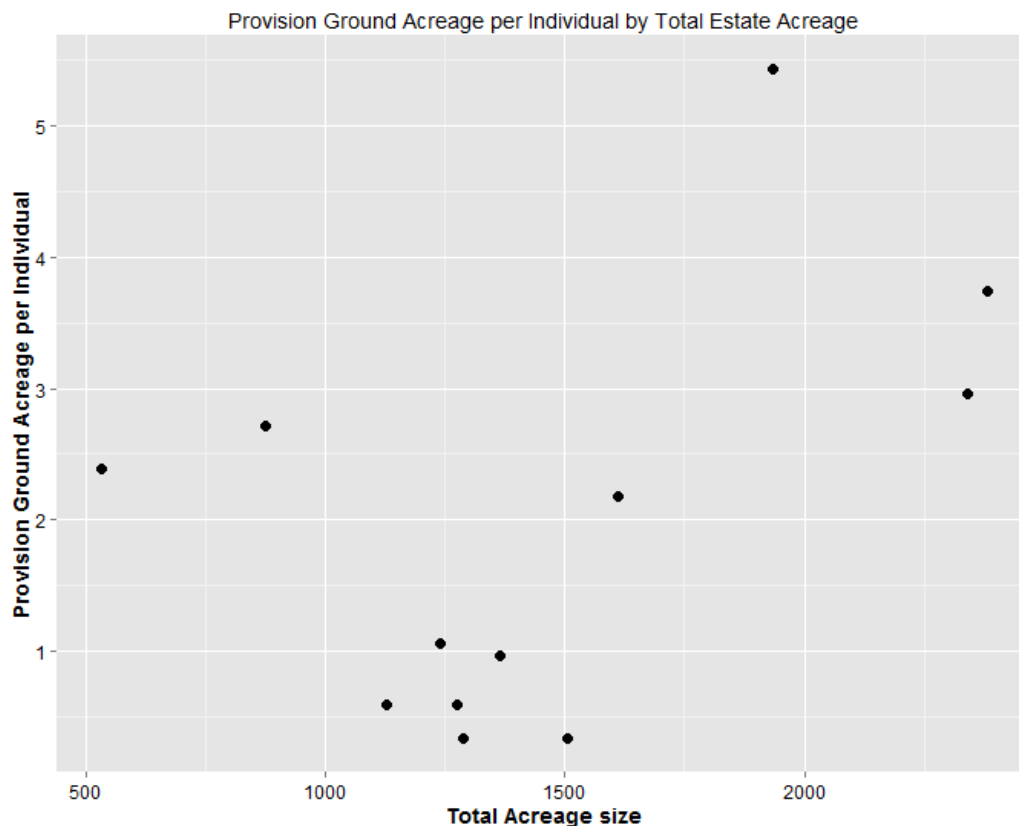


Figure 4.05 XY Scatter Plot of Provision Ground Acreage per Enslaved Individual by Total Acreage.

In comparing acreage per individual against the total size of the estate (n=12), we see a cluster of estates that fall between 100 and 1500 total acres with an average provision ground acreage per person of less than one acre (Figure 4.05). Surprisingly, the two estates with smaller total acreage contain a greater amount of identified provision grounds than the 1000 - 1500 acre estates. The higher average values for estates larger than 1500 total acres are expected as a function of the amount of land unsuitable for cane cultivation, though we saw no correlation between total estate size and expected provision ground acreage. Though the sample size is small, the frequency of provision grounds of less than 200 acres and the average acreage per person of less than one acre suggests that this set of values may have been common on many estates. In addition, a weak negative correlation exists between the date of the plat and the

provision ground acreage per individual (Appendix 1: Figure A1.03), similar to the decrease in the Old and New Montpelier data.

To include all of potential acreage available to enslaved people on these estates, I consider the marginal acreage per individual. The Montpelier account book suggests that households tended several plots, which presumably were not contiguous. In the Old Montpelier sample, these plots ranged from 0.25 to 2.5 acres, with primary crops including plantains, cocos, yams, and corn (1998:194-195). In most cases, Higman notes that there were less pieces (or plots) than people in a household in 57 percent of the households, and 29 percent of the households maintained one piece per person. Taken together, this evidence suggests that slave families or groups may have maintained several plots with different concentrations of food crops and in various stages of “order,” according to planter standards. This evidence is supported by Pulsipher’s study of slave gardens and provisioning areas on Montserrat and other islands in the Lesser Antilles (Pulsipher 1990; 1991). The maximization of the most beneficial cultivation conditions for each crop type likely led to the distribution of plots across areas to which enslaved people had access. In my sample, two clusters of values are discernible in the comparison of marginal acreage per person and total estate size, both displaying a positive linear relationship (Figure 4.06). No discernible similarities exist between the data points within the two groups other than comparable marginal acreage per individual. Overall, these data reflect an increase in marginal acreage per individual with an increase in estate size. In conjunction with the positive linear relationship between marginal and total acreage, the marginal per individual averages suggest that enslaved people living on larger estates had greater access to arable cultivation plots.

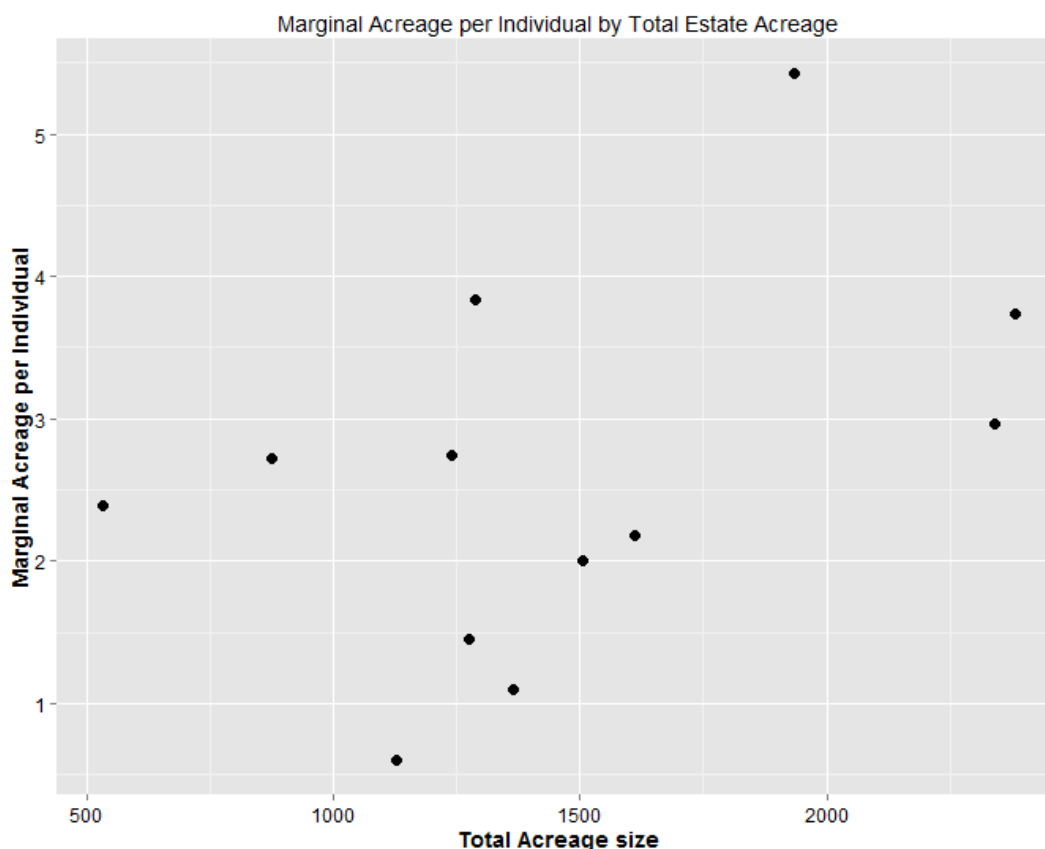


Figure 4.06 XY Scatter Plot of Marginal Acreage per Individual and Total Acreage Size.

In addition to the provisioning acreage available to individuals, another factor that likely influenced enslaved people's production of surplus was the expectation of output production from cane cultivation. I examine production of sugar and rum for the year of the plat with respect to the known cane field acreage. In a similar fashion to David Ryden's St. Andrew study (2000), I then consider the number of enslaved individuals working on that estate to understand the pressures placed on these people to produce a given output. While there are numerous environmental conditions (e.g., rainfall, weather, transport distance) and accidental conditions (e.g., loss of skilled laborers, supply interruptions) that impacted sugar and rum production, I argue that an analysis of even a small sample of estate data suggests the range of labor expectations present at individual estates.

Accounts Produce (AP) by year and estate contain the data for this comparison. Law required that the owner, agent, or attorney for an estate submit yearly accounts of goods sold and services rendered for which earnings were received. For the sugar estates, a vast majority of the income derived from the sale of sugar and rum. Additional revenue was earned through the sale of cattle, pimento, logwood, corn, and other perishables. Early accounts, generally prior to 1780, in the AP include the amount in Jamaican pounds and pounds sterling received for shipments of sugar and rum, primarily to England, as well as within the colony. In my sample, I referred to the AP record for a given estate closest to the date of the estate's plat. In most cases, the closest record was no more than five years later than the plat date. I modified the year associated with the estate to reflect the produce record date rather than the plat date for this comparison.

The first test of this relationship suggests that Hall's Delight estate was a significant outlier given its limited cane fields and subsequent output. After removing this data point, the cane acreage is, not surprisingly, a good predictor of sugar output in hogsheads, with a R^2 value of .526 and a p-values less than .05 (Appendix 1: Figure A1.04). Following Higman's (1984) and Ryden's (2000) comments on productivity and the optimal size of the labor force, respectively, I also tested whether enslaved population size was a predictor of sugar output in hogsheads. While this is a small sample ($n=13$), the plot suggests a positive linear relationship (Figure 4.07). However, the clustering in this output plot indicates two thresholds for production: estates with less than 150 slaves typically produced less than 150 hogsheads, while estates with more than 250 slaves produced more than 200 hogsheads, with two outliers. The absence of data points from 150 to 250 slaves suggests two scales of production. Though many factors clearly contributed to whether a sugar estate produced an optimal output, including some of the spatial parameters addressed in the next section, this data supports arguments that one important component was the number of laborers available during harvest.

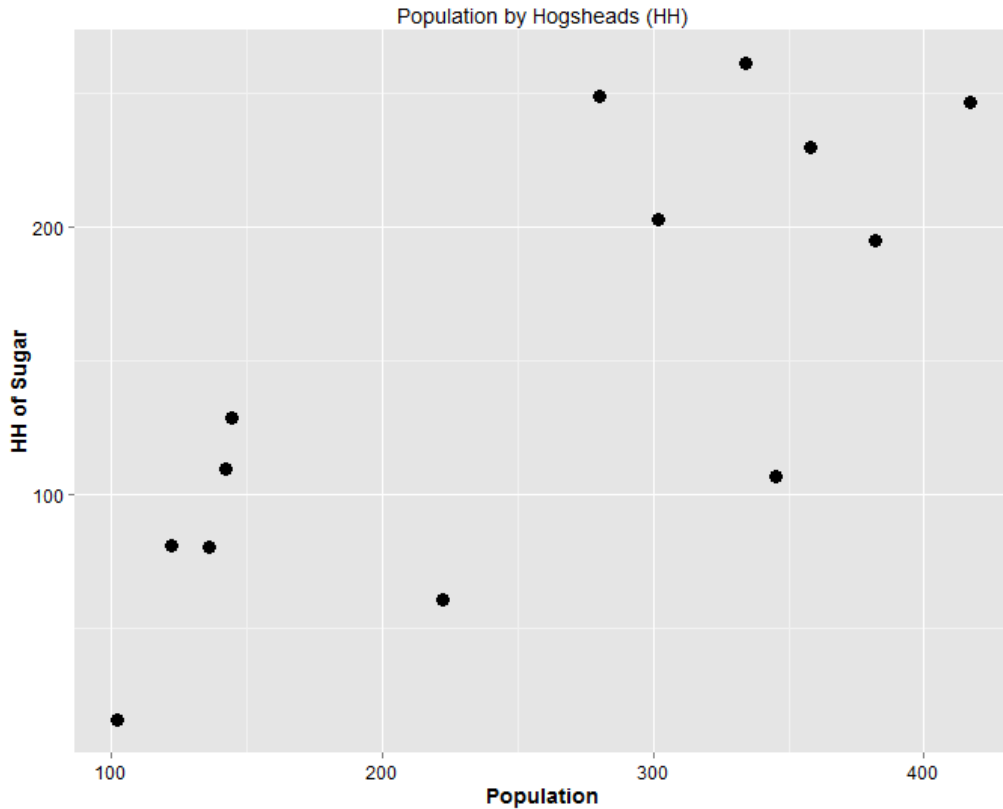


Figure 4.07 XY Scatter Plot of Enslaved Population by Sugar Output in Hogsheads.

The data reviewed here clarify several of the expectations of the profit/control/surplus model. First, unexpectedly, there is only a weak positive correlation between cane acreage and total acreage, suggesting that landuse organization varied considerably across estates for reasons other than estate size. Second, the amount of allotted provision grounds typically falls below 200 acres regardless of total estate size, while the amount of marginal land to which slaves may have had access predictably increases with total acreage. Third, for enslaved individuals, life on larger estates was beneficial in terms of provisioning acreage per person, despite expectations for greater sugar production and the potential increased competition for resources within the community.

Estate Map Data

In the context of conclusions about landuse on Jamaican sugar estates, this section evaluates the profit/control/surplus model with spatial and environmental evidence from three sugar estates active during the eighteenth and nineteenth centuries: Drax Hall, Stewart Castle, and Papine (Figure 4.08). An additional site, Seville estate, is discussed at the end of this chapter. I analyze the parameters of suitability, proximity, centrality, and surveillance by employing various GIS techniques in the ArcGIS program. Assessment of favorable provisioning conditions in light of planters' maximization of profit and control requires quantified estimates of each attribute. This approach is based on the integration of historic survey plat data and modern sources on topography and soils.



Figure 4.08 Jamaican Sugar Estates Examined in the Spatial and Archaeological Analyses.

GIS Methodology

Within the broad category of landscape studies in archaeology, archaeologists have successfully utilized Geographic Information Systems (GIS) applications to address questions about spatial organization, catchment/resource analysis and accumulated travel costs

(Aldenderfer and Maschner 1996; Allen et al. 1990; Crumley and Marquardt 1987; Kvamme 1989, 1999; Llobera 1996; Wheatley 1995; Wheatley and Gillings 2002). GIS-based methods provide powerful analytical tools for the evaluation of spatial variables on historic landscapes. The application of GIS techniques in plantation landscape studies continues to increase (Armstrong et al. 2009; Harmon et al. 2006; Hopkins et al. 2011; Reid 2008; Randle 2011). Additional tools within ESRI's ArcGIS and other programs facilitate an analysis of spatial data from the Jamaican sugar estates.

To evaluate the optimal conditions outlined in the previous section, I analyzed the three estate maps using tools available in MicroStation and ArcGIS software packages. In order to systematically measure slope and other components of the estates based on the maps, it was necessary to properly scale and orient them to the actual landscapes they represent. Georeferencing techniques greatly facilitated this process such that the estate boundaries accurately encompassed the appropriate geographic space. In addition, modern 2D topographic images also were oriented based on their coordinate projection system to ensure vertical and horizontal accuracy. Information on these maps was digitized for integration with the spatial analysis tools available, including georeference of the plat and calculation of digital elevation maps that serve as the basis for slope and visibility calculations. Integration of modern topographic data with the land use and other data present in the oriented maps provides a more comprehensive picture of the historic plantation landscapes.

Brief Estate Histories

The three estates analyzed below are Drax Hall in St. Ann, Stewart Castle in Trelawny, and Papine Estate in St Andrew. I selected these estates for two primary reasons: each has a detailed, dated plat map with legend; and an associated archaeological assemblage from the slave village. These spatial and material components facilitate analysis of the provision ground system from its "beginning" in the cultivation of surplus food crops and its "end" in the discard of costly goods acquired in nearby markets. In addition, as examined below, these estates offer

different landuse schemes, processing types, and topographic profiles that influenced the conditions of cultivation within the provisioning areas to which enslaved people had access. Based on these differences, I examine variation in advantageous conditions for surplus production between the three estates.

Drax Hall, one of the earliest sugar estates established on the north coast of the island, was settled in the 1690s by William Drax, a relative of eminent Barbadian sugar planter Henry Drax (Armstrong 1990:24). The estate remained in the Drax and Barrett families until it was purchased by absentee owner William Beckford in 1762 (Armstrong 1990:27). In the following landscape analysis, I primarily draw on the estate map drawn from a survey by George Wilson conducted in 1752, though a large vignette at the bottom is dated 1765 (Figure 4.09 National Library of Jamaica (NLJ) St Ann #1275). In addition, there are three other maps of the estate, all undated. Two similar maps contain outlines of the cane fields and depict the works buildings, overseer's house, and slave village (NLJ St Ann #71 and St Ann #679). The remainder of the estate, most notably the woodland and provision grounds of the 1765 plat, are not extant. No other information is present apart from cane field names and acreage information. It is possible that these drawings are related to the shift at Drax Hall from a wind-powered to a water-powered mill. Based on the style and coloring, the third map is an early nineteenth century depiction of Drax Hall (NLJ St. Ann #97). While it is possible that this map is a later copy of an earlier map, the acreage of the individual fields and the locations of the buildings differs from the two undated maps and the 1765 Beckford map. As noted below, this later map does provide useful evidence for understanding landscape organization at Drax Hall.



Figure 4.09 Drax Hall Estate, NLJ St Ann #1275.

Most of the information available on the history of Stewart Castle is provided by family documents located in the National Library of Jamaica in Kingston. Stephen Panning detailed the history of the estate and conducted a survey of its extant buildings in the 1990s (Panning 1995, 1996). Stewart Castle estate was established by James Stewart in 1754. His son was forced to mortgage the estate in 1797, though he later reclaimed possession of the property, under the management of Robert Shedden and Sons, in 1810. It is possible that this James Stewart is the same one who authored *An Account of Jamaica and Its Inhabitants* published in an edited form in 1823. Surveyed by Munro, Stevenson and Innes, the Stewart Castle plat is dated 1799 and is identified at that time as the property of “the honorable James Stewart esquire” (Figure 4.10, NLJ Trelawny #235). It is the only extant depiction of the estate that includes more than an outline of the property. An additional document portraying the Stewart Castle landscape is a painting by J. B. Kidd detailing the works complex and the Castle itself. This image clearly shows the cattle mill

that crushed the cane from the surrounding fields, as well as the other sugar processing buildings and the roads that crossed the estate. The Stewart house was a fortified structure surrounded by a masonry wall topped with broken wine bottles. While most Jamaican great houses were open to the island breezes, the Stewarts chose to secure their house from possible raids by maroons or their own slaves. The castle complex includes two defensive towers on the house itself, a cellar and water tank for daily and emergency use, and, in most cases, slits in the high castle walls instead of windows (Panning 1995:202).



Figure 4.10 Stewart Castle Estate, NLJ Trelawny #235.

Representative of the smaller, coastal plain estates along the South coast, Papine estate was established in the 1750s by Alexander Grant, a Scotsman who inherited the property as a penn or cattle farm (Yates 1955). In the late eighteenth century, it was owned by J.B. Wildman (Francis-Brown 2004, 2005). It was Wildman's manager that Lady Mary Nugent met when she

toured the estate in October of 1801 (Wright 1966). The Papine aqueduct, which diverted water from the Hope River and powered the sugar mill, was a shared venture between three neighboring planters, and to this day it supplies the city of Kingston with water. The plat is dated 1834, the year of *de jure* Emancipation in Jamaica (Figure 4.11, NLJ St Andrew #1135). Another image of the Papine estate depicts the jointly owned aqueduct's relationship to the Papine "Negroe Grounds," the "Negro Houses and Gardens," and the Papine works, as well as the neighboring Mona Estate works (NLJ St Andrew #616). Two additional figures on the map depict the division of the water that flowed from a main gutter operated by the neighboring Hope Estate. This undated plan may be of an earlier date than the 1834 plat. A majority of the other images are boundary lines or larger scale depictions of estates in the surrounding area such as Hall's Delight and Hope estate.



Figure 4.11 Papine Estate, NLJ St Andrew #1135.

Table 4.02 denotes the essential information for each estate according to the plats noted above. With respect to the baseline values discussed in the previous section, Drax Hall is a

significant outlier in total acreage and contained the greatest amount of marginal acreage in the 33 map sample. Of the three estates analyzed here, Drax Hall is by far the largest estate in land and number of slaves, though its cane field acreage only exceeds Stewart Castle's fields by approximately 50 acres. On the other hand, Stewart Castle's cane acreage, at nearly 50 percent of the total acreage, exceeds the average percentage of 28.8 in the larger sample. Papine estate reflects the trend of smaller estates that were established early in the period of exponential estate growth during the early to mid-eighteenth century near the coast (Ryden 2000). Though Papine's

Estates (Date of Plat)	Total Acreage	Cane Acreage and Percent Total	Production of Sugar and Rum (Date of Entry)	Number of Enslaved Laborers
Drax Hall (1765)	3400.00	533.91 (15.7%)	254.5 HH sugar, 133.3 puncheons rum (1763-80) ⁵	334 ⁶
Stewart Castle (1799)	1106.16	486.64 (43.9%)	166 HH sugar; 140 puncheons rum (1814) ⁷	258 ⁸
Papine (1834)	1288.39	357.17 (27.7%)	45 HH sugar; 12 puncheons rum (1832) ⁹	134 ⁹

Table 4.02 Summary of Estate Data.

total cane acreage is only 130 acres less than Stewart Castle, its sugar production is one third less than Stewart, and its rum production is far less. This relatively limited production was likely a function of the diminishing returns on sugar exports by the 1830s. At its peak production in 1801, Papine shipped 207 hogsheads of sugar to England and sold 83 puncheons of rum to merchants in Kingston. While it is unlikely that the acreage under cultivation diminished over time, the 1832

⁵ Drax Hall Accounts Produce (average) recorded in Armstrong 1990.

⁶ Drax Hall slave list of 1779 transcribed in Armstrong 1990.

⁷ Accounts Produce (1B/11/4), National Archives, Spanish Town, Jamaica.

⁸ Slave Registry of 1817 (1B/11/7), National Archives, Spanish Town, Jamaica

⁹ Jamaica Almanac 1835. The 1829 and 1832 registries for Papine estate also denote a considerable removal of slaves from the estate to other properties owned by James Beckford Wildman, including Salt Savannah and Low Ground in Clarendon parish (1B/11/7 Jamaica National Archives; Francis-Brown 2005).

records are consistent with the other estate records. The number of cane acres cultivated at Papine was sixty acres more than the other St Andrew estates in the larger sample.

To evaluate the profit/control/surplus model outlined in the previous section, I examine the quantified optimal conditions present at these three estates for sugarcane and provision cultivation: suitability, centrality, proximity, and surveillance.

Cane Suitability

The cane acreage distributions for the three estates reflect fairly distinct landuse schemes. At Drax Hall, less than twenty percent of the total estate area was planted in cane, likely a function of the limited area of advantageous conditions along the coastal plain discussed below. The total cane acreage, however, exceeds the other two estates, and reflects the third highest amount in the larger sample. The Stewarts utilized the available land to cover nearly half of it in sugar cane. At Papine, the percent acreage in cane is much closer to the average for estates in the larger sample. As shown in the previous section, these basic differences suggest that factors other than estate size governed cash crop planting and the division of the landscape.

To deduce the degree of cane suitability between these three estates I examine two related parameters: slope values and soil conditions. The expectation given in the profit/control/surplus model is that areas with “gentle” slopes, good drainage, and clay soils were maximized for cane cultivation. Modern data suggests that suitable slope values for sugarcane cultivation fall into three main categories, the total range of which is 0 to 5 degrees. Suitability for cane greatly decreases from 5 to 25 degrees, with only limited arboreal agriculture on slopes greater than 25 degrees. As an estimation of contemporaries’ suggestion to locate cane fields in “gentle” slopes, I examine two aspects of slope: the percentage of suitable land (slope of 1 to 3 degrees) that is planted in cane; and the percentage of cane acreage located within suitable areas.

To calculate these values, I began by creating a raster of slope values from the digital elevation map of each estate. I reclassified these slope values to correspond to a single value to represent each suitability category (1=high suitability, 2=moderate suitability, 3=low suitability, 4=limited suitability, 5=unsuitable). I then combined the reclassified slope map with the locations of the cane fields. Percentage of the cane acreage in each category was thus estimated at the level of the original slope value, approximately ten foot square pixels.

	High Suitability	Moderate Suitability	Low Suitability
Drax Hall	45.7	21.4	3.3
Stewart Castle	56.5	45.4	36.3
Papine	36.6	40.6	13.9

Table 4.03 Percentage of Each Suitability Category Planted in Cane.

Comparison between the three estates reveals relatively similar utilization of the high suitability land, though the percentages are lower than expected given that cane was the primary cash crop (Table 4.03). With Drax Hall and Stewart Castle, we see greater than 45 percent of the suitable land is planted in cane, suggesting a high degree of maximization. However, the Drax Hall values in the moderate and low categories indicate an avoidance of these less than suitable areas. Stewart Castle values suggest the necessity of exploiting all three categories for cultivation. The Papine data indicate a similar pattern with moderately favorable areas planted in cane. Further contextualization of these data comes in the estimation of the cane acreage which falls into each category (Table 4.04). For Drax Hall, despite the utilization of high suitability land for cane, most of the cane acreage actually falls in the moderate category. This result is likely a function of the lower slope values that present drainage problems in the coastal plain; the Papine values also follow this pattern, with similar drainage and erosion concerns. These values also support the inference that Stewart Castle cane was distributed amongst the three categories. In

general, the data suggest that the highly and moderately suitable areas were maximized for cane cultivation, and a majority of the cane was grown in moderate areas.

	High Suitability	Moderate Suitability	Low Suitability
Drax Hall	29.4	68.0	9.1
Stewart Castle	28.3	29.3	26.3
Papine	37.6	53.3	4.0

Table 4.04 Percentage of Cane Acreage Located in Each Suitability Category.

	Lowest Field Slope Value	Highest Field Slope Value	Average Slope per Field
Drax Hall	0.53	2.49	1.35
Stewart Castle	1.26	11.1	5.64
Papine	0.75	2.44	1.14

Table 4.05 Cane Acreage Slope (degrees).

These lower than expected values for maximum suitability are likely the result of two factors: secondary crops such as guinea grass also require gentle slopes for optimal cultivation; and the areas identified as highly suitable are not necessarily contiguous and therefore difficult to exploit. Individual field data also provide evidence for the planters' maximization of suitable areas. It is clear that the amount of contiguous suitable land was more restricted than its simple occurrence on the landscape. The average slope for each cane field reveals an additional level of optimization, in which the average slope value of the Drax Hall and Papine cane fields fall into the high suitability slope category (Table 4.05). Despite this limitation, the overall scarcity of land with more than minimal suitability on the property indicates that the owners of all three estates capitalized on the available resources to cultivate cane.

Beginning in the 1950s, soil profiles for Jamaica were compiled by the Department of Soil Science at the University of the West Indies, St Augustine. Each published volume outlines the geology, soils, and agriculture present in each Jamaican parish. While some denouement of the soil in these areas was likely caused by continuous agriculture over the past 350 years, the locations of the main soil types remain roughly similar.

For the Drax Hall cane fields, a majority of the acreage is located in the alluvial coastal plain and is composed of Nonsuch clay, which is characterized by a high natural fertility with slow drainage through the soil and a slight erosion hazard (Barker 1968). According to the soil report for the parish of St Ann, this soil type is rated highly suitable for sugar cane and pasture, and suitable for food crops and food trees. However, nearly 36 percent of Drax Hall's fields, reflecting 191 acres, are located in Killancholy clay, which is only "suitable" for cane; due to erosion concerns, the soil report authors suggest that no further agriculture should be practiced in this soil type. Stewart Castle cane fields are generally comprised of three soils characteristic of the limestone uplands: Bonny Gate stony loam, Lucky Hill clay loam, and St Ann clay loam (Figure 4.12). More than 50% of the fields are a combination of all three of these soils. Only the Lucky Hill clay loam is rated in modern recommendations as highly suitable for cane cultivation; Bonny Gate and St Ann loams are unsuitable for cane, even with favorable slope conditions. The Papine cane field soils are dominated by Maverly loam which formed over old alluvia (Liguanea Plain). This shallow alkaline soil has very slight erosion potential and moderate drainage in most areas. According to the modern report, Maverly loam without irrigation is only suitable for pasture and food trees. With irrigation, however, this soil is suitable for cane and food crops and highly suitable for bananas and vegetables. Of the available land within the Papine boundaries, this soil type is the most beneficial to sugarcane cultivation.

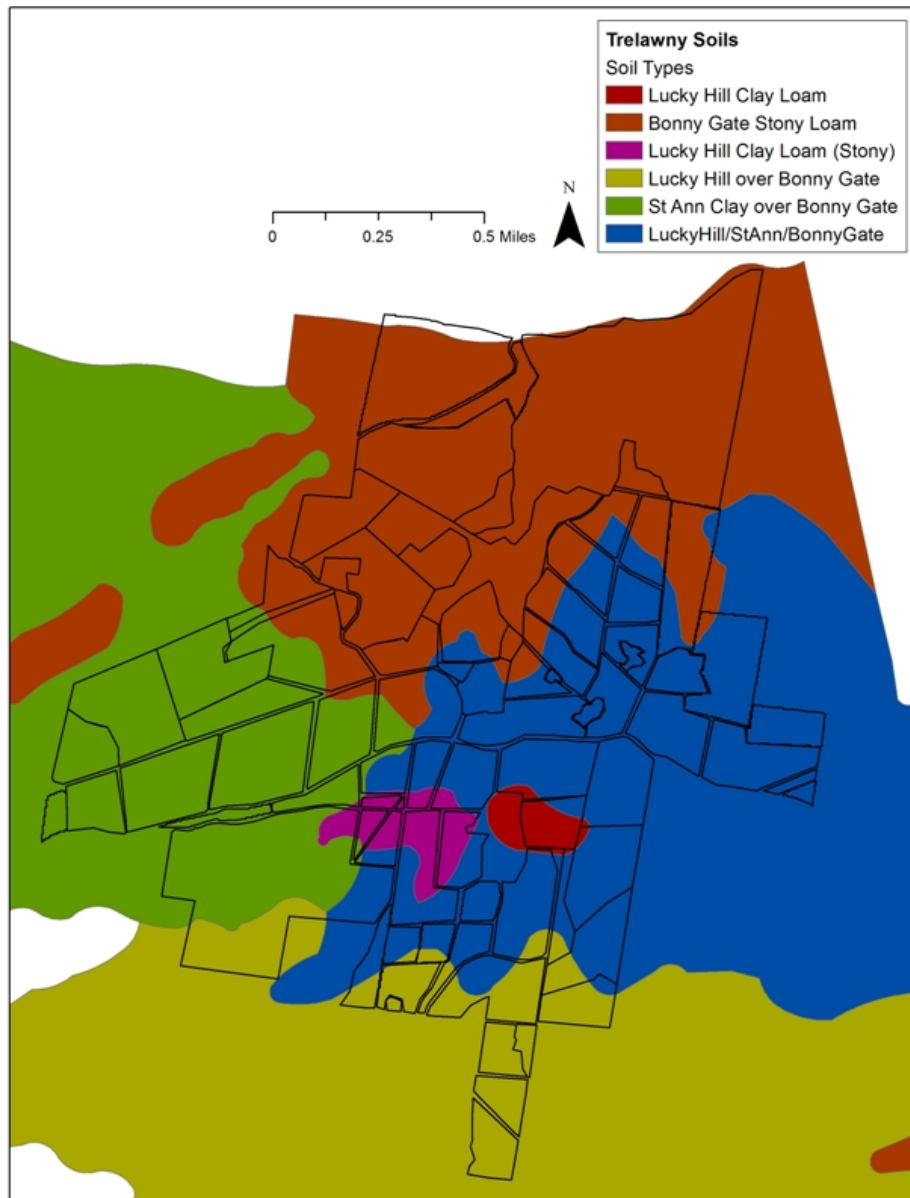


Figure 4.12 Soil Types within the Boundaries of Stewart Castle Estate, Trelawny.

Taken together, the soils data suggest that the areas encompassed within the Papine and Drax Hall contained a higher potential to produce a viable cane crop than Stewart Castle. Only the Drax Hall fields reflect contemporary observers' emphasis on the optimal soil conditions of "brick clay" (Roughley 1823). With investments for either drainage or irrigation, the Drax Hall and Papine soils are highly suitable for cane. While the Stewart Castle profile is difficult to discern in

terms of the amount of the more suitable Lucky Hill clay loam, the exploitation of this area of the estate, in conjunction with the slope data, suggests an intentional selection of the best land for cane. For all three estates, the cane suitability values arguably meet the expectations for a profitable organization given the available topography and soil conditions.

Provisioning Suitability

Beneficial conditions for the production of surplus food crops in provisioning areas are necessarily difficult to estimate. Under the profit/control/surplus model, I suggest that favorable conditions are those that do not require further investment of time and labor such as terracing or need for additional water. Soil profiles are expected to be rocky and less fertile given the intensity of cane cultivation on the best land demonstrated above. I begin by outlining the village space as an additional location of limited farming. I then examine the slope and soils of the allotted provision grounds and the marginal areas that may have been open to provisioning to estimate relative conditions for surplus production.

