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RAYMOND ALEXANDER CAMERON HUNTER

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This dissertation is dedicated to Don and Margaret Cameron, and to Ray and Rona Hunter

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Abstract

This dissertation examines the intertwined social and ecological consequences of colonialism by tracing processes of agricultural transformation at the Inka royal estate of Ollantaytambo, in the Cusco region of Peru, during the century and a half that followed the 1532 Spanish invasion of the Inka Empire. At Ollantaytambo, the Inka built an immense anthropogenic landscape designed to produce and reproduce Inka power. In the sixteenth century, a diverse cast of historical actors—local Andean lords, aspirant Spanish landowners, erstwhile Inka elites, emerging ecclesiastic orders, colonial officials, local agriculturalists, introduced and native flora and fauna—transformed that landscape by creating the *hacienda*, a system of colonial landholding and agricultural production that endured into the twentieth century on a landscape built *by* the Inka *to be* inherently Inka.

In this dissertation I frame the formation of the hacienda as a question of political ecology. I focus on the role of land—conceptualized as an active *process* deeply enmeshed with human social and political life, rather than an inert backdrop to human activity—and land use in the socio-historical process of hacienda formation. Two years of archaeological, archival, and paleoenvironmental fieldwork anchor my argument: the agroecology of the Ollantaytambo region was radically transformed during socio-historical processes rooted in colonialism, but the origins of these transformations should be traced through both Inka and Iberian histories of land governance and use. The hacienda realigned land in politics, but this process was structured by latent properties of the Inka landscape and shaped at every turn by a range of human and non-human agencies. As a result, land was not just *governed* differently under Inka and Spanish Colonial rule, it *acted* differently within the political ecology of colonial agricultural production.

By tracing how the hacienda emerged at Ollantaytambo this dissertation demonstrates how the extended process of Spanish colonialism reverberated through Andean agroecologies for centuries.

Chapter 1
The Research Problem

1.1 Introduction

In this dissertation I investigate the entanglement of socio-political and environmental change by examining the ecological consequences of Spanish colonialism in the Andes. I consider historical and ecological processes of agricultural transformation at the Inka royal estate of Ollantaytambo, in the Cusco region of Peru, during the century and a half that followed the 1532 Spanish invasion of the Inka Empire. At Ollantaytambo, the Inka built an immense anthropogenic landscape designed to produce and reproduce Inka power. In the sixteenth century, a diverse cast of human and non-human actors—local Andean lords, aspirant Spanish landowners, erstwhile Inka elites, emerging ecclesiastic orders, colonial officials, local agriculturalists, introduced and native flora and fauna—transformed that landscape by creating *hacienda* agrarian estates, a system of landholding that concentrated land ownership in the hands of a small number of families, and that endured into the twentieth century.

Haciendas at Ollantaytambo were expansive agrarian enterprises comprised of vast tracts of land for commercial maize and wheat production and hundreds of hectares of highland pastures. Their operation was predicated upon the labor of Andean workers, which was secured through colonial power relations, including unequal access to land. By tracing how haciendas emerged on a landscape at Ollantaytambo built *by* the Inka *to be* inherently Inka, this dissertation demonstrates how the process of Spanish colonial subjugation reverberated through Andean agroecologies. My investigation of early colonial Ollantaytambo is a *political ecology* of hacienda formation that queries the factors that shaped the hacienda as it emerged as a dominant political, social, and ecological institution in the rural Andes.

In studies of the Spanish colonies the emergence of the hacienda is frequently framed in terms that emphasize the imposition of colonial power. Agrarian estates are largely assumed to have evolved out of earlier modes of colonial governance through processes of land seizure, Indigenous dispossession, and the colonization of ostensibly unused lands. These factors are certainly part of the story I outline in this dissertation, however, as I demonstrate, haciendas emerged out of fundamentally ecological processes initiated by first Inka and then Spanish imperial expansion. In the chapters that follow I argue that the agroecology of the Ollantaytambo region was radically transformed through socio-historical processes rooted in colonialism, but that the origins of these transformations should be traced through both Inka and Iberian histories of land governance and use. Colonial-era transformations cannot be attributed to Spanish power alone, but rather were the result of multiple overlapping agencies. I focus on the role of the fields and pastures of the Ollantaytambo, that is, the land that was the fundamental basis of hacienda production, in the socio-historical process of hacienda formation. I conceptualize the agricultural fields that are my focus as an active force deeply enmeshed within human social and political life, rather than an inert backdrop to human economic activity. My argument in what follows is that the hacienda required a realignment of land in politics, but this process was structured by latent properties of the Inka landscape and shaped at each turn by a range of human and non-human agencies. As a result, land was not just *governed* differently under Inka and Spanish Colonial rule, it *acted* differently within the political ecology of colonial agricultural production.

1.2 Spanish Colonialism in the Andes

In the thirteenth century, the Inka, an ethnic group based in the Cusco region of Peru, launched an extended campaign of conquest, and ultimately subjugated almost the entire Andean region. The Inka Empire, *Tawatinsuyu,* or the "Realm of Four Quarters," stretched from contemporary Chile in the south to Ecuador in the North and spanned the Andes from the Pacific ocean to the cloud forests of the eastern mountain slopes. The Inka remade the Andes: they moved whole populations to preform labor, curtail rebellion, and solidify their sovereignty; commandeered resources like mines and agricultural land; and directed the construction of immense new complexes of fields and terraces that, when combined with the labor of their subjects, could generate surpluses to stock state storehouses and provision ever-ongoing military campaigns (Bauer 1996; 2004; Covey 2006; D'Altroy 2002; 2005; Kolata 2013).

In 1532, a small party of invading Spaniards stumbled into an ongoing crisis within the Inka realm. A civil war sparked by the untimely death of the ruler Huayna Capac pitted two claimants to succession: Atahualpa, based in Quito, fought his half-brother Waskar, whose faction held to the traditional base of power in Cusco. These Spaniards confronted Atahualpa in a battle at a place called Cajamarca and captured the aspirant ruler, in the process securing a major victory in their campaign of conquest that coalesced decades later with the formation of the Viceroyalty of Peru.[1]

[1] While 1532 has become enshrined as the date that marks the end of Inka dominion, the Battle of Cajamarca was fought in November and Atahualpa was not executed until July 26, 1533. For accounts that detail the events of the Spanish invasion see Covey (2020); Hemming (1970); Kolata (2013). Seed (1991) provides an alternative reading of the encounter between Atahualpa and Spaniards in Cajamarca. Lamana (2008) explores the first decades of the encounter, prior to the consolidation of Spanish power. The viceroyalty was not officially established until a decade after Cajamarca, when the first viceroy was sent to Peru from Spain.

While the Spanish invasion—and the battle at Cajamarca in particular—was certainly a major event in Andean history, scholars have recently pointed out that the capture of the aspirant Inka ruler and the battles that followed have taken on outsized importance as pivotal events upon which the history of two continents hinged (see Covey 2020, 20-25).[2] As VanValkenburgh (2019) puts it, the events of 1532 have become a "methodological, epistemological, and ontological" barrier that obscure details of the conquest and mask continuities between Inka and Spanish rule (see also Bray 2018; Lamana 2008). As these scholars point out, at its most egregious, overemphasis on 1532 assigns the Spanish invasion almost transcendental historical significance. Such a focus disregards the fierce resistance raised against the Spanish and discounts the neo-Inka state established soon after the fall of Cusco in nearby Vilcabamba, a political entity that co-existed in tension with Spanish-occupied territory for decades. Moreover, it implies that the collapse of the Inka state was immediate, and that it was replaced by a colonial infrastructure that burst into being fully formed, ignoring the fraught processes through which individual invaders, the Iberian crown, remnant Inka nobility, and Andean people, negotiated with and struggled against one another as they improvised the social and political order the emerged under Spanish rule.

Archaeologists, anthropologists, and historians have de-emphasized historical events like 1532 that have taken on outsized importance in colonial histories by placing them in deeper

[2] As Covey highlights, narratives that over-emphasize events like those of 1532 reduce the complexity of the colonial encounter: even as just one party in an ongoing civil war, Atahualpa stands in for the entire Andean world; in turn, the Spanish stand in for the supposed inherent technological and civilizational superiority of Catholic Europe; Western progress inevitably wins the day. Here, the power of the Inka ruler is absolute, the Spanish appear as well organized and unified servants of the crown, an evolutionary hierarchy of racial superiority is implied, and "the West" brings historical change (see also Seed 1991; Mikecz 2020).

historical context. For instance, Wernke (2007; 2013) advocates a "transconquest" perspective that looks across a span of time from the pre-Inka Late Intermediate Period (LIP) into the Colonial era.[3] Wernke suggests that by examining both Inka and Spanish efforts to subjectify the Andes, researchers can identify both imperial transformations and structures that endured across political shifts. This approach emphasizes that the consolidation of Spanish colonial control over the Andes was contingent and uncertain; Andean people variably aided, opposed, and negotiated with Iberian invaders who themselves struggled to govern the people that lived in the region. The institutions through which Spanish control was asserted over the Andes were not imposed whole-cloth, but rather were improvised and negotiated as they were brought into being (see also Gose 2008; Lamana 2008; VanValkenburgh 2021).

In this dissertation, I build from such approaches to examine emergence of haciendas in the Ollantaytambo region around the close of the sixteenth century. The hacienda followed after other Spanish efforts to subjugate the rural Andes and govern Andean people. In the initial decades after the Spanish invasion, Andean people were categorized by Spanish officials into *encomiendas*, grants of Native Andean labor assigned most frequently to wealthy Spaniards, but also occasionally to deposed Inka nobility. These grants were defined in terms of specific tribute assessments—the "*tasa*"—which often included both the products of labor on fields within the territory of the communities who were "granted" (i.e., maize, vegetables, animal products, timber), as well as labor to be performed directly for the encomienda holder, or *encomendero*, such as caring for his animals or tending to his fields (Cocoran-Tadd and Pezzarossi 2018; Julien

[3] At Ollantaytambo, the LIP is from roughly 1000–1300 C.E., the Inka Period from roughly 1300–1533 C.E., and the Colonial Period from 1533–1824 C.E.

2000).[4] Importantly, the encomienda did not imply direct rights to *land* within the territory of the peoples included in the encomienda grant. Indeed, even as the value of a particular encomienda was directly related to the productive capacity of the land within its boundaries, as an institution the encomienda was premised on a fundamental distinction between land and labor.

While the encomienda was intended to be an institution through which Spanish sovereignty could be indirectly asserted over the Andes, it rapidly decreased in importance in much of the Andean region. The power of the encomenderos was initially curtailed by reforms included in the Spanish "New Laws," first promulgated in 1542 but delayed in Peru to 1552 following open armed rebellion against the king (see Covey 2020; Lockhart 1968; Stern 1993). As the encomienda waned in significance (it did not completely disappear for centuries), Andean people were organized into "*repartimientos,*" groups of people treated as a unit by colonial administrators that were responsible for collective tribute to royal coffers.[5] Still later, during the tenure of the reformist viceroy Francisco de Toledo (in office 1569-1581), Andean tribute payers were forced into concentrated settlements (*reducciones*), intended to enable Christianization,

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[4] Cocoran Tadd and Pezzarossi (2018, 88) define the encomienda as "an assemblage of labourers, knowledges, pre-existing political relations and infrastructures and the ecological and geologic affordances of the region they inhabited. The labour potential and economic value of an encomienda was entangled with the types of tribute its constitutive labourers could produce and the respective values that followed regional and global desires."

[5] Often, the term *repartimiento* could roughly correspond with "village," or "town" in that it frequently referred to geographically clustered households, but this was not universal, and the division of *repartimientos* was externally imposed by colonial officials. As such, *repartimientos* often cut across or subdivided existing kin-groups and communities (e.g., Covey and Quave 2017).

impose Spanish ideas of "civilized" urban life, and facilitate the extraction of tribute (in labor and in-kind, see Mumford 2014; Wernke 2013).[6]

Throughout the last decades of the sixteenth century, wealthy individuals and emergent organizations like convents and monasteries sought to consolidate their power and ensure legacies of wealth by establishing title to agricultural fields. These initially small parcels of land would become the bases of the first haciendas in the region, institutions that, by the middle of the seventeenth century, controlled much of the best agricultural land around newly established colonial towns and cities (Glave and Remy 1983; Ramírez 1996; Stern 1993). While, like the colonial institutions that preceded them, haciendas would be transformed and changed through the Colonial Period in response to both external (i.e., regional grain markets) and internal (i.e., worker rebellions) factors, they would remain the dominant landholding institution in the Andes into the twentieth century.

In many ways, the emergence of haciendas in the Spanish colonies is an old theme in Latin American studies—historians and anthropologists have written at length of the beginnings of haciendas in Peru and New Spain since at least the middle of the twentieth century (e.g., Chevalier 1963; Gibson 1964; Keith 1977; Lockhart 1968; 1969). These scholars acknowledge and argue for the separation of the hacienda from preceding institutions like the encomienda in legal terms, while nonetheless recognizing both a temporal connection between the institutions (i.e., hacienda succeeding encomienda as mode of elite wealth-accumulation) and highlighting that encomenderos often sought to bridge the gap between land and labor implied by the

[6] Toledo set out to dramatically remake the Andes: VanValkenburgh describes his rule as a "war on the past" (2017, 2). The Viceroy eradicated the vestiges of Inka power manifest in the remnant neo-Inka state hidden in the jungles near Vilcabamba by executing the last of these "rogue" Inka rulers and commissioned a new history to cast the Inka as deposed tyrants and the Spanish as liberators (Sarmiento de Gamboa 1999 [1572]).

encomienda by securing fields near their tributaries that would ultimately become haciendas. Lockhart (1969, 417), for instance, quotes the Historian Silvio Zavala's (1936) argument that the hacienda was created "under the cloak of the encomienda." More recent scholarship builds on this work by detailing the process through which privatized landholding in the Viceroyalities of New Spain and Peru emerged amidst struggles and negotiations between encomenderos, Native lords, and the Spanish Crown in Madrid (Amith 2005; Burns 1999; Covey 2020). For instance, Stern's (1993, 30-32) influential study of the colonization of the Inka province of Huamanga (contemporary Ayacucho) showed that the privatized lands that became haciendas were frequently the result of land grants sought by encomenderos *and* the *kurakas*—hereditary Andean lords—who ruled directly over tributary populations. By forming alliances and securing land, these men could secure their status as rural powerbrokers.

Such legal and political histories are certainly part of the story I outline in this dissertation, however, rather than concentrating on the machinations of Andean lords, wealthy conquistadors, and royal officials, here I take a (literal) "ground-up" approach to studying the origins of the hacienda by focusing on Ollantaytambo's agricultural land—the fields and pastures developed by the Inka that became the foundation of hacienda production—and the farmers who worked those fields under Inka and Spanish Colonial rule. As I detail in subsequent chapters, these fields were built by Inka laborers as part of a royal estate (see Kosiba 2015). After the collapse of Inka rule, the same fields and pastures anchored the power of the local *kuraka*, who's ability to ensure the wellbeing of his subjects—and thereby his authority—was directly connected to his capacity to command the labor to make the fields productive. Still later, the rich land drew Spanish colonists who sought to cement their wealth and status, and thereby initiated conflicts (and collaborations) with both *kurakas* and local farmers (see Burns 1999; Glave and

Remy 1983; Kosiba and Hunter 2017). By tracing changes in agricultural practices and attendant transformations to the land and ecologies of the Ollantaytambo region through these changes, I demonstrate that haciendas at Ollantaytambo emerged in an era of legal, socio-political, *and* ecological transformation. This focus highlights that while haciendas actualized new, distinctly colonial, forms of landholding and labor organization in the region, they were also shaped by histories of land management that preceded the Spanish invasion by decades and centuries. In this sense, haciendas were simultaneously representative of both the profound changes and deeply entrenched continuities that characterized the Colonial Andes.

1.2 Colonialism, Ecology, Landscape

In this dissertation, in exploring both transformation and continuity under Spanish rule, I draw on Dietler's (2010, 18-19) definition of colonialism, "the projects and practices of control marshaled in interactions between societies linked in asymmetrical relations of power and the processes of social and cultural transformation resulting from those practices."[7] I am guided by Patrick Wolfe's argument that colonial invasions are better understood as persistent relations of power—structures—than historical events (Wolfe 2006; 2013; see also Kauanui and Wolfe 2012; Simpson 2016).[8] My approach to studying colonialism is also informed by researchers that

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[7] For Dietler (2010, 18) *colonization* is "the expansionary act of imposing political sovereignty over foreign territory and people." As Dietler highlights, through the historical process of colonialism both colonizing and colonized societies are inevitably transformed: "both parties eventually become something other than what they were."

[8] Here I draw on Wolfe's famous assertion that: "invasion is a structure not an event" (2006, 388). Wolfe writes specifically about settler colonialism, that is, colonial projects predicated on the elimination of Native peoples and the occupation of their lands and enacted by people that "come to stay." I do not mean to imply that Spanish colonialism in the Andes was a settler colonial project; there were decided differences with the ideologies that drive the settler colonial projects Wolfe was analyzing. For instance, many Spanish colonial enterprises were entirely dependent on the maintenance of Native Andean populations as a labor force rather than

demonstrate that colonial power is not absolute, but that colonial contexts are shaped by a range of agencies, including overt and subtle resistance to foreign impositions (Estes 2019; Dietler 2005; Given 2004; Gose 2008; Lamana 2008; Liebmann 2008; Liebmann and Murphy 2011; Wernke 2013). Hence, while colonialism is the creation of *enduring structures* of subjugation—of which the hacienda was one—those structures (and the practices through which they are enacted) are improvised and negotiated in real time rather than being imposed ready-made.

I focus on ecological (and agroecological) themes to elaborate the emergence of the hacienda as a colonial power structure and clarify the complex, contingent, and drawn-out political processes through which a variety of human and non-human agents shaped the formation of haciendas on fields at Ollantaytambo initially designed to reinforce the power of the Inka empire. By "ecology," I mean the dependencies and connections between animals, plants, land, and peoples that emerge in and constitute relations to particular places (e.g., Raffles 2002). Agroecology, by extension, is the particular kind of ecology created in agricultural contexts in relationships between agriculturalists, plants, animals and the land itself (see Chapter 2). I use "landscape" to refer to the socially and culturally mediated meanings and values attached to particular places, space, and ecologies. I understand these values and meanings to be produced through practices of relation with the physical and symbolic environment. Thus, landscape includes fields, pastures, mountains, and so forth—but also the socially mediated meanings associated with those materials. To produce landscape involves working changes in materials—such as building a canal, razing a village, grazing sheep on fragile terrace walls—and also practices that "render the external world intelligible and its forms culturally legible, and thus

predicated on their elimination. Here my invocation of Wolfe's point is meant to draw attention to the structural transformation wrought by colonial power.

authorize action upon it" (Richard 2018, 36). As Smith (2003) highlights, power is expressed through landscape, and the production of landscapes is inherently political. Hence, to study landscape transformation is to study political processes.

As historians, geographers, and anthropologists have long noted, colonialism and imperial expansion initiated ongoing and far-reaching transformations to ecologies and landscapes as colonizers displaced and subjugated Indigenous peoples, cleared forests, drained wetlands, pastured newly introduced animals, established mono-culture plantations, and imposed extractive economies on the frontiers of colonial and capitalist expansion (e.g., Anderson 2006; Candiani 2014; Melville 1994; Roberts 2019). Initially, such studies largely concentrated on the movement of biological materials—flora and fauna, seeds and pathogens. Alfred Crosby (1972; 1986), for example, argued that colonists attempted to re-create the environments they had left behind, creating what he termed "neo-Europes" through the introduction of a "portmanteau biota" assemblage of animals, plants, and micro-organisms. More recently, researchers studying the ecological consequences of colonialism have pushed against determinist readings of environmental change, demonstrating that biotic transfers were embedded in social systems, happened in concert with the movement of technology and knowledge, and were inflected by the actions of diverse agents "on the ground" (Bell 2013; 2015; Carney 2001; Spielman et al. 2009).

Research into ecological transformations brought about by colonialism is paralleled by investigations of *pre-colonial* ecologies. Researchers have cogently demonstrated the anthropogenicism of pre-contact landscapes, showing how ecologies as diverse as the Amazon (Erickson 2014; Glaser and Woods 2004; Iriarte et al. 2020), eastern North American woodlands (Cronon 1986), prairies of the Midwest (McLeester 2017), and Australian sclerophyllic forests (e.g., Gammage 2013; Pascoe 2014; cf. Neale 2018) were dramatically altered by the people who lived amidst them for millennia prior to European invasions (see Denevan 2001). Such research puts the lie to myths that colonial powers proliferate about the lands into which they expand; the Amazon was not an empty "counterfeit paradise"; the prairie was not vast expanse of unused grassland waiting for the plough; the Australian bush was not *tierra nullius*. By showing that human hands were constantly re-shaping pre-contact environments researchers demonstrate how the claims to a state of nature—verdant "forest primeval," resource-poor desert, or empty paradise—that justified the co-option of those spaces are themselves products of colonialism, inherently political, erasing histories of land-use, genocide, and colonization (Cronon 1996; Deneven 1992, Mann 2006). This is to say, narratives that elide ecological transformation are themselves constitutive of colonialism. They negate local histories, rationalize genocide and erasure, and produce colonialism as *fait accompli* from the first moment of contact. As Davis and Todd (2017) emphasize, research in this vein is not just of historical interest, but is also of import to contemporary politics. The authors, writing to intervene into debates over when in time researchers should situate the beginnings of the Anthropocene as a global epoch, argue for the beginning of the Colonial Period as the beginning of the Anthropocene in order to acknowledge the effects of settler colonialism as world-making (for the settler) and world-destroying (for Indigenous peoples).[9] In levying this argument, the authors highlight that colonialism is an

[9] The authors, writing specifically from a North American perspective, specify 1610 as a particular date, however, their broader argument is less anchored to that particular date than it is the initiation of colonization. They write: "to use a date that coincides with colonialism in the Americas allows us to understand the current state of ecological crisis as inherently invested in a specific ideology defined by proto-capitalist logics based on extraction and accumulation through dispossession – logics that continue to shape the world we live in and that have produced our current era" (Davis and Todd 2017, 764). Davies and Todd levy this argument while critiquing the concept of the Anthropocene writ-large for building upon and reproducing colonial universalism and imbalances of power. In effect, their argument is that *if* the Anthropocene is to be signaled with a "golden spike" date, it should be acknowledged as an era that emerged from

ongoing power relation predicated on the attempted elimination of Native lives and control over native land that is *history* but is not *past,* and is manifested in the transformation of ecologies at scales from hyper-local to the global climate.

By exposing the myth of pre-colonial "pristine" ecologies, these researchers demonstrate cogently that empires and colonial powers do not just materially transform ecologies through the extraction of raw goods and labor or the displacement of waste, they also exercise power by defining what land and ecologies are understood to be—that is, by defining "Nature" (Cronon 1995; Morrison 2018). The geographer Andrew Sluyter (1999; 2002), writing about the colonial landscapes of New Spain, makes this point by suggesting that if colonial landscape alterations *and the processes by which they become obscured* are to be fully understood, researchers must consider both "material and conceptual" transformations. Here, Sluyter defines "conceptual landscape transformation" as the set of transformations that exist in the mind: that is, re-figurations of the categories through which landscape is understood and valued, including the basis for and definition of land rights, as well as management and governance practices. Richard Hunter and Sluyter (2011) describe this process in 16th century New Spain, where the viceroyalty was carved out through the apportioning and surveying of *estancias* for grazing sheep and cattle. In Veracruz, genocide led to the abandonment of fields, which, covered with new-growth vegetation, could be categorized as untouched wasteland, and thereby "improved" through enclosure and conversion into pasture for European domesticates (Sluyter 2001). One conceptual transformation allows for another—the creation of colonial territory from "empty" space—which

violence wrought to Indigenous peoples through colonization and to enslaved peoples via the trans-Atlantic slave trade, to do otherwise would be to vacate those histories.

in turn prompts subsequent material transformations brought about through the introduction of cattle and sheep.

The displacement of indigenous people and usurpation of land wrought through colonialism that Hunter and Sluyter discuss makes it obvious that contested understandings or conceptualization of landscapes and ecologies are inherently political. Marisol de la Cadena draws on ethnographic research in Peru to make a parallel point with her formulation of the "anthropo-not-seen," a "war waged against world making practices that ignore the separation of entities into nature and culture—and the resistance to that war" (de la Cadena 2015b, 3). For instance, in her ethnographic studies of *runakuna* (Quechua-speaking Andean people in ayllu relations) living in the shadow of the mountain Ausangate in Cusco, de la Cadena (2015a, 243-244) shows how *runakuna* engage with the mountain, like other "earth-beings," as a dynamic and lively actor in social and political processes: "Ausungate is the highest ranking earth-being…endowed with the attribute of commanding (he is *kamachikuq*) the rest of the earth-beings—and *runakuna*, of course…earth-beings can send or prevent thunder and hail, thus hindering or favoring the lives of crops, animals, and humans. They are *atiyniyuq*: they have the capacity to do things." As de la Cadena shows, there is a fundamental incommensurability between *runakuna* modes of relating to entities like Ausangate and modernist perspectives of the Peruvian state (and external science) that view the mountain as inert matter.

Such conflicts are not unique to the Andes. For instance, Wells and Mihok explain that Mesoamerican soils understood by agronomists as the product of biochemical processes of erosion and weathering were and are, to Maya peoples, animate ancestral gifts that demanded reciprocation; such soils are "active cultural agents that contributed to fashioning and fixing worldviews, values, and beliefs" (Wells and Mihok 2009). Estes (2019) contrasts settler colonial understandings of Mni Sose (the Missouri River) with Oceti Sakowin recognition of the river as a living non-human relative in the context of the #NoDAPL movement to highlight the ongoing violence of settler expansionism in the United States. For de la Cadena, the "anthropo-not-seen" was initiated in the Americas in the fifteenth century when Spanish caravels brought the first European invaders to Caribbean shores and continues into the contemporary era (see also Harvey, Krohn-Hansen, and Nustad 2019). These arguments make clear that examining both biophysical transformations to ecologies wrought by colonialism *and* the simultaneous clash of foreign values, ontologies, or meanings can expose how colonial power operates in ways not always recorded in archival records, but that nonetheless transformed colonized landscapes and changed how people lived in relation to colonized ecologies.

In this dissertation I focus on the agricultural fields and pastures of the Ollantaytambo region, including infrastructures like terraces and the canals that irrigate them. In part, this focus is because Ollantaytambo was an intensively cultivated agroecology; the people I study in this dissertation were farmers, and as such intimately engaged with those fields on a daily basis. As I outline in detail in the next chapter, I understand Ollantaytambo's fields and pastures to be multispecies material products intertwined in and generative of human social and political life. As such, while agricultural fields anchor my study, I examine those fields by considering the communities of plants, animals, and people that lived and worked upon them through the Inka and Colonial Periods. My focus on agricultural land is informed by recent interventions in political ecology, archaeology, and critical geography that accentuate the active role of materials and non-humans in political and social life (e.g., Bennet 2010; Bauer and Kosiba 2017; Harvey, Krohn-Hansen, and Nustad 2019; Harvey et al. 2014; Givens 2017; Ingold 1993; 2000; 2007; 2010; Olsen 2010; Sundberg 2011; Todd 2014; Whatmore 2002). Research in this vein demonstrates that rather than inert matter upon which humans act, non-humans and materials are actively constitutive of human social and political life. For instance, Brite (2018) argues that the Karakum River system in Turkmenistan—a canal dug in the latter half of the twentieth century by the USSR to irrigate broad swaths of arid land—is a product of *both* Soviet engineering *and* the action of the waterway itself. In Brite's reading, Soviet imperial domination over the Karakum Desert was "attained only through negotiations with nonhuman agents that had shared inclinations towards environmental transformation" (Brite 2018, 124). Legacies of Soviet and hydrological "shared inclinations" linger in the Karakum Desert surrounding the course of the river even as the political institution of the Soviet Union has decades-since collapsed. The materials of the river system retain their power even after the political entity it emerged alongside has ceased to dominate the region, and the river continues to act on local environments and their inhabitants.

My own approach to understanding how non-humans and things are intertwined in human social and political life is most directly inspired by the work of Tim Ingold (1993; 2000; 2007; 2013). Ingold emphasizes that the material world is comprised of interconnected "things" that are always in flux. Rather than static "objects," these "things," are "gathering[s] together of the threads of life" (2010, 4), they are not discrete, but rather are mutually constituted alongside other materials and beings. Ingold uses the example of a tree; as he highlights, upon close examination, the question of where the tree begins and ends is impossible to answer—the tree is not just constituted by bark, wood, and leaves, but also the insects and algae that live upon it, the birds that make their homes in it, the squirrels that spring from its branches, and the forces like wind and rain that act upon it. A world of such "things" is never static, but always *becoming*. Ingold (2010, 11) writes: "As they move through time and encounter one another, the trajectories of diverse constituents are bundled together in diverse combinations." Within this framework—and particularly within the agroecological context upon which I concentrate—humans and non-humans are deeply intertwined and are always bringing each other into being. Non-humans and materials are constitutive elements of human social and political life.

Attributing political effects to non-humans and materials adds new valences to the emergence of the hacienda in Peru. Hacienda creation is not just a question of conflicting Iberian and Andean sovereignty over agricultural modes of production, rather, the emergence of the hacienda is revealed to be a process profoundly shaped by introduced and native flora and fauna, extant social and political formations, and the land itself. Taking these framings into account, the questions that I ask of Ollantaytambo's political and agroecological transformation under Spanish Colonialism are multifaceted: How were Inka-built fields made into the grounds of colonial-hacienda authority? How was this transformation shaped by the various agencies—Andean and Spanish, elite and non-elite, human and non-human—at play in historically contingent colonial processes? How were relationships between people, land, plants, and animals, re-articulated during the process of colonization? How did extant materials such as Inka-built infrastructures influence the reconstitution of these relationships? To address these research questions in this dissertation I address three more focused lines of inquiry:

- How did practices of land-use change during the period of hacienda formation (ca. 1550–1650)?
- How did land governance and access to land change between the Inka and Colonial Periods (ca. 1400–1700)?
- How was the land itself transformed during these processes?

By considering these questions at Ollantaytambo I trace the intertwined socio-historical and ecological processes through which a place built to instantiate the authority of the Inka Empire was transformed into the grounds of colonial-hacienda power in the decades after the Spanish invasion of the Andes.

1.3 The Study Region

The Inka, Colonial, and contemporary settlement of Ollantaytambo is in the Urubamba Valley, approximately 40km northwest of the city of Cusco at the confluence of the Urubamba and Patacancha rivers.[10] Today, the Urubamba Valley is widely known as the "Sacred Valley of the Inka" due to the ruins of the palatial Inka estates that line its course and draw hundreds of thousands of tourists annually (Figure 1-1). From Ollantaytambo, river waters plunge into the highland jungle, passing below Machu Picchu before eventually working their way to the Atlantic Ocean via the Amazon River system.

[10] In its upper reaches, the Urubamba is called the Vilcanota River. The two names are frequently used interchangeably. Here I use "Urubamba" for the entire course of the river as this is the name commonly used in the Ollantaytambo region.

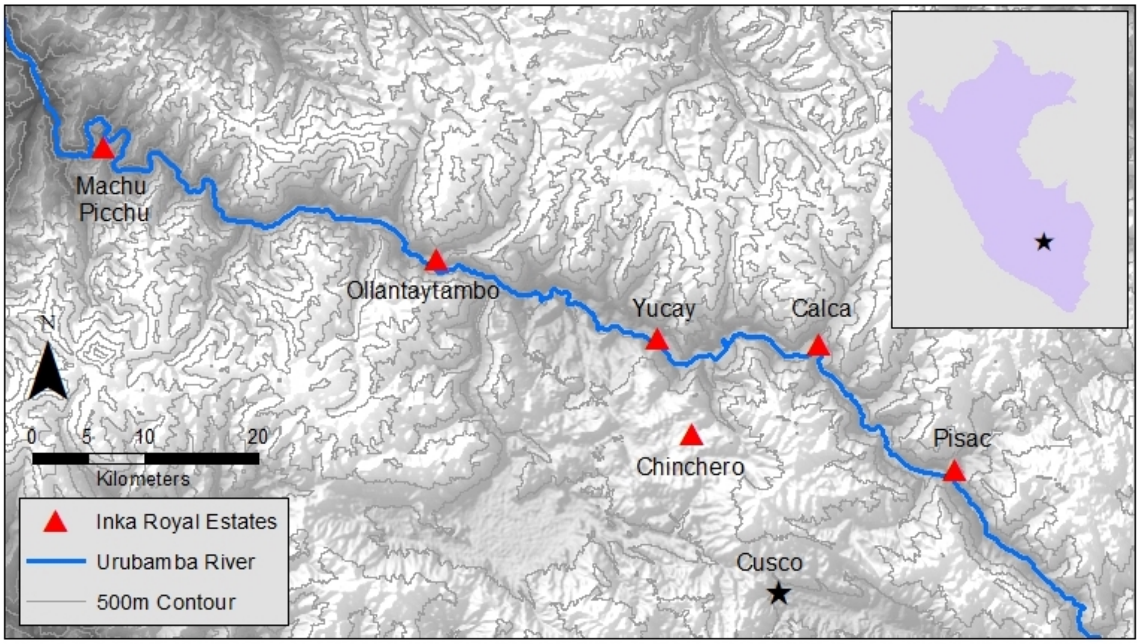

Figure 1-1: Cusco and Royal Estates (mentioned in the text) in relation to the Urubamba River. For reference, the city of Cusco sits at approximately 3400 masl, Ollantaytambo is at approximately 2800 masl, and at Machu Picchu the Urubamba flows at approximately 2000 masl. All figures by the author unless otherwise indicated.

As the data I draw on relate to sites centered around Ollantaytambo, and because of the importance of that settlement during the Inka and Colonial periods, I refer to the study area of this dissertation as the "Ollantaytambo region" (Figure 1-2). As I define the region for the purposes of this study, this area includes the floor of the Urubamba Valley stretching from the community of Pachar to the east, where the Huarocondo River joins with the Urubamba, to the community of Sillque to the west, and from the Socma Valley in the south (a tributary of the Huarocondo Canyon) to the archaeological site of Markaqocha in the north. These limits approximate Inka and Colonial era boundaries: during the Inka Period, the constructed landscape associated with Ollantaytambo extended across these lands, *huacas*—features of landscape understood to *be people*—and agricultural infrastructures located throughout the region marked the approach to the monumental Inka core of the royal estate (Kosiba 2015); documentary analysis demonstrates that people living in the colonial *repartimiento* of Ollantaytambo worked lands throughout this area early in the Colonial Period (Kosiba and Hunter 2017). Subsequent to the expansion of the hacienda system at Ollantaytambo, haciendas centered around the town extended across the valley floor and high-altitude pampa through the entire study area, dominating agricultural land and labor until the agrarian reforms of the mid 20th century.

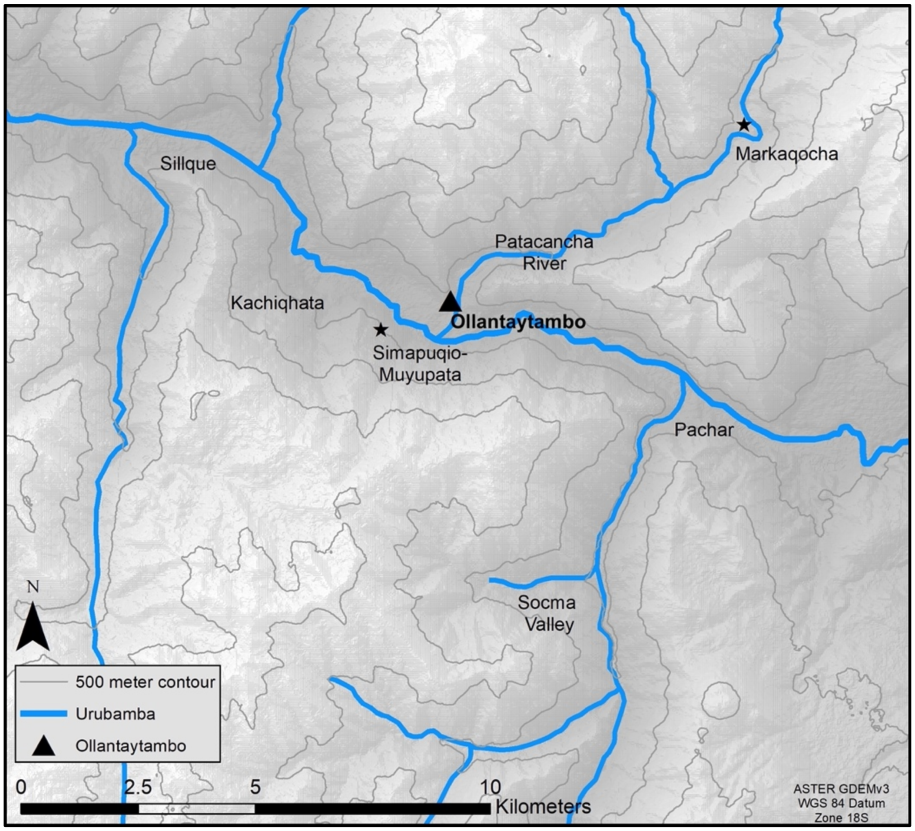

Figure 1-2: The study region, centered on the town of Ollantaytambo. Black stars indicate locations of archaeological sites—Simapuqio-Muyupata and Markaqocha—where excavations were conducted for this project. The Urubamba runs in a northwesterly course through the study area.

The Ollantaytambo region provides a striking example of the verticality of Andean agroecologies; high-altitude pasturelands are linked to valley-bottom temperate production zones.[11] The sculpted landscape (~2500–2800masl) immediately surrounding the town is ideal

[11] Researchers into the Andean past have long thought of Andean complementarity in vertical terms. John Murra (1980) posited the "vertical archipelago" model which held that discrete

for growing a variety of temperate-zone cultigens, most prominently maize, which has remained the most important crop in the region since the Inka period (Glave and Remy 1983; Kosiba and Hunter 2017). From Ollantaytambo the Patacancha Valley provides access to higher elevation ecological zones. The road through the Patacancha rises from the Urubamba floor to a high-altitude mountain pass (~4800 masl) in approximately 20 km, passing through maize lands and high-altitude tuber production and pastoral zones before plummeting into coca producing regions on the eastern slopes of the Andes.[12] Terrace complexes and archaeological sites such as Choquebamba, Pumamarka, and Markaqocha testify to the importance of the Patacancha Valley as a zone of occupation and agricultural production before, during, and after the Inka occupation of the region. On the southern bank of the Urubamba the valley walls crest in high altitude steppe where pastoralism is the only viable economic activity. This side of the valley features dense archaeological remains, including LIP settlements, Inka quarries like those at Kachiqhata, terrace complexes, and the ruins of once-wealthy haciendas. To the west, as elevation decreases, the Sillque area features some of the best maize land in the Cusco area, and was once the seat of a rich hacienda. Continuing westward down the valley (towards and beyond Machu Picchu), the warmer and wetter conditions of jungle and cloud forest—the "*yungas*" ecological zone—offer opportunities for coca, sugarcane, and coffee cultivation, along with access to a wide range of *selva* (jungle) fruits. Botanical data presented in this dissertation demonstrate that people were

ethnic groups extended control over resources in multiple ecological zones to secure access to a variety of goods. Pulgar Vidal's (1967) geographic study of Peru's eight elevation-derived "natural regions" is an early precursor of this work.

[12] Gade's (1975) study remains the definitive evaluation of land use in the Urubamba region. Gade provides a detailed evaluation of the growing zones of the most important economic taxa in the region.

moving cultivars across these production zones during both the Inka and Colonial periods (see Chapter 6).

Today, the town of Ollantaytambo is best known for the monumental ruins set into the terraced mountainside where the Patacancha and Urubamba valleys meet. In a large portion of the town narrow canal-lined streets intersect at right angles in the original Inka layout. Many contemporary dwellings are built upon Inka foundations. Indeed, the entirety of the modern town, and many of the numerous archaeological sites that surround it, sit within an anthropogenic landscape planned by Inka engineers and built by laborers working under Inka direction. Smaller ruins and archaeological sites encircle the town in all directions, most dating to the Inka and pre-Inka periods. As I explore over the chapters that follow, while Inka legacies are more overt, hacienda management dramatically recontoured the region as new social and ecological relations emerged on the Inka landscape. Legacies of Inka and Colonial rule continue to shape relations between people living at Ollantaytambo and the local environment through cultural patrimony laws that control agricultural practices on the Inka-built terraces that remain the foundation of local agricultural production.

1.4 Plan of the Work

Over the next six chapters of this dissertation, I examine the historical and ecological process by which different actors at Colonial Ollantaytambo brought the hacienda into being in the sixteenth and seventeenth centuries. In the next chapter, "Towards a Political Ecology of Hacienda Formation," I outline my theoretical and methodological approach to examining how haciendas took shape around Ollantaytambo. I argue that as the hacienda was an ecological institution created and maintained through socio-political relationships, a perspective informed by political ecology is best suited to examine the process of hacienda formation. By situating my research project within the intellectual trajectory of political ecology I argue that attention to the fields and pastures of the Ollantaytambo region is revelatory of intertwined processes of political, social, and ecological change through which aspirant landowners created hacienda holdings. This chapter also outlines the methodological approach employed throughout the dissertation, describing how I developed and interpret historical and archaeological datasets to understand how land use, governance, and access changed as haciendas emerged and consolidated. I conclude Chapter 2 by describing the archaeological sites—Simapuqio-Muyupata and Markaqocha—at which I directed excavations to recover the data presented in subsequent chapters.

Chapter 3, "Land, Labor, and the Making and the Remaking of Ollantaytambo" begins by presenting existing research on the Ollantaytambo region; it traces the transformations of the region from the Inka expansion until the period of hacienda consolidation at the end of the sixteenth century. In the second part of the chapter, I detail how the occupations at the sites of Simapuqio-Muyupata and Markaqocha fit within the regional historical trajectory of transformation from Inka royal estate to hacienda ecology. I show that both places were occupied by Inka subjects (Markaqocha by local people, Simapuqio-Muyupata by servile *yanakuna*), and both places were largely abandoned early in the Colonial Period before being reoccupied by *Yanacona de Españoles,* workers in servitude to Spanish landowners. By presenting these data I highlight that processes of socio-historical transformation initiated by the Inka reverberated into the Colonial Period, and show that within the Colonial Period, agrarian ecologies were beginning to dramatically transform around the close of the sixteenth century when land was consolidated into emerging haciendas.

I extend this argument in Chapter 4, "Histories of Possession: *Amojonamiento*, Surveying, and the Creation of Colonial Territory at Ollantaytambo," by using archival data to trace the gradual process through which Spanish landowners supplanted the authority of the local *kuraka* over laborers and land at Ollantaytambo. I demonstrate how the application of Spanish legal and customary practices of landholding at Ollantaytambo allowed Spaniards to disarticulate land from the *kuraka's* administration and vest possession in individuals and institutions such as Cusco's monasteries and convents. I focus on the practices through which Spanish power was actualized on Ollantaytambo's fields, showing how Spanish ceremonies of possession cast land as open and available for appropriation, and demonstrating how colonists layered value onto the landscape and made ownership of plots legible (both archivally, and on the landscape) through the construction of *mojones* (boundary stones). I conclude the chapter by tracing how legal structures like the *composición de tierras*—periodic surveys and redistributions of agricultural land—allowed colonists to accumulate broad tracts of valued fields. I argue that such practices constituted acts of territorialization through which colonial control was asserted over the land of the Ollantaytambo region. As they imposed Iberian *dominio* (possession) onto Inka-built agricultural fields, figures like colonial officials, Native Andean lords, newly arrived Spanish colonists, and ecclesiastic representatives simultaneously created colonial territory and a corpus of archival documents that cemented their own authority.

Chapter 5, "Afterlives of Inka Infrastructure at Colonial Ollantaytambo," demonstrates how the shifts in land tenure outlined in Chapter 4, coupled with the emergence of new agricultural practices such as the cultivation of introduced grains and pasturing of foreign fauna like cattle, pigs, sheep, and goats, worked transformations to the agrarian infrastructures (i.e., terraces, canals, and reservoirs) the Inka developed at Ollantaytambo. By drawing on pollen and macrobotanical datasets excavated from a defunct reservoir at Simapuqio-Muyupata, this chapter suggests that those introductions altered the socially mediated constraints of agricultural production such that some infrastructures were maintained and others allowed to collapse in a process of agricultural deintensification. This chapter demonstrates that the value of particular fields was not innate, but fluctuated in relation to how those fields were situated in emerging patterns of colonial landholding.

In the sixth chapter, entitled "From *Yanakuna* to *Yanacona:* Land and Labor Under Inka and Hacienda Rule," I compare the agricultural products consumed by agricultural workers living under Inka and Colonial regimes of land management to explore how those workers accessed and made use of the fields and pastures of the Ollantaytambo region. This chapter draws on botanical and zooarchaeological datasets excavated from Inka and Colonial occupations at Simapuqio-Muyupata. These data suggest that while foreign fauna were rapidly adopted into worker diets in the Colonial Period, non-native flora were less readily accepted. At the same time, botanical data like evidence of crop processing suggest a shift in the organization of agricultural labor from a more centralized system under the Inka to household level production by hacienda workers.

The final chapter of this dissertation, "From the Inka Estate to the Agrarian Reform," summarizes the contributions of the work to Andean archaeology, the historiography of the Colonial Andes, and anthropology more broadly. This chapter looks back on the hacienda from the perspective of the agrarian reform of the mid-twentieth century that split up haciendas and vested possession of hacienda lands in the workers that labored upon them. By doing so, this chapter situates the historical processes of colonial transformation within longer term trajectories of land administration and use, demonstrating that the consequences of Inka and Colonial land management continue to reverberate into the contemporary era. By levying this argument, this chapter makes a case for detailed studies of ecological and environmental *process* over narratives of transformation anchored to particular dates or “golden spikes” in socio-ecological histories.

Chapter 2
Towards a Political Ecology of Hacienda Formation

2.1 Introduction

Ollantaytambo, 1530: The royal Inka estate of Ollantaytambo radiates out from a monumental temple complex built into the slopes of a steep mountain ridge. The lush valley floor stretches away from these buildings for kilometers in three directions. North, east, and west, geometric walled fields spill out from the center of the settlement. Vast terraces sweep down to the valley floor at the confluence of the Patacancha and Urubamba rivers. Irrigation canals wind for kilometers to bring water from high altitude springs to these fields, making them productive even during the months-long dry Andean winter. Here, Inka subject workers from across the empire produce enormous surpluses of maize, which is kept in the storehouses that line the cliffs above the town—an ever-present reminder of the power of Inka rulers to generate plenty. These surpluses support constant quarrying from nearby mountain slopes—the noises of stonecutters ring out above the din generated by teams dragging immense blocks of stones to the yet unfinished temple sector at the center of the settlement. *Huaca* "place-persons," boulders, springs, or other significant features understood to *be people*, dot the landscape; rituals at those places link the bounty of the land and the deified might of the Inka ruler. Ollantaytambo is designed to be a comprehensive infrastructure of Inka power; *huacas*, fields, buildings, and canals, all are intended to reflect and reproduce Inka control over the land and those who work it.

Figure 2-1: The geometric terraces of Ollantaytambo radiating from the center of the Inka settlement, located to the upper right of the photo. All photos by the author unless otherwise indicated.

Within a century of the 1533 arrival of Spanish forces in the Cusco region, this vista was utterly transformed. Wars, pandemics, and the forced relocation of Indigenous populations into consolidated towns left the villages and hamlets that had dotted the sides of the valley unoccupied. Unmaintained canals were broken, and unworked terraces were grazed by newly introduced cattle and sheep. Vestiges of Inka power remained in the impressive monumental terraces, and now illicit *huacas* still demanded veneration, however, Catholicism was a newly mandated religion. Inka storehouses stood empty and ruined. Now agricultural surplus was taken for sale to urban centers such as Cusco, or farther afield to the town of Potosí, where the mining boom brought higher prices. Land was distributed amongst members of a newly-created civic body—the *repartimiento* of Ollantaytambo—and by private owners of emerging hacienda estates. A regular flow of Andean people fled the *repartimiento* to take up residence on these haciendas to avoid onerous tribute requirements. Indeed, these ever-growing *latifundia*—extensive landed properties—were well on their way to surpassing the *repartimiento* as the most important rural institutions in the region as wealthy Spaniards and ecclesiastic orders eagerly added small plots to their properties and consolidated control over labor. These haciendas would dominate the rural landscape for the next four centuries until Peru's agrarian reform of the 1960s broke up consolidated estates and distributed lands amongst former hacienda workers.

In the first chapter of this dissertation, I suggested that looking to processes of ecological transformation can expose the situated practices and complex negotiations through which diverse agents created historically contingent colonial contexts. As I suggested, at Ollantaytambo this means investigating the origins of the hacienda system of agricultural production. The transformations I describe in the first paragraphs of this chapter—a suite of changes to land, landscape, and social organization that pre-figured the hacienda—were by no means inevitable, and while some changes were sudden, they were situated within an extended socio-historical process of political and ecological transformation. Ollantaytambo's haciendas, institutions that, by the close of the seventeenth century, controlled the majority of agricultural land in the region, emerged from this socio-natural process. The story of hacienda formation is one of the creation of colonial territory, but also ecology, labor, land, and colonial power, all contextualized within the dramatic contours of the former Inka estate at Ollantaytambo. How did these expansive agrarian enterprises, premised on individualized land ownership and explicitly colonial labor relations, emerge on a landscape at Ollantaytambo that was built to be inherently Inka? How did that that emergence build on and alter extant properties of the Inka landscape, and how did it re-shape local agroecologies? How did different groups of people—erstwhile Inka elites, local subjects, and invading Spaniards, amongst others—shape this history?

In this chapter I outline the logics that guide my approach to addressing these questions. I frame this investigation as a *political ecology* of hacienda formation wherein I query how ecological changes in Colonial Ollantaytambo were manifested and experienced unevenly by different actors, and how those transformations are evinced in seemingly unremarkable remnants of agricultural production and domestic consumption. In this chapter, given my focus on Ollantaytambo's fields and pastures, I highlight changes in *agricultural land* and *land use* as guiding analytics. In what follows I outline how I frame the agricultural land of the region as an object of archaeological and historical study, and why I focus on it. In short, my approach is predicated on my understanding of land as both the fundamental grounds of agricultural production and a product of agricultural labor that is an interface between human and non-human constituents of agroecologies. Land is not an inert backdrop to human activity; rather, the elements that comprise Ollantaytambo's fields and pastures were and are a dynamic *process* deeply intertwined with localized sociopolitical transformations.

Why focus on agricultural land? On the one hand, I appreciate the value of a landscape perspective and it informs my approach here very closely—particularly approaches to landscape rooted in critical geography (e.g., Richard 2018; Sluyter 2002; Smith 2003; Sundberg 2011; Zukin 1993; see Chapter 1). As researchers have shown, the Andean landscape was contested through the Colonial Period, and the Spanish explicitly set out to transform it: "The mountainous region being the chief part of the country…settlements of Christians cannot be made there," wrote Pedro Sancho, in his memoires of the first Spanish forays into the region (1915 [ca.1550];

see H. Scott 2009). Colonizers launched campaigns to extirpate idolatries they understood to be materialized in *huacas* and attempted to impose Christianization through resettlement into *reducciones* intended to inculcate Iberian notions of settled life (Mumford 2014; Wernke 2013). Archaeologists have investigated these processes through the lens of evangelization, however, we have a more limited understanding of how contests over the Andean landscape played out within the fields and pastures of the region, or how they were materialized in the transforming agroecology. In this dissertation, I investigate how Ollantaytambo's agricultural fields and pastures became a grounds of colonial contestation through which power over the rural landscape and authority over agricultural workers were negotiated. As I argue below, attention to the governance of agricultural land clarifies the political aspects of hacienda formation (i.e., resource creation, access, and use) as well as foregrounding ecological transformation across the period in which haciendas were created.

The remainder of this chapter is roughly divided into two parts. In the first, I contextualize my research questions by describing Ollantaytambo's haciendas, situate my research in relation to trajectories of political ecology thought, and outline how I view land as an object of archaeological attention. My argument in this section is that a focus on agricultural land is revelatory of social, political, and ecological transformation; in this case, the creation of the hacienda and consolidation of colonial control over land and labor. In the second part of the chapter, I detail the methodological contours of my study. I outline my epistemological framework for unifying archaeological and historical data and describe the sites where I conducted archaeological research. I begin though, by describing the contours of the Colonial and Republican era haciendas that began to emerge at Ollantaytambo at the close of the sixteenth century.

2.2 Haciendas at Ollantaytambo

The hacienda was an immensely diverse institution, variable through time and across space in the Spanish colonies. Even within the Viceroyalty of Peru, haciendas varied widely. Coastal haciendas, for instance, where landowners used slave labor to produce cash crops like sugar or wine grapes, were clearly different from high altitude herding haciendas in the Andean sierra (see Weaver 2015). Even in the sierra, however, hacienda agriculture and social life varied considerably depending on location relative to urban centers, whether landowners resided on the estates, and environmental factors like elevation or water availability. At a fundamental level though, haciendas shared some characteristics. They amounted to extensive landholdings and a social relationship between landowners and resident workers (often referred to as *peones*, *colonos,* or *yanaconas)*[1] premised on unequal access to land. Keith (1977, 2) defines the hacienda as "an estate which belonged to a recognized member of a privileged elite, and it was a commercial farm which provided and income sufficient to support the conspicuous consumption which demonstrated aristocratic status." This definition broadly holds for the haciendas I discuss in this dissertation, which were fundamentally oriented around agricultural production.[2] To this definition though, I would add that Ollantaytambo's haciendas were territorial and political

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[1] *Yanaconaje* was a colonial laborer status that evolved from the Inka institution of *yanakuna* servant-subjects. I discuss this distinction at greater length in Chapter 3. I follow Covey (2020) in referring to the Inka "*yanakuna*" and Colonial "*yanacona*."

[2] This is true of the haciendas I examine, although the term "hacienda," derived from *hacer* ("to do") also had a broader meaning that applied generally to profit making enterprises. In different times and places in the Spanish Colonies there were lumber "haciendas," mining "haciendas," or even manufacturing "haciendas." The term was also used for the "royal hacienda"—the bureaucratic apparatus that collected taxes and provided income to the crown (Keith 1977). As I use the term it applied only to agricultural enterprises.

institutions that actualized control over space, social structures premised on inequality, a set of ecological relations, and the actual fields and pastures within which agricultural labor was performed. In this section, I outline some commonalities of haciendas across the Andes, but focus on the characteristics of the institutions at Ollantaytambo.

At the most basic level, haciendas were territorial units of landholding, amalgams of landed property vested in individuals or institutions.[3] Estates varied in size, but those in the sierra were often extensive, frequently amounting to many hundreds of hectares. For instance, at Ollantaytambo the Hacienda Compone (also called Huatabamba in the Colonial Period) was approximately 80740 ha in the mid nineteenth century, stretching up almost the entire extent of the Patacancha Valley. Other haciendas were much smaller (such as Pachar, which had 3380 ha as of 1930), however even smaller haciendas were extensive and adjoining lands were frequently accumulated together into even larger properties (Glave and Remy 1979; see Figure 2-2). Haciendas could also be comprised of incontiguous distinct parcels (frequently called "annexes"), such as the Hacienda Rumira (Figure 2-2). Even in in these instances though, they were territorial institutions in that they were predicated on the expression of control over a given area of agricultural land.

Individualized possession of land should not be assumed to imply total authority across the extension of these estates. The territorialization of haciendas was an always ongoing project; boundaries were far from secure or solidified, rather, they were fuzzy, often uncertain, and frequently the subject of disputes and contests between landowners (e.g., see zones "*in litigio*" in

[3] The legal concept that underwrote this ownership in the Colonial Period, *dominio,* was more nuanced than implied by modernist concepts of private property. I explore this concept further in Chapter 4.

Figure 2-2). Moreover, control by landowners within the bounds of lands they claimed as property was often far from absolute. While the most valuable valley-floor plots were often tightly administered, life in higher altitude fields and pastures was less directly subject to hacienda control. At Ollantaytambo, haciendas were established as territorial institutions in the middle part of the seventeenth century, and by the end of that century dominated agricultural landholding in the region (Glave and Remy 1979; 1983). While haciendas retained legal rights over the majority of land in the region until the agrarian reform of the mid-twentieth century, this endurance should be understood as an ongoing project of territorial consolidation rather than a realized accomplishment.

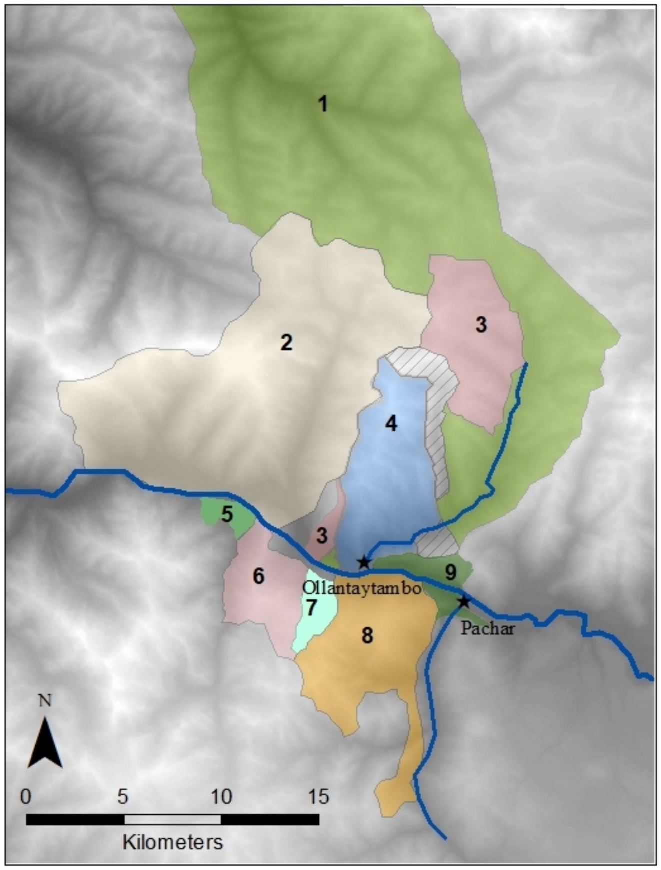

Figure 2-2: This map shows the extent of hacienda landholding around Ollantaytambo at the time of the agrarian reform in the mid-twentieth century; a snapshot of frequently shifting boundaries between estates. Different colors correspond to different haciendas: 1) Compone (Huatabamba), 2) Phiri, 3) Rumira (note this hacienda had discontinuous valley bottom and highland holdings), 4) Lands of the Ollantaytambo Community, 5) Sillque, 6) Kachiqhata (Cachicata), 7) Simapuqio, 8) Pachar, 9) Mascabamba. Note also the areas of crosshatching, which were lands subject to litigation, "*in litigio*" between the haciendas and the community at Ollantaytambo. The locations of the towns of Ollantaytambo and Pachar are indicated by stars. Data for this map were collected from the archives that house documents from Peru's agrarian reform (ADRAC; *Afectaciones*, PIAR Calca-Urubaba, 1973).

The specific agricultural enterprises of a given hacienda varied according to ecological affordances, as well as economic and cultural preferences. Along the Urubamba, lower elevation locales in the jungle produced sugar in the Colonial Period, and added coffee when a global market for the beans developed in the nineteenth and twentieth centuries. Mid-altitude holdings (like those around Ollantaytambo) were largely dedicated to maize and wheat, while higher altitude haciendas were essentially ranching enterprises (see Gade 1975). However, ecological complementarity was also important *within* haciendas. Extensive holdings were critical to hacienda operations; haciendas required land to produce market crops, to support resident workers, and to produce the broad array of materials required to keep the estate functional (e.g., wood, fodder, foodstuffs, pasture). A consistent source of irrigation water was required to keep valley-bottom fields productive; avoiding complicated negotiations over water rights demanded that haciendas control land extending up tributary rivers. It is likely not coincidental that many of Ollantaytambo's hacienda holdings extended along watersheds to highland sources, often mimicking Inka land use patterns to take advantage of Inka agrarian infrastructures like canals (Kosiba and Hunter 2017).[4] As Glave and Remy (1979; 1983) describe around Ollantaytambo, the relatively flat, low altitude lands on the floor of the Urubamba valley were largely dedicated to producing valued market crops (e.g., wheat and maize). Meanwhile, landowners allocated higher altitude lands to resident workers for tuber production or to pasture the draft animals required to cultivate fields and bring produce to market.[5] As Lockhart (1969, 425) writes: "a drive to self-sufficiency, diversification, or completeness…was a constant in Spanish colonial estates from the early sixteenth century onward."

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[4] Glave and Remy (1979) suggest that *hacendados* sought to acquire land simply to ensure access to the water that flowed through it. These landowners would thus purchase lands that they had no real intention to work, which could subsequently be let to landless peasants who became *yanaconas* or *feudatarios*.

[5] In describing the many holdings of Cusco's Bethlehemite order at Ollantaytambo and elsewhere in the Cusco region, Glave and Remy (1983, 284) note that the order held lands for commercial maize production at Sillque, near Ollantaytambo, pastureland for dairy production at Cachiccata (Kachiqhata), land for maize and wheat at Pachar, pasture near the city of Cusco in Huancaro for the order's mules, and land at a place called Parpay was used for pasturing wool-bearing animals and as a source of forest products. In this case, ecological complementarity was widely scattered across many kilometers of the landscape and predicated on constant movement between the order's properties.

Finally, the hacienda was a social relation between landowners and laborers. Haciendas were either owned by wealthy individuals or institutions but in either case were most often directly administered by a resident *mayordomo*. At Ollantaytambo the Bethlehemite order, Augustinian friars, Cusco's Mercedarian Monastery, and the Convent of Santa Clara all held seigneurial properties in the Colonial and Republican eras, as did a number of wealthy families. Workers living on haciendas were caught up in relations of servitude with these landowners, often premised on debt or agreements to labor a certain number of days of the year in exchange for the use of plots of land.

Gade (1975) described the labor relations of hacienda workers in the Urubamba Valley in the middle part of the twentieth century (prior to and during the process of agrarian reform), noting that: "agricultural laborers ("*colonos"*) on manor estates are those who "belong" to it and are, in fact, not really free agents. In return for work on the hacienda, they are allowed to farm two or three *topos* for their own use" (1975, 31).[6] Such arrangements are often described as paternalistic patron/client relationships, and some hacendados may have understood themselves to be benevolent patrons, however, labor relations were predicated on exploitation and tended towards violence. Eighteenth century documents from the Hacienda Sillque, for instance, detail the forced labor and imprisonment of resident workers who failed to meet labor obligations (*ARC*, *Epoca Colonial*, *Legajo* XIV 584, 16v). These relationships—predicated on monopolized possession of land—were the backbone of what of Peruvian journalist and historian José Carlos

[6] The *topo* is the unit of area for land that I use most commonly in this dissertation. A *topo* varied in size considerably over time and space, but likely approximateed a third of a ha. The other unit of area I use frequently, the *fanega (*or *fanegada)* was a unit of land that could be sown with a *fanega* (a volumetric measure) of seed. Glave and Remy (1983) calculate that in Colonial Ollantaytambo a *fanega* was roughly equivalent to 2.9 ha.

Mariátegui described as an essentially "feudal" system of land management that endured into the 20th century. For Mariátegui, the preservation of *latifundia* marked the clearest legacy of colonialism in rural Peru and constituted the essential elements of Peru's "agrarian problem" (Mariátegui 1974: 32).[7]

The degree to which the hacienda reflected a truly feudal political economic order has been subject to considerable academic debate (e.g., Burga 1976; Coatsworth 2005; 1978; Ramírez 1985; Martinez-Alier 1977; Wolf and Mintz 1957). These studies of haciendas often attempted to categorize agrarian labor organization on a spectrum from feudal to proto-capitalist, often contrasting haciendas with sugar or cotton plantations in order to understand the development of broader colonial political economies. A finding that emerges from this literature is that the specificity of hacienda political economy (including labor organization) was historically contingent and varied depending on factors as variable as local politics and global market conditions. For instance, at Ollantaytambo Glave and Remy (1979) break the hacienda era into three periods, the first, the era of "formation" and consolidation, lasted from the 1550s until 1689, when the Bethlehemite friars acquired the hacienda Sillque to support their hospital in Cusco, an acquisition that consolidated privatized ownership of the vast majority of the agricultural land in the region. Their second period, which Glave and Remy argue lasted until the close of the 18th century (roughly analogous with Peruvian independence) they characterize as "*Empresarial*" or "for profit." During this era haciendas focused on the commercialized production of grains sent to urban markets. Their final period, beginning with independence, is

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[7] As a primary source, Mariátegui is suspect; he rarely traveled out of Lima, and likely had an at best secondary understanding of rural land relations in Peru. I cite him here to demonstrate the broad recognition of land, and land access, as an economic and political issue rooted in the inherent inequality the hacienda system imposed on the rural Andes.

the period of "*Gamonalismo*," a time during which haciendas were much less profitable (in part because Peru imported large quantities of inexpensive grain from Chile) and hacienda ownership was more important as a mark of political status, rather than for agricultural production. This periodization emphasizes that while the hacienda was a legacy of colonialism in the twentieth century (as characterized by Mariátegui) the institution was not simply a static holdover of an earlier era, but rather was a historically variable enterprise that meant different things at different times in the Andean countryside.

As I discussed in Chapter 1, scholars often frame the emergence of haciendas as an evolution of the encomienda or as the result of interventions on the part of the Spanish Colonial state, such as the assignment of land grants by viceregal authorities. However, at Ollantaytambo, neither the encomienda nor land grants satisfactorily explain why haciendas took the form they did: the encomienda within which Ollantaytambo was included was assigned to Spaniards who did not maintain homes or seek lands in the area (see Julien 2000; Varón Gabai 1997), and strictly speaking, land grants at Ollantaytambo were rare. As Glave and Remy (1983) outline in detail, only one substantial grant directly resulted in the creation of a hacienda at Ollantaytambo: a *merced* of grazing lands at a place called Tioparo to Cusco's Augustian monastary in 1568 (see Chapter 5). Moreover, while much hacienda scholarship queries labor relations and connections to commercialized markets from the perspective of political economy, rather than strictly political economic institutions, haciendas were also power structures predicated on agroecological relationships—control over agricultural land and the labor to make that land productive. As such, investigating the origins of the hacienda at Ollantaytambo is to interrogate the *political ecology* of the early Colonial Period.

2.3 Towards a Political Ecology of Hacienda Formation

"Political Ecology" is a broad term; research under the umbrella of political ecology ranges from Marxist analysis of resource access to post-modern inflected investigations of the discursive construction, definition, and understanding of the "natural" world. Indeed, Paul Robbins suggests that rather than a discipline, method, or theory, political ecology is best understood as a community of practice linked by a collective commitment to investigating the "forces at work in environmental access, management, and transformation" (Robbins 2011, 3). The analysis I undertake in this dissertation is informed by distinct threads of political ecology rooted in anthropology and critical geography. In the paragraphs that follow I situate the chapters that follow in relation to these approaches to show how my focus on the fields and pastures—the agricultural land—of the Ollantaytambo region elucidates the historical process of hacienda formation.

In anthropology the term "Political Ecology" was first used by Eric Wolf (1972) as an intervention in paradigms of cultural ecology (e.g., Steward 1972). Wolf foregrounded the importance of agrarian political economy to understandings of human-environment interactions; cultural practices like local customs of land tenure were not simply adaptations to environment, but rather mediated "between the pressures emanating from the larger society and the exigencies of the local ecosystem" (Wolf 1972, 202). Despite this early use in anthropology, it was within geography that political ecology solidified as a body of research, most prominently with Blaikie and Brookfield's (1987) *Land Degradation and Society*.[8] Blaikie and Brookfield's analysis, in their own words, combined "the concerns of ecology and a broadly defined political economy.

[8] The origins of political ecological thought in geography are frequently traced to Carl Sauer (see Robbins 2011, Paulson et al. 2005). In particular, Sauer's *Morphology of Landscape* (1925) is viewed as a keystone text. See Morehart et al. (2018) for a discussion of political ecology genealogies and applications to archaeology specifically.

Together this encompasses the constantly shifting dialectic between society and land-based resources, and also within classes and groups within society itself" (Blaikie and Brookfield 1987, 17). Writing from a world-systems perspective, the authors argued that environmental degradation in "peripheral" nations was caused by structural disadvantages of the global political economic order. In effect, their work solidified an approach that sought to understand environmental change or ecological transformation in relation to resource access, resource use, and broader political-economic structures; environmental change was to be understood through "attention to who profits from changes in control over resources … exploring who takes what from whom" (Robbins 2011, 59; see also Bryant and Bailey 1997, 28-29). By demonstrating that localized environmental degradation was a response to inequality and imbalances of power at much broader scales, Blaikie and Brookfield powerfully demonstrated that land is a dynamic material situated in, and responsive to, decidedly human histories. While critiqued in anthropology for assuming a "rational" land manager and failing to acknowledge the extent of symbolic resources and cultural meaning attached to land and landscapes, Blaikie and Brookfield recognized and argued that environmental processes carried different meanings and consequences for different actors. A given change to land may not be universally understood within the same terms; processes like land degradation vary depending on perspective—a "reduction in the capability of land to *satisfy a particular use*" (my emphasis, Blaikie and Brookfield 1987, 6; see also A. Bauer 2010, 7; Morehart et al. 2018).

In the 1990s a new, post-modern, turn in political ecology built on the work of earlier researchers like Blaikie and Brookfield. This movement recognized Nature/Culture distinctions as fundamentally modern and turned away from political economy towards analysis of the discursive "construction" of the environment (e.g., Descola 1994; Escobar 1999). This work sought to demonstrate the different abilities of actors to define resources, and looked to investigate how the material world is produced as knowledge for political projects (Biersack 2006; Peet and Watts 2004). This turn in political ecology powerfully demonstrated that the production of knowledge about Nature is shot through with power after a fashion frequently manifested on the landscape, however, critics suggested that this approach de-emphasized the "ecological" or "material" aspects of environmental change (see A. Bauer 2010; Walker 2005). As Goldman and Turner summarize the critique: "Changing material (ecological) conditions are seen as influencing environmental politics only through the divergent meanings attached to change by individuals and groups with divergent powers" (Goldman and Turner 2011, 7).

More recently, political ecology has also taken up a renewed concern with material-ecological processes, in part through an engagement with Science and Technology Studies (STS) (e.g., Goldman et al. 2011). In keeping with a general renewed interest in materiality in anthropology and geography, political ecology researchers increasingly acknowledge the active role materials play in shaping both their own discursive construction and material-ecological processes in the world (see Harvey et al. 2014).[9] This shift has re-emphasized the importance of materials—the biophysical—in political ecological processes even as it has retained attention to how competing knowledge claims frame understandings of the "natural" world. Here though, rather than adaptationist cultural ecology framings, this renewed focus on the role of materials in political processes draws on STS and feminist approaches to materiality to undo stark

[9] Latour's early program of Actor Network Theory is the inspiration for a great deal of this work. Many scholars, for instance, draw on examples like Latour's (1988) analysis of the discovery of the pasteurization process. In that study Latour underlines how social and political commitments can make some facts easier or harder to discover and transmit to broader publics, while also demonstrating that objects like microorganisms are able to manifest themselves as political actors—in that case, aiding in the success of Pasteur's project (see also Robbins 2011, 77).

differentiations between Nature and Culture (e.g., Bennett 2010; Todd 2018; Whatmore 2006). For example, Sundberg (2011) employs a posthumanist framing derived from Harraway (2008) to argue that nonhumans like thorny landscapes and endangered cats actively shape the geopolitics of boundary creation and enforcement along the US-Mexico border. Research in this vein demonstrates that environments and ecologies are not just shaped through human intervention; rather, environments and people emerge together in relational processes (e.g., Lyons 2020; Kawa 2016; Kirksey 2015; Raffles 2002).

My own invocation of political ecology builds from each of these approaches. In the chapters that follow I consider shifts to the material-ecological milieu of the Ollantaytambo region—that is, I examine the regional agroecology as a historically dynamic entity—while retaining attention to contests over conceptualizations and governance of that agroecology through the period in which haciendas were created. In doing so, I consider how diverse human and non-human actors were variably involved in and experienced the consequences of this historical process. In invoking these various strains of political ecology I follow what Robbins (2011) terms the "hatchet and seed" tendency of the approach; critically examining and deconstructing dominant narratives of human/environment relations ("hatchet') in search of alternative and more complete understandings ("seed"). In this case, the "hatchet and seed" demands looking beyond colonialist narratives of domination over people and spaces to better understand the historically contingent and locally situated processes through which institutions like haciendas were created by a variety of actors. This approach suggests a dual focus on the symbolic-discursive practices of meaning making through which the hacienda landscape at Ollantaytambo was produced, and on ecological transformations precipitated by the colonial encounter, including those that followed from the introduction of foreign flora and fauna and creation of new kinds of landholding and labor organization. This is to say, this approach requires attention to how the values associated with particular places were negotiated through *both* legal discourses and agricultural practices, each of which was a domain of colonial conflict. To do this, I focus my attention on the agricultural land—the fields and pastures—that formed the basis of Ollantaytambo's Inka and hacienda agroecologies, and study the material remains left behind by the workers that made those lands productive under Inka and Spanish Colonial rule. In the next section, I explain what I elaborate further how I understand the agricultural land of the Ollantaytambo region as an object of anthropological inquiry.

2.4 Land and Ecology at Ollantaytambo

At Ollantaytambo the Inka created hundreds of hectares of land ideal for maize cultivation by leveling slopes and draining waterlogged valley bottoms (see Kosiba 2015; Chapter 5). The construction of the field systems that surround the town changed the ecological strictures of agricultural production. As Treacy and Denevan (1994) highlight, manipulating materials to build features like terrace complexes and irrigation infrastructures amounts to the *creation* of cultivable land within the stark verticality of Andean ecologies. As numerous scholars of Andean agriculture highlight, the construction and maintenance of such lands was, and is, inherently political (e.g., Mayer 2002; Kolata 1996, Denevan 2001; Wernke 2010; 2013). By building terraces, augmenting soils, and digging canals and drainage systems, ancient engineers and workers created systems of what the anthropologist Enrique Mayer (2012) terms "*production zones*:" relatively small field systems comprised of adjacent fields suitable for the growth of particular crops (see also Wernke 2013). Mayer argues that these production zones reflect and constitute social relationships by creating links between farmers. He writes:

> When we think of production zones as artifacts, rather than as adaptations to the natural environment, our attention is directed to how they are created, managed, and maintained. Then the importance of the political aspects of control by human beings over each other, in relation to how they are to use a portion of their natural environment will again come to the fore" (Mayer 2012, 241).

Moreover, relationships between people and land are decidedly historical and shift in conjunction with political, ecological, and economic articulations. Mayer (2002), for instance, highlights the reforms of the Viceroy Toledo as a particularly disruptive intervention in relationships between farmers and fields. Allen (2002) traces the history through which the ayllu of Sonqo, in the Cusco region, developed ties to land *during* the Colonial and Republican eras as ayllu members defended their lands from Spanish colonists, hacendados, republican tax collectors, and other threats. The ways in which people relate to land—and in turn, the ways in which land was entwined with politics—varied over time in conjunction with socio-historical change.

However, scholars—including Mayer—also highlight that agricultural land in the Andes is meaningful beyond its political or economic import. Mayer writes: "A field in the Andes is a *chacra*, a powerful object and a symbol that conveys states of being and feelings" (Mayer 2002, 2). Mayer quotes the agronomist Julio Valladolid: "The nurturing of the *chacra* is the heart of Andean culture which, if not the only activity carried out by the peasants, is *the one around which all aspects of life revolve*" (Valladolid 1993, 51, cited in Mayer 2002, 2, my emphasis). This relationship between agriculturalists and their fields is part of the reason Mayer describes Andean farmers as "articulated peasants," connected to and constituted by relationships outside of the household.[10] In Mayer's reading, peasant households are formed, in part, through labor in

[10] In Mayer's argument, the household is also shaped by other articulations; community, ayllu, markets, money, and the organization of land tenure, amongst other factors, dramatically impact how people relate to and work the land.

the *chacra* and the relationships that emerge between people, plants, and animals in the *chacra*. Allen (2002, 17) makes similar arguments to explain how her *Runakuna* interlocutors in Cusco relate to their land: "The land is many correlated things: it bears their crops, feeds their animals, and supplies mud bricks for their houses. It is also a legal unit, a bounded territory that they have defended for centuries. It is, moreover, a land*scape*, a constellation of familiar topographical features that serve as reference points in time as well as space."

For instance, in the pre-Hispanic Andes, Ramírez (2005) argues the term "*chacra*" applied only to planted land; it was the act of working the land—applying politically mediated labor—that made it into a mutually recognizable cultural object with social significance. *Chacras* emerged from the intermingling of human labor with the material of soil, rock, microbiota, plant, and animal matter. These *chacras* were inherently political, however, rather than being lords over land, in Ramírez's reading, Andean elites controlled labor, and by extension derived power over the land *that their subjects worked*. The authority of these lords emerged from this intermingling; *kurakas* were intermediaries with more-than-human divine forces imbued in the landscape, by ritually *feeding* those beings *kurakas* in turn ensured that lands would be productive such that their subjects would be *fed*. Within this relation, it is impossible to disentangle *land* as a material from the labor—human and non-human—that makes agricultural production possible, and political authority is deeply entangled with the ecological potential of particular fields and pastures.

These observations regarding the relationship between people and their fields are reminiscent of what Ingold (2000, 134-150) terms a "relational model" of land, which he contrasts with a "genealogical model," the typical "Western" view of land as economic resource.

For Ingold, the genealogical model posits land as a measurable homogenous thing, there to be occupied, but that itself sits “outside of history” (2000, 135): “every form of life exists upon the land…it is simply and permanently there, an enduring surface over which generation after generation of individuals pass like cohorts on the march” (2000, 149). By contrast, the relational model holds that rather than life existing *on* the land, life emerges in relation with land, which is “itself imbued with the vitality that animates its inhabitants.”[11] Hence, within the relational model (which Ingold associates broadly with non-Western and Indigenous ontologies), individual fields and pastures are not discrete static objects, but rather are things constituted in *in relationships* between humans, non-humans, and materials (akin to Ingold’s (2010) tree example, see Chapter 1). Hence, even the most overtly anthropogenic of agricultural land is a socio-natural product that mingles both human constructions and the inputs of non-humans like microbes, minerals weathering from rocks, plant growth, and the manure of animals walking upon it (Given 2017). Ingold writes “both humans and the animals and plants on which they depend for a livelihood must be regarded as fellow participants in the same world, a world that is at once social and natural” (2000, 87).[12] People and nature are together in history “nature is not a surface of materiality upon which human history is inscribed; rather history is the process wherein both people and their environments are continually *bringing each other into being*” (2000, 87). This is

[11] Ingold notes that the relational model of land is very close to his understanding of landscape*,* (Ingold 2000, 428, n2).

[12] Blanchette’s (2015) examination of industrial pork production in the contemporary American Midwest is an alternative formulation that demonstrates a similar point. Blanchette shows that the social contexts of pork production—including the social and family lives of human workers—are radically shaped by porcine needs. For example, the need to eliminate cross-contamination between barns limits interactions between workers from different farms. Hence, even the seemingly most “un-natural” of agricultural contexts, the industrial factory farm, is profoundly shaped to accommodate the needs of the pig.

a relation that Given (2017) characterizes as *conviviality;* “strivings such as growth, politics, community, and livelihood are “cofabrications” between a host of co-dependents with their own needs and limits, non-humans and humans alike” (Given 2017, 131).

As well as informing my understanding of the relationship between agriculturalists and land, this framing also shapes my understanding of agricultural labor; rather than concentrating on the agency of the agriculturalist, it suggests that agency within agricultural systems is distributed amongst human and non-human constituents. Writing to problematize the distinction between agricultural “food producers” and hunter-gatherer or foraging strategies of “food procurement,”[13] Ingold (2000, 86) suggests that the best way to understand agriculture—or “food production”—is not as an activity that is different in *kind* from “food procurement,” but rather as an activity that differs in *intensity*. Agricultural labor is fundamentally not about *making* products, but rather about working to create optimal conditions for *growth*. The difference between food procurement and food production is not absolute, but rather is “the relative scope of human involvement in establishing the conditions for growth” (Ingold 2000, 86). Agricultural systems are not apart from “natural” ecologies, rather, they are themselves particular kinds of ecologies built upon the multispecies constitution of fields and pastures. Human agency and intentionality is only one contributing force in the construction of agroecologies. This perspective is aligned with how many Quechua farmers understand agricultural practices; as Mannheim (2015, 249) explains, within Quechua semantics: “one does not herd animals, one follows them. Similarly, an irrigation canal does not carry water; it rather guides (*pusay*) it.”

[13] The difference between “gathering and cultivation, and between hunting and animal husbandry” (Ingold 2000, 86).

Taking these points together, while agrarian ecologies develop over the *longue durée*, they are also the products of day-to-day decision making on the part of farmers and are created through relations between humans, non-humans, animals, plants, and the land itself. Understood thus, Mayer's (2002) "production zones" do not just emerge from political negotiations amongst people, but rather are collaborations that imbricate agricultural labor, land, flora, and fauna in mutual obligations. Agricultural fields are not a stable background to social or political activity, and not an environment to which people adapt. As Ingold (2007) emphasizes, materials do not so much have "attributes" as they have "histories." Agriculture is not just humans acting on land, but rather is a set of practices that emerges in relationships between farmers, plants, animals, and land (see Rosenzweig 2014, 23). Agroecologies are always in a state of becoming such that their non-human constituents— plant, animal, and material—are dynamic and active forces in social and political life (A. Bauer 2010; Bauer and Kosiba 2016; Blaikie and Brookfield 1987; Erickson 2006; Hecht et al. 2014; Kosiba and Hunter 2017; Morrison 1995; 2006; 2009).

The property of environmental interlocutors that I am describing here—their capacity not only to accommodate human actions but also trigger alterations to social and political life—is captured well in STS studies of infrastructure, and in particular studies of *environmental infrastructures*. Environmental infrastructures are infrastructural projects (facilities or systems to support action) that are dependent on multi-species inputs from "Nature" (Bruun Jensen 2015; Harvey et al. 2016). For instance, Morita (2017) outlines how floating rice operates as environmental infrastructure through relationships with farmers in Thailand's Chao Phraya delta. Long stemmed floating rice varieties accomplish the same ends as canals and sluices required for growing short-stem rice varieties; by growing to accommodate a depth of several meters of water they make cultivation possible in the face of potentially catastrophic flooding. Morita argues that the specific qualities of these floating taxa are central infrastructural components of the Chao Phraya delta—itself an infrastructure of flood control that protects the city of Bangkok. In another example, Bruun Jensen (2015) draws on Raffles' (2002) discussion of the socio-natural creation of the Rio Guariba in the Brazilian Amazon, in which Raffles highlights that the river is both a social presence and a physical actor that reshapes land, to demonstrate how as riparian infrastructures become embroiled in politics, such infrastructures become "tools for distributing wealth, power, capacity, vulnerability" (Bruun Jensen 2015, 23). This is to say, the river operates as a conduit of political energy. As I elaborate further in Chapter 5, such environmental infrastructures have effects and accomplish action beyond what is immediately intended of them. In this sense, environmental infrastructures do not just reflect political and social actions, *but also constitute them* (Harvey et al. 2017).

The emphasis within this framing on the active potentials inherent in non-human components of ecologies is resonant with recent anthropological and archaeological approaches that challenge ontological distinctions between people and objects.[14] Archaeologists have adopted theories that de-emphasize distinctions between people and things in different ways (e.g., symmetrical archaeology, new materialisms, conviviality, see Harris and Cipolla 2017, Ch. 8). As Rosenzweig and Marston (2018, 89) put it, these perspectives frame "elements of the environment not just as political pawns, but also as political conductors." The authors invoke Bennett (2010) to suggest that attributing this "vitality" to ecological agents amounts to a "recognition that our environmental interlocutors make us do things, including acts of political

[14] Scholars in infrastructure studies tend towards a dialectical practice-based approach based around Andrew Pickering's *Mangle of Practice* (1995). Pickering's "dance of agency" posits that the resistance and accommodation of scientific instruments to particular intentions in the lab shapes experimental practice.

consequence" (Rosenzweig and Marston 2018, 89). In the chapters that follow, I draw on these perspectives by emphasizing how the specific material and ecological properties of the flora, fauna, fields, canals, and terraces that are documented in archaeological and archival data from sixteenth and seventeenth century Ollantaytambo shaped the socio-historical process of hacienda formation as it played out across the sixteenth and seventeenth centuries.[15] In the next section of this chapter, I outline my approach to gathering and interpreting data regarding transformations to Ollantaytambo's fields and pastures, and in turn, the social articulations of the agricultural laborers who worked upon them, across the period of time in which haciendas emerged as the dominant landholding institution in the region.

2.5 Methodological Approach

In this study I draw on different kinds of data to demonstrate how the fields and pastures that comprised the agricultural land of the Ollantaytambo region were transformed through the Inka and Colonial periods. By detailing these histories, I show how lands developed by the Inka at Ollantaytambo became political conductors that shaped the emergence of the hacienda. In generating the datasets to address these lines of inquiry I am guided by studies that take into account both the action of human cultivators and non-human constituents of agroecologies (e.g., A. Bauer 2010; Erickson 2014; Lyons 2020; Kawa 2016). I draw on research that explores societal practices through which agricultural lands are created, maintained, and governed (e.g., Kosiba and Hunter 2017; Langlie 2018; Morrison 2018; Osborne and VanValkenburgh 2013;

[15] While the data I draw on in this dissertation do not speak directly to questions of social ontologies, the approach I have outlined here is, in its broad strokes, commensurate with the agentive potentials that arise from the personhood of things frequently highlighted in Andean ethnography and ethnohistory (Allen 2002; Bray 2019; de la Cadena 2015a; Kosiba 2020; Mannheim 2019; Mannheim and Salas Carreño 2015; Tantaleán 2019).

Rosenzweig and Marston 2018). And I take direction from archaeological approaches that clarify how archaeological remnants—crop seeds, animal bones, terrace walls, pollen, or grinding stones—that might nominally appear politically neutral are evidence of political processes and demonstrative of social transformations (Morehart et al. 2018; Oas and Hauser 2017; Rosenzweig 2014). Below, I outline the guiding principles that orient my approach to fieldwork. I begin by tracing my methodological tack and then describe the sites of my research.[16]

My approach combines historical, archaeological, and paleoenvironmental methods to examine transitions in land and land use around Ollantaytambo at both regional and site-specific scales. To understand bio-physical transformations to the ecology of the Ollantaytambo region across the Inka and Colonial Periods I draw on pollen data—both published (Chepstow-Lusty et. al. 2018; Chepstow-Lusty et. al. 2009; Chepstow-Lusty et. al. 2007; Chepstow-Lusty et. al. 1997; Chepstow-Lusty et al. 2009)—and from my own excavations at the site of Simapuqio-Muyupata (see below). These data permit an assessment of the ongoing use of Inka agrarian infrastructures into the Colonial Period. At the regional scale I also draw on archival research to evaluate shifts in patterns of land tenure across the same period. At a more localized level I focus attention on the specific trajectories of particular plots of land and the workers who lived in surrounding archaeological sites. Excavations at the sites of Markaqocha and Simapuqio-Muyupata elucidate (1) trajectories of occupation, and how occupations changed in relation to broader regional socio-historical processes, and (2) how agricultural laborers living at the sites under both Inka and

[16] Detailed treatments of the specificity of excavation and recording methods and artifact analysis are included in the appendices. I discuss sampling for specific kinds of data (e.g., zooarchaeology, macrobotanicals, pollen) where I discuss those data in subsequent chapters.

hacienda regimes of land management were articulated to the broader agroecology of the Ollantaytambo region during the Inka and Colonial Periods.

Archival Research

The goal of my archival research was to clarify how the application of Iberian law and custom reshaped practices of land tenure in the Ollantaytambo region through the sixteenth and early seventeenth centuries. In what follows, I draw on archival data to explore how various actors—local *kurakas,* agricultural laborers, aspirant landowners, colonial judges, and religious orders, amongst others—shaped the conflicts and collaborations through which hacienda patterns of landholding and land use were brought into being. Finally, I use documentary sources to trace the specific histories of individual plots of land surrounding archaeological sites to contextualize material remains recovered in excavations. To these ends, the archival component of my research focused on documents that detail interactions between people and land; in particular documents from land distributions, descriptive accounts of property creation, titling documents, and wills that detail land *as possession*. Much of my historical data comes from the 1594 and 1629 iterations of Spanish Colonial practice of *composición y repartimiento* at Ollantaytambo. As I detail in Chapter 4, the *composición y repartimiento* emerged at the end of the sixteenth century as royal authorities in Spain attempted to consolidate control over and maximize revenues from the Spanish Empire. In practice, colonial officials surveyed land surrounding consolidated communities of Andean people and assigned title to tributaries ("*repartimiento*"). Subsequently, lands that were found to be, or that were declared to be, vacant, could be taken over by aspirant landowners upon payment of a fee ("*composición*"). Documents from the *composición y repartimiento* at Ollantaytambo have also been discussed by Glave and Remy (1983), Kosiba (2015), and Kosiba and Hunter (2017).

The documents I consulted for this project are housed in archives in Cusco and Lima, including, in Cusco, the *Archivo Regional de Cusco* and the *Archivo de la Dirección Regional Agraria de Cusco,* and in Lima, the *Biblioteca Nacional* and *Archivo General de la Nación*.[17] My approach to reading these documents builds from the historiographical theories of Michel-Rolph Trouillot. In detailing the construction of historical narratives Trouillot (1995) argued for a differentiation between *historicity 1*, what happened in the world (socio-historical process), and *historicity 2*, the stories that are told about what happened in the world (narrative). Trouillot noted that there are a series of mediating processes that shape the transformation of historicity 1 into historicity 2, including culturally and societally negotiated understandings of *what is possible*.[18] In the Spanish colonies, historians and anthropologists have demonstrated that the corpus of documents now used to build narrative (historicity 2) of socio-historical processes (historicity 1) was written by an educated class of *letrados* motivated to shape the colonies according to logics that justified and reinforced their own power (Rama 1996; Burns 2010; Rappaport and Cummins 2012; see Chapter 4). Drawing on these historical theories, and the political-ecological literatures I outlined above, I read the archival record as not just incomplete, biased, and replete with mis-readings, but also as the creation of actors who were producing

[17] My archival research would have been impossible without the help of Jesús Galiano Blanco and Alex Usca Baca, both of whom searched for relevant documents and transcribed folios when I was unable to be present in archives. A transcription of the documents from the 1594 and 1629 *composición y repartimiento* at Ollantaytambo was shared with me by Steve Kosiba.

[18] Here, Trouillot uses the example of the Haitian Revolution to illustrate that for a socio-historical happening to be transformed into history it must first be recognized and understood as an event, that is, must be understood as an occurrence (here the Haitian Revolution is an example of an event disregarded as impossible in the moment of its happening). If an event is recognized as such, it still only is incorporated into historicity 2 if records are produced after a fashion that future readers can access, and if those readers understand the event to be significant.

history in real time in full knowledge that the history they created would become grounds for the operation of power in the colonial countryside. So while I do draw on this corpus of documents as evidence of "what-happened" in a positivist sense, I am also attentive to how the documents position and produce the actors and the materials they purport to describe—that is, I read these documents to understand how the overwhelmingly Spanish actors "behind the pen" discursively produced the very lands, environments, and "natural" entities they purported to describe as they walked Ollantaytambo's fields and pastures.

To link archaeological and historical data I again turn to Trouillot, who explicitly foregrounds the importance of the material world in shaping historical narratives: "the materiality of the socio-historical process (historicity 1) sets the stage for future historical narratives (historicity 2)" (Trouillot 1995, 29). This is to say, the material world places a hold on the stories about the past that can convincingly be told. As Trouillot writes "the bigger the material mass, the more easily it entraps us: mass graves and pyramids bring history closer while they make us feel small" (Trouillot 1995, 29). Here then, the agricultural land of Ollantaytambo is itself a material that constrains the narratives that can be told about it, and the archaeological record offers structure to my own account (historicity 2) of hacienda formation. This is not just to say that archaeology offers a positivist "check" on potentially compromised archival data; rather, it is to say that archaeological and historical data must be read together with an eye for how the operation of colonial power produces inherently political historical narratives (see Chase 2016).

Archaeological Research

The majority of the data that anchor subsequent chapters were accumulated through archaeological research at two sites near Ollantaytambo, Markaqocha and Simapuqio-Muyupata.

I designed excavations at these sites to clarify occupation histories in relation to the political, ecological, and social transformations of the Inka and Colonial Periods, and to allow for the assembly of datasets that demonstrate how people living at the sites practiced agriculture for subsistence and surplus through their engagement with local and regional agroecologies. To clarify occupation histories, excavation teams dug test pits arrayed across different sectors at each site. More expansive excavations at Simapuqio-Muyupata allowed for the assembly of data sets relating shifts in domestic practices to historical change in site occupation. These excavations proceeded under the aegis of two distinct archaeological projects supervised by the Cusco Ministry of Culture, the *Proyecto de Investigación Arqueológica con Excavaciones Simapuqio-Muyupata* (PIASM, Co-director: Lic. Cinthia Eliana Vera Mateos) and the *Proyecto de Investigación Arqueológica con Excavaciones Markaqocha* (PIAM, Co-director: Lic. Normaliz Alanya Quintanilla).

Site Selection

I selected Markaqocha and Simapuqio-Muyupata as the locations for archaeological investigation due to a number of shared characteristics documented in preliminary research. Surface remains suggested that both sites were occupied across the Inka and Colonial periods. Documentary evidence highlighted that both became part of Spanish owned estates during the sixteenth century, in the process incorporating Andean laborers into Spanish directed practices of land management (see Chapter 3). Each site is close to extensive agricultural infrastructure and is located along what were important roads during the Inka and Colonial periods. Moreover, each site offers the opportunity to compare archaeological data from domestic contexts to paleo-ecological data. At Markaqocha, a pollen core from a now-dry lake at the site provides a *longue durée* record of environmental change, while at Simapuqio, pollen samples extracted from a reservoir at the site during excavations offer a perspective on local ecological changes over a much more focused period of time (see Chapter 5). Markaqocha was the site of a large pre-Inka "town," and features diverse types of architecture associated with an extended occupation dating from as early as the Formative Period (Chepstow Lusty et al. 2009; Chepstow Lusty et al. 2018; Kendall and Chepstow-Lusty 2006; Kosiba 2010; 2011). By contrast, Simapuqio was built during the Inka period. The site is located close to important pre-Inka settlements, however, the majority of architecture at the site itself was built during the Inka period and excavations did not yield any evidence of substantial pre-Inka occupations (see Figure 1.2 for site locations relative to Ollantaytambo).

Markaqocha

Markaqocha is located in the Patacancha Valley, approximately 10km from Ollantaytambo by way of the main road through the valley. The site, which takes its name from a small, now in-filled, lake that sits in a basin adjacent to the Patacancha River, is at an elevation of 3350 masl. At Markaqocha, the Patacancha Valley abruptly turns from running NE to SW to a near direct North to South orientation, contributing to a unique microclimate along the river. Despite the high elevation, maize agriculture is viable in fields around the site,[19] but land at higher altitudes is almost exclusively used for fodder and tuber production. At the highest altitudes before the mountain pass at the crest of the Patacancha Valley, pasturing sheep and camelids and limited tuber cultivation are the only feasible agricultural activities. The road that runs through the site was a well-traveled llama caravan route during the Inka and Colonial period, and the pasture that surrounds the lake was likely an important source of fodder. The

[19] Kosiba and Hunter (2017) determine there could have been approximately 9.05 Ha of land suitable for growing maize within a 1km radius of Markaqocha.

earliest of the ruins crowded on the slopes above the lake date from approximately 800 BC (Chepstow-Lusty et al. 2007), but the most prominent are considerably more recent, dating to the LIP, Inka, and Colonial periods (Kosiba 2010).

Figure 2-3: Looking north up the Patacancha Valley from the southern edge of the Sector B ridgetop at Markaqocha. Note the chapel complex in the lower right and Inka buildings at the foot of the hill bottom left. Sector C is in the background. The now in-filled lake is the darker, marshy ground to the right of the river in the center of the photo.

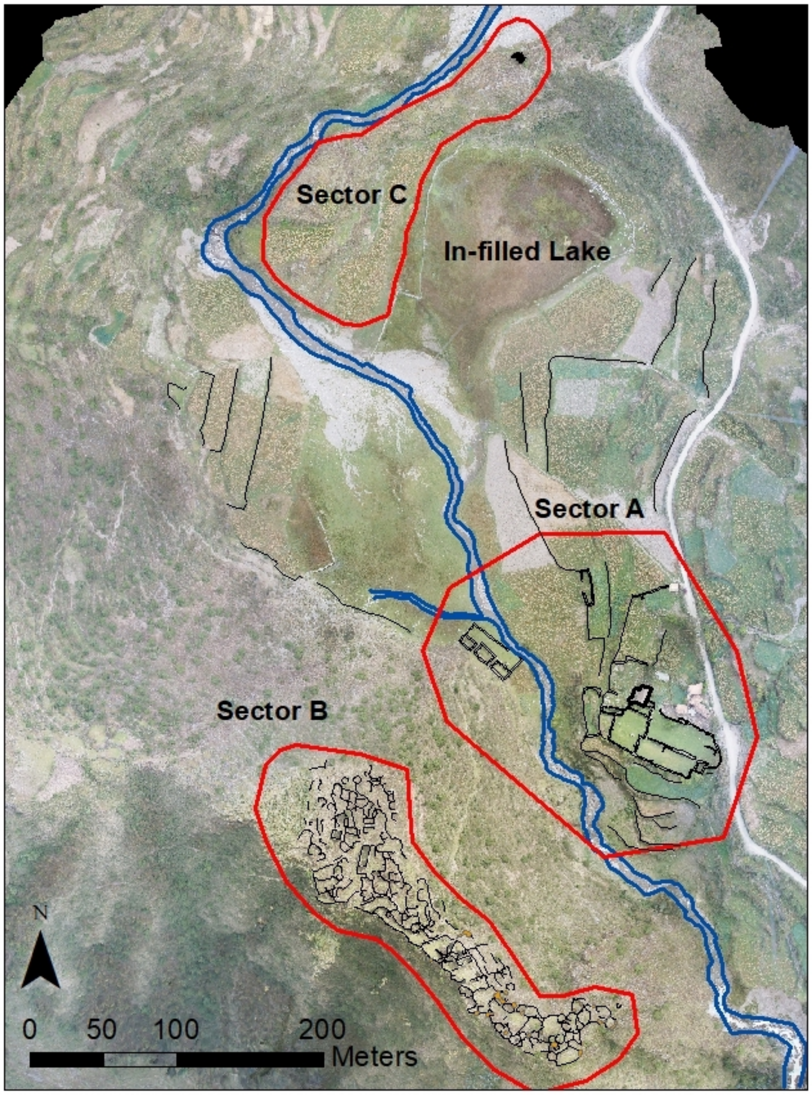

Figure 2-4: Map showing distribution of Sectors and architecture at Markaqocha. The photo in Figure 2-3 above was taken from the southern end of Sector B. Base image is a high-resolution composite orthophoto created from drone imagery (orthophoto courtesy of Steve Kosiba).

To facilitate research at the site, I divided it into three sectors (Figure 5). Sector A is in the southeastern corner of the site and contains both Inka and Colonial contexts. This sector includes a series of three monumental Inka buildings that line the west bank of the Patacancha River and a complex of buildings and plaza spaces that abut contemporary homes and surround the colonial chapel. Here, I refer to this second set of structures as the “chapel complex.” This complex is comprised of a series of large containing walls with niches that today form large plaza spaces, but also contain the ruins of domestic structures. There were likely two chapels in this complex, one, still used on feast days, and another, now in ruins, that I identified as a probable chapel based on its elongated rectangular shape, proximity to the graveyard, and main door opening onto a plaza space (Figure 2-5). Members of the local community upheld this identification, explaining that it was common knowledge that the structure had long ago been the main chapel at the site. This sector also contains a Christian graveyard with graves dating from at least as early as the nineteenth century.

Figure 2-5: Looking north onto the chapel complex at Markaqocha. Note the thatched chapel. The rectangular building running east-west immediately in front of the thatched chapel is the original chapel at the site. The walls of large plaza spaces all feature niches that were once part of Inka buildings, indicating that there were once many more structures at the site.

Sector B is a ridge top settlement with the hallmarks of an LIP town, including surface scatters of LIP pottery styles, residential patio groupings, and proximity to a discrete tomb sector

(Kosiba 2010; 2011). The majority of structures in this sector conform to local LIP architectural norms: they are built of uncut fieldstone, walls are not coursed, and buildings are rounded or D-shaped (see Kendall 1985; Kosiba 2010, 122). Of note are three buildings that are overtly larger than others in the sector. These three structures are quadrangular and feature thick walls and interior niches.

Sector C is a rocky outcrop to the north of the site around which the Patacancha River runs. This sector contains numerous *chullpa* tombs built upon terraces. Research in Sector C in the late 1990s established an occupational history dating to the Formative Period (2200 BC–200 AD). These three sectors surround the infilled lake to the North, West, and South. To the east of the site the topography rises sharply in a series of rough lynchet-style terraces that crest in high pastureland.