Table 4.06 includes the available information on the size of the slave village areas according to the three plats used in this analysis. Clearly these values must be viewed in the context of the houses, swept yards, and cooking areas that likely dominated the available space. First, the Drax Hall location is likely a smaller area than was actually occupied by enslaved people. I calculated, based on the location of houses drawn in the village on the later nineteenth century map (#97), an approximate village area of 43.54 acres. While this value is clearly not exact, it represents a conservative estimate of the available acreage. Second, at Stewart Castle, the opposite problem is encountered; it is likely that the 48.25 acres were not all available to the laborers since the area is denoted as “Negro house & Guiney grass.” In this case, the houses drawn on the plat suggest an area closer to 35 acres. Finally, the Papine village was estimated based on its location within the larger “works” area. Archaeological survey evidence discussed in the following chapter indicates that the village fully occupied the space included in the survey plat, and possibly an area adjacent to the sugar processing buildings. The total area is approximately

27 acres in size. The relative difference in acreages generally corresponds to the differences in the number of enslaved people living on each estate. That being the case, it is unlikely that all individuals listed for the estates lived in the village boundaries. For example, it is possible that the 334 individuals at Drax Hall included domestic workers who lived near the great house, and temporary housing may have been constructed in the marginal areas (Delle 2014).

Estate	Village Acreage	Provision Grounds Acreage	Additional Potential Acreage	Slope of All Marginal (non-village) Areas (degrees)	Standard Deviation of Slope of All Marginal (non-village) Areas	Marginal Acreage per Individual
Drax Hall	8.5 (plat) 43.54 (calculated)	9.25	1237.6	11.3	4.5	3.84
Stewart Castle	48.25 (plat)	180.0	180.0	17.4	6.2	0.88
Papine	26.84 (calculated)	45.0	514.5	5.9	3.9	3.71

Table 4.06 Summary of Acreage and Slope Data Related to Provisioning at the Three Estates.

Evidence from the previous section indicates that enslaved people living on larger estates like Drax Hall and Stewart Castle may have had access to a greater amount of marginal land even if the allocated provision grounds were small. In most cases, larger estates encompassed a more diverse ecological landscape with significant areas unsuited to cane. Additional evidence is needed to suggest that these areas were open to provision cultivation. Two additional maps of Drax Hall indicate that provision ground areas existed on other parts of the estate, namely wooded areas to the south in the limestone hills (NLJ St Ann 97 and Jamaica Records Office CO 441/4/11). These later surveys also depict the nine acres of “Negro grounds” on the 1765 plat as cane fields. The marginal areas available thus vastly increase the provisioning potential for enslaved people at Drax. Both “woodland” areas at Stewart Castle are also denoted as “Negro grounds.” Even with this additional acreage, the proportion of total provisioning acreage at

Stewart Castle falls well below the other estates. The Papine plat also notes “Woodland and Negro ground” areas near the woodlands; the inclusion of the latter sections increases the acreage more than 11 times. Additional cartographic evidence indicates that Papine slaves had access to an area to the northeast of the village along the aqueduct. Finally, the modern topographic map of St. Andrew indicates that the far northeastern corner of the estate includes part of the Dallas Mountains; this particular area is noted as “Papine Mountain” (National Land Agency, Topographic Sheet 105d).

In terms of acreage available per individual enslaved person, the difference of Stewart Castle is even further pronounced, with 0.88 acres per individual at Stewart Castle compared to 3.71 acres at Papine and 3.84 acres at Drax Hall. In the larger sample ($n=12$), a majority of the marginal acreage per enslaved individual values fall below four acres and above one acre. This suggests a considerable disadvantage for enslaved people at Stewart Castle to produce more than basic subsistence crops.

As Mintz and Price argue, one of the primary conditions of provision grounds was their unsuitability for sugar cane cultivation. Historic accounts written by planters and observers alike emphasized avoidance of “rocky” hills for cash crop cultivation. For the three estates, the provisioning areas are dominated by these unfavorable conditions, with some variation. The typical crops grown in these areas primarily include corn, yams, potatoes, cassava, eddoes, as well as several varieties of beans, plantains, and bananas (Parry 1955, 1962). Clearly the requirements for each of these crops differed; the benefits of mixed cultivation supported the retention of nutrients and water in cleared plots (Berleant-Schiller and Pulsipher 1986). I review the slope and soil data for provisioning areas based on modern recommendations for agriculture.

The slope data presented here suggests relatively difficult conditions for soil preservation, certainly in the case of cane cultivation. The soil reports note that in general these slopes are suitable for cultivation with strong limitations given the potential for erosion and limited soil fertility. As Table 4.07 indicates, Bonny Gate Stony Loam is the primary or underlying soil type in the

provisioning areas of all three estates. This stony loam consists of a thin mantle present over white limestone and, when located on steeper slopes of greater than 10°, it is characterized by rapid drainage, limited fertility, and is suitable only for forest and food trees. Given the steepness and variability of the provisioning areas, these soil types limit the locations in which annual agriculture could be sustainable. The slope and soils data suggest significant limitations of fertility within the provisioning areas to which enslaved people had access.

Estate	Marginal Areas Majority Soil Type	Marginal Areas Soil Fertility*; Recommended Agriculture
Drax Hall	Killancholy clay over Bonny Gate stony loam	Moderate due to erosion; Pasture, vegetables, food trees
Stewart Castle	Bonny Gate stony loam	Limited due to erosion; Pasture, food trees
Papine	St Ann clay loam over Bonny Gate stony loam	Moderate due to erosion and aridity; Coffee, food trees

Table 4.07 Soil Types in a Majority of Provisioning Acreage.

*At the given slope values noted in text.

The particular conditions within each estate's marginal areas refine these findings. At Drax Hall, there are small sections of the marginal areas that contain areas of less than 15° slope consisting of Carron Hall Clay soils that are suitable for food crops, vegetables, and food trees with moderate limitations (Barker 1986:17-19). It is possible that enslaved people traveling from the village could exploit these more beneficial areas within the vast Drax Hall woodlands. At the same time, the energy expended in travel through the wooded hills to these locations must also be considered. For Stewart Castle, few opportunities were available beyond the thin soils of Bonny Gate stony loam. Enslaved people at Papine had access to Cuffy Gully gravelly sandy loam in the mountain land, which was suitable for bananas, food crops, and food trees, though at the slope gradient there is a moderate risk of erosion.

Overall, the provision ground growing conditions were generally dominated by soil types unsuitable for ground provisions, bananas, or vegetables, and only suitable for food trees. Clearly it would have been difficult to cultivate food crops under the conditions of limited water retention, erodibility, and shallowness. In most cases, the dominant slope range of this soil type is over 10°. This data suggests that the production of more than basic foodstuffs would have been difficult without significant investment to decrease erosion and improve fertility.

The prevalence of Bonny Gate stony loam in the Stewart Castle and Drax Hall village spaces with average slopes below 10° suggests that the soil's poor quality was recognized and that the villages were relegated to these fairly flat, though less desirable areas. At both estates, this placement was also to the disadvantage of enslaved laborers traveling to the mill, since it increased that distance. Only the Papine village soils offered an opportunity for cultivation, though this would be limited by low rainfall without additional irrigation. In sum, the slope and soils data indicates only moderate conditions for any agriculture apart from food trees. This data suggests that enslaved people seeking to produce subsistence and surplus crops needed to invest even more of their limited time and energy into this task. Evidence of this improvement is visible on the Stewart Castle landscape with terrace walls within the village house gardens, and the planting of fruit-bearing trees (ackee and mango) within the Papine village.

Proximity

The following discussion addresses the spatial parameter of proximity through three related measurements: the centrality of the millyard to the cane fields, the movement of enslaved laborers to the processing area, and the travel distances to reach provision ground areas. The first two aspects speak to the profit and control schema employed by planters, with minimization of cut cane transport and daily laborer travel. In their "off-time," enslaved people negotiated the journey to and from provision grounds, often laden with harvested crops (Senior 1835:37-38). These distances thereby contributed to the energy they expended in surplus production.

Mill centrality is an essential component of the profit side of the model: if cane is not efficiently processed, much of the time and labor spent in its cultivation is immediately lost. As with proximity, we encounter a similar problem, what determines whether a mill is central, and what should it be central to? Higman's solution to this question was a centrality ratio that compared distance to the mill from the nearest and farthest boundaries of the estate (1987). Higman's ratio compared the distances from the works to the nearest and farthest boundary lines of the estate, with an ideal value of 1. Under this measure, the Stewart Castle mill centrality value is approximately .36, indicating an off-center position. Drax Hall's mill centrality value is approximately .8 and Papine's is .74.

Estate	Distance from Mill at which All Cane Acreage Encompassed (miles)	Distance from Village to Mill (miles); Greater or lower than average ¹	Distance from Village to Nearest Provisioning Area Boundary (miles)	Percent Visibility of the Village from the Overseer's House and Great House
Drax Hall	0.8	0.64 (greater)	0.25	100; 0
Stewart Castle	1.0	0.275 (greater)	Adjacent	6; 25
Papine	0.7	Adjacent (lower)	0.865	84; 76

Table 4.08 Summary of Proximity and Surveillance Parameters on the Three Estates.

¹ Averages (in yards) for a ten-year period provided in Higman 1987.

To further examine the mill's placement, I offer an additional measure of centrality that establishes defined overland distance "buffer" zones from the mill across the fields (Table 4.08). The amount of cane acreage within each buffer zone demonstrates the extent to which the mill was located in a position to adequately process a majority of the cane harvested from the fields. At Drax Hall, nearly 79 percent or approximately 465 acres of cane were encompassed at .5 miles from the millyard. All of the cane fields fall within .8 miles of the windmill yard, which was later converted to a watermill in the same location (Figure 4.13). The maximum distance to the farthest field along the intervals between fields outlined in the 1765 plat was 1.05 miles. For Stewart Castle, the overland distance to the farthest cane-field boundary was approximately 1.16

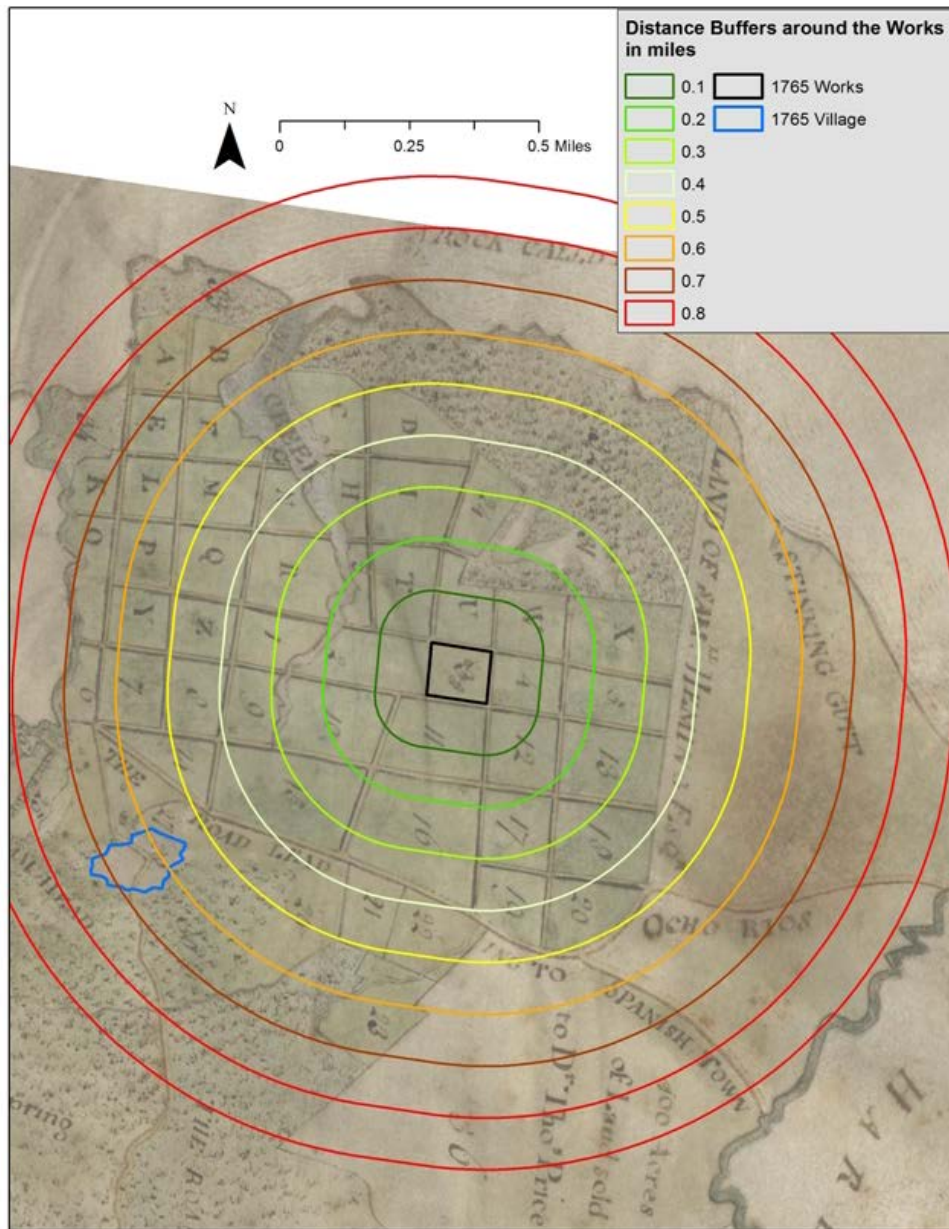


Figure 4.13 Buffer Zones surrounding the Works, Drax Hall, St Ann.

miles, and the nearest cane-field boundary was directly adjacent to the works complex, with the four adjoining fields totaling 58.1 acres. In addition, though it is difficult to deduce which particular roads wagon drivers utilized to carry cut cane to the mill, measurement along the roads outlined on the 1799 plat increases the maximum distance from the farthest field to 1.28 miles. The buffer zone data indicates that 39.75 acres of cane was accessible within .1 miles of the boundary of the mill complex. At a distance of .6 miles from the works, 80.3 percent or more than 380 acres of

cane were encompassed. All of the cane acreage was encompassed within 1.0 miles. At Papine, the distance to the farthest field is .74 miles. All of the cane fields are encompassed with the .7 mile buffer zone, with approximately 275 acres of cane within 0.5 miles. Though the total acreage at Papine exceeded that of Stewart Castle, the smaller number of cane fields was better positioned within the estate to maximize transport of cane to the water mill.

Although they do not reflect the necessary usage of road and field intervals for travel, these results quantitatively demonstrate that the works complex at each estate was effectively placed to accommodate a majority of the cash crop acreage within one mile of the millyard. In modern trials, a single ox with a loaded cart traveled at a speed of approximately 2.15 miles per hour (O'Neill and Kemp 1989). Given this data, and all other factors being equal, the placement of the works at these locations would have facilitated cane transport within approximately thirty minutes from the farthest fields. While additional comparative data for other Jamaican sugar estates is not available, the limited distance for transport at these estates likely minimized overall processing time on the estate. In addition, the buffer zone evidence suggests that some of the field locations may have been chosen due to their proximity to the mill, rather than the most suitable slopes or soil types. This location is particularly salient for Drax Hall since its windmill, and later a water-powered mill, required a precise location to harness these resources.

Several authors of sugar planting treatises recommend that the enslaved laborer village should be "close" to the millyard. This factor satisfies both profit and control: minimization of travel decreased overall processing time during harvest; and, if the overseer's house was located in the works yard, observation of the nearby village was conducted without much difficulty. According to Barry Higman's survey of Jamaican estates (1987), the average distance between these two points ranged from 187 yards to 462 yards from 1760 to 1839. Since no ideal distance is predictable at this time, the available averages provided by Higman (1987) must serve as comparison to the estate values. At Drax Hall, the distance from the village centroid to the millyard is 0.64 miles (1133 yards). This distance far exceeds the averages that Higman

calculated, particularly for the 10 year time period from 1760 to 1769 (187 yard average). In this case, it is likely that the village was located at the southwest edge of the cane fields to accommodate the placement of the cane fields in the fertile coastal plain. In addition, as noted above, the wind and water mills of Drax required the particular location to facilitate efficient processing. the travel time of cut cane was a greater priority than the travel of enslaved people to the fields and millyard. At Stewart Castle, the overland distance from the estimated center of the village to the works is approximately .275 miles (484 yards). The larger-than-average distance from the works suggests that the village may have been placed according to considerations other than proximity to the mill complex, such as the high suitability for cane surrounding the mill or a shorter distance to the castle (.259 miles, 455.8 yards). In contrast to the other estates, the Papine village is directly adjacent to the mill and the processing buildings, being located on either side of the aqueduct which powered the mill (Figure 4.14). This location of the village clearly facilitated constant functioning of cane crushing and boiling during the harvest season since travel time for enslaved laborers was negligible.

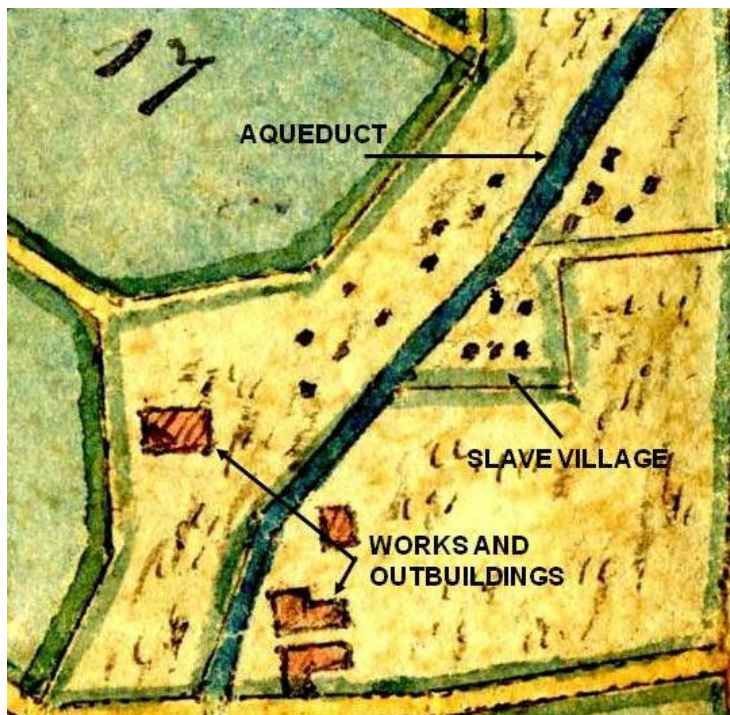


Figure 4.14 Papine Village adjacent to Millyard and Aqueduct c. 1834.

The distance traversed by enslaved people from their homes to the provisioning plots reflected a considerable investment in time given the limited number of days available to them to cultivate. Calculations of distance traveled are based on the roads depicted on the plats, assuming that slaves took the shortest possible route to reach their plots. No data is available on exact location of individual provision plots for these three estates. To approximate the shortest distance traveled, I use the estimated centroid of the village area as the origin point and the border of the marginal areas as the destination point. Despite the immense size of the woodland areas at Drax Hall, enslaved people walking from the village did not have a considerable distance to travel. A more formal road is drawn from the main road leading to Spanish Town, through the village. It continues roughly north-south through the entirety of the woodlands that may have served as a potential provisioning area. Distance from the village to the boundary of this area is .25 miles. Stewart Castle's grounds, though more limited in acreage, were adjacent to the village. A path denoted on the 1799 plat suggests consistent travel from a road through the center of the village onto the forested ridge overlooking the wharf. The path that enslaved people on Papine estate traveled is slightly more difficult to determine. The Hope River runs along the border between pasturage and the identified grounds and the additional (marginal) woodland areas. Assuming passage across the river was available (no bridge is depicted on the plat), the distance from the village to the nearest boundary was .865 miles. In this case, the soil quality and slope requirements for cane and pasture likely relegated the Papine grounds to this location on the eastern edge of the estate. Enslaved cultivators at Papine needed to travel the furthest to reach the edge of their grounds, although the maximum distance traveled likely fell to their counterparts at Drax Hall.

Millyard and Village Visibility

Given that its location was dependent on the cane field location and distances discussed above, it is likely that the mill served as the determinative anchor point for the location of the other elements on the estate (Higman 1988). To maintain the desired degree of control via surveillance,

the ability of the overseer and planter to observe activities in the works complex was an important factor in the location of their dwellings. As noted in the previous section, the Viewshed tool in the ArcGIS Spatial Analyst toolset codes the landscape according to whether the terrain is visible from a single observer point. The viewshed output thus contains two values: 1 = visible; 0 = not visible. This tool provides a visual summary of the intervisibility among different areas of an estate.

At Stewart Castle and Papine, the presence of the overseer's house within the works complex indicates that this area was consistently surveyed, maximizing observation of the sugar processing. At Drax Hall the overseer's house is located in pasture south of the cane fields and to the east of the village. Though the location is not identified on the 1765 plat, I calculated the visibility from its approximate location on the later undated map (NLJ St. Ann 679); the entire works yard is visible from the overseer's house, with an observer height of six feet. This calculation, however, does not account for the height of the vegetation surrounding the house and the cane fields between the domestic area and the millyard. Without more information on the construction of the house (i.e. one or two story, or the presence of a porch), it is unclear how much of the yard was visible. Additional evidence from the undated map indicates that the "overseer's crophouse" was located within the works yard, suggesting the presence of managerial control within that space. Overall, the mill visibility evidence suggests that this feature was a priority of landscape organization at the three estates.

Contemporary observers such as Beckford (1790) and Roughley (1823) recommended that the laborers' village should be within sight of the overseer's or owner's house. This visual form of indirect surveillance, as opposed to the direct surveillance implied in physical proximity, would serve as a reminder to the enslaved workers that they were always under scrutiny. In contrast, at Stewart Castle, the precise placement of the overseer's house in the millyard resulted in the obstruction of the overseer's view of a majority of the slave village. The limited surveillance is clearly illustrated in the viewshed output, with only approximately six percent of the village area

visible from this observer point (Figure 4.15). In addition, the viewshed from an observer point at the castle (main house) indicates a lack of visibility of the works complex and a partial view of the eastern border of the slave village, approximately 25 percent of the total village area (Table 4.08, page 135). At Papine, the visibility data indicate that a majority of the village could be seen from the overseer's house in the millyard, though the approximately 10 to 15 foot high aqueduct likely obscured surveillance depending on which side of the aqueduct the observer was standing. A similar output exists from the great house to the east of the village and mill complex. At Drax Hall, the village is 100% visible from the overseer's house, but not visible from the great house, which is nearly 0.83 miles from the northeast boundary of the village area.

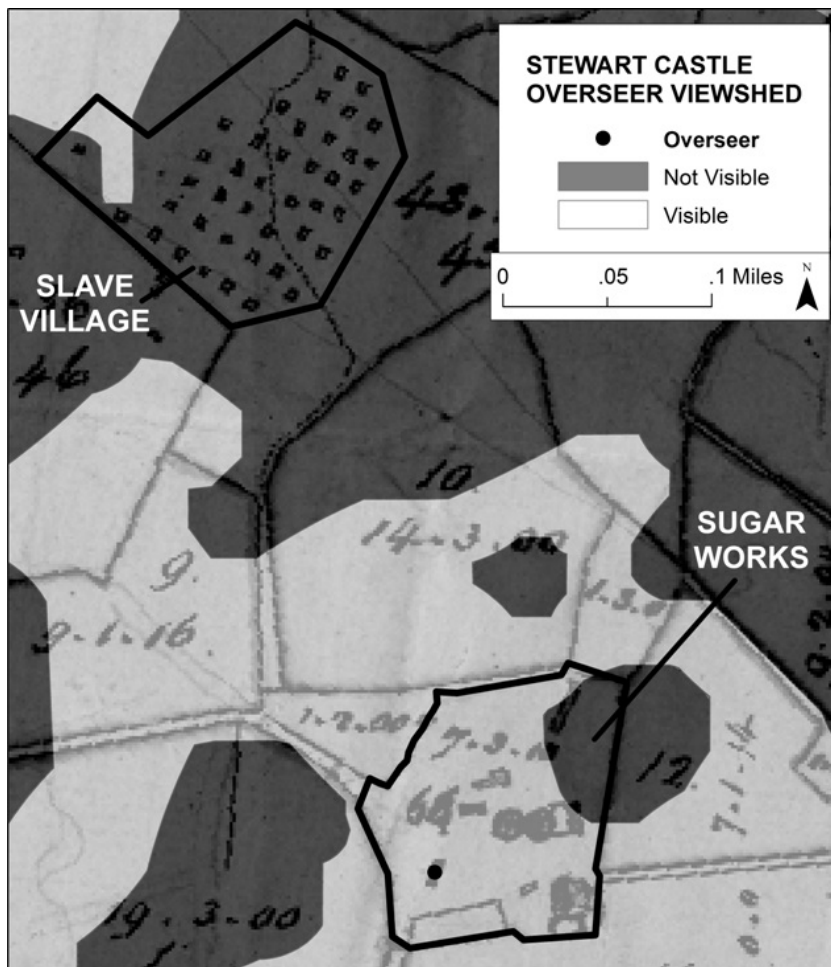


Figure 4.15 Viewshed from Overseer's House at Stewart Castle, Trelawny (after Bates 2014).

These estimates suggest that, in the view of the estate owners, the activities occurring within the works yard required a greater intensity of surveillance than those within the slave village. At Drax, the necessary placement of the mill and fields in the coastal plain for cane cultivation necessarily led to the location of the overseer's house and village across the main road and south of the fields. The Stewart Castle village was likely situated further from the millyard, and thereby beyond the sight of the overseer, to accommodate more cane acreage in better soils and closer to the works. The more compact, east-west arrangement and mostly uniform soils of Papine facilitated the location of the village adjacent to the mill and overseer's house. Thus, the same general principles of the mill as the focal point of organization resulted in slightly different arrangements of the surveillance landscape. A key factor not considered in the visibility calculations is the obstruction of the village by food trees within and around the borders (McDonald 1993:96-97). The ackee trees at Papine may be an example of this interference. If vegetation was present, the visibility would have been even further reduced than suggested in the viewshed output. Overall the visibility data suggests that this aspect of the planter's goals to maintain profits and control was minimized in favor of cane cultivation conditions and the processing activities in the works yard.

Summary

These plantation organizations arguably optimize both centrality and proximity; they are remarkably similar despite differences in the shape of the property and the number of acres under cultivation. Lack of fit with the model occurs in the category of optimal visibility and suitability on the estates. These outcomes indicate that the estate owners chose to maximize control in industrial spaces, sacrificing visibility of domestic spaces for profit and efficiency in the mill complex. Maximization of areas with soils suitable for cane cultivation also resulted in this limited visibility. In turn, the findings also reveal the potential for enslaved people to conduct their own affairs in domestic and provisioning areas beyond the observation of the owner and his agents.

Placement of the village on these estates clearly depended on the mill yard and the activities conducted therein. The recommended positioning of the overseer's house to observe the slave village did not correspond with the preferred surveillance of the works yard; maximization of centrality and proximity superseded visibility of domestic spaces. Without the constant presence of surveillance, enslaved people could take advantage of the primacy of cane cultivation and processing that removed their houses from the viewshed of the planter and the overseer. This evidence suggests that we must reexamine the extent to which models such as panopticism truly apply to the complexities of on-the-ground plantation organization and the interactions that occurred within its boundaries (Foucault 1977).

Agricultural conditions within provisioning areas suggest several obstacles to the successful cultivation of basic and surplus foodstuffs. On these three estates, the contemporary observers' suggestion to relegate the villages and provision grounds to unsuitable areas holds true for Papine, Drax Hall and Stewart Castle estates. Poor fertility, steep slopes, and high erosion potential likely contributed to the difficulties that enslaved people encountered in accomplishing this task during their "off-hours." Despite these unfavorable conditions, archaeological evidence discussed in the following chapter indicates that enslaved people at each estate participated in the market by selling their produce and purchasing imported goods. By analyzing this archaeological data, I test the hypothesis that enslaved people with access to a greater amount of provisioning acreage per person, shorter travel distances, and favorable cultivation conditions were able to produce a greater surplus than their counterparts.

CHAPTER 5: ACCESS TO MARKETS: ARCHAEOLOGICAL ANALYSIS OF SLAVE VILLAGE ASSEMBLAGES

The previous chapter addressed the beginning activities associated with the provision ground system: the cultivation of surplus food crops. This chapter addresses the end product of the system: the discard (and inferred acquisition) of market goods by enslaved people. To assess variability in the functioning of this system across the island, I correlate the conditions observed in the landscape analysis with the archaeological evidence of the market activities of the three enslaved communities. The communities of Drax Hall and Papine estates had access to nearly three acres of provisioning acreage per enslaved person, moderately favorable soil conditions, and, in the case of Papine, the largest market on the island. In contrast, the landscape data suggests that Stewart Castle is an outlier in terms of advantageous provisioning conditions, with limited acreage, poor soils, and slopes subject to erosion and deficient water retention. These conditions suggest that the Stewart Castle community was at a disadvantage in producing any surplus and thereby investing part of that surplus in market goods. I would expect that this constraint resulted in a limited procurement of costly items by enslaved people at Stewart Castle, in contrast to their counterparts at Drax Hall and Papine.

The first section of this chapter discusses the excavations of the four village sites and provides a broad overview of the techniques, recovery methods, and research questions of the principal investigators. The following section reviews previous and current studies of the market systems in which enslaved people participated in the British Caribbean and the mainland colonies. Archaeological studies of these systems have predictably focused on imported goods found on slave domestic sites as markers of market participation. In light of case studies by Howson (1995), Reeves (1997), Wilkie and Farnsworth (1999, 2005), and Galle (2006, 2011), I examine the acquisition of refined ceramics as a proxy for market access, tracing costly applied decorations and forms across all three sites over time. I then review the forms and decorations of various imported ceramic types. The final section is the analysis of ceramic attribute data from the three estates. In addition, I incorporate archaeological material from Seville estate in St Ann as an

additional case study to model the range of ceramic variation, and propose potential provisioning conditions at this estate.

Previous Research of Market Access

Slaves' access to material goods in market contexts within the Caribbean was facilitated by their exploitation of the land (space) and time available to them. As noted by Orser, modeling the acquisition of goods is an essential component to "understanding the dynamics of material life" of the plantation, which in turn suggests the inherent power relationships and social networks created between slaves (1992:99). In this chapter, I consider slaves' market access as the opportunity to purchase market goods with surplus produce, a particular "deployment of surplus" as suggested by Hauser (2014a). This approach emphasizes that the opportunity to acquire and acquisition are moments in which responses to domination occurred, rather than merely the means to end of status differentiation. Drawing on Howson's discussion of plantation archaeology, I argue that the cultivation of surplus and its subsequent deployment are equally important "in a context of social action" as the use and display of market goods in the yards and houses of enslaved people.

The market system which developed from the sale of surplus items by enslaved people in the Caribbean also led to their "accumulation of liquid capital" to an extent "hardly to be expected under such circumstances" (Mintz 1983:113-114). These unexpected patterns of acquisition have generated many analyses of market participation by enslaved people in the Caribbean and North America. The historiography of this subject can be grouped into three main topics: the "dual economy" noted by Richard Sheridan (1993), including the structure of the slaves' "informal" economy; the role of slaves' "customary rights" with respect to independent production within the regime of slavery; and an internal competition for resources among enslaved people. Sheridan's work identified a parallel economy to the planters' control of cash crop production and export (1993), one which was completely dependent on the additional labor and time expended by enslaved people. In the Caribbean, this economy often sustained European merchants and

tradesmen living in cities and port towns. Historian Lorna E. Simmonds elaborates on this division in her discussion of Kingston markets. She notes the “formal” economy comprised of “members of the white community and the Jewish mercantile group” supplying institutional demand, and the “informal” comprised of marginal group members who supplied the “needs of lower orders” (2002:277). Higman argues that planter elites strove to keep these economies separate and distinct through commodity restrictions such that slaves were excluded from trading “in items of export production, imported goods, and status-linked commodities” (1996:228).

These restrictions suggest that there was a collection of goods approved for marketing by slaves, the sale, purchase, and possession of which were considered customary rights exercised by slaves. The seeming contradiction of slaves as human property owning material property and livestock has long fascinated students of slavery (Berlin and Morgan 1995). As an example, Roderick McDonald in his comparative analysis of slaves’ economy in Jamaica and Louisiana argues that the principle of customary rights, “slaves’ prerogative of deriving personal gain from their labor,” served as the foundation of the internal economy (1993:18). McDonald’s discussion primarily focuses on evidence of housing as a category of material culture, likely because of the paucity of literature on slaves’ other possessions. He concludes that certain aspects of housing were “hallmarks of ownership...normally, though tacitly, recognized by the planters and their agents” (1993:110). Despite the legal limitations imposed on slaves’ marketing of commodities and the organization of the weekly markets, this recognition of their economic activities underpinned their role as independent sellers and consumers in colonial markets.

Historians have also addressed the potential for internal differentiation within enslaved communities based on energy expenditure in “off-time” labor. Woodville Marshall examines the provision ground system and internal economies of the Windward islands, including Grenada St. Vincent, arguing that surplus cultivation and market participation required additional resources that not all slaves could afford (1991). The physical requirements of daily labor must be considered while exploring the attempts “to cope with slavery” (Marshall 1991:60). As noted in

Chapter 4, Higman (1998) notes that at Montpelier competition for resources related to provisioning certainly occurred given the differences between plots cultivated by different family groups and the distribution of skilled versus field laborers within those groups. On the whole, the historiography of slaves' economy including market participation suggests that these activities were one of the few independent (though sanctioned) avenues that slaves pursued "to make lives of their own" (Marshall 1991:60). As Mintz argued, the "historical facts 'on the ground'...stand as a violent exception to the intent of the plantation system and to the ideal status of the slaves" (1983a:119).

Building on the limited historical accounts of what slaves purchased, archaeologists are uniquely positioned to provide evidence of the goods acquired by slaves since the remains of those goods are recovered from domestic contexts. Beginning with Robert Ascher and Charles H. Fairbanks' first foray into the archaeological evidence of slave life (1971), subsequent excavations across North America and the Caribbean have yielded an abundance of imported, manufactured goods, primarily ceramics. Explanations for this phenomenon note the taphonomic and economic factors involved in the deposition of different artifact materials over time. As Deetz famously chronicled, many early colonial goods consisted of perishable materials such as plant fibers (wood, reeds, gourds) and metals like pewter that break down quickly under most conditions. When everyday items came to be made of iron, brass, ceramic, and glass, the amount of recoverable material increases (Deetz 1996[1977]). An increase in frequency is also a function of availability since over time these items were produced in large quantities in European factories built on the profits of cash crop production.