Prior research at Markaqocha concentrated on the pre-Inka occupations of the site. The Cusichaca Trust Archaeology Project executed extensive excavations in Sector C in the 1990s to investigate the *longue durée* histories of occupation. In association with those excavations researchers took two overlapping cores from the center of the lake. Research teams led by Alex Chepstow-Lusty have used data from these cores to re-construct the environmental history of the immediate region, including a vegetation history derived from pollen, and a fire history based on carbon ratios. Core data offer a unique perspective on ecological shifts in the immediate catchment basin around the lake. Pollen and other proxies—concentrations of charcoal, coprophilous mites, and plant microfossils—allow for the reconstruction of historical patterns of land use in the immediate vicinity of the site (Chepstow-Lusty et. al. 2018; Chepstow-Lusty et. al. 2009; Chepstow-Lusty et. al. 2007; Chepstow-Lusty et. al. 1997). Other prior research at the site includes extensive mapping work that documented the typical LIP settlement pattern within

Sector B (Kosiba 2011). In association with his broader survey of the Ollantaytambo region, Kosiba dated architectural mortar in two structures at the site, confirming the buildings were built during the LIP and early Inka periods (Kosiba 2010, see Chapter 3).

Simapuqio-Muyupata

Simapuqio and Muyupata are adjacent complexes of agricultural fields and ruins located on the southern slopes of the Urubamba Valley, approximately 1km from Ollantaytambo on the southern bank of the Urubamba River. For administrative purposes, I treated the two areas as one archaeological site, but divided it into separate sectors. Simapuqio (Sector C) is an Inka-built terrace complex that rises from the banks of the Urubamba. The terraces are built upon remodeled scree at the lower end of a ravine and are irrigated by an underground stream that surfaces at their apex (Protzen 1992, 32). Muyupata (Sectors A and B) is a separate set of fields located above the terraces of Simapuqio, including several large terraces. The site stretches for approximately a kilometer along an Inka road that has been an important travel route for centuries, linking Ollantaytambo to other important sites on the southern bank of the Urubamba, including the quarries at Kachiqhata, mortuary complexes, villages occupied from the LIP period to the present, and important haciendas (Protzen 1992).

Figure 2-6: Photo taken from an Inka road through Ollantaytambo's maize fields looking south across the Urubamba river towards Simapuqio-Muyupata, labels indicate the distribution of sectors at the site.

Figure 2-7: Drone Photo of Simapuqio-Muyupata indicating distribution of sectors at the site. Sector A continues up the hillside to the right of the frame.

Simapuqio-Muyupata was divided into three sectors for recording purposes. Sector A is on a slope above the Muyupata area (Figures 2-6 and 2-7). It contains two types of architecture; round, likely residential, structures of between 3 and 3.5 meters in diameter and smaller *chullpa* tombs—the majority of which are also round, and range between 1 and 2 meters in diameter. There are over 70 of the larger structures scattered along the slope, and at least twelve *chullpas* (Figure 2-8). The larger round buildings cluster along the path of a canal that descends through the sector to a now-dry reservoir in Sector B.[20] The *chullpas* are located on or around bedrock outcroppings on the edges of the residential structures. At the outset of research, I hypothesized that this sector was occupied during the pre-Inka Period (approximately 1000-1400C.E) based on surface architecture. As I outline in detail in Chapter 3, no pre-Inka artifacts were recovered in excavations, however, Bengtsson (1998) dated mortuary *chullpa* structures near the site to the LIP, and Kosiba's (2010) surface collections recovered LIP ceramics, so the area was almost certainly occupied during the LIP, even if many buildings at the site were raised during the Inka Period (see Chapter 3).

[20] This reservoir and canal is part of a broader irrigation system that once watered the southern slope of the Urubamba Valley from near the Inti Punko 'sun gate' to Muyupata. I discuss this infrastructure in greater detail in Chapter 5.

Figure 2-8: At left, *chullpa* mortuary structures in Sector A. Photos of domestic architecture in this sector are included in Chapter 3. At right, the adobe chapel structure in Sector B of the site.

Sector B stretches along the road that passes through the site and includes buildings on either side of that road. Buildings in this sector are, with one exception, rectangular, vary widely in size, and date to the Inka, Colonial, and Republican periods based on excavation findings (see Chapter 3). The Inka buildings are primarily residential and are grouped in several clusters dispersed through the sector. Excavated evidence suggests that two adobe buildings adjacent to the in-filled reservoir—one of which was likely a chapel—were probably constructed during the late Colonial or early Republican period. The reservoir in this sector was once the primary water source for a series of large terraces in the sector as well as further fields to the west of the water source descending to the banks of the Urubamba (see Chapter 5).

Sector C is the terrace complex that sits immediately above the Urubamba River and the buildings located within those terraces, which were occupied during the Inka and Colonial periods. This Sector also contains the ruins of the mansion that was the seat of the Hacienda Simapuqio during the Republican period (Figure 2-9). Apart from notation of the ruins in studies of the broader Ollantaytambo region, including Kosiba's survey and surface collection, (Kosiba 2010; Kosiba and Hunter 2017), Simapuqio-Muyupata has not been the subject of systematic investigation.

Figure 2-9: At left, the Republican-era mansion ("*casona*") of the Hacienda Simapuqio, located in Sector C of the site. At right, terracing in Sector C adjacent to the Urubamba river. Ollantaytambo is on the other side of the river in the upper left corner of the photo.

Excavating at these two sites provided opportunities to ask different questions of the archaeological record. Markaqocha was long occupied before the Inka asserted power over the Ollantaytambo region, while Simapuqio was largely built during the Inka Period. While both sites were occupied across the Inka and Colonial eras, people living in them likely had different connections to the Inka authority situated in the royal estate, and later, to the Spanish landowners who administered haciendas in the region.

Excavation methodology

I designed excavations at Markaqocha and Simapuqio-Muyupata to allow for a detailed examination of occupation histories at the sites across the Inka and Colonial periods, with a particular focus on clarifying how people living in the region were interacting with the agricultural land that surrounds each site. Excavations at both sites employed the same basic methodology. Teams comprised of students, professional archaeologists, and people from local communities excavated all units. Contexts were differentiated on the basis of soil type or color, frequency of inclusions, and artifact density. Thick deposits were also split into arbitrary levels.

Excavation teams further divided all units into 1x1 meter subunits and collected artifacts separately for each stratum and sub-unit. All excavated soils were screened through 5mm mesh. Soil samples for macro-botanical analysis and phytolith/starch grain analysis were taken from all contexts.[21] At Markaqocha, an excavation team comprised of four members of the local community of Huilloc and a local professional archaeologist conducted all excavations. At Simapuqio-Muyupata, an expanded team included ten members of the *Asociación de Productores Agrícolas de Simapuqio*, graduate students from Vanderbilt University and the University of Illinois at Chicago, and two Peruvian colleagues. At Markaqocha, I planned excavations to elucidate variation in occupation histories between different sectors at the site. Excavation teams dug test pits (1x1m and 1x2m) in a variety of different spaces across Sectors A and B. At Simapuqio-Muyupata, in addition to test pits, more extensive excavations clarified domestic practices in households occupied during the Inka and Colonial periods. I selected excavation locations at both sites to ensure sampling of different architectural forms across sectors. All excavated materials were analyzed by specialists at labs in Cusco, Lima, and Trujillo.

Dating Occupations at Markaqocha and Simapuqio-Muyupata

Andean archaeologists typically divide time prior to the Spanish invasion according to a series of "horizons" and "intermediate-periods." Horizons are eras of pan-Andean cultural phenomena marked by the distribution of similar materials—largely ceramic—across the region. Intermediate periods—between the horizons—are generally considered to be times of reduced

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[21] I discuss botanical sampling and processing procedures in greater length in Chapters 5 and 6.

pan-regional interaction, decreased political complexity, and increased small-scale warfare. This chronology, developed by John Rowe (1945) based on his analysis of ceramics excavated in the coastal Ica Valley, has been adapted by regional specialists to account for considerable local variability. For instance, in Cusco, the Inka period begins nearly a century earlier than it does in parts of the Andes that would become provinces of the Inka Empire (Table 2-1; see B. Bauer 2004; Kosiba 2010).

The Inka Period, or "Late Horizon," is understood to have ended at 1532 with the Spanish invasion, however, post-1532 contexts can frequently only be identified as such archaeologically if they include overtly colonial artifacts or foreign biota. Such materials were likely uncommon—especially outside of urban centers—until at least the end of the sixteenth century (Chatfield 2007). Because of this, it is difficult to distinguish between early Colonial and Inka Period contexts in the archaeological record.[22] Moreover, shifts within the centuries-long Colonial Period are difficult to distinguish as there are few well defined material markers of chronologies in the Colonial Andes.[23] My analysis of archaeological contexts from Markaqocha and Simapuqio-Muyupata largely depended on established ceramic chronologies for the Cusco region to distinguish temporally between the LIP, Inka, and Colonial periods (B. Bauer 1992;

[22] Given the difficulty of using ceramics as a firm temporal marker many archaeological projects instead depend on historical documentation of events like town founding (Smit 2018), abandonment during the Toledan reforms (Wernke 2007; 2013), or settlement razing (Bauer et al. 2015) to situate occupations in absolute time.

[23] Frequently, historians subdivide the Colonial Period into an early era of "indirect rule" brought to a close by the tenure of Viceroy Toledo and a subsequent era of "direct rule," but this classification is not universally used by archaeologists, who frequently impose localized systems of periodization based on the subject of inquiry and local historic events (e.g., Smit 2018, Smith 1991).

1999; Kosiba 2010; Quave 2012).[24] Below, I discuss the attributes used in this project to classify contexts temporally, with a focus on ceramic styles.

Table 2-1: Archaeological and historical chronologies for Ollantaytambo, Cusco, and the broader Andes (see Bauer 2004; Kosiba 2010). Kosiba (2010) advocates using "Ollanta Phase" for the LIP at Ollantaytambo to emphasize that LIP Ollantaytambo was culturally distinct from other regions in Cusco.

Cusco/Ollantayambo Region	**Inka Provinces**	**Dates**
Killke Period/ "Ollanta Phase"	Late Intermediate Period	ca. 1000–1300
Early Inka	Late Intermediate Period	ca. 1300–1400
Classic Inka/Imperial Inka Period	Classic Inka/Imperial Inka Period/ Late Horizon	ca. 1400–1533
Colonial Period	Colonial Period	1533–1824
Peruvian Republican Period	Peruvian Republican Period	1824–

LIP Wares

In the Cusco region the "Killke" ceramic style and related ware-types is broadly understood to mark the LIP. Archaeologists argue that Killke style wares were produced in Cusco prior to the Inka imperial expansion (Bauer 1996, 2004, Bauer and Covey 2002, Bauer and Stanish 1990; Covey 2006). But, as Kosiba (2010, 120) argues, Killke is troublesome as a marker of early Inka political influence given that Killke-like styles have considerable local variability. Moreover, Chatfield suggests that Killke-like wares may have been produced concurrently with later styles, perhaps even into the Colonial Period (2007, 84). At Ollantaytambo, Kosiba proposes instead an LIP style called "Ollanta Phase" to emphasize the correlation of local variation in ceramic style at Ollantaytambo and broader shifts in material

[24] I directed ceramic analysis alongside three Peruvian colleagues and students from the *Universidad Nacional de San Antonio Abad del Cusco*. We collected up to 26 descriptive attributes from each diagnostic sherd. All diagnostic sherds were photographed, and rim sherds were also drawn.

culture in the LIP (2010, 122-125). Kosiba characterizes LIP "Ollanta Phase" wares on the basis of form, decoration, and paste. Straight-sided bowls and jars are particularly diagnostic. Typical decoration includes thickly painted black and red lines (Kosiba 2010, 125). The paste is rough, with inconsistently sized inclusions. Mica, frequently used to distinguish Inka pastes, is largely absent from these LIP sherds.[25] In our investigations, we treated the co-presence of LIP architectural markers (Kendall 1985; Kosiba 2010, 122) and LIP sherds as evidence of LIP occupation, but did not assume that occupations featuring those markers did not continue into the Inka Period.

Inka Wares

Archaeologists consider the "Cusco-Inka" or "Imperial Inka" pottery style broadly indicative of Inka influence. Other pottery styles also occur in Cusco Late Horizon contexts, such as Pacajes and Sillustani styles imported from the Lake Titicaca area (Bauer 2004, 92), however in our excavated assemblages such styles were absent while Cusco-Inka pottery styles were common. Bauer (1999) reports that the production of the Cusco-Inka style is thought to have begun around 1400 and that these ceramics were likely continually produced until shortly after the Spanish invasion. This style is highly standardized by paste composition and decoration and is limited to a relatively small number of forms. The paste is characteristically orange to salmon colored. Inclusions are relatively small (~0.4mm) and consistently sized. Typical forms include jars, pots, and plates. Polychromatic decoration is often geometric; straight lines, pendant triangles, and thin crosshatching are typical (Quave 2012). On some vessel forms, such as *aríbala* storage jars, modeled protrusions are common features. Bauer (2004) suggests that the

[25] Ollanta Phase sherds are associated with radiocarbon dates from the mid thirteenth and fourteenth century (Kosiba 2010, 121).

Cusco valley districts of San Gerónimo and San Sebastián were likely loci of production (see also B. Bauer 1999), but Quave (2012; 2017) has identified further production contexts at the site of Cheqoq, an imperial estate in the Maras region, comparatively close to Ollantaytambo.[26] It remains unclear when exactly Cusco-Inka style ceramic production ceased, but Chatfield (2007, 91) suggests that it was likely shortly after the Spanish invasion but prior to the emergence of Spanish-style ceramic workshops.

Figure 2-10: Inka ceramics recovered from Simapuqio-Muyupata, including a plate (top left), and likely aríbala jar fragments (top middle and right, bottom left). Examples of Markaqocha ceramics are included in Chapter 3.

Colonial Ceramics

Colonial ceramics have not been extensively studied in the Cusco region (but see Chatfield 2007) and are still understudied in the Andes more broadly. The most obvious marker

[26] Quave's (2012) study of Inka pottery at Cheqoq includes detailed descriptions of sherds and pastes that were frequently consulted for this study.

of Colonial-era manufacture is the presence of tin or lead glazes, as glazing technology was not used in the Andes prior to the Spanish Invasion. In the 1980s, the Moquegua Bodegas Project investigated the ceramics industry associated with wine and brandy production in the Moquegua Valley to the south of Cusco (Rice 2012; Smith 1991), however, the unglazed *tinajas* and *botijas*—vessels for the production and transport of wine—ubiquitous in Moquegua and other wine-producing regions (e.g., Weaver 2015) are absent from the assemblages recovered in excavations for this project. Rather, the presence of glazes is the most obvious marker that ceramics date to the colonial era.

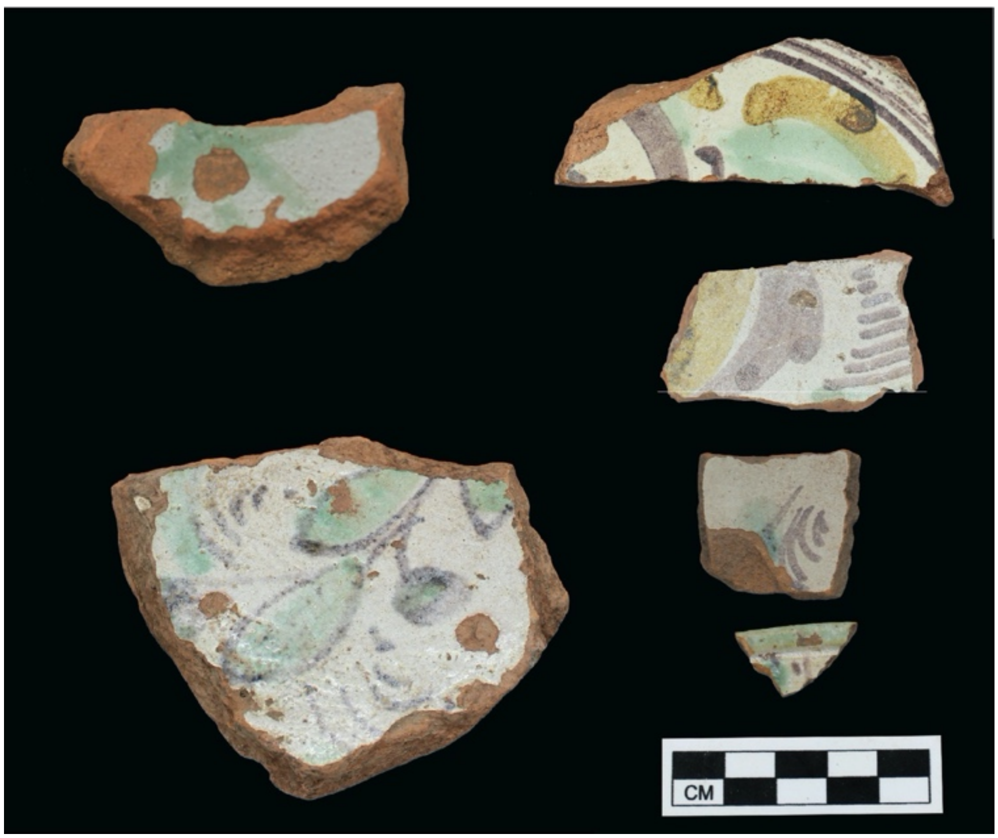

Figure 2-11: Glazed sherds recovered at Simapuqio-Muyupata. Colonial wares from Markaqocha are illustrated in Chapter 3. Most of the sherds in the Colonial assemblage are plates or shallow bowls.

The nascent state of historical archaeology in Peru means that glazed wares are highly imperfect temporal markers. Historical research indicates that glazed ceramics were likely first imported to Peru from production centers in New Spain and Panama, but this trade was later supplanted by production in Andean cities including Quito, Lima, and Cuzco as demand rapidly exceeded the supply available through import (Chatfield 2007; Jamieson 2001; Jamieson and Hancock 2004; Rice 2013). Recent compositional studies of glazed wares from the north coast of Peru determined that the majority were imported from Panama, but a significant subset was likely of Andean manufacture (Kelloway et al. 2018). Rice (1997) differentiates two varieties of Andean-produced majolicas, *Contisuyu* ware (tin enameled), and *Mojinete* (glazed and enameled). Rice (2013) recovered one *Contisuyu* sherd in Moquegua from beneath the ash layer deposited by the eruption of the volcano Huanaputina in 1600, confirming early production of glazed wares in the highlands. Rice suggests that these *Contisuyu* wares were produced in Cusco (2013, 263). Acevedo (1986) notes that a four-year contract to produce glazed tableware was executed in 1588 in Cusco, indicating that a pottery industry to meet the needs of Spanish tables was operating in Cusco by the close of the sixteenth century. According to Rice (2013), glazed pottery produced in Cusco had green and "purplish-black-brown" decoration, which is consistent with many sherds recovered at Simapuqio-Muyupata and Markaqocha, although other color combinations were also common.

A limited number of unglazed sherds recovered from Markaqocha and Simapuqio-Muyupata were also identified as Colonial on the basis of attributes such as a brick red paste with few inclusions, thick vessel walls (~1cm), or striations indicating manufacture on a potters-wheel. In addition to tableware, a final conclusively diagnostic colonial ceramic category was roof tiles. Roof tiles were produced in Cusco relatively early in the Colonial Period; the 1549 *encomienda* tribute assessment for Ollantaytambo directed workers to travel to Cusco to produce 500 roof tiles outside the city (Julien 2000). Roof tiles were also found in Bauer's excavations in

Vilcabamba, the capital of the neo-Inka resistance, indicating that they were adopted as common building materials well beyond the boundaries of Spanish centers by at least the 1570s (B. Bauer 2015). Excavation teams recovered roof tiles at both Markaqocha and Simapuqio-Muyupata in contexts associated with late Colonial-era occupations.

Other Temporal Markers

In addition to ceramic markers, other foreign imports provide a mechanism to distinguish contexts as post-1532. For instance, foreign plants and animals, such as pigs and wheat, mark colonial deposits. As with glazed ceramics, however, the use of these taxa for dating deposits only allows for differentiation of post-invasion contexts; the absence of such taxa is not a sure indication that a context is pre-1532. Moreover, the distribution and acceptance of these taxa in Andean diets was far from immediate, making the presence of such taxa a poor specific temporal marker. To better situate occupation levels within absolute time, I sent seven samples from Simapuqio-Muyupata and four from Markaqocha for radiocarbon dating (see Appendix 1). These samples were selected to either anchor specific contexts in absolute time or to frame the early and late margins of stratigraphic deposits. As I discuss in Chapters 3 these dates suggest that it was not until the end of the sixteenth century that material markers of colonialism became ubiquitous in the countryside around Ollantaytambo.

2.6 Conclusion

In this chapter I situated my dissertation research as a political ecology of hacienda formation. Through the sixteenth and seventeenth centuries haciendas at Ollantaytambo became expansive landholding institutions that operated through a fundamental social distinction of landowner/tenant premised on unequal access to and control over land as an agricultural resource. I contextualized my investigation of this socio-historical process within trajectories of thought in the broad arena of political ecology. I argued that an examination of the emergence of the hacienda should encompass not just an examination of material (i.e., bio-physical) transformations to agroecologies, but should also consider the manner in which those ecologies were understood and governed. To do so, I suggest archaeological attention to the fields and pastures of the Ollantaytambo region as an object of inquiry. I defined these agricultural lands as multi-species socionatural products—akin to an environmental infrastructures—that are always in flux; dynamic *processes* that, as material, intervene in social and political lives. My focus on agricultural land in this dissertation is guided by three key questions: How did land use change? how did worker access to land change? How did the land itself change as a result? To answer these questions, I draw on historical, archaeological, and paleoenvironmental datasets; in this chapter I outlined the procedures through which data were collected during archaeological and archival research. In the final sections of this chapter I discussed my epistemological approach to unifying historical and archaeological data and described the specific sites of my study in greater detail.

In concentrating on agricultural land in this dissertation my aim is to demonstrate how the social, political, historical, and ecological processes that I investigate are all inextricable from the fields and pastures of the Ollantaytambo region. In the following chapters I interrogate bio-physical transformations to environments, including the agricultural infrastructures built by the Inka at Ollantaytambo that made fields around the town valuable. I trace changes in the governance of land, and how those shifts altered patterns of access, and thus analyze how a distinctly colonial form of agricultural administration was produced through emplaced interactions of Spaniards, native Andean peasants, and local lords. Finally, I demonstrate how these different actors, alongside non-human components of agroecologies, were agents that shaped the process of hacienda formation. In the next chapter, I contextualize this work further by outlining prior research on the Ollantaytambo region and by describing archaeological findings from Simapuqio-Muyupata and Markaqocha.

Chapter 3
Land, Labor, and the Making and Remaking of Ollantaytambo

3.1 Introduction

Soon after the Spanish invasion of the Andes a group of *yanakuna*—resettled Inka servant-subjects—that had worked fields around the royal estate at Ollantaytambo decided to leave their homes above the terraces of Simapuqio and abandon the fields, orchards, and pastures they had tended for the Inka. Perhaps they hoped to return to their ancestral homes; perhaps they fled the violence wrought by Spaniards rampaging across Cusco; perhaps, their Inka overlords defeated, they understood their labor obligations to have ended; perhaps they intended to follow Manco Inka to his rule-in-exile at the nearby jungle stronghold of Vilcabamba. The reasons why an Andean person might abandon their home in the tumult following the Spanish invasion were numerous, and we cannot know exactly what factors drove these people to migrate. We do know, though, how they marked the occasion and ritually closed the space in which they had lived. They hunted and killed a young deer, assembled objects that materialized their ties to their house and marked it as an Inka building—a bronze *tumi* knife, a grinding stone, and fine Inka-style ceramics—and prepared a feast of gourd, beans, quinoa, and fruit to accompany the venison. They then dug a pit into the floor of their home and laid the objects within it, interspersed with flowers collected from surrounding fields. They placed the remains of the deer atop the accoutrements and set the entire assemblage alight. In doing so, they severed their connections to the building, the village, and the Inka estate at Ollantaytambo.

These people were part of a wave of migration in the Andes that began under Inka rule, and continued—perhaps even intensified—after the Spanish invasion. The Inka regularly moved subjects, most commonly laborers, to complete state projects or serve on state farms. D'Altroy (2005) estimates that the Inka moved between 3 and 5 million Andean people—sometimes the short distance between ridgetop and valley floor, sometimes from one end of Andes to the other (Rowe 1980). These workers labored for the empire alongside local communities of imperial subjects. As a result, the Inkan Andes was a patchwork of displaced peoples, a cosmopolitan social landscape in which people of diverse ethnic groups originating from across the empire were settled in relatively close proximity, frequently far from their ancestral homelands (DeMarris 2005; Kolata 2013). Even as the collapse of the Inka order liberated some of these people from state-imposed servitude, Spaniards imposed servitude on others and moved them in turn. Over the first decades following the Spanish invasion, continued wars and pestilence drove people from their homes, newly established cities drew residents, and, even as pandemics wrought devastation, the Spanish policy of *reducción* forced people into congregated villages (see Larson 1998; Mumford 2012; Wernke 2013; Wightman 1990).

Ollantaytambo, like other places in the Andes, was dramatically re-shaped by population movement, the creation and subsequent abandonment of new settlements, and demographic collapse through the Inka and Colonial Periods. At the same time, the land itself was transformed by infrastructural projects and changing patterns of land use. In this chapter, I trace the history of political and social transformations around Ollantaytambo across the Inka and Colonial periods to contextualize the theoretical and empirical arguments that follow in subsequent chapters. I situate moments like that described above—the ritualized abandonment of a house at Simapuqio-Muyupata—within the broader historical context of my research at Inka and Colonial Ollantaytambo and within the specific occupation histories of the sites that are the focus of subsequent chapters.

This chapter is divided into two sections. In the first part, I outline prior research on Ollantaytambo, tracing the findings of archaeological and ethnohistorical research that elucidates the assimilation of the region into the Inka Empire and the creation of the Inka estate, and summarizing the findings of more limited work on the Colonial Period that has demonstrated the emergence of a farming economy of maize, wheat and livestock amidst conflicts over land, even as the *repartimiento* at Ollantaytambo created as a Spanish administrative unit and transformed during the century of the Colonial Period. In the second part of this chapter, I outline the results of archaeological and archival research at Markaqocha and Simapuqio-Muyupata. I summarize the investigations I directed at each site, what was found, and what those findings tell us about who lived at each of these places through the Inka and Colonial periods. Archaeological and archival data from those sites suggests that, at the end of the sixteenth century, new kinds of occupations were emerging on the landscape around Ollantaytambo. At that time, Colonial material culture, including bone from introduced animals and glazed ceramics, become common in archaeological deposits, indicating that workers directly subservient to new Spanish landowners began to reoccupy former Inka sites located on lands held in new forms of ownership. These data illustrate the drawn-out processes of subjectification through which first Inka and subsequently Spanish Colonial authority was established over Andean fields and demonstrate how each of these successive political shifts was materialized in the occupation of small villages scattered across the Ollantaytambo region.

3.2 Ollantaytambo Under Inka and Spanish Rule

The impressive Inka and pre-Inka ruins of the Ollantaytambo region have captured the attention of archaeologists and antiquarians for well over a century—at least since George

Ephraim Squier's visit in the nineteenth century (Squier 1877). Researchers have applied archaeological and ethnohistorical methods to clarify the Inka and pre-Inka histories of the landscape and ruins that surround the town, and have combed archives in Cusco, Lima, and Spain for data on the Colonial and Republican era occupations of the region. In this section, I outline what the results of this research tell us about the social composition of Ollantaytambo for a period stretching from the Inka imperial expansion until roughly a century after the Spanish invasion.

According to the Spaniards who related accounts of Inka history in the 16th century, the Inka ruler Pachakuti Inka Yupanqui conquered the people who lived around Ollantaytambo and brought the region under Inka control. Sarmiento de Gamboa—commissioned by Viceroy Francisco de Toledo to write a history of the Inka that would portray Inka rulers as tyrants—wrote that this this was a violent subjugation. In Sarmiento's telling, Pachakuti went to war with the people of Ollantaytambo. He "killed them all, burned the town, and destroyed it so that no memory was left of it" (Sarmiento de Gamboa 2007 [1572], 125).[1] According to this version of events, Pachakuti then directed the construction of monumental architecture at the site—he "continued… to a place they now call Ollantaytambo, eight leagues from Cuzco, where he was

[1] These quotations are from a 2007 translation by Brian Bauer and Jean-Jaques Decoster. Regarding the supposed conquest of the people living around Ollantaytambo, the original 1907 translation to English by Clements Markham reads: "The Inca marched against them with a large army and gave them battle…at last the Ollantay-tampus were conquered. [*All were killed, the place was destroyed so no memory was left of it]*" (p107–108, italics and brackets in the original). Markham editorializes that the italicized text was added to Sarmiento's manuscript after the fact by Viceroy Toledo to emphasize Inka tyranny. It is worth noting the importance of memory here – it speaks to the role of the material world in literally making Inka history (see Niles 1999). According to this narrative, Inka Pachakuti erased the memory of the peoples that had lived in Ollantaytambo before and built a new estate to materializing his own power and support the *panaca* that would ensure his voice would continue to be active in Inka politics after his death.

constructing some very sumptuous buildings" (Sarmiento de Gamboa 2007 [1572], 138). Sarmiento's narrative accords with other ethnohistorical data that suggest that Ollantaytambo was one of Pachakuti's personal estates (Julien 2000; Protzen 1992, 19; Rostworowski 1993).[2] However, archaeological evidence suggests the assimilation of the Ollantaytambo region into the Inka heartland was a more complicated process than the conquest narrative presented in the written account.

During the Late Intermediate Period, social organization in the Ollantaytambo region centered on several large sites, including Markaqocha. Although the LIP is broadly considered to be a period of balkanization and interethnic warfare in the Andes, there is little evidence from the Ollantaytambo region for such conflict. Rather, Kosiba (2011) suggests the LIP occupation of the Ollantaytambo was characterized by a "politics of locality" wherein political activity as well as quotidian practices like agriculture were concentrated close to relatively small and largely autonomous communities. Kosiba's (2010; 2011) survey of the region found that these "towns" were centers where specific practices such as communal food consumption and ancestor veneration linked populations living in surrounding clusters of smaller residential sites (Kosiba

[2] Multiple Inka rulers are connected to Ollantaytambo in sixteenth century documents, and other *panacas* (ancestral descent cults of specific rulers), and Inka nobles likely held rights to land around Ollantaytambo (see Chapter 4). Garcilaso de la Vega (1945 [1609]) attributes construction at Ollantaytambo to the eighth Inka ruler, Inka Viracocha, the father of Pachakuti, however, Garcilaso also attributes other key achievements more frequently attributed to Pachakuti to Viracocha. In legal contests over land from the 1550s, Francisco Mayontopa, the *Kuraka* of Ollantaytambo, variably claimed rights due to ancestry from Pachakuti Inka Yuipanqui or his son Thupa Inka Yupanqui (Glave and Remy 1983, see also Chapter 4), so it is difficult to unequivocally state that Ollantaytambo was Pachakuti's estate. Regardless, other nobles would have held lands around the town; for comparison, Covey and Amado (2008) outline how the estate at Yucay, which belonged to Huayna Capac and his *panaca*, included lands assigned to several other royal *panacas* as well as other Inka nobles.

2010, 300).[3] People living in these communities participated in a variety of economic activities, including maize agriculture in lands near valley bottoms and high-altitude pastoralism. However, considerable areas that would later become important agricultural zones under the Inka were largely undeveloped (Kosiba 2010).

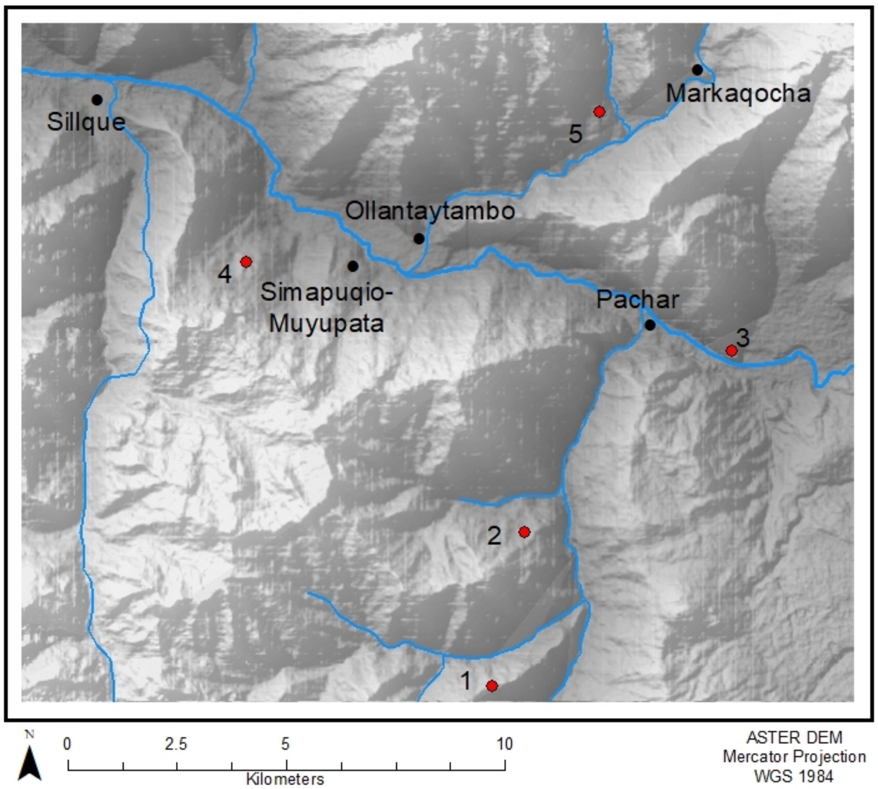

Figure 3-1: Image of the study area with important places referenced in the text indicated. In addition to Markaqocha, important "towns" identified on Kosiba's survey include (Numbered): (1) Wat'a, (2) Sulkan, (3) Yanahuara, (4) Llactallactayoq, (5) Pumamarka.

[3] Kosiba identified eight such "towns" in around Ollantaytambo with characteristics that distinguished them from other sites. These sites were differentiated by factors such as the kind or elaboration of domestic and monumental architecture, presence of mortuary complexes, number and density of buildings, density of surface level artifacts, and Inka renovation of LIP structures (Kosiba 2010, 128).

Archaeological research in LIP settlements around Ollantaytambo clarifies how the Inka sought to impose their authority on those spaces by remaking them to emphasize Inka power during the period of imperial expansion. For instance, Kosiba's (2010) excavations at the site of Wat'a demonstrate that when the Inka assimilated people living at that site into the empire in the fourteenth century, LIP places and items of value were ritually destroyed, and new spaces and practices of authority were inaugurated. At places like Wat'a with long histories of occupation, the Inka staged political practices like feasts in new ways that emphasized Inka might. As local people participated in such practices and renovated their towns to match Inka architectural precepts, they were made into Inka subjects (Kosiba 2010; see below on Markaqocha). By contrast with the narrative of conquest, devastation, and violent subjugation recounted by Sarmiento de Gamboa, Inka political order around Ollantaytambo was premised on the conversion of place and the creation of authority (Kosiba 2010, 303).

Unlike long-occupied LIP sites, the monumental center of Ollantaytambo was essentially a new construction built after the Inka expansion into the region. Multiple radiocarbon dates highlight that the core of the settlement was built during the period of Inka imperial ascendency (Bengtsson 1998; Kendall 1985).[4] Laborers working under Inka orders erected the immense stone architecture of the residential sector and the temple complex using enormous stone blocks carved from the quarries of Kachiqhata across the Urubamba River.[5] Like the monumental

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[4] Appendices in B. Bauer (2004) and Kosiba (2010) provide comprehensive lists of dates for the Cusco region and Ollantaytambo respectively. Protzen (1992) emphasizes that Inka construction at Ollantaytambo was still underway at the time of the Spanish invasion.

[5] Workers roughed out immense blocks from the rockfall around these quarries and then transported them down the steep slope and across the Urubamba before hauling them back up to construction sites in a monumental effort; Protzen (1992, 178-182) estimates that more than 1800 people may have been needed to pull the largest blocks up the steep ramps to their final locations.

architecture at the core of the estate, the sculpted landscape around Ollantaytambo was built with the labor of Inka subjects. By building terraces and channelizing the Urubamba and Patacancha rivers, these laborers made hundreds of hectares of new land at the estate, converting waterlogged land into well drained fields and turning steep slopes into farmable terraces (Farrington 1980; Kosiba 2015; see also Chapter 5).[6]

But, as Murra (2002) highlights, Inka lands were not productive without a steady supply of labor. To produce the surpluses that stocked estate storehouses, provisioned armies, and provided the raw materials for feasts, the Inka brought workers to the region and charged them to cultivate Ollantaytambo's fields. Amongst these workers were *yanakuna* and *mitmikuna*, two categories of worker subjects. *Mitmikuna* are frequently referred to as "internal colonists," workers resettled from one region of the empire to another to perform specific labor. *Yanakuna,* were personal retainers associated with specific Inka lords or tied to the lands of those lords. *Yanakuna* status was permanent and inheritable, and meant severing ties from ancestral kin groups and alienation from ancestral lands and shrines (D'Altroy 2001). Spanish writers of the sixteenth century tell us that conquered peoples were frequently forced to take on *yanakuna* status when captured in battle, or in punishment for a crime. For instance, Betanzos writes that the punishment for thievery was *yanakuna* status, for the thief and their descendants (Betanzos 1996 [1557], 138). At the same time, however, *yanakuna* status could be privileged and honored. Betanzos states that when Inka Yupanqui consecrated the temple of the sun in Cusco he ordered

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[6] Ethnohistoric data suggest that at least some aspects of the collective system of field organization may have survived into the colonial era. For instance, the distribution of usufruct rights to plots of land suggest that Inka nobles and allies held land in the center of the town under the Inka, a pattern that remained stable for decades into the Colonial Period (Kosiba and Hunter 2017).

that two hundred married men be *yanakuna* to serve the temple and work lands dedicated to it, "the *yanacona* servants of the temple were thought to be like something blessed and consecrated" (1996 [1557], 74-76).[7] At Ollantaytambo, as at other Inka royal estates like nearby Yucay (see Covey and Amado 2008; Quave 2012), *mitmikuna*, *yanakuna*, and local people were required to work on newly-developed lands associated with the royal estate.

As Kosiba (2015; 2017) highlights, these workers inaugurated new *huacas* at Ollantaytambo to materialize relations of kinship and authority between Inka elites, the laborers themselves, and the fields upon which they worked. These relationships were cemented by the circulation of foods between workers, Inka elites, and the *huacas* themselves. Feeding *huacas* ensured that those powerful earth-beings would support the continued productivity of the fields that undergirded Inka power (see Mannheim and Salas Carreño 2015; Ramírez 2005). The practices through which these relationships were produced linked Inka subjects to specific places at Ollantaytambo and created a landscape that reinforced Inka power (Kosiba 2018; 2015; Nair 2015; Niles 1999). That Ollantaytambo's terraces are still understood to be indices of Inka prowess, despite five centuries of Colonial and Republican land management, testifies to the success of the Inka project.[8]

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[7] A corollary to *yanakuna* labor was also important in the Colonial Period, although, as I outline below, in a much-changed form. To differentiate between the Inka and Colonial institutions, I follow Covey (2020) in referring to the Inka "*yanakun*a" and Colonial "*yanacona*." Similarly, "*mit'a*" refers to traditional reciprocal projects of labor rotation in the pre-Hispanic Andes, while *mita* is the rotational service system implemented by Viceroy Toledo, wherein Native communities had to provide one seventh of their population to colonial work projects—most often mining.

[8] See, for instance, Squier's (1877, 507) impression of the terraces: "nothing could be more beautiful than the system of terraces … They bend in and out with the sinuosities of the river, in graceful curves, their stony faces relieved by the vines and shrubs that cling up against them or droop in festoons over their edges. No visitor can see them without being amazed at the skill, patience, and power to which they bear, and will bear for ages, a silent but impressive

This history of the Inka subjectification and remaking of Ollantaytambo highlights that the agrarian ecology that Spaniards stumbled onto in the region was a relatively new creation; the Inka grafted new agricultural practices and forms of labor management onto newly developed lands. It is also instructive as to who was living at Ollantaytambo under Inka rule. Early chroniclers and colonial documents corroborate that a substantial population of *yanakuna* permanent worker-servants lived in and around the settlement alongside local people, Inka nobility, and groups of resettled *mitmaqkuna* workers (Glave and Remy 1983, 7). All of these people would shape the transformations that ensued from the collapse of Inka authority.

Indeed, the people living at Ollantaytambo were caught up in the violence that ensued from the Spanish invasion. In the mid 1530s, the estate was briefly the base of the Inka resistance launched by the newly anointed ruler Manco Inka Yupanqui.[9] In a fierce battle fought at the town in 1537, Manco Inka's forces routed an army of Spanish cavalry and Andean allies, forcing them back to Cusco. Accounts of this battle provide vivid depictions of the clash, noting how fighters lined the terrace walls and cliffs above the valley (Anonymous 1539;[10] 146-48; Protzen

testimony."

[9] The history of political wrangling and violence that led Manco Inka Yupanqui to Ollantaytambo is beyond the scope of this chapter. In brief, he was initially put forward as an Inka puppet king by invading Spaniards in Cusco. As a scion of the Waskar faction of the Inka civil war interrupted by Spanish invaders (who executed Atahualpa, leader of the rival group), Manco initially viewed the Spanish as allies and fought alongside them to eradicate the last of Atahualpa's armies. The reality of his situation vis a vis the Spanish evidently quickly became clear to Manco, however, as he several times tried to escape from the Spanish. Ultimately, Manco rallied an army and launched a siege against Spanish held Cusco that lasted for ten months. After abandoning the siege of Cusco, Manco retreated to Ollantaytambo, where he held off Spanish attacks in the Battle of Ollantaytambo before retreating again to the jungle stronghold of Vilcabamba where an independent Inka kingdom survived until 1572 (B. Bauer 2015; Covey 2020; Hemming 1970).

[10] The anonymous *Relación del sitio del Cuzco y principio de las guerras civiles del Perú hasta la muerte de Diego de Almagro, 1535 a 1539* is frequently credited to Vicente de Valverde, but it

1992, 17-21). Soon after, the Inka resistance under Manco Inka retreated to the jungle stronghold of Vilcabamba (Bauer 2015). Many of the workers the Inka had transplanted to Ollantaytambo were likely involved in the fighting, others may have returned to their home communities, and some likely stayed in the town (Glave and Remy 1983).

The emergent Spanish colonial authority grouped the Andean people who remained around Ollantaytambo together as the "*Repartimiento de Tambo*," which Fernando Pizarro granted as an encomienda to his brother Hernando in 1539 (Julien 2000, Varón Gabai 1997).[11] Scholarship on the first decades of the Colonial Period is scant, but emphasizes population loss and a community in transition (Glave and Remy 1983). According to Julien (2000), the labor demanded in the initial *encomienda tasa*—a tribute assessment based on the male population of working age—of 1549 suggests the *repartimiento* initially consisted of between 180 and 240 tributary households.[12] In 1555 the *kuraka,* or hereditary leader, of Ollantaytambo requested that the *tasa* be reassessed to account for a decrease in population. His subjects, he claimed, had died in the rebellion of Hernández Girón, were made ill during mandatory excursions to pick coca in warmer lowlands, or had abandoned their homes to take on servitude to individual Spaniards—

may also have been written by Diego de Silva, a soldier and poet who traveled to Peru shortly after the initial invasion. Cited in Covey (2020).

[11] Hernando Pizarro was granted tribute from people living on lands that had been associated with estates of at least three Inka rulers, Pachacuti, Thupa Inca, and Huascar. Julien (2000) reproduces three versions of the encomienda grant document in full, each version, she suggests, is a reproduction of a copy that Hernando Pizarro brought with him when he returned to Spain shortly after receiving the encomienda award. According to that document, the *repartimiento* was to provide payment including large quantities of maize, wheat, and other goods in-kind, as well as labor to pick coca in the encomendero's fields.

[12] Julien (2000) discusses this grant in detail and reproduces the documents that made the grant official. Julien's population estimates are rough calculations based on analogy with other *repartimientos*, hence the broad range of population size.

"*se han hecho yanacona*" (Julien 2000).[13] In response, the tribute assessment was nearly halved, a figure Julien uses to estimate that the tributary population was between 90 and 160 households at the time.[14] Consolidation of people from nearby hamlets and the creation of the *Yanaconas del Rey*[15] ayllu at Ollantaytambo may have briefly boosted the population of *repartimiento* following the Toledan *reducción*, however, documents from repeated surveys at the end of the sixteenth and beginning of the seventeenth centuries highlight a further decrease in the tributary population. In 1594, the tributary population was recorded at 94 people. By 1628–29 the tributary

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[13] As Wightman (1990) explains, to "make oneself a *yanacona*" meant to abandon traditional community or ayllu affiliations and take up personal servitude, either on a hacienda, or as a laborer tied to a Spaniard in urban settings. Such a move was frequently motivated by fear of mandatory labor in mines or by onerous tribute obligations. Varón Gabai (1997) suggests that the drastic reduction in tribute demanded in the second *tasa* is an indication that the *repartimiento* may have been divided into smaller units (1997, 251), however, it is unclear if this was the case.

[14] More precise data regarding demographic changes in Colonial Ollantaytambo are available from the 1575 Toledan *visita* (inspection tour) that proceeded the *reducción*. Documents from that survey note 209 tributaries in the *repartimiento* (Cook 1975, 166). Noble David Cook published the inspections of the Toledan *visita* in full (1975). The 1575 *visita* inspection of Ollantaytambo provides another glimpse at the sixteenth century economic output of the community at Ollantaytambo (Cook 1975). In this document, the "*Repartimiento de Tambo"* is listed in being held in encomienda by Melchoir Maldonado in 'second life,' a reference to the two-generation duration of encomienda assignments (the encomienda passed to Melchoir's father, Arias Maldonado, after Hernando Pizarro). The Ollantaytambo inspection document notes that "Tambo" had a population of 209 tributary households, totaling 919 people. In this document, nominally in-kind tribute payment was expressed in monetary terms—100 *fanegas* of maize at 150 *pesos ensayados*, 25 *fanegas* of wheat at 37.5 *pesos*, and 156 chickens at 19.5 pesos. With an additional 828 pesos in cash, the final calculus of the inspector was a total tribute of 1035 *pesos* annually—approximately 5 *pesos* per person.

[15] Many Andean communities and *reducciones* incorporated ayllus of *Yanaconas del Rey* during this period. These were previously unsettled Andean people without access to community landholding that were settled into *reducciones*. The *Yanaconas del Rey* moniker for these groups was reflective of their status as tributaries to the king, and stood in opposition to *Yanaconas de Españoles*, workers that were legally subject to individual Spaniards (Wightman 1990).

population had collapsed to 33 tributaries; a decade later, in 1639, only 19 tributaries were recorded in the rolls of the *repartimiento*.[16]

During these decades the *encomienda* was fading in importance across the Andes (Covey and Amado 2008; Stern 1993, 43-50; Lockhart 1968). Spaniards, remnant Inka nobility, and ecclesiastic institutions were instead solidifying their wealth and power by securing land on which to produce crops for commercial sale (Burns 1999; Glave and Remy 1983; Kosiba and Hunter 2017; Chapter 4). Kosiba's survey of the Ollantaytambo region demonstrates that in the Colonial Period, emergent haciendas and small settlements tended to be located such that they could easily take advantage of land that was ideal for both maize and wheat production (Kosiba and Hunter 2017). It is unsurprising that haciendas concentrated on the production of these crops given their high monetary value in emerging commercialized markets—in their history of Ollantaytambo's haciendas, Glave and Remy describe maize as the "*personaje elemental,*" the essential character, in the history of the town (1979). Haciendas near Ollantaytambo and other erstwhile Inka estates sent grain to markets in Cusco and, more profitably, the mining town of Potosí (Burns 1999; Glave and Remy 1979; 1983; Covey and Quave 2017). On Ollantaytambo's haciendas, permanent resident workers worked hacienda fields alongside tributary community members pushed into wage labor to cover cash tribute levies (Glave and Remy 1979; 1983). By the mid seventeenth century colonial transformations to land ownership and use were largely

[16] These data come from the 1594-95 and 1628 *composición y repartimiento de tierras.* I am grateful to Steve Kosiba for sharing a transcription of this document with me (see also Kosiba 2017; Kosiba and Hunter 2017). These documents also provide a glimpse of non-tribute paying ayllu members living in the *repartimiento* at Ollantaytambo, listing the "widows and orphans" of each ayllu the lands assigned to those people. Glave and Remy (1983) and Kosiba and Hunter (2017) provide greater detail in the decrease in population across these various groups and the decrease in the overall population through this period.

actualized: haciendas largely controlled land and labor, and crop complexes were dominated by maize and wheat for sale in urban markets.

The political economy of the Ollantaytambo region was clearly dramatically transformed by subsequent Inka and Spanish invasions. In the tumultuous decades that followed the Spanish Invasion, the newly formed *repartimiento* at Ollantaytambo was responsible for tributary *encomienda* labor, even as the repartimiento shrank over the sixteenth century and lands increasingly appropriated into newly formed haciendas. At Ollantaytambo, these colonial institutions have largely been studied from a regional political-economic perspective that demonstrates how their growth was driven by demand for maize and wheat in urban centers and mining towns (Glave and Remy 1983; Burns 1999). In the chapters that follow I build on this research by showing how, even as they built on the existing foundations of the Inka landscape, emerging haciendas were premised on novel arrangements of land and labor that reshaped Ollantaytambo's fields and pastures. To do this, I deploy archaeological, historical, and paleo-environmental data developed through research at the archaeological sites of Markaqocha and Simapuqio-Muyupata.

3.3 Histories of Labor and Land use at Markaqocha

Figure 3-2: Monumental Inka niched structures at along the bank of the Patacancha river at Markaqocha. Note maize fields in the foreground. Paleoenvironmental and archival data suggest that introduced fauna like the cattle in this photo became common at the site at the end of the 16th century.

I designed excavations at Markaqocha to clarify occupation histories at the site in relation to extant published data on localized ecological change. To this end, the excavation team excavated eleven test pits across sectors A and B of the site (total area of 18.5m^2 excavated). Here I interpret excavation data in relation to my archival research and published reports on two overlapping cores extracted from a wetland at the site. Given the overall low excavated area, the archaeological findings presented here are provisional. Pollen and other proxies derived from the cores—concentrations of charcoal, coprophilous mites, and plant microfossils—clarify the relationship between archaeological findings, broader political trends, and land use in the Markaqocha basin (Chepstow-Lusty et al. 1998; Chepstow-Lusty et al. 2009; Chepstow-Lusty et al. 2000). [17] Together, the full assemblage of different kinds of data suggest that during the LIP,

[17] Today, this wetland is a marshy depression approximately 40 m in diameter, however, it was a shallow lake at least as recently as the mid-twentieth century and was likely a considerably larger

Markaqocha was home to a community of farmers and pastoralists. When brought under Inka sway, this community hosted imperial officials and performed tributary labor. Subsequent to the Spanish conquest the site was largely abandoned. By the close of the sixteenth century, however, it was reoccupied by *yanacona* in the service of Spanish landowners. Radiocarbon dates confirm that this occupation coincided with renovations to Inka-built structures at the site and endured through the Colonial Period. In what follows, I follow the chronology of occupation at the site suggest by my archaeological results and outline archaeological findings on Sector B first, then Sector A.

LIP to Inka Occupations in Sector B

Sector B is the ridgetop residential complex at Markaqocha. Excavation data confirm that it was built and occupied during the LIP, as suggested by Kosiba's spatial analysis and radio-carbon dates from architectural mortar (Kosiba 2010; 2011).[18] As the expanding Inka state made the people living at Markaqocha into imperial subjects in the fourteenth century, they witnessed and participated in a broad array of changes to their milieu. New architectural forms testify to political shifts; three Inka-style monumental buildings were raised in the ridge top settlement. Quoined corners, interior niches, and thick walls distinguish these structures from the agglutinated architecture of the majority of Sector B buildings, which frequently feature round

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body of water in the more distant past. I discuss data from the core in this chapter and return to findings from Chepstow-Lusty's research on the core in Chapter 5.

[18] Kosiba (2010) dated mortar from Inka structures at the site to the fourteenth and fifteenth century, demonstrating that the town was incorporated into the Inka domain relatively early in the process of state expansion (Kosiba 2010, 2011). For comparisons between Inka and LIP architectural styles, see Niles (1999), Protzen (1992). Kendall (1985) describes LIP architecture surrounding Ollantaytambo in detail.

corners and incorporate large boulders or bedrock into building walls (Figure 3-3; see Kendall 1985 for overview of LIP building styles).[19]

Excavations in the largest quadrangular building, located in an open space in the middle of the LIP town, confirmed that the building was built by the Inka and used during Inka rule. The excavation team dug two test pits against the walls of this structure: one against the southeastern interior corner (MQ-B3, 2x1m); and one against the external doorjamb of the western door to the structure (MQ-B4, 2x1m). In MQ-B3, excavations revealed that the people who built the structure laid a foundation layer of compacted red clay that was streaked with carbon throughout its 30cm of depth. Above this foundation layer, Inka ceramics dominated the identifiable ceramic assemblage, accounting for 70% of recovered sherds as compared with 5% of sherds from LIP vessels (n=45 sherds).[20] The excavation team placed unit MQ-B4 (2x1m) against the exterior of the door in the western wall of the same structure. Finds in this unit included charred camelid bone, a grinding stone, and fragments of Inka *aríbala* jars, all recovered in strata directly above the red clay foundation layer. Inka ceramics accounted for 83% of the identifiable assemblage, and only 6% of sherds reflected LIP styles (n=61 sherds).[21]

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[19] The stratigraphy in unit MQ-B2, in the northernmost quadrangular building, was mixed, but ceramic assemblages point to Inka construction and occupation. Unit MQ-B7, in the southernmost quadrangular structure, demonstrated that current surface of the building was approximately 10cm above the bedrock, but did not yield artifacts. The original floor of this building was likely a thin layer prepared directly above the bedrock.

[20] In this section, I attribute design of these buildings to Inka architects as they follow the precepts of the Inka architectural canon. It is difficult to ascertain who actually was responsible for the labor of laying foundations, raising walls, and roofing these buildings. At Wat'a, Kosiba (2010) suggests that local people provided the labor to transform their own communities. There is no reason to suspect a different pattern at Markaqocha.

[21] As I discuss in Ch. 2, the designation "LIP Ceramic" is troublesome as it is difficult to concretely associate LIP ceramic styles with the LIP period exclusively (Kosiba 2010). Ceramic studies in Cusco suggest that these wares were still used in the Inka period (Chatfield 2007), so

Figure 3-3: Compare quadrangular (left) structures and round structures (right) in Sector B at Markaqocha.

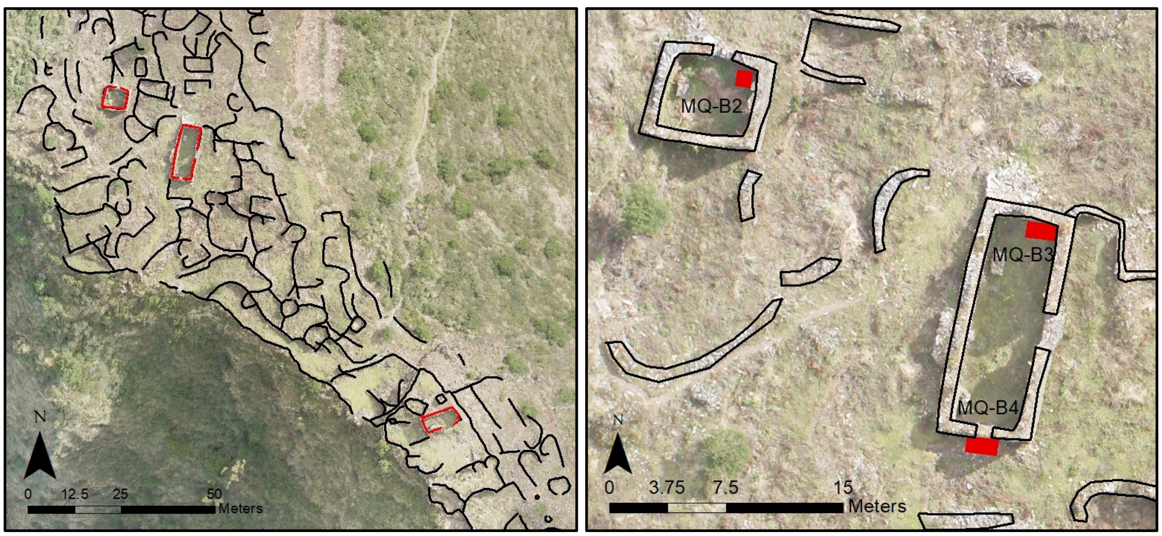

Figure 3-4: Unit Locations in Markaqocha, Sector B. At left: Locations of quadrangular, Inka-built, structures in Sector B of Markaqocha (in red) in relation to the pre-existing LIP architecture in the site. At right: simplified map of unit locations within quadrangular structures. The base of these image is a high resolution orthophoto created from drone imagery (courtesy Steve Kosiba).

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here, rather than a strict temporal marker, the relatively ubiquity of these ceramics might be better understood as representative of the "Inka-ness" of the place.

Figure 3-5: Fragments of the neck of an Inka jar, perhaps used to serve corn beer, recovered from unit MQ-B4.

Because of the limited size of the excavated sample, my conclusions are preliminary; however, this assemblage suggests that the building was a locus of food and drink distribution under the InkaAs in other imperial contexts, commensal feasts are widely recognized as one of the mechanisms through which the Inka established and maintained political authority (Bray 2003; Hastorf and Johanssen 1993; Klarich 2010; Kolata 1992; Ramírez 2005).[22] Kosiba's (2010) work at Wat'a demonstrated that when the Inka incorporated that site into their empire,

[22] In Sector B, the interpretation of archaeological remains is difficult because the shallow deposits in the sector have been repeatedly disturbed by agricultural activity. Moreover, the ridge-top bedrock is located close to the surface, meaning few units yielded deep deposits. All but one of the units in Sector B yielded zooarchaeological remains of taxa introduced from Europe, however, these bones were recovered in either contexts thoroughly mixed by agriculture, or in surface contexts.

political practices such as feasting that were once hosted in open and accessible spaces were moved into closed spaces that emphasized Inka imperial power. Although the sample from Markaqocha is small, data from the site indicate that reciprocity-inducing feasts directly associated with imperial architecture may have cemented Inka authority over the people living at the site.[23] Under this interpretation, by building the quadrangular structures, the Inka converted the public plaza into a place that indexed Inka authority; the use of Inka ceramics further reinforced Inka power by highlighting connections between the empire and feasting practices that grounded political power.

Evidence from domestic contexts in Sector B suggests that the LIP community largely remained in place through the political changes associated with Inka rule at Markaqocha. These units yielded high concentrations of LIP and Inka ceramics, but little material culture associated with other periods.[24] For instance, in unit MQ-B2, excavations in a round structure revealed an undisturbed use surface—a compacted earth floor protected by a layer of wall collapse—which yielded both Inka and LIP type pottery, suggesting that the people living in the house used both styles during an occupation that spanned both periods.[25]

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[23] This assemblage was recovered from the unit against the external doorway. Given the limited area excavated it is unclear whether feasts were more likely to have been staged inside the building (restricted space), or in the patio (open space), so I am not comfortable speaking to the details of the practice and their political meaning, however, it seems likely that the pattern at Markaqocha mimics Kosiba's findings at Wat'a.

[24] MQ–B2, MQ–B5, MQ–B7, MQ–B8, MQ–B10. I do not discuss these units in detail here as findings were similar. All ceramics analyzed in this project are either (likely) locally produced LIP "Ollanta Phase" wares, classic Inka sherds, or domestic wares of indeterminate cultural association.

[25] Only two indisputably colonial artifacts were recovered from Sector B. Both of these small glazed sherds were from disturbed contexts, so it is impossible to conclusively determine when they were deposited. European fauna was recovered in nearly all Sector B units, suggesting the sector was continually used following the Spanish invasion, however the near absence of other

The paleoenvironmental record from the Markaqocha lake core clarifies changes in land use that coincided with the ascendancy of Inka rule over the LIP community at Markaqocha. Given the high elevation of the site, the people that lived at the site in the LIP may have been largely reliant on pastoralism; however, a low relative density of coprophilous mites in the core record for this period suggests that shepherds pastured their animals at high altitudes away from the lake (Chepstow-Lusty et al. 2009). The pollen record demonstrates that these farmers grew chenopods and limited maize on the slopes around the lake (Chepstow Lusty et al. 1997). As they were made into Inka subjects, the people living at Markaqocha changed the focus of their agropastoral practices. In the lake core, the period of Inka rule is marked by the highest concentrations of *Alnus* (alder) pollen in the sequence (Chepstow-Lusty et. al. 2009). Chepstow-Lusty and Winfield (2000) infer that increased *Alnus* pollen concentrations are reflective of Inka-directed agroforestry on the slopes of the Patacancha Valley (see Chapter 5). Mite and plant-fossil proxies suggest that at the same time, caravan traffic dramatically increased; draft animals were pastured around the lake at a much greater frequency than before the ascent of Inka power (Chepstow-Lusty et. al. 2009).[26] These caravans connected people living at Markaqocha to the broader region and were likely a mechanism through which Inka material culture arrived at the site. Together, these data suggest that the local people living at Markaqocha under Inka rule

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colonial artifact styles suggests that post-invasion uses of the sector were ephemeral, rather than long term residential occupations. Indeed, these post-conquest faunal remains may well have been deposited during the agricultural activities that mixed strata across the sector.

[26] Mite concentrations are inversely correlated to calcified Charophytes algae in the core. This plant microfossil is generally understood to indicate clear, shallow and nutrient poor water. Their numbers decline when water is frequently disturbed. It makes sense that that these concentrations would increase as caravanning and pasturing decreased, as was the case at Markaqocha (Chepstow-Lusty et. al. 2009).

performed rotational tributary labor like caring for caravans, maintaining the royal road, tending state forests, and provisioning travelers passing through the site. [27] The political power that undergirded demands for this labor was consolidated through practices like commensal feasting wherein state officials hosted local leaders in distinctly Inka spaces. Markaqocha was a cosmopolitan place; the local people living at the site were likely in frequent contact with *yanakuna* and *mitmaqkuna* working in Ollantaytambo, Inka administrators and nobility, and caravanners.

Inka and Colonial Occupations in Sector A

Archaeological data demonstrate that the Inka directed construction on the floor of the Patacancha Valley (Sector A) as they consolidated control of the Markaqocha area. New domestic architecture and monumental buildings presided over the narrow passage through the valley. Buildings in this sector are markedly different from the majority of structures in Sector B. In this sector, architecture reflects Inka styles; most surviving structures are quadrangular and many feature internal niches. These imperial infrastructures marked the approach to Ollantaytambo, emphasizing to travelers that they were entering a center of Inka power. Rather than local people, these buildings may have housed state officials or workers brought to Markaqocha to tend to caravans along the road through the site. Five test pits were excavated around these buildings in Sector A (total 8.5m2, See Figure 3.6). Material culture recovered from

[27] The Inka road system was a critical component of imperial infrastructure, and the road itself an important index of Inka power (Hyslop 1984; Wilkinson 2019) It is possible that Markaqocha operated as a tambo waystation on the Inka road system. Were this the case, it would have been likely been the last such station at which travelers would have stopped prior to Ollantaytambo and may well have marked the entrance to the estate. Below Markaqocha, the floor and sides of the Patacancha are terraced such that the landscape would have evoked Inka power, but above the site, there are fewer indices of Inka power.

these units spans the LIP, Inka, and Colonial periods, however, Inka and Colonial artifacts dominate artifact assemblages, and stratigraphic and radiocarbon data indicate that the buildings were built by the Inka and remodeled in the Colonial Period.

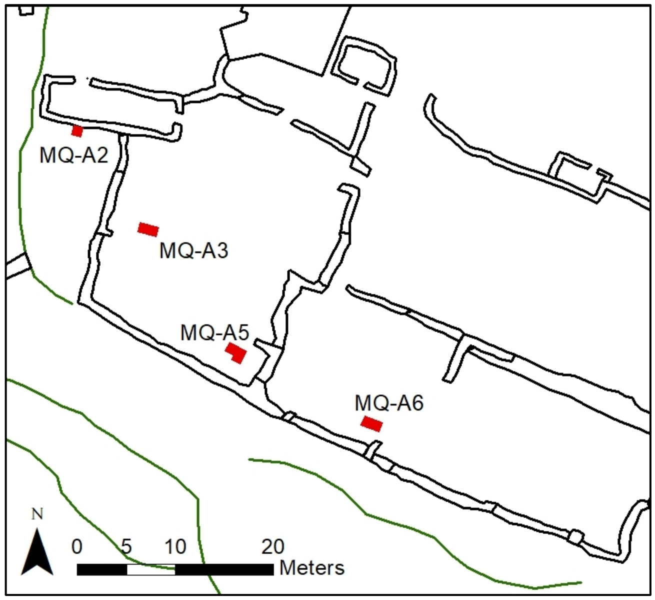

Figure 3-6: Markaqocha chapel complex units. This map does not show unit MQ-A1, which was located in an Inka building adjacent to the river. That unit yielded only extremely disturbed deposits indicative of repeated looting and flooding.

In order to understand the construction sequence of the buildings in Sector A, four test pits were excavated in the chapel complex. [28] One of these (MQ-A2) was placed against the exterior wall of the original chapel at the site underneath a niche where it appeared that a secondary wall, no longer standing, intersected with the main structure. Inka architectural attributes, including the niche, strongly imply that the chapel was built by remodeling Inka architecture. The excavation team recovered Inka and Colonial ceramics from this unit, as well

[28] A unit in the riverside Inka structures pictured in Figure 3-2 (MQ–A1) revealed deposits entirely disturbed by looting and repeated iterations of flooding along the floor of the valley, so here I focus on the four units excavated in and around the chapel complex.

as a wide array of animal bone in a sequence of stratigraphic layers over a meter deep (Figure 3-7). Two radiocarbon dates anchor this stratigraphic sequence in absolute time. Charcoal from within the bottommost course of stones of the chapel wall returned a date indicating that the foundation was laid in the sixteenth century.[29] This sample was associated with Inka ceramics and indeterminate domestic wares, suggesting that it may have been deposited relatively early in the calibrated radiocarbon date range, and suggesting that the chapel builders likely repurposed a foundation originally laid by Inka masons. A second sample from the middle of the sequence returned a date suggesting deposition in the mid to late sixteenth century.[30] It is impossible to know the rate of deposition within the stratigraphic sequence, so situating contexts precisely between these dates is difficult. Nonetheless, excavated assemblages demonstrate that colonial glazed wares and a wide array of non-native taxa were common at the site by around the close of the sixteenth century, indicating that people lived at the site near continuously through the Inka and Colonial periods, and confirming that Inka-built structures at the site were remodeled during the Colonial Period.

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[29] The age of this sample (MQ-C#4) is BP 325±31 years. Calibrated using the OxCal Southern Hemisphere 2020 calibration curve, this date returns a 95% confidence interval of 1501–1665AD. The full range of probabilities associated with these dates are presented in Appendix X.

[30] The age of this sample (MQ-C#3) is BP 275 ± 31 years. Calibrated using the OxCal Southern Hemisphere 2020 calibration curve, the 95% confidence interval for this date is 1518–1800. This is a broad range, however, the sample was associated with glazed wares (suggesting deposit in the mid-late 16th century) and the broadest statistical probability for deposit is from 1627–1675.

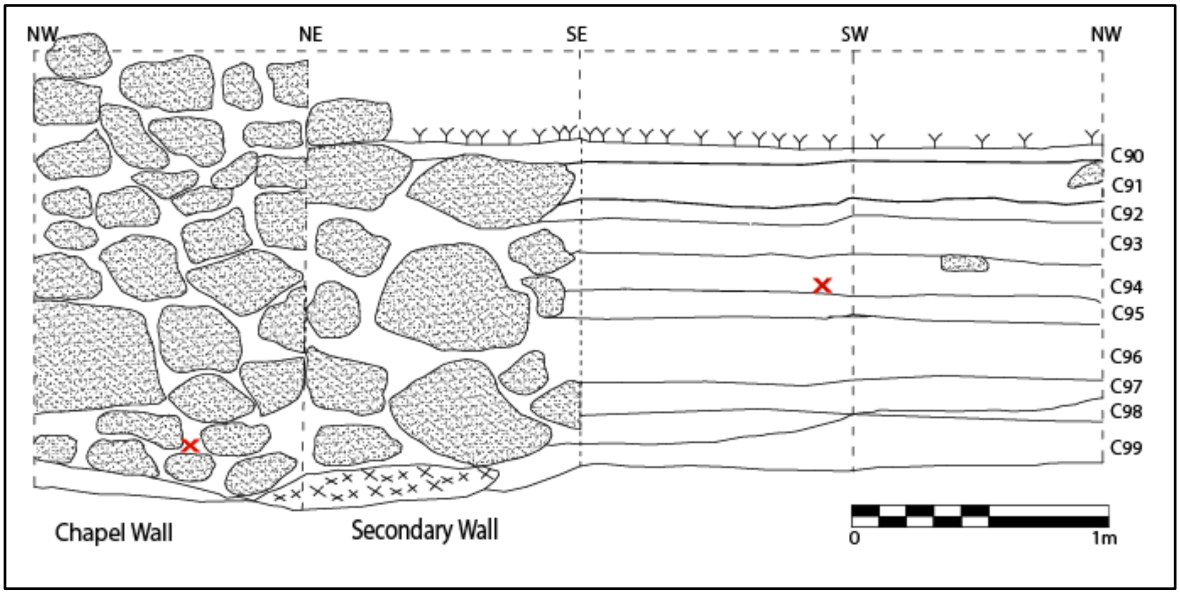

Figure 3-7: Profile drawing of Unit MQ-A2, with locations of radiocarbon dates indicated with red "X".

Figure 3-8: Location of unit MQ-A2 alongside exterior wall of the chapel, red arrow indicates where secondary wall used to join the chapel wall. Excavation data indicate that these walls were built in the Inka Period and subsequently incorporated into the chapel in the late sixteenth or early 17th century.

Other units excavated in Sector A featured similar stratigraphic characteristics. The excavation team placed two units in locations hypothesized to be domestic structures (MQ-A3, MQ-A6, each 2x1m). Excavators dug these test pits to a depth of approximately a meter and a half to sterile strata. In Unit MQ-A3, the excavation team dug through a thick context of large rocks (30-40 cm in diameter) that contained both Inka and Colonial ceramics, including fragments of roof tile, before uncovering a floor of dense packed earth. The floor surface was littered with Inka ceramics (41%), Colonial ceramics (16%), and indeterminate undecorated wares (41%, total n=22). All of the indeterminate sherds were identified as cooking vessels based on heavy soot accumulation. Excavations clearly defined a wall in the eastern profile of the unit that extended for approximately 20 cm below the floor. The people who built the floor laid a construction fill that contained Inka and indeterminate undecorated ceramics, but also yielded cattle bone. Contexts below the level of the fill contained much lower densities of ceramics.

These finds suggest that while this building was likely constructed under Inka direction, it was remodeled and occupied during the Colonial Period.

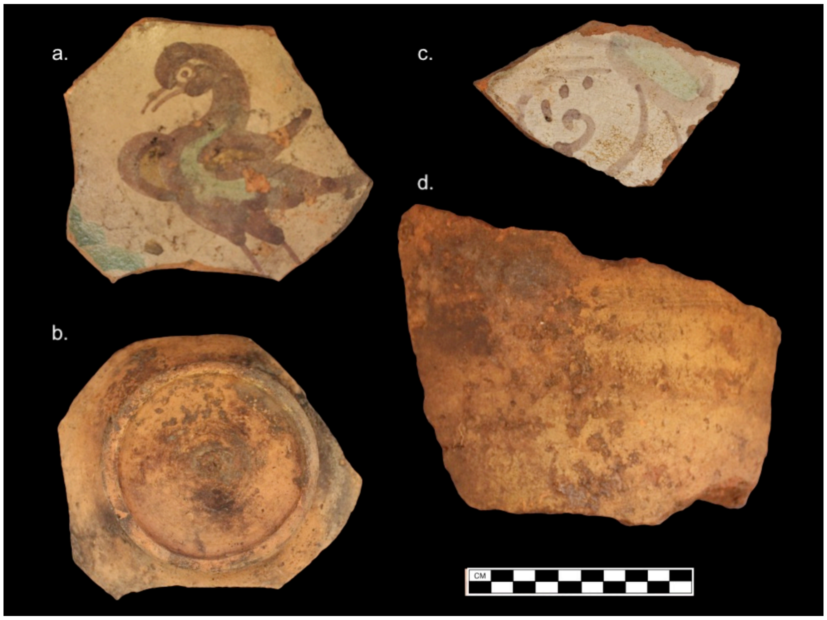

Figure 3-9: Colonial ceramics recovered from unit MQ-A6, including, (a,b) front and back of a plate featuring image of fighting rooster, (c) plate fragment, and (d) roofing tile.

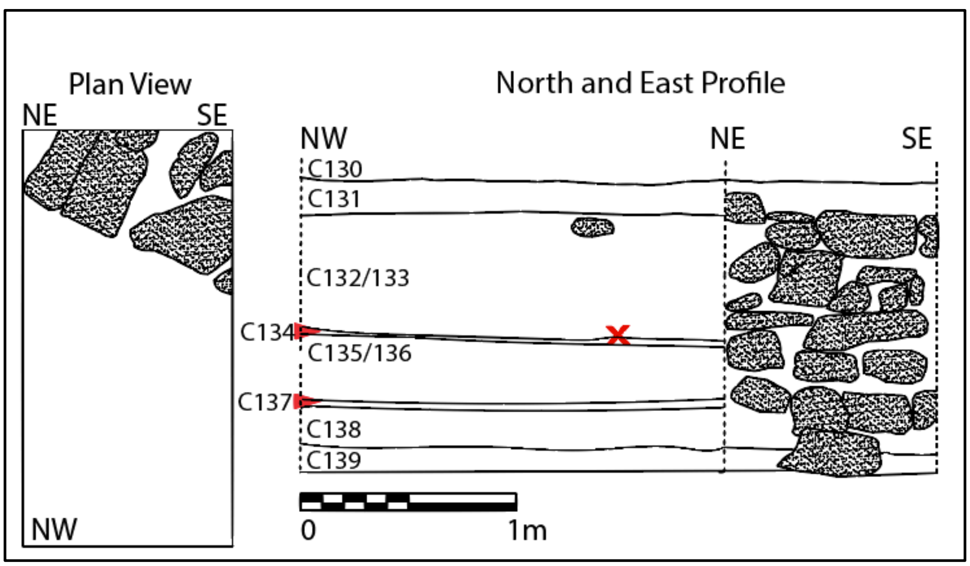

Figure 3-10: Left: Unit MQ-A6 profile. Red arrows indicate floor levels. Red "X" indicates radiocarbon date (Sample #5). Where contexts are displayed together in the drawing, thick strata were arbitrarily distinguished from one another in order to maintain control of artifact collection. In this drawing, C 132/133 was a layer of large rocks and rubble that included Colonial artifacts.

In unit MQ-A6, excavations uncovered superimposed floors beneath a thick layer of large rocks similar to those in the upper strata of unit MQ-A3 (C132/133, see Figure 3-10). Excavators recovered only Inka and indeterminate domestic ceramics from the lower (earlier) floor, a layer of packed earth flecked with carbon. However, the bones of sheep, cow, and horse from beneath the floor indicate that it was laid after 1532. A thick (~30 cm) layer of fill separated the earlier floor from the subsequent use surface. The higher floor level was a compacted clay surface with carbon and pebble inclusions. This floor had the base of a ceramic vessel set into it and yielded ceramic evidence of both the Inka and Colonial occupations, as well as indices of food preparation, including a grinding stone. A peach pit recovered from this level shows that the people living in the site at this time were able to access introduced agricultural products grown in lower ecological zones. A radiocarbon date from carbonized wood recovered from just above the later floor level places the terminus of this occupation at the late seventeenth century or later.[31]

Evidence from unit MQ-A5 suggests that the buildings excavated in units MQ-A3 and MQ-A6 were filled with rubble in the same event. The excavation team placed unit MQ-A5 in the corner of one of the open plaza spaces at the site, in front of a niche in the retaining wall, in order to determine whether the niched wall had been part of a domestic structure.[32] In this unit the excavation team exposed the remains of a young human individual within a layer of large

[31] The age of this sample (MQ-C#5) is BP 185 ± 28 years. Calibrated using the OxCal Southern Hemisphere 2020 calibration curve, the 95% confidence interval for this date is 1669-1921, however, the statistically most likely portion of this range (49.3% probability) is from 1669–1785. Given the totality of evidence from this Sector, and taking into account the stratigraphy of the Markaqocha core, I suspect that occupations in this sector were capped in the same event, roughly correlated with the end of the eighteenth century.

[32] Excavators initially opened this unit as a 1x1 meter test pit, but expanded it to 2x2 meters when they encountered the burial in order to excavate that context in its entirety. Only 2.5m^2 of the 4m^2 of the expanded unit were excavated.

rocks (35-40cm in diameter). This individual was not formally interred; a large boulder resting atop the pelvis had crushed the individual in situ. Apart from a small metal crucifix, there were no goods associated with the burial. Pockets of ash ranging from 10 to 20 cm in diameter were scattered through the soil matrix surrounding the skeleton. The large stones that surrounded the individual rested upon a floor surface that also contained a grinding stone and Inka and Colonial ceramics. A carbon sample (Sample #6) from an ash pocket located directly underneath the cranium returned a date of, at the earliest, the late seventeenth century.[33]

I interpret the stratigraphy of these units as evidence that buildings around the chapel were first occupied during the Inka Period, and that this occupation extended into the Colonial Period.[34] After the later occupation, large rocks and rubble filled the houses. Leveled over, this cap of rubble now forms the surface of the plazas in front of the chapel. The similarity in radiocarbon dates from units MQ-A5 and M-A6 suggests that the buildings around the chapel were filled or collapsed at roughly the same time, perhaps even during the same event. Radiocarbon date ranges strongly suggest that this occurred well after the end of the 1600s, but it may have been considerably later. Chepstow-Lusty et al. (2009) note a fine-grained inorganic horizon in the stratigraphy of the lake core indicating that the wetland at Markaqocha shallowed rapidly around 1800 CE due to rapid sediment deposition. Markaqocha sits on a seismic fault,

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[33] The age of this sample (MQ-C#6) is BP 190 ± 26 years. Calibrated using the OxCal Southern Hemisphere 2020 calibration curve, the 95% confidence interval for this date is 1668–1923, however, the statistically most likely portion of this range (55.7%) is from 1668-1785. The similarity of this date with sample MQ-C#5 is striking, and highly suggestive that both samples were deposited as part of the same event. See Appendix 1.

[34] As I discuss below, Markaqocha was officially titled as a Spanish-owned estancia (ranching operation) in 1594, so remodeling at the site may have been associated with the creation of that estancia.

and the entirety of Sector A is built upon the remains of a major landslide that blocked the valley at Markaqocha several thousand years ago (Grützner, personal communication, 2017). It is quite likely that smaller earth-moving events occurred more recently—landslides are very common in the waterlogged soils of the rainy season in Cusco (Candia-Gallegos 1993). Such an event would explain the thick layer of rubble that covered houses in Sector A and may correspond to the shallowing of the lake. I have not yet discovered archival evidence to corroborate this hypothesis, however, given available evidence this seems like the most likely interpretation of the available data.

Evidence from the Markaqocha core and the archival record are suggestive of the economic activities in which the people living at Markaqocha participated across the period spanning Inka and early-Colonial rule. During the decades immediately subsequent to the Spanish invasion, the concentrations of proxies in the core indicating the presence of grazing animals drop precipitously, suggesting that pasturing and caravanning around the lake became much less frequent (Chepstow-Lusty et al. 2009). This may indicate that the movement of goods and people that had intensified under Inka administration was considerably reduced. Mite concentrations spike once again around 1600, which Chepstow-Lusty and colleagues correlate with the proliferation of non-native grazing animals (Chepstow-Lusty et. al. 2009). The documentary record bears this out; an estancia was titled at Markaqocha in 1594, and other estancias were operating nearby shortly thereafter (ARC, F: *Colegio Educadas* L. 02, f: 271, see Chapter 4). In 1594, lands around the site were titled to Luis Vizente, a Cusco carpenter. Vizente's land title was predicated on his claim that the lands had been abandoned and unworked save by *yanacona* that pastured cattle, raised pigs, and grew grains on his behalf (ARC, F: *Colegio Educadas* L. 02, f: 271, 1601; see also Chapter 4). In the seventeenth century the land around Markaqocha passed from Vizente to other landowners before being incorporated into the expanding Hacienda Huatabamba in the latter decades of the seventeenth century, which held the land until the agrarian reforms of the twentieth century (see Chapter 4, Glave and Remy 1983). Throughout this period, the site was occupied by *yanacona* who worked the fields and pastures around the site for the benefit of absentee landowners.

While findings are provisional, the occupation sequence I outlined in this section suggests that Markaqocha was occupied during the LIP by a broadly autonomous community. When subjectified by the Inka, these workers performed tributary labor for the empire. In the Colonial Period, many people left the site, however, the occupation of Sector A at Markaqocha continued until many of the buildings at the site were abandoned (perhaps following a catastrophic seismic event) at some point after the end of the seventeenth century. In reality, though, Markaqocha has likely never been completely uninhabited for extended periods. Over time people developed new ties to the place. For instance, in 1846, a group of people that claimed membership in a “Markaqocha Ayllu” collectively engaged in litigation in Cusco, suggesting that by that point a new community was well established at the site, even as the land was claimed by the Hacienda Huatabamba, based near the center of Ollantaytambo (ARC, *Protocolos Notariales*, N:54, 1842-1847). Today, several families continue to make their homes at Markaqocha and farm fields at the site, and the chapel remains an important ritual space that hosts celebrations attended by people living throughout the Ollantaytambo region.

3.4 Occupation and Abandonment at Simapuqio-Muyupata

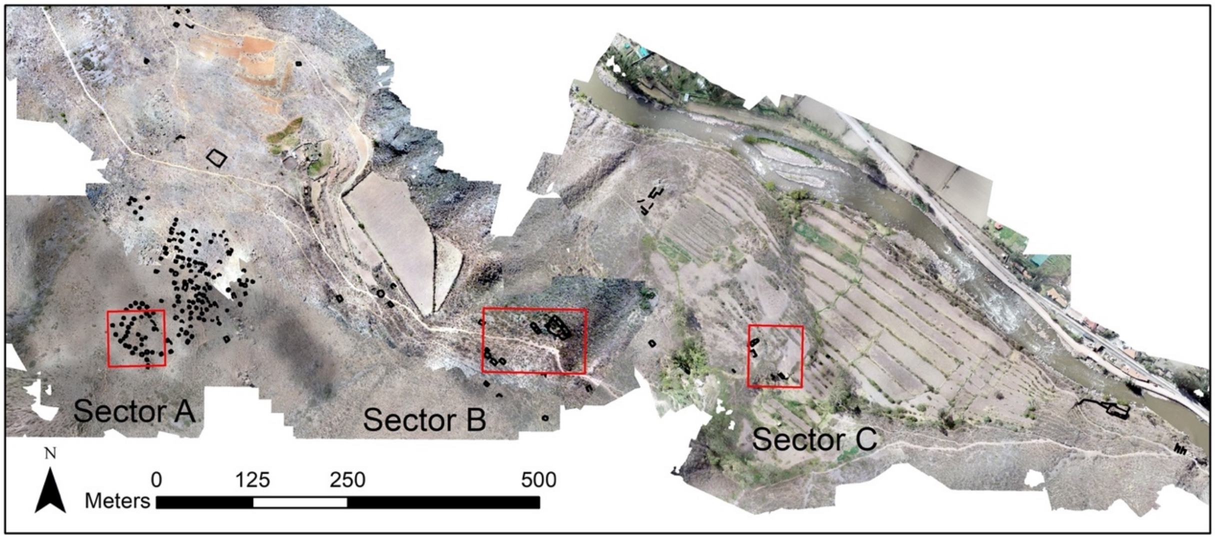

Figure 3-11: Map of Simapuqio-Muyupata showing distribution of sectors. Red rectangles are the approximate locations of insert maps presented below. Underlying image is a high resolution orthophoto created from drone photography.

At Simapuqio-Muyupata I directed the excavation of sixteen units across three sectors. The excavation team dug three units in Sector A (total $9m^2$), eight units in Sector B ($51m^2$), and five units in Sector C ($47m^2$). Below, I outline archaeological findings from those excavations in relation to the archival record. I consider botanical and zooarchaeological data from excavations at Simapuqio-Muyupata in greater detail in Chapter 6.

Structures in Sector A

In Sector A the excavation team dug two units in domestic structures and one atop the canal that runs through sector (I discuss this unit in Chapter 5). The results of these excavations posed interesting contradictions that merit further study. Buildings in Sector A were built by digging into the slope of the mountainside to create a platform, erecting a retaining wall on the upslope side, and building walls on the three lower sides. Many feature a large vertical stone against the doorway, which frequently face east. Due to the rounded or D-shaped plan of buildings in this sector and the un-coursed rough masonry from which they were made, I hypothesized that these structures were built and used during the LIP. This hypothesis accorded with findings from Kosiba (2010), who's surface collections in this are recovered LIP ceramics, and radiocarbon dates from nearby *chullpa* tombs (Bengtsson 1998).

Excavations in two of these buildings (Units SM-A1, SM-A2) exposed floor surfaces at a depth of between 10 and 15cm from the surface. Occupations were single component and shallow. Excavators recovered few artifacts: a limited quantity of ceramics, a few unidentifiable fragments of animal bone, and a grinding stone. Ceramics featured pastes and forms diagnostic of Inka manufacture, but were undecorated.[35] By contrast with expectations, a sample of animal bone recovered from the floor surface of unit SM-A1 returned a date indicative of Inka occupation, and excavations yielded no evidence of LIP occupations.[36] These finds suggest that the buildings in Sector A were occupied and used during the Inka Period, even if they may have been built in the LIP.

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[35] The grinding stone yielded phytolith evidence of maize, (*Zea mays*), bean (*Phaseolus sp.*), and gourd (*Cucurbita sp.*) processing. These botanical data are further elaborated in Chapter 6.

[36] The age of this sample was 424 ± 26 years BP. Calibrated using the Southern Hemisphere OxCal 2020 curve, this returns a date of between 1448 and 1623 at the 95.4% confidence interval and 1457-1600 at 68.2% confidence. The calibration probability distribution (included in Appendix X) is highly suggestive of late Inka occupation.

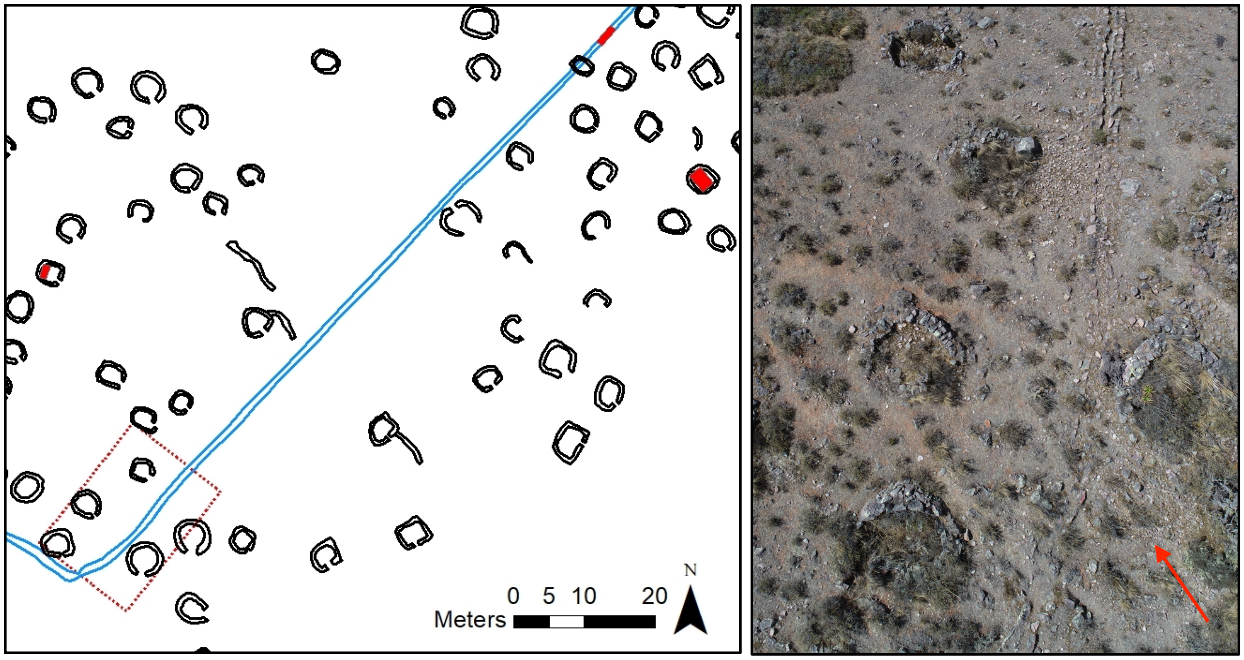

Figure 3-12: At left: Image of location of Sector A units, note the large number of buildings (this is just a partial sample; there are many more in the sector) and the canal. Almost all buildings have doors opening to the east, away from strong prevailing winds. The hillside in this sector slopes downwards to the northeast (along the same trajectory as the canal). At Right: Drone photo showing course of canal and surrounding buildings. Red arrow indicates north. The approximate location of this image is indicated by the red dashed rectangle in the map.

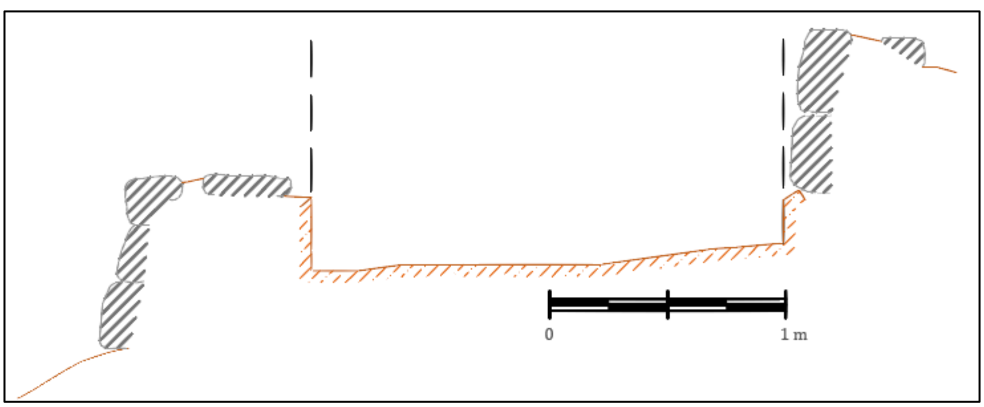

Figure 3-13: Cross section of Unit SM-A2 indicating how surfaces for the buildings were constructed by leveling the slope of the hill. Note that this is the entire excavated profile of the unit, deeper than the floor level.

Despite the lack of direct evidence in excavated contexts for occupations at Simapuqio-Muyupata during the LIP, there is considerable evidence that the immediate area was a vibrant locus of activity prior to the consolidation of Inka power in the region. Kosiba (2010) documented the important nearby LIP site of Llactallactayoq (~1.5km distance) and collected LIP sherds at Simapuqio-Mutupata. Bengtsson (1998) and Hollowell (1987, cited in B. Bauer 2004) dated material from *chullpa* tombs around the quarries at Kachiqhata (~1km distant) to the LIP. Kosiba (2010) argues that such tombs materialized claims to place during the LIP. These data suggest that the Simapuqio-Muyupata area may have been understood as territory of nearby communities in pre-Inka era. [37]

The absence of LIP artifacts in excavations suggest that buildings in Sector A were either thoroughly cleaned prior to Inka occupations or were actually built during the Inka Period. In either case, it is notable that these structures were used during the Inka Period but diverge from the Inka architectural canon. This suggests that these buildings were not meant to be understood as inherently Inka and were not part of the symbolic landscape that marked Ollantaytambo as an Inka place. The shallow single component occupations and low density of artifacts suggests that occupations in these buildings were short-lived and impermanent. Yet, the sheer number of structures—at least seventy—implies that a substantial number of people lived in Sector A.[38] While the small area excavated makes definitive conclusions impossible, these preliminary findings suggest several possibilities to be tested with further excavation: these structures may have been built in the LIP by local people, and subsequently used as temporary housing for

[37] Bauer (2004) provides a list of these dates alongside others from the Cusco area. At least one of the samples Bengtsson dated was associated with Inka material culture, so it may represent early Inka presence, or Inka reuse of carbonized material.

[38] We mapped over 70 structures, however, given the variable preservation on the steep slope of Sector A there were almost certainly many more. This suggests that at any given moment there could have been several hundred people living in Sector A.

seasonal or courvée workers during at the Inka estate. Or, they may have been labor camps for the workforce the Inka brought to Ollantaytambo to raise terraces or work in the quarries at nearby Kachiqhata.[39] Further excavations and radiocarbon dates are required to test these possibilities.

Sector B Inka Houses

Architecture in Sector B was built in a dramatically different style to that in Sector A. Sector B constructions follow a typical Inka architectural canon: common features include a quadrangular layout, quoined corners, and niched interiors.[40] The majority of walls in the sector include some worked stone, although no buildings were built exclusively from shaped stone.[41] The excavation team dug units in two distinct groups of Inka buildings. The results of excavations in these structures suggest they were built during the Inka Period and used for only a

[39] I discuss the canal running through Sector A in Chapter 5. We had hoped to date the canal through excavations, but no datable materials were recovered. That said, the absolute straight course of the canal suggests that the architecture surrounding it was built after it was. As I discuss in Chapter 5, this canal may have been pre-existing agricultural infrastructure that was appropriated and expanded by the Inka, so it follows that Sector A structures may have been built relatively late in the pre-Hispanic era.

[40] One round structure of approximately 10m in diameter stands out from the others. This building is located immediately adjacent to the road through the site, and has been badly looted, so we did not excavate in it.

[41] This chapter draws on data from units SM-B8, SM-B9, SM-B10, SM-B5, SM-B6, SM-B7. I do not discuss units SM-B2 or SM-B4 in detail. SM-B4 was excavated in the reservoir at the site, and is discussed in greater detail in Chapter 5. Ceramics from Unit SM-B2, a test unit placed outside the door of the chapel-like structure at the site, suggest that the space was used late in the Colonial or early Republican era. Little is known about this occupation of the site, but during this period of time the Muyupata area marked the boundary between the Hacienda Simapuqio and the Hacienda Kachiqhata, as well as the approach to Ollantaytambo, so the chapel may have in part served to delineate the spaces between the two properties. Considerable quantities of Inka ceramic were distributed through this area around the reservoir (see also Chapter 5), so it seems as if the reservoir area was important for a broad swath of time.

relatively short time during the Inka Period before they were abandoned. I interpret a low density of Colonial and Republican era artifacts scattered through the sector as evidence of ongoing ephemeral occupations after the primary occupation of these structures ended.

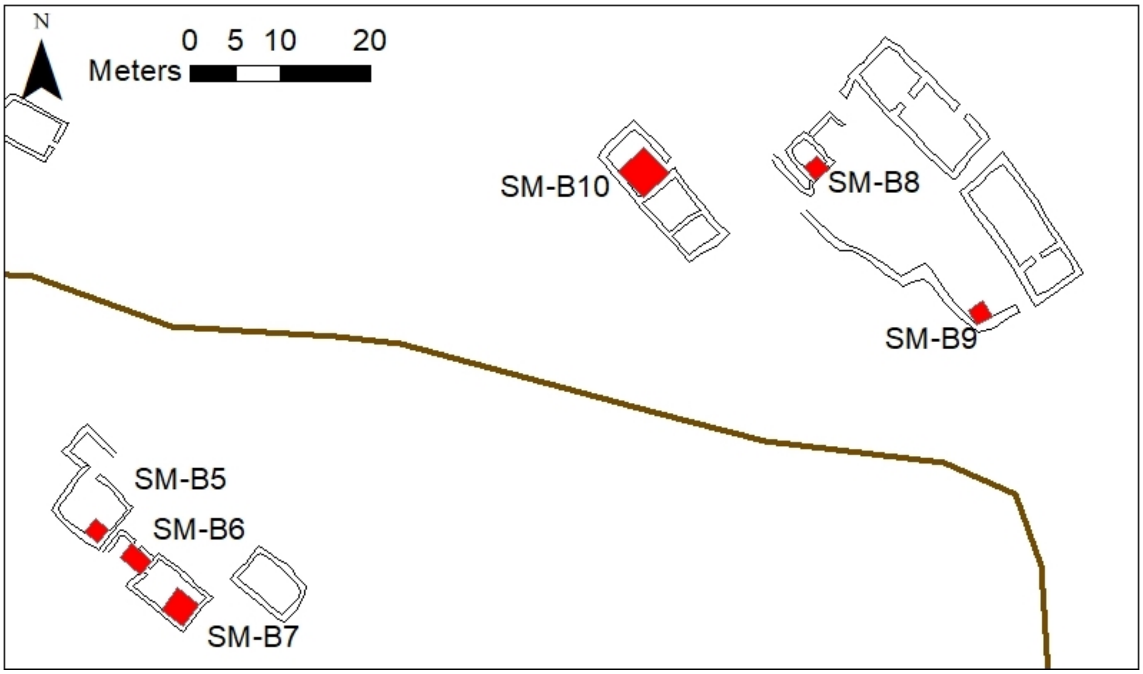

Figure 3-14: Locations of units in Inka buildings in Sector C. The brown line running through the center of the map is a modern path through the site that likely corresponds to an Inka road.

Units SM-B5 (2x2m), SM-B6 (2x3m), and SM-B7 (3x3m) were in a group of buildings just above the road through the site. All of these units were shallow and single component—excavators encountered floor contexts within 20 cm of the surface, and floors were constructed directly on sterile strata. Artifact assemblages were almost exclusively comprised of Inka sherds, the majority of which were utilitarian wares for cooking rather than serving vessels.[42] While

[42] When classifying vessels we drew on attributes including shape, size, decoration, and whether or not the vessels were burnt. We interpreted burning and soot accumulation as evidence that vessels were used for cooking, except in cases where vessels were obviously burnt after deposit or as part of a ritual. Bowls, plates, and small jars were considered serving vessels. Large jars were classified as food preparation or storage vessels. This classification system drew on Kosiba (2010), Bray (2003), and Quave (2012; 2017).

relatively little animal bone was recovered from these units, that which was recovered was almost exclusively Andean taxa—guinea pig and camelid.[43] The most notable find in this cluster of excavation units was a burial dug into the floor of the house in unit SM-B7.[44] The people who lived in the house buried this juvenile individual in an upright crouched position, and encircled the body with long flat stones (40-45cm x 5cm x 15cm). They used large fragments of a ceramic jar to cap the burial chamber but did not deposit other grave goods with the individual.

Prior to the Spanish invasion, Andean people commonly incorporated burials into architecture by placing individuals within walls or burying them within floors. Such burials have been interpreted elsewhere as anchoring ties to place and animating connections to the house (See Toohey et al. 2016). Kosiba (2010, 288) comments that similar burials at nearby Wat'a were not just placed *in* the foundations of houses, they *were* foundational to occupations in that they materialized connections between the living space of the house and ancestral presences in the landscape. While it is difficult to make concrete interpretations about the burial at Simapuqio-Muyupata without having a larger sample from the site and region for comparison, the find is suggestive that while the house may only have been occupied for a short span of time, the people who lived in the building understood themselves to be permanent occupants of the site.

Findings from excavation units in the second cluster of buildings in Sector B suggest a similar chronology of occupation to other buildings in the sector. The excavation team dug units

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[43] I discuss the zooarchaeological assemblage from Simapuqio-Muyupata in greater detail in Chapter 6.

[44] Skeletal remains were analyzed by the bioarcheology team at the Ministry of Culture in Cusco, led by Oliver Medina Delgado. Their analysis determined an age of 5 to 10 years based on dental eruption and degree of bone fusion.

SM-B8 (2x2), SM-B9 (2x2), and SM-B10 (4x4) in a cluster to the north of the road. In SM-B8, a unit placed in a small structure opening onto a patio, excavators recovered ceramics and animal bone suggesting an Inka era occupation. SM-B9, which was placed in the corner of that patio space where two containing walls met, also yielded a largely Inka artifact assemblage. However, these units also contained artifacts diagnostic of short-lived post-invasion occupations. In SM-B8, a stratified sequence of expedient hearths in the southeastern corner of the unit suggests repeated use as a shelter after primary abandonment. Artifacts from these hearths, including a bone button, faunal evidence of sheep and chicken consumption, and Colonial ceramics, suggest that ephemeral occupations continued intermittently from the early Colonial Period to the contemporary era.

The excavation team dug unit SM-B10 in the westernmost room of a large three-room Inka building. As in other units in the sector, excavations in unit SM-B10 uncovered a floor surface after only approximately 15cm of excavation. This floor was littered with Inka wares, including a large storage jar. No artifacts suggest extended occupations outside of the Inka Period, and the zooarchaeological assemblage was exclusively comprised of native Andean taxa, further confirming Inka construction and use.