This material signature also signals some ability of the site's inhabitants to acquire these market items. In conjunction with the historiographical literature noted above, most archaeological examinations of slave economies are centered on the question of *why* enslaved people with limited resources would choose costlier items over locally-available alternatives. In some cases, scholars argued that slaves on particular plantations received ceramics and other imported items

from the master, whether for need or as an incentive for labor (e.g., Joseph 1993; Thomas 1995). In other studies, enslaved people made choices based on their position within the plantation hierarchy. Following Stanley South's pattern recognition approach, John Otto and others noted that, though at a glance slaves acquired similar materials to overseers and planters, differences in form and decoration indicate their acquisition of necessarily cheaper vessels that served specific cooking and dietary needs (Adams and Boling 1989; Drucker 1981; Otto 1984). Critics of this approach note that there is no reason to assume that planter conceptions of status were adopted by enslaved people; it is likely that "their meaning derives at least as much from their context of acquisition as from their association with white European-American culture" (Howson 1990:90). In his critique, Parker B. Potter concluded that Adams and Boling specifically would conclude that an ability to purchase similar ceramics subverted the inherent power differential, concluding that "no amount of porcelain on his or her table could transform a slave into a planter" (Potter 1991:99).

The limitations of the pattern recognition approach and the developing work on African origins and creolization (Mintz and Price 1992[1976]) spurred exploration into how African experiences shaped the choices made by enslaved people. Some studies examined the manufacture or acquisition of locally-made ceramics (Armstrong 1990), but also included the reimagining of mass-produced objects to serve as talismans or other spiritual objects (Leone et al. 2001; Thomas 1998; for a recent critique see Davidson 2014).

These approaches, however, leave us with the question of the acquisition of everyday, imported items found in such large quantities across sites of slavery. Several studies of plantation Caribbean material address this question by examining imported (primarily English) ceramics as a medium through which power, ideals, and identities were communicated between social groups (Farnsworth 1996; Howson 1995; Reeves 1997; Wilkie and Farnsworth 1999, 2005; Wilkie 2000). Howson argues that imported vessels signaled a combination of meanings, including group inclusion ("common membership in a culture"), and that the function of an imported vessel for

serving or dining was secondary to the “style of decoration” (1995:216). Wilkie and Farnsworth (1999, 2005), and Wilkie (2000), adopt a similar approach, identifying slaves as consumers based on a somewhat vague notion of “African choice” as expressed in both decorative elements and colors, and the combination thereof. Given the limited availability and difficulty in obtaining any ceramics in the Bahamian islands, Wilkie and Farnsworth argue that the presence of certain ceramics suggests a degree of choice despite relative cost. They link “African choice” to handpainted elements that resemble African symbols such as the Bakongo cosmogram, as well as to color palettes and pairings that are presumably more “African” than others. The division between planter and slave (expectedly) remains fixed: “Thus the color schemes and patterns the slaves added reinforced their West African identities, in contrast to the colors and patterns reflecting European identity provided by the planter” (Wilkie and Farnsworth 1999:312).

Another line of inquiry interprets the strategies of enslaved people as responses to larger demographic and economic changes occurring within the Atlantic World (Galle 2006; Galle et al 2009; Galle 2011; Neiman 2008). In this approach, consumption and access are a function of signaling, a strategy in which males and females signal their fitness to potential mates and competitors. Resource stress from external pressures such as falling sugar prices, disruptions in trade, and frequent destructive weather influenced the ability of slaves to invest in certain types of goods. In addition, internal demands such as plantation labor regimes limited opportunities to acquire costly items such as metal buttons and refined ceramics (Galle 2011:230). Unlike other recent approaches, the signaling theory employed by Galle and Neiman is grounded in quantitative evidence of consumption across time and space.

As noted by Reeves (1997, 2011) and Galle (2011), I argue that understanding variability in an enslaved community’s access to the market sheds light on the conditions of daily life as much as attempts to interpret the motivation or meaning behind their choices. Avoiding Howson’s pitfall that “the meaning of things somehow can be construed directly from frequency distributions,” I examine how assemblages of imported goods correlate to opportunities to

purchase those goods, and thereby the conditions of provision ground cultivation discussed in Chapter 4.

Market Participation and Ceramic Assemblages

One way in which to assess market access and participation is comparative, quantitative analysis of material culture distribution and attributes. Hauser's extensive study of market dynamics in Jamaica through the lens of the production and consumption of locally-made coarse earthenwares (*yabbas*) illustrates how a single material culture class reflects the multidimensional economic and social spheres of enslaved people (2006, 2008). In conjunction with historical evidence, this ability to follow the roots and routes of the pots is based on data collected from the objects themselves from different sites across the island. With this approach in mind, I examine the decoration and form attributes of refined, imported ceramics from Drax Hall, Seville, Stewart Castle, and Papine to map access to market goods as a whole.

As briefly noted above, this category of market goods has been the focus of studies about slave life for several important reasons. First, they are often the most ubiquitous artifact type found on eighteenth and nineteenth century slave domestic contexts throughout the Atlantic World (Singleton 1995:127). When considered with locally-made materials, ceramics are by far the most numerous inorganic artifacts recovered in these contexts. In general, the tendency of ceramic fragments to survive most taphonomic processes contributes to their ubiquity in the archaeological record. This high frequency is beneficial for analysis since large sample sizes decrease the influence of sampling error which is inherent in any archaeological excavation. Inferences made from this analysis thus are more likely to accurately reflect the characteristics of change over time and space.

Second, in the context of colonial sites, the increasing production of refined ceramics on a massive scale after 1750 suggests a greater availability of these objects over time. This chronological factor is also evident in the shifting decorative applications and increase in number

of forms. In this way, identifying manufacturing date ranges for ware types and even decorations greatly facilitates the dating of historic sites in the Atlantic World. In addition, as discussed above, form and decoration have the potential to inform hypotheses from slave dietary practices to cultural/group identity formation and maintenance. Finally, it is likely that these imported vessels were only available in the market setting, or infrequently from traveling hucksters (Hauser 2008; Wilkie and Farnsworth 1999). As a result, their acquisition directly reflects the marketing activities by enslaved people selling their surplus.

In sum, the consistent presence of imported, refined ceramics on domestic sites indicates that slaves living in different areas and under different working conditions were able to acquire market goods of this kind. This commonality makes it an ideal artifact category to examine market participation by enslaved people and any potential variability. Arguably, in Jamaica, slaves' access to and acquisition of these ceramic vessels was made possible through the sale of surplus that they produced in provision grounds. It follows that the different conditions of provisioning between the three estates resulted in differential access to ceramic vessels and market goods in general. In this analysis, I assume that the purchase of individual vessels remained a significant expense to the enslaved person. Some scholars note that the increasing mass production of these ceramics in England and Europe led to falling prices over time in American markets after 1750 (Miller 1980, 1984a, 1984b, 1988, 1991, 2000; Miller and Moodey 1986; Miller, Martin, and Dickinson 1994). Despite this trend, archaeological evidence suggests that increase in the consumption and discard of market goods, such as refined ceramics and buttons, by enslaved people outpaced the decreasing prices until the early nineteenth century (Galle 2011:242). Given that the archaeological record of slave village sites in the British Caribbean and throughout the American colonies includes not only "cheap" undecorated flatwares, but also highly decorated, "costly" serving wares suggests that enslaved people sought out these items, likely for a number of reasons, some of which I noted above. I assume that slaves selling provision ground produce in the market sought to invest in these vessels if they could garner the necessary resources. In

this way, the presence of decorated serving vessels in an assemblage can be considered a proxy for relatively greater access to the market. This idea is further explored in the next section.

Since my focus concerns ceramic form and decoration, the question of differential availability between Jamaican market towns is appropriate. Given the limited documentary evidence, I cannot account for this variable. It is possible that the Kingston market, as the largest and busiest on the island from its foundation to the present day (Burnard 2002; Higman 1991; Simmonds 2002), provided a greater array of vessels. Lower prices were likely due to greater competition among merchants and potentially higher compensation for the produce that slaves sold. Without direct research into this supposition, however, I propose that enslaved people living at Drax Hall and Stewart Castle estate viewed the same imported, refined ceramics as their counterparts at Papine estate in St. Andrew.

In addition, I assume that the assemblages recovered from each of these village sites reflect a cross-section of the enslaved community and a group-level consumption pattern. While previous work examined potential internal differentiation within enslaved communities (Higman 1998; McDonald 1993; Reeves 1997, 2011; Wilkie and Farnsworth 1999, 2005), the correlation of provision ground conditions and market access necessitates comparison of total assemblages. Ideally one could coordinate the rich historical record of an estate like Montpelier in St. James to determine which family groups cultivated particular provision ground plots, as well as the occupations of each groups' members. The problem still remains of how to determine which specific houses and their associated assemblages belong to a particular family. The associated documents for the estates in question, however, do not allow for this type of detailed correlation. The lack of documentary evidence of skilled laborer versus field hand houses, in conjunction with differences in excavation techniques, obscures internal comparison on this level. This analysis is based on comparison between estates, representing the overall access of a community to the market based on provisioning conditions, rather than between internal occupational or social groups.

Finally, this analysis cannot take into account the potential earnings that enslaved people made from craft production and the sale of livestock and poultry. As outlined by Higman (1998), the benefits derived from the sale of animals, meat, and eggs could represent a significant portion of a household's income (199-210). It is possible that cash from these transactions with owners or other slaves were used to purchase imported ceramics. In this case, without direct historical evidence in the form of account books or a full sample of zooarchaeological material, I assume that this practice was common on all three estates. In this case, the analytical potential of analyzing ceramic assemblages outweighs the variables that cannot be modeled.

Details of Ceramic Manufacture with an Emphasis on Form, Decoration, and Price

My assessment of variability in ceramic acquisition focuses on two aspects of refined¹⁰ ceramics manufactured in China, Europe, and England in the seventeenth, eighteenth and nineteenth centuries, namely form and decoration. As noted above, ceramics of English manufacture are the most ubiquitous artifacts found on British colonial slave sites (Singleton 1995:127). Forms produced in England beginning in the seventeenth century fall into three main categories: serving, dining, and utilitarian. James Deetz (1996 [1977]) argues that the manufacture of vessels for individual dining was the result of broader cultural changes in Georgian society, noting that distinctions between individuals within the same household and between spaces for cooking, eating, sleeping, and entertaining became the norm. This shift from communal to individual arrangement necessitated the need for everyday "dining" vessels such as plates, cups, mugs, and bowls. Emulation of formal dining practices of elites also required "serving" vessels such as platters, tureens, pitchers, and punchbowls. As the tea ceremony and hot beverage consumption rose in popularity in the eighteenth century, English potters produced specialty serving vessels, such as teapots, teacups, teabowls, saucers, creamers, and sugar

¹⁰ The term "refined" distinguishes these vessels according to the refining of the clay used to produce them. This process resulted in fewer impurities and a denser, consistently "clean" paste that could be thinly potted. The refined earthenware body, however, could not withstand temperatures greater than 1000 degrees Fahrenheit and remained moderately porous.

bowls. The growing “middle-income group which could not afford [Chinese or continental European] porcelains for its tea and dining tables, yet wished to be perceived as having such” purchased specialty vessels for the consumption of tea, coffee and hot chocolate (Edwards and Hampson 2005:55). Utilitarian forms remained a fixture in the British pottery industry throughout the period. Primarily made from coarse earthenware and stoneware (not refined) materials, specific forms consisted primarily of storage jars, cooking vessels, milk pans, and chamberpots. Table 5.01 provides a summary of the ware types discussed below.

Ware Type	Begin Date	End Date
Creamware	1762	1820
Delftware, Dutch/British	1600	1802
Fulham Type Stoneware	1671	1775
Ironstone/White Granite	1840	2000
Porcelain, Chinese	1660	1860
Porcelain, English Bone China	1794	2000
Porcellaneous/English Hard Paste	1820	2000
Slipware, North Midlands/Staffordshire	1670	1795
Westerwald/Rhenish	1650	1775
White Salt Glaze	1720	1805
Whiteware	1820	2000
Yellow Ware	1830	1940

Table 5.01 Ware Types Mentioned in Text with Manufacturing Date Ranges.

The early manufacture of refined ceramics in England was spurred by the continuation of local traditions of coarse earthenware production, the success of continental production of wares by the French, Dutch, and Iberians, and the coveted, costly porcelains brought through the Chinese trade. Slipware production began in the seventeenth century in the Midlands area of England, with a majority of forms for utilitarian usage (e.g., milk pans), but also elaborately decorated plates and chargers. Tin-enamelled earthenwares produced in Holland (Delft), France (Faience), and Iberia (Majolica) consisted primarily of light blue, white, and pale pink surfaces decorated with handpainted polychrome or blue palettes. As an early emulation of Chinese porcelain in appearance and decoration, Dutch Delft became the most popular of these ware types on the English market, to the extent that manufacturers in London and elsewhere began producing their own version (Britton 1987; Lange 2001; Ray 1968). For many British colonial

North American and Caribbean assemblages, the exact origin of the Delft vessels cannot be determined; for this reason, the ware type designation is recorded as “Delftware, Dutch/British.” Given the range of decorative styles applied and a similarity to Chinese porcelain, Delft was manufactured in large plates, punchbowls, and cups that rose in popularity through the early eighteenth century for dining and entertaining. Unfortunately, Delft soft body and fragile glaze could not withstand the heat required for the increasingly popular consumption of tea, coffee, and chocolate like the Chinese porcelain (Lange 2001:13). Despite this limitation, Delft remained a less expensive alternative to pricier wares until the last quarter of the eighteenth century when it was replaced by more refined earthenwares.

Chinese porcelain was available in English markets after 1600. Due to high transportation costs and the limited availability, however, Chinese porcelain vessels were only available to the wealthiest members of society in the early eighteenth century, and thus became a symbol of elite status. As the popularity of Chinese porcelain rose, Chinese potters and traders sought to increase its market potential and began producing vessels on a much larger scale. Over time, certain border (rim) designs and central scenes, both handpainted over and under the glaze, became the most desired, and Chinese manufacturers focused on mass-producing patterns such as Canton and Nanking. While still painted by hand, these designs became more stylized and less distinct than previous intricate patterns. Despite this increase in availability, Chinese porcelain remained an expensive ware in British and colonial markets.

English potters’ desire to copy the appearance and forms of Chinese and continental European porcelain led to several developments in the local pottery industry. While Delft continued to be produced, other potters turned to creating high-fired, salt-glazed stonewares from clays that had been used in tobacco pipe manufacture. This work resulted in the types known today as Slip Dip stoneware (1715-1775) and White Salt Glaze (1720-1805) stoneware. These white-bodied stonewares were produced in a wide array of plates, tavernwares (mugs, tankards) and specialty items (teapots, chocolate mugs, etc.), with molded decorations on the plates and

later elaborate handpainted enamels on hollow forms (Edwards and Hampson 2005). Unlike Delft, the nearly vitrified stoneware vessels could readily hold hot beverages without breakage. The press-molded rim and body decorations on White Salt Glaze stonewares were one of the first experiments with press-molding on a large scale (Edwards and Hampson 2005:77-102), a technique which later became part and parcel of refined ceramics produced in the late eighteenth century. Several other refined stonewares were produced during the mid-eighteenth century. Two of these types, Black Basalt and Rosso Antico, mimicked ancient Greek vases in both composition and decoration. Black Basalt was made from a black stoneware clay that could be finely potted (wheel-thrown and thin-bodied), while Rosso Antico was made from a red variety (Edwards 1994). Almost exclusively produced as teawares, vessels of this type included sprig-molded Greek figures and engine-turned basketwork or column-like decorations.

Following the success of Delft and White Salt Glaze stoneware, English potters in the Midlands began experimenting with a refined earthenware body in individual dining and serving vessels. Thomas Whieldon, working in the 1730s and 40s, produced a lead-glazed, white-bodied type which later became known as Whieldon ware. With roots in the mottled glazes found on coarse slipwares, this ware is identified by its distinctive decorative application of colored crystals producing yellow, brown, and green splotches. The press-molded border patterns were also applied to Whieldon vessels. Though popular, this type was supplanted by the efforts of Whieldon and his partner Josiah Wedgwood to create a local, marketable alternative to Chinese porcelain, a type more durable than Delft and cheaper to produce than White Salt Glaze stoneware. Breaking from Whieldon in the 1750s, Wedgwood after much experimentation produced a white-bodied, refined earthenware (from a combination of kaolin clay and Grown stone) with a cream-colored glaze (Miller and Hunter 1990, 2001). Wedgwood was also a master marketer of his products. By associating his “cream-coloured” ware with the royal family and the Queen herself, Wedgwood garnered tremendous demand for his product across all sectors of society. The widespread popularity of what is called creamware (or CC ware) was unlike any seen previously and greatly contributed to the rise of the British pottery industry in the third quarter of the

eighteenth century. Many refer to the development of creamware as a “revolution,” a fundamental change in both production and marketing strategies that also reflected a cultural shift in appealing to the masses and their continued adoption of the tea ceremony. The focus on the development of a home market and providing less expensive alternatives to Chinese and continental porcelains led to the success of creamware.

This success allowed potters to experiment with different decorative techniques including: press-molded rims on plates, serving vessels such as tureens, and teawares; black transfer-printed and handpainted polychrome patterns applied over the fired glaze; and handpainted-blue, *chinoserie* styles replicating Chinese designs. The last two categories represent the most expensive decorations on creamware vessels and typically were found only on serving vessels. Despite the success, Wedgwood and fellow potters continued to adjust the glaze formulas for creamwares to achieve a more porcelain-like surface (Miller and Hunter 2001). A majority of historical archaeologists refer to this subsequent ware type as “pearlware.” George Miller and Robert Hunter (2001) argue that the “China glaze” introduced in the 1770s was an elaboration of decorative techniques in another attempt to simulate Chinese porcelain, rather than a new, distinct ware type (see also Miller and Earls 2008). Alternatively, Lois Roberts (2011), in her volume on handpainted blue, dated vessels of each type, argues that the documentary evidence for “China glaze” reflects only a blue glaze applied to vessel surfaces. In her analysis of Roberts’ dataset, Jillian Galle (2012) demonstrates that, since the decoration on the vessels of each type in the sample could be identified as *chinoserie*, the dates painted on the vessels record the shift from creamware to pearlware as a recognizable temporal change independent of decorative style. In the following analysis, pearlware is considered a distinct ware type with an accompanying series of decorative genres.

The development of pearlware resulted in a proliferation in applied decorations. The earliest set of decorations is the handpainted blue designs discussed by Miller and Hunter, including Chinese-style elements and neoclassical motifs. These designs occur primarily on

hollow serving and dining vessels. The molded designs on plates and platters continued on pearlware in the form of shell edge and other molded designs, with the addition of painting over the molded edges in blue, green, and mulberry. Another set of handpainted designs, primarily botanical garlands and abstract bands, were completed in a warm palette and are recorded as “polychrome warm” genre. A final set of designs applied by hand include several techniques that fall under the category of factory-made slipwares. In contrast to many archaeological analyses, this term is employed in Digital Archaeological Archive of Comparative Slavery (DAACS) protocols as a genre rather than a ware type. This distinction is similar to that applied in the chinoserie case: factory-made slipware techniques are found on creamware, pearlware, and their successor whiteware vessels, and thereby cannot be a separate ware type. The slipware techniques applied by hand include dendritic or mocha designs which resembled trees or abstract shapes, and slips of different colors applied with a brush or cup in cat’s eye, fans/leaves, and cable/worm shapes (Rickard 2006). Other techniques were applied while the vessel was turned on a lathe, including plain “annular” slipped and painted bands, rouletted bands with applied color, and other incised (inlaid slip) bands. In many cases, hand-applied and lathe-turned decorations occurred on the same vessel.

The greatest innovation during the production of pearlware occurred with transfer printing. Though applied to creamware, the printing process was significantly developed for under-the-glaze application in cobalt blue designs in the 1780s (Samford 1997). This process involved multiple steps: popular prints or drawings of the time were copied by engraving copper plates; these copper plates were filled with ink and a metallic oxide coloring agent; thin sheets of tissue paper were laid on the copper plates to transfer the design; the inked tissue sheets were then placed on bisque-fired vessels and heated to adhere the design to the body (Coysh and Henrywood 1982; Samford 1997). These steps all occurred prior to the application of a lead glaze which covered the vessel and a third firing (Samford 1997 citing des Fontaines 1966:102). The ability to cut and lay sheets over curved surfaces resulted in designs that encircled the entire vessel and the application of several printed designs on one vessel. In addition, though the

process appears arduous, once the copper plates were engraved, hundreds of vessels with the same printed patterns could be produced in one day at a lower manufacture cost than handpainted designs. By the 1790s, transfer printing was adopted by many of the Staffordshire potteries and transfer-printed vessels became the costliest ceramic items (Miller 1980).

The total number of printed designs created is difficult to estimate. Patricia Samford proposes production dates of design sets based on “decorative trends evident in the 19th century and based on examining printed vessels,” including chinoserie, pastoral, exotic views, classical, and romantic (1997:5-19). Border patterns were often paired with several different central scenes that comprised a series. These central scenes were placed on the interior base flatwares and the exterior body of hollow wares, with the borders around the rims and bases. Alternately, some central scenes only appear with one border (e.g., Willow pattern) and some designs, known as sheet patterns (Neale 2005), cover the entire vessel with no additional border. Correctly identifying a border or central scene pattern at the sherd level is clearly quite difficult, though particular design elements can be linked to specific patterns (the identified patterns in this analysis are noted in the final section). Furthermore, establishing the particular manufacturer of the pattern and thereby a tighter date range is nearly impossible given that popular patterns were copied by several manufacturers over time, and the subtle differences between them are only evident on complete vessels.

Despite, or possibly because of, the success of pearlware, Staffordshire potters continued their quest to mimic Chinese and other porcelains during the nineteenth century. As another refined, white-bodied ware, whiteware exhibited a nearly white surface color, primarily the result of refining the lead glaze applied to the vessels. In addition to blue transfer-printing, slipped decorations, and handpainted blue designs, several new decorative techniques developed at the same time as whiteware was produced. First, transfer print manufacturers’ experimentations with different metal oxides had produced black, green, and brown designs on pearlware bodies. Further testing produced a wide range of colors beginning in the 1820s including light blue, red,

pink, purple, gray, and polychrome prints. Second, handpainted decorations in a “cool” rather than warm palette were applied to whiteware vessels. Finally, sponged decorations comprised of all-over designs or botanical bands were also popular.

Several types of true porcelains were developed in England during the late eighteenth and early nineteenth century. Despite its popularity in the mother country, very few sherds of soft paste porcelain, a white soft body with an alkaline glaze, were found in the sample analyzed here. As its name implies, bone china porcelain contained bone ash as an attempt to harden the paste, with an alkaline glaze and overglaze decorations including handpainting and applied decals. Developed in the 1820s, porcellaneous or English hard paste porcelain was the closest ceramic produced in England to continental porcelains manufactured in Germany and France since the early eighteenth century, and also the closest approximation to Chinese porcelain. With a pure white hard paste and thick, shiny alkaline glaze, porcellaneous was a more expensive alternative to the refined whitewares produced at the same time. Decorative techniques were primarily handpainted overglaze decorations, including gilt bands and botanicals, mimicking French designs.

Ceramic Prices

In terms of colonial markets for these refined ceramics, historical research has been focused on markets in continental British North America and the subsequent development of the American market as a target audience for British refined ceramics (Miller 1984a, 1984b; Miller and Hunter 1990; Miller et al. 1994). Clearly London and other large cities in England remained the primary market, but there is archaeological and documentary evidence that wares arrived in British North America almost as soon as they were produced and sold in England (Edwards and Hampson 2005). For residents of British colonies in the Caribbean, it is more difficult to trace exactly which decorated vessels and forms the merchants acquired, and which were most popular among the different socioeconomic classes within the island (Reeves 1997:218). As British manufacturers appealed to what they perceived as a distinctly “American” taste after 1780

(Miller et al. 1994), presumably consumers in the Caribbean continued to follow trends popular in the metropole. Undoubtedly, as a majority of the population in the British Caribbean, enslaved consumers drove the demand for a variety of market goods across the region (Howson 1995:137).¹¹

Since 1980, previous examinations of slaves as consumers of refined ceramics typically address George Miller's price data for cream-colored (CC) wares. In his pioneering work on ceramic prices, Miller (1980) develops an index for assessing decorated vessels and specialized forms by arguing that plain, undecorated creamware plates were the least expensive vessels available in colonial and later American markets. Many archaeologists applied Miller's data to their archaeological assemblages in order to estimate the relative consumer purchasing power of the inhabitants of a particular site (e.g., Adams and Boling 1989), assuming that the full suite of vessels that Miller notes was available in local markets. Miller updated his 1980 findings in a 1991 article outlining "corrected" index values based on further price list research. The basis of Miller's work is minimum vessel counts by form and decoration, and coordination of occupation periods of the site with 38 years of manufacture for which he provides the values (Miller 1991:4). Miller's decorative types include undecorated, shell edged, sponged, painted, dipped, and transferprinted (Miller 1980:34-35). His primary form categories are plates (divided into seven sizes according to diameter), teacups, saucers, and bowls (Miller 1980:27-34). The decorations and forms are the most common in the manufacturer and merchant price-fixing lists (Table 5.02).

¹¹ Howson's price data represents only the 1830s (Howson 1995:Appendix B).

Form	Cream-Coloured	Edged	Under Glaze Lined	Printed: Willow	Printed: Other Patterns
Table Plates	1s 6d	2s	2s 6d	4s	5s
Soup Tureens	1s 6d	2s	2s 6d	4s 6d	5s
Covered dish	1s (each)	1s 6d (each)	1s 9d (each)	2s 6d (each)	3s (each)

Form	Cream Coloured	Dipped	Painted	Printed
Mugs	1s 9d	2s 9d	4s	6s
Bowls, all sizes	2s 6d	3s	4s	7s
Chamberpots	2s 6d	NA	4s	7s
Bowls and Saucers	3s	4s 3d	4s 6d	7s 6d
Capped Teapots	5s 6d	NA	7s	14s

Table 5.02 – Ceramic Vessel Cost (in shillings (s) and pence (d) per dozen) based on 1814 Staffordshire manufacturers price fixing list, reproduced in Miller 1984b. Cost reflects smallest size category for each form, where applicable.

Two detailed examinations of Caribbean slave village assemblages adopt Miller's price indices as a form of analysis. Jean Howson (1995) in her extensive study of plantation slavery and economy in Montserrat analyzes consumer choice in two plantation village sites and one great house site based on rim sherds. Challenging Armstrong's interpretation of plates as a common household "tableware," she argues that plates were primarily for display, while bowls were the main serving and dining vessels (Howson 1995:208-218; Table 5.03). She asserts that both the acquisition of decorated plates and bowls were attempts to display status and "identification with the African community" (1995:217). Rather than availability or cost, she concludes that enslaved people made decorative choices according to an aesthetic profile which was also based on an African identity.

Form	Cream-Coloured	Shell Edge	Blue Printed	Fancy	Dipped/Colored	Unspecified
Bowl	2s 6d	NA	5s	NA	3s 4d	NA
Plates	3s 9d	3s 9d	5s	3s 4d	NA	NA
Cups & saucers	4s 2d	NA	4s 2d	NA	3s 4d	5s
Mugs	NA	NA	NA	15s	5s	5s
Chamber pot	10s	NA	16s 8d	NA	NA	NA

Table 5.03 Ceramic Vessel Cost (in shillings and pence per dozen) based on research by Howson (1995 Table B.4) of Jamaican merchants' inventories from 1831, 1832, and 1838.

Matthew Reeves (1997, 2011) analyzed household assemblages from two adjacent estates, Thetford, a sugar estate, and Juan de Bolas, a coffee plantation. Enslaved people at these two estates frequented the same market, Old Harbour, but differed in their labor roles and communal organization. Reeves argues that the artifact patterning in the relationship between local coarse earthenwares (*yabbas*) and imported ceramics of the type noted above suggests differential access to markets between households within the same community. He quantitatively evaluates these observable differences by examining four of Miller's decorative types across sites in Jamaica and Virginia, concluding that choice in ceramic decoration "was influenced more by market availability than individual household preference" (2011:196). Reeves' focus on household-level comparisons suggests the potential for distinguishing inequality within a community based on market access.

My approach in this analysis differs from these studies in two key ways. First, ceramic analysis was completed at the sherd-level. Identifications of ware type, vessel category (hollow or flat), form, decorative genre, and individual decorative elements were attribute-based. For each recorded category of information, certain criteria for identification must be met. No attempt to mend or vesselize sherds was made except in cases where multiple sherds from the same context clearly mended together. In this case, the relationship between sherds was recorded in the "Mends" tab in the DAACS database recording system. This approach is a fundamentally different way of considering the kind of data that can be extracted from individual sherds, in comparison to rim sherds or mended vessels. Some archaeologists consider that rim sherds and

mended vessels provide “a better estimate of actual vessels represented” in a given assemblage (Howson 1995:335; see also Breen 2012). In this case, the concern is with double counting sherds from the same vessel as representative of a particular form or decorative type. The reality of ceramic breakage patterns is that this is a common occurrence. The challenge is to glean information from the assemblage as a whole in a defensible way. Proponents of rim or vessel analysis often point to the problematic values of raw counts or relative frequencies to support their choice. I argue below that there are viable alternative ways to examine sherd-level attributes beyond counts or relative frequencies.

Second, my approach incorporates time as a crucial factor to understanding intra- and intersite dynamics. Considering that historical archaeologists most often develop site chronologies based on ceramic distributions, it is surprising that decorative types and forms are not examined over time within or between sites. It is rare that sites are tightly dated to the extent that they are comparable without considering time. Maintaining temporal control ensures that observed patterns reflect differences in access or choice within households or communities. In the following section, I discuss the formation processes of the sites and the differences in excavation techniques that resulted in the nine assemblages analyzed. I then describe the process of building site chronologies and establishing occupational phases following these excavation details.

Excavation and Research Summaries of Sites in this Analysis

The following section discusses the research questions, excavations, and analyses pertaining to the three village sites, Drax Hall, Stewart Castle, and Papine. I include a fourth site here (Seville estate) and in the refined ceramic analysis to provide an additional four house areas for comparison (see Appendix 2 for site maps). In the final chapter, I assess whether the vessel form and decoration patterns indicate beneficial conditions for provisioning at Seville estate.

Drax Hall Excavations

At the villages of Drax and Seville, Doug Armstrong's excavation strategy was designed to delineate the chronology of village houses and to investigate a sample from slavery and post-Emancipation eras. In his examination of African aspects of slave culture, Armstrong focused on house and yard features within the villages. Armstrong's primary goal was to explore the cultural characteristics of enslaved people through their material culture from the earliest settlement of the estates to the era of post-emancipation in Jamaica. Drax Hall and Seville, as noted in Chapter 4, were two of the earliest sugar plantations established on the north coast of the island. Following excavation techniques established by predecessors such as Merrick Posnansky, Armstrong centered his investigation on individual house feature excavations, and thereby conducted household-level analyses. In published documentation of the excavations, Armstrong and his collaborators emphasize the processes of transformation within the villages as inferred from the archaeological record, both during the period of Afro-Jamaican slavery and East Indian indentured servitude after Emancipation (Armstrong 1983, 1990, 2011; Armstrong and Kelly 2000; Armstrong and Hauser 2004).

I have selected three of the house features for further analysis through the processing of the field records and artifacts into the DAACS database. I selected the test units in order to obtain a broader sampling of the village than that provided by the individual house feature excavations (n=6). Though the sample sizes from each test unit may be limited, understanding intrasite patterning within Jamaican villages requires broader spatial coverage of excavations. This approach precludes taking one or two houses as representative of a single time period of a village. In addition, the assemblage from these test units is comparable to the shovel-test-pit data acquired by DAACS on the Papine and Stewart Castle sites.

The three house features I selected include Feature 01, 15, and 52. These houses are the features that Armstrong uses to discuss the three basic time periods since they were the most completely excavated. I chose them for this same reason, as well as the level of documentation

compared to the other feature excavations. Due to the possibility of overlapping context numbers and the difficulty of translating the grid system points into the DAACS database, each grid system pertaining to the Drax Hall features was simplified to an alphanumeric combination and entered according to each feature.

The initial observation of Feature 01 occurred during the walking survey when brick and limestone fragments were found on the surface. Based on this evidence, a test unit (TP01) was placed to explore the area around the house, and subsequent excavation revealed the back exterior wall of the house (Armstrong 1990:101). Each excavation unit opened within the foundations (Zone 1) was excavated to a 10 cm depth, exposing the foundation walls, rooms and floors. Zones 2 and 3 were placed outside the house. These area excavations revealed a discrete 9 x 4.5 meter structure, with three partitions discernible based on differences in flooring (Armstrong 1990:101). Those units which crossed the exterior and interior wall foundations did not contain postholes. Armstrong surmised that this absence may reflect the placement of support posts on bricks or flat stones at the corners of the house (Armstrong 1983:131). In total, data from thirty-nine excavation units are entered in the DAACS database for Feature 01.

Feature 01 was the only fully excavated, intact house foundation dating to the slave period at Drax Hall (Armstrong 1990:101). Armstrong interpreted Feature 01 as an early house within the Drax Hall village, its occupation likely falling during the last quarter of the eighteenth century. Construction of Feature 01 likely consisted of filled walls covered in daub, or wattle-and-daub walls, with corner support posts, and doors along the long axis (Armstrong 1990:104). A possible kitchen area behind the house was identified based on limestone material outside the foundation, a predominance of "kitchen group" artifacts, and slate "roofing fragments" (Armstrong 1990:104).

Feature 15 was identified as a broad flat area with a line of cut limestone blocks. Like Feature 01, the structure is 9.5 x 4.5 meters divided into three rooms, two with limestone/marl floors and one with an earthen floor or possibly a wooden floor (Armstrong 1990:116). The front

foundation wall consisted of cut limestone blocks fixed to the limestone bedrock, while the back wall was a single or double row of bricks (Armstrong 1990:120-124, Figures 33-35). This evidence suggests the necessity of stabilizing the “downslope” portion of the house and the usage of the natural slope for the house’s back wall. The architectural evidence of Feature 15 suggests that it may have been more substantial than Feature 01. For example, the wall between the middle and southeast rooms is somewhat thicker and demarcated by two lines of brick (Armstrong 1983:145). In addition, the front foundation wall was wider than that of Feature 01, and a secondary row of brick and rocks was uncovered approximately 25 to 30 cm from its outer edge. Armstrong posits that this second row is evidence of either a thick wall comprised of two layers wattle and daub, or of an outer wall of an earlier structure (Armstrong 1983:146; Armstrong 1990:121). Behind Feature 15, Armstrong suggests there was a probable cooking shed and kitchen area based on the presence of limestone blocks and marl, as well as “roofing slate” fragments (Armstrong 1983:146; Armstrong 1990:124). Armstrong interpreted Feature 15 as a “free laborer-period” house area based on his MCD calculation (1854.1). Ceramic evidence also points to the presence of eighteenth century deposits in Zone 2 (Armstrong 1990:136).

Feature 52 was initially identified as a heavy artifact scatter of domestic materials uncovered in the test unit (TP52). Upon area excavation, this feature did not contain any definite foundation outlines, only a dense layer of marl mixed with artifacts uncovered that may represent a possible living area floor (Armstrong 1983:131). Additional horizontal “strips” (0.5-x-2 meter units) were excavated to the same depth, but no foundation evidence was uncovered (Armstrong 1983:132). Due to the difficulty of tracing the foundation, an additional level, designated 01A (“top of marl floor”), was excavated separately from the typical two levels present in other house area excavations. Armstrong interpreted Feature 52 as a yard area due to the concentration of artifacts, and the relative paucity of artifacts found within the foundation walls of Feature 01 (Armstrong 1990:109).

Seville Estate Excavations

As a joint project of Syracuse University and the Jamaica National Heritage Trust, excavations led by Armstrong in the Seville African-Jamaican village followed similar procedures to those seen at Drax Hall. In 1981, a preliminary survey of the property surrounding the historic great house indicated the presence of two village sites, rather than the expected multicomponent site (Armstrong and Galle 2007). This evidence suggested that the historic maps of Seville estate, as discussed in Chapter 4, each depicted a separate village, one southwest of the planter's house dating to the early to mid-eighteenth century and one to the northwest occupied starting in the last quarter of the eighteenth century. House area excavations expanded on these test units, consisting of additional 1-x-1 meter excavation units. Employing an innovative approach, Armstrong and his team entered assemblage data into a dBase 4 database in the field. The data were then downloaded into AUTOCAD and SURFER programs to conduct spatial analyses, including artifact distribution maps.

The first village, dating to the early to third quarter of the eighteenth century, included twenty identifiable house areas, identified by Armstrong as Locus 1 (Armstrong and Kelly 2000). Supported with funding from the Mellon Foundation, DAACS staff cataloged assemblages from house areas 15 and 16 during an on-site project at the Jamaica National Heritage Trust in downtown Kingston. This project was the first undertaken as part of the DAACS Caribbean Initiative (Armstrong and Galle 2007). In the early village, most units contained three levels, roughly corresponding to the ten cm arbitrary intervals: a mixed upper level, a second level with solidly eighteenth century material, and a third level containing architectural features such as walls and floors. Units on the downslope (north) side of the house contained thinner deposits than those on the upslope (south) due to the position of the house on the slope (Armstrong and Galle 2007).

House 16 was identified during the survey based on a pronounced linear pattern of rocks and a surface scatter of artifacts, including locally-made ceramics. Excavation of this five-by-

three-meter house was the first conducted in 1988. Features identified during the excavations include postholes (between the foundation stones and as wall supports), and flooring comprised of stone or marl. None of the postholes or postmolds were excavated. In addition, a burial was uncovered in the house yard; full excavation revealed a 1750s date, prior to the destruction of the house (Burial 1 discussed in Armstrong and Fleischman 2003). The two-room house included a brick-and-stone foundation, a clearly defined doorway and possible small porch based on exterior postholes without associated foundation walls. A yard area behind the house was identified by a paucity of artifacts within an area of crushed marl similar to that used within the house. Evidence of sweeping or clearing of the yard area includes the presence of artifacts near the house foundations and along the outer edges. This pattern was also noted at other house areas. House 15 was identified in the preliminary survey as a linear pattern of rocks, with area excavations conducted in 1989 and 1990. Postholes for foundation and room walls were identified, but not excavated. The two-room, wattle-and-daub house is roughly 4 x 9 meters. An additional room was added at a later point in time. A hearth area in the yard was indicated by a concentration of stones (Armstrong and Galle 2007).

In Locus 2, house areas 32 and 35 in the later village were reanalyzed for this project. Incorporating these additional house areas facilitates intrasite spatial and temporal comparisons, expanding on those analyses published by Armstrong and his collaborators (Armstrong 2011; Armstrong and Kelly 2000; Armstrong and Hauser 2004). Excavations indicated that each house was set on its own axis, rather than a predetermined road or path. During the 1990 field season, excavations of house area 35 suggest that the house was constructed of wattle and daub with a wooden floor. It is located near the center of the later village, close to two other house structures (HA 33 and HA 34). Few of the excavation units were excavated below the arbitrary depth of 10 centimeters (Level 01), primarily due to the presence of bedrock within this level. These units sampled foundation walls and the interior of the structure. House area 32 was located between two footpaths at the northern edge of the later village. Very few units were excavated below the

10 cm arbitrary level (01). Evidence from Level 02 suggests limestone foundations and possible areas of marl flooring.

DAACS Excavation Strategies at Stewart Castle and Papine

Under the direction of Fraser Neiman and Jillian Galle, DAACS excavations have focused on the village sites of Stewart Castle and Papine Village from 2007 to 2011. The strategy employed on these villages has been implemented by Neiman at the Monticello property in Charlottesville, Virginia since 1997 (Neiman 2008). This strategy was borrowed from prehistoric archaeological surveys primarily conducted in the U.S. southeast using shovel-test-pits (STPs) (see Krakker et al. 1983 for discussion). The difficulty in this technique is that the raw data from each STP cannot be analyzed as such, but must be smoothed to fill in the gaps (Neiman 2008).

Shovel test pits at DAACS-excavated sites were fifty cm in diameter on six meter centers. These measures were determined to best suit the analytical goals of broad spatial coverage while recovering suitable sample sizes and stratigraphic information from each pit. For ease of excavation management, transects and STPs were divided into “areas” which roughly corresponded to discernible village segments, such as on either side of a road or architectural feature. In addition, three or more 1-x-1 meter units were placed at each site to further explore depositional processes and potential architectural features, such as terraces or cisterns, visible on the surface. Temporal phasing within the village can be confirmed using stratigraphic evidence within these units (Cooper et al. 2008). The goal of these projects was to address the “social, economic and subsistence” of slaves across the plantation, rather than those living in two or three houses (Cooper et al. 2008). Overall village patterns gleaned from this sampling strategy have informed several comparative analyses that include the Stewart Castle and Papine assemblages (Galle 2010; Galle 2011; Galle et al. 2010; Neiman et al. 2010). The recent completion of this work meant that the assemblages did not require reanalysis.

Data from these sites is included in this project for several reasons. Given the fairly limited number of extensive, systematically-recorded excavations of slave village sites on Jamaican sugar estates,¹² the Papine and Stewart Castle projects represent a significant set of data with which to study intra- and inter-site patterning in village contexts. Second, the available plat data and the narrowed focus of the provision ground analysis to three parishes restricted the corresponding archaeological analysis.

The Stewart Castle collections incorporated in this analysis include material recovered from 174 STPs and three 1-m² units excavated in the village area identified on the 1799 plat. Previous research by DAACS staff suggests that the main house was occupied from c. 1770-1810, and the tested portion of the village was occupied from c. 1770-1830 (Cooper et al. 2008; Galle et al. 2010). Spatial patterning in the village data indicates that in the mid-to-late eighteenth century occupation was primarily in the northern portion of the village, and in the nineteenth century occupation may have been concentrated in the southern area of the site. Further excavation is necessary to confirm these inferences. Architectural evidence also suggests differentiation between the north and the south in house construction. Plaster and mortar fragments may reflect nogged housing in the northern portion (Unit 1), while cut limestone blocks were found in the south (Unit 2). Unit 3 was placed to examine the construction of one earthen terrace; deposits suggest its association with the limestone foundation structure (Galle 2007).

At Papine, fieldwork conducted over three field seasons centered on the slave village area encompassed on either side of an extant brick-and-stone aqueduct constructed in the 1760s. During these excavations, 1207 STPs and six 1-x-1 meter units were excavated. Two units adjacent to the cistern were begun, but not completed due to time constraints. Over 58,000 artifacts, excluding faunal remains, were recovered from the excavations. The overwhelming

¹² Notable exceptions include Barry Higman's work at Montpelier Estate in St. James (1998), and Matthew Reeves' work on Juan de Bolas and Thetford estates in St. Thomas in the East (1997; 2011). James Delle's analyses have focused on coffee estates in the Yallahs region (1998), and a cattle pen, May Pen in Manchester (2011; 2014). Each of these excavation projects focused on individual household- or structure-based analyses, rather than broad site sampling.

majority of artifacts consisted of brick, daub and stone fragments; ceramics and glass represent the next most ubiquitous artifact classes. Phases of village occupation were calculated by DAACS staff according to MCDs based on smoothed STP ceramic data. The earliest phase (P01 1791) was concentrated along the western edge of the sampled area; phase 2 (P02 1801) is also on the western side of the aqueduct; phase 3 (1822) constitutes a majority of the site, east of the aqueduct (Galle 2011).

The following section revisits the expectations for differentiation between the three primary sites and outlines the techniques applied in the analysis of the data recovered from the excavations summarized here.

Ceramic Data Analysis

Based on the spatial analysis addressed in Chapter 4, I expect that enslaved people at Stewart Castle were at a disadvantage in producing a surplus and thereby access to market goods compared to contemporary individuals at Papine and Drax Hall. I examine this concept of access through two interrelated ceramic attributes, form and decoration, across the three sites. I add an additional four house areas excavated at Seville estate as a comparison to these estates and to determine whether the provisioning conditions were beneficial to the enslaved population at this fourth estate.

George Miller's work on ceramic price fixing by Staffordshire manufacturers in the nineteenth century provides some insight into the relative cost of vessels of different form and decoration. Based on his extensive documentary research, Miller focuses on plates, teacups and saucers, and bowls, though he provides prices of other vessels in English pence per dozen (1980, 1984b; 1991). Compared to table plates, it is clear that costlier vessels by form are the hollow serving vessels, including flat oval dishes, "covered dishes," tureens, and sauce tureens (Miller 1980:23). In general, teaware sets consisted of a great degree of variation according to

size, handle shape, body shape, and applied decoration; this degree of specialization and the function of the sets likely garnered a greater cost on the market (Miller 1991:15-16). At a cost of 30 pence per dozen for undecorated vessels, bowl costs also varied by size with larger bowls costing more (Miller 1991:21-22). Table 5.02 reproduces the prices from the 1814 Staffordshire price fixing list discussed by Miller (1984b) according to the most common forms in the Jamaican village sample and ordered by least to most expensive. This data suggests that tablewares, including plates and soup tureens, were the least expensive refined earthenware forms, with increasing prices for bowls, chamberpots, and teawares. Clearly the prices of each form also increases with added decoration. Howson's appendix of Jamaican merchant prices for ceramic vessels confirms the relative cost scaling by form (Table 5.03). For each form, the Jamaican cost is consistently higher than those in the Staffordshire list, and undecorated plates exceed the cost of undecorated bowls. Though not included in her lists, presumably more specialized hollow forms such as tureens and coffee pots garnered higher prices than the more common forms in the inventories. The additional data from Howson suggests significant markups of all vessel types in colonial markets.

In the sample of nine assemblages from the four estates, I approached the analysis of vessel form with two sets of aggregated categories. I chose this method primarily due to the smaller sample sizes of individual identified forms, though I address these vessels with respect to decoration in the third analysis section. Discounting hundreds of sherds because they cannot be identified to a specific form does not seem sensible. In this way, I am able to include many sherds identified as either hollow or flat teawares, tablewares, and utilitarian vessels. This inclusion greatly improves the reliability of form comparisons made between assemblages.

The first aggregation approach draws on the traditional categorization made by historical archaeologists between teaware, tableware, and utilitarian vessels, with the further distinction of hollow or flat vessels. Hollow or flat unidentified teaware and tableware forms are incorporated in the sample. No distinction is made, however, between everyday items such as bowls, and

specialty forms such as pitchers, tureens, and other hollow serving dishes; all of these forms are categorized as hollow tablewares. The second aggregation approach is based on whether the form would have been used in the following activities: food preparation or storage (utilitarian); serving of food or beverages with specialty forms, such as platters, punchbowls, and teacups; and dining or daily consumption of food. This approach is similar to one proposed by Anne Yentsch (1990) in which she draws a distinction between food and beverages, and between preparation and consumption, though her method is based on minimum vessel analysis. In this aggregation, specialty vessels are in a separate category from vessels of daily usage, though flat and hollow vessels are in the same category. For example, plates and bowls are both categorized as “dining,” while platters and tureens are “serving” vessels. In the following analysis, I review the artifact discard rates of each category and suggest the analytical differences between the approaches.

Miller’s data clearly also addresses the cost differences between decorative techniques (Table 5.02). Compared to undecorated versions of the same form, decorated vessels were consistently 33 percent more costly. For tableware forms such as plates and tureens, the least expensive decoration was edged wares. Also known as Shell Edge, this decoration consisted of a combination of molded and painted elements (Miller 1991:5-6; Miller and Hunter 1990). Tablewares with simple handpainted lines or plain bands were roughly equivalent to the Shell Edge costs. Transferprinted tablewares in the common Blue Willow pattern, or in other patterns, were the most costly. Teawares, bowls, mugs, and other hollow forms were often painted, slipped, and rouletted in a variety of colors, a genre referred to historically as “dipped” or “dipt” wares, and identified as Factory-made Slipware in the DAACS system. Handpainted vessels in overglaze and underglaze designs, primarily botanical and other bands, garnered 1.5 times the price of undecorated vessels. Finally, transferprinted teawares were likely the most expensive non-utilitarian vessels acquired by enslaved people in this sample (Table 5.03).

The data in this sample consists of domestic contexts uncovered during each of the excavations described in the previous section. Each of the ceramic assemblages from the domestic sites described above was cataloged according to DAACS standards. The cataloging protocols employed by the DAACS database are based on sherd or fragment level analysis (<http://www.daacs.org/about-the-database/daacs-cataloging-manual/>). These detailed protocols ensure standardization of terminology, measurements, and identification across catalogers and assemblages from different locations and time periods. This standardization is essential for comparative analysis between sites excavated by different methods and cataloged by several individuals. DAACS protocols outline attributes for the identification of individual sherds to specific or general vessel forms. Identification is also based on cataloger experience and familiarity with the attributes, as well as comparison to type collection vessels housed at Monticello in Charlottesville, Virginia. In general, DAACS catalogers responsible for the identification of the sherds in this sample are conservative in their assignments of form and decoration.

The relevant fields recorded for each individual sherd in this analysis of refined wares include the following: count, ware type, vessel category (hollow or flat), form, completeness (e.g., base, body, rim), surface treatment (e.g., lead glaze), decorative genre, stylistic elements (individual elements identified on a given sherd), evidence of burning, and mends (which sherds may physically mend together). Out of these attributes, the primary fields from which I gleaned the form and decoration data are vessel category, form, and decorative genre.

Methods: Mean Ceramic Dates, Seriation, and Correspondence Analysis

For early historical archaeological work, most site or occupation chronologies were based on documentary evidence, and the archaeological remains were employed to refute or confirm the historical record. Refinement of site or occupation chronologies for historical archaeologists using material culture began with tobacco pipe mean bore diameter histograms developed by J.C. Harrington (1954). Harrington's formula, originally based on an ideal sample of pipe stems of steadily decreasing bore diameters over 180 year time span, calls for the product of the 64ths

size class and the number of pipe stems of that class divided by the total number of pipe stems in the sample. Lewis Binford (1962) refined Harrington's formula with a linear regression formula with the caveats that the pipe stem sample needed to be large, deposited over time at a consistent rate prior to 1780. Current application of mean bore diameters for site chronologies has proven useful for sites that date prior to 1750. For later sites, it appears that the 4/64ths measurement becomes the norm and thus the frequency curve plateaus at four rather than decreasing. In this case, the bore diameter chronology method is not reliable for late eighteenth and nineteenth century sites. Techniques for dating historical artifacts based on diagnostic attributes such as shape, manufacturer marks, and decoration are expertly summarized by Ivor Noel Hume (1969) and George Miller (2000). While sometimes less systematic than Harrington and Binford's formulas, these attribute-based methods that draw on historical documentation of artifact types and their variation through time are an invaluable resource for developing assemblage chronologies.

With the publication of Stanley South's *Research Methods in Historical Archaeology*, historical archaeologists realized the analytical potential of the thousands of ceramic sherds in their assemblages, beyond a summary table of relative frequencies of ware types and forms. South proposed a mean ceramic date (MCD) formula based on the known manufacturing date ranges of ceramic ware types that accounts for the number of sherds recovered in a given context (South 1972).

$$\bar{x} = \frac{\sum_{i=1}^n f_i m_i}{\sum_{i=1}^n f_i}$$

F sub i is the frequency of each ceramic ware type. M sub i is the median date for the manufacture of each ceramic ware type. N is the number of ceramic types in the sample. The formula calls for the division of the products of the counts and median dates by the sum of

frequencies (total count). The output of the formula is a mean ceramic date that can be used to relatively date a context.

Despite the simplicity of this formula, it has multiple assumptions that underlie any comparison between MCDs. First, the ware types involved in each estimation have battleship-shaped popularity curves that increase and decrease over time. In addition, these curves should have maxima that are evenly spaced in time, and they should be symmetrical with equal variance on either side of the maxima (normal or Gaussian distribution). Secondly, in a given set of assemblages, similar time averaging has occurred. Thirdly, and less concretely, the assemblages should be from the same “cultural tradition,” with access to similar goods, and from the same “local area.” The classic example of the similarity is Dethlefsen and Deetz’s (1966) analysis of stylistic sequences of headstone motifs in colonial Massachusetts cemeteries. Finally, we assume that historical documentation of the ceramic manufacture dates is accurate. These assumptions are not to say that the MCD formula is not a useful chronological tool, but rather that any analysis that employs the formula must include an acknowledgment of potential bias in the sample. This caveat is particularly true for the shape and spread of the popularity curves.

A refined method to calculating MCDs is proposed by Neiman and Smith (2005), in which the best linear unbiased estimate (BLUE) of the mean ceramic dates is calculated. This estimate is based on weighting the ware type counts according to their frequency such that types with long manufacturing ranges, such as Chinese Porcelain (1660 - 1860) or British Stoneware (1671 to 1800), have less influence on the MCD. This estimation again assumes that the curves are Gaussian, and the standard deviations are 1/6 of the manufacturing spans (Galle 2006:108). The BLUE MCDs of the sites used in this analysis are presented in Table 5.04.

Site	Phase	BLUEMCD
Drax 01	01	1799.771
Drax 01	02	1842.403
Drax 15	NA	1862.606
Drax 52	01	1802.492
Drax 52	02	1813.656
Seville 32	NA	1800.072
Seville 35	NA	1831.442
Seville 15	01	1780.449
Seville 15	02	1791.386
Seville 15	03	1808.877
Seville 15	04	1839.86
Seville 16	01	1753.965
Seville 16	02	1775.706
Seville 16	03	1786.559
Seville 16	04	1789.967
Stewart	01	1794.184
Stewart	02	1799.309
Papine	01	1790.556
Papine	02	1797.2
Papine	03	1808.488

Table 5.04 BLUE MCDs of the Analyzed Assemblages.

In six of the sites analyzed here, more than one “occupational phase” was identified through previous research into the ceramic assemblages. Borrowing concepts about species abundance from ecology, Neiman and Smith (2005), Galle (2006), and Smith and Neiman (2007) developed a technique for determining mean ceramic dates and occupational phases for sites excavated through unit and STP methods through the use of the frequency seriation method and correspondence analysis (CA). Seriation methods are based on models of how attributes or types are distributed across units of time. In frequency seriation, the ordering of units (in this case, artifacts or assemblages) and their resulting unimodal distributions (battleship-shaped curves) is inferred to be a chronology. Frequency seriation is more sensitive to change than other forms of seriation, but requires large samples and an independent measure to determine the direction of the inferred chronology (Dunnell 1970). CA is the multivariate statistical method employed to

determine variability within the assemblages by two or more factors. CA calculates the chi-squared distances between assemblages according to the following steps: “compute the differences between the relative frequencies for each type, square them, divide each squared difference by the relative frequency of its type in the entire data set, add up the results, and take the square root” (Smith and Neiman 2007:55). CA outputs include a set of dimension scores that reflect the relationship between rows and columns in a data table, in this case the assemblages (contexts) and ceramic ware types (Duff 1996:90). As the sum of the chi-squared distances, inertia values of each dimension suggest the contribution of each dimension to the variation in the sample (Smith and Neiman 2007:55-56). This generalization of the seriation method thus ideally allows for the “identification of those factors, disentangling the roles they play in determining assemblage composition” (Smith and Neiman 2007:58). Depending on the variation present, correspondence analysis reveals changes in the frequency of types over time, and the approximate temporal positions of contexts relative to each other (Smith, Galle, and Neiman 2012).

Smith and Neiman (2007) apply this method to archaeological materials to develop a “continuous, relative chronological sequence” for low-fired ceramics recovered from mound sites in the Deep South. CA converts the ware type frequencies into “scores” such that each assemblage is plotted according to the chronological and synchronic dimensions of variation. As a result, the extent to which the content of assemblages changed over time can be estimated accurately. In an ideal assessment of an assemblage comprised of multiple contexts deposited over time, the CA dimension 1 scores plotted against the CA dimension 2 scores should produce a U- or V-shaped curve, reflecting the increasing and decreasing popularity of types in the contexts. If dimension 1 is time, then the ordering of the units (whether contexts or stratigraphic groups or features) can be inferred as a chronology, and the relationship between the units can be inferred as a chronological sequence. As with the general seriation method, an independent test is needed to ensure the direction of the sequence and to test that dimension 1 is in fact time. One way in which to test this relationship is to calculate a Pearson’s correlation test between the

dimensions and the independent evidence for each context; the null hypothesis is that there is no correlation between time and the assemblage. A linear relationship between the units is expected if dimension 1 is time. The benefit of this approach is that it illustrates not only the temporal sequence in the overall assemblage (beyond the “house” level), but also the relationships between individual contexts across the site.

Calculating BLUE MCDs and the CA was accomplished through the creation of code in the R programming language using the R Studio user interface (see Appendix 3 for code samples). Based on a previous code developed by Fraser Neiman, this code calculates mean ceramic dates, summarizes counts of ware types with associated dates, creates seriation plots, and performs CA on a given assemblage based on the ware type counts and BLUE mean ceramic dates as a proxy for time. I modified this code to run for the sites in question.

Unit excavations typically do not encounter the same level of sampling error as shovel test pit surveys, the raw counts from each context (unit and stratigraphic layer) do not need to be “smoothed” or otherwise transformed in order to identify patterns in the associated assemblages. As noted above, the BLUE MCDs are calculated based on the ware type counts and manufacturing date ranges available through the DAACS database (<http://www.daacs.org/about-the-database/ceramic-ware-and-mean-ceramic-date-types/>). Types without date range information, such as Caribbean coarse earthenwares, are not included. In addition, types with counts less than ten out of the total sample of contexts are not included. A table of ware type counts for each context is created; contexts with fewer than five sherds are removed from the sample. This table of raw counts is the basic data fed into the CA analysis.

Neiman developed two complimentary functions to facilitate computation of the correspondence analysis. The first computes the MCDs and midpoints; the second sorts the data according to the BLUE MCD output. I modified these steps to run with each of my datasets. The first visualization step of the code creates a seriation plot that denotes the frequency of the types

across the context samples. This plot suggests whether the data conforms to the battleship-shaped curves that denote underlying patterning.

In this analysis of each site, I applied the methodology outlined by Smith, Galle and Neiman to discern any occupational phasing in the sites that I reanalyzed: Drax Hall features 01, 15, and 52; and Seville house areas 32 and 35. Unfortunately, sample size and time averaging issues complicated the process of dividing each house area into definite occupational zones. In examining each site as a single assemblage, the results were mixed. Following the same steps noted above, the CA of Drax Hall feature 01 denoted two occupational phases. Though there was not much patterning in the CA plot of Dimension 1 and 2 scores, Dimension 1 did positively correlate with time, reflecting a linear relationship (Figure 5.01). Since the Dimension 1 and BLUE MCD plot indicated that the smaller Dimension 1 values reflect earlier deposits and larger reflect later deposits, we can group contexts according to their Dimension 1 scores and create chronological phases. To determine the groupings, I calculated a weighted histogram of Dimension 1 scores according to the ceramic counts per context (density); bin size in this case is 0.1 (Figure 5.02). This graph indicates two occupational phases for feature 01, with an approximate cutoff value between them of 0.2. For each phase, a BLUE MCD value was calculated based on the newly grouped contexts (see Table 5.3). This value is the basis for holding time constant in future comparisons of forms and decorative genres between assemblages.

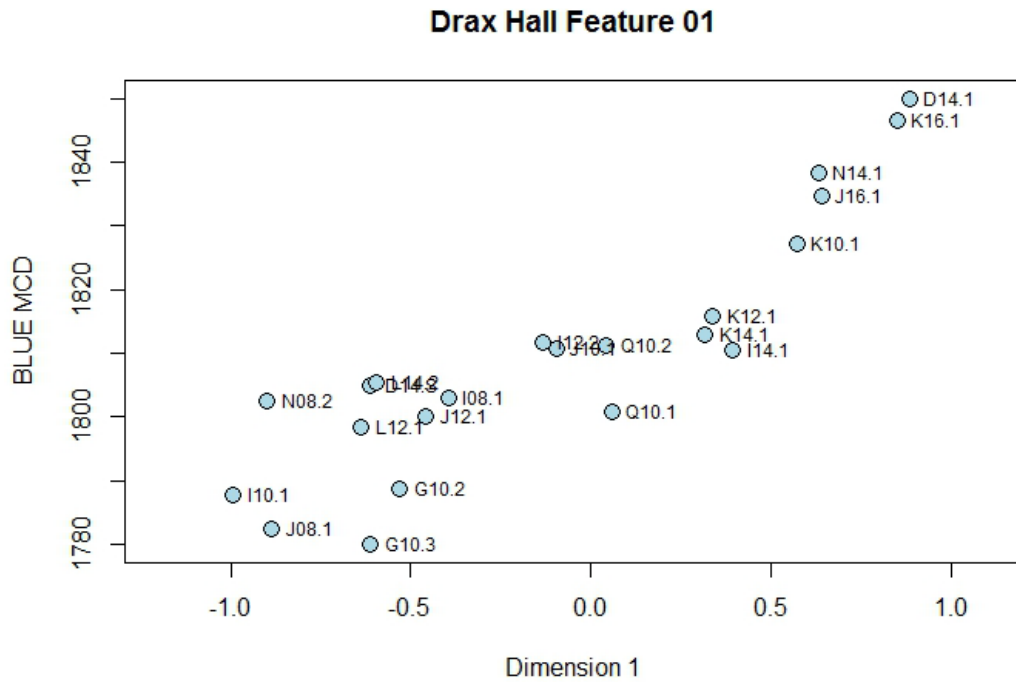


Figure 5.01 Plot of Dimension 1 scores and BLUE MCDs of Drax Hall Feature 01 ($p < 0.05$).

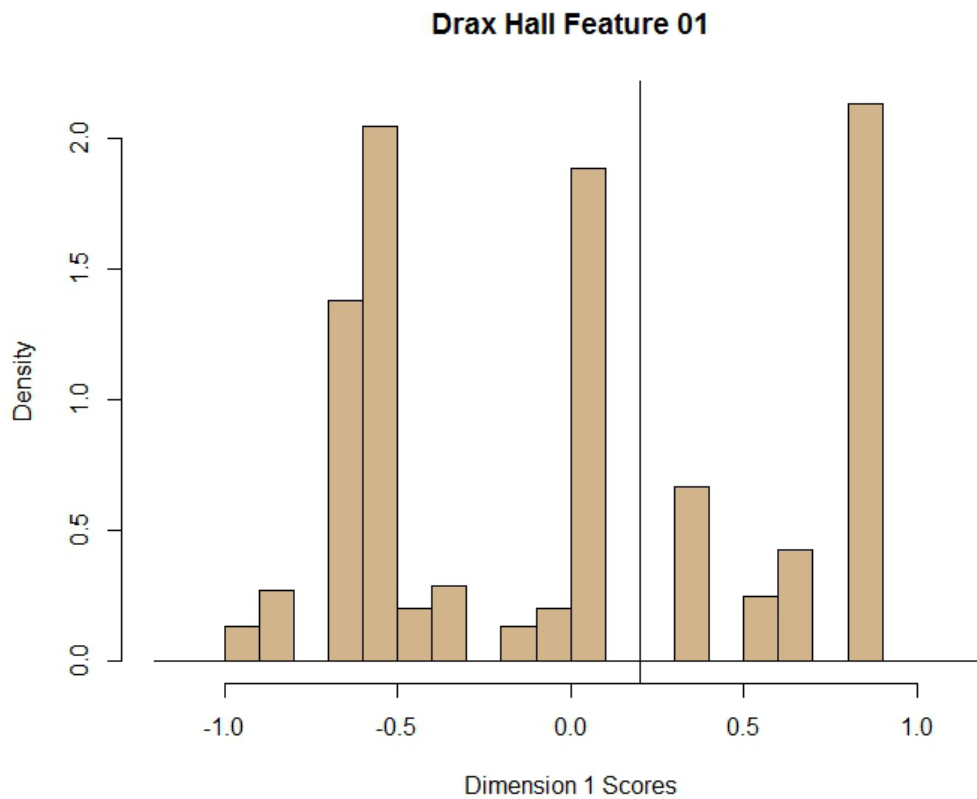


Figure 5.02 Weighted Histogram of Dimension 1 Scores and Ceramic Density in Drax Hall Feature 01.

For Drax Hall feature 52, the seriation plot suggests that the three main refined earthenware types (creamware, pearlware, whiteware) vary over time across the assemblages (Figure 5.03). However, the presence of British Stoneware, Delftware, and Staffordshire/North Midlands slipware across the assemblages suggests some mixing within contexts over time. The plot of Dimension 1 scores against Dimension 2 scores does not present a particularly identifiable pattern, and the ware type plot suggests that the types do not distribute across Dimension 1 as one would expect if that dimension reflected time. However, when the Dimension 1 scores are plotted against the BLUE MCDs from each context, the correlation value

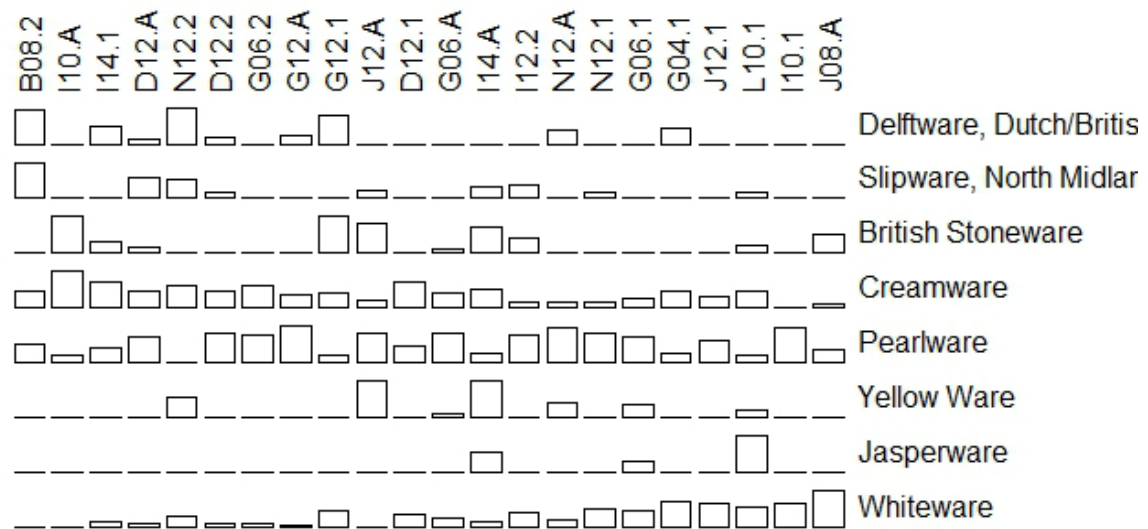


Figure 5.03 Seriation Plot of Primary Ware Types in Drax Hall Feature 52.

is much less than zero, suggesting some correlation between time and Dimension 1 (Figure 5.04). Several different scenarios are possible to account for this type of output. Since the Drax Hall village area likely was occupied over more than 100 years of the estate's sugar production history, the accumulation of ceramic material in and around house areas is expected, with early types such as Delft and Staffordshire slipwares in the same stratigraphic context as later pearlware and whiteware. In addition, taphonomic processes on the site may have contributed to the mixing of these materials. As Armstrong notes, in the excavation of feature 52,

soil accumulation was limited and the houses were built into the hillside such that erosion may have also resulted in the lack of distinction between occupation and overburden layers (1990:106-109). Despite this mixing, one earlier phase and one later phase are discernible in the weighted histogram of feature 52 Dimension 1 scores (Figure 5.05). While the associated BLUE MCDs for these phases appear to reveal a roughly twenty-year difference in median occupations, it is likely that the house was continually occupied throughout the early nineteenth century. Rather than an interpretation of strict calendar dates, the chronological distinction facilitates grouping within the assemblage to examine potential changes over time.