One context stands out from other finds in this unit—the assemblage described in the opening to this chapter. In the north-east corner of the excavation, excavators uncovered a pit dug into the floor of the building. In the pit, the excavation team recovered the disarticulated remains of a juvenile deer atop Inka ceramics and a grinding stone. The pit contained fine ash, much of the bone was charred (64% of recovered bone fragments were charred, including cranial elements, vertebra, and long bones), and a high proportion was calcified (23% of recovered bone fragments), indicating that the contents of the pit were likely burnt in an intense fire.[45] A copper *tumi*-knife was recovered adjacent to the burnt animal. Phytoliths on the grinding stone indicate that it was used for maize, beans, and gourd processing. Additional phytoliths from the surrounding soil matrix included gourds, *Cheno-Ams*, and beans (see Chapter 6). The excavation team also recovered carbonized Asteraceae and Fabaceae seeds from this context (see Chapter 6).[46] A dated sample of carbonized wood suggests that the people at Simapuqio-Muyupata who ate this meal and burned the remnants did so shortly after the Spanish invasion.[47]

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[45] With the exception of one fragment of camelid tibia, all bones from this context were identified as either deer or 'medium mammal,' and the MNI for the context was 1, suggesting that the majority of the bone was from the same animal.

[46] It is worth noting that the mandible of the deer was placed atop the assemblage (see Figure 3-15). Kosiba (2010, 270) found that mandibulae were frequently deposited on top of contexts that marked either the beginning or terminus of Inka occupations at Wat'a.

[47] The radiocarbon age of this sample is surprisingly young (BP 284±24), however, the 95.4% confidence interval (1512–1799) is broad. The artifacts deposited strongly suggest that this deposit was laid before non-native taxa or foreign styled artifacts were common in the region. Based on the full distribution of radiocarbon probabilities, it is likely that this happened before 1547 (see Appendix 1). The instability of the radiocarbon calibration curve for the period of time spanning the late Inka and Early-Colonial eras often makes data imprecise.

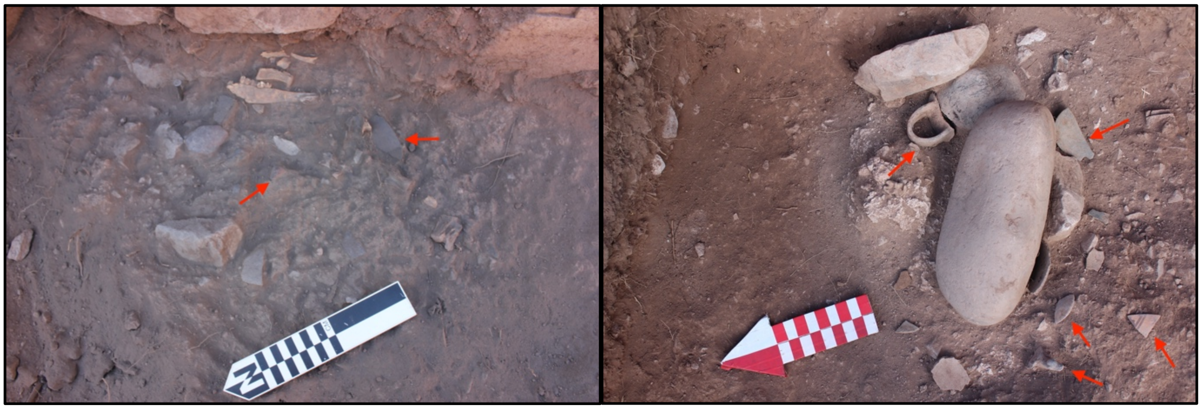

Figure 3-15: Photos of the ritual context in Unit SM-B10. Left photo (bone) was deposited above the contents of the right-hand photo. The visible bone in this photo is the top of a layer of dense bone and ash that continued for approximately 10cm of depth. Note the mandible on top of the context; Kosiba (2010) notes that mandibulae frequently marked the opening or closing of Inka occupations at Wat'a. Red arrows indicate Inka ceramics from this context.

As outlined in the introduction to this chapter, I interpret these remains as evidence of a structured deposit performed upon abandonment of the house. Deer was likely infrequently consumed by the majority of Inka subjects. Indeed, scholars suggest that hunting and eating deer was a sumptuary practice reserved for Inka elites; the presence of the deer marks the event as special (Niles 1999; Rowe 1980; Sandefur 2001).[48] The participants in this ceremony deposited artifacts that were central to the operation of the household (the grinding stone) and that marked it as the house of Inka subjects (the *tumi* knife, Inka ceramics) under the floor inside the door of

[48] At least nominally, hunting was likely a ritualized sumptuary practice under the Inka that was reserved for elites and nobility (see, for instance, Cieza de Leon (1998 [1553], 164-165). Rowe (1980, 46-47) questions the degree to which such restrictions could be enforced in practice. Quave et al. (2019) suggest that the remains of wild taxa at Cheqoq, a settlement of retainers associated with the Yucay estate of Huayna Capac, are indications that the people living at the estate likely either 1) violated prohibitions against hunting, 2) were granted occasional rights to hunt, or 3) were gifted wild animal meats by elites.

the building. By depositing and burning these items, the occupants of the house severed their connection to a place to which they understood they would not return.[49]

Figure 3-16: Copper Tumi knife recovered from ritual context in Unit SM-B10.

Evidence from across the units in this sector suggests that buildings were built during the Inka Period, occupied while Ollantaytambo was a royal estate, and then abandoned shortly after the Spanish invasion of the region. Who were the people that lived in these houses under Inka rule? Ceramic, dietary, and archival data provide some clues. Based on zooarchaeological data (see Chapter 6), meat was relatively infrequently consumed by the people who lived in Sector B, suggesting the population was non-elite (Bray 2003; Sandefur 2001; see Chapter 6).[50] Yet, the

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[49] While it is possible that these buildings were not abandoned until later, such as during the *reducción* effort of the Viceroy Toledo that consolidated villages across the Andes, including Ollantaytambo, this seems unlikely in the case of Simapuqio-Muyupata. For one, there is a near total absence of colonial artifacts or non-native animal bone in contexts associated with the primary occupations of the buildings.

[50] 548g of bone were recovered from contexts in Sector B that were identified as Inka, excluding the context of burnt bone in SM-B10. A total of 21.15m^3 were excavated in this sector, meaning that 21.9g/m^3 of bone were recovered. By comparison, at the site of Cheqoq, a settlement of *yanakuna* workers in the Maras region, 139.5g/m^3 (Hu and Quave 2020). Obviously this is a coarse comparison given potential differences in preservation and sampling, however it does suggest overall lower rates of meat consumption at Simapuqio-Muyupata.

ceramic assemblage and architectural styles in the sector are classically Inka. People living at the site were provisioned with or adopted visible symbols of Inka authority. The occupation of Sector B was relatively short and limited to the Inka Period. All of these data suggest that Sector B was occupied during the Inka Period by *yanakuna* workers brought to the site to work nearby fields. These workers would have been provisioned by the estate, which explains their access to Inka goods, but would have had fewer material indicators of elevated wealth than the Inkas themselves, even if their role as *yanakuna* may have conferred special social status. *Yanakuna* occupation aligns with data from other nearby Inka estates, such as the complex of Yucay, where the Inka created new villages on the margins of newly engineered valley bottom and terraced landscapes to house groups of retainers brought to the estates to work for the Inka (Covey 2009; Covey et. al. 2008; Hu and Quave 2020; Quave et al. 2019).

The documentary record provides clues as to the specific kinds of labor *yanakuna* at Simapuqio-Muyupata would have been performing for the Inka estate. In the 1594 *composición y repartimiento* survey and land distribution at Ollantaytambo, part of the land at Simapuqio was described as a "*guerta*" (*huerta*), a garden or orchard, which, at the time, belonged to Francisco Quispe Topa, the *kuraka* of Ollantaytambo.[51] This suggests that lands at Simapuqio were highly valued fields designated for the production of specific vegetable and fruit crops. The people living at Simapuqio-Muyupata were likely responsible for tending these fields and maintaining associated agricultural infrastructure, including the system of canals and reservoirs that irrigated fields across the site (See Chapter 5). Shortly after the Spanish invasion, the *yanakuna* living at

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[51] This is one of only two such '*guertas'* recorded around Ollantaytambo. The other was located on the terraces of Huatabamba, relatively close to the center of the town. See Chapter 5.

Simapuqio-Muyupata abandoned the site, leaving the Inka-style dwellings in Sector B unoccupied save for by travelers or pastoralists who occasionally used them as shelter through the Colonial Period and into more recent eras.

Inka to Colonial Occupations in Sector C

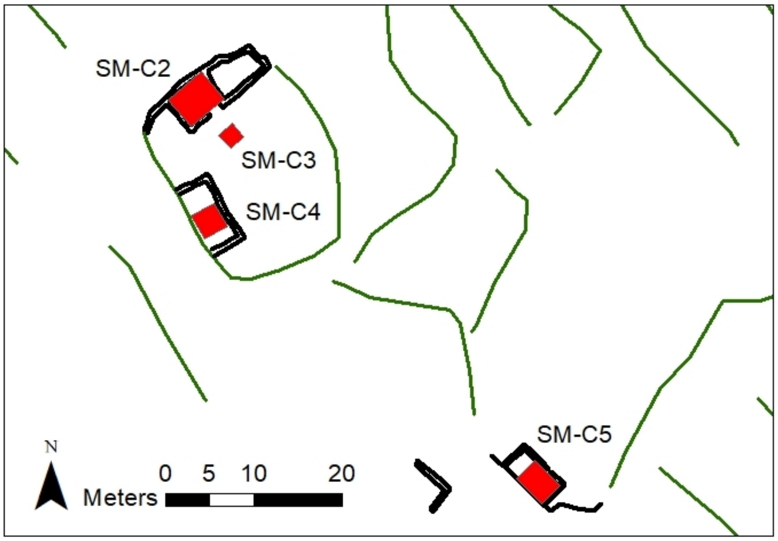

Figure 3-17: Sector C Excavation Units. Green lines indicate terracing.

Excavations in Sector C revealed evidence that agricultural workers lived in the sector during both the Inka and Colonial periods, although excavation data suggest that those occupations were discontinuous. The excavation team dug in three buildings in Sector C; unit SM-C3 (4x5m) covered one room in a two-roomed building, SM-C4 (3x3) was placed in an adjacent single-roomed structure built against a terrace wall, SM-C5 (4x3m) was excavated in another terrace-backed building.[52] Excavation data indicate that the construction and occupation

[52] Two other units were excavated in Sector C, SM-C3 and SM-C1, I don't discuss them here as nothing of note was recovered in these excavations. C3 was in a patio space; contexts were entirely disturbed until the bedrock level. SM-C1 was in a disused reservoir, however, contemporary artifacts above the stone lining and early 20th century artifacts beneath that lining indicated that it was used, remodeled, and abandoned relatively recently.

of these three buildings followed a similar pattern. They were built and used first during the Inka Period, briefly abandoned, and then subsequently reoccupied through the Colonial Period.

In each unit (excluding SM-C3, which was in a patio, and yielded only heavily disturbed contexts), excavators uncovered floors of compacted earth between 15 and 20 cm below the surface. In units SM-C3 and SM-C5, sub-floor levels contained almost exclusively Inka wares, suggesting that the floors were laid during initial Inka-era construction. A radiocarbon sample from the foundation level of SM-C3 returned a fifteenth century date suggestive of construction early in the period of Inka ascendancy.[53] Ceramic and zooarchaeological evidence, though, indicates that these structures were both used during the Colonial Era. Seemingly, after Inka workers abandoned these structures—likely near the close of the Inka Period—they sat empty for only a short period of time before being reoccupied.

[53] This dated sample had an age of BP 515 ± 28 (95.4% confidence 1410–1456; full range of probability for this date is in Appendix 1. This date roughly accords with the broader episodes of construction during which the Inka remade the landscape around Ollantaytambo, suggesting the buildings were built at roughly the same time as the terraces.

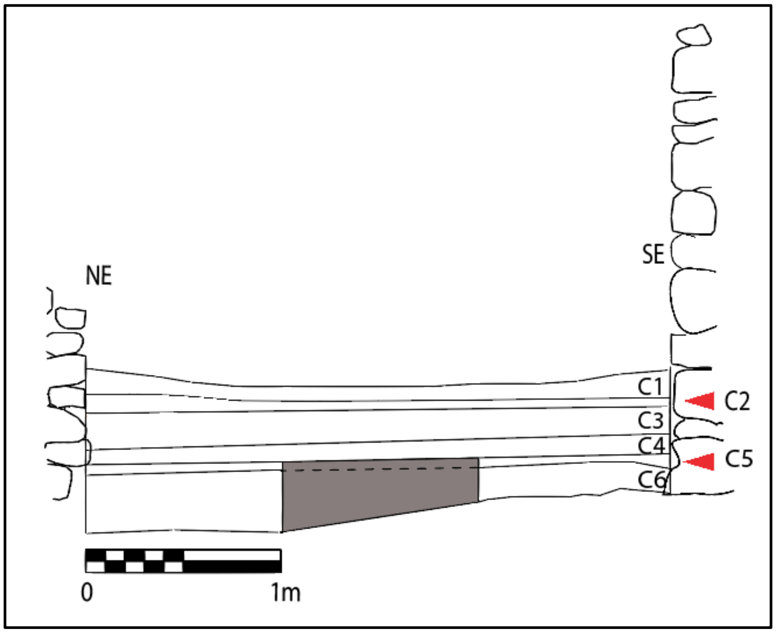

Figure 3-18: Profile drawing of the eastern profile of unit C4 at Simapuqio, the red arrows indicate superimposed floors. Grey area is an unexcavated 1x1 meter segment of the original floor (C5) This drawing is essentially a cross section of the house—note the terrace wall on the eastern profile.

The stratigraphy of SM-C4 materializes this occupation history clearly. In that unit, excavators uncovered superimposed floors. The earlier floor, at a subsurface depth of approximately 40cm, was made of dense packed earth with very small (<.5cm) gravel inclusions (Context 5, see Figure 19). Below this floor excavated strata were nearly sterile, yielding only three Inka sherds. The floor level itself, and deposits immediately above it, also yielded predominately Inka sherds (88% of 53 total sherds) as compared to colonial sherds (12%). Fill above these levels also contained primarily Inka wares, but included a slightly higher (18%) proportion of glazed sherds. Excavators uncovered a second floor (Context 2) of packed earth capping this fill (approximately 10cm below the surface level). The higher floor yielded an artifact assemblage featuring both Inka and Colonial wares. These finds suggest that this building was constructed and first occupied during the Inka period, and while the occupation may have continued for a short while into the Colonial Period, the building was soon after abandoned. Subsequently, the building was reoccupied, and rather than cleaning out the detritus that covered the original floor, the new occupants simply compacted the surface to create a new floor.

Even as Inka *yanakuna* abandoned Simapuqio, buildings in Sector C did not sit empty for long; rather, these buildings were reoccupied in the Colonial Period. Historical data strongly suggest that Colonial-era occupants of Sector C buildings were agrarian workers who worked the terraced fields at Simapuqio for the benefit of Spanish landowners. In the 1594 *composición y repartimiento*, usufruct rights to fields within the terrace complex were assigned to six of Ollantaytambo's tributaries (*BNP*, 1629. F: *Manuscritos*, D: B-1030; Kosiba and Hunter 2017). These tributaries would have farmed the fields to meet subsistence needs and their tribute obligations. However, the land at Simapuqio was not held by these tributaries for long. By the next iteration of the *composición y repartimiento* in 1629 the terraces had been taken over by a Spanish resident of Ollantaytambo, Miguel de Mora, who had his title to the terrace complex validated during the 1629 *composición* (*BNP*, 1629. F: *Manuscritos*, D: B-1030; see Chapter 4). De Mora had many other holdings around Ollantaytambo and was a resident of the town, so it is unlikely that he lived on the terraces himself. Rather, these buildings in the terraces were homes to Andean people who took on *yanacona* status and worked for de Mora. When he died, Miguel de Mora passed the lands at Simapuqio on to his sons Salvador and Alonso, who became powerful landholders in the seventeenth century. As the de Mora family consolidate and expanded their holdings, the terraces were incorporated into the hacienda system of landholding (see Chapter 4).

Taken together, these data suggest that the people living at Simapuqio-Muyupata through the transition from Inka to Spanish colonial rule lived as laborers under two distinct regimes of land management. Under the Inka, *yanakuna* living at Simapuqio-Muyupata labored on maize fields built for the Inka estate and tended to the gardens of Inka nobles. These buildings and fields were abandoned post 1532, when those workers left the site. Many of the buildings remained empty through the Colonial Period, but some, in Sector C, were re-occupied by *yanacona* affiliated with Spanish landowners when land transfers into Spanish hands began in earnest towards the end of the sixteenth century. The *yanacona* who lived in Simapuqio through the second occupation worked in servitude to the owner of the land, Miguel de Mora, and later to his sons. It is impossible to know exactly who these workers were—whether they moved to the lands from as close by as Ollantaytambo, or from a greater distance—but evidence from the occupation in the terraces suggests that they lived in houses on the terraces into the 18^{th} century.

3.5 Conclusion

Two sequential imperial projects wrought transformations to the Ollantaytambo region between the fourteenth and sixteenth centuries. The Inka literally reshaped the region by raising enormous terrace and field complexes, refigured social geographies by moving people around the landscape, and transformed local ecologies by directing agricultural production at the Inka estate. The effects of this Inka imperial project lingered as Spaniards imposed new forms of colonial authority, extracted tribute from Andean people living amongst the remnants of the Inka estate, and introduced new practices of land management. Evidence from Markaqocha and Simapuqio-Muyupata demonstrate how these political transformations were materialized in the small villages surrounding the monumental core of the Inka estate. Data from those sites indicate that each was home to populations of subservient agrarian workers under Inka and Spanish rule. Under the Inka, local people living at Markaqocha performed tributary labor for the Inka state, maintained imperial forests, tended pack animals, and supplied the needs of caravanners. At Simapuqio-Muyupata, resettled *yanakuna* living in the newly established hamlet tended to the fields and gardens of the estate. Both sites were largely depopulated during the early part of the Colonial Period. However, around the close of the sixteenth century there is clear evidence that both places were re-occupied by people who worked for Spanish landowners. Luiz Vizente's 1594 claims to the land at Markaqocha were predicated on the work his *yanacona* servants did at the site. People living on the terraces at Simapuqio-Muyupata in the seventeenth century worked the land on behalf of the Spanish landowner, Miguel de Mora, and lived in servitude to that landowner.

These shifts are illustrative of broader changes in the organization of labor in the Colonial Andes. At the fall of the Inka state, many *yanakuna* were cut loose of obligations to deposed Inkas. Some accepted subservience to local Andean nobles and affiliated themselves with communities near the lands where they had been assigned to work (Wightman 1990). In turn, these lords, and the kin groups that they ruled over, were obligated to provide tributary labor to encomienda grant holders. Other former *yanakuna* attached themselves to Spaniards eager for personal servants or moved onto private lands as resident laborers. As a result, two broad categories of agrarian workers of Andean descent emerged in the first decades of the Colonial Period: settled tributaries with encomienda obligations and *yanacona* with ties of personal service who were exempt from tribute obligations (Larson 1998; Wightman 1990). Viceroy Toledo codified this distinction in the 1570s by establishing two categories of *yanacona*. *Yanacona* directly affiliated with Spaniards became legally categorized as *Yanaconas de Españoles*. All other *yanacona* were consolidated in *reducciones*, taxed, and included in *repartimiento* labor tax obligations. These *yanacona*, now settled, assumed usufruct rights to land around the *reducciones* as they became tributary members of newly formed *Yanaconas del Rey* ayllus. There was though, a constant drift of people leaving *reducciones* and *repartimientos* for haciendas where—even given onerous labor demands—landowners could offer respite from tribute demands and the *mita* labor draft (Wightman 1990, 20). At Ollantaytambo, Glave and Remy (1983) estimate that by the close of the seventeenth century as many descendants of the original *repartimiento* lived and worked on the haciendas around the town—in places like Simapuqio and Markaqocha—as there were living within the town itself.[54]

In this, the specific histories of occupation by workers at Simapuqio-Muyupata and Markaqocha are illustrative of historical trends in the Ollantaytambo region and the Andes more broadly. As the native Andean population dropped precipitously and *reducciones* shrunk over the sixteenth and seventeenth centuries, individuals and institutions consolidated wealth and power by securing title to expanses of agricultural land (see Chapter 4). However, as Murra (2002, 305-306) highlights, land alone did not equate to wealth in the Inka or Colonial Andes. Without access to a ready supply of labor, claims to land were ultimately meaningless. Under the Inka, labor was assured through the ritualized exchange of food products—mediated by *huaca* place-persons—that cemented kinship between workers, elites, and the land itself. While we cannot know the specific motivations of the *yanakuna* that left Simapuqio-Muyupata at the end of the era of Inka rule, the ritualized abandonment of at least one house suggests that they severed their

[54] As Wightman (1990) points out, this history of movement and migration makes colonial census documents uncertain records of the actual occupation of the landscape. Such records were a momentary snapshot of *reducción* populations, contested even as they were created by village leaders and state officials debating tribute requirements (e.g. Stern 1993, 116-117). They frequently failed to capture an accurate population count and rarely acknowledged the presence of non-tributaries on the landscape. Actual and official population figures could be wildly divergent.

connections to the Inka estate and understood their obligations to labor on Ollantaytambo's fields to have ended. Subsequently, new kinds of relationships to authority were established between agrarian workers and hacienda landowners. Laborers lived and worked on fields to which they had no legal rights, and their exploitation undergirded hacienda production. As one scholar describes the relationship between hacienda owners and workers: "the history of haciendas is … the history of how landowners attempted to get something out of the Indians who were occupying hacienda lands" (Martinez-Alier 1977: 68).

The prior research and trajectories of occupation at Simapuqio-Muyupata and Markaqocha I outlined in this chapter provide the empirical foundation and context necessary for the investigation of shifts in Ollantaytambo's agrarian ecology that I undertake in the chapters that follow. These data demonstrate that an agricultural system purpose-built by the Inka to produce surpluses of maize and index imperial authority became the foundation of commercialized maize production under hacienda land management. New kinds of labor, new ways of occupying the landscape, and new patterns of tenure emerged prior to and during the decades in which haciendas consolidated control over land at Ollantaytambo. Across the chapters that follow, I discuss the specific socio-historical and ecological processes through which labor and land were reconfigured through these decades. The stakes of this history are self-evident: colonial structures governing land and labor were the foundation of a system of agrarian exploitation that endured for four centuries in the region for four centuries.

Chapter 4
Histories of Possession: *Amojonamiento*, Surveying, and the Creation of Colonial Territory at Ollantaytambo

4.1 Introduction

In July or August 1559—the middle of the Austral winter—a dramatic conflict played out on a stretch of valued lands near Ollantaytambo. Some weeks before, members of ayllus living around the town, under the direction of the *kuraka,* Don Francisco Mayontopa, had planted tracts of land called Tambobamba and Colcabamba[1] with maize to support *mitmaqkuna* living nearby—a remnant of the Inka workforce called the *Collas Ayllu*. Given the season, the maize was an early crop. In August, the seeds had probably only just germinated, and the plants were small and delicate. Mercedarian friars, later described by witnesses as acting "with no cause whatsoever," let loose a herd of oxen into the fields.[2] The beasts trampled the young plants and

[1] These fields are broad, flat lands close to the monumental center of Ollantaytambo, and so likely were especially productive and highly valued during the Inka Period. Glave and Remy (1983) argue that the toponyms associated with the fields suggest that their products were intended to fill *qollca* storehouses ("Colcabamba") and supply *tambo* waystations ("Tambobamba") at the town. I extrapolate the timing of this conflict from documentation of the resulting court case, which was dated to November and in which witnesses testified the events had happened about four months prior. Burns (1999) also discusses this case, I draw upon my own reading of the associated documentation here. These *mitmaqkuna* may not have belonged to the ayllus of Mayontopa's repartimiento, however, by working to provide for them he may have in effect been levying a claim of authority over them.

[2] "…un pedaço de tierra de los dichos mis partes llamada Colcabamba de sembrar mayz para los yndios del dicho repartimyento del ayllo collas mitimaes en que estavan sembradas doze hanegadas de tierras dos frayles de la orden de Nuestra Señora de la Merced sin causa alguna echaron en las dichas tierras dentro en lo sembrado muchos bueyes y espasçieron el dicho mayz que estava creçido y de nuevo turnaron a arar la dicha tierra y a sembrarla y las sembraron de

ate the fragile shoots. The land now barren, the friars reploughed the fields and planted them with wheat (*AGN: Derecho Indigena*, L: 31, C: 614, 1559-1560).

In many ways, this incident was an unremarkable colonial conflict over use rights of valued agricultural land, seemingly a straightforward case of "ecological imperialism" wherein colonizers made use of foreign taxa—oxen, wheat—to aid the project of resource appropriation. However, in its specificity, the case prompts questions about the conflicts over agricultural land that were becoming increasingly common in the Andes by the middle of the sixteenth century: Who were the actors—the *kuraka*, and the friars—and from where were their authority to challenge one another derived? What were the bases of their conflicting claims to land? Why was it that those claims were mediated through competing plantings? What was the customary and legal framework in which it made sense for the friars to use draft animals to force claims to land, rather than appeal to courts? For that matter, what were the logics that guided Mayontopa to turn to Spanish justice for restitution, thereby generating the documents that record the incident? How did the privatized landholding that ultimately undergirded the expansion of haciendas emerge from this normative order?

In this chapter I turn to the archival record, looking to incidents like that described above, to explore transformations in land tenure at Ollantaytambo across the first century of the Colonial Period (~1550–1630). I consider how Spanish ideas about Andean land were innovated and actualized on the landscape at Ollantaytambo such that expansive hacienda estates were made possible on a landscape that was literally built to ground Inka power. I am particularly concerned with the *practices* through which colonists engaged with Ollantaytambo's fields and

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trigo..." Burns (1999) translates "*bueyes*" as "donkeys," here I use "oxen," which are more likely to have been used for plowing. In any case, they were certainly draft animals.

pastures as they created discrete small- to medium-sized properties in the late sixteenth and early seventeenth centuries. By examining these practices and considering how they were situated within broader discourses about the rights to land ownership, I demonstrate how colonizers laid the foundations of *latifundismo* during the first century of the Colonial Period by converting the fields and pastures of the Inka estate into land that could be owned as *property*. In what follows I focus on fields surrounding the archaeological sites introduced in the prior chapter—Simapuqio-Muyupata and Markaqocha—but I also examine the histories of the valued valley-floor fields at Ollantaytambo that became the core of hacienda ecologies. I argue that the process by which these lands were notarized as individualized property was part of a broader project of meaning making that attempted to dissociate the Andean landscape from the Inka past and make Inka fields into territorial objects legible to colonial administration. Colonialism and the creation of private property required that the Andean landscape be tamed, understood, and marked—in short, subjectified—but this was a highly contested process. In moments of conflict and collaboration, colonial bureaucrats, Andean lords and their subjects, Spanish aspirants to ownership, and church officials engaged in practices that forged colonial territory from Andean landscape, ultimately allowing for the growth and administration of hacienda estates on fields built by the Inka state. As colonists and crown officials wrote the landscape into the archive by documenting rituals of property creation, describing the locations of boundary markers, and surveying the occupation and use of lands, they effected a transformation of the landscape, producing what they purported to describe.

My analysis of these histories clarifies how colonial bureaucrats operationalized Spanish imperial power in exurban spaces like Ollantaytambo. As such, this chapter builds on a growing chorus of additions to Angel Rama's (1996) famous argument that the written word enacted a kind of hegemony in Colonial Latin America (e.g., Adorno 2007; Candiani 2014; Dueñas 2010; Seed 1995). According to Rama, a relatively small group of literate urban bureaucrats exercised disproportionate power in the Spanish Colonies. Working from newly established cities, these "*letrados*" shaped discourse such that they literally imagined the colonies into being according to logics that justified their positions of power, simultaneously designing the gridded cities that anchored Spanish power and filling the archives of those cities with edicts, titles, and records that reinforced the authority of the written word. Rama's argument has been expanded in multiple ways, but in particular on two fronts (French 2016). Firstly, scholars have demonstrated that literacy was more common than we might think amongst colonial-era populations. For instance, Burns (1999, 10) demonstrates how, even as colonial archives were produced in a manner that deliberately excluded many—particularly Andean litigants—the "delegated writing" of scribes and notaries afforded even the illiterate a broad capacity to exert the power of the written word and shape the colonial world (see also Salomon and Niño-Murcia 2011).[3] Secondly, researchers have challenged conceptualizations of literacy that privilage the written word, expanding the concept to encompass other modes of communication. For example, Rappaport and Cummins demonstrate that modes of communication such as paintings, wax seals, and urban design allowed the illiterate to participate in the "lettered city." Speech acts such as drafting of maps prior to city founding, ritually reading documents in the course of granting land, and manipulating royal decrees also consolidated the hegemony of the "lettered city" while not depending exclusively on the written word (Rappaport and Cummins 2012, 114). My analysis in

[3] Salomon and Niño-Murcia (2011) make a similar argument, demonstrating that indigenous peoples were joining the "empire of letters" (in their terms) during the Colonial Period at roughly the same time as literacy became common in Europe.

this chapter further extends Rama's arguments by showing how the same *letrados* that planned colonial cities such as Cusco and Lima were critical to the production of colonial landscapes well beyond city walls that were created by surveyors as they walked the land, established property boundaries, and titled ownership.

Interactions between these officials, aspirant Spanish landowners, and Andean people on the landscape at Ollantaytambo drew on Spanish legal approaches to landholding, practices rooted in Iberian custom but not codified in law, and Andean notions of land tenure. Henceforth, when I refer to "legal" forms of landholding, I mean practices that followed from written edicts of the Spanish court or viceregal authorities. It is worth emphasizing that the "legality" of different forms of landholding was fluid and depended on one's status within the colonial system. It is also worth emphasizing that Andean people quickly learned to adroitly engage with the Spanish legal system to defend themselves from colonial encroachment (e.g., Burns 2010). Rights derived from Spanish law were only one mechanism of authority through which people made claims to land; In this chapter I frequently contrast questions of legal landholding with other factors that people in Early Colonial Ollantaytambo argued legitimized landholding, including customary practices rooted in Spanish conventions and longstanding Andean traditions of land management. For example, the ancestral power of the *kuraka* to distribute land was another mechanism through which rights to hold or work land were derived—indeed, as I elaborate, the waning authority of *kurakas* in the face of Spanish encroachment was a major factor in the expansion of haciendas around Ollantaytambo.

Up until now in this chapter I have used the terms "property" and "private property" to refer to the application of a set of ideals to Andean fields wherein the ownership of plots of land was vested in individuals or institutions. However, as Bastias Saavedra (2020) emphasizes, "property" in the modern sense is anachronistic with regards to Spanish conceptualizations of land tenure. Rather, Spaniards would have understood land ownership in terms of *possession*, or, as I outline in greater detail below, *dominio* (dominion).[4] So, while in places in this chapter I continue to use "property" as a shorthand, I do not mean to imply modernist understandings of property relations. To avoid too overt a focus on the expansion of property I instead draw on the cultural geographic concept of *territoriality*, the practices through which people attempt to assert control over a discrete geographic space in order to control people, things, and social relations (Sack 1986, 19; see also Elden 2013; Osborne and VanValkenburgh 2013, see below). Framing the emergence of Spanish landholding in terms of territoriality pushes focus onto the *practices*—including surveying and the ritualized performance of possession—through which both Spanish and Andean people engaged with the land and attempted to affirm control of it. It also draws attention to the customary and legal frameworks—the "normative order" (Bastias Saavedra 2020)—in which specific kinds of possession, and acts to affirm that possession, made sense.

In what follows I first discuss in greater detail how scholars have framed the imposition of Spanish forms of landholding on Inka lands. Subsequently, the bulk of this chapter is divided into three sections. In the first I consider practices of property creation around Ollantaytambo

[4] As Bastias Saavedra (2020, 223) puts it: "The focus on the otherness of indigenous modes of land tenure and use has led historians to neglect the otherness of the normative order that regulated land relations within the framework of the European *ius commune*. From a twenty-first-century perspective, both indigenous and Spanish representations of land tenure are incommensurable with our contemporary notions of land, property, and rights." Bastias Saavedra instead advocates a consideration of the "normative order in which the legal protection of possession made sense." Vassberg (1984) and Graubert (2017) make a similar point. See also de la Puente (forthcoming).

during the mid to late sixteenth century. My focus here is on the participation of colonial officials, aspirant landowners, and Andean people with the rites and rituals through which people took possession of land. To examine how these ritualized practices were situated within legal discourse about rights to land I examine the conflict between the *kuraka* of Ollantaytambo and the Mercedarian convent I referenced above in detail. This case shows how, even as Native Andean use-rights to land were at times affirmed by Colonial authorities, the logic underlying those rights was translated into colonial terms. In this section I draw on Paja Faudree's analysis of the *Requerimiento*—a key legal instrument of Spanish expansionism—to demonstrate how ritualized practices of property creation and transfer layered authority onto colonial landscapes. I argue that these formalized rituals enacted legal authority by casting specific fields as a particular kind of land; they were claims that Andean fields were *tierras baldías*, an Iberian customary category that indicated lands were available for appropriation.

In the second section of the chapter I consider the aftermath of the first *composición y repartimiento de tierras* at Ollantaytambo in 1594 to demonstrate how *dominio* was materialized on land by the construction of *mojón* boundary markers as colonists levied claims to pastureland. Together, rites of possession and *amojonamiento*—the practice of marking the land with *mojones*—functioned as arguments of categorization and practices of territorialization that operated in parallel with the colonial project of sovereignty by alienating land from Inka histories and making it an object that was legible to Spanish authorities. In this section I elaborate the operation of *amojonamiento* by reference to the establishment of the estancia of Markaqocha. By tracing the history of this estancia I show how *composición* allowed aspirant landowners to carve out private holdings that were explicitly distinguished from the surrounding landscape, and how, by marking those holdings, these colonists in effect transposed a new kind of authority onto Ollantaytambo's landscape.

The final section of this chapter considers the 1629 iteration of *composición y repartimiento de tierras* at Ollantaytambo. In it, I trace the trajectories of specific parcels of land across the *composición*, demonstrating how colonial surveyors literally produced a hacienda landscape by radically rearranging landholding and compressing the fields of the shrinking *repartimiento*. Documents from these events describe colonial practices of surveying, making clear how *composición* both facilitated the enclosure of land and imposed new meaning onto the landscape as rich valley-bottom fields were transformed into the hearts of nascent hacienda holdings. These documents demonstrate that, as they walked the land, colonial surveyors *produced* the landscape they claimed to *describe*.

4.2 Colonial Territory, *Dominio*, and The Inka Estates

When discussing the colonization of land in the Andes scholars frequently juxtapose a communitarian Andean ethos with a colonial urge to commodify and enclose (e.g., Mayer 2002; Murra 1980; Ramírez 1996; 2016; see Bastias Saavdra 2020; Graubert 2017). In this view, in the pre-Colonial era and early-Colonial eras, many Andean people understood land as "*sapci* or that which is common to all" (Ramírez 2016, 34), and the Spanish invasion introduced radically different concepts of enclosure and private ownership to the Andes. As Burns (1999, 57) puts it, "for the Spanish land was a thing (*res*) of which a single individual or institution might gain rights of sovereignty (*dominio*)… through purchase or by a grant…. For the Incas, however, land was a token of very different kinds of relationships. Pasture and croplands were assigned and reassigned regularly within local-level arrangement of kinship and reciprocity."[5] At Ollantaytambo, this distinction risks overstating the case. As an Inka estate, landholding and the distribution of fields around Ollantaytambo under the Inka was likely quite top down. During Inka times, fields, and the *yanakuna* servant-subjects that worked them, were likely administered by local nobles and Inka elites, perhaps including the *panacas* (ancestral cults) of deceased rulers, rather than through communitarian kin networks. For that matter, while the Spanish certainly did introduce new ideas about landholding to the Andes, Iberians also had elaborate systems of common lands governed according to edicts laid out in the *Siete Partidas* Medieval law code (Amith 2005, 84; Bastias Saavdra 2020). Moreover, neither "Spanish" nor "Indigenous" notions of land holding, tenure, or "property" were static; the socio-historical process of the colonial encounter created distinctly new and highly situated forms of landholding (e.g., Allen 2002; Vassberg 1984). As Graubert (2017, 78) puts it, rather than a binary of views on landholding, "both Spaniards and Andeans came to colonization with heterogeneous understandings of property and use, and that the early colonial period was characterized by their active and creative entanglement."[6]

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[5] I elaborate on the translation of "*Dominio*" below.

[6] Greer (2018) makes a similar point about the reification of difference between Native and European notions of property for North America as a whole, highlighting that much Iberian land was held in semi-common or common forms, rather than as private holdings.

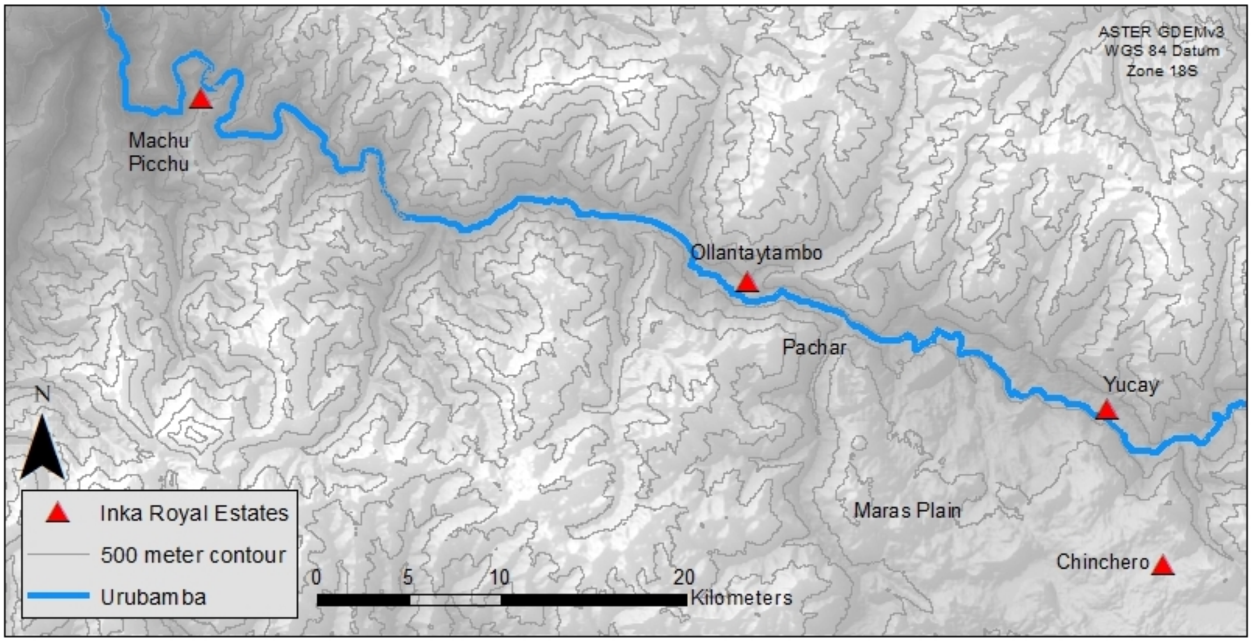

Figure 4-1: This map shows the location of several of the royal estates along the Urubamba river, including Yucay, Ollantaytambo, and Machu Picchu. Pisac is located approximately 20 kilometers east of Yucay. This map just shows the locations of the monumental core of the estates; each was comprised of dispersed and potentially overlapping holdings that stretched for kilometers.

Research on the administration of land at Ollantaytambo under the Inka shows that fields around the town were distributed according to social rank. Fields in the center of the town were allotted to Inka nobility and their allies, while less centrally located fields were farmed by resettled workers and local people (Kosiba 2015; Kosiba and Hunter 2017). Detailed archaeological and ethnohistorical work at the royal estate of Yucay provides additional data on how land may have been administered at Ollantaytambo under Inka rule (Covey and Elson 2007; Covey and Quave 2017; Covey and Amado González 2008; Niles 1999; Quave 2012; Rostworowski 2015).[7] Yucay, an estate associated with Huayna Capac (the final ruler prior to the

[7] These historical reconstructions are made possible in part through the existence of a particularly rich corpus of documents derived from the complicated Colonial history of the estate. Many of these documents have been published in full (Covey and Amado González 2008; Rostworowski 2015). These documents also detail the complicated post-1532 history of the estate, which was

Spanish invasion), stretched along the Urubamba Valley for approximately 15 kilometers, and may have abutted up to Pachakuti's developments at Pachar (Niles 1999, 133). Rather than a contiguous expanse, the estate was comprised of pastures, forests, herds, and agricultural lands distributed across this part of the Urubamba Valley (Covey and Amado González 2008; Covey and Elson 2007). Niles (1999, 121-153) describes the form of the estate in detail, noting that it featured extensive agricultural fields and irrigation systems, pleasure gardens (*moyas*), forests, and hunting lands reserved for the use of Inka elites. While the estate was dedicated to the ruler Huayna Capac, agricultural lands on the estate were not exclusively held by the ruler or his *panaca*. Rather, in addition to holdings retained by Huayna Capac, discrete parcels were distributed amongst several other Inka rulers and nobility (living and deceased), to support the Sun cult, *Coyas* (Inka queens, or female nobles), local peoples, and a permanent staff of two thousand *yanakuna* (Covey and Amado Gonzalez 2008, Julien 2000; Niles 1999, 151-152). Assuming that lands on Pachakuti's estate at Ollantaytambo were distributed after a similar fashion, Ollantaytambo's fields were probably not as deeply embedded in ayllu kin networks as is frequently assumed of Andean communities. This is to say, the structures of landholding from which colonizers disarticulated land at Ollantaytambo in the second half of the sixteenth century were both rooted in long term histories of the Inka estate system and *emerged during* the first decades of the Colonial Period (see Kosiba 2015).

As Kosiba and Hunter (2017) demonstrate at Ollantaytambo, rather than a top-down imposition of market-oriented tenure systems, colonial conflicts and negotiations over land were locally situated and highly variable depending on the actions of local peoples, extant values

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claimed by Francisco Pizarro and ultimately assigned to Beatriz Coya, one of the last Inka descended queens, as a seigneurial property (Covey and Elson 2007; Rostworowski 2015).

materialized in particular fields, pre-colonial patterns of occupation and use, and material and ecological processes such as field degradation and climactic shifts. Spanish claims were rarely straightforward or uncontested. Andean people asserted their rights to land according to longstanding Andean principles, within the logics of the Spanish judicial system, and through variously subtle or outright resistance to Spanish attempts to reshape the Andean landscape (Mumford 2012; Stern 1993; VanValkenburgh 2012; Wernke 2013). Colonial efforts to subjectify land and people frequently were foiled by the topography itself (Scott 2009); Andean people hid in remote settlements, farmers worked small fields in deep valleys beyond the purview of authorities, and surveyors avoided steep terrain (Kosiba and Hunter 2017; Mumford 2012). Finally, Andean people, including elite lords descended from the Inkas, were themselves involved in the complicated processes of deal making and negotiation through which individualized landholding was actualized on the landscape. As Scott notes of Peru's colonial landscapes, they "were never the product of European agency alone, but emerged from ongoing interactions between the material landscape, its indigenous inhabitants, and Hispanic populations" (2009, 6).

To elaborate this process in this chapter I draw on the geographic concept of territoriality. Territoriality is a useful analytic for thinking about the origins of the hacienda for a number of reasons. As Sack (1986) emphasizes, territory is not passive, rather, territory demands constant and ongoing efforts to establish control over a geographic area. As such, specific territories have histories (see also Elden 2013, 4-5). This emphasis pushes focus onto how specific *practices* of colonization, including, as I discuss below, rites of possession, landscape marking, and surveying, extended and maintained control over space through ongoing contests over authority to control both space and people. Territoriality as an analytic is generally deployed at the scale of the state, and frequently in relation to modern projects dedicated to making landscapes legible-to and defensible-by state level administration. However, as Amith (2005) demonstrates in his "spatial history" of colonial Guerrero, the process of territorialization is not unique to the modern nation-state. Amith frames the creation and marking of possession in the incipient Spanish colony of New Spain—the "inscription of human presence and proprietary rights on the land" (Amith 2005, 154)—as a process of territorialization wherein grants of individual tracts of land, inscribed via boundary markers, created territory by delineating the extension of colonial power over the landscape. Here I extend Amith's argument by focusing on the practices through which aspirant landowners at Ollantaytambo created property of Inka-fields and pastures. The hacienda itself was ultimately realized as a territorial institution around Ollantaytambo when individualized control was extended over space. To be sure, hacienda boundaries were porous, and the authority of hacendados was far from absolute, but the hacienda nonetheless represented an overt expression of control over space (see Chapter 2). Moreover, territoriality accords closely with the Iberian notion of *dominio*. As Pagden (1990) outlines, *dominio* is a complicated term with its own history, deeply entangled with moral and theological debates over Spanish rights to conquest and the rights of indigenous Americans to their own lands, bodies, and labor. *Dominium* could take different forms. Conceptually, *dominum* related personhood and autonomy to possession. Those who possessed authority to act on their own behalf were understood to have *dominio directo* and were fully capable actors understood to have the capacity to act as full subjects. By contrast, the more limited *dominio util* was the set of capacities carried by minors and wards incapable of, or not to be trusted with, full independence. In the Spanish legal framing, this was the status that Native Andean people legally occupied; they were assumed to be in need of protection (see Pagden 1990; Ramírez 2016, 46-47).

This distinction carried over into rights of landholding. *Dominio directo* conferred in individuals the right to the produce of land, as well as the right to alienate, sell, rent it, or neglect it. *Dominio util* implied a limited right of usufruct, whereas *dominio directo* entailed a more absolute right of control over land.[8] As I outline below, this distinction between *dominio directo* and *dominio util* manifested itself on the landscape around Ollantaytambo most acutely during the *composiciones de tierras* in the seventeenth century. *Dominio directo* was the conceptual basis that allowed the hacienda to exist, in that it allowed individuals and institutions to assume titles to discrete plots of land—*pequeñas propiedades*—that were later accumulated and combined into the *latifundia* of the seventeenth and eighteenth centuries. *Dominio*, though, could not just be granted: even where viceregal or local colonial authorities might offer a concession of land, *dominio* had to be performed on the land to be fully realized.

4.3 Creating *Tierras Baldías* at Ollantaytambo: Mayontopa v. Mercedarians

For the first decades following the Spanish invasion of the Andes, Spaniards interfered minimally in patterns of landholding developed during, or immediately after, the Inka era. For a generation after 1532 Andean people—tributary communities, headed by local lords—retained rights to the majority of agricultural lands, and legal structures made it difficult for Spaniards to alienate fields from Andean lords and their subjects. There were complicated legal and moral questions that needed to be addressed. For instance, the Viceroy Toledo would argue the invasion was justified as an act of liberation against Inka tyranny—could the usurpation of land

[8] *Dominio directo* did though, frequently carry at least nominal restrictions. It was not a right of total soverignty. As Ramírez (2016) points out, land held in conditions of *dominio directo* had to be worked for a certain amount of time to be retained, and was not supposed to be donated to the church. The degree to which these restrictions were observed varied considerably across time and space.

from newly "liberated" Andean people be justified? Did the *indios* and their native lords have natural rights to the lands they worked?[9] Dominant legal thought presented land as a divine gift, and landholding entailed an obligation to make best use of the land and improve it. As Spanish judges would argue as late as the seventeenth century, Spaniards had rights to land (just as Spain had rights to an empire) that were found uncultivated or underworked. Although, prior to conquest, the broader colonies had been occupied by people with rights under natural law, those original inhabitants had abandoned or underused the land, thereby proving that they had no need for it, vacating claims, and making it available for colonization (see Herzog 2013, 2015; Muldoon 1991).[10] Thus, across the Spanish empire, sedentary indigenous communities of agriculturalists could hope to retain rights to land that they continuously used and could demonstrate they required for subsistence. Otherwise, those rights were suspect and land could be appropriated.

In Peru though, and especially prior to the population collapse of the late sixteenth and seventeenth century, this appropriative logic butted up against a landscape that was very conspicuously worked: terraces and canals testified to an agriculture that was familiar to Spanish invaders and suggested a kind of land tenure that should be respected. Scott (2009, 2) describes how the first Spaniards to cast their eyes over the Andes from ships sailing the Pacific coast were struck by the familiarity of the vistas they encountered. These men remarked upon familiar animals—dogs, geese, and herding animals—familiar crafts—needlework, beading,

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[9] See Ramírez (1996, 42-50) for a discussion of contrasting Spanish views on whether the Inkas could be said to have held land as property. Herzog (2013; 2015) discusses Spanish engagement with the legal and moral questions of conquest in detail.

[10] Although, of course, the "natural rights" of the indigenous peoples of the Americas were also a topic of debate (see especially Pagden 1995, Ch. 3; Adorno 2007, Ch. 4).

metallurgy—and the "state of order" in which the people they observed lived. Scott argues that such description should be understood as a "fantasy of familiarity and, by extension, of possession." By "making the alien *known*" the would-be conquistadors sought to make it *theirs*.[11]

Still though, as Covey (2020, 463) outlines, Spaniards who desired land could not simply seize it. Rather, until at least the 1560s they had to either purchase land directly from Andean nobility, prove that it had been ownerless and vacant since the invasion, or establish that it had been worked exclusively for the benefit of the state or religion in the Inka era. What's more, even where *dominio* rights to tracts of land could be vested in individuals or institutions, the actual spatial extent of those lands was frequently inscrutable. Plot boundaries were often amorphous and poorly defined, and land claims were mediated by the testimony of aged Andean elites who could speak to the history and extent of specific named fields. The dimensions of these plots were illegible to colonial authorities, and frequently unclear to landowners themselves. Covey writes: "legal precedent favored the continuity of Inca-era practices, which focused on named plots that only indigenous elites knew how to trace out and measure" (Covey 2020, 467).[12]

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[11] Greenblatt (1991, 66-68) suggests that initial recognition of familiarity and shared humanity, like that which Scott describes, was dispelled by the very act of taking possession. In Greenblatt's reading, the act of taking possession transformed residents of a newly assimilated territory from potential equals to outlaws incapable of self-governance (see also Benton 2002, 12-13).

[12] Spanish officials understood this situation as a limitation to colonial power and offered various solutions. Polo de Ondegardo, a colonial official I return to below, suggested that remnant Inka nobles should be made to survey lands alongside Spaniards who could then mark the boundaries of fields and write them into archives. Later, the Viceroy Francisco de Toledo proposed a blunter solution, proclaiming that Inka-era land divisions should be disregarded, field markers destroyed, all indigenous titles invalidated, and land distributed amongst Spaniards. Toledo's proclaimation was never actualized, but it betrays his intentions to undo traditional landholding patterns (Covey 2020).

Early Spanish attempts to exert *dominio* over specific plots of land around Ollantaytambo were situated within this framework. Individual Spaniards and ecclesiastic institutions like Cusco's Mercedarian monastery or the Convent of Santa Clara could request grants or purchase plots from Andean nobles, but their holdings were limited to relatively small and discrete parcels.[13] As in the case with which I opened this chapter, these claims were contested by Ollantaytambo's *kuraka*, who challenged land appropriation both "in the field" and in courts of law. The archival record suggests that during the first decades after the Spanish invasion only a few colonists actively pursued land around Ollantaytambo: Geronimo Costilla, acting for his own benefit and as an agent of the Cusco convent of Santa Clara, sought holdings to grow wheat in the 1550s; Around the same time, Cusco's Mercedarians were allotted the parcels of land at Tambobamba and Colcabamba, only to have the grant rescinded after a complicated legal battle that I discuss at length below (see also Burns 1999). In the next decade Augustian friars successfully lobbied for an extensive grant at a place called Tiaparo, and the first *mestizos* and Spanish men to reside permanently in the town leveraged their connections and proximity to the community to secure direct purchase from the *kuraka* (Glave and Remy 1983).

During this period—and likely until at least the Toledan reforms of the 1570s—colonial officials were infrequent visitors to Ollantaytambo. They appear most frequently in the archive as participants in the ritualized creation of *dominio* property. In these rites, future owners would build *mojones*—boundary markers—and ceremonially take possession of land by tearing up

[13] Glave and Remy (1983, 80-87) outline the primary mechanisms through which Spaniards carved out small properties around Ollantaytambo during the middle part of the sixteenth century – a period the authors refer to as the *"hacienda antigua."* The authors note that outright grants were rare; it was much more common for Spaniards to access land via the execution of fraudulent contracts, dubiously legal agreements with the local indigenous lords, and what they term "*ocupaciones de hecho*"—extralegal occupations subsequently legitimized.

plants, breaking branches, and scattering stones.[14] By completing these actions, landowners demonstrated their intent to make productive use of and improve the lands. In an emblematic example Burns describes how the aforementioned Geronimo Costilla traveled to Pachar in 1557 to define the contours of a grant of 200 *fanegadas*[15] of land to the Convent of Santa Clara. Costilla, working with a scribe and witnessed by numerous local people, including the *kuraka* Mayontopa, traced out the contours of the soon-to-be ecclesiastic holding. He then, as Burns writes, tore up grass, broke branches, and scattered stones, all the while "chanting possession, possession, possession…*and thereby literally performed into existence a valuable piece of property*" (Burns 1999, 52, my emphasis).[16]

By completing these rites, Costilla acted out the *dominio* claim now vested in the convent, manifesting possession and stewardship of the land by symbolically throwing stones and tearing plants in a rite nearly ubiquitous in documentation of Colonial property creation and

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[14] Additional examples are published in Burns (1999, 50-55), Rappaport and Cummins (2012, 118-122), Stavig (2000); For contemporary examples demonstrating that these rites remain important in some communities see Rappaport (1994, 11). These rites were not unique to land transfers, indeed, they were broadly similar to rites performed for the transfer of other valuable property. For example, the purchase of a house would also likely involve the purchaser being led through the building by an official chanting "possession," they might symbolically throw out previous occupants and vest ownership by handing over keys. Although the rites could vary depending on the status of individuals participating and the kind of property involved, the broad strokes of the rites (and language required to document them) was dictated in legal manuals (Rappaport and Cummins 2012).

[15] Glave and Remy (1983) calculate that in Colonial Ollantaytambo a *fanega* was roughly equivalent to 2.9 ha, meaning that this grant was for a truly staggering 580 ha, and likely never really realizable.

[16] Some years later Mayontopa would challenge the convent's rights to this property, a suite which was ultimately dropped in 1559 when the parties agreed that the Claras would cede rights to their initial grant in exchange for the "donation" of a smaller set of fields. This "donation" was the foundation of what would, over the next century, become the Hacienda Pachar (Glave and Remy 1983).

transfer. These rituals are examples of what Seed (1995) terms "ceremonies of possession," performances that legitimized conquest and colonization. The most exemplary of such ceremonies in the Spanish Colonial world was the *Requerimiento*—the Requirement—a document performatively read by invading Spaniards upon encountering indigenous groups in which those groups were called upon to submit to Castilian sovereignty or face violent attack. Scholars note the apparent absurdity of the *Requerimiento,* which was frequently read to non-Spanish speakers, or retroactively to captives after conquistadors had already attacked (e.g. Greenblatt 1991; Restall 2003; Todorov 1984).[17] However, Paja Faudree (2015) argues the *Requerimiento* was not simply an absurdist manifestation of imperial ideology, rather, it was a performative speech act that accomplished a social action: when read, it brought into existence the conditions that justified conquest and territorial acquisition. As such, it was intended not just for the ostensible indigenous audience, but also for European interlocutors. While perhaps absurd on face value, when situated in legal and customary context, the ritual of the *Requerimiento* can be understood as a critical instrument of colonial power that made social action possible.

The same is true of rites of property creation and transfer. These rituals are revelatory of Spanish attitudes towards land and landholding and clarify the legal and customary context in which land claims operated. In effect, the form of the rites constituted a claim that fields were a specific category of land. They were an argument that no one was cultivating the fields in question and a demonstration that the future owner intended to steward the land and make it productive. As such, the rites amounted to a claim that the lands were *tierras baldías*, a customary term meaning "wastelands" or "idle lands." In early sixteenth century Iberia the term

[17] These critiques echo sixteenth century contemporaries like Bartolomé de Las Casas, who wrote of the document "we do not know whether to laugh or cry and the absurdity of it" (Las Casas 1951 [c.1550], cited in Todorov 1984, 149).

baldío was most commonly used to delineate common lands that were technically the property of the crown (*tierras realengas*), long understood to be free and open to all, akin to commons (Vassberg 1974; 1975; 1978; 1996).[18] A slightly different meaning to the category emerged during the *Reconquista*, wherein Moorish lands were made into *baldíos* that could be taken over by Christians (Ramírez 2016; Sluyter 2003). Thus understood, the category specifically referenced land that was *once productively worked* but was now uncultivated or abandoned. By levying the argument that Andean fields were *baldíos* Spaniards could in turn make the argument that they should be permitted to take them over. As *baldíos*, once occupied, now "abandoned" Andean fields could be subject to individual or institutional *dominio*. Thus, making an argument that a given plot should have been understood as *baldío* allowed claimants to circumvent the thorny legal and moral question of whether Andean people were entitled to sovereignty over Andean fields.

Even more specifically, the invocation of *baldíos* drew on a common misunderstanding of Inka land administration practices. The Spanish broadly understood that Inka lands were divided into three portions, one dedicated to the sustenance of local people, one for the benefit of the Sun cult, and one from which yields would be used to support the activities of the empire. While at least some Spaniards understood this to mean that two thirds of lands were surplus to Andean requirements, and should have been vacant and available, the reality was much more complicated (Burns 1999). As Ramírez (1996) argues, many Spaniards fundamentally misunderstood the kind of "ownership" the Inka state or Sun cult enjoyed over such fields. She suggests that Inka control over land was premised on the control of labor and products. Far from

[18] Prefiguring later colonial policy, in the sixteenth century the crown increasingly sold such lands in Iberia to defray imperial debts (Vassberg 1975).

what the Spaniards understood, there were—lands of the royal estates and state farms aside—no great tracts of land that had been dedicated exclusively to religious or imperial maintenance during Inka times (See also D'Altroy 2003, 263-265; Kolata 2013, 100-103). And even on those estates, control over the products of fields was likely at least in part to be understood as a product of the authority to command *labor* rather than direct rights of possession over land (Ramírez 2005). Thus, when Spaniards levied claims to *"tierras del inga y del sol*"—lands of the Inka or Sun—they were engaging in a more complicated kind of usurpation than simply taking over abandoned fields. Finally, it is important to note here that the kinds of land subject to early Spanish claims around Ollantaytambo were valuable precisely because they were built as elaborate infrastructures to facilitate maize cultivation. They did not fit the classic definitions of *baldíos.* That is, they were valley floor holdings, and could yield valued crops precisely because terrace and canal infrastructure was maintained; even if uncultivated, they had not been left fallow for long.

The 1559 contest over the fields of Tambobamba and Colcabamba with which I opened this chapter is illustrative of conflicts that resulted from early colonial efforts to take possession of land. Burns (1999) also discusses this case at length. Here, I draw on my own reading of the relevant litigation records as well as Burns' analysis, which focuses on contrasting Spanish and Andean understandings of land within the context of expanding ecclesiastic holdings around Cusco. My interest here is on how the particular practices of claim and counterclaim making within the litigation clarify the emerging and shifting order of custom and law that governed land access at Ollantaytambo in the mid-sixteenth century. This case, ultimately a failed attempt at the appropriation of valued land, is a particularly useful demonstration of how that body of law and custom would change over time, as the lands in question were successfully alienated from Andean hands a half century later.

In the suit, the Mercedarians sought to uphold ownership of 25 *fanegadas* of valued land at Colcabamba and Tambobamba they claimed to have been granted by the Corregidor of Cusco, Licentiate Bautista Muñoz, some two years prior. The friars accused Mayontopa of directing the *indios* of Ollantaytambo to surreptitiously plant the land with maize in an attempt to usurp their tenure. Given the timing of the case, representatives of the monastery may have had a point with this claim. Witnesses suggest the fields were trampled in July or early August, which would mean they had been planted with maize at least several weeks prior. While occasionally an early crop is planted, maize is usually not planted as early as July or August, as it is too cold for good germination and there is a risk that frost will kill young plants (Gade 1975). This raises the possibility that Mayontopa did not intend to raise the maize plants to maturity, but rather had the land planted to curtail the Mercedarian planting and prompt a conflict that would allow him the opportunity to put forward his own claims to the land. [19]

In the ensuing litigation Mercedarian witnesses repeatedly characterized the fields as unworked *baldíos*. According to the monastery's witnesses, prior to ecclesiastic occupation, Colcabamba had been fallow: "the land was not broken [plowed], and appeared to have not been broken for long time and is dispopulated" (*AGN: Derecho Indigena*, L: 31, C: 614, 1559-1560, *f*

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[19] While it is impossible to know for sure, this possibility would not be out of keeping with Mayontopa's adroit engagement with the Spanish legal system (See Burns 1999). De la Puente (forthcoming) details a 1644 case from the Cañete Valley, close to Lima, wherein, attempting to make individualized land into common holdings, members of one ayllu seeded the land with communally owned seed. The seed seemingly acted as a sign of the type of land the field was understood to be. The widow who held the land as individualized holding was instructed by a judge supporting her claim to not let the seed enter the ground or germinate to secure her tenure. This is to say, the seed materialized the labor of planting, and the origin of the seed (common or individually owned) suggested the kind of land the field was understood to be.

7v).[20] They claimed the fields at had been dormant, empty, and wasted: "the lands were vacant and unpopulated, no one planted or labored upon them, or broke the soil" (*AGN: Derecho Indigena*, L: 31, C: 614, 1559-1560, *f 13)*.[21] During the time of the Inkas, the friars claimed, the lands been dedicated to the Sun-cult and Inka rulers, worked by dedicated *mitmaqkuna*, and as such had never been properly speaking the property of Mayontopa or his subjects. Finally, witnesses for the monastery declared that Mayontopa's claim to the land could not possibly be valid, for the simple reason that he and the community of Ollantaytambo already had too many fields to productively work: "Mayontopa and the *indios* of Tambo have many other lands that they cannot work, for the lands are great and the *indios* few" (*AGN: Derecho Indigena*, L: 31, C: 614, 1559-1560, *f*5v).[22]

For his part, Mayontopa's witnesses argued that the community had long planted the fields and depended on them for subsistence and to meet tribute obligations. His witnesses insisted forcefully that the monastery was misrepresenting community (dis)use of the lands, testifying that they had been planted by the community through recent growing seasons: "even four years ago more or less this witness saw the lands at Colcabamba cultivated/planted and the *indios* of Don Francisco planted them" (*AGN: Derecho Indigena*, L: 31, C: 614, 1559-1560,

[20] "…no estavan rompidas e mas por ellas pareçia no averse rompido mucho tiempo y estavan despobladas..."

[21] " …que sabe e vio que desde que entraron los españoles en este reyno hasta que el dicho Convento de Nuestra Señora de la Merced rompio e labro las dichas tierras estuvieron siempre yermos e despobladas eriales sin ronper que nadie se aprovechava de ellas…"

[22] "…si saben que las dichas tierras son sin perjuizio del dicho Mayontopa o de sus yndios e de otra persona alguna porque el dicho Mayontopa e los demás yndios de Tambo tienen otras muchas en gran cantidad los quales no pueden sembrar por ser las tierras muchas e los yndios pocos…"

*f*31v-32).[23] One after another, witnesses recounted that the Mercedarians had loosed animals into the fields to destroy maize planted by Mayontopa's community, in effect arguing that the fields were occupied and productively used in the recent past and had only recently been seized by the friars. Finally, witnesses noted that Mayontopa's subjects had held and worked the fields in the more distant past by tracing the history of the land. The fields were worked by Don Francisco's ancestors—Mayontopa's father, and grandfather—a lineage that traced directly to the all-powerful Inka ruler Topa Inka Yupanqui (*AGN: Derecho Indigena*, L: 31,C: 614, 1559-1560, *f* 33v - 43v).[24] Mayontopa's thus rooted his claims in history and offered a circuitous refutation of the argument that the lands had been of the Inka state rather than the community: even if the lands may have been dedicated to the Inka, they were nonetheless Mayontopa's ancestral holdings. Moreover, and perhaps more importantly, Mayontopa not only required the fields, but he was able to command the *labor* to work the land and make it productive.

In response, the Monastery called upon witnesses who had been present when friars, accompanied by scribes representing the Cusco cabildo, performed the rites that should have secured ecclesiastic possession. The presentation of these rites in the testimony suggests that their very completion was understood to be evidence in and of itself that the fields had been vacant and unused. The friars produced documents detailing how a Justice, Juan de la Plaza, vested in the monastery "real and corporal bodily possession" of the lands as he "took by the hand the said Father Friar Francisco de Campo in name of the said *Monasterio de Nuestra*

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[23] "…abra 4 años poco mas o menos que este testigo vio sembradas las dichas tierras de Colcabamba e que las sembraron los dichos yndios de Don Francisco …"

[24] Glave and Remy (1983, 12) report that Mayontopa is described as a descendent of two Inka rulers in two different documents; both Topa Inka, as in this document, and elsewhere as a member of the *panaca* of Pachakuti Inka Yupanqui.

Señora de la Merced of the said city of Cusco." The men measured the borders and marked the land, "and to signal possession he [the friar] walked on the said *chacras* and pulled up earth and stones" (*AGN: Derecho Indigena*, L: 31,C: 614, 1559-1560*, f* 45).[25] Mayontopa was not only uncomplainingly present for the rites, they said, he had even helped to measure out and mark the fields that the monastery claimed, thereby actively assisting in the creation of ecclesiastic property. Witnesses implied that by failing to object, Mayontopa had in effect confirmed that the lands were unused; the monastery took possession peacefully, with the "consent and willingness of the said Cacique" (*AGN: Derecho Indigena*, L: 31,C: 614, 1559-1560*, f* 1).[26]

The presentation of the rites as evidence of a transfer of possession suggests that they were not simply an incidental formality in the privatization of the landscape; rather, they were essential to the process of landscape transformation that made *dominio* possible. Here we might return to Faudree's point that the *Requerimiento* was a performance designed to accomplish a particular social action—in that case, to bring into being conditions that justified violent conquest. Similarly, the rites of possession created a set of conditions that brought *dominio* into being on Andean fields. When performed, they cast lands as vacant and unused. Successfully completed without objection, they confirmed their own premise. By tearing up weeds and removing stones a prospective owner in effect declared a field neglected, and thus available,

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[25] "…tomo por la mano al dicho Padre Fray Francisco de Campo en nombre del dicho Monasterio de Nuestra Señora de la Merced de la dicha ciudad del Cuzco e lo metió en las dichas tierras de Tambobamba y en la posesión real actual corporal velcuasi y de ellas e dijo que le daba e dio la dicha posesión tanto quanto puede e con derecho debe e no más y según e de la manera que por el dicho Juan de la Plaza fueron deslindadas e amojonadas e por virtud de la comisión para ello a él dada y estaba presto de les amparar e defender en ella… Juan de la Plaza les dava e usando de ella y en señal de posesión se paseó por las dichas chacras e arranco tierra e piedras de ella…"

[26] "… Monasterio tomo poseçion paçifica y quieta de las dichas tierras con el consentimiento y voluntad del dicho Caçique e yndios lo qual están ya de 2 años…"

while at the same time assuming responsibility for bringing it back into production. What's more, just as new owners figuratively marked the land by tearing up plants, scribes wrote the performance of these rituals into archives. As such, the *de facto* right of occupation became aligned with a *de jure* legal right of possession. An essentially figurative transformation—the performative plucking of weeds and throwing of stones—enacted a change of ownership and allowed owners to demonstrate their new relationship with the land. Because of the specific understanding that *baldíos* were once productive and now abandoned fields, this transformation had the effect of severing potential counterclaims made on the basis of historic ownership or ancestry.

Mayontopa's witnesses argued vehemently that the lands had been taken against the wishes of the community, and by force. His initial failure to object, they claimed, was seated in a fear of violent reprisal. This argument was seemingly sympathetic to the judge in this case, Polo de Ondegardo—the *Corregidor* of Cusco—who supported Mayontopa's claim to the fields in a decision subsequently upheld by the *Real Audiencia* in Lima. Ondegardo's rationale is not included the copy of Mayontopa v. Mercedarians I have accessed, however, Burns (1999, 56) suggests that his decision in Mayontopa's favor may have been at least partially rooted in a more complex understanding of the Inka system of land division between community, state, and sun than was common among Spaniards. Citing his writings, Burns highlights that Ondegardo thought little of the shallow notions of Inka land tenure that prevailed amongst many of his compatriots and rejected the premise that lands once farmed for the Inka and Sun were inherently vacant (Burns 1999, 57). Ondegardo noted that the expropriation of "Inka state" and "Sun" lands constituted a kind of double tax on indigenous communities, who both lost land and were required to furnish tribute equivalent to that which, under the Inka, had been produced on those lands (Ondegardo 1990, 50, cited in Burns 1999).

That said, as Burns explains, even as Ondegardo upheld Mayontopa's claims he transformed the basis for the *kuraka's* rights to land. Landholding became authorized within the tenets of Spanish law and was premised on need demonstrated through ongoing use, rather than on rights derived from the Inka past or Mayontopa's authority as *kuraka*. As Tamar Herzog (2013) notes of conflicts over land from the Quito region, while Andean litigants often anchored land claims in the pre-conquest past, Spanish judges generally ignored these arguments. When indigenous claimants retained use rights to land, Herzog suggests it was because they could demonstrate continuous occupation and ongoing use, where "productivity" premised first grain and vegetable cultivation, and then pasturing (Herzog 2015, 114-119). Lands that were understood to be vacant, or used for pursuits such as hunting or gathering, could be justifiably usurped within the confines of Spanish law. [27] As Burns points out, the terms of such conflicts were defined by the limits of the Spanish legal system and Spanish conceptualizations of land rights. These cases forced natives to "pose as imperial subjects" (Burns 1999, 56).[28] Litigation created a break with the past that vacated rights derived from Inka histories. In the eyes of Colonial authorities "native rights became Spanish and the memory of a past was replaced by the (relative) certainty of a present" (Herzog 2013, 309; see also Herzog 2015). In effect, the case forced Mayontopa, his community, *and the land* into the realm of Spanish legal thought. Even as

[27] Amith (2005, Ch. 3-Ch. 4) discusses similar examples in New Spain.

[28] Of course, whether or not these people were really "posing" or were in fact *acting as* subjects might be debated. That is, regardless of the (unknowable) authenticity of Mayontopa's recognition of colonial power, the very fact of his engagement with colonial authority is itself illustrative of a process of subjectification.

Mayontopa's tenure was upheld, the judgement in his favor made the land legible as titled property.

Mayontopa was not just involved in the emerging "market" for land defensibly; he, like many other *kurakas* of the day, actively sold unneeded land in order to raise funds to cover his tribute obligations (Stern 1993). Antonio de Porras, a *mestizo* resident of Ollantaytambo—a descendant of one of the original invaders that accompanied Pizarro and one of the first Spanish speakers to take up residence in Ollantaytambo—was a notable beneficiary. De Porras was active in the social and legal life of the community at Ollantaytambo and ingratiated himself to the community by helping to fund the defense of some fields against expropriation by a neighboring community (Glave and Remy 1983). He was also among the first Spaniards to grow wheat commercially at Ollantaytambo. With Mayontopa's successor, Gonzalo Cusirimache, he founded a "*compañia"* to produce wheat for sale in Cusco in 1577 (*BNP, Libros Raros, Manuscritos,* A-300, 1581; see Chapter 5). As Glave and Remy (1983) outline, Porras and a few other Spaniards and *mestizos* living in Ollantaytambo during this period leveraged their connections to the town to acquire lands through direct negotiation with Mayontopa and Cusirimache. Through this mechanism Antonio de Porras was able to assemble a considerable collection of fields, including rich maize and wheat lands adjacent to those secured for the Nuns of Santa Clara at Pachar by Geronimo Costilla. The *kuraka's* authority to make these sales is indicative of the power he retained over lands around the town in the middle of the sixteenth century.

The authority of native lords would radically transform during and following the tenure of Viceroy Toledo (1569-1581). Toledo initiated a wide-ranging campaign to undermine *kurakas* and eliminate the last vestiges of overt resistance to Spanish rule. Amongst other reforms, he consolidated dispersed hamlets into "reduced" settlements, effectively opening up broad areas of new *tierras baldías* to Spanish acquisition, and intensified the brutal *mita* labor draft, which increased mortality and drove people to flee their home communities (Mumford 2012; VanValkenburgh 2012; Wernke 2013; Wightman 1990). Unlike elsewhere in the Andes, the *reducción* at Ollantaytambo may not have resulted in the relocation of the majority of the community. While Toledo's inspectors codified the dispersed population into four officially delineated ayllus, it is unclear exactly how this changed the distribution of settlement and landholding in the 1570s (see Chapter 3).[29] Indeed, the decades immediately following *reducción* remain opaque; it is not until the final decade of the sixteenth century, following the initiation of the bureaucratic process of *composición y repartimiento de tierras*, that Spanish accumulation of land *qua* property began at Ollantaytambo in earnest.

4.4 The 1594 *Composición de Tierras* and the Estancia at Markaqocha

The *composición y repartimiento de tierras* was a major step towards the realization of Toledo's initial gestures in the 1570s towards a more systematic colonial management of land in the viceroyalty. *Composición* was an administrative practice of land sales that originated in Spain, where it emerged in the second half of the sixteenth century as a mechanism for the king to raise funds via the sale of crown lands—*tierras realengas* (Amith 2005). In the Americas, *composición* followed a series of royal *cédulas* issued by Phillip II in the late 1580s and early 1590s that declared, amongst other things, that he, solely, was the sovereign owner of all land in the empire, and as such, the crown (rather than municipalities) was the only entity that could

[29] Graubert (2017) highlights a change in legal attitudes towards land in the 1570s as the crown more aggressively and directly seized land. Here I gloss the full ramifications of the Toledan reforms, which had dramatic consequences in the Andes, as specific documentation for the Ollantaytambo region is scant. For more conclusive treatment, see Mumford (2012), Wernke (2013).

grant legally valid title (Amado González 1998). In that it was motivated in part by the need to raise funds, the initiation of *composición* reflected a recognition of the latent value that could be extracted from land sales as demand for land increased across the Atlantic Ocean (Amith 2005; Covey 2020).

In Peru, Phillip's declarations cast a generation's worth of municipally issued land grants into doubt, as well as titles derived from sales between *kurakas* and individuals. Holdings like those assembled by Antonio de Porras around Ollantaytambo became suspect and would need to be legitimated by royal judges. For Andean lords and their native subjects, Phillip's *cédulas* were even more troubling. They had the effect of legally vacating all rights to land they claimed through historic occupation and ancestry, even as customary ties derived from the authority of Andean lords would prove more difficult to dislodge (Covey 2020, 489). Legally, lands that had been tenuous property of Andean communities became the property of the king—*realango*—and if disused or found vacant, would revert to royal control for further sale or redistribution. No longer were Andean lords legally permitted to engage in transactions like the sales and exchanges of land that Mayontopa had engaged in during the 1560s; the right to accumulate property, and rent, divide, or sell holdings (*dominio directo* possession) was extended only to Spaniards and some wealthy indigenous individuals. There was no parallel right for *repartimiento* holdings.[30]

[30] Herzog (2013) notes that Spaniards continued to recognize that individual natives could have a moral right to hold private land through the same logic of occupation and use that applied to Spaniards, but these rights did not extend to communities. This explains how some wealthy indigenous leaders were able to accumulate property (see Stern 1993), even as such rights were not extended to communally administered land. Larson (1998) highlights that these reforms were not universally accepted by Spaniards, some of whom even advocated against *composición* and argued that land should be returned to *repartimientos*.

In the Andes as in New Spain, *repartimiento y composición* became a mechanism of dispossession that gradually alienated land from Andean *repartimientos*, allowed for the creation of private property and, ultimately, the accumulation of extensive estates. In practice, *composiciones* were inspections during which royal judges categorized lands according to whether they were "legitimately" privately held with valid title, occupied by Andean communities, worked without legal title, or "truly" vacant and abandoned (and, in the latter three cases, technically the property of the king). Fields were distributed to ayllu members according to need—the "*repartimiento"* part of the process—and land found unoccupied could be purchased directly from the crown. At the same time, "unsettled" or suspect titles derived from *ocupaciones de hecho*—occupations in fact, but not law— could be quieted in *composición.* As such, *composición* allowed colonists who covertly expanded their holdings or seized land without legal backing to have title legalized and legitimized by royal authority (Herzog 2013; Ramirez 1996, 75).

The dramatic impact of *composición* at Ollantaytambo is illustrated by the raft of land titles issued after the first iteration of the surveys at the town in 1594. These surveys, conducted by the Licenciado Alonso Maldonado de Torres, codified and delineated the extent of holdings associated with what were, by now, the four officially delineated Toledan ayllus.[31] Tributary households, *indios* aged beyond tributary status, and community institutions like nascent *cofradias* and the church were allowed *dominio util*—usufruct—of lands that were now,

[31] The documentation of these surveys directly related to the *repartimiento* of Ollantaytambo survives as a copy in the folios associated with the 1629 *composición*. I am grateful to Steve Kosiba for sharing a transcription of that document with me. Documentation of *composición* at Markaqocha and other places on the fringes of the Ollantaytambo region are accessioned separately, I accessed those documents in the *Archivo Regional de Cusco*.

following the *real cedula* of 1591, subject to the *dominio directo* of the king. Lands that fell outside of these parcels were declared "*sobras"*—"extra" lands that were vacant and available to aspirant landowners. With *composición*, it was no longer just the ostensible "*tierras del inga y sol*" that could be taken over; Phillip's declaration of personal sovereignty had the effect of rendering *all* untilled, and much tilled, land available for appropriation.

The creation of the estancia of Markaqocha is indicative of the process through which *composición* facilitated the expansion of privatized holdings around Ollantaytambo. Following Maldonado's inspection, Luis Vizente, a carpenter in Cusco, petitioned to purchase "lands of the Inka *that now belong to the King* two leagues from the town of Ollantaytambo at a place called Marcacocha" in order to establish an estancia to graze cattle (*ARC*: F: *Colegio Educandas*, L: 02, 1568-1722, *f*: 472v).[32] Vizente offered 50 pesos for title to the land required for the corrals and outbuildings needed to operate an estancia, and requested an additional two and half *fanegadas* for planting potatoes, maize, and wheat. Upon agreeing to pay a slightly higher price Vizente petitioned for an official to travel with him to Markaqocha to survey his new holdings, measure and mark the land, and officially give over possession. Maldonado dispatched an official to "measure and outline the sites… give possession…and set up boundary markers on the lands referred to *in the sale*" (*ARC*: F: *Colegio Educandas*, L: 02, 1568-1722, *f*: 473v). While Vizente's petition included a suggestion that the land had been, historically, "of the Inka," this was not the basis for his request, rather, he emphasized that the lands were salable assets of the crown. Indeed, it is worth highlighting that Vizente's transaction was understood to be a direct sale, the terms of which were negotiated with representatives of the king. Whereas, just decades

[32] "…estan dos leguas del dicho pueblo de Ollantaytambo un assiento para estanzia de ganados llamado Marcacocha tierras del Ynga y agora pertenecen a su magestad…"

previously, Antonio de Porras had negotiated directly with the *kuraka* to purchase land, now the equivalent funds flowed to royal coffers.

And so, on the third of September 1594, a representative of Vizente, several witnesses, and a crown official measured out the lands that Vizente had purchased and recorded their boundaries, noting specifically that they abutted on one side with a ravine, waterfall, and several large "houses of the Inka," (Fig. 2) as well as an "old town of the Inka," the property was marked by placing "four *mojones* of stone, and on each *mojón* a cross" (*ARC*: F: *Colegio Educandas*, L: 02, 1568-1722, *f*: 47).[33] Finally, Vizente's agent formalized the enclosure of the land by performing the all-important rites of possession, walking across the property "uprooting grasses, and moving stones from one part to another." He thus "took possession quietly and peacefully, without complaint"[34] creating a recognizable piece of property at Markaqocha such that its boundaries can still be roughly approximated more than four centuries later.[35] *Mojones*

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33 "…linda por lo largo con la quebrada que baxa de la ssierra y un salto de agua a lo llano de unos Caserones y pueblo viejo del Ynga e por la otra parte con la ssierra y por ancho con tierras Baldias del Ynga y le puse quatro mojones de piedras y en cada mojon una cruz y el dicho sitio para el corral y cavaña que tiene los dichos quinientos passos linda con las dichas dos hanegadas y media de tierra que linda con las dhas dos fanegadas y media de tierra que linda con la quebrada y salto de agua y tierras de los yndios de Tamvo y se le pusso por mojon una cruz…"

34 The repetition of this and other phrases in documentation is indicative of the formulaic nature of these rituals. "…Alonso Suarez en el dicho nombre y en ella le meti por la mano y el dicho arranco yervas y tiro piedras de una parte a otra e hizo otros actos de posession y el susso dicho en el dicho nombre aprehendio en ssi la dicha posession actual corporal jure domine velquassi la qual le di quieta y pasificamente y sin contradision de persona alguna…"

35 While the original *mojones* erected in this property transfer are no longer prominent, and many have likely long since been taken down, the natural features that marked the property—reed bed and waterfall—and the Inka ruins referenced in the title remain prominent features on the landscape. Refer to Figure 2.4, in that figure the reed bed is the dark area in the center-rear of the photo. The "houses of the Inka" and "old town of the Inka" referenced in the original land title likely refer to the buildings in the lower left and lower right of the photo. The waterfall is located directly below the photographer.

materialized the distinction between different types of land; topographic anomalies (ravine, waterfall), enduring features of the landscape (the abandoned Inka buildings and other ruins), and purpose built markers with crosses, visually marked Vizente's plots as property. They distinguished the new estancia from surrounding terrain, "pastures, hills, and waters," which were designated to remain common, open for use by *Indio* or Spaniard alike (*ARC*: F: *Colegio Educandas*, L: 02, 1568-1722, *f:* 478*)*.[36]

Vizente's titles confirm that the estancia at Markaqocha was created to be an enduring piece of property. Vizente, and his heirs, were guaranteed perpetual possession over the land, including the *dominio* rights to "sell, give, alienate, and occupy the lands, to make of them whatever they desired forever" (*ARC*: F: *Colegio Educandas*, L: 02, 1568-1722, *f*: 478v).[37] Indeed, a will he wrote in 1618 suggests that Vizente soon took advantage of these rights. Within five years of taking possession of the land he had sold a portion to another resident of Ollantaytambo, and, in 1600, gifted another plot to a young girl, Francisca Veredas, to clear a debt to her parents.[38] Vizente specified that "one *topo* of land with a house and shack in

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[36] "…los pastos montes y agyas de las dichas tierras y estancias han de ser y sean communes, asi como para Españoles y para Indios…"

[37] "…dichos vuestros herederos y subsesores para que sean vuestras, propias y como tales los podáis bos y ellos bender, donar traspasar y enajenar y hacer de ellas lo que quisieres y por bien tubieredes como de cosa vuestra propia habidas y herededas con justo y ligitimos títulos y compradas, con vuestros propios dineros de quien os las pudiere vender, dar, donar y traspassa y os aseguro y prometo en nombre de su magestad que este dho titulo y venta os será siempre firme y balido perpetuamente siempre jamas y obligo a la rreal hacienda de su magestad a la ebision y saneamiento de las dhas tierras … "

[38] In his will, written in 1618, Vizente notes that he still owned 1.5 Fanegadas at Markaqocha, and had sold 1.5 fanagadas to Cristobal de Carranza in addition to an unspecified amount sold to Fernando Alvarado and the one *topo* gift to Francisca de Veredas. Hence, at some point, his holdings must have considerably exceeded the 2.5 fanegadas initially granted. I have not found documents in the Cusco or Lima archives detailing further land purchases. While obviously the lack of official title is not conclusive on this point, it suggests the possibility that Vizente may

Marcacocha…and two large corrals with their *mojones* next to a large stream, adjacent to a reed bed," together with four breeding cattle living at the site, would become Francesca's property to be passed to her future heirs, or, should she not have children, her sister (*ARC: Protocolos Notariales*: 260, 1618-1619).[39]

In order to formalize Francisca's ownership her possession needed to be performed and manifested on the land materially, and so, several months after Vizente notarized the gift, Francisca, now four or five years old, was required to travel from Cusco to Ollantaytambo, and from there up the Patacancha Valley to Markaqocha to perform the characteristic ceremonies, made remarkable in this case only by the age of the participant. The need to continually mark and remark the land and to record and re-record those markings at each iteration of transfer is telling. It highlights that *amojonamiento* and rites of possession were not just significant at the initial moment of territorialization. These ceremonies intertwined the land, landholders, and colonial authorities, associating *dominio* rights, written title, and the material terrain of particular fields in an ongoing territorial relation. Rappaport and Cummins (2012, 121) note that through these rites, ownership was inscribed in three ways: onto the bodies of landholders through their corporal participation; on the land itself via the establishment of *mojones;* and finally, into the

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have expanded his holdings by liberally interpreting the boundaries of his land rather than through official purchase. Given that the original sale indicates that Markaqocha was surrounded by common grassland, this possibility does not seem too far-fetched. Vassberg, (1978, 54), notes that in Spain at this time, it was common for farmers to plow furrows into commons that adjoined their lands or even dismantle and move *mojones* in order to expand their holdings *ARC: Protocolos Notariales*: 260, 1618-1619.

[39] "… topo de tierras casa y cabaña que yo tengo y poseo en Marcacocha junto al pueblo de Tambo legua y media del dicho pueblo en la quebrada del que linda por una parte y otra con tierras que yo vendi a Fernando Alvarado rresidente en Tambo y el dicho sitio tiene dos corrales grandes con sus moxinetes y pasa por junto a ello un arroyo grande y un totoral por plaça y el çerro por la otra parte…" *ARC*: F: *Colegio Educandas*, L: 02, 1568-1722, *f*: 269.

archive. As colonists bounded spaces by constructing and renewing *mojones*, they literally inscribed the landscape with colonial authority. By writing these boundaries into the archive, they made the land legible to the emerging apparatus of colonial governance. Thus, *amojonamiento* can be read as an attempt at the ostentatious conversion of the Inka landscape into colonial territory—performed to witnesses, and inscribed into archives—at the same time as it materialized individual possession.

As private property was created and marked privately held *dominio* parcels were distinguished from common highland pastures. Andean lords who were able to secure private *dominio* holdings of their own also relied on *amojonamiento* as a mechanism to protect their lands. As Rappaport and Cummins (2012) note, by invoking such distinctly colonial practices, Andean people were able to assert longstanding territorial privileges within a new colonial reality where legitimate authority to define rights to landholding rested with colonial officials. For instance, in 1608, an Andean noble named Don Alonso Topa Atao Ynga, claiming descent from the Inka Huayna Capac, petitioned to the Cusco cabildo that they mark and delimit his fields near Curimarka, in effect converting his historical claims into Spanish-backed *dominio* rights and enlisting the emerging colonial apparatus in defense of his land. Several months later he again petitioned to the cabildo, this time requesting that they *not* send out an official to erect *mojones* on grasslands and swamp adjacent to his fields, as he was concerned that a new neighbor—who had already displayed expansionist tendencies by driving his animals over the erstwhile Inka's fields—intended to expand his private lands into pasture that Topa Atao required for his own sheep and llamas (ARC, *Benficencia Publica, Colegio Ciencias*, 1555-1729, L:46, *f*: 215-220; see Chapter 5). This example demonstrates that by the beginning of the seventeenth century even Andean nobles recognized the authority of colonial state to legitimize tenure.

Along with his petition for land at Markaqocha, Vizente requested title to several other additional plots around Ollantaytambo in 1594, including land near Phiri to be used for the construction of a mill. *Composición* allowed him to legitimize the beginnings of what would become a substantial portfolio of holdings around the town, including the land that would ultimately become the Hacienda Cachicata, one of the largest in the region (see Chapter 5). These holdings were surveyed and affirmed as part of the wave of property creation that followed the 1594 *composición*. Several other estancias were officially granted in 1594 and 1595, including, for example, grants for grazing at places called Huaipon, Chillipahua, and Huayllabamba (see Chapter 5). Given that these purchases followed immediately from the initiation of *composición*, it is quite possible that these lands were occupied *de facto* already, and *composición* allowed for those *de facto* occupations to be made legal. It is worth noting that the wave of titles around 1594 were explicitly for grazing lands on the fringes of ecological zones where maize or wheat cultivation were possible. Unlike the earlier forays into the Ollantaytambo region by men like Geronimo Costilla and Antonio de Porras, who sought to grow wheat, land claims at the end of the sixteenth century reflect the increasing importance of a pastoral economy. This trend may indicate that between the plots Maldonado allotted to Ollantaytambo's four ayllus and lands that had already been usurped in the early part of the sixteenth century, there were few fields available that were suitable for the cultivation of valued grains like maize or wheat. Alternatively, and perhaps more likely, it may indicate that there was a shortage of the labor necessary for intensive grain cultivation, and so extensive pasturing was a more viable mode of agriculture. As I outline in the next section, subsequent iterations of *composición* would facilitate the creation of *dominio* possession over enormous tracts of valley bottom holdings that would be worked as intensive maize land and provided the foundation of haciendas at the town.

4.5 The 1628 *Composición de Tierras* and the Emergence of the Hacienda

The second iteration of *composición* at Ollantaytambo, in 1628, marked a radical change in the intervention of colonial authorities in patterns of landholding around the town. During this *composición* the crown—here represented by Don Sebastian Gonçales de Mendoça, a justice in the viceroyalty—went beyond codifying indigenous *dominio util* holdings and awarding rights to vacant lands as in 1594; instead, Gonçales de Mendoça manipulated landholding to join large tracts of contiguous vacant fields. In doing so, he illustrated sharply how the distinction between *dominio util* and *dominio directo* could be instrumentalized to dispossess Andean people, and how the actualization of that distinction facilitated the emergence of concentrated landholding by the men who would become the first generation of true *hacendados* at Ollantaytambo. By doing this, Gonçales de Mendoça demonstrated conclusively that *use* of land no longer necessarily implied *rights* to it—at least for the members of the *repartimiento*.

The 1628 *repartimiento y composición* was actually initiated in 1626. In a series of interviews conducted in that year Gonçales de Mendoça discovered that the social landscape of Ollantaytambo had dramatically transformed since the 1594 surveys. The population had dropped to roughly a quarter of the 1595 levels; only some 20 tributaries resided in the *repartimiento*. Much of the land around the town was no longer used by original plot assignees or their descendants (see Glave and Remy 1983, Kosiba and Hunter 2017). These findings prompted a Spaniard named Pedro de Soria, newly arrived in the viceroyalty but already emerging as an important local landowner, to petition to purchase any "*tierras sobras*" at Ollantaytambo.

And so, in 1628, having accepted a commission from the Viceroy Marquez de Guadacaçar to conduct the survey, Gonçales de Mendoça left Cusco for Ollantaytambo to evaluate just how much land was available.[40] Like his predecessor Maldonado, Gonçales de Mendoça, accompanied by a surveyor who measured the extent of specific plots, walked the landscape, interviewed witnesses, and consulted textual records to adjudicate between fields being worked by their "proper" indigenous usufruct holders, land being worked illegally (according to the Colonial laws that restricted the use of *repartimiento* fields to tribute payers belonging to the *repartimiento)*, and a smattering of truly private parcels to which individuals held *dominio directo* rights. His work did not go unimpeded—for one, the *kuraka* Mayontopa fled the town and hid in the hills rather than assist in the surveys—but with the assistance of Spaniards like Miguel de Mora, an Ollantaytambo resident who was to benefit enormously from the procedure, and aided by the records of the 1594 survey, the *composición y repartimiento* was completed.[41]

The survey confirmed the findings of 1626 interviews; many *topos* that had been divided amongst the ayllus of the community in 1594 were indeed being worked outside the bounds specified by laws governing the distribution of *repartimiento* use-rights. Some fields were planted by *forastero* outsiders who rented land from the *kuraka*, others were worked extrajudicially by *naturales* of the town who had been assigned fields according to internal

[40] Diego Fernández de Córdoba y López de las Roelas, 1st Marquess of Guadalcázar, was viceroy in Peru from 1622–1629. Here I replicate the spelling of his title included in the *composición* document.

[41] De Mora is described by Glave and Remy (1983, 131) as a foremost "agent of the destruction of indigenous society" due to his aggressive tactics to accumulate personal wealth at the expense of the town's ayllus.

negotiations or who had taken over fallow land. In an attempt to rectify this situation, Gonçales de Mendoça conducted a new *repartimiento* and re-distributed *dominio util* rights, in the process evicting some individuals that had been "improperly" working fields for decades. For instance, in 1594 three *topos* of a field called Pomatallis had been assigned to a tributary named Martin Yucra. Subsequent to his death the land was taken over by his nephew, Marcos Apocho (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f* 191v.).[42] Despite Apocho's appeals to retain usufruct of the plots, Gonçales de Mendoça instead assigned the fields to another tributary. The denial of Apocho's claim to the lands that had been assigned to his uncle in 1594 highlights how *composición* disarticulated land from ayllu kin structures. Apocho and Yucra were both of *Chichaysuyu* ayllu, so according to logics of ayllu level land management it would otherwise have been normal for Apocho to take over the land following Yucra's death, along with attendant obligations to collective labor projects. These conflicts demonstrate contrasting Spanish and local notions of what constituted a legitimate occupation of land. What appeared as illegitimate—or illegal—to Gonçales de Mendoça may have been perfectly legitimate to members of *repartimiento*'s ayllus, accustomed to internally negotiated usufruct arrangements and the rotation of plots in and out of quasi-common status.

Comparing Apocho's case to other lands in the Pomatallis field system provides a useful demonstration of how the difference between *dominio util* and *directo* operated in practice. In the 1594 composición, 12 *topos* of the field were allotted to Don Francisco Quispe Topa, the *kuraka* at the time. Six of these *topos* were intended to support his office—*dominio util*—and six were

[42] "…en el assiento llamado Pomatallis los quales se midieron y no pareçieron aver mas de dos topos y medio los quales tenia sembrado Marcos Apocho su sovrino sin ser suyos ni perteneserle…"

designated as personal property befitting his noble status, to be passed to heirs—*dominio directo* (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f* 165v). When surveyed in 1628 usufruct of the land intended to support the *kuraka* had passed—as intended—with the office to Mayontopa. By contrast, *dominio directo* to the other six *topos* now rested with the Spaniard Miguel de Mora.[43] The rejection of Apocho's tenure contrasts sharply with the legitimization of de Mora's: while in both cases the 1594 document provided the basis of judgment, that archival evidence was mediated by the social position of the judged, the categorization of the lands, and the *kind of rights* the claimants were understood to bear. This instance also illustrates a clear shift in the administration of landholdings. Unlike in the first decades of Colonial rule, where poorly defined parcels with amorphous boundaries were referred to by name, now the land was precisely measured by an official using specific tools, here a cord of known length. The territorial extent of these plots was demonstrated through the actions of these surveyors on the land, and the authority of titles written into ownership backed rights of possession.

De Mora benefited enormously from the *composición*. In addition to having his titles at Pomatallis ratified he also was able to transform questionable claim to the terraces of Simapuqio into *dominio directo* title. In the 1594 *repartimiento*, eight *topos* of land at Simapuqio had been divided amongst six *naturales* of Ollantaytambo. By 1628, all these men had died without heirs. From a legal perspective, the terraces were vacant. However, this legal supposition was not reflected in fact; witnesses testified that de Mora had been planting the fields for years (*BNP*,

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[43] "… con un cordel que le está mandado y huvo los dichos seis topos que lindan por la parte de arriva con otros seis topos de tierra que al presente posee Miguel de Mora que fueron de Don Francisco Quispi Topa…" *BNP*, 1629. F: *Manuscritos*, D: B-1030, *f;* 166v. Miguel de Mora had inherited these lands through a relationship with Dona Costanca de Soria, the heir of Quispe Topa, an illustration of the flexibility of status and possibility of movement between categories of subjectivity inherent to the colonial context.

1629. F: *Manuscritos*, D: B-1030, *f:* 33). For his part, de Mora claimed to have purchased the terrace complex from another Spaniard, who he claimed had been given the land in a municipal grant, but he could produce no title. In a clear illustration of the process by which "*occupaciones de hecho*" were made legal, Gonçales de Mendoça legitimized the holding, granting title and inscribing ownership into the authority of the archive (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f:*181).

While de Mora benefited from *composición*, solidifying a status that would see him repeatedly serve as a local official, his activities during the *composición* pale by comparison with Gonçales de Mendoça's efforts to re-structure patterns of landholding for Pedro de Soria's benefit. In a dramatic demonstration of the power of *composición* as a tool of dispossession, the *Juez* evicted tributaries of the *repartimiento* of the town from lands they or their ancestors had farmed for decades. By relocating these farmers into consolidated field complexes near the center of the town Gonçales de Mendoça vacated broad areas of contiguous fields and made them available for sale to aspirant landowners.

The trajectory of the fields of Colcabamba and Tambobamba—the same fields Mayontopa (the first) had successfully defended against the Mercedarians in 1559—is illustrative of this process. In the 1594 *repartimiento*, these lands were divided amongst Ollantaytambo's ayllus—26 *topos* at Tambobamba, and 35 at Colcabamba (see also Kosiba and Hunter 2017). However, during the 1628 composición Gonçales de Mendoça found that significant lands were no longer occupied by original assignees (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f:* 43*v)*.[44] At Tambobamba only twelve *topos* of the original allocation were still

[44] "…sobras ay en Tambobamba, Surayra, Colcabamba y que por muerte de algunos yndios an bacado las quales cada topo de tierras las a alquilado y arrendado el dicho su caique Don

occupied by descendants of 1595 grantees, at Colcabamba, only twenty-five of thirty-five *topos* were being worked after a fashion that Gonçales de Mendoça considered legitimate. Using the justification that Andean people who retained *domine util* rights to isolated parcels would be subject to abuses by Spanish neighbors—"they will take their water, abuse them, and trample fields with their cattle… [those animals] will take the fruit of the fields" (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f:*228)[45]—Gonçales de Mendoça relocated *indios* with usufruct in Tambobamba and Colcabamba to leftover lands in the center of the village (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f:* 228).[46]

The newly continuous plots of land at Colcabamba and Tambobamba were quickly sold to Pedro de Soria. For the sum of 2175 pesos he acquired a parcel of roughly 30 *fanegadas* (approximately 87 hectares) of some of the best maize and wheat producing land near Ollantaytambo. This sale was not uncontested—Cusco's Augustinian friars complained that they had not had a chance to bid; the auction of the lands had been announced "more for ceremony than for justice." What's more, the Augustinian's claimed, de Soria had planted the lands before his tenure was confirmed, suggesting the sale had been orchestrated privately in what amounted to a fraud against the king (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f:* 4).[47] For his part, de Soria

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Francisco a los corregidores y curas a peso el topo y a los particulares a tres y quatro pesos para con ellos pagar la tasa de los muchos Muertos…"

[45] "…notorios daños que les arian assi en tomarles el agua como en pisarles y maltratarles sus chacras con sus ganados y criados estando en ellas como en coxer los frutos dellas…"

[46]"…tierras que ay de sobras en los assientos de Pomatallis, Guaranguay, Tiopongo y otros nombres que estan por encima de la Plaça Antigua y donde assi todos los demas yndios del dicho pueblo tienen sus chacras por ser como son algunos dellas mexores tierras que malas en que al presente estan…"

[47] "…hizo dar los pregones mas por çeremonia que por justicia…" It is unsurprising that the Augustinians complained – if they had been able to combine vacated fields with their existing

argued that personal services he had conducted for the king merited special treatment, his tenure was upheld, and the fields became the foundation of one of Ollantaytambo's largest haciendas (Glave and Remy 1983, 215).

The 1628 *composición y repartimiento* at Ollantaytambo demonstrates the limited rights afforded indigenous landholders from the end of the sixteenth century. Examples like the eviction of Marcos Apocho and *indios* with holdings in Colcabamba and Tambobamba from fields they had worked for decades demonstrates the elimination of even nominal gestures towards land rights derived from use. It also illustrates the power crown officials had to supersede processes of land distribution or commons administration internal to the *repartimiento*. The preclusion of renting or selling unused community land shows how the rights afforded the Andean lords were dramatically curtailed by comparison with their ancestors. Finally, the *composición* demonstrates how colonial surveying practices made the distinction between *dominio util* and *dominio directo* manifest on the landscape, allowing powerful Spaniards new ways to access land. Rather than carving out small discrete plots as their predecessors had, men like de Mora and de Soria were able to instrumentalize *composición* to create continuous holdings of rich valley-bottom fields.

By conferring title in some cases, and by evicting landholders in others, Gonçales de Mendoça regularized a mixed occupation of *forastero*, *dominio util* occupancy, plots with *directo* titles, and illegitimate occupation, in the process producing an enduring hacienda landscape of contiguous plots of valuable agricultural land. In the following decades, Tambobamba and

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nearby holdings at Tiaparo they would have had a truly formidable piece of property. De Soria's action here in prematurely planting the fields is reminiscent of the competing sowings of Mayontopa and the Mercedarians in 1559, planting the fields amounted to a claim on the land. The seeds marked possession.