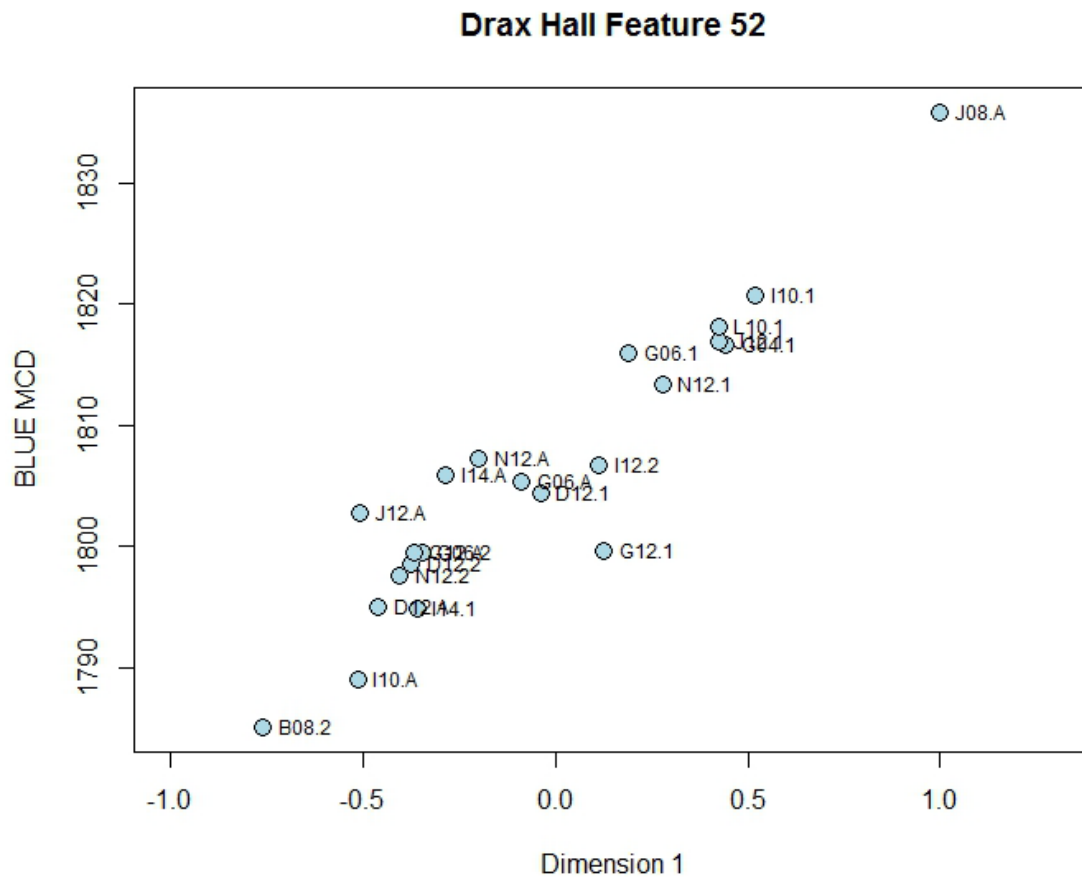


Figure 5.04 Plot of BLUE MCDs by Dimension 1 Scores for Drax Hall 52 ($p < 0.05$).

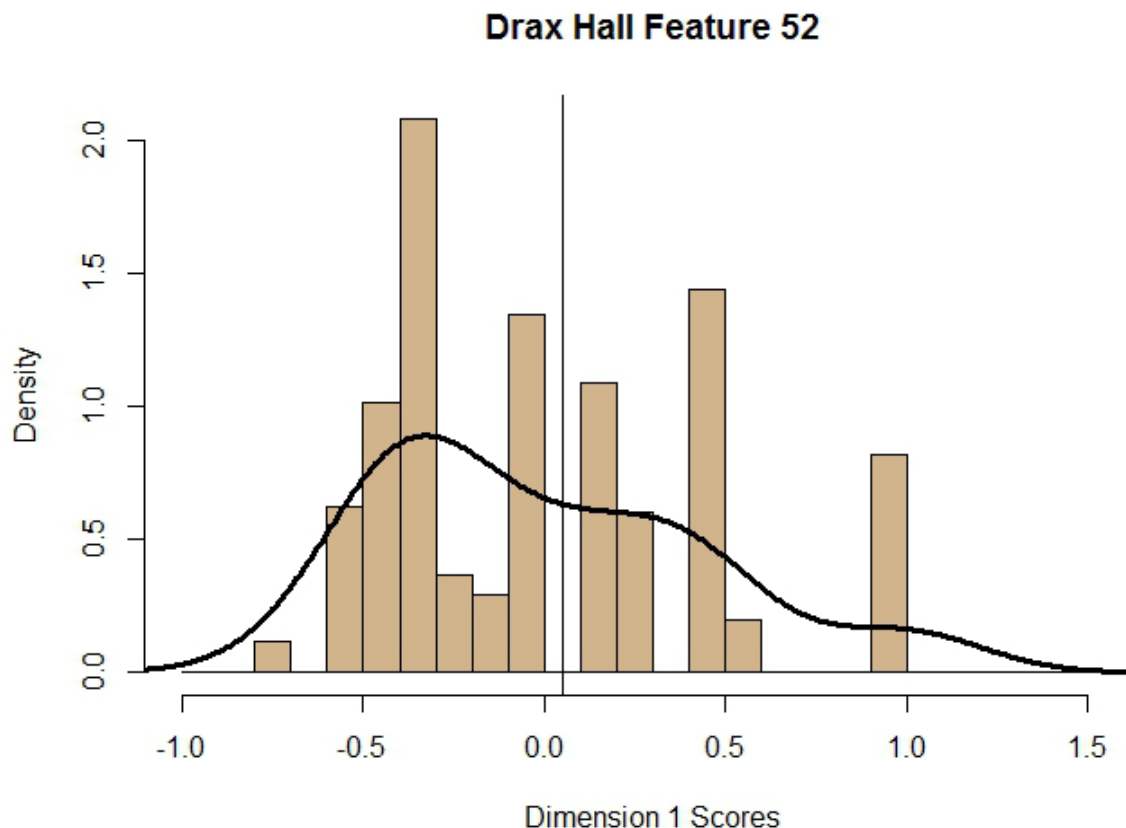


Figure 5.05 Weighted Histogram of Dimension 1 Scores and Ceramic Frequencies in Drax Hall Feature 52, with Density Curve.

Unfortunately, sample size and time-averaging issues complicated the process of dividing the other house areas into definite occupational zones. Drax Hall feature 15 contexts displayed no discernible ordering; the assemblage is dominated by whiteware in all contexts, accounting for 81 percent of the identified sherds with known manufacturing ranges (Appendix 1: Figure A.05). The continuous occupation of the village noted above likely accounts for the earlier ware types in the sample. Identified by Armstrong as a post-Emancipation structure (1990:116-124), the limited presence of other ware types across the feature 15 contexts suggests occupation of this house area after 1820 and the role of whiteware as the primary refined ceramic acquired by enslaved people and their descendants.

The CA outputs for Seville house areas 32 and 35 did not indicate a chronological ordering of contexts, unlike the distinct occupational patterning identified by DAACS in houses 15

and 16. House 32 and 35 contexts primarily consisted of the most common refined ware types of creamware, pearlware, and whiteware. At house 32, no discernible vertical or horizontal variation according to time is discernible in the contexts with sherd counts greater than five. The proportions of ware types, however, suggest that the house was not occupied after Emancipation. For house 35, neither Dimension 1 nor Dimension 2 correlated with time, despite some potential clustering along Dimension 2 evident in the CA plot (Appendix 1:Figure A.06). In this case, it is possible that the differences between contexts reflect a spatial rather than temporal gradient.

This approach to determining intrasite chronologies takes into account sherd counts and manufacturing spans to suggest the temporal relationship of contexts to one another. From here, the possibilities for intrasite stratigraphic and analysis of any artifact types are clearly abundant. Furthermore, intersite comparison is also possible, since all chronologies were developed using the same methodology. This approach thus facilitates the discernment of intersite patterning in ceramic acquisition.

Methods: Artifact Indices

In examining the distribution of decorative genres and vessel forms across the sites, we are concerned with measuring the variability within and between these attributes in the assemblages. In the same way as basic MCDs, historical archaeologists usually summarize and analyze their data using counts, relative frequencies, and minimum vessel counts (MVCs). As noted above, the goal of this study is to measure attribute variability; the number of minimum vessels does not contribute to the measurement of these attributes since they can be discerned at the sherd level. In this case, general cost estimations are based on the forms and decorative categories present in an assemblage, not on individual identified vessels. Given the predominance of the MVC approach in historical archaeology, one additional goal of this analysis is to demonstrate that a sherd-level, attribute-based analysis indicates measurable differences without the need for time-consuming cross-mending and vesselization.

Although relative frequencies suggest the general distribution of an attribute in a sample, the denominator values often contain their own degree of variability. For example, as the chronology data suggests, in many cases the total number of ceramic sherds varies according to occupation span and the type of deposits excavated (e.g., middens versus house floors or yard areas). Since the relative frequency is based on the assumption that a subsample of the population describes the population as a whole, it subsumes any potential variability. To measure variation, I employ an artifact abundance index (AI) method, which estimates an artifact group's (Artifact Group 1) discard rate relative to the discard rate of a single baseline artifact group (Artifact Group 2). This measurement is more reliable than relative frequencies since the baseline group either does not fluctuate with time, or fluctuates in a predictable way (Neiman et al. 2000; Galle 2006). This approach identifies a denominator value that fits these criteria and calculates an artifact index value for each attribute being measured.

The primary concern in creating the artifact indices is to find a suitable denominator class that does not vary with time or that varies in a predictable manner. In the given assemblages, I was limited in my testing to all ceramics, all glass, and all wine bottle glass as potential denominators based on the materials I reanalyzed from Drax Hall and Seville village sites. Each test determines whether there is any significant correlation between the density of individual artifact classes and time (see Appendix 3 for code example). Square root densities were calculated on the length, width, and depth (area) of phased assemblages. These densities are then plotted against the BLUEMCDs to determine whether any correlation is present. The correlation test I employed is a Kendall's tau rank correlation; in this case, when the p value is greater than 0.1 then there is no significant correlation with time (Galle 2006:168). I calculated the following p-values for each artifact class: all ceramics, p-value = 0.6787; all vessel glass, p value = 0.7825; wine bottle glass, p-value = 0.945. These values and associated plots indicate that none of the square root count densities significantly correlate with time for any of the artifact classes. I selected wine bottle glass as the most suitable denominator class in the artifact index since I verified the counts in my analysis of the Drax Hall and Seville assemblages. It is important

to note that the perceived lack of correlation with time for a given Artifact Group 2 may be influenced by factors such as site formation processes or site occupation spans. Given this concern, I interpret the abundance indices as a measurement of relative investment by enslaved people in the given Artifact Group 1. This interpretation differs in that sense from the method employed by Galle wherein the calculated artifact index values are construed as discard rates.

Ceramic Form and Decoration

Based on the variation in provisioning conditions, I would expect that enslaved people at Stewart Castle had more limited access to imported market goods compared to their counterparts at Papine and Drax Hall. To test this hypothesis, I examine relative investment in ceramic vessels according to aggregated form and decoration categories over time and across sites. I add four additional datasets that consist of house areas within the earlier and later village at Seville estate to provide further context with the primary assemblages. The lack of provisioning data for the Seville estate means that the conditions within this estate may be estimated based on the positioning of those assemblages in the larger sample. I expect that Stewart Castle assemblage consistently will have the lowest values across the more costly vessel categories, which include teawares, serving vessels, handpainted decoration, and transferprinted decoration. With more beneficial conditions in provisioning and thereby an advantage in producing surplus foodstuffs to sell at market, enslaved people living in the Drax Hall and Papine villages likely invested more in these costly ceramics.

Under the tea/table approach, identified vessel forms are separated into three categories: hollow tableware, flat tableware, and teaware. Sherds with form identifications of “Unidentified: tableware” and “Unidentified: teaware” were included in their respective categories. I did not distinguish between hollow and flat teaware, since the majority of flat teawares are saucers which were purchased as “sets” with either teacups or teabowls. An artifact index value for each category is calculated for each assemblage, with wine bottle glass as the denominator class. For example, the total number of flat tableware sherds in Drax Hall feature 01, phase 01 is 99, while

the number of wine bottle sherds is 445. This data provides an index value of 0.181985. For the same category, in this case flat tableware, the index values of each assemblage are plotted together with their BLUE MCDs. In addition, confidence intervals for each index value are calculated to indicate the reliability of the estimation procedure. The calculation performed here is based on Alan Agresti and Brent Coull's "add two success and two failures" (adjusted Wald) interval method which performs well with small sample sizes (1998). This plot facilitates identification of temporal patterns across the assemblages including differences between them.

Figure 5.06 depicts the abundance index values of flat tablewares through time. Each data point is an occupational phase of a site, and is color coded by site. The investment in flat tablewares clearly increases over time, which may reflect the decreasing cost of plates into the nineteenth century (Miller 1994 et al.). Two notable outliers on this plot are Seville house 16 phase 04, which shows higher value for its time period, and Drax Hall phases 01 and 02, which show lower values than contemporary sites. The plot of hollow tableware index (Figure 5.07) reflects similar values and an increasing trend over time. Here there is a greater distinction between contemporary sites from 1775 to 1813. This result indicates that the baseline abundance value for Papine and Drax Hall 52 was greater than Stewart Castle, Seville houses 15 and 16, which all increased over time. In general, the abundance values are roughly similar across all nine assemblages. The flat and hollow tableware values are also similar, with higher abundance of flat vessels at Seville, equal abundance at Papine and Stewart Castle, and higher abundance in hollow vessels at Drax Hall. Based on Howson's cost data, this result suggests that inhabitants of Drax Hall acquired costlier vessels. While this may be true for Drax Hall feature 52, the low values of Drax Hall feature 01 suggest a lower than average investment in both hollow and flatwares.

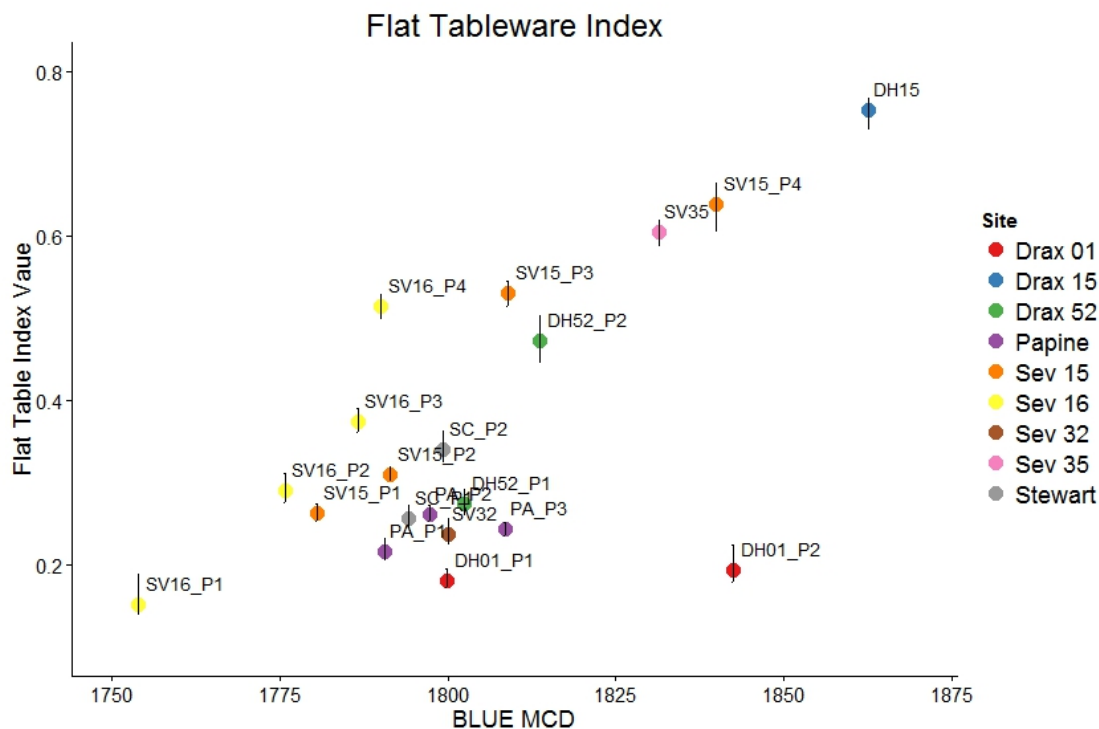


Figure 5.06 Refined Ceramic Flat Tableware Index Plot.

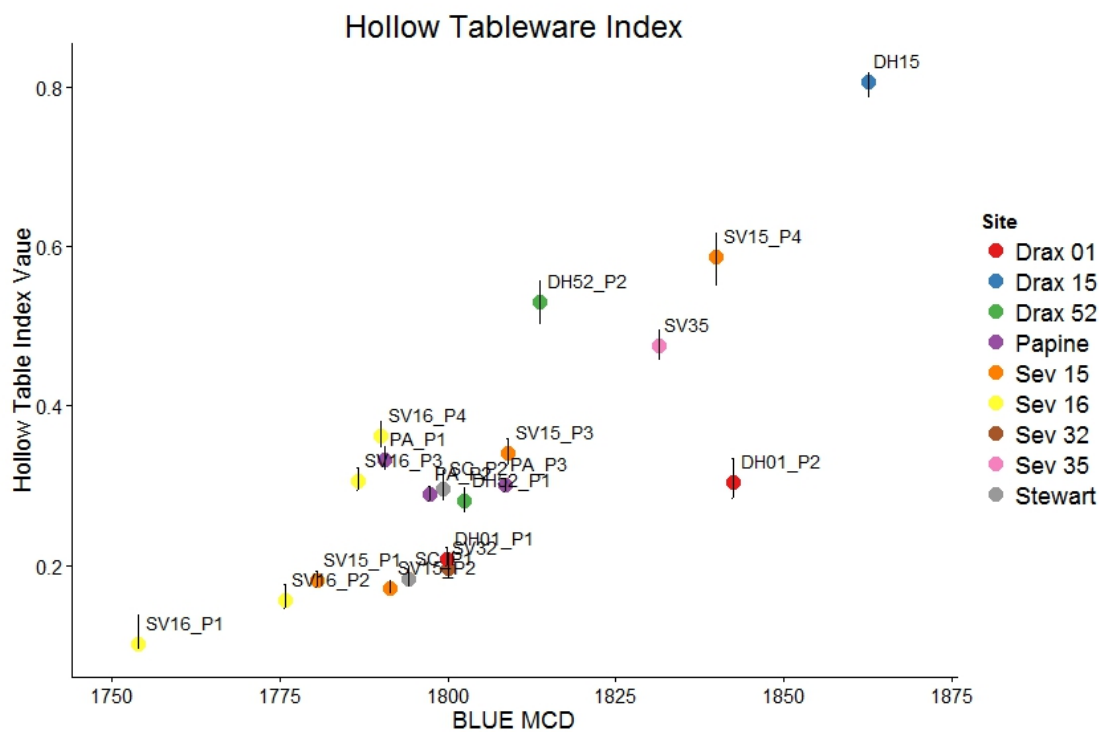


Figure 5.07 Refined Ceramic Hollow Tableware Index Plot.

For vessels associated with the tea or hot beverage preparation and consumption, there is considerable distinction across the assemblages (Figure 5.08). Abundance index values of these specialty vessels were higher at the Seville sites than the other estates, with Seville house 35 exhibiting the highest rate. At Drax Hall, the abundance increased over time, while at Papine it decreased over time. For teaware, Stewart Castle exhibits the lowest rates compared to contemporary phases at other estates, as expected. Given the high cost of these vessels relative to tablewares, overall they invested in teaware less frequently than flat and hollow tablewares. It is important to keep in mind the smaller sample sizes here, as reflected in the larger range of confidence intervals for half of the assemblages.

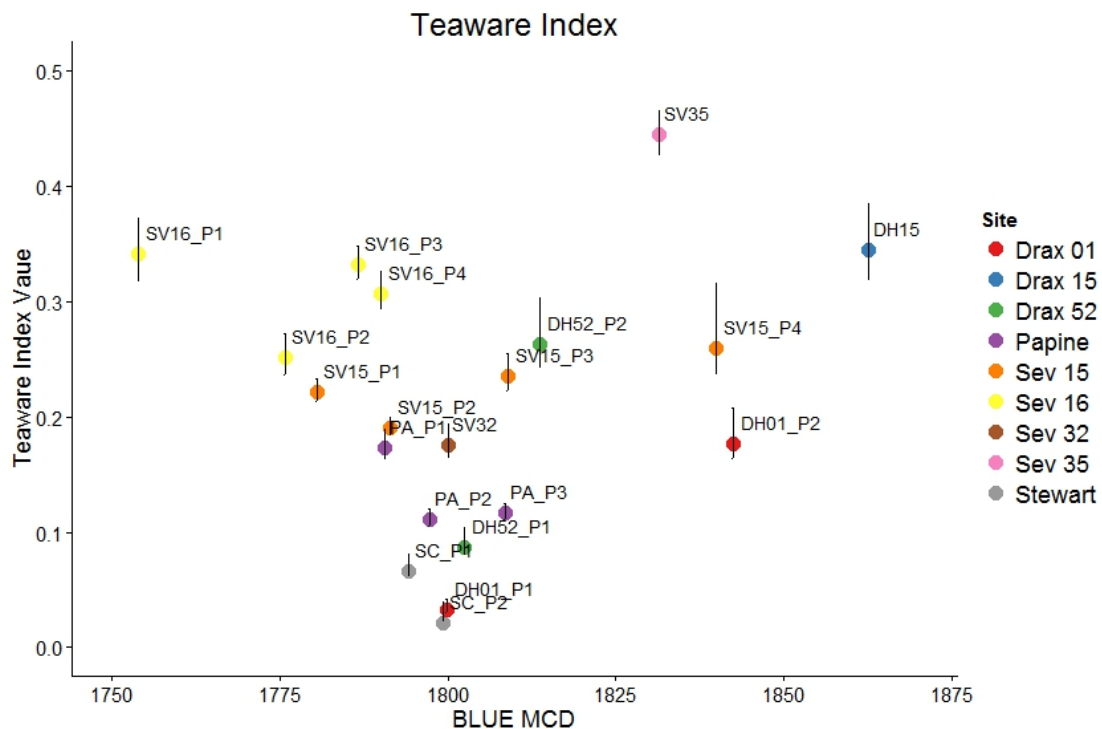


Figure 5.08 Refined Ceramic Teaware Index Plot.

Under the second approach, I examine the abundance of “dining” and “serving” vessels without distinction between hollow and flat vessels. The dining index values (Figure 5.09) produce a similar pattern to that of the flat tableware plot, with Seville sites (apart from Seville 32)

exhibiting higher values, the clustering of Papine phases, and the increase over time in Drax Hall phases. One difference in this approach is the increase from Stewart Castle phase 01 to phase 02, suggesting a possible improvement in access to vessels for daily consumption. The serving vessel plot is nearly identical to the teaware plot (Figure 5.10). This result is likely due to the fact that the number of identified serving vessels does not significantly contribute to the sample sizes of teawares, primarily teacups and saucers.

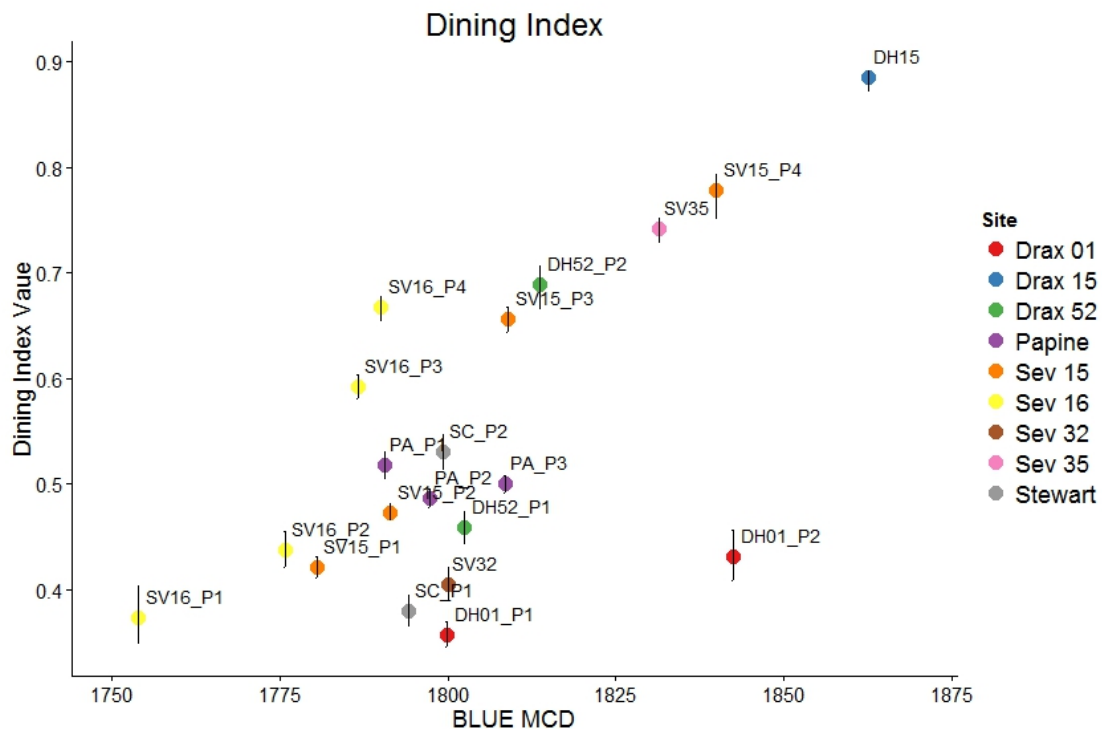


Figure 5.09 Refined Ceramic Dining Vessel Index Plot.

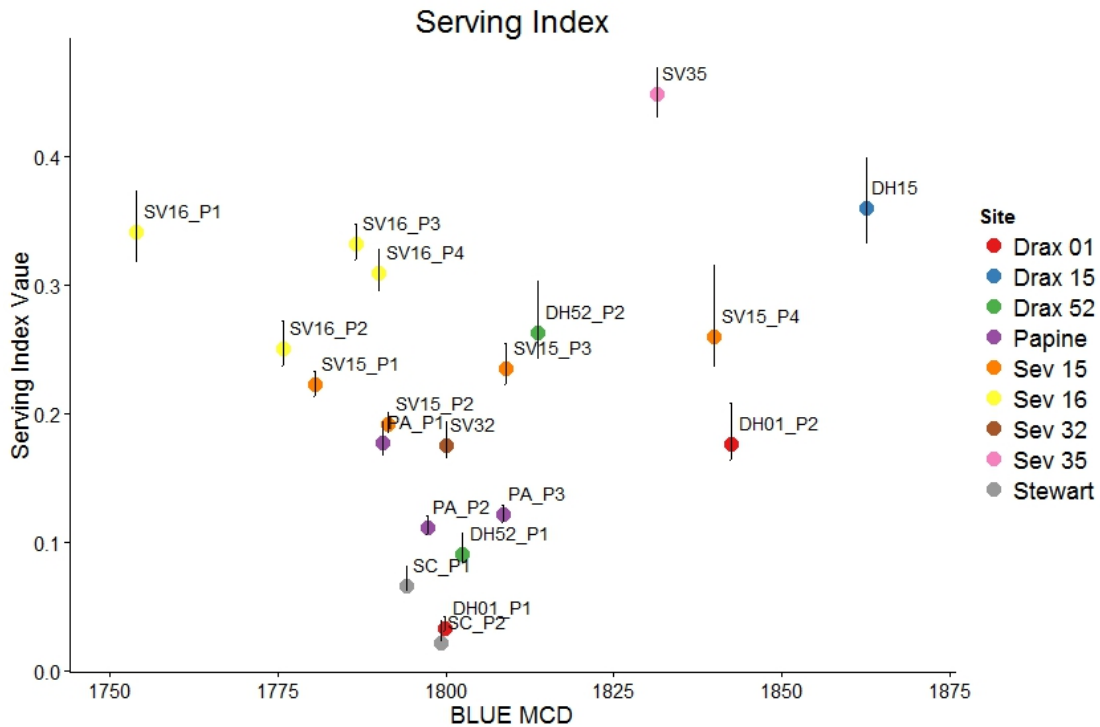


Figure 5.10 Refined Ceramic Serving Vessel Index Plot.

The two approaches highlight the degree of increase over time in the abundance of tableware or dining forms versus the variability in teaware or serving forms. The temporal increase in tablewares may reflect the steadily decreasing cost of place settings through the nineteenth century (Miller et al. 1994), such that availability and accessibility of these forms increased for enslaved people. Teawares, on the other hand, remained more costly. Intersite comparison indicates consistently higher index values for the Seville sites (greater than 0.2) and the later phases of Drax Hall sites. In examining contemporary phases with BLUE MCDs near 1800, we see that Seville sites exceed the value of Papine, with Drax Hall and Stewart Castle at less than 0.1. In this case, the Papine values indicate consistent investment in costlier wares compared to the Drax and Stewart values. The increase in Drax Hall abundance may reflect a shift in access to those costlier wares. These relative positions are tested in the examination of decoration.

Testing variability in the decorated vessels acquired by enslaved people on the four estates requires some aggregation of the detailed attributes recorded at the sherd level according to DAACS protocols. In this case, I examined the genre-level data without concern for the specific ware types of the sherds. For example, Factory-made Slipware consists of a set of decorative techniques applied to vessels beginning in 1785 and continuing until the twentieth century (Rickard 2006). Factory-made slipware thus spans four common refined ware types found on all the sites: creamware, pearlware, whiteware, and yellow ware. Given the small sample sizes of similar, individual decorative elements at the ware-type level, all refined earthenware, refined stoneware, and porcelain sherds were considered at the Genre level. Following this grouping, further aggregation of the types was necessary in order to support defensible comparisons of the assemblages due to sample size (e.g., three sherds of Royal Pattern creamware in Drax Hall feature 01). Within the R code, I assigned larger decorative categories to the specific genres recorded in DAACS. Fortunately, these categories generally correspond to the types identified by British manufacturers and colonial merchants discussed by George Miller and others. Specific color was one attribute which was removed from the comparison. For example, any sherd identified as “Shell Edge, Blue”, “Shell Edge, Green”, or “Shell Edge, unidentifiable” was subsumed under the decorative category of “Shell Edge.” Similarly, any transfer-printed sherd identified as a color other than Blue (which corresponds to a medium or dark blue or purple-blue) was assigned a decorative category of “Printed, other.” While black underglaze transfer-printing was introduced as early as 1790, most of the additional colors became popular after 1820 (Neale 2005).

I examine the four most common decorative categories across the sites in order of cost: Shell Edge, Handpainted, Factory-made Slipware, and Transferprinted. At first glance, it is clear that the shell edge index values (Figure 5.11) are not necessarily reliable as reflected in the large confidence interval range on most data points, some of which do not include the observed index value. The decrease over time is expected since shell edge decreased in popularity and production in competition with newly introduced techniques such as transferprinting. These low

abundance values are surprising, however, since shell edge is the least expensive decorative category in this sample. In that sense, the relatively higher value of Stewart Castle phase 02 assemblage is expected. Individuals at this site and Seville house 16 and 35 invested more in this type of decorated vessel than their counterparts.

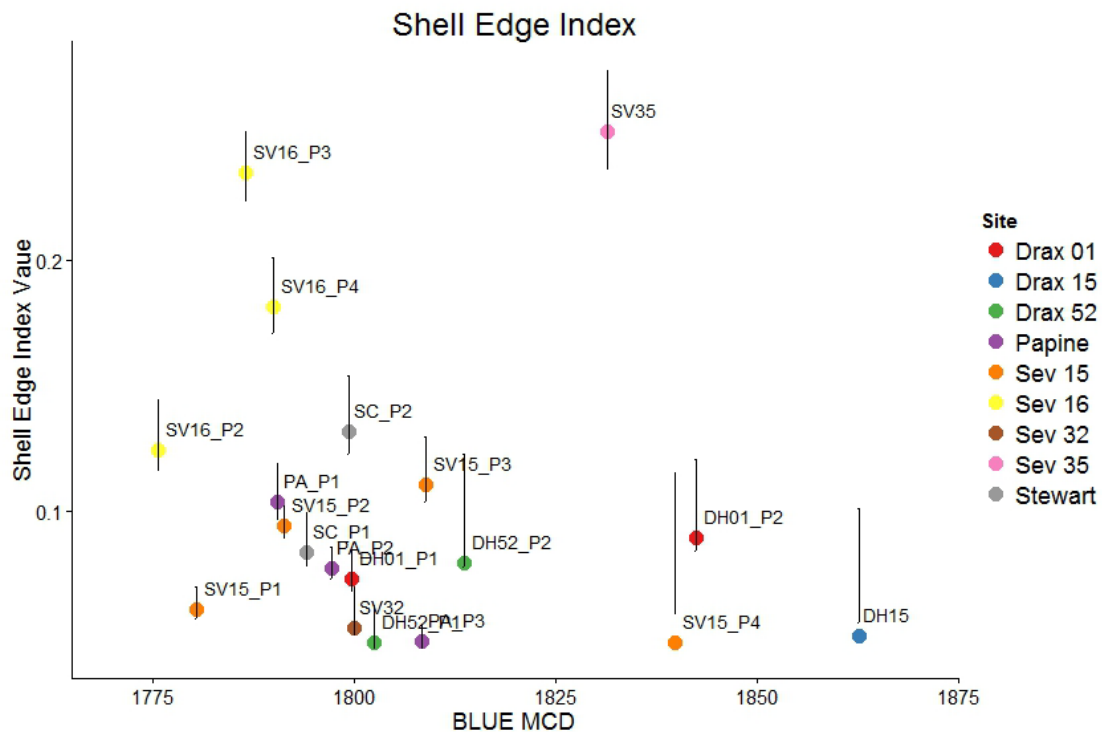


Figure 5.11 Refined Ceramic Shell Edge Index Plot.

I grouped handpainted decorations into two larger categories, handpainted blue elements and handpainted polychrome elements. Both of these categories include Chinese porcelain and English porcelain ware types. The sample sizes of these more costly wares were not large enough to examine independently from the more common refined earthenwares. The handpainted values indicate that most assemblages have an abundance value below 1.5, with Drax Hall 01 and Seville house 32 with the lowest values (Figure 5.12). Seville house 16 continues to include the highest values; this position is somewhat expected given that handpainted decorations on Delft and pearlware were more popular prior to 1800, before the rise

in slipwares and transferprinted vessels. Given the mid-range cost of these primarily hollow table or teaware vessels, the relatively greater investment in painted decorations by enslaved people at Stewart Castle is expected.