Colcabamba became the fertile valley bottom foundation of the Hacienda Huatabamba. A series of landowners joined additional parcels to that hacienda, including several properties higher in the Patacancha Valley, including Markaqocha (*ARC*: F: *Protocolos Notariales*, No.188, 1651-1652, *f*: 1639). Eventually, the hacendados of Huatabamba controlled a territorial expanse that stretched for kilometers across the highlands surrounding the *repartimiento* (see Figure 2.1). Miguel de Mora's holdings at Simapuqio would also anchor a hacienda; in 1659 his sons Salvador and Alonso de Mora had the land at Simapuqio re-surveyed and their titles affirmed by a local justice (ARC. F: *Colegio Ciencias*, L: 26, 1555-1725, *f*: 447v). Thus, lands that had been distributed amongst the indigenous community in the late sixteenth century were transformed into a holding that maintained its essential form as a distinct unit of property—the Hacienda Simapuqio—until the agrarian reform of the twentieth century.[48]

4.6 Conclusion

In Chapter 2 of this dissertation I highlighted that different strains of political ecology have variously emphasized the discursive and material/ecological construction of landscapes and environments (Robbins 2011). In a similar vein, Andrew Sluyter (1999) insists that colonialism wrought both "material" and "conceptual" transformations to American landscapes (see Chapter 1). As Sluyter highlights, colonialism associated new socially and culturally mediated *values* to environments, ecologies, and land. Colonial encounters re-figured the categories through which land was understood, including the basis for and definition of land rights, and management and governance practices. In this chapter I traced how Spanish legal conceptualizations of rights to

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[48] Even as the terrace complex of Simapuqio was a discrete unit of property, at different moments it was temporarily joined to other haciendas, including by the Bethlehemite friars, who combined holdings at Sillque, Kachiqhata, and Simapuqio in the eighteenth century.

land and landholding, particularly in relation to the sovereignty of Andean lords and their subjects, changed over the course of roughly the first century of the Colonial Period and were materialized "on the ground" around the community of Ollantaytambo. I discussed how colonizers circumvented legal and moral quandaries about native rights to land by first claiming, and then creating, *tierras baldías*. By doing so, I traced the discursive practices and socio-historical processes through which colonists transformed the royal estate of the Inka Pachakuti into individually and institutionally vested possessions.

The practices through which this conversion was enacted were fundamentally territorial: marked the imposition of Spanish control over bounded and delimited space. Following Robert Sack's conceptualization of territoriality, VanValkenburgh and Osborne (2013, 14) write: "territorial control can be treated as a power strategy, but to be enacted, territorial boundaries must be represented and performed…Territory is performed not only by walls and fences but also maps and ceremonies that seek to objectify the spaces of claimed sovereign domains."[49] The case studies I have traced in this chapter are rife with examples of just these kinds of practices. As Spaniards ritually enacted possession, marked the boundaries of their new plots, and surveyed fields in *composición,* they brought colonial territory into being even as they performed *dominio* authority into existence. As in the *Requerimiento*, these formalized rituals enacted legal authority, and, as they were manifested both on the land and in the notarial record, were essential to legitimizing land transfers. By recording these rites, the same *letrados* that planned colonial

[49] Here the authors also build on Lefebvre's (1991) theorizations of the production of space and Smith's (2003) point that the production of space is constitutive of political landscapes. The authors continue, noting that practices of spatial representation are rarely uncontested, and that a richer understanding of the social processes that undergird territorialization emerge if we consider "friction" between contrasting spatial representations and practices.

cities such as Cusco—as well as Andean participants-in and witnesses-to those rites—were critical to the production of rural landscapes like those around Ollantaytambo. As Rappaport and Cummins (2012, 232) argue, "as social, political, and ritual space was inscribed geographically, the written record became a central vehicle for the construction of the colonial order." The colonial landscape and the archive came into being together as Colonial officials and surveyors walked the land, established boundaries, and titled ownership, and as Andean people advocated for their own rights to land, both through the legal system and according to longstanding Andean logics.

By creating property *qua* territory colonial officials and landowners layered colonial power onto a landscape already laden with referents to Inka authority, which, although deposed, was always uncomfortably close given its embeddedness in the fields, shrines, terraces, and mountains that materially anchored conflicts over land (e.g., Niles 1999; Kosiba 2017). At Ollantaytambo, the ostentatious anthropogenic landscapes designed to foreground the might of the Inka made the erasure of pre-Colonial histories impossible. However, Inka histories could be made less relevant through attempts to reify a break in time between the Inka and Colonial periods—the erosion of the authority of the Andean lords and Inka descendants to exercise direct sovereignty over ancestral fields can be read as part of broader efforts to break with the past that intensified during Toledo's tenure as Viceroy and continued through the Colonial Period, including efforts to extirpate idolatries and resettle Andean people in consolidated communities (Mumford 2012; VanValkenburgh 2017; see Chapter 1).

The creation of *dominio* authority was fundamental to the emergence of the hacienda. Both the fertile agricultural valley bottoms and higher altitude tuber and pastoral zones were essential to meet the ecological demands of hacienda production. Indeed, even as the 1628 *composición* provided the impetus for the growth of haciendas belonging to men like Pedro de Soria and Miguel de Mora, the nuns of Santa Clara were expanding the holdings that they had secured around Pachar in the middle of the sixteenth century. The convent combined their lands with the properties created by Antonio de Porras and Geronimo de Costilla at Pachar to create a unified expanse of rich maize land on the valley floor, and aggressively pursued pasture in the steep valleys and high-altitude plains that overlooked their holdings (Burns 1999; Glave and Remy 1983). Other haciendas were growing according to the same pattern as landowners sought high altitude pasturelands and tuber production zones to complement their valley-floor holdings. Indeed, while I have focused on the discursive negotiation of land rights in this chapter, the documents I draw upon suggest ecological trajectories: first, Spaniards intercropped Inka maize with wheat due to the high demand for European grains in emerging Colonial cities (Covey 2021). At the close of the sixteenth century pastoralism allowed for the exploitation of higher altitude lands. Later, the expansion of commercialized maize production to supply burgeoning markets in mining centers drove efforts to displace Andean people from rich valley bottom lands.

Land, of course, was only ever part of the equation. As Murra (2012) points out, land was useless without regular and assured access to other people's labor. To make land productive demanded that labor—both human, and non-human (i.e., draft animals)—could be made to work the land. Thus, the ever-decreasing area of *repartimiento* landholding at Ollantaytambo should be understood alongside the decrease in the tributary population; not just, though, as a function of the amount of land needed by tributaries to support themselves and meet tribute requirements, but also as linked to the erosion of the *kuraka's* authority, derived as it was from his ability to command labor and ensure the welfare of his subjects. Relatedly, the emergence of the hacienda, and struggles to make haciendas productive, were tied to the ability of hacendados to muster a workforce that included residents, non-resident wage laborers, and forced *mita* labor granted by the colonial state (see Larson 1998). This rearrangement of agricultural labor accompanied agroecological transformation; as I detail in the next chapter, intensive grain production continued from the Inka to the Colonial periods in some of Ollantaytambo's fields, while others were used much less intensively to farm tubers or graze animals.

To conclude this chapter, I want to return to the conflict I introduced in the opening paragraphs between the *kuraka* Mayontopa and the Mercedarian convent. Scholars have variously emphasized contrasting tendencies of Spanish imperialism to uphold indigenous tenure and respect traditional land rights on the one hand, and to systematically disposes indigenous communities on the other (see Adorno 2007; Herzog 2015; Pagden 1987, 79-98; 1990). The conflict between Mayontopa and the Mercedarians over the fields of Colcabamba makes clear that *both* of those perspectives can be understood as broadly accurate, even as neither tells the full story. While Mayontopa's authority over the fields of Colcabamba and Tambobamba was upheld, his rights to administer the land were contingent upon Iberian authority. The basis of his legitimacy as leader changed and to defend his holdings he was forced to engage with the Spanish legal system as a colonial subject. Thus, through the Colonial Period, these fields—already charged with meaning through Inka legacies—were layered with new authority as they were made into colonial territory. As such, this case is illustrative of the simultaneous production of archive and colonial landscape; as arguments in the case detail the extent of the fields, they make them legible to colonial authority. The existing Inka fields of Colcabamba and Tambobamba were produced concurrently as colonial territory and as objects in the archive. Finally, in legal and customary context, the case demonstrates that the flora and fauna imbricated in the conflict were not just incidental actors. Maize shoots were essential to Mayontopa's argument that he intended to work the fields. Similarly, oxen and wheat allowed the Mercedarians to materialize their claims to alleged *tierras baldías*. Newly introduced flora and fauna actively shaped both the emergent Colonial agroecology and the social production of agricultural land and landscapes. In the next chapter I explore the material/ecological consequences of these introductions by examining transformations in the use and morphology of Ollantaytambo's agrarian infrastructures.

Chapter 5
Afterlives of Inka Infrastructure at Colonial Ollantaytambo

5.1 Introduction

In 1577 Antonio de Porras, a Spanish scribe and lieutenant to the *Corregidor* of Yucay, made an agreement with the heads of Ollantaytambo's ayllus, including the then *kuraka*, Gonzalo Cusirimache, to found a "*compañía"* to grow wheat for sale in Cusco. Porras and the community would collaborate to cultivate "vacant lands" on the floor of the Urubamba Valley that stretched from "Pachar to Pilco"—fields that Porras would later assert had been under threat from Spanish encroachment, and that the community had already been forced to defend in several legal battles (*BNP, Libros Raros, Manuscritos,* A-300, 1581*)*. According to the terms of the *compañía,* which was to last for a period of nine years, ten young workers from the community would plough, plant, irrigate, and tend the fields. At the time of harvest, "all the community and people of the said town, young and old, will do the work with haste for the risk of waters and downpours" (*BNP, Libros Raros, Manuscritos,* A-300, 1581*, f*:232v).[1] In turn, Porras would provide the draft animals and tools necessary for planting. Proceeds would be used, in part, to reduce the "labor and vexation" of annual tribute requirements (*BNP, Libros Raros, Manuscritos,* A-300, 1581*, f*:233).[2]

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[1] "…nos obligamos de dar y que daremos diez yndios mozos de buena hedad para poder trabajar … como para sembrar y regar las sementeras y tierras de barbecho … hasta guardar los granos en los troxes y graneros saldrá a ello todo el comund e gente del dicho pueblo chicos y grandes para que se haga con toda la brevedad por el riesgo de aguas y turbiones…"

[2] "…dicha compañía es para que los dichos yndios tengan de donde poder pagar su tasa con menos trabajo y vexacion de sus personas…"

Four years later, in 1581, Porras was charged by the *Corregidor* of Yucay, Albaro de Mendoça, of abusing his position as a scribe to extort land, labor, and money from several Andean communities.[3] At Ollantaytambo, Porras was accused of forcing undue labor of animal care onto members of the *repartimiento* and demanding excessive compensation when several of his animals were lost. According to the suit, the scribe had kept between twenty and forty pigs, twenty sheep ("*carneros de Castilla*"), fifteen to twenty camelids ("*carneros de la tierra*"), oxen, and a breeding stock of horses at the town; witnesses reported that care for these beasts required that two community members work without recompense. Porras insisted that this work was only ever performed by the very young or very old, was not a threat to encomienda tributes, and moreover, had been negotiated in the terms of his original agreement with the *kuraka*. What's more, he argued, his beasts were often neglected by their keepers. Twenty-three of his horses and nine oxen had been lost. His pigs and sheep were kept corralled all day without fodder until, in desperation, they escaped. Running loose, several were killed. The compensation he demanded for these losses—seventy *fanegas* of wheat, worth a peso and a half each—was, he claimed, far less than the 280-peso value of the animals (*BNP, Libros Raros, Manuscritos,* A-300, 1581,*f*: 186).

It is unclear exactly how this case was resolved, or whether the agreement between Porras and the community endured through its intended nine-year trajectory. Nonetheless, the

[3] In this case Porras was also accused of abusing the power afforded to him as a scribe and Lieutenant of the *Corregidor* to purchase land near Amaybamba. Glave and Remy (1983, 115-125) discuss Porras' activities at length, including his agreement with the people of Ollantaytambo. They suggest that the charges were brought against him, at least in part, because he was making it possible for the *tributaries* from Ollantaytambo to avoid working for a neighboring encomendero. In this sense, while Porras was no doubt taking advantage of his connections to Ollantaytambo's ayllus for personal gain, the relationship may have been mutually advantageous.

case is illustrative of the emerging colonial agroecology at Ollantaytambo in the mid to late sixteenth century wherein newly introduced taxa were farmed in—and contributed to—radically new social contexts based on agreements forged in the quagmire of colonial power struggles. Here we see the early production of wheat for commercial sale (other "*compañías*" may have been formed as early as the 1550s, see Burns [1999, 49-50]). Foreign fauna proliferate as part of the same process of agrarian colonization. The case demonstrates how the expansion of the colonial agroecology was, at times, facilitated by alliances between local Andean leaders and Spaniards outside the bounds of the encomienda system. In detail, the case is even more revelatory; we see pastoralism as an early source of uncompensated labor and are offered a glimpse at the number and variety of animals being kept on the land around Ollantaytambo well before the close of the sixteenth century. Clearly, a new agroecology of plants, animals, and agricultural practices was emerging from the ruins of the Inka estate as new forms of landholding articulated people, land, plants, and animals in new ways.

In this chapter I consider the ecological consequences of colonialism at Ollantaytambo by examining how the changes to landholding I discussed in the prior chapter operated in parallel with shifts in agricultural practice that became materialized in Ollantaytambo's fields. The documentary record makes clear that non-native flora and fauna were increasingly important components of the agroecology emerging around Ollantaytambo even before the interventions of Antonio de Porras in the 1570s. For instance, the encomienda *tasas* of 1549 and 1555 each include tributary requirements of wheat, pigs, and fodder for horses (see Julien 2000). Clearly, at least some of the extensive anthropogenic landscape at Ollantaytambo, the canals, terraces, reservoirs, roads—*agricultural infrastructures*—that the Inka built around the town were being put to new uses.

Given that Inka Ollantaytambo was oriented towards labor-intensive maize production, how did the Inka agricultural system change when estate workers died in pandemics and fled colonial violence? [4] What happened to Inka-built infrastructures when the organizational structure of the Inka estate collapsed? How did shifts in the socio-ecological context of agricultural practice—the presence of new flora and fauna, changes in tribute demands, shifts in tenure patterns, and nascent commercialized production—alter how Ollantaytambo's agroecology looked, produced, and *acted* as the hacienda emerged?

To crystallize this set of questions further, we might return to the 1555 conflict between the *kuraka* Mayontopa and the Mercedarian convent that I discussed at length in the prior chapter. That conflict was thrust it into the legal arena when the Mercedarian friars loosed animals onto fields Mayontopa's subjects had planted with maize. The animals destroyed the seedlings, and the friars subsequently replanted the land with wheat. In this story, foreign taxa are foregrounded; oxen and wheat are made active in the colonization of land, and maize agriculture is supplanted in the very action that challenges native tenure. How was the transition from intensive maize agriculture to the mixed farming of maize and wheat materialized on the landscape? How did newly introduced animals—cattle, sheep, pigs, equids—shape colonial agroecologies as they ate plants and trampled terraces? How were the fields and pastures that

[4] In this chapter, when I refer to "intensive agriculture" I am referencing agricultural and infrastructural practices, like fertilizing, building irrigation canals, or weeding, that apply additional labor to existing crop lands in order to increase yields. I am also referring to the construction of new fields that could only be farmed with relatively high labor inputs. Usually, intensification implies diminishing returns on labor (Brookfield 1984; Bruno 2014; Erickson 2006). At Ollantaytambo, Inka agriculturalists both intensified production by applying new practices to existing fields and increased yields by bringing new fields into production (Kosiba 2015).

once supported the Inka estate at Ollantaytambo changed by being wrenched out of Inka management and usurped by foreign owners?

To answer this set of questions, this chapter draws on botanical data derived from excavations in the defunct reservoir at Muyupata and documentary materials from archives in Cusco and Lima. Stratigraphic pollen and macrobotanical samples from the reservoir elucidate transitions in the communities of plants living on fields around Ollantaytambo and hint at the emergence of a pastoral economy. As will become clear as I lay out those data, the question of material changes in Ollantaytambo's agroecology through the first century of the Colonial Period is tightly connected to the histories of the agricultural infrastructures—elaborate complexes of terraces and canals—built by the Inka to facilitate intensive maize production and emphasize the power of the Inka state. Research has clarified how the emerging colonial agrarian system re-shaped aspects of rural life such as the geopolitics of land access, as, for instance, the introduction of taxa like wheat allowed small fields unsuitable for maize to be cultivated (Kosiba and Hunter 2017). The pollen data I use in this chapter provide an alternative perspective on the agroecological transformation of the Ollantaytambo region by detailing processes of change elided or obscured in the archive produced by surveyors that recorded land as it was, with little attention to its history or ecological potential.

In the Andes, anthropogenic landscapes like Ollantaytambo's have been extensively studied as indices of agricultural intensification organized at scales ranging from the archaic Tiwanaku state to village-level intergenerational projects of accumulated "landesque capital" (Denevan 2001; Erickson 2006; Guengerich and Berquist 2020; Janusek and Kolata 2004; Kolata 1996). Scholars across the Andes have noted that hectares of pre-Hispanic anthropogenic field systems are no longer farmed, many seemingly unworked since the Colonial Period. Yet, researchers have accorded little attention to what happened to those infrastructures after they ceased to be used for intensive production. Rather, scholars have glossed these lands as "abandoned" (but see Denevan 2001; Wernke 2010; Benavides 2004). Indeed, there is a tendency to view post-1532 landscape histories as either taphonomic processes of infrastructural degradation (in the case of "abandoned" fields) or broadly ahistorical continuations of agricultural practice (in the case of lands still farmed) rather than as the result of socially mediated and ongoing choices about how land is used. Thus, while scholars highlight the "abandonment" of agrarian landscapes in the Colonial Period—frequently in terms that emphasize dramatic population decline—there is little discussion of what that "abandonment" might actually have entailed in terms of changes in agricultural practice or resulting shifts in agroecologies.[5] In this chapter, I suggest that we might better grasp the complicated process of shifting agricultural practice by considering the socially and ecologically mediated processes through which decisions were made to cease cultivating specific field systems and by considering the action of plants and animals that continued to make use of ostensibly abandoned lands.

When discussing the Inka-built agricultural infrastructures of the Ollantaytambo region, I draw on Larkin's (2013) definition of "infrastructure." Larkin describes infrastructures as "built networks that facilitate the flow of goods, people, or ideas and allow for their exchange over

[5] Various explanations that have been put forward for field 'abandonment' in the Andes, including lower temperatures during the Little Ice Age (Brooks 1998), a reduction in water availability (Guillet 1992), and colonial and *reducción* and population collapse in the Colonial Period (Donkin 1979). See Wernke (2010) for a discussion. Explanations predicated on demography are complicated further by the imprecision of population data derived from archival accounts that focus on "legitimate" residents of officially delineated communities without accounting for outsiders or *yanacona*.

space. As physical forms they shape the nature of a network, the speed and direction of its movement, its temporalities, and its vulnerability to breakdown" (2013, 328). While Larkin's analysis is particularly focused on infrastructures that allow for the circulation of "goods, people, and ideas" in the modern world, his definition retains utility for my analysis of the pre-modern Inka and Spanish Colonial worlds of Ollantaytambo (see Morrison 2015; Wilkinson 2019). Larkin insists that infrastructures should be studied as components that both *form* and *constrain* networks and systems. As Kosiba (2015) argues, Ollantaytambo's infrastructures both shaped the agrarian system around the town and created dependencies between farmers across the region. I am also compelled by Larkin's assertion that infrastructures have sensorial and aesthetic effects beyond their instrumental functions. As Wilkinson (2019) highlights, different people perceive and experience the same infrastructures in different ways, depending on their positionality. At Ollantaytambo, Inka agrarian infrastructures not only facilitated agricultural intensification, they also indexed the power of the Inka state to control the natural world and impose order on supposedly unruly landscapes and subjects (Kosiba 2010). The built landscape communicated a message of social differentiation that literally materialized the power Inka elites held over their subjects (Kosiba and Bauer 2012; Niles 1999).

This focus emphasizes that agrarian infrastructures are and were innately political. As Bruun Jensen and Morita (2017) point out, because infrastructures are inherently social and political, infrastructural change—even when subtle or slow—offers a perspective on social and political change. I would add that agrarian infrastructures like those at Ollantaytambo are the anthropogenic foundation from which regional agroecologies emerged. By studying changes in these ecologies, it is possible to understand how shifts in infrastructure are themselves indicative of changes in agricultural practice; infrastructure, politics, and agroecologies shifted together and in response to one another. This framing demands a consideration of how the suite of fields, canals, plants, animals, and people assembled by the Inka at Ollantaytambo continued to have material effects after the collapse of Inka administration. What properties emerged from Inka infrastructures as they were transformed post-invasion, and how did these properties, in turn, shape the emergence of the hacienda?

Below, I first describe how the Inka-built agrarian infrastructures at Ollantaytambo allowed the region to function as a coherent ecology by bringing land and people together in specific ways—most importantly, to produce vast quantities of maize. I then describe infrastructures that are present at Simapuqio-Muyupata in greater detail in order to contextualize botanical data from the reservoir at the site. By presenting those data—pollen and macrobotanicals—I demonstrate that while the fields around Muyupata, and in the Ollantaytambo region more broadly, were certainly transformed in the decades following the Spanish invasion, this transformation does not necessarily suggest abandonment—even in instances where infrastructures failed and intensive cultivation was no longer possible. Rather, these data suggest agricultural *deintensification* and the introduction of new agricultural practices on some fields amidst a regional agroecology in transition. Many fields—like those in the Simapuqio terrace complex—continued to be used for intensive maize production through the Colonial Period. Others, including many hectares of terraces on the sides of the valley, ceased to be intensively cultivated soon after the Spanish invasion. I close the chapter by returning to archival data to demonstrate how these transformations eased the expansion of early estancias into expansive haciendas as landowners stretched boundaries of private plots by following grazing herds onto common fields. In conclusion, I emphasize that the complex relationships among infrastructures, agricultural practice, and perceptions of land left over from the Inka era shaped the emergence of the colonial agroecology at Ollantaytambo in a process that continues to ramify into the contemporary era.

5.2 The Inka Agroecology at Ollantaytambo

At Ollantaytambo, the Inka built a complex, interconnected system of fields, canals, and other agricultural infrastructures to allow for the interaction of soil, water, and plants to produce the surpluses that supported the sumptuous lifestyles of ethnic Inka elites. Beyond the ecological affordances they offered, these infrastructures functioned as a symbolic register of Inka power. The built landscape linked agricultural productivity and imperial administration and literally grounded the memory of Inka rulers by materializing their power in carved stone and shaped earth (Kosiba 2015; Niles 1999). This is to say, the landscapes of estates like Ollantaytambo were designed to both intensify production and to materialize the social difference between ethnic Inkas and their subjects—differing relations to the built environment at Ollantaytambo marked differences between ethnic Inkas and their subjects (Kosiba and Bauer 2012).[6]

The Inka built Ollantaytambo by channelizing the Urubamba and Patacancha rivers, laying extensive networks of canals, moving massive quantities of earth and stone to build terraces, and resettling entire communities to work newly developed land. Inka engineers developed new fields on the floor of the Urubamba by building bulwarks against flooding and

[6] As Wilkinson (2019) argues with regards to Inka roads, infrastructure were experienced and understood differently depending on status. In nearby Amaybamba, Wilkinson demonstrates that the Inka road was designed to maximize the labor required for maintenance. The labor demanded for road upkeep was part of the point of the infrastructure as it materialized inequalities between the elites who traveled the roads and the non-elites who maintained them. By placing the road in a location where it would be regularly washed out by river flooding and threatened by encroaching vegetation the Inka demonstrated their power to impose order on the natural world via the mobilization of labor.

draining marshy lands. Farrington (1980) shows that the Inka altered the flow of the river by building retaining walls to maximize available agricultural land. Kosiba's (2015; 2018) survey and GIS analysis calculates 17.3 km of walls were built to guard against flooding in the prone-to-waterlogging valley bottom and to hold back the Urubamba and Patacancha rivers. Inka subjects developed new fields on the valley floor and adjacent slopes by erecting terraces—Kosiba estimates approximately 376 km of terracing, amounting to 270 ha of fields—in an articulated system designed to support the production of maize.[7] In this sense, the agricultural landscape around Ollantaytambo required intensive labor to create and maintain, but the system itself was also spatially extensive as more agricultural lands were brought into production.

As a system, these infrastructures were designed and built to function as an integrated whole and created "dependencies" (Kosiba 2015) between farmers and fields at different locations within the system. The most obvious indication of this is the network of canals that allowed for the irrigation of fields along the sides of the valley and on the valley floor. As I discuss below, the availability of irrigation water dramatically changes the potential productivity and value of land in the Andes. As such, infrastructure such as the 11 km Kulluspukio canal (Kosiba 2015), the Pumamarka Canal, or the approximately 15 km Kachiqhata canal system (see below) [8] were essential to cultivation on the enormous areas of terracing dispersed along their

[7] Kosiba's (2015; 2018) study of Ollantaytambo's terraces found that the vast majority of Inka built infrastructure in the region (72.8% of fields) was built on relatively gentle slopes of less than twenty degrees, and about half (50.1%) on slopes of less than ten degrees. These terraces are concentrated within 200m of the valley floor and were built as an integrated system.

[8] This is my name for the canal system, discussed more extensively below, that links the reservoir at Muyupata to a water source on the high plain of Chankachuka via the Sillque Valley. As I discuss below, erosion makes it impossible to definitively trace this canal along its entire length, however, the preponderance of evidence suggests that it operated as a single irrigation system.

lengths. Each of these trunk canals had numerous offshoots, and variable needs for water distributed along trunk and branch canals would have demanded coordination across widely dispersed field systems (Kosiba 2015; Kosiba and Hunter 2017).[9] A rupture at any point in one of these main canals would have wrought havoc for farmers along the length of the fields, and differential demands for water in different fields at different times (depending on, for instance, time of planting or stage of growth) would have demanded coordination amongst agriculturalists across the irrigation system (Kosiba 2015; 2018). These canals were (and, where they still operate, are) material linkages within "irrigation clusters" (*sensu* Guillet 1987; 1992), collections of fields that demand coordinated care. Even where individual terraces could be maintained at the household level, decisions about management, maintenance, and the availability of water must be made at the supra-household level. Thus agricultural production at Ollantaytambo under the Inka was a coordinated enterprise wherein people, plants, animals, and soils were managed together in order to generate surpluses for the royal estate. As Kosiba (2018) points out, the Inka did not just set out to develop fields at Ollantaytambo, they intended to elaborate an *interlocking regional ecology* that would function as an integrated whole to generate surpluses to support state power. This is not to suggest that this ecology functioned without the friction, conflict, or breakdowns inherent to complex infrastructural systems, but rather to highlight that it was *intended* to function as an *idealized* whole.

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[9] There are many ethnographic studies that demonstrate how contemporary irrigation systems in the Andes are administered at nested community or ayllu levels, or even more broadly, over regions (depending on system length). Given its status as a royal estate, Inka organization at Ollantaytambo may well have been considerably more top down than many of these accounts suggest of contemporary practices (Gelles 2000; Mitchell 1976; Trawick 2003).

So how did the agricultural infrastructures built by the Inka at Ollantaytambo act as part of the regional agroecology? Studies from across the Andes have demonstrated that level terrace planting surfaces improved land by allowing farmers to accumulate and maintain thick, rich topsoils (Sandor 1992; Sandor and Eash 1980). Terraces also create beneficial microclimates by shedding cold air and retaining day-time solar heat in the thermal mass of stone-lined walls (Evans and Winterhalder 2000). However, a primary function of terrace infrastructures was likely hydrological: moderate terrace slopes mitigated erosion and maximized water absorption while also preventing waterlogging (Donkin 1979; Guillet 1987; Treacy 1994; Wernke 2010). At Ollantaytambo, terracing allowed otherwise marshy and waterlogged valley bottom lands to be intensively farmed. On the valley sides, terracing controlled erosion and created level growing surfaces that simultaneously retained enough moisture to hydrate plants while draining sufficiently to curtail waterlogging. These infrastructures afforded agricultural activities that mitigated the stark wet-dry cycles of rainfall in the Peruvian sierra.[10] Terracing and irrigation extended the growing season, allowing for planting in late August or September prior to the onset of annual rains—necessary for crops to fully develop before the onset of frosts in June and July—while ensuring enough water was present for seed germination and strong early growth (Gade 1975).[11] This is particularly important for maize, the crop that fundamentally undergirded

[10] At Ollantaytambo, it rains nearly every day from mid-October to April, and very rarely in other months. Annual rainfall generally varies between 500ml and 600ml a year, but this is heavily concentrated across the wetter months (Gade 1975).

[11] Gade's (1975) ethnographic study remains the definitive examination of the ethnobotany of the Urubamba Valley. He notes that farmers without irrigated land frequently plant a late crop of maize (between October and November), but that this crop has a high chance of failure if seasonal rains are later than usual. An early crop, planted in July and August, is also sometimes grown as an early harvest is highly profitable, but this is very risky due to the low temperatures in July and August and often fails. Gade's observations may not be directly reflective of

Inka power by feeding armies and fueling ritual celebrations. Maize demands an extended growing season in the Andes. Terraces retained enough irrigation water to ensure seeds could germinate and seedlings establish before heavy daily rains risked waterlogging soils—an environment in which young maize plants cannot thrive—and it ensured plants would mature to allow for harvest well before a risk of frost at the close of the rainy season (Mitchell 1976).[12]

In addition to extending the material affordances of the agricultural landscape at Ollantaytambo, terraces and canals acted as aesthetic indices of Inka power. At Ollantaytambo, terrace designs made Inka power to command labor concrete and naturalized Inka authority by literally rooting it in the earth (Dean 2010; Kosiba 2018). *Huacas* materialized in features like caves, springs, or large boulders further implied connections between the aesthetic contours of Ollantaytambo's landscape and the political-ecological power materialized within it. This sacred landscape was produced and reproduced through the performance of rituals at particular places that reinforced connections between the power of local elites, the Inka state, and the land itself. Kosiba (2015) notes that many of Ollantaytambo's most important *huacas* were, and are, directly associated with agricultural fields, and, via state-directed veneration, connected Inka power to agricultural productivity. For example, the terraced fields of the Socma Valley are irrigated via waters that are channelized to loop around and through the elite Inka site of Curimarka, which includes large carved stones, before plummeting over a dramatic waterfall. These waters directly

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historical practices, but they demonstrate some of the ecological constraints that shape agricultural production in the valley.

[12] While maize was almost certainly the dominant crop on Ollantaytambo's fields, and was definitely the most symbolically important, these fields also likely produced chili peppers (*ajī*), potatoes, and other crops. Pleasure gardens and orchards were also common features of estates—documentary references to a "*guerta*" suggest that these elements of the estate may have been located at Simapuqio. Additionally, high altitude pastureland, like the fields at Chankachuka, likely provided forage for vast herds of camelids associated with the estate.

link the political power situated in the elite residences, the power of the earth-being embodied by the carved stones and waterfall, and the productivity of the agricultural landscape of the Socma Valley.

The documentary record demonstrates that irrigated and terraced land was understood as being for maize cultivation, and retained its importance as such into the Colonial Period. In the 1594 *composición y repartimiento* at Ollantaytambo almost all of members of the community made specific claims to lands for maize growing within Inka-developed fields along the valley floor (*BNP*, 1629. F: *Manuscritos*, D: B-1030; Kosiba and Hunter 2017; see also Chapter 4). Later, in interviews conducted prior to the 1628 *composición,* descriptors to justify the estimated value of land invariably included whether or not the land was irrigated and good for maize growing. For instance, one witness reported that a *fanegada* of irrigated land in the valley good for growing maize—that Spaniards could also use for wheat—was worth approximately four hundred pesos based on a price of around forty pesos per *topo*. (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f* 22).[13] Other witnesses suggested irrigated land for maize production might have an even higher value —up to fifty to sixty pesos per *topo* (*BNP*, 1629. F: *Manuscritos*, D: B-1030, *f* 43). These witnesses did not provide similar estimates as to the value of unirrigated lands, but this absence is in itself instructive. Evidently, unirrigated lands were simply not a concern to either the colonial bureaucrats responsible for assessing lands around the town or the Andean

[13] This witness made this valuation based on having seen areas of a *topo* be sold for approximately 40 pesos, and calculating a *fanegada* to be roughly equivalent to ten *topos*. The witness describes this valuation as "*a quatrocientos pesos de a ocho rreales*"—four hundred pesos of eight *reales* each. For comparison, the annual tribute of each of Ollantaytambo's tributaries during this period was between four and five pesos, based on the total encomienda *tasa* (See Julien 2000).

peoples advocating for rights to land.[14] The conflation in these documents of "maize land" and "irrigated land" highlights that irrigation was an essential characteristic of land understood to be for maize agriculture. Indeed, in titles and legal documents regarding conflicts over land, plots are almost always categorized according to whether they were "*de regado*" or "*temporal*"—irrigated or dependent on seasonal rainfall (Kosiba and Hunter 2017).

Inka canal and terrace systems around Ollantaytambo were undoubtably crucial agricultural infrastructure that allowed for the year-round cultivation of large expanses of land that would otherwise have been restricted to much shorter growing seasons. Conflicts over Ollantaytambo's fields indicate that these agricultural lands were sought after the Colonial Period (Glave and Remy 1983). Yet, as Gade indicates, "many agricultural terraces, especially those between 3000 m and 2500 m were abandoned long ago and are covered today with brush" (1975, 42).[15] Field abandonment, Gade continues, "is not because this land is not needed, but

[14] Irrigation was also important to mitigate against the risk of crop failure in particularly dry years. For instance, in 1693 a lack of rain caused a widespread famine in the Cusco area. As crops failed, people resorted to eating wild plants that were otherwise not regularly part of diets. It is likely that that the widespread failure of Inka irrigation systems exacerbated such events – indeed, Gade (1975, 74) suggests that the intensive use of wild flora in diet may have only become common after the collapse of Inka systems of agricultural organization and food distribution: "Desde el año anterior…en esta ciudad y gran parte del obispado, notable esterilidad de la tierra y escasez de frutos, negando el cielo sus lluvias en castigo á los mortals, aunque nó con el rigor de otras hambres. En la presente comían los pobres toda clase de yerbas, principalmente en los obrajes, donde los cueros, aún hasta tostados, les servieron de alimento" (Anales del Cuzco, 184; Gade 1975, 74).

[15] Of course, this explanation for the "abandonment" of fields raises a question: why were canals and irrigation systems allowed to lapse into disrepair? Terrace "abandonment" has been explained and investigated through numerous factors, including resettlement, *reducción*, and depopulation (Donkin 1979), the lowering of effective limits of cultivation during the Little Ice Age (Brooks 1998), Denevan (1986; 2001) suggests multiple factors, encompassing social organization, demography, and climate were all involved. See Wernke (2010) for discussion and modeling of these factors that concludes that abandonment is better understood as deintensification, and should be understood within the context of totalizing colonial ecological transformation rather than resulting from discrete factors.

because the irrigation canals have been destroyed." Wernke (2010, 54) makes a similar argument based on a study in the Colca Valley: the pattern of "contiguous tracts of abandoned fields is likely epiphenomenal to the dereliction of their respective irrigation systems." Wernke also points out, though, that "abandonment" can be a mischaracterization of what might be better termed "deintensification." Furthermore, as (Plekhov et al. 2021, 2) highlight, a binary of "farmed" and "abandoned" terraces is problematic as it elides potentially extended fallow periods, fails to account for variation in the intensity of production, and does not acknowledge the effects that infrastructures have as "geomorphologically "active" agents, even when unfarmed. Below, I investigate the post-conquest histories of Inka-built infrastructures at Ollantaytambo through the example of the terraces and canals around Simapuqio and Muyupata by combining pollen and archival data. By doing so, I provide a perspective on agroecological transformation that accounts for variation in agricultural practice at a localized level and that shows how changes in land use became materialized in the fields of the Ollantaytambo region.

5.3 Agricultural Infrastructures at Simapuqio-Muyupata

Many of the kinds of infrastructures that the Inka built around Ollantaytambo to make the region into a coherent productive ecology are present at Simapuqio-Muyupata. The site and its immediate surroundings feature housing for workers, terraces and fields, canals, reservoirs, and sections of an Inka road. Sector C, the existing terrace complex, is comprised of bench-style terraces—many still in use—ranging in height from approximately one meter to well over three meters, in width from one meter to up to twenty-five, and length from tens of meters to hundreds. In total area, these terraces comprise approximately 10.6 hectares of land.[16] Today, these fields

[16] This area, as well as other field area calculations in this chapter, were calculated in ArcGIS by drawing field boundaries on a high resolution orthophoto created in Agisoft Photoscan using

are irrigated with spring water that percolates from scree at the apex of the terrace complex. Water is collected in two reservoirs and distributed via a network of small canals. Even the longest of these canals is only a few hundred meters in length, so by comparison with many of irrigation networks around Ollantaytambo, Simapuqio is a relatively small self-contained "irrigation cluster" (Guillet 1992). Reservoirs in this sector can be nearly entirely emptied during a day of continuous irrigation, and so require constant replenishment during times of intensive use. Irrigation schedules and water rights are closely monitored and subject to negotiation by members of the agrarian association that administers the land. The members of this association—the *Asociación de Productores Agrícolas de Simapuqio*—collectively take responsibility for cleaning and maintaining the canals and reservoirs.[17]

Figure 5-1: One of the two reservoirs at Muyupata, at left partially full of water during the dry season, at right, emptied for cleaning, which is required between one and three times a year depending on sediment accumulation. Note the pile of sediment at the front of the frame of the right-hand photo – Members of the *Asociación de Productores Agrícolas de Simapuqio* report removing up to several centimeters at each cleaning. Left photo by the author, right photo courtesy of Jose Rodriguez. Note wild plants flourishing around the reservoir due to spillover of water.

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images collected with a drone. These field boundaries were subsequently ground-truthed by printing the high-resolution orthophoto at large scale and walking field boundaries.

[17] In a comment to Guillet (1987) Knapp cites Mothes' (1986) ethnographic observations to suggest that the silt carried by canals to reservoirs is an important source of nutrients applied to fields as fertilizer after those infrastructures are cleaned.

Agricultural infrastructure in Sector B also include terraces and canals. Terraces in Sector B include two large bench terraces that together compromise approximately a third of the agricultural land in the sector. These two terraces feature retaining walls over three meters in height and were clearly referenced as landmarks in colonial surveys.[18] Other terraces and fields in this sector are located to the west, descending towards the sheer slopes that plummet from Muyupata to the Urubamba. These fields are no longer clearly demarcated bench-style terraces because retaining walls have collapsed; it is less clear where terrace edges were located in the Inka Period, however, I calculate an area of approximately 3.8 hectares of terraced fields in this sector.[19]

Fields in Sector B are currently irrigated with water from a source in the Kachiqhata area approximately three kilometers distant, but this is a very recent development. Until hose was laid in 2019, people living around Muyupata have no memory of the fields being irrigated.[20] In the deeper past, fields at the site were irrigated by water stored in a reservoir located at the top of the

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[18] These terraces are clearly described in a 1659 land title document as "four *topos* and a half that are in a large terrace and another that it is above in the manner of a triangle"—"*quatro topos y medio en un anden grande y en otro que están sobre a manera de triangulo*" (ARC, *Colegio Ciencias*, L. 26, *Libro* 16, 1555-1725, *f.*442).

[19] Given the disrepair of these terraces, it is possible that there was once considerably more terraced land in this sector. The total area of land in this sector could have been terraced in the past is approximately 6.26 ha.

[20] When we conducted our fieldwork in 2019, the landowner at Muyupata had only recently completed laying a series of hoses from Kachiqhata to Muyupata. Previously, only seasonal cropping had been possible as all water used at Muyupata had to be carried up from sources in Simapuqio or Ollantaytambo proper, depending on sometimes contentious relationships between people living at Muyupata and the agrarian cooperative administering water rights to Simapuqio. The recent completion of the hose system has drastically increased the area of land under cultivation around Muyupata. I return to this series of events in the conclusion to this dissertation.

sector. This reservoir sits between two sets of terraces and has lateral outflows that once fed smaller canals leading to each set of fields (see Figure 5.5). The double-faced meter-thick walls of the reservoir could have, when filled, allowed for the accumulation of up to approximately 330 cubic meters of water.[21] Excavation data (see below) raise the possibility that this reservoir may have first been in use well before the arrival of the Inka in the Ollantaytambo region during the Cusco Formative Period (2200 BC-200 AD), however, these data and scatters of Inka sherds surrounding the reservoir confirm that it was used during the Inka period.

Figure 5-2: At right, The easterly outflow from the reservoir. Note the hose in the foreground – three kilometers of this hose currently brings water to the site. At left, aerial view of the reservoir. Note the blue dashed lines indicating outflows to fields to the east and west. The inflow to the reservoir has been destroyed, but was from the south (bottom of photo). This photo also shows the location of the excavation unit in the reservoir relative to these canals (dark triangle upper left).

The reservoir itself was filled by the canal that descends straight through the structures in Sector A. This canal connects to a broader irrigation system that brings water from the high-altitude plains to the south above the site. The trunk canal, which I refer to as the “Kachiqhata

[21] Or 330 000 liters. This figure is based on a calculation of area (220m^2) by the approximate depth of 1.5 meters established via our excavations in the reservoir. I discuss this excavation unit in greater detail below.

Canal" because it passes through the quarry of that name, circles around the mountain range that forms the wall of the Urubamba valley by way of steep cliffs above the Sillque Valley, passing above Inka and LIP ruins and fields along a total length of approximately 12 km before reaching its terminus at the Muyupata reservoir. Cumulatively, the main trunk canal and primary subsidiaries comprise a total length of approximately 15 kilometers.[22] It is difficult to date the construction of this irrigation network; it is quite possible that it was constructed piecemeal and that new offshoots and extensions were added as new fields were developed. However, the extent of the canal system suggests that the area from Muyupata to the ridge above the Sillque Valley, which includes many nominally distinct sites and terrace complexes, functioned as a synchronized agricultural system that also demanded coordination among pastoralists on the high plain surrounding the water source, farmers in the Sillque Valley (their fields draw water from the same high altitude catchment) and workers in the quarries at Kachiqhata, who may have used the water it brought for stonecutting (Protzen 1992,140-141).[23]

[22] I have walked the entire length of this system, except for stretches along the cliffs above the Sillque valley that would be unsafe. The canal is still easily visible and can be traced for most of its length. There are, however, limited lengths where it is no longer preserved. My argument that the entire canal is connected to the same system even where it cannot be traced today is based on (1) the continuous decrease in elevation along the length of the canal, and (2) data from the Cusco Ministry of Culture, which mapped the canal in 1985 as a continuous system. Protzen, writing in 1992, notes that portions of the canal had already been eroded, but suggests that the canal was once a unified system. While the length of this canal is impressive, it is not particularly remarkable by Andean and Inka standards. Canals exceeding 10 km are common. But this canal is technologically exceptional in its course along the cliffside high above the Sillque Valley, where construction demanded that an aqueduct be hollowed out of the cliffside.

[23] This is not to suggest that there is some sort of perfect coordination assumed under the Inka – there were no doubt conflicts between water needs for quarrying, for agriculture, and for animals

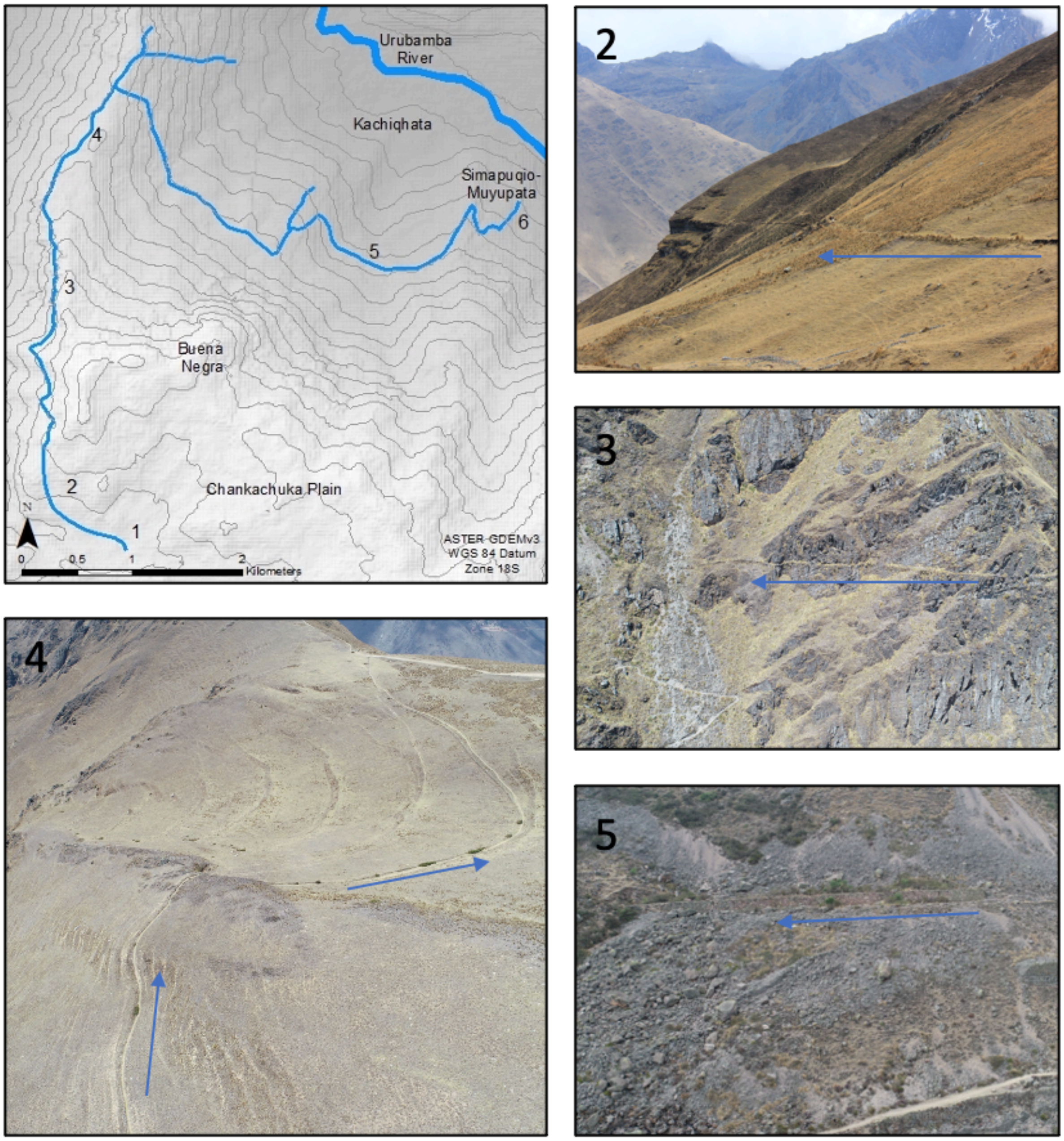

Figure 5-3: Kachiqhata canal system, from its source on the plain of Chankachuka (1) to terminus at Simapuqio-Muyupata. Blue arrows in photos indicate path of canal, (2) near the source of water in Chankachuka, (3) along the cliffs high above the Sillque Valley, as the canal passes around the mountain Buena Negra, (4) crossing the high ridge along the Inka archaeological site of Inti Punku, and (5) running along the bottom of a retaining wall built within the quarry of Kachiqhata, perhaps built to protect the canal from rockfall (see Protzen 1992). Contour lines on the map indicate 100 m changes in elevation.

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pastured in higher altitude fields around the source of the Canal, rather, it is to highlight that political practices made adjudicating between those needs possible.

The canal flows roughly west to east along the side of the Urubamba Valley until, above Muyupata, it abruptly turns downslope and plunges into the reservoir along a steep, straight course that passes directly through the many round structures in Sector A. The canal drops approximately 120 meters in elevation over a final course of approximately 200 meters.[24] This section of the canal course is approximately 50 cm wide, with walls 30 cm wide and approximately 20 cm deep. The PIASM excavation team dug a 3x1 meter unit (Unit SM-A13) along a three-meter stretch of the canal in order to observe construction techniques, and in hopes of recovering datable material from beneath the stone lining. These excavations revealed that the canal walls were built by setting double-courses of large stones, roughly flat on one side (the canal interior) into a foundation of fist-sized stone rubble. The interior course of the canal was then paved with thin, flat rocks. No artifacts or datable material were recovered from the excavation unit placed on the canal, but its straight uninterrupted course through the many buildings of the sector suggests that it was either built at the same time or prior to those structures.[25]

[24] This course has an average slope of approximately 30 degrees, but for much of the length it is much steeper. On this final section it intersects with one round structure in Sector A, which may have served as a holding tank to meet the needs of those living in the buildings in the Sector. I cleaned and profiled the downslope side of this structure where it intersected with the canal. This profile suggested that the canal once emanated from this structure through a narrow channel that could be blocked, further suggesting that it once operated as a holding tank. Unfortunately, a contemporary path passes directly above this structure and the repeated passage of hooves and feet has collapsed the walls, so definitive conclusions are impossible.

[25] Given the Inka date from domestic excavations in Sector A (see Chapter 3), this final course of the canal may well have been built in either the early Inka or LIP period. However, much earlier dates from the reservoir itself (see below) complicate this supposition.

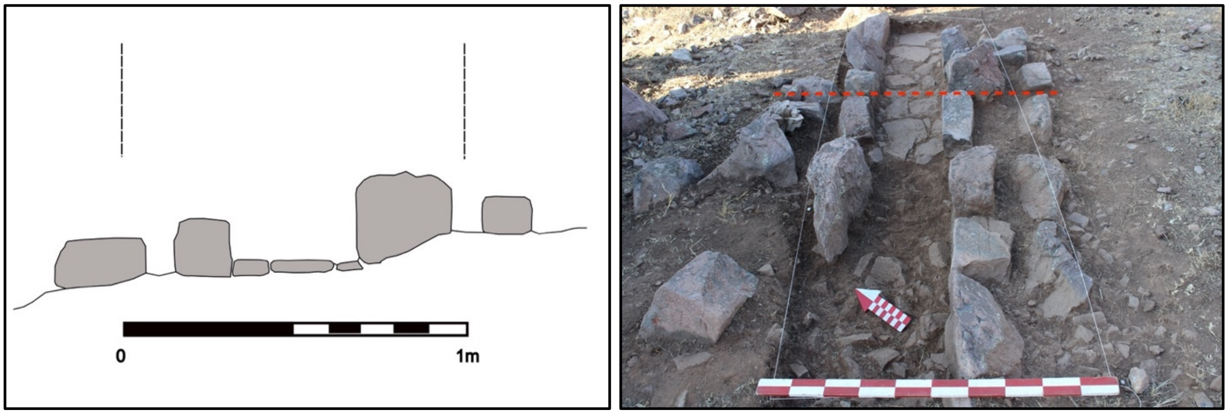

Figure 5-4: At right, the three-meter stretch of the canal cleaned in excavations, showing, in background, the paved interior surface, and in foreground, the fist sized angular rocks that provided the foundation for the canal. At left, canal cross section. Dotted lines indicate bounds of excavation unit. Red dotted line in left image shows location of cross section.