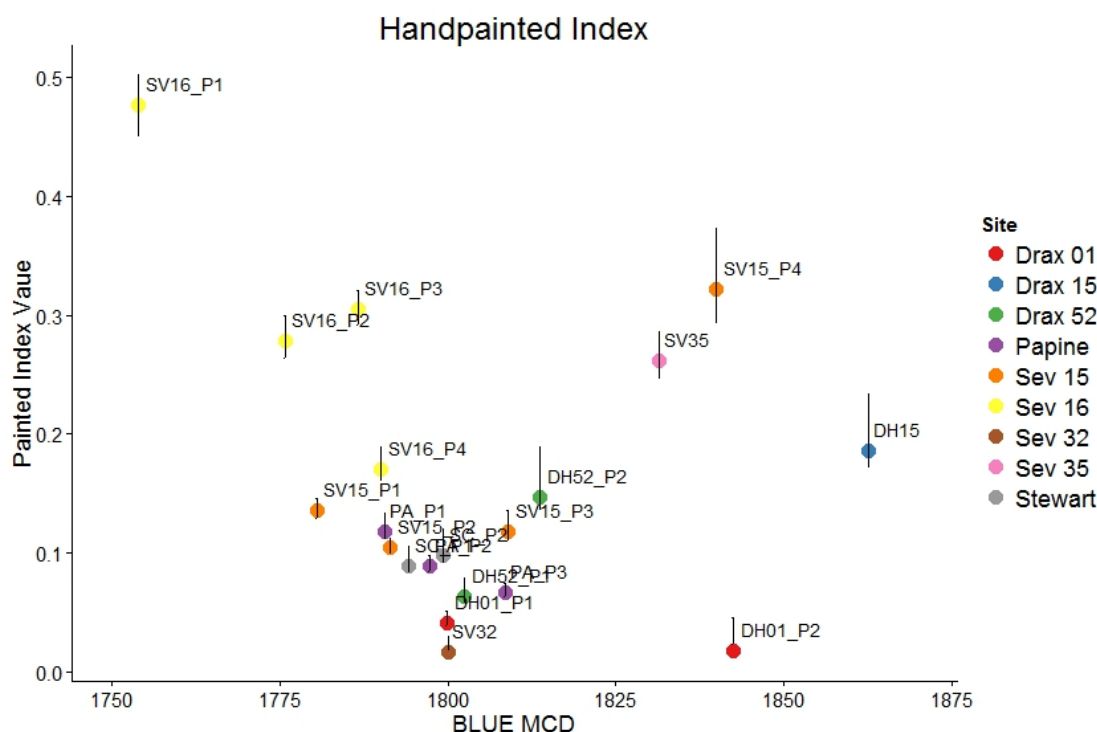


Figure 5.12 Refined Ceramic Handpainted Index Plot.

Factory-made slipware abundance values indicate several clusters of assemblages (Figure 5.13). First, Seville house 16 again includes the highest abundance values compared to contemporary assemblages, including other Seville house areas. Annular and mocha decorations were applied to pearlware-bodied, primarily hollow tableware, vessels after 1780. The second cluster of values fall below .6 and includes phases from Drax Hall, Stewart Castle, and Seville, with Drax Hall 01 and 52 exhibiting the lowest values after 1785. This cluster falls below the abundances seen in the Papine assemblages, Stewart Castle phase 2, Seville 15 phase 3, and Drax Hall 52 phase 2. Since slipwares were some of most expensive hollow vessels available in the market, these high values suggest that enslaved people at these sites invested their

resources in these vessels. The last group consists primarily of whiteware and ironstone sherds with plain slipped bands, a popular form of decoration on these later ware types.

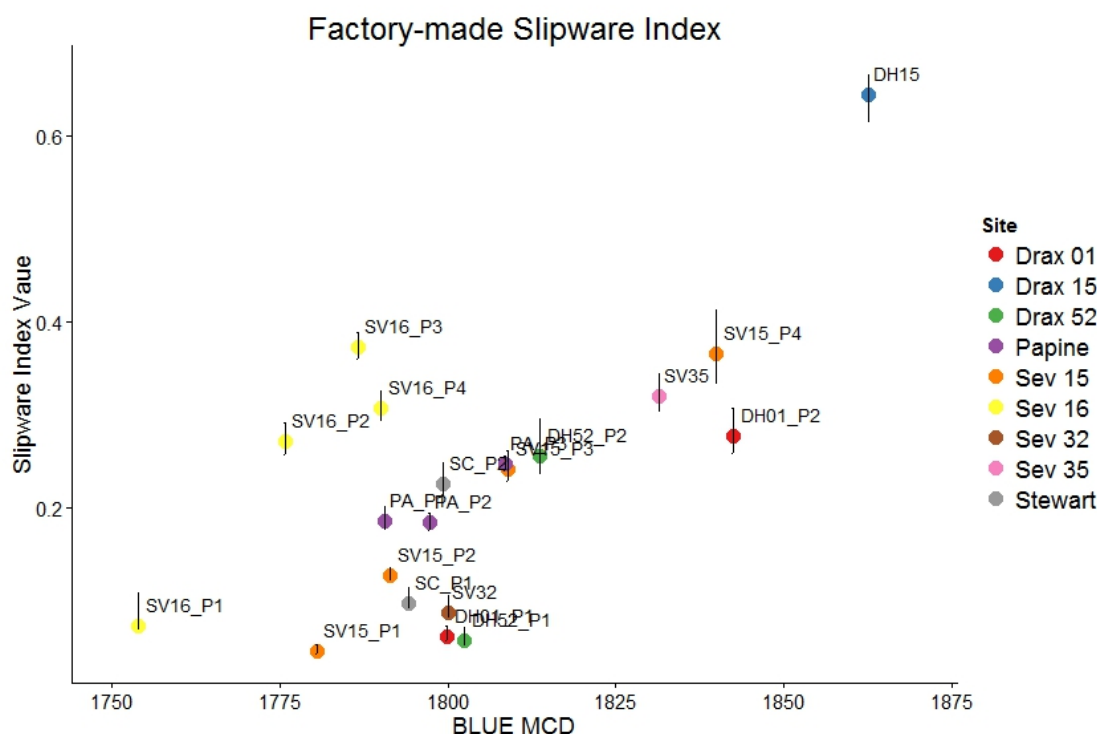


Figure 5.13 Refined Ceramic Factory-made Slipware Index Plot.

As the most expensive decorative technique on any vessel form, transferprinted vessels perhaps provide one of the best markers of a community's access to the market and expenditure of surplus resources (Figure 5.14). The most notable pattern is the increase in abundance of transferprinted values at each site, apart from Drax Hall 01. In consideration of the previous graph, enslaved laborers at Drax Hall 01 chose to invest in slipwares rather than transferprinted wares. The cluster of values around the value of 1.5 suggests that the assemblages prior to 1800 contained roughly the same proportion of transferprinted sherds. A distinct increase in abundance over time is discernible for Seville 15 and 16, Drax Hall 52, and Papine. While this increase may be expected as a result of the rapid rise in popularity of the transferprinted decorative technique (Sanford 1997), the cost data presented by Miller and Howson clearly indicates that the cost of

transferprinted wares remained high through the 1830s. The relatively high abundance values thus suggest a decided investment in these wares across all four estates. As expected, the Stewart Castle values are low for the sample at phase 01, but are comparable to contemporary sites at phase 02. Thus, while enslaved people at Stewart Castle invested to a greater extent in less costly shell edge and slip decorated wares, they also acquired the most expensive vessels available.

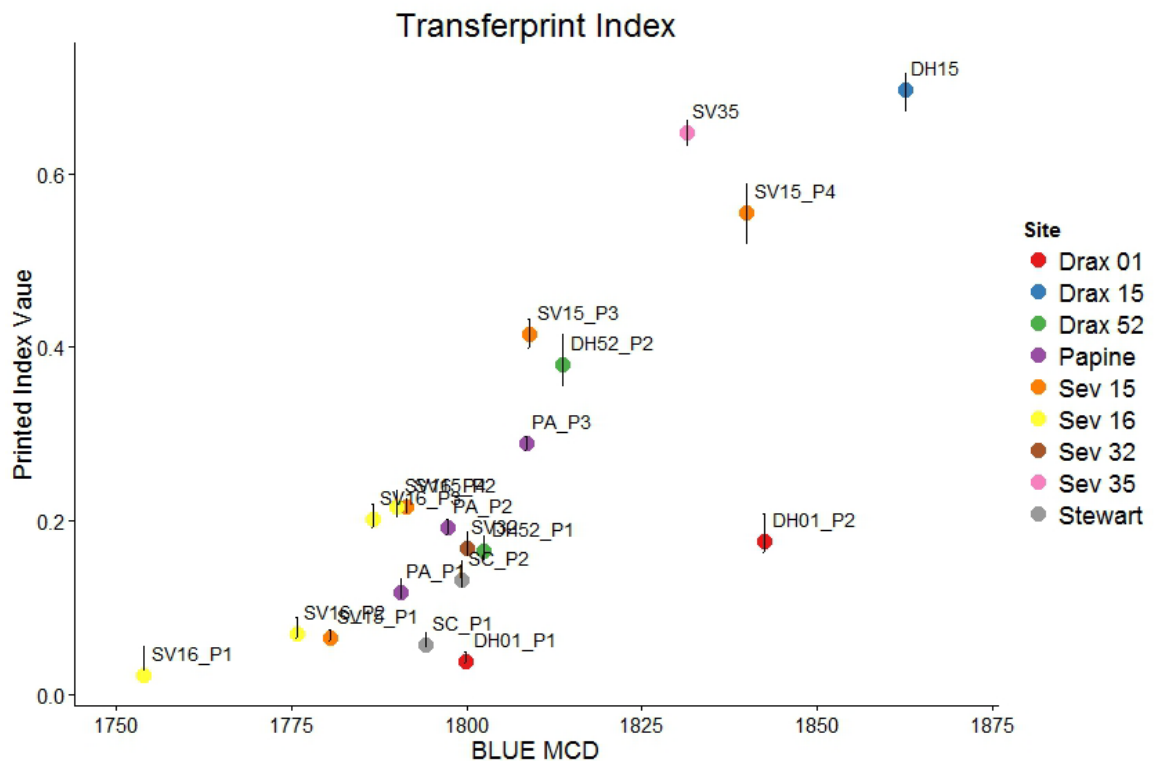


Figure 5.14 Refined Ceramic Transferprint Index Plot.

Approximating Investment in Decorated Vessels

Turning again to the Staffordshire price list discussed by Miller (1984b), I examine the average price of decorated vessel forms at each site. This approach provides a basic way in which to assess form and decoration within the sample and thereby evaluate the patterns noted in the form and decoration analyses noted above. Average price estimations are based on the

Staffordshire cost in shillings for decorated vessels (Table 5.02) and counts of identified sherds by form and decoration. Due to sample size limitations, I selected decorated bowls and flat tableware. A weighted average of all of the decorated sherds with an identified form is calculated based on the number of sherds present in each decorative form category. This weighted average thus reflects the average price of the particular decorated form within an assemblage. For example, in the Drax Hall 52 Phase 02 assemblage, 24 sherds of slipware, six sherds of painted, and 11 sherds of transferprinted bowls were recovered. Bowls with these decorations cost 2.5, 4, and 7 shillings respectively. The weighted average incorporates the relative difference between the sherd counts to approximate the average bowl price within the sample, in this case, 3.93 shillings.

Proponents of cross-mending, vesselization, and minimum vessel counts argue that a sherd-based approach includes the danger of double counting sherds that are part of the same vessel. However, by applying the same estimation technique to all of the samples involved, this approach produces a relative scale of price comparison. It also removes the often arbitrary and subjective identification of vessels from sherds that do not mend. In addition, this approach incorporates a larger sample of data rather than discounting sherds because they are not identifiable to a particular vessel. Debate about individual sherds versus aggregation by vessel is similar to the debate between the number of identifiable specimens (NISP) and minimum number of individuals (MNI) in zooarchaeology (Grayson 1978; Marshall and Pilgram 1993). While MNI assumes the presence of individuals based on paired or similar elements within a skeleton (a known entity), minimum vessel counts (MVC) assumes that sherds with comparable form or decoration, whether mended or not, reflect one vessel. In this way, like MNI, MVC tends to exaggerate the presence of less common forms or designs. The arbitrariness of the vesselization process and the lack of agreed upon standards upon which MVCs are calculated by different investigators complicate comparison across sites. An exception is the calculation of estimated vessel equivalencies (EVEs) that focus on identifiable sherds such as bases and rims (Orton et al. 1993). Small sample sizes for these completeness attributes in this sample precluded use of

this approach. In terms of MVC, the prohibitive cost in time and labor of cross-mending across excavated contexts outweighs any advantages of this approach. For these reasons, the estimation average price based on decorated sherds of identified forms is employed here.

Average vessel bowl price takes into account four decorative categories recorded in the Staffordshire lists: dipped, painted, Willow pattern printed, and printed with another pattern. For bowls, the price for Willow and other patterns is equal at seven shillings. Figure 5.15 illustrates the average decorated bowl price across the sample assemblages by time. A majority of the assemblages have a price of less than 4.0 and greater than 3.25 shillings. Outliers include Seville House 16 and Drax Hall 52; the values for these assemblages actually reflect a higher frequency of dipped sherds, the least expensive bowl decoration (Figure 5.16). In contrast, the most expensive decoration on bowls, transferprinting, is infrequent across all samples, resulting in averages after 1800 around 3.5 shillings. This result suggests that individuals at these sites invested in dipped and painted bowls to a greater extent than the costly printed versions. While this relative difference may be a function of market availability, the presence of transferprinted bowl sherds in 18 out of the 19 phased assemblages indicates that these vessels were available in local markets or from traveling higglers. In comparison to the results from the separate form and decoration analyses, the bowl price estimates suggest that enslaved people across the sites were investing a similar amount in these vessels. The distinction of Seville House 16 and Drax Hall 52 may indicate internal differentiation in those villages.

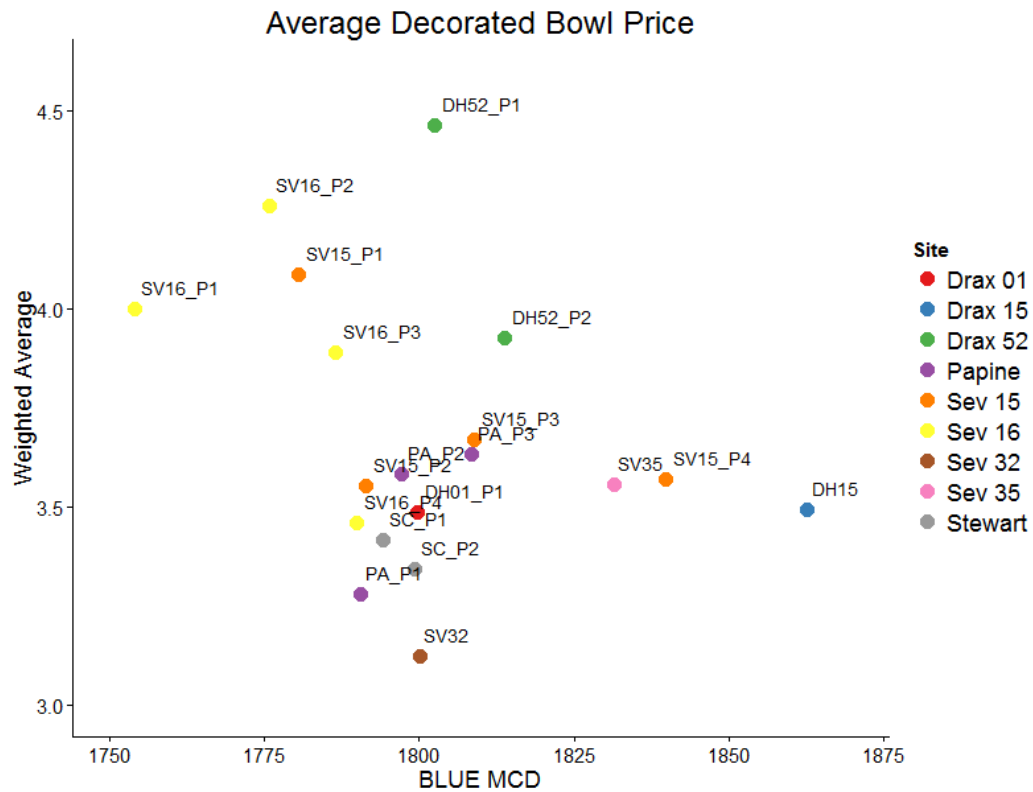


Figure 5.15 XY Scatter Plot of Average Decorated Bowl Price and Time.

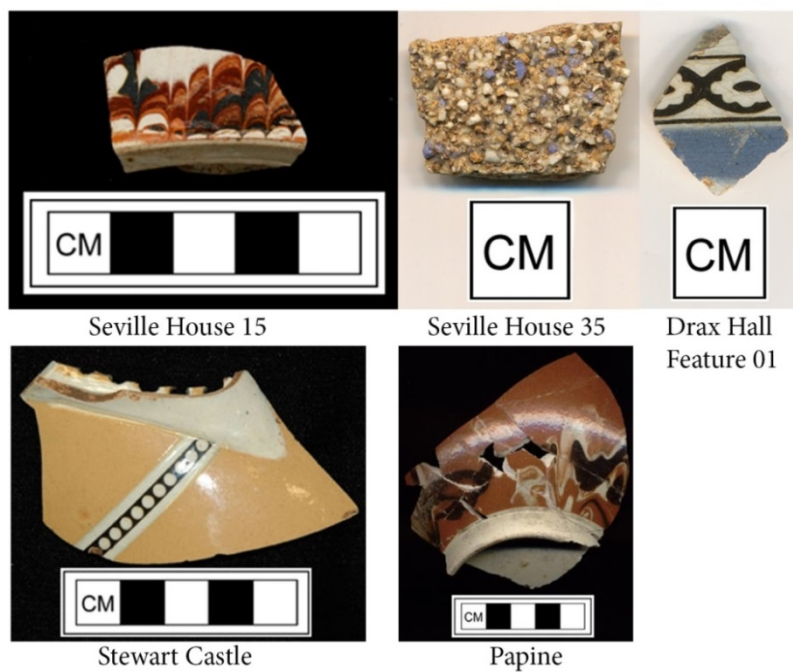


Figure 5.16 Examples of Slipware Decoration across the Sites.

Decorated flatwares include edged, painted, printed with Willow pattern, and printed with any other pattern. In this sample, “edged” includes molded edges with no applied color such as Royal or Queen’s pattern and molded edges with painted color such as Shell Edge (Figure 5.17). While infrequent, handpainted designs on plates and platters are present in this sample. Printed flatware garnered the highest price, with mass-produced Willow patterns cheaper (four shillings) than other patterns (five shillings). In similar fashion to the transferprint index, the resulting comparison of average decorated flatware prices reflects an increasing investment in this decorative technique (Figure 5.18), possibly suggesting a decrease in cost per plate over time. Comparison between sites indicates that Drax Hall 15 and 52, Seville House 15, and Papine Phase 3 exhibit the greatest average flatware price. In comparison of previous results, the Stewart Castle prices suggest that enslaved people on this estate invested in decorated plates to a comparable extent to their counterparts. In contrast, the average decorated bowl data suggests a smaller investment in this form.



Figure 5.17 Examples of Molded Edge Decorations at Seville and Drax Hall.

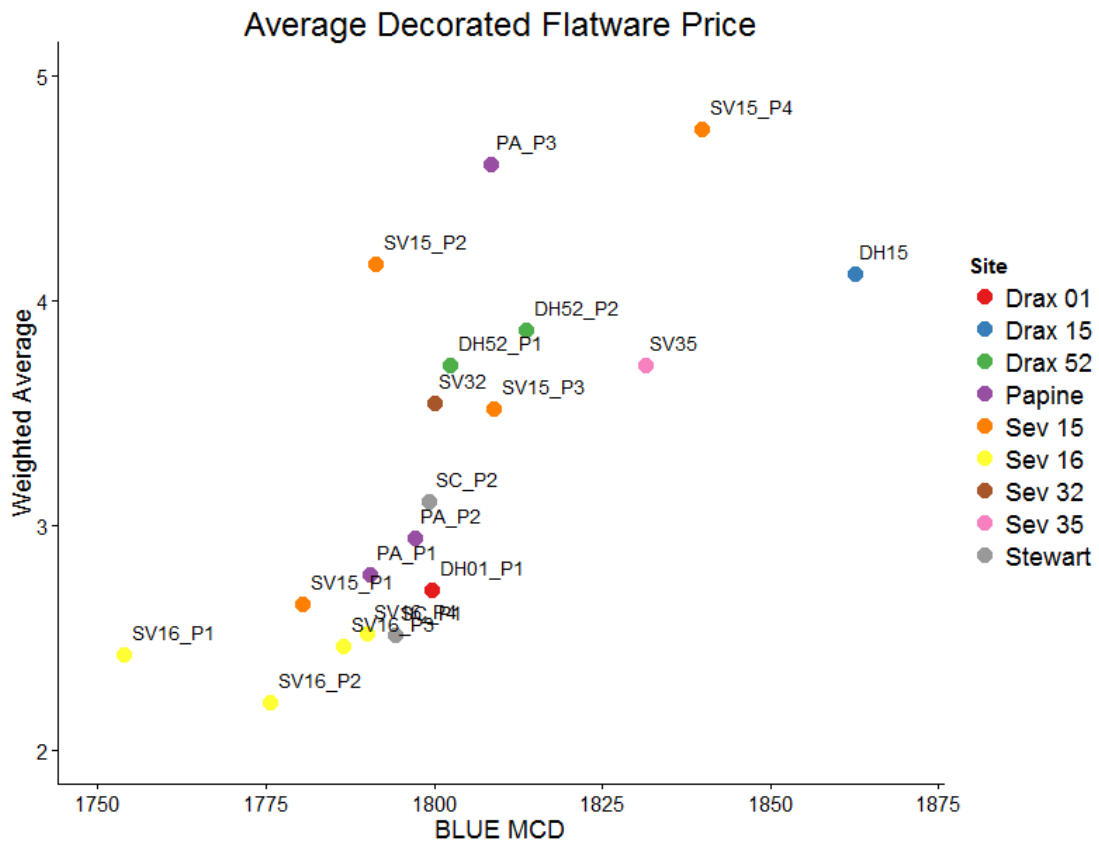


Figure 5.18 XY Scatter Plot of Average Decorated Flatware Price and Time.

Identifiable patterns across the sites suggest the availability and potential selection of patterns other than Willow. For example, Seville House 35 includes a pattern consisting of goats of various sizes (Neale 2005:22) and a pattern of a commemorative series entitled “Reflections on the Works of God” (Figure 5.19). While these patterns may reflect the choices of newly freed slaves after emancipation in 1838, the investment in these vessels suggests an ability to purchase some of the costliest ceramics available in the marketplace.



“Reflections on the Word of God” Series

“Goat” Pattern

Figure 5.19 Seville House 35 Identified Transferprint Patterns.

Overall, the ceramic form and decoration data presents a complex set of patterns within and across the sample sites. As expected, the Drax Hall values for costlier serving vessels reflect an investment in the latest decorative trends rather than cheaper alternatives. While the increase over time of some decorations is predicted, the increase in serving vessel and teawares suggests a possible positive shift in the opportunities available to enslaved people to access the market. Papine values remain fairly consistent across all of the attributes analyzed here, with investment in teawares to a greater extent than their counterparts at Stewart Castle and Drax Hall. For Stewart Castle, low values in serving vessels and teawares point to limited investment, while the relatively comparable acquisition of slipped and printed vessels suggest greater investment. In this case, it is possible that they selected according to decoration rather than form and function, Furthermore, the decorated vessel price suggests they invested more in decorated plates than bowls, the least expensive decorated form. Finally, the consistently high values in all attributes for the Seville data, particularly houses 15 and 16, indicate a level of access to the market beyond their contemporaries. The implications of these relationships are addressed in the following chapter.

CHAPTER 6: SYNTHESIS AND CONCLUSIONS

The central hypothesis of this project is that enslaved people who cultivated a greater acreage of provision grounds, with favorable cultivation conditions, and minimal travel distances, generated more surplus provisions and thus had greater access to the market and the goods and interactions therein. To evaluate this hypothesis, I address two central concepts in the context of the provision grounds: surplus and access. Surplus encompasses the actions of enslaved cultivators to benefit from the imposed task of independent food production. I begin with a model of plantation spatial organization that encompasses the provision ground conditions in the context of the planter's overall management. Michel-Rolph Trouillot (2002) argues that the plantation as ideal never existed as conceived. Instead, every plantation attempted to approximate an ideal type despite local limitations, "thus leading perhaps to different social relationships and creole traditions" (201). This argument applies to the model of profit, control, and surplus that I outline in Chapter 4; by identifying optimal conditions for the maximization of the three variables, I test whether three estate organizations exhibit these conditions.

Based on the comparison of quantified spatial data, I develop a set of expectations for the relative access to market of each enslaved community. Access incorporates the successful sale of surplus produce and, as a result, acquisition of market goods. To model access, I examine one set of market goods, refined ceramics, recovered from domestic sites in the Atlantic World. The manufacture of these objects represents the industrial growth in England and Europe fueled by Caribbean sugar profits. At the same time, their acquisition by enslaved people reflects Mintz's suggested "breach" in the exploitative system that governed their daily lives (1983a:113). The distribution of ceramic sherds in slave village contexts thus reflects the relative level of access to market that enslaved communities exercised. Integrating the results of the spatial and artifact analysis is the goal of this synthesis.

The profit/control/surplus model contains expectations for four related spatial parameters: suitability, proximity, centrality, and surveillance. I evaluated several aspects of each parameter

according to the needs of the planter and the slave. As Singleton (2014) and others have attested, the spaces maintained by enslaved people cannot be divorced from the overall landscape organization imposed by planters. I first examined the relationship between several landuse variables to determine the role of the provision grounds across a sample of thirty-three sugar estates. Surprisingly, the total size of the estate was not a significant predictor of cane or identified provision ground acreages. The frequent association between woodland and “Negro grounds” in the cartographic evidence suggests the possibility that these areas were open to provision ground cultivation. A positive linear relationship exists between total estate size and the acreage of these areas, indicating that slaves living on larger estates may have access to a larger potential provisioning acreage. Examining spatial variables in conjunction with the recorded populations of enslaved individuals from colonial records indicates a correlation in sugar output and size of the labor force. This survey of landuse variables also provides baseline comparative data for the analysis of the four spatial parameters in the three case study sites: Drax Hall in St Ann, Stewart Castle in Trelawny, and Papine in St Andrew.

The systematic evaluation of planter-based expectations at the sites indicates that the location of cane fields and the centrality of the mill were maximized, and the distance from the mill to the laborers’ village was minimized, at each estate. These three attributes support the expectation of a profitable organization for sugar output. In terms of control, the importance of the mill and beneficial cultivation conditions subsumed any desire for indirect observation from the planter’s or overseer’s house. Since a successful harvest depended on the smooth operation of activities in the mill, boiling and curing houses, planters focused attention on this area of the estate. At Stewart Castle, this organization relegated the domestic and cultivation sites to the outskirts of the plantation hub and maximized suitable soils, with village and provision grounds on the rocky loam ridges to the north. Similarly, at Drax Hall the village occupies the base of the limestone foothills, with access to the cane fields facilitated by an east-west highway serving as the boundary edge of the coastal plain. Potential provisioning acreage at Drax extends southward into the forested woodlands. On Papine estate outside the city center of Kingston, the village is

located on either side of the aqueduct that fueled the water mill to the southwest. This integrated arrangement maximized the profit and control parameters to a greater extent than the other estates.

In terms of surplus production, the expected conditions were fairly limited considering contemporary accounts of hilly, rocky land at the margins of the estate. Drax Hall and Papine arguably contained the more favorable location in terms of acreage, with above average marginal acres per enslaved individual. While the total number of individuals includes children and the elderly, it provides a defensible measure of the *potential* acreage available for provisions and thereby opportunity for surplus production. Stewart Castle provision grounds were limited to the identified provision grounds, with less than one acre for each individual. Suitability conditions for food crops in each of the provisioning areas were less than favorable. Despite greater water retention and rainfall at higher elevations, poor soils on uneven slopes suggest that erosion was likely a concern. The mixed cultivation in provision plots may have counteracted this tendency, though additional time and labor investment were required to maintain this arrangement. The provision ground conditions do not provide a clear ranking of estates according to suitability and proximity. For example, the enslaved community at Stewart Castle had adjacent access to their grounds, but these grounds were limited in terms of area and soil fertility. For Papine and Drax Hall, poor conditions and travel distances may have been offset by access to small plots of favorable suitability within the larger marginal areas. In this case, the data suggest that the ridgeline plots of Stewart Castle were the most difficult to produce a surplus.

Given these conditions, I develop a set of expectations for market access wherein the acquisition of costly goods reflects participation in the informal economy. Richard Sheridan referred to the cash crop market in sugar, rum, coffee and other cash crops operating in the island and the internal market of produce, meat, and crafts as the “dual economy” (1993). Barry Higman (1996) explored these two parallel economic systems through the legal restrictions that attempted to maintain separation between them by limiting the goods which slaves could sell and

the locations in which they sold and purchased their wares. In slaves' acquisition of imported goods manufactured in England, we see their direct participation in the consumer revolution that developed in the home and colonial communities during the eighteenth century (Galle 2006). These "status-linked commodities" in the households of enslaved individuals whose life and labor supported the merchants and manufacturers of England and Europe represent another example of Mintz's "breach" (Higman 1996:228). Thus one way to model access is through an analysis of the material culture acquired by market participants.

The provisioning parameters suggest that the enslaved communities at Drax Hall and Papine had more opportunity for surplus production and access to the market than their counterparts at Stewart Castle. To evaluate this hypothesis, I examine two measurable attributes of the refined ceramics commonly discarded in domestic contexts: vessel form and decoration. With the expanding production of ceramic vessels catering to the tastes of the elite and a growing middle class in the eighteenth century, market availability of costly wares necessarily increased. The work of George Miller (1984a and b, 1988, 1991, 2000) and others indicates that vessel costs varied according to form and decorative genre. The known relative hierarchy of forms and decorations facilitates an assessment of each attribute within the slave village assemblages of the three estates. I include a fourth site, Seville estate, with four household assemblages as an additional comparative sample. Patterns in form and decoration at some of the Seville house areas points to greater investment in costly ceramics relative to their counterparts at Drax Hall, Stewart Castle, and Papine.

Ceramic assemblage data is drawn from the previous analyses of these sites and my reanalysis for this project. This data is contained in the Digital Archaeological Archive of Comparative Slavery (DAACS) database. The standardization of recording and measurement across all three assemblages facilitates comparison of attribute-level data. The comparative analysis is also based on the digital nature of this data. The development of complex query and analytical code in the R programming language necessarily relies on a digital record of the

artifacts and their attributes. The R code is the ideal way in which to build site-wide chronologies and to identify patterns in the vessel form and decoration data. Modifying R code written by Fraser Neiman, I first developed mean ceramic dates for the reanalyzed sites: Drax Hall features (houses) 1, 15, and 52; and Seville house areas 33 and 35. Applying a technique developed by Neiman, Smith, and Galle, I found two identifiable chronological groups for Drax Hall feature 1 and feature 52 such that each house area contained two distinct occupational phases (Smith and Neiman 2005; Galle 2006). Seville 33 and 35 assemblages did not exhibit any defensible division of contexts according to time, suggesting a degree of time-averaging in assemblage formation with the inclusion of early and later types in the same contexts across the house foundations and yards.

I assessed form and decoration on the sherd level using an artifact index technique that generates a ratio based on an additional artifact type that does not change over time. For the assemblages considered here, the optimal second artifact class was wine bottle glass; across all four sites, wine bottle glass counts did not correspond to mean ceramic dates. Using artifact indices, I calculated values that serve as an approximation of slaves' investment in a given set of forms or decorations. Results of the form analysis indicate that specialty types such as teawares and serving vessels are a better indicator of difference among assemblages. The observed rise in tablewares, such as plates and bowls, into the nineteenth century likely reflects an increase in availability as prices decreased (Miller et al. 1994). It is possible, however, that this rise also may demonstrate aspects of amelioration after the turn of the century including an increase in the number of days allotted by planters for provision ground cultivation. The tea and serving vessel index plots are nearly identical (Figures 5.08 and 5.10). The Papine and Stewart Castle values remain relatively consistent over time, with phase 1 and phase 2 at Stewart Castle exhibiting the lowest level of investment apart from Drax Hall feature 1 phase 1. For Drax Hall features 1 and 52, I infer a greater investment in these forms over time based on the marked increase. In consideration of ceramic form, the data indicates that the Stewart Castle community invested more in tablewares than expensive teawares compared to their counterparts. The Seville houses

exhibit the greatest values for teaware and serving categories, suggesting a greater degree of market access.

Given sample size considerations, I concatenated data from the detailed recording of sherd-level decoration in DAACS into five decorative categories. These categories also have identifiable correlates in the price records of Staffordshire potters such that a relative cost hierarchy can be inferred (Miller 1984b). The results of this analysis indicate a similar overall pattern to the form assessment. Stewart Castle values for the cheaper decorations are often close to or greater than their counterparts, while they are much lower for expensive transfer-printed vessels. Generally the Seville sites exhibit higher than average values in each decorative category. The decoration plots, however, seem to provide a more nuanced illustration of the differences and similarities between the assemblages. The two most common decorative categories are factory-made slipware and blue transferprint. Within slipwares, the similarity in index values between Stewart Castle, Papine, Drax Hall 1 and 52, and Seville 15 and 35 is clear (Figure 5.13), reflecting a similar degree of investment across the four estates after 1800 (Drax Hall feature 15 remains an outlier). Greater differentiation is apparent in the blue transfer-print values; here Seville house 35 and house 15 phase 2 exhibit the greatest values. The relationship between data points suggests higher relative investment by enslaved people at Drax Hall and Seville than Papine and Stewart Castle.

The ceramic analysis thus contributes to an understanding of surplus and access by demonstrating variability in the acquisition of refined ceramic vessels. For the Drax Hall assemblage, index values of specialty forms and costlier decorations are consistently greater than those of Papine and Stewart Castle. The Papine values most often fall within the average values for the phased assemblages in the sample, while Stewart Castle values indicate investment in less costly forms and decorations. Overall, the ceramic data suggests the differentiation among the three sites according to acquisition of teawares and to some extent transferprinted vessels. These results tentatively substantiate the hypothesis that enslaved

communities with more provision ground acreage and beneficial conditions had greater access to participate in the internal market than their counterparts with limited resources. Consistently lower values in costly attributes suggest that enslaved people at Stewart Castle had more restricted access to the market, possibly based on provisioning constraints.

In comparison with the three primary sites, the Seville house areas exhibit greater investment across all of the categories. While no spatial data on the provisioning conditions at Seville estate is extant, this data supports the possibility that enslaved people on this estate had more opportunities to produce a surplus than the three estates reviewed here. The consistently higher index values across the form and decoration categories indicate significant investment in these goods relative to their counterparts at other estates. Variability in investment occurs with Seville houses 33 and 35, which Armstrong and Kelly (2000) identified as part of the “later” village within a more organic arrangement of houses (see also Armstrong 2011). Several possibilities may account for this difference: a change in provisioning strategies, an increase in rationed food as part of amelioration, or the shift to “paid” labor after 1838 that limited former slaves’ expenditures. The ceramic analysis reveals these patterns in acquisition and suggests new avenues for research of other artifact types and market participation.

My approach to investigating how enslaved people capitalized on an exploitative system through spatial parameters and ceramic attributes is useful in its comparative examination of quantitative data. Similar studies that address provisioning and market activity (Delle 2014; Galle 2011; Hauser 2014a and b; Howson 1995; Reeves 1997, 2011) also analyze archaeological data from village areas. This project contributes to these interpretations of the provision ground system by testing hypotheses about spatial organization and goods acquisition in a comparative assessment of estates across Jamaica.

While developing a comparative approach may seem obvious given its utility, the challenge is to ensure that the data are comparable to rule out the introduction of other variables. Selection of measurable attributes is essential to this process. There are several aspects of the

provision ground system that did not meet this requirement, such as the permissions to travel instituted by the planter, differences in the availability of ceramic types between market centers, and individual obstacles to cultivation and travel including illness and age. Clearly these factors influenced whether individuals and families produced a surplus, carried that surplus to market, and purchased imported goods. Without quantifiable estimations of these variables, however, they cannot be included in the model and remain questions for future research. In this case, I restrict the analytical variables to the landscape organization imposed by the planter, suitability and proximity of provisioning land, and the material outcomes of market surplus in ceramic objects.

Each set of data presents challenges in comparability. Matthew Reeves (1997, 2011), Jillian Galle (2011), and Mark Hauser (2014b) address plantation factors controlled by the planter as points of differentiation. Reeves draws his differences from plantation type, sugar versus coffee, the time restrictions on the former group to cultivate provisions, and labor expectations in sugar cultivation. He argues that these differences placed sugar estate workers at a disadvantage in acquiring market goods. Galle examines time and labor differences in a comparative analysis of Chesapeake and Jamaican sites, concluding that the pressures on slaves living and working on sugar estates limited their access to costly goods. Hauser argues that differences in familiarity with and knowledge of farming and crops between newly arrived, African-born slaves and Dominican-born slaves resulted in disparate surplus production.

The spatial data in my research holds labor expectations relatively constant. While the Accounts Produce data indicates differences in output of sugar production between the three estates, the labor and time expectations in cane planting, cutting, and processing were likely very similar. Given this controlled parameter, I focus on topographic and organizational variables to estimate actual conditions of cultivation based on a synthesis of historic and modern data. Extracting this data from comparable sources ensures that the correlations drawn between them are defensible.

One way to establish comparability in archaeological materials is temporal control. Accounting for diachronic change in the ceramic assemblages is crucial to understanding their distribution along other variables. If time is not considered, averaging across an assemblage may obscure patterns by concatenating contexts that contain discrete evidence of changes in occupational phase. The benefit of focusing on ceramics in an assemblage is the known manufacturing dates that provide a method for approximating site phases, namely mean ceramic dating. These estimations are possible because of standardizations in the recording of materials from across sites that were excavated by different investigators using different methods. Careful recording according to established protocols ensures that identifications of attributes such as ware type and surface treatment are consistent across catalogers. Developing chronologies based on materials recovered from STP surveys necessarily requires adjustment in the raw counts of artifacts. The smoothed data is then considered in the phasing of the overall site, in this case Stewart Castle and Papine villages. The technique for developing the chronology is otherwise the same across all sites. Accounting for chronological differences is particularly necessary in ceramic analysis since ware types and decorations change over time. This factor is not considered by Howson or Reeves.

In a similar fashion, comparison of form and decoration attributes also requires an underlying structure of the necessary and sufficient conditions present to identify a single sherd to a known form and genre, such as a transfer-printed bowl or a Shell Edged plate. These conditions are outlined in the DAACS cataloging manuals, again assuring consistency across catalogers. I concatenated forms and decorations into larger categories after the cataloging of individual sherds, based on patterns in the sherd-level data and correlation with the historic price information.

Relying on quantified archaeological data to evaluate hypotheses avoids the pitfalls associated with basic relative frequencies typically used by historical archaeologists (e.g., Delle 2014, Hauser 2014a, Howson 1995, Reeves 1997). Since the total number of artifacts of an

artifact type may fluctuate with time, using these counts as the basis of a ratio may introduce uncontrolled variability into the frequency estimates. By accounting for time with detailed chronologies and denominator values that do not vary with time, we can improve on statements such as Hauser's about "a hazy idea that the assemblage seems to be less intense and less diverse" in comparison (2014a:61). The development of analytical strategies to test variability within and between assemblages must be based on the comparison of measurable attributes.

By analytically approaching research questions with real world archaeological data, we can generate models for testing hypotheses. In this way, this project speaks to the debates about creolization and African retentions in its focus on concrete approaches to material culture data and archaeological context. The question becomes, what would an "African" or "creole" pattern in an assemblage look like? Identifying a decorative motif or color on a vessel as reflecting "African" sensibilities raises more questions than answers in understanding marketing and consumption patterns of the enslaved. Establishing expectations prior to analysis is key to the success of demonstrating that historical archaeological data can reveal information about the recent past. In this way, I support Braithwaite's and Bolland's assertions that the social relations in which people engage in activities as responses to the environment and each other are more important to understanding slave and post-emancipation societies than survivals or retentions (Braithwaite 1971; Bolland 1998). James Delle (1999) elaborates on this argument by demonstrating that the creole as identity was drawn from a complex series of interactions between individuals through the media of space, material culture, language, and foodways. My research supports these conceptions by modeling the conditions under which these interactions occurred within the context of surplus and access.

The central goal of this project addresses the strategies that enslaved people developed to exploit a system designed to extract their energy and labor in all aspects of life. Following Mintz's assertion of the internal market as a "breach" in the slave system (1983a:113), I argue that the production of surplus and access to the market were primary points at which slaves

asserted customary rights (McDonald 1993) to property in the form of land and goods. The series of actions encompassed in the provision ground system complicates restrictions related to slaves' "legal personality" and the lack of legal recognition of their "capacity for choice and action" (Klein 1971:83). The contradictory nature of slaves' assertion of rights exhibited in their daily choices and actions is a compelling impetus to examine the variability between the experiences of enslaved people. Models that incorporate slave actions thus summarize and evaluate the factors that influenced this variability.

Hypotheses must also incorporate the goals of the planter in labor extraction and cash crop production as part of the overarching slave system. This recognition, however, does not negate the evidence that slaves exerted their rights, particularly in property ownership and inheritance. Reviewers criticized Roderick McDonald's extensive comparison between conditions of slavery on sugar estates in Louisiana and Jamaica for "treating the slaves' internal economy as if it were independent of the relations of domination and exploitation that characterized the larger plantation political economy" (Pargus 2006:373). This critique highlights the tendency of economic history to favor the ruling power. The very fact that these two systems, Richard Sheridan's "dual economy" (1993), existed and arguably expanded at the same time is one of the more intriguing aspects of slaves' role in the market economy. Despite the overwhelming circumstances set against them, enslaved people exploited self-provisioning to their advantage, as well as to the planter's benefit in cost-cutting and supporting the internal market economy. While McDonald may not have contextualized his argument effectively, his study successfully examined the importance of a primary aspect of slave life, namely the "prerogative of deriving personal gain from their labor" (McDonald 1993:18). One may argue that these actions merely support the continuation of the forced labor regime in that slaves provided their own basic subsistence during "off-time" under the command of the planter and more broadly the economic demands of the colonial power. At the same time, we see that slaves took advantage of this expectation to travel within and beyond the plantation, to maintain their grounds and claim possession of "*their own*" crop (Senior 1835:41, emphasis in original), and to purchase some of

the costliest goods on the market. These choices and actions certainly point to strategies developed to counteract exploitation.

This concept of adaptive strategies in the form of ownership and acquisition bring us back to the idea of proto-peasantries and the parallel modes of production occurring in the Jamaican economy (Delle 2014; Mintz 1961, 1974, 1978). As Mintz convincingly argues, these actions “contributed both to the effective operation of the [slave] system on the one hand and to its progressive weakening on the other” (1974:212). He also interprets these actions as a form of resistance (Mintz 1983a:116), which they were certainly in the context of the institution of slavery. At the same time, the reduction of the production of surplus and exercise of access to “resistance” overlooks the innovative and far-reaching nature of their actions in developing an economy outside the bounds of the plantation. Mintz clearly does not limit his treatment of slaves’ capitalist production to resistance, but his inclusion of the term raises questions about the outcomes of slaves’ “weakening” of the system. Planters convinced themselves that the provision ground system tied enslaved people to the land through a sense of ownership. At the same time, enslaved people’s fundamental role in the internal economy secured their position as a social and economic group capable of directly (e.g., *maroonage* and rebellion) and indirectly (e.g., property ownership and marketing) challenging the subjugation imposed by European elites. Mintz argues that these actions also laid the groundwork for the formation of peasantries from enslaved communities and their descendants. While the connections following emancipation seem clear, the development of the family land system, the slow recovery of the economy, and the influx of other labor from the East Indies complicate any linear interpretation of freedmen as peasants over the tumultuous period (Besson 1987; Emmer 1995; Heuman 1981; Mintz 1979; Olwig 1999). These and other changes in economic and social structures necessarily occurred in the post-emancipation era. At the same time, the strategies of surplus and access continued to govern subsistence farming concerns (e.g., Pulsipher and Goodwin 1999).

In addition to these more specific inferences, my project also contributes to debates within landscape archaeology and historical archaeology on the nature of data sources and analysis. The trend over the last fifteen years to incorporate Benthamite and Foucauldian frameworks into studies of spatial dialectics has influenced inferences about how visibility and surveillance were instituted in the past. The development of GIS techniques to model these organizational parameters already existed in the world of city planning and logistics. Applying these analytical techniques to archaeological data is an ongoing research focus that also includes historical archaeology sites. As noted above, organizing and visualizing comparable data begins by finding the methods by which to address research questions. For the map analysis discussed in Chapter 4, the suite of spatial analyst tools in ArcGIS software was an ideal package for exploring the relationship between the historic estate landscapes and the people who lived and worked there. This project offers one approach to evaluating whether theories of elite organization and surveillance apply to actual instances of agricultural and built environments.

My approach to documentary and cartographic evidence is at heart an anthropological one. This approach summarizes observations about enslaved people's daily life and, based on measurable data, infers their experiences with the landscape, labor, and time. Evaluating these experiences with the material outcomes of market participation suggests how enslaved people developed strategies to manage available resources. This approach would not be possible without multiple lines of evidence and an integration of these datasets. Furthermore, my analysis reexamines texts and artifacts traditionally associated with the colonial elite (planters and managers) to view them in the context of enslaved people's choice and actions. The original function of the survey plats was to record the land owned by the planter for insurance or management purposes. Beneath this basic functionality, the inner workings of an estate and its people are discernible by applying a different perspective and modern analytical tools. Characteristics of their domestic and agricultural spaces, as well as the paths of movement they traveled, suggest slaves' experiences with a landscape designed for profit and control. In a similar way, the refined ceramics produced in China, England, Europe catered to the tastes of

elites and a growing middle class increasingly reliant on the “sweetness” grown and processed by Caribbean slaves (Mintz 1985). Enslaved people’s eventual acquisition of the costly vessels developed for the home market is “hardly to be expected under such circumstances” (Mintz 1983a:113-114). These tangible markers of slaves’ capitalization of a brutal regime represent a negation of their status as little more than property. The idea that contradictions like this one, or dialectics in Delle’s conception, existed alongside the dominant plantation economy demonstrates the fundamental flaw in forced labor, namely the assumption of subordinate status. The documentary and archaeological evidence of these practices are essential sources for investigating the instances of these contradictions on the ground.

APPENDICES

Appendix 1: Additional Figures

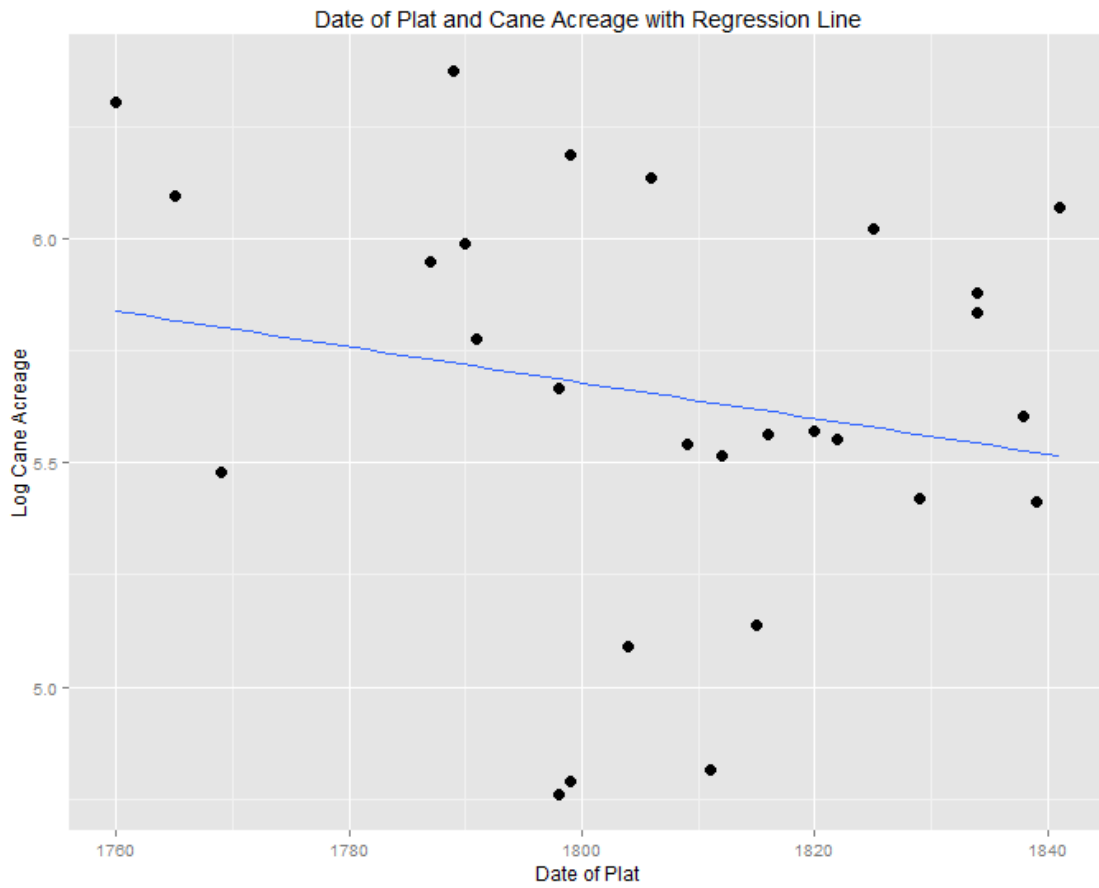


Figure Appendix 1.01 XY Scatter Plot of Cane Acreage and Date of Plat, $R^2=0.4898$.

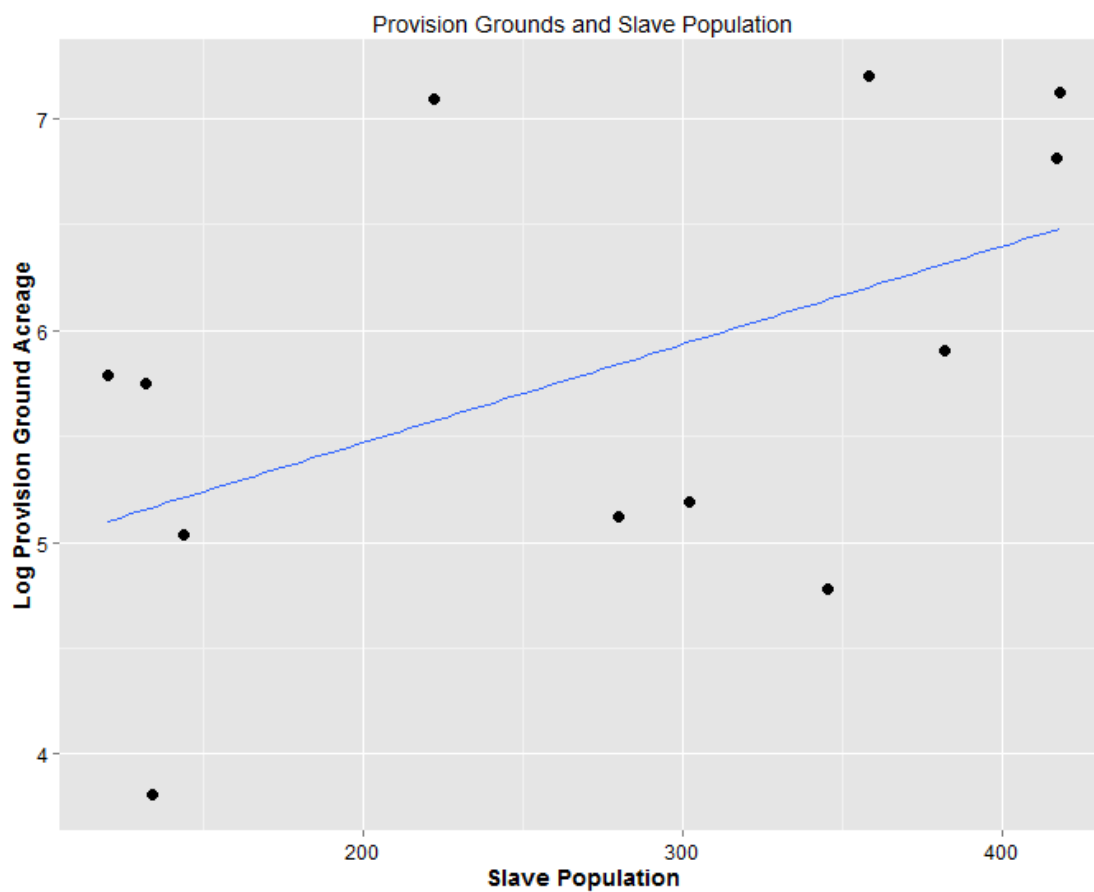


Figure Appendix 1.02 XY Scatter Plot of Provision Ground Acreage by Slave Population.

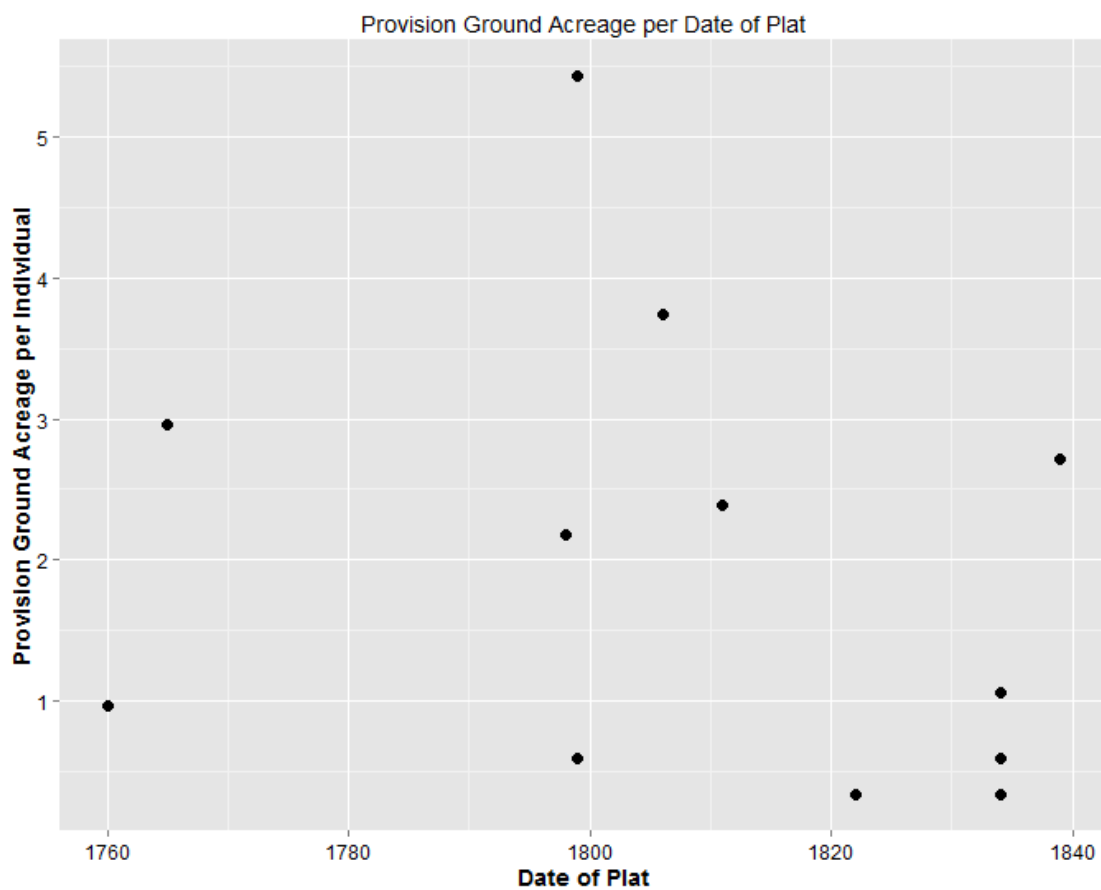


Figure Appendix 1.03 Provision Ground acreage per Enslaved Individual by Date of Plat.

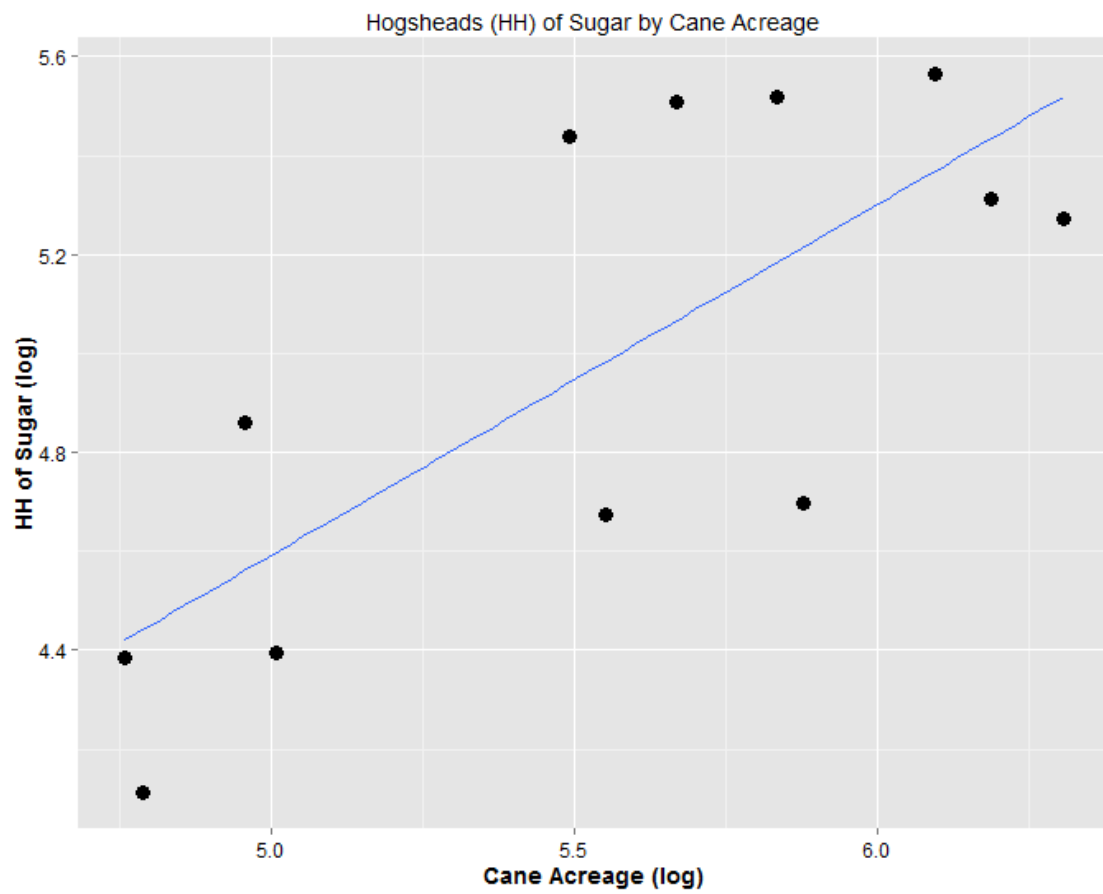


Figure Appendix 1.04 XY Scatter Plot of Hogsheads of Sugar by Cane Acreage.

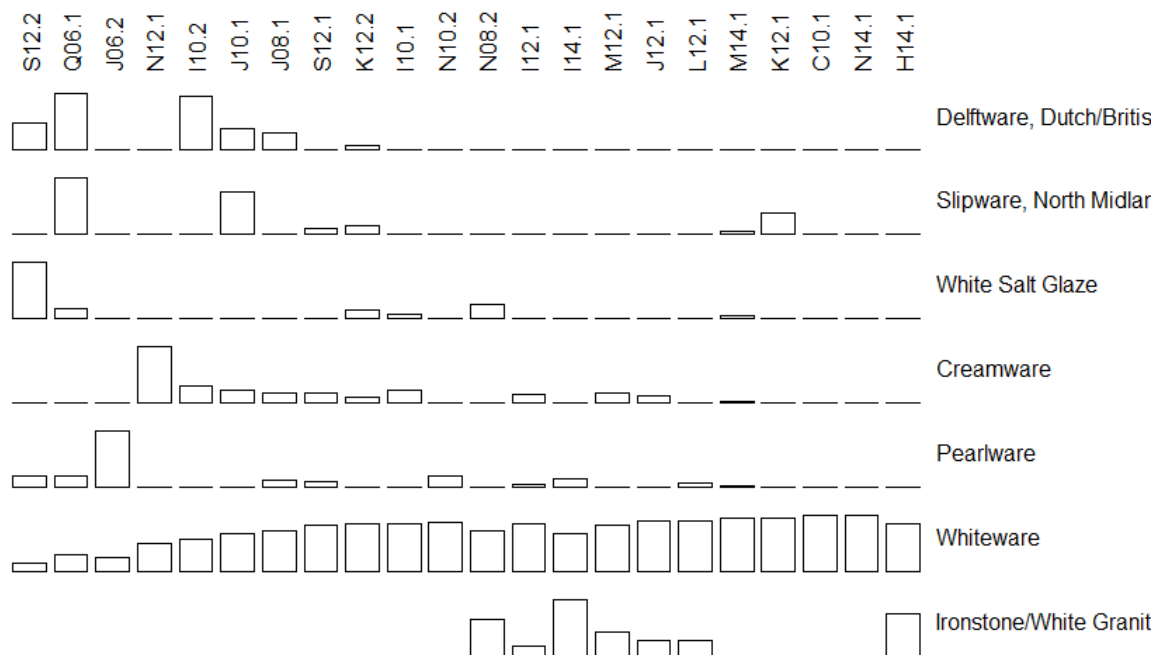


Figure Appendix 1.05 Seriation Plot of Primary Ware Types in Drax Hall Feature 15.

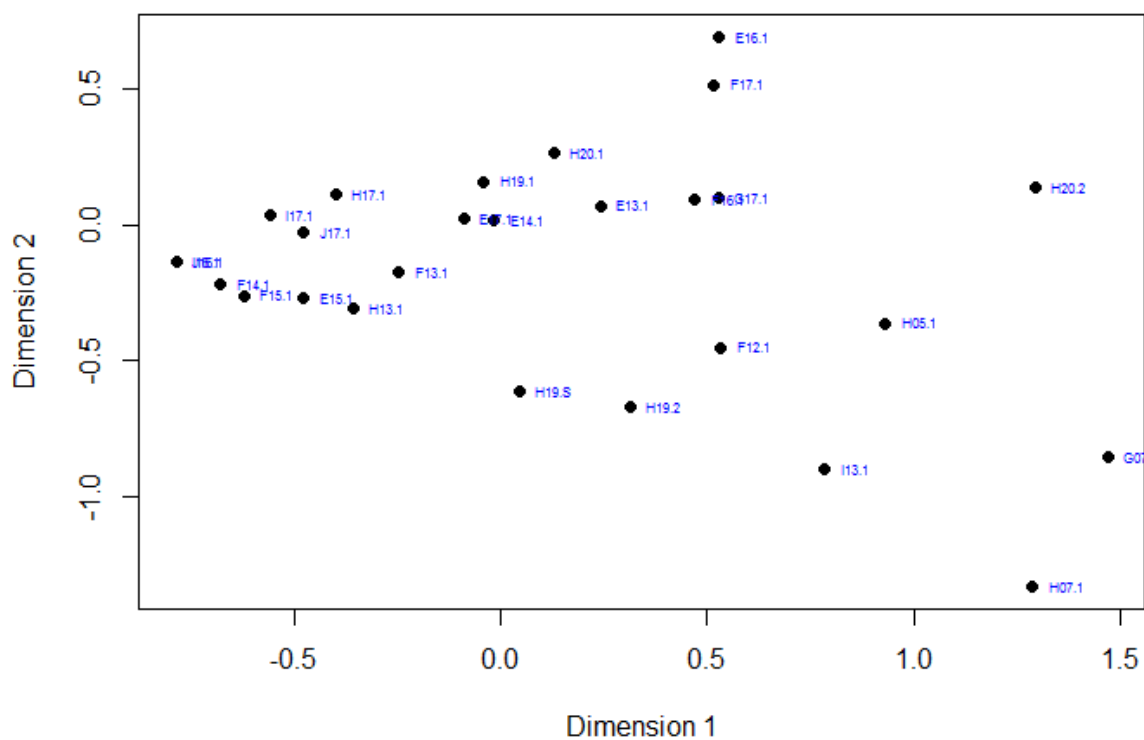


Figure Appendix 1.06 Correspondence Analysis Plot of Seville House Area 35.

Appendix 2: Site Maps

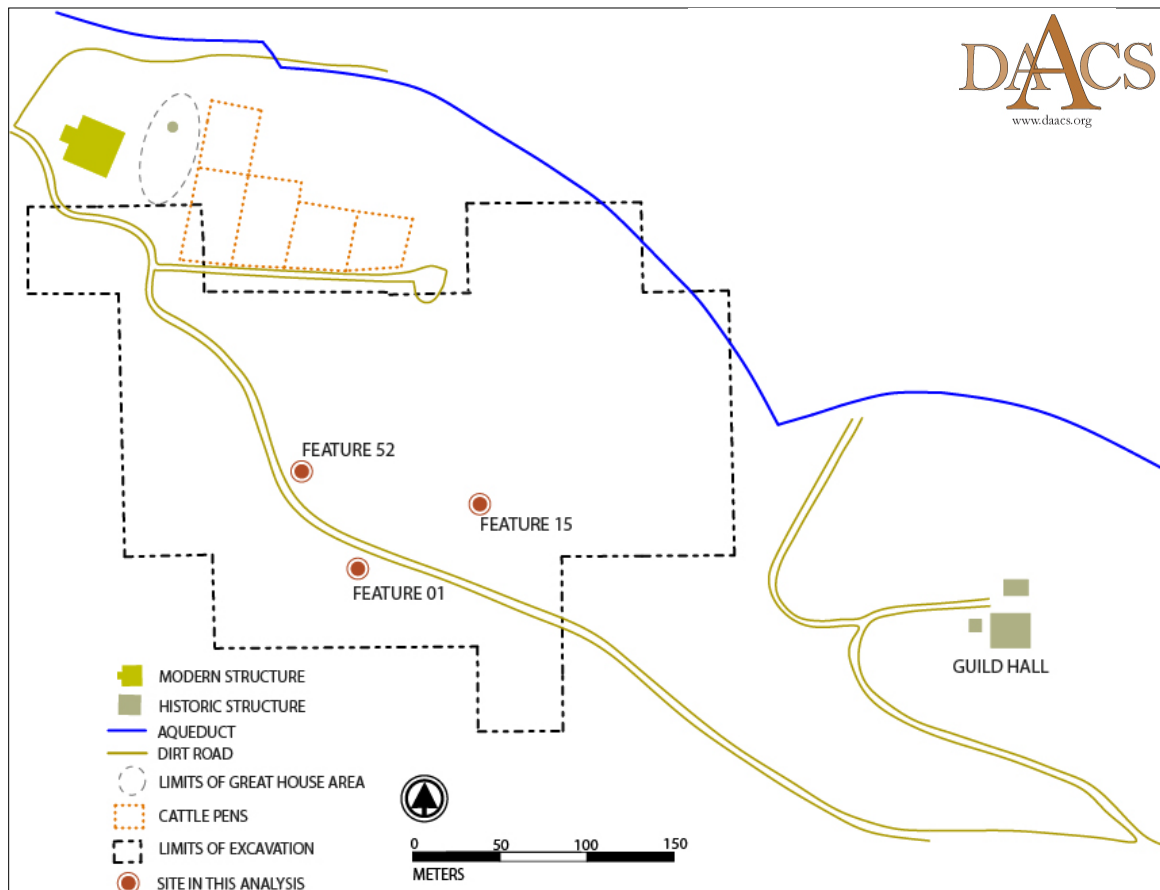


Figure Appendix 2.01 Map of Drax Hall Estate noting excavated areas used in this analysis. Drawing and map by the Author based on Figure 13 (page 63) from Armstrong 1990.

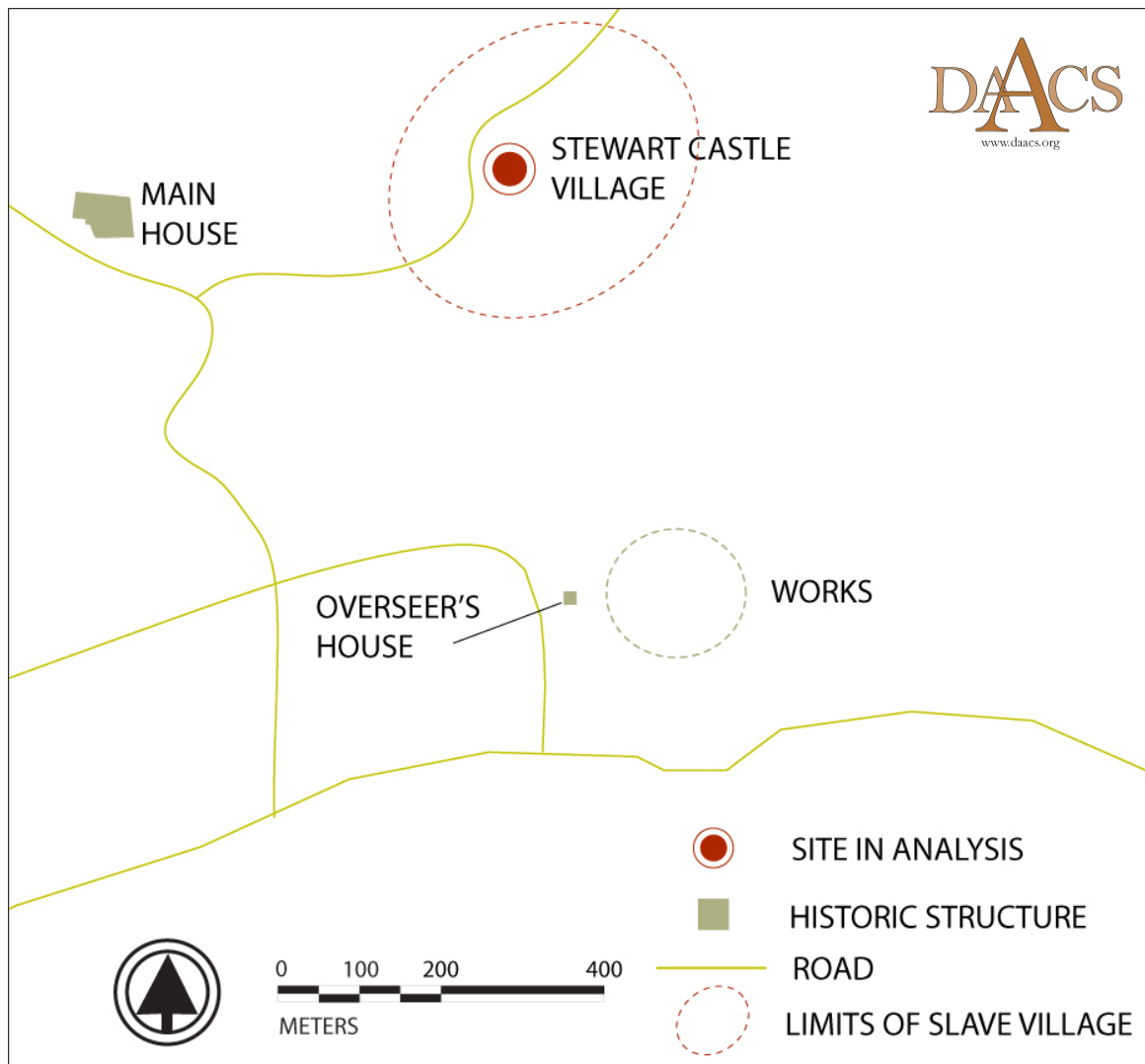


Figure Appendix 2.02 Map of Stewart Castle Estate noting excavated areas used in this analysis. Drawing by Leslie Cooper modified by the Author. Map courtesy of DAACS.

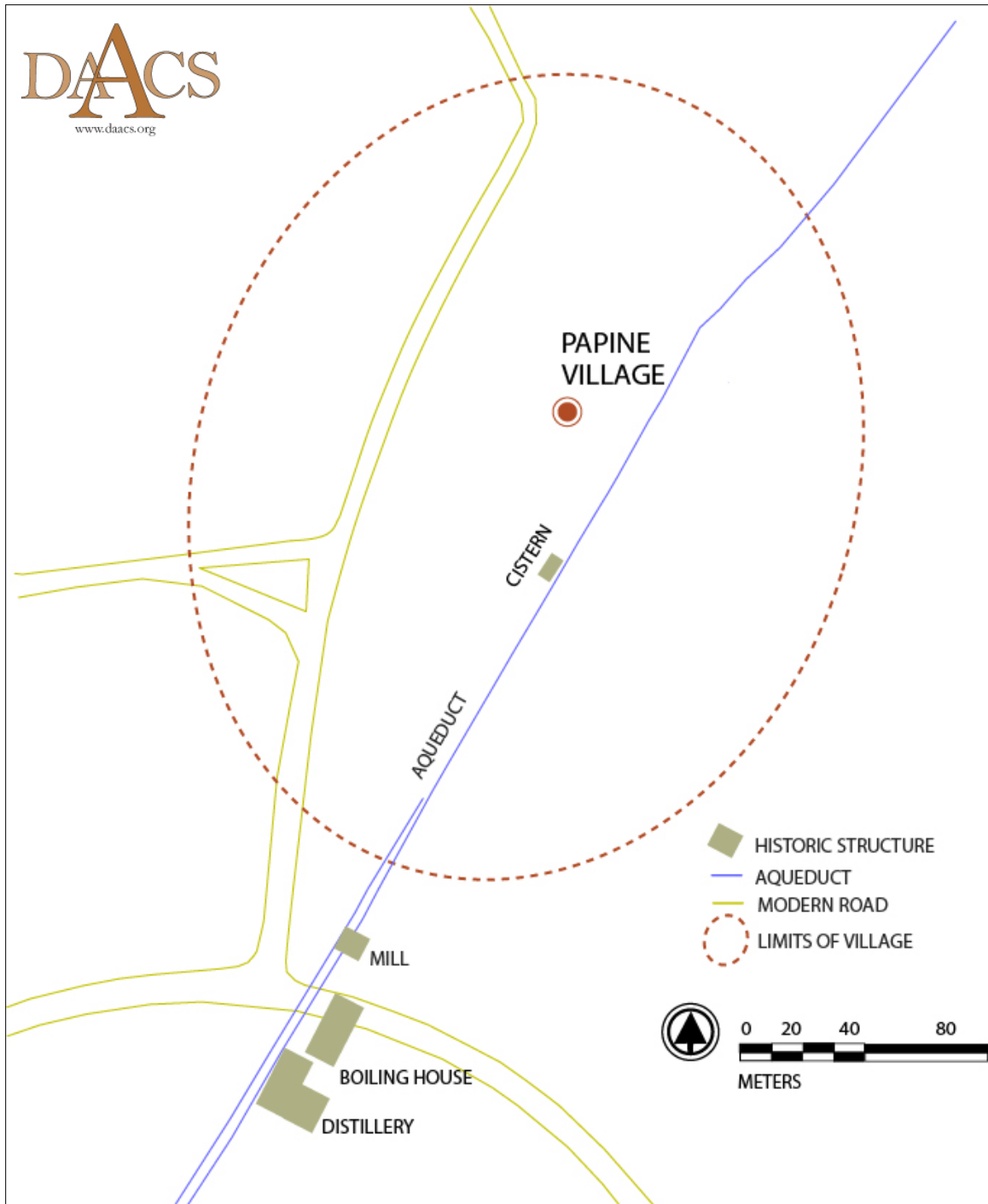


Figure Appendix 2.03 Map of Papine Estate noting excavated areas used in this analysis. Drawing by Leslie Cooper modified by the Author. Map courtesy of DAACS.

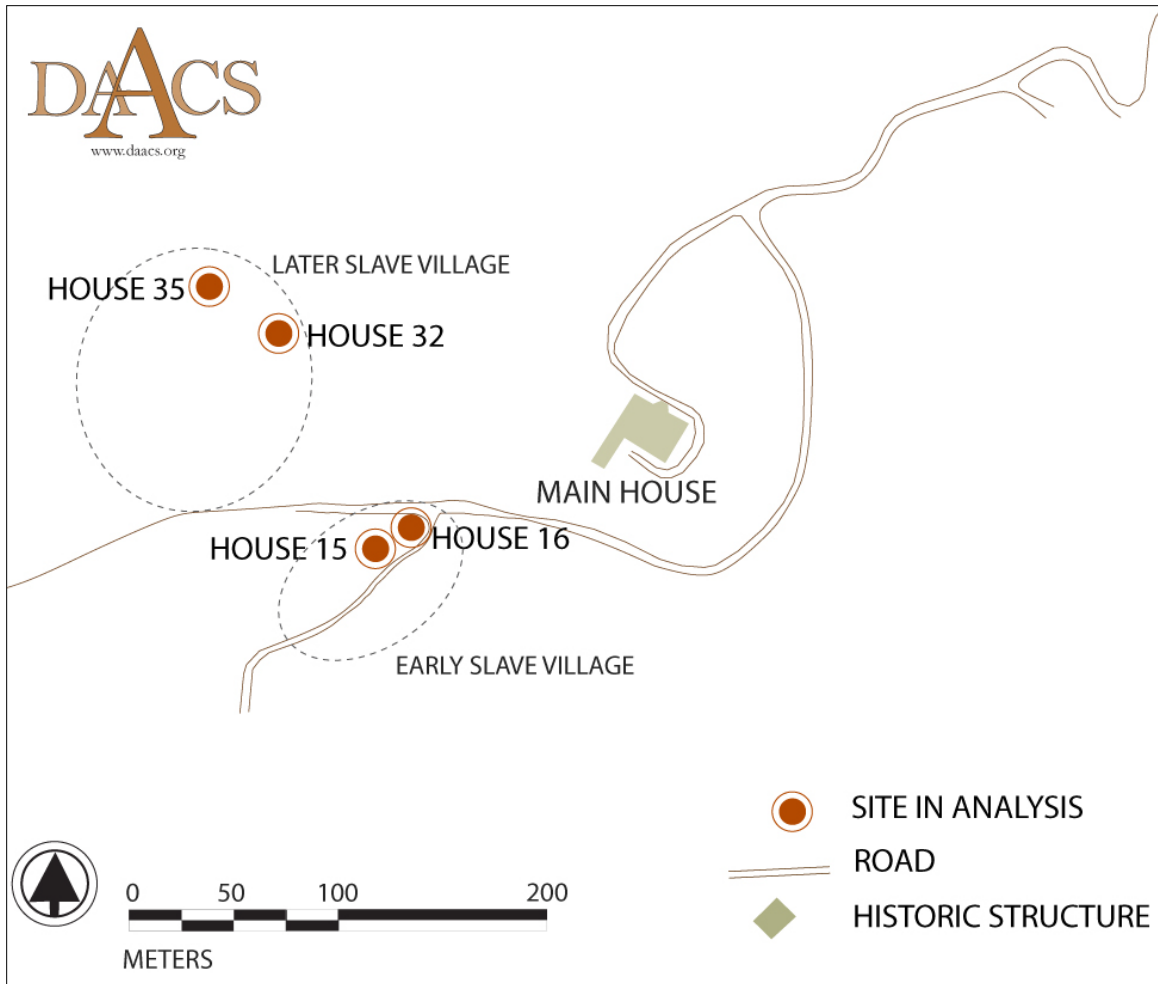


Figure Appendix 2.04 Map of Seville Estate noting excavated areas used in this analysis. Drawing by Leslie Cooper modified by the Author. Map courtesy of DAACS.

Appendix 3: R Programming Code Examples

All of the R code used in this analysis was written within the domain of the R Core Team at the R Foundation for Statistical Computing, Vienna, Austria (2014).

The following packages facilitated the analysis:

```
RPostgreSQL (Conway et al. 2013)
plyr (Wickham 2011)
reshape2 (Wickham 2007)
seriation (Hahsler et al. 2014)
anacor (de Leeuw and Mair 2009)
ggplot2 (Wickham 2009)
```

Example #1 Correspondence Analysis

The following code includes a correspondence analysis at the context level for any project in DAACS. Certain lines must be modified in order to account for outliers (e.g., ware types and contexts included). This code was written by Fraser D. Neiman, Thomas Jefferson Foundation. Please contact the Author at lbates@monticello.org for any use or reproduction of this code.

```
#Filename = wareTypeCAandMCD.R
#Establish a DBI connection to DAACS PostgreSQL database and submit SQL
queries
# Created by: Fraser D. Neiman 8.5.2014
# Last update: Lynsey A. Bates 02.25.2015

#Load the library
require(RPostgreSQL)

#Tell DBI which driver to use
pgSQL <- dbDriver("PostgreSQL")
#Establish the connection
DRCcon<-dbConnect(pgSQL, host='drc.iath.virginia.edu', port='5432',
dbname='daacs-production', user='drcquery', password='!queryacct!')

#Get the table with the ware type date ranges
MCDTypeTable<- dbGetQuery(DRCcon,' SELECT * FROM "tblCeramicWare" ')

#Submit a SQL query: note the use of \ as an escape sequence
wareTypeData<-dbGetQuery(DRCcon,'
SELECT
"public"."tblCeramic"."Quantity",
"public"."tblCeramicWare"."Ware",
"public"."tblCeramicWare"."BeginDate",
```

```

"public"."tblCeramicWare"."EndDate",
"public"."tblContext"."ContextID",
"public"."tblContext"."ProjectID",
"public"."tblContext"."Context"
FROM
"public"."tblContext"
INNER JOIN "public"."tblContextSample" ON
"public"."tblContextSample"."ContextAutoID" =
"public"."tblContext"."ContextAutoID"
INNER JOIN "public"."tblGenerateContextArtifactID" ON
"public"."tblContextSample"."ContextSampleID" =
"public"."tblGenerateContextArtifactID"."ContextSampleID"
INNER JOIN "public"."tblCeramic" ON
"public"."tblCeramic"."GenerateContextArtifactID" =
"public"."tblGenerateContextArtifactID"."GenerateContextArtifactID"
INNER JOIN "public"."tblCeramicWare" ON "public"."tblCeramic"."WareID"
= "public"."tblCeramicWare"."WareID"
WHERE
"public"."tblContext"."ProjectID" = \' DAACS Project ID here \' ')

# Compute new numeric variables from original ones, which will be
necessary to compute the MCDs
MCDTypeTable<-within(MCDTypeTable, {
midPoint <- (EndDate+BeginDate)/2
span <- EndDate - BeginDate
inverseVar <- 1/(span/6)##2
})

#Create a summary of ceramic ware types and counts
require(plyr)
summary2<-ddply(wareTypeData, .(Ware), summarise, Count=sum(Quantity))
summary2

#Recode some of the ware types, if necessary
#wareTypeData$Ware[wareTypeData$Ware ==\'Tin-Enameled, unidentified\'] <-
\'Delftware, Dutch/British\'

#Remove ware types without manufacturing date information
typesWithNoDates <- MCDTypeTable$Ware[(is.na(MCDTypeTable$midPoint))]
wareTypeData1<- wareTypeData[!wareTypeData$Ware %in%
typesWithNoDates,]

#Create a new summary of ware types and counts
summary3 <-ddply(wareTypeData1, .(Ware), summarise,
Count=sum(Quantity))

#Use this step to remove ware types with small sample size or that are
#outliers in the correspondence plots
wareTypeData2 <- subset(wareTypeData1, ! wareTypeData1$Ware %in%
c(\'Ware Type #1\',\'Ware Type #2\'))

#Use this step to remove outlier contexts in the correspondence plots
wareTypeData3 <- subset(wareTypeData2, ! wareTypeData1$Context %in%
c(\'Unit01 LevelA\'))

```

```

#Produce a data frame with contexts as rows and type as columns, with
#the entries as counts
WareByCxt <- ddply(wareTypeData3, .(Context, Ware), summarise,
Count=sum(Quantity))

#Transpose the data to create a data matrix with context (rows) x type
#cols); context ~ ware formula syntax, left side = row, right side =
#column, to fill in body of table with counts, fill others with zeros
require(reshape2)
WareByCxtT <- dcast(WareByCxt, Context ~ Ware, value.var='Count',
fill=0 )

#Compute the count totals for each context i.e. row
#Counts start in column 2
WareByCxtTTotal <- rowSums(WareByCxtT[,2:ncol(WareByCxtT)])

#Remove all the rows where totals are less than or equal to 5
WareByCxtT1 <-WareByCxtT[WareByCxtTTotal>5,]

#Build a function that computes MCDs (F. D. Neiman 2014)
#Two arguments: 1. unitData: a dataframe with the counts of ware types
#in units. We assume the left variable IDs the units, while the rest
#of the variables are types 2. typeData: a dataframe with at least
#two variables named 'midPoint' and 'inversevar' containing the
#manufacturing midpoints and inverse variances for the types. This
#function returns a list comprise of two dataframes: MCDs has units and
#the vanilla and BLUE MCDs midPoints has the types and manufacturing
#midpoints, in the order they appeared in the input dataframe.

EstimateMCD <- function(unitData,typeData){
countMatrix <- as.matrix(unitData[,2:ncol(unitData)])
unitNames <- (unitData[,1])
nUnits <- nrow(unitData)
nTypes <- nrow(typeData)
nTypesFnd <- ncol(countMatrix)
typeNameames <- colnames(countMatrix)
#Create two column vectors to hold inverse variances and midpoints in
#the order in which the type variables occur in the data
invVar<-matrix(data=0,nrow=nTypesFnd, ncol=1)
mPoint <- matrix(data=0,nrow=nTypesFnd, ncol=1)
  for (i in (1:nTypes)){
    for (j in (1:nTypesFnd)){
      if (typeData$Ware[i]==typeNameames[j]) {
        invVar[j,]<-typeData$inverseVar[i]
        mPoint[j,] <-typeData$midPoint[i]
      } } }

#Replace NA values for types with no dates with zeros so that they do
#not count; Compute the BLUE MCDs; Produce a unit by type matrix of
#inverse variances
invVarMat<-matrix(t(invVar),nUnits,nTypesFnd,byrow=T)
blueWtMat<- countMatrix * invVarMat #Matrix of weights
sumBlueWts <- rowSums(blueWtMat) #Sums of the weights
blueMCD<-(blueWtMat %%% mPoint) / sumBlueWts #Compute BLUE MCDs

```

```

sumWts <- rowSums(countMatrix)
MCD<-(countMatrix %*% mPoint) / sumWts #Compute the vanilla MCDs

#Assemble the results in to a list
MCDs<-data.frame(unitNames,MCD,blueMCD,sumWts)
colnames(MCDs)<- c('Context','MCD','blueMCD', 'Count' )
midPoints <- data.frame(typeNames,mPoint)
MCDs <- list('MCDs'=MCDs,'midPoints'=midPoints)
return(MCDs)
}
#end of function EstimateMCD

# apply the function to the data
MCDByCxt<-EstimateMCD(WareByCxtT1,MCDTypeTable)

#Create a function to sort the rows and cols of a matrix based on the
#orders from two arguments (F. D. Neiman 2014)
#arguments: the name of the variable that contains the unit scores
#MCDs); the name of the variable that contains the type score (the
#midpoints); the name of the dataframe that contains the counts of
#ware types in units
#returns:the sorted dataframe
sortData<- function(unitScores,typeScores,unitData){
  #unitScores <-U3MCDByUnit$MCDs$blueMCD
  #typeScores <-U3MCDByUnit$midPoints$mPoint
  #unitData <- U3WareByUnitT1
  sortedData <-unitData[order(unitScores),]
  sortedData <-sortedData[,c(1,order(typeScores)+1)]
  return(sortedData)
}

# apply the function
WareByCxtT1Sort <-sortData(MCDByCxt$MCDs$blueMCD,
MCDByCxt$midPoints$mPoint, WareByCxtT1)

#Convert to a matrix, whose columns are the counts and make the unit
#name a 'rowname" of the matrix
Mat<-as.matrix(WareByCxtT1Sort[,2:ncol(WareByCxtT1Sort)])
rownames(Mat)<-WareByCxtT1Sort$Context
rSums<- matrix (rowSums(Mat),nrow(Mat),ncol(Mat), byrow=F)
MatProp<-Mat/rSums

#Use the newly created matrix to generate a seriation (Bertin's) plot
library(seriation)
bertinplot(MatProp, highlight=F)

#Correspondence Analysis
require(anacor)

#anacor requires an input matrix, with rownames and colnames so we
convert the dataframe to a matrix
#You will need to change the col index values to fit your data.
Mat2 <-as.matrix(WareByCxtT1[,2:ncol(WareByCxtT1)])
rownames(Mat2)<-WareByCxtT1$Context

```

```

#Run the CA with the anacor function
ca2<-anacor(Mat2, ndim=5, ellipse=F, scaling =
c("Benzecri","standard"))

#Plot the inertias - total amount of variation that each CA dimension
#accounts for
plot(1:(nrow(ca2$chisq.decomp)),ca2$chisq.decomp[,2], type="b",
col="blue", xlab="Dimension", ylab="Proportion of Inertia", cex=2)

#Plot the row scores on dim1 and dim2
plot(ca2$row.scores[,1],ca2$row.scores[,2],pch=21,
bg="lightblue",cex=1.5,
      xlab="Dimension 1", ylab="Dimension 2", main='Site Title')
text(ca2$row.scores[,1],ca2$row.scores[,2],rownames(ca2$row.scores),
      pos=4, cex=.75, col="black",xpd=TRUE)

#Plot the column scores on dim1 and dim2, to identify which types are
#important in which regions of the plot
plot(ca2$col.scores[,1],ca2$col.scores[,2],pch=21,bg="lightblue",cex=1.
5,xlab="Dimension 1", ylab="Dimension 2", asp=1, main=" Site Title")
text(ca2$col.scores[,1],ca2$col.scores[,2],rownames(ca2$col.scores),
pos=4 ,cex=.75, col="black")

#Plot the relationship is between MCDs and CA scores:Dim 1 vs. MCDs
plot(ca2$row.scores[,1], MCDByCxt$MCDs$blueMCD, pch=21, cex=1.5,
bg="lightblue", xlab="Dimension 1", ylab="BLUE MCD", main="Site Title")
text(ca2$row.scores[,1],MCDByCxt$MCDs$blueMCD,rownames(ca2$row.scores),
pos=4, cex=.75, col="black", xpd=TRUE)

#Run Kendall correlation test for the scores and MCDs
cor.test(ca2$row.scores[,1],MCDByCxt$MCDs$blueMCD, method="kendall")

#Create weighted histogram to determine occupational phasing

#Dim 1 Scores Histogram
hist(rep(ca2$row.scores[,1],MCDByCxt$MCDs$Count),col='tan',
breaks=seq(-1,1.6,.1), main='Site Title', xlab="Dimension 1 Scores",
freq=F)

#If applicable, add line break to the plot at the appropriate junctures
(spaces between histogram bars)
abline(v= x value, col="black")
abline(v= x value, col="black")

#Create a vector for the phases with as many entries as assemblages
Phase <- rep(NA, nrow(ca2$row.scores))

#Assign phases based on Dim 1 scores
Phase[(ca2$row.scores[,1] <= -xvalue)] <- 'P03'
Phase[(ca2$row.scores[,1] > - xvalue) & (ca2$row.scores[,1] <= xvalue)]
<- 'P02'
Phase[(ca2$row.scores[,1] > xvalue)] <- 'P01'

#Create a Table of contexts, counts, and MCDs

```

```

unit <- rownames(MCDByCxt$MCDs)
dim1Scores <- ca2$row.scores[,1]
dim2Scores <- ca2$row.scores[,2]
MCD<- MCDByCxt$MCDs$MCD
blueMCD <-MCDByCxt$MCDs$blueMCD
count<- MCDByCxt$MCDs$Count

CA_MCD_Phase <- data.frame(unit, dim1Scores,dim2Scores,MCD,blueMCD,
Phase, count)

#Calculate weighted mean to produce MCDs for each phase
PhaseMCDs <- data.frame(tapply(CA_MCD_Phase$blueMCD,
CA_MCD_Phase$Phase, weighted.mean))

```

Example #2 Artifact Index Values based on Decorative Categories

The following R code includes a correspondence analysis at the context level for any project in DAACS. Certain lines must be modified in order to account for outliers (e.g., ware types and contexts included). This code was modified by the Author from SAS code written by Jillian E. Galle and Fraser D. Neiman, Thomas Jefferson Foundation. Please contact the Author at lbates@monticello.org for any use or reproduction of this code.

```

# Ceramic Decoration Indexes by Site Phase with Confidence Intervals
# Created by: Lynsey A. Bates 08.04.2014
# Last Edited by: Lynsey A. Bates 03.15.2015
# SQL base code by Jillian E. Galle and Fraser D. Neiman

#load the library
require(RPostgreSQL)

# tell DBI which driver to use
pgSQL <- dbDriver("PostgreSQL")
# establish the connection
DRCcon<-dbConnect(pgSQL, host='drc.iath.virginia.edu', port='5432',
                  dbname='daacs-production',
                  user='drcquery', password='!queryacct!')

#Submit a SQL query: note the use of \ as an escape sequence
Decoration <-dbGetQuery(DRCcon,'SELECT
"public"."tblContext"."ProjectID",
"public"."tblContext"."DAACSPHASE",
"public"."tblCeramic"."Quantity",
"public"."tblCeramicWare"."Ware",
"public"."tblCeramicVesselCategory"."CeramicVesselCategory",
"public"."tblCeramicForm"."CeramicForm",
"public"."tblCeramicCompleteness"."CeramicCompleteness",
"public"."tblCeramicGenre"."CeramicGenre"

```

```

FROM
"public"."tblContext"
INNER JOIN "public"."tblContextSample" ON
"public"."tblContextSample"."ContextAutoID" =
"public"."tblContext"."ContextAutoID"
INNER JOIN "public"."tblGenerateContextArtifactID" ON
"public"."tblContextSample"."ContextSampleID" =
"public"."tblGenerateContextArtifactID"."ContextSampleID"
INNER JOIN "public"."tblCeramic" ON
"public"."tblCeramic"."GenerateContextArtifactID" =
"public"."tblGenerateContextArtifactID"."GenerateContextArtifactID"
INNER JOIN "public"."tblCeramicWare" ON "public"."tblCeramic"."WareID"
= "public"."tblCeramicWare"."WareID"
INNER JOIN "public"."tblCeramicVesselCategory" ON
"public"."tblCeramic"."CeramicVesselCategoryID" =
"public"."tblCeramicVesselCategory"."CeramicVesselCategoryID"
INNER JOIN "public"."tblCeramicForm" ON
"public"."tblCeramicForm"."CeramicFormID" =
"public"."tblCeramic"."CeramicFormID"
INNER JOIN "public"."tblCeramicCompleteness" ON
"public"."tblCeramic"."CeramicCompletenessID" =
"public"."tblCeramicCompleteness"."CeramicCompletenessID"
LEFT JOIN "public"."tblCeramicGenre" ON
"public"."tblCeramic"."CeramicGenreID" =
"public"."tblCeramicGenre"."CeramicGenreID"
WHERE
"public"."tblContext"."ProjectID" = \'SITE 1 NAME HERE\' OR
"public"."tblContext"."ProjectID" = \'SITE 2 NAME HERE\'
')

#If applicable, set NA phases to blank
Decoration$DAACSPHASE[is.na(JamDec$DAACSPHASE)] <- ""

#Create joint Project/Phase Column
Decoration$Site <- paste(JamDec$ProjectID, JamDec$DAACSPHASE, sep="_")

#Remove unphased from list
Decoration2 <- subset(Decoration, ! Decoration$Site %in% c('Site
Missing Phase'))

#Remove non-refined ware types such as Coarse Earthenware and
Stonewares
Decoration3 <- subset(JamDecMod, ! JamDecMod$Ware %in% c('Non-RE ware
type'))

#Aggregate dataset by Genre
justgenre <- aggregate(Decoration3$Quantity, by=list(Decoration3$Site,
Decoration3$Ware, Decoration3$CeramicGenre), FUN=sum)
colnames(justgenre)<- c("Site", "Ware", "Genre", "Count")

#Ensure that the Count variable is numeric
justgenre <- transform(justgenre, Count = as.numeric(Count))

#Subsume some Genres into broader Decorative Categories

```

```

justgenre$Genre[justgenre$Genre == 'Molded Edge Decoration, other'] <-
'Edged'
justgenre$Genre[justgenre$Genre == 'Dot/Diaper/Basketweave'] <- 'Edged'
justgenre$Genre[justgenre$Genre == 'Barley'] <- 'Edged'
justgenre$Genre[justgenre$Genre == 'Bead and Reel'] <- 'Edged'
justgenre$Genre[justgenre$Genre == 'Feather Edge'] <- 'Edged'
justgenre$Genre[justgenre$Genre == 'Royal Pattern'] <- 'Edged'
justgenre$Genre[justgenre$Genre == 'Flow, transfer print purple/black']
<- 'Printed'
justgenre$Genre[justgenre$Genre == 'Flow, transfer print blue'] <-
'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, light blue']
<- 'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, black'] <-
'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, brown'] <-
'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, green'] <-
'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, pink'] <-
'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, polychrome']
<- 'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, purple'] <-
'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, red'] <-
'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under, blue'] <-
'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Under,
unidentifiable'] <- 'Printed'
justgenre$Genre[justgenre$Genre == 'Transfer Print Over'] <- 'Printed'
justgenre$Genre[justgenre$Genre == 'Shell Edge, blue'] <- 'Edged'
justgenre$Genre[justgenre$Genre == 'Shell Edge, green'] <- 'Edged'
justgenre$Genre[justgenre$Genre == 'Shell Edge, unid.'] <- 'Edged'
justgenre$Genre[justgenre$Genre == 'Polychrome, cool'] <- 'Handpainted'
justgenre$Genre[justgenre$Genre == 'Polychrome, warm'] <- 'Handpainted'
justgenre$Genre[justgenre$Genre == 'Handpainted Blue'] <- 'Handpainted'
justgenre$Genre[justgenre$Genre == 'Overglaze, handpainted'] <-
'Handpainted'

#Re-aggregate by Genre to get the counts by Decoartive Type
justgenre2 <- aggregate(justgenre$Count, by=list(justgenre$Site,
justgenre$Genre), FUN=sum)
colnames(justgenre2)<- c("Site", "Genre", "Count")

#Read in wine bottle glass counts and phase MCDs from your working
#directory - see Chapter 5 of #this document for #more information on
#why wine bottle glass was #chosen as a denominator in this sample.
WBG_MCD <-read.csv("WineBottleCounts.csv", header= T,
stringsAsFactors=F)

#Merge Decorative Category and WBG

```



```

DecCatSite <- merge(WBG_MCD, justgenre2, by.x = c("Site"), by.y =
c("Site"))

#Create an additinal column of to sum Cerm Form Counts and WBG Counts
#to use in the creation of the artifact index (artifact1 + artifact2 /
#artifact2)
DecCatSite$Total <- DecCatSite$Count + DecCatSite$WBG.Count

#Create Index Column Based on Counts
DecCatSite$Index <- (DecCatSite$Count)/(DecCatSite$Total)

#Create confidence intervals: this function computes the "add two
#success and two failures" CI for a binomial proportion according to
#Agresti and Coull 1998. Thanks to Fraser Neiman for this function.
adjustedWaldCI<-function(count,total,alpha){
  nTilde <- total+4
  pTilde <- (count+2)/(total+4)
  se <- sqrt((pTilde*(1-pTilde))/(nTilde))
  upperCL <- pTilde + se * qnorm(1-(alpha/2))
  lowerCL <- pTilde + se * qnorm(alpha/2)
  upperCL<-ifelse ( upperCL > 1, 1, upperCL)
  lowerCL <-ifelse ( lowerCL < 0, 0, lowerCL)
  return(data.frame(pTilde,upperCL,lowerCL))
}

#Run function on decorative category data
CIDecCatSite <- adjustedWaldCI(DecCatSite$Count, DecCatSite$Total,0.5)
DecCatSite$CIUpper <- CIDecCatSite$upperCL
DecCatSite$CILower <- CIDecCatSite$lowerCL

#Here is an example of this process using Slipware decoration
#This step narrows down the data set to sherds with 'Slipware, factory
#made' as the Genre
AllSlip <- DecCatSite[DecCatSite$Genre == 'Slipware, factory made',]

#Plot the Slipware Index Values against the BLUEMCDs to account for
#temporal change
require(ggplot2)
ggplot(AllSlip,aes(x=AllSlip$BLUEMCD,y=AllSlip$Index,label=AllSlip$Label,color=AllSlip$Name)) +
geom_point(size=5,shape=19)+
geom_errorbar(aes(ymin=AllSlip$CILower, ymax=AllSlip$CIUpper),
colour="black", width=.1) +
geom_text(aes(label=AllSlip$Label),hjust=-.1, vjust=-1, colour="black")
+
theme_classic()+
labs(title="Factory-made Slipware Index", x="BLUE MCD", y="Slipware
Index Vaue")+
theme(plot.title=element_text(size=rel(2)),axis.title=element_text(size
=rel(1.5)), axis.text=element_text(size=rel(1.25)),
legend.text=element_text(size=rel(1.5)),legend.title=element_text(size=
rel(1.25)))+
scale_colour_brewer(name="Site", palette="Set1")

```

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