The Inka agricultural infrastructures at Simapuqio and Muyupata were almost certainly used for intensive maize agriculture. Botanical evidence from excavations in the reservoir (see below) suggest that maize was an important crop around the site. Terraces, including both the bench terrace complex in Sector A and the enormous terraces and now-eroded smaller fields in Sector B, would have provided ideal conditions for maize cultivation. In addition to maize, these fields may also have been used to cultivate high value crops like tree fruits and *ají* peppers. Indeed, sixteenth century documents refer to a "*guerta"* at Simapuqio that was likely a space dedicated to specialty crops, including vegetables and, as pollen evidence presented below suggests, tree fruits.[26] Infrastructures at Simapuqio and Muyupata would have been worked by *yanakuna* associated with the Inka estate, likely the same people who lived in the houses at the site. These workers were responsible not just for farming the fields, but also for cleaning silt from reservoirs, maintaining terrace walls, and repairing the canals that facilitated intensive

[26] "*Guerta*" replicates the spelling in the 16th century document, rather than the modern Spanish "*huerta*." Only one other space at Ollantaytambo is described as a "*guerta"* in these documents, the second location is at Huatabamba, just to the west of the contemporary town (see Chapter 3).

production. Farmed thus, the nearly 15 hectares of land at the site would have produced surpluses of maize to be kept in and distributed from the storehouse complexes that line the cliffs above Ollantaytambo.

In the final sections of this chapter, I assess the post-Inka use and dis-use of the agricultural infrastructures around Simapuqio-Muyupata and within the broader Ollantaytambo region using botanical data derived from excavations in the reservoir at Muyupata. My focus is on understanding how these infrastructures were transformed from the early period of Colonial Period extraction through encomienda to the establishment and consolidation of hacienda landholding. As I elaborate below, the terraces at Simapuqio likely have a relatively straightforward historical trajectory of use as irrigated maize and wheat fields through the Colonial Period. Muyupata, however, is characteristic of fields that fell out of cultivation and were differently incorporated into the Colonial agroecology.

5.4 Excavations in the Muyupata Reservoir

In order to assess the use and dis-use of infrastructures, including the reservoir and surrounding fields, the PIASM excavation team dug a 2x2 meter unit in the northwestern corner of the reservoir at Muyupata. The unit was excavated with three specific goals: (1) record techniques used in the reservoir construction; (2) obtain a stratigraphic sample of pollen and macrobotanical remains from the vertical excavation to assess change over time in patterns of land use; and (3) recover any material culture, including ceramics and zooarchaeological remains that accumulated in the reservoir as it silted in. To anchor data in absolute time (and to aid in dating the reservoir itself), samples for radiocarbon dating were collected throughout the excavated sequence. To ensure stratigraphic control over all remains and samples recovered, the excavation team separated excavated material according to both 5 cm arbitrary levels and contextual distinctions such as soil type or density of inclusions. Excluding the highest layers, which were recently disturbed (Context 3, see Figure 8), a total of 21 arbitrary levels were excavated to a total depth of approximately 160 cm below the current soil surface, or approximately 250 cm below the current height of the reservoir wall. Soil samples for both pollen analysis and macrobotanical analysis were collected from each arbitrary level.

Reservoir Stratigraphy

The stratigraphy of the excavations in the reservoir suggests that only the first 45 cm of this excavated depth represents Inka and Colonial Period sediment accumulation. Below the mixed surface layer (Context 3), levels 4a through 7b were broadly similar in consistency, soil type, and color: fine semi-compact dark brown silt. Excavators recovered Inka ceramics from these strata, as well as both native and introduced animal bone. Two samples from this silty sequence returned dates suggestive of Inka or Early Colonial deposit.[27] I interpret a roughly 10 cm cap of fine clay (levels 8a and 8b) below these silty strata to be the bottom of the reservoir as used during the Inka Period. This layer was entirely devoid of artifacts and material save for a single small fragment of bone that, when dated, returned a radiocarbon age indicative of the late Middle Horizon to LIP.[28] Below these levels, the next 20 cm of the stratigraphy (levels 9a to 11b) contained a mix of Inka and Formative ceramics in a very fine compacted matrix. From

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[27] The age of the higher sample stratigraphically, from level 5b, (SM-B4#10, animal bone) is BP 431±32 years. Calibrated using the OxCal Southern Hemisphere 2020 calibration curve, this date returns a 95% confidence interval of 1443-1624AD. The second sample, from the bottom of level 7a, (SM-B4#3, wood carbon) returned a date of BP 405±32, calibrated at the 95% confidence interval to 1434-1625. The full range of probabilities derived from calibrating these dates are presented in Appendix 1.

[28] The age of this sample (SM-B4#11, Animal Bone) is BP 1115±29 years. Calibrated using the OxCal Southern Hemisphere 2020 calibration curve, this date returns a 95% confidence interval of 895-1025AD. The full range of probabilities associated with these dates are presented in Appendix 1.

level 12a to level 13b excavators dug through a very compact clay, which included a sample dated to the Mid to Late Formative Period,[29] below which (levels 12a through 14b) the fine clay gave way to naturally occurring yellowish-red sterile soil which extended below the wall foundation.

This stratigraphy—and in particular the levels (9a-11b) containing mixed Inka and Formative ceramics—indicates that either the Inka built the reservoir atop the remains of a much older site, and, when they dug into the ground to lay the reservoir foundation and excavate the holding tank, earlier remains were mixed with Inka material culture, or the reservoir was originally built much earlier than the Inka Period—as early as the Formative—and was renovated by the Inka to irrigate estate fields. These interpretations remain conjectural and cannot be verified without more extensive excavations. Nevertheless, it is clear that the uppermost strata of the reservoir sequence (level 7b and above) are a largely uniform matrix deposited during the Inka and Colonial Periods.[30] This stratigraphy places the bottom of the reservoir during the period of Inka use (the interface between levels 7b and 8a) at a height of approximately 150 cm from the current top of the reservoir wall. In what follows, I present the results of pollen and macrobotanical analysis of samples taken from the upper sequence with the Inka and Colonial periods in order to assess the use of infrastructures at the site across these two periods.

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[29] This sample (SM-B4#12) returned a date of BP 2463±28 years, calibrated to (95%) BC 751-401. Given that the layers from which these samples were taken yielded mixed Inka and Formative ceramics, it is likely that there was considerable mixing of material when the reservoir was constructed or renovated in the Inka Period.

[30] It is perhaps significant that strata identified here as the bottom of the reservoir—the clay seal—were the only layers to yield pollen from the *Lamiaceae* family, likely the Andean wild mint (*muña*), and that this pollen was a high proportion of the grains in that sample (%37).

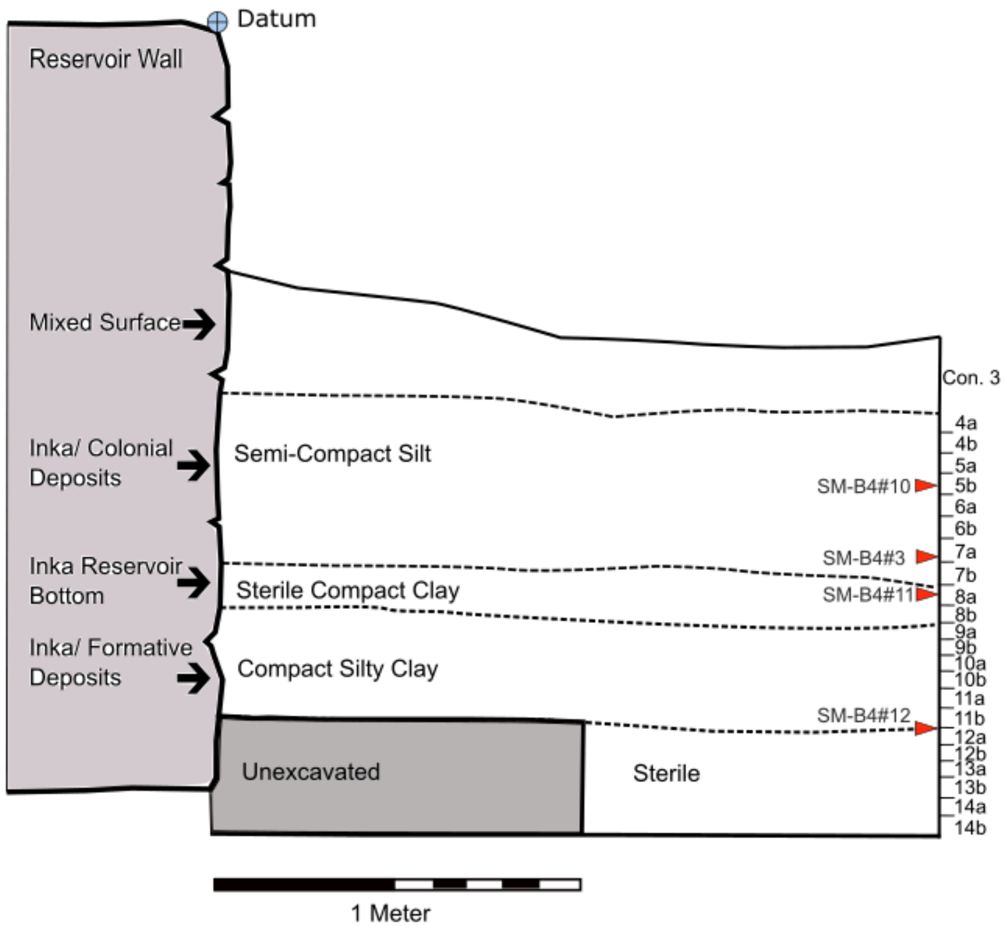

Figure 5-5: Eastern profile of excavations in the Muyupata reservoir. Alphanumerical codes to the right indicate arbitrary levels. Red arrows indicate dated carbon samples.

Dating the Inka/Colonial Sequence

The two radiocarbon dates from the upper strata of the reservoir anchor the deposit in absolute time, confirming that the sequence dates to the Inka and Colonial periods. While the dates themselves calibrate with higher probabilities of Inka deposit, it is likely that, until the Inka estate at Ollantaytambo ceased to function in the 1530s, the reservoir would have been regularly cleaned, so these strata were almost certainly deposited after 1532. These levels contained only Inka ceramics; however, a mandible of sheep/goat recovered from stratum 5a confirms that strata

5a and above post-date the introduction of those animals to the Urubamba Valley, an event which may have occurred as early as the 1540s. The two radiocarbon dates in the sequence are very close temporally—the calibrated ranges for the two dates overlap considerably—suggesting that these strata were deposited relatively quickly one after another. Modeling these two dates together using Bayesian statistics (via the OxCal modeling program) results in a poor statistical agreement (Appendix 1; see Figure 6), so it is difficult to definitively situate these dates in time. However, the model does suggest that the depositional sequence was laid in the late 1500s and early 1600s.

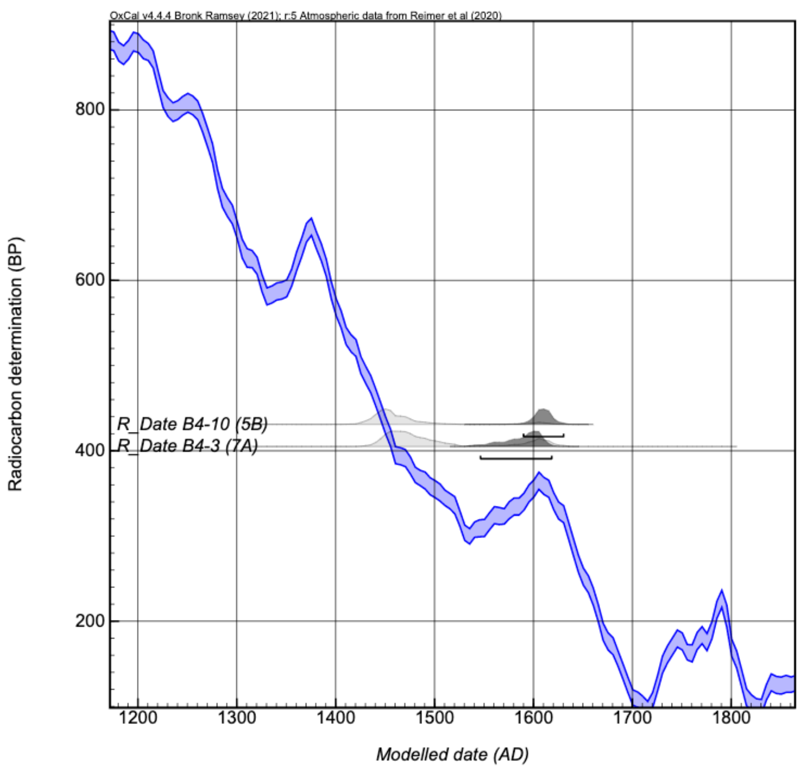

Figure 5-6: Modeled distribution of probabilities associated with radiocarbon dates from the upper stratigraphy of the reservoir based on OxCal v. 4.4 PSequence modeling (Bronk Ramsey 2008). This model assumes post 1532 deposition for both dates, however, it returned a low overall agreement, so the derivative ranges are not statistically rigorous. Dates for this time are know to vary widely due to fluctuations in the radiocarbon calibration curve. Even so, given sediment accumulation rates, the model suggests that the sediments from which pollen discussed in this chapter were recovered were deposited around the close of the sixteenth century.

While the 40 to 45 cm depth of the Inka-Colonial sequence is suggestive of an extended period of sediment accumulation, members of the agrarian cooperative at Simapuqio estimate that they remove approximately a cubic meter of sediment from each of the operational reservoirs at the site during each cleaning, which occur between once and three times a year. Given the area of these reservoirs (~100-125m^2), this represents an accumulation of between 1 and 3 centimeters annually, implying that the Inka-Colonial sequence might well have been deposited over a period of only a few decades. Pollen remains of trees and woody plants decrease only slightly throughout the sequence (see below), suggesting the deposition sequence dates either prior-to or at the beginning of the widespread deforestation of the seventeenth century (Chepstow-Lusty et al. 2009). Given these constraints, it is highly probable that the pollen sequence was deposited across the transition from Inka to Colonial rule during a period in which the canal system was not maintained and accumulated sediments in the reservoir were not cleaned. It is impossible to know with certainty whether the rate of deposit was constant across this period. Factors like animal trampling and the collapse of terrace walls may have caused intermittent events of rapid erosion. Indeed, as I discuss below, the concentration of the only aquatic taxa in the sequence (Typhaceae *Typha*) varies according to a pattern that suggests that the influx rate and amount of standing water in the reservoir shifted dramatically, likely in accordance with the final breakdown of irrigation infrastructure. Given these uncertainties, while I use the data from the sequence to assess change over time, the pace of these changes remains an open question.[31] Nevertheless, radiocarbon dates from these strata suggest changes in

[31] *Typha* concentrations are at their highest in context 6a (130-136cm), and subsequently collapse (see below). At the same level there is a slight shift in soil consistency and color, perhaps indicating a change in the mechanism through which the reservoir was filled in (from silt brought by the canal to windborne sediment), which would have changed the rate of deposition.

agricultural practice materialized in the fields and pastures of the region, and recorded in the pollen record, had occurred by the middle of the seventeenth century.

5.5 Reservoir Botanical Analysis

The excavation team collected samples for pollen analysis from each arbitrary level in the reservoir sequence according to the procedures outlined by Bryant and Holloway (1983, 199). Bulk soil samples for macrobotanical analysis were standardized at six liters. As discussed below, conclusions from this analysis are curtailed by limitations inherent to the datasets, but they nonetheless provide a picture of shifting colonial ecologies and changes in the use of agrarian infrastructure around Simapuqio-Muyupata and in the broader Ollantaytambo region for approximately the first century after the Spanish invasion.

Assessing a Local and Regional Record

Palynologists understand stratigraphic pollen records to be indices of both local and regional processes; water bodies of different sizes and at different elevations collect pollen from different distances, and pollen of different types travel different ranges, depending on factors such as grain size and whether the producing plant is primarily wind or insect pollinated (Faegri and Iversen 1989). Maize pollen, for instance, is enormous by comparison with other Poaceae taxa. The majority of maize pollen grains are trapped within the flower and few travel more than a few meters, so maize pollen are rare in depositional sequences even where the plant is a common cultigen (Jarosz et al. 2003; Sublette Mosblech et al. 2012). By contrast, pollen from wind transported genera—particularly, in this sequence, Podocarpaceae *Podocarpus* (pine), Ephedraceae *Ephedra* (an evergreen xerophytic shrub), and Betulaceae *Alnus* (alder)—can travel many kilometers prior to deposition, so fluctuations in the concentrations of those taxa are indicative of regional processes.

At Markaqocha, the closest comparable pollen record to the Muyupata reservoir, Chepstow-Lusty and colleagues (1996; 1997) note that the ~40m diameter of the in-filled lake suggests that the core they extracted represents a localized pollen record. The reservoir at Muyupata is even smaller (approximately 15 meters in diameter). However, pollen grains were likely transported to the reservoir via the canal as well as through direct deposition—"pollen rain"—on the reservoir surface. Thus, the Muyupata record is likely representative of plant assemblages in fields directly surrounding the reservoir, plants from the broader expanse of high plains and hillsides from which pollen might have been deposited in the canal, and, in the case of regionally dispersed high pollen producing taxa, the broader Cusco region.

In addition to the wind pollinated plants that make up the majority of the Muyupata pollen assemblage, rare grains from zoophilous taxa, including Bignoniaceae and Malpigiaceae, may indicate the presence of trees relatively close to the reservoir that are otherwise underrepresented in the pollen sequence. To better track the presence of plants that do not produce wind-borne pollen, this study also sampled for macrobotanical remains from each of the arbitrary levels. These remnants are largely charred seeds from trees and shrubs, and were likely either blown into the reservoir after fires on the landscape or were deposited as trash across the period in which the reservoir silted in.[32]

Data Limitations: Pollen Concentrations

Pollen samples were processed and analyzed at the paleoenvironmental laboratory of the *Universidad Peruana Cayetano Heredia*.[33] Samples were spiked with a known quantity of

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[32] In the next chapter I compare these samples with findings from domestic contexts.

[33] Macrobotanical samples were floated in Ollantaytambo and subsequently sent to UPCH for analysis.

Lycopodium spores to facilitate concentration calculations. Pollen counts were targeted to a minimum of 200 grains per sample. Pollen concentrations throughout the sequence, however, were surprisingly low, and therefore, in many samples, the total number of grains counted was under 200 (see Figures 5-7).[34] Low overall concentrations and the variation in total concentration between samples suggest possible problems with the preservation of pollen in the reservoir context, and potentially compromises the degree to which those samples accurately reflect historical plant assemblages.[35] The overall poor preservation of pollen through the sequence and extreme variation in concentrations may be due, in part, to the wet/dry seasonal cycle of the Andean year given that pollen is particularly susceptible to repeated desiccation and saturation and rapid deposition in the sequence, as was likely (see above) could exacerbate this issue (Hall 1981; Holloway 1981; Edwards and Trigg 2016).

[34] Pollen concentrations throughout the sequence are far lower than generally accepted levels in paleoenvironmental reconstruction, where 1000 grains/g sample is generally accepted as a floor (see Hall 1981; Edwards and Trigg 2016). Concentrations varied from an extreme low of 1gp/g in sample in the 140-145 cm depth to a high of 57gp/g in depth 125-130 cm. Here, I nonetheless present pollen results because they are supported by historical and macrobotanical data.

[35] For this reason, I am particularly cautious of conclusions drawn based on percentage results from sample depth 140-145cm, where a low number of grains prompts drastic fluctuation in relative sample composition.

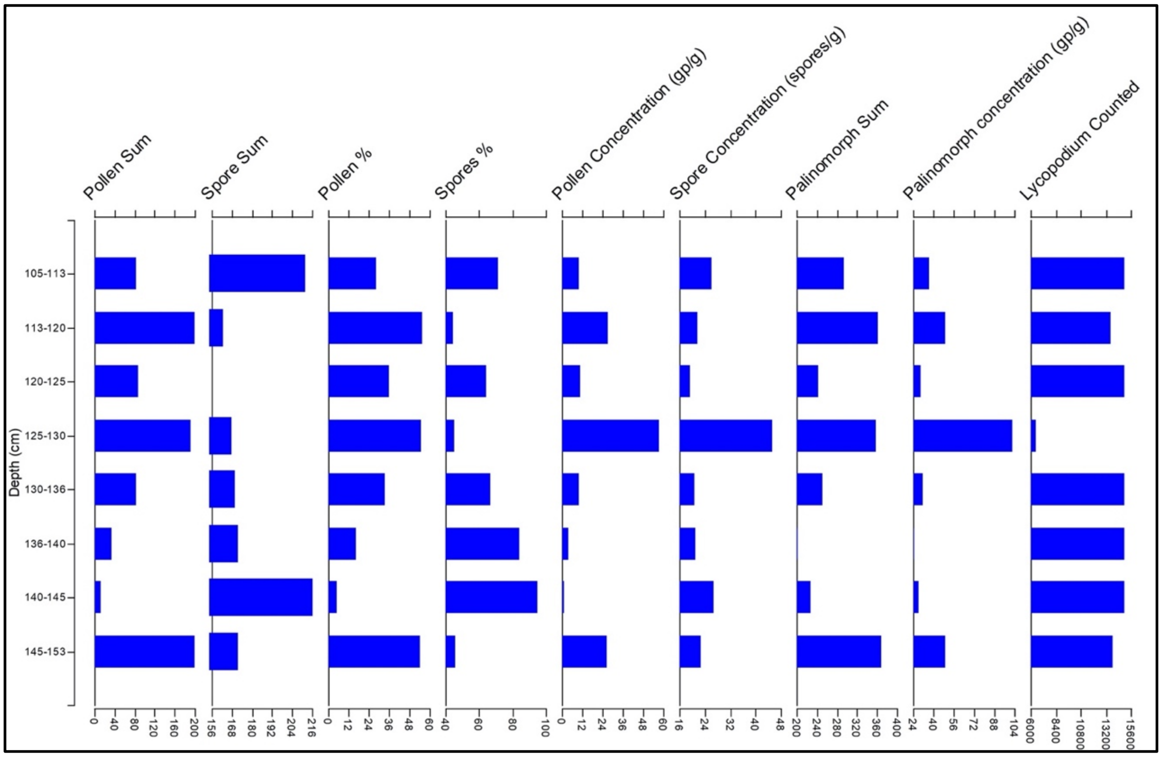

Figure 5-7: Counts, percentages, and concentrations of pollen and spores through the Inka and Colonial layers of the sequence plotted against deposit depth, in centimeters. The Lycopodium count on the far left represents spores added to facilitate concentration calculations.

The pollen data derived from this sequence are highly variable; no taxa were ubiquitous throughout the sequence, although *Cheno-Ams* (*Chenopods* and *Amaranths*) appeared at all depths except 140-145 cm. Because that sample has the lowest pollen concentration of the sequence, the absence of *Cheno-Am* pollen is likely to be the result of sampling or preservation errors rather than reflective of a drastic reduction of these taxa on the landscape. Betulaceae *Alnus* was the second most ubiquitous pollen, present in six of the eight samples. This ubiquity is likely both reflective of the prevalence of that taxa on the landscape and a result of the high pollen production and wide dispersal of the *Alnus* tree. *Podocarpus*, Solanaceae *Solanum*,[36] and

[36] These pollen are assumed to represent Solanaceae *Solanum tuberosum* (potato)*,* however, they are indistinguishable from *Solanum lycopersicum*, the tomato. I assume that these grains are *tuberosum* because tomatoes, a Mesoamerican cultigen, were likely not introduced to the

Poaceae (grass family) pollen are also present in the majority of samples, although at highly variable concentrations.[37] Beyond those taxa, the vast majority of identified pollen are only present in one or two samples, although various genera of Asteraceae are ubiquitous across all but one of the samples.

The volatility of the sequence is likely in part reflective of low overall pollen counts but may also be indicative of an underlying flux in plant communities on a landscape in transition. Indeed, many of the taxa present, such as Asteraceae, are common ruderals that quickly colonize disturbed soils and recently eroded slopes, so their relatively high presence across samples in the sequence suggests that growing conditions—and thus the plant community—may have been unstable through the period of deposition in the reservoir. Because pollen counts and concentrations are low, and the variation in ubiquities makes comparison between samples less rigorous, these pollen data should be treated with a degree of caution. As such, the conclusions I draw from pollen data in this chapter are conservative and supported by other independent data, including parallel macrobotanical sampling from Muyupata, published environmental proxies from the Markaqocha core sequence, excavation data from Simapuqio-Muyupata, and the archival record.

Botanical Data and Analysis

Ollantaytambo region until relatively late in the Colonial Period and have likely never been major cultigens (Gade 1975). There are several genera of wild tomato in the Andes, however, these taxa are unlikely to have be common around Ollantaytambo, so the ubiquitous potato is a more likely source of the pollen.

[37] Poaceae pollen might be representative of any number of native grass taxa, including high altitude *Jarava Ichu* (locally *paja*). It is possible that some of these pollen were from introduced grains, such as wheat and barley, but this is unlikely as those taxa are self-pollinating (Edwards and Trigg 2016; Kelso and Beaudry 1990)

In this section I outline broad trends in pollen and macrobotanical data. These descriptions begin with the deepest of the eight strata sampled from the Inka and Colonial periods (i.e., oldest to youngest). Depths given here are measured from the datum for this unit, which was located atop the reservoir wall (refer to Figure 8 above). Excavations began 68cm below the level of the datum, and the uppermost layers of unsampled disturbed soil continued to a depth of 105 cm from the datum.

Macrobotanical remains recovered from sampled strata are nearly exclusively comprised of charred seeds, the majority from taxa also represented in the pollen assemblage. With the exception of Cannabaceae *Celtis* (hackberry), macrobotanical remains not also represented by pollen are all from zoophilous taxa that would not necessarily be expected to be found in the pollen sample. Because of the variability of total concentrations between strata, I discuss the relative *percentages* of pollen recovered below. Figures 11 and 12 display change over time in both concentration and percentages for the major taxa in the sequence; for the majority of these taxa, percentage and concentration trends are aligned.

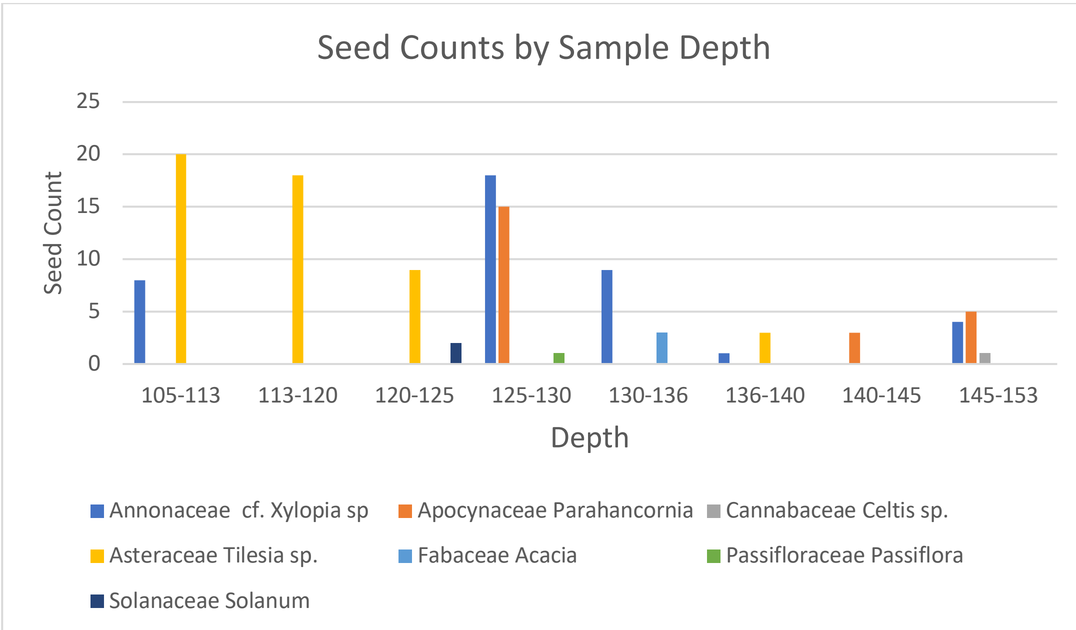

Figure 5-8: Macrobotanical remains by Sample depth.

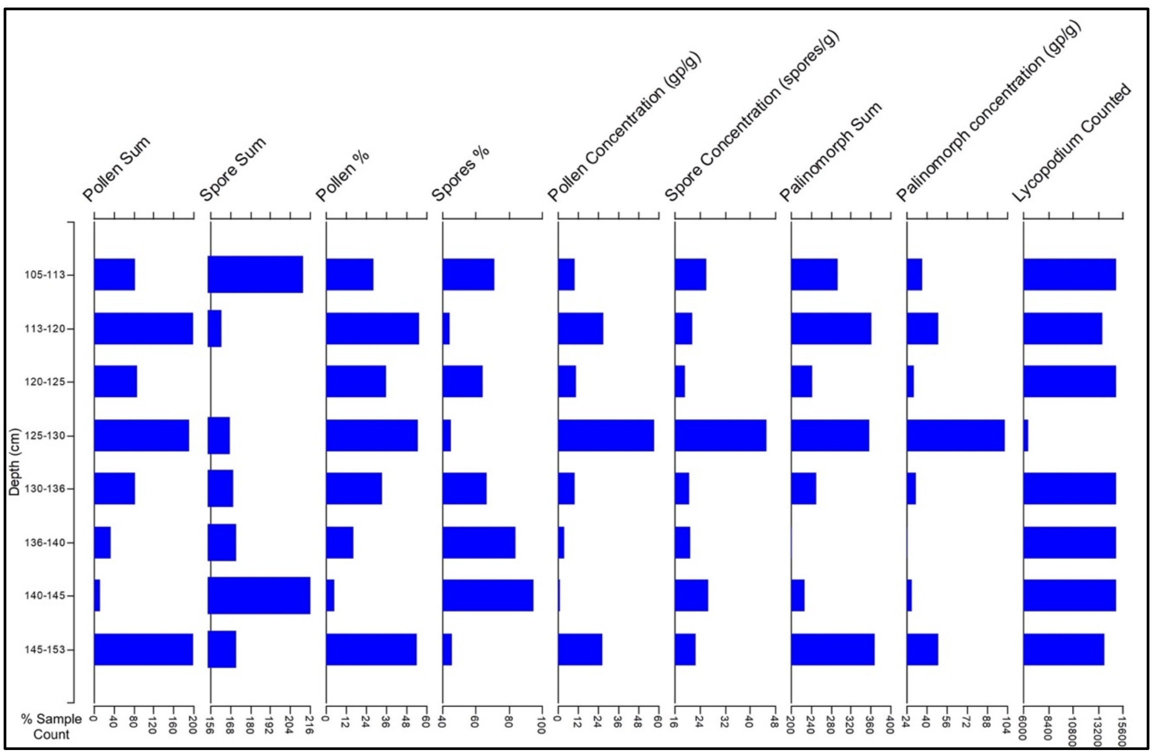

Figure 5-9: *Percentages* of major taxa recovered in the Muyupata sequence. Percentages are calculated here from the count of each pollen type per sample relative to the total count for that sample.

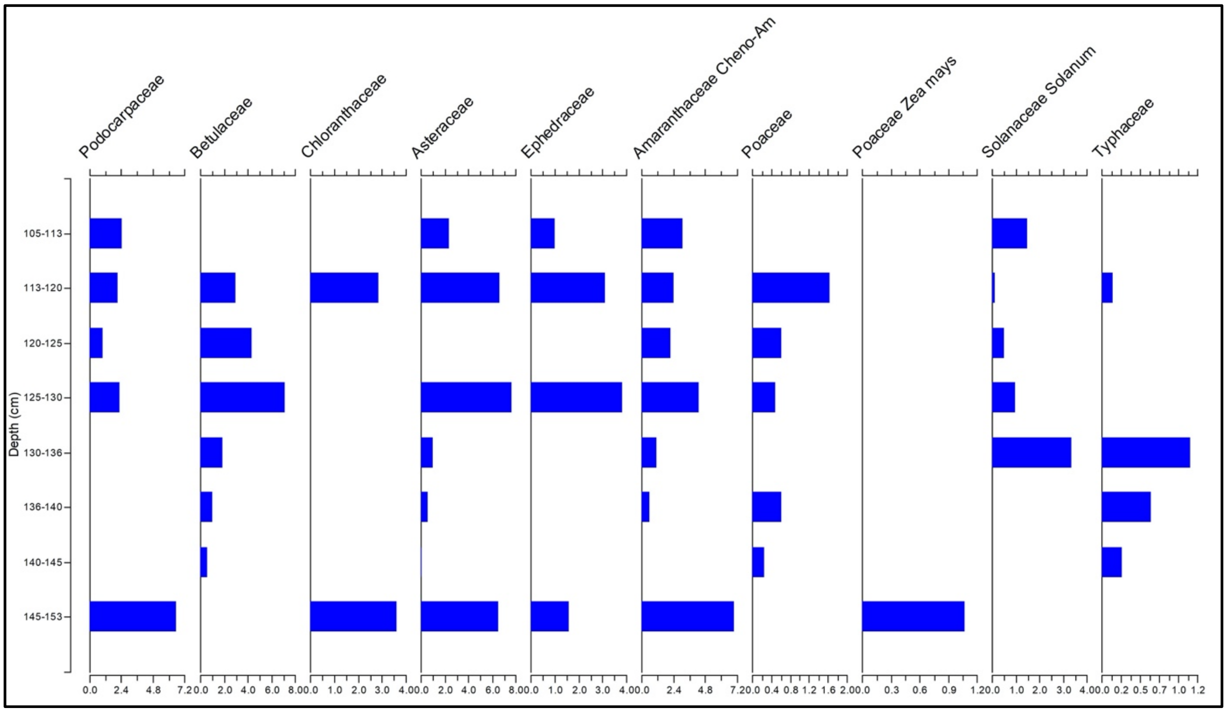

Figure 5-10: *Concentrations* (grain/g) of the major taxa in the Muyupata sequence. Full data are included in Appendix 6.

The deepest stratum, from a depth of 145-152 cm (7b), is notable as the only sample to contain maize pollen. While the 4% of pollen in this sample (8 of the 200 grains counted) may seem like a small percentage, it is relatively high for maize given that maize pollen rarely travel more than a few meters from the plant. At this level, *Cheno-Ams* are a significant portion of the pollen assemblage (26%). This sample is notable because of the absence of Betulaceae *Alnus*, otherwise ubiquitous through the sequence. Herbaceous plants comprise the majority of the assemblage, but Poaceae is conspicuously absent. Macrobotanical remains include Annonaceae *cf. Xylopia*, Apocynaceae *Parahancornia,* an Amazonian fruit bearing tree, and Cannabaceae *Celtis*. The next level, 7a (140-145 cm) has the lowest overall pollen count and concentration of the entire sequence, so findings are tentative. In this level, maize pollen disappear from the sequence. *Alnus* pollen are suddenly a large proportion of the assemblage, amounting for 41.6% of pollen grains. Poaceae (16.6% of the assemblage) contributes to a rise in the overall proportion of herbaceous plants, although the overall low concentrations mean that the concentration of herbaceous plants decreases relative to the prior stratum.

From a depth of 136 to 140 cm (level 6b), *Cheno-Ams* begin to increase in proportion (15%). *Alnus* continues to be an important component of the tree assemblage, joined, in this sample alone, by the tree Bignoniaceae (15.5%). Macrobotanical remains include additional seeds of Annonaceae *cf. Xylopia* but also include, for the first time in the sequence, seeds of Asteraceae *Tilesia,* a small flowering plant that rapidly establishes in disturbed or eroded soils. In level 6a (130 to 136 cm) *Cheno-Ams* decrease in percentage (to 10.7%). In this level Asteraceae rates remain largely stable; *Alnus* increases in percentage to 32%. This sample is most notable as the first sample in which Solanaceae *Solanum* pollen (32.1%) were present. As potatoes are largely (although not exclusively) insect pollinated, the high percentage of this pollen in the sample likely indicates that potatoes were grown in fields in the immediate vicinity of the reservoir. Macrobotanical remains from this stratum include Fabaceae *Acacia* and additional seeds of Annonaceae *cf. Xylopia*.

From 125-130 cm (5b) *Cheno-Ams* increase in percentage (20.68%) and *Alnus* decreases significantly (to 12.5%). It is notable that grasses are uncommon in this level, and that potato pollen decrease as a percentage of the assemblage (4%). Notably, pollen from *Ephedra*, a common xerophytic plant, appear in the assemblage at the same level that Typhaceae *Typha*, the only aquatic plant in the sequence, disappears. While *Ephedra* is wind pollinated and pollen may have originated at a considerable distance from the reservoir, the coincidence of a rise in xerophytic taxa and decline of water-loving taxa may indicate a landscape-wide trend of irrigation system failure, which would have resulted in a reduction in the total water available on the landscape. At this level, additional seeds from Annonaceae *cf. Xylopia*, Passifloraceae *Passiflora*, and Apocynaceae *Parahancornia* were recovered. At a depth of 120-125 cm (Level 5a) *Alnus* pollen rebounds to 40.2% of the assemblage (the second highest concentration in the sequence). *Podocarpus* also becomes more important as a percentage, rising to 9.1% of the assemblage. *Cheno-Ams* percentages also increase to 20.6% of the assemblage. Macrobotanical remains from this sample included additional seeds of Asteraceae *Tilesia* and seeds of Solanaceae *Solanum*, further confirming the likelihood that potatoes were cultivated around the reservoir. The mandible of a sheep or goat was also recovered at this level, the first incontrovertible evidence of post-conquest deposition in the sequence.

In the next level, from a depth of 113-120 cm (Level 4b), the percentage of the pollen originating from *Alnus* drops (11%) in a trend that continues into the subsequent sample and may be indicative of colonial deforestation. The total proportion of the assemblage comprised of woody plants remains largely stable despite this decrease due to the appearance of *Schinus molle* (Andean Pepperberry) in the sequence (10.5%). *Molle* is a small, drought tolerant species by contrast with the water loving *Alnus*, so these trends may be indicative of a drying landscape. Further seeds of Asteraceae *Tilesia* in the macrobotanical assemblage suggest an unstable landscape and erosion. The final layer of the strata, from a depth of 105-113 cm (Level 4a), *Cheno-Ams* rise to their highest proportion in the entire sequence (29.76%). *Podocarpus* (23.8%) is the most important of the tree taxa at this point in the assemblage. Solanaceae *Solanum* (14.28%) are the only pollen grains in this sample that are likely representative of cultivated plants. Macrobotanical remains in this stratum again include the ruderals Asteraceae *Tilesia* and Annonaceae *cf. Xylopia*.

The results of this analysis are revelatory about trends in infrastructure use at both regional and local scales, particularly when combined with data from the Markaqocha lake core sequence and the historical record.

Regional Scale

Trends in regional ecologies are most clearly represented by the majority of the tree species, the Asteraceae, and other wide-dispersing, wind pollinated taxa like *Ephedra*. Breaking the pollen data down by plant type clarifies these regional trends. Here, I use four categories: aquatic plants, trees, and herbaceous plants (Figure 5.12 displays percentage of the pollen assemblage by plant type). Categorization of taxa was based on Gade's (1975) ethnobotanical studies. The "herb" category includes both plants that disperse pollen widely and more localized pollen dispersers, but the tree category is dominated by taxa that disperse pollen broadly.

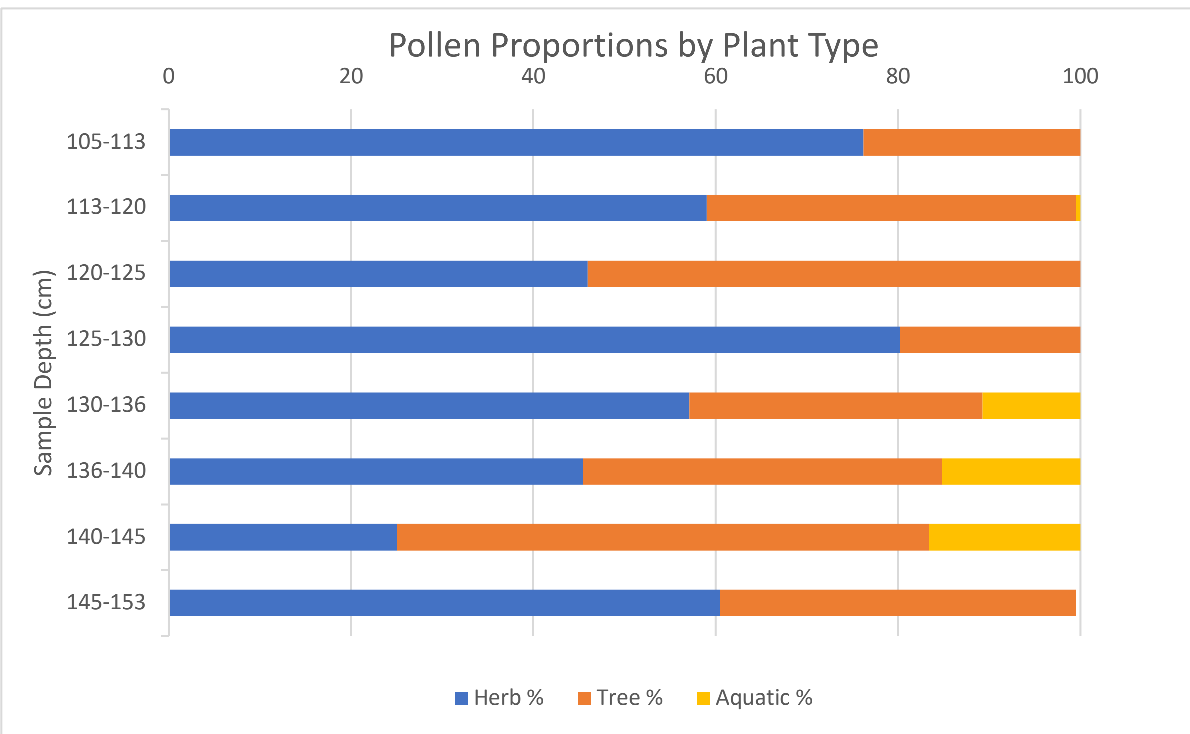

Figure 5-11 Percentages of different plant types in the pollen sequence, plotted against sample depth (cm). Note that the sample from 140-145 has very low counts and may be biased towards tree pollen. Typhaceae are the only aquatic taxa recovered in the sequence.

This categorization demonstrates a trend towards a lessening proportion of arboreal wind-dispersed pollen in the higher strata of the sequence. Over time, pollen from herbaceous taxa—in lower depths largely *Cheno-Ams* and in later samples Poaceae, Solanaceae, and Asteraceae—become a higher proportion of the pollen assemblage. It is notable that the only aquatic plant, Typhaceae *Typha* is totally absent from the earliest sample, but then represents (from deep to shallow) 17% (sample 7a), 15% (sample 6b), and 10% (sample 6a) of the pollen assemblage, before disappearing entirely except for a lone grain in the second to last sample. The rise in the proportion of aquatic pollen in the early strata may be indicative of the cessation of infrastructure maintenance—reservoir cleaning—which would have afforded the plant the opportunity to grow in places where it would not have been able to gain a foothold when infrastructures were regularly cleaned.[38]

Within this sequence, arboreal pollen in the early strata are largely Chloroanthaceae and Podocarpaceae *Podocarpus*, the middle strata are dominated by Betulaceae *Alnus*. *Podocarpus* returns as the source of most woody pollen in the upper samples, although at the end of the sequence there is a rise in the proportion of tree pollen from the *Schinus molle* tree.[39] This small

[38] The plant is wind pollinated, so this pollen may also have originated in other wetlands, including high-altitude wetlands located above the reservoir. It is impossible to say with certainty whether this trend is representative of the broader region or whether these pollen grains might have originated within the Muyupata reservoir itself. If these grains originated within the reservoir, the absence of *Typha* pollen in later strata indicates the ultimate failure of the canal and drying of the reservoir. This would also have resulted in a change in the mode of sediment deposition, from water borne silt to wind borne dust. There is a very slight change in sediment color (from Munsel color 7.5yr 3/3 dark brown to 7.5yr 3/2 dark brown) and a slight loosening of the compactness of the sequence between levels 6a and 6b, which may be indicative of such a shift in the mode of sediment deposition.

[39] In terms of its growth pattern and distribution on the landscape, *Schinus molle* is similar to many of the shrub taxa present in the sequence, however, in keeping with the 200cm of height

tree grows quickly in disturbed soil has a high tolerance for dry conditions. Its prevalence in the later samples is indicative of disturbed soils and drier growing conditions. The rise of this tree as a proportion of the woody pollen may also be indicative of a decline in forest cover from larger trees like *Alnus*. In the Markaqocha core, *Alnus* is among the most common pollen types from around AD 1000, accounting for approximately 50% of the pollen in the Markaqocha sequence, until a decline (to roughly 30%) around AD 1700 (Chepstow-Lusty and Winfield 2000, 324). A decrease over time in the ubiquity of pollen from *Alnus* and other large tree species is in line with broader environmental histories of the Andes over the transition from Inka to Colonial rule that infer a trend towards the destruction of forests due to the collapse of Inka edicts governing the use of forest products and increased Spanish demands for fuel for heating and to power the smelters that were the primary source of imperial wealth (Chepstow-Lusty and Winfield 2000).[40] At Ollantaytambo, for instance, the encomienda tribute *tasa* demanded building timber, wood for fuel, and charcoal—10 *arrobas* in a month in 1549, rising to 50 *arrobas* in 1555 (see Julien 2000).[41] While the total proportion of tree pollen in this sequence remains relatively high until the last sample, it follows that the majority of the Muyupata sequence was deposited before the most dramatic and widespread deforestation.

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distinction I use between tree and shrub taxa, *molle* was classed as a tree species.

[40] Ansion (1986, cited in Chepstow-Lusty et al. 1997) draws on the Friar Bernabe Cobo's history of the Andes to estimate that the daily wood consumed by a single Spaniard may have been as much as a month's supply for a native Andean. Chepstow-Lusty et al. (1997, 131) attribute the collapse of forests around Ollantaytambo to the elimination of Inka edicts, high rates of Spanish consumption, and potential overgrazing, but also acknowledge a possible decrease in pollen production due to cooling during the Little Ice Age.

[41] The *arroba* is a unit of weight and volume derived from the carrying capacity of a donkey that approximates a bushel.

The increase in the relative proportion of herbaceous taxa is also indicative of a transforming plant community. Many of these taxa—in particular the Asteraceae—are ruderals that colonize recently disturbed soil or uncultivated fields (e.g., Brugger et al.2009). At Markaqocha, Chepstow-Lusty and colleagues (2009) interpret increasing proportions of Asteraceae *Ambrosia* in the core in the Colonial Period as an indication of erosion and the cessation of terrace maintenance. While the Muyupata sequence does not include *Ambrosia* pollen, the Asteraceae that are present may also be indicators of erosion. These plants—like *Ephedra*, which increases in proportion across the same portion of the sequence—are also broadly drought tolerant. Their increased presence in the sample across time may indicate a shift towards drier growing conditions. Given the relative short duration of the pollen sequence from the Muyupata reservoir (maximally ~100 years), the trend towards a more drought tolerant plant assemblage is unlikely to be indicative of climatic shifts, such as a decrease in rainfall.[42] Rather, I interpret this trend to indicate a decrease in the distribution of irrigation water on the landscape. When irrigation systems were functional, canal spillover would have allowed even water-dependent wild taxa to flourish along the paths of canals and on the edges of field systems. Thus, here the increase in drought tolerant plants as a proportion of the Muyupata pollen assemblage may indicate the dilapidation of Inka built irrigation systems.

At a regional level, pollen from the Muyupata sample are indicative of the failure of

[42] It cannot be absolutely ruled out that the increased proportion of drought tolerant plants is an indication of broader climactic shifts, however, proxies from the Quelccaya glacier (Thompson et al. 1994) indicate that the period from approximately 1500-1720 was wetter than usual (by contrast, the 1720-1860 period was quite dry). This is to say, the general trend towards a drier landscape likely did not begin until well after shifts recorded in the Muyupata record.

infrastructures like irrigation canals and terraces, indicated by the increase in proportion of drought tolerant plants and an increase in the proportion of Asteraceae—a proxy for disturbed soils and eroded field systems. These findings are broadly consonant with the higher altitude record from the lake core at Markaqocha, approximately 11 kilometers distant. In the Markaqocha data, pollen evidence, charcoal ratios, and concentrations of coprophilous mites tell a comprehensive story of terrace neglect demonstrated via an increase in ruderal concentrations (Asteraceae *Ambrosia*, in particular)[43] correlated with the emergence of a pastoral economy and the decline of forest cover during the Colonial Period (Chepstow-Lusty et al. 1997; Kendall and Chepstow-Lusty 2006; see Chapter 3). Although the data from Muyupata do not demonstrate deforestation to the dramatic extent evident in the Markaqocha core, this may be because the Muyupata record ceases prior to the widespread deforestation of the seventeenth century recorded at Markaqocha and may also reflect variation in the catchment areas of the two sequences.[44] The co-occurrence of evidence of ruderals in the two data sets, aligned with mite evidence for an increase in pasturing in the Markaqocha core, is highly suggestive of a dramatic increase in pastoralism around Ollantaytambo during the first century of the Colonial Period.

<u>Local Scale</u>

Changes in ecology and infrastructure use at the local level are demonstrated in the Muyupata sequence by pollen from plants with constrained pollen dispersal, including maize, Solanaceae *Solanum,* and various zoophilous trees. The macrobotanical assemblage—likely

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[43] Note that while the majority of Asteraceae pollen are similar in morphology, Asteraceae *Ambrosia* can be distinguished.

[44] This pattern of colonial deforestation is also evident in pollen records from the Laguna Huaypo, approximately 15km from Ollantaytambo (Sublette Mosblech et al. 2012).

composed of plants that charred in adjacent fields and were blown into the reservoir—provides an additional optic on hyperlocal ecological processes and indicates trends that played out on the broader landscape—an increase in the prevalence of ruderals and drought tolerant plants—were also local to Muyupata.[45] The increased frequency of seeds from Asteraceae *Tilesia* in the Muyupata sequence is particularly suggestive of this trend. Increases in the overall count of macrobotanical remains in later strata may indicate increased burning on fields around the reservoir. Chepstow-Lusty and colleagues (1997) suggests that field burning may have become more common in the Colonial Period to maintain agricultural fields for planting with reduced labor, or to clear land for pasture.

The local pollen record signals a significant shift in the use of terraced fields in the immediate vicinity of the reservoir, namely, a transition from maize to potato cultivation.[46] Because maize pollen travel a very short distance, and because the canal that feeds the reservoir at Muyupata passes well above maize production zones along the majority of its course, maize pollen likely represents production in the fields immediately adjacent to the reservoir. Similarly, potatoes are predominantly insect pollinated (although limited wind pollination does occur), so Solanaceae *Solanum* pollen grains in the sample likely originated in fields close to the reservoir or along the canal. Maize pollen is only present in the sample from stratum 7b, the lowest (and earliest) of the samples in the sequence. The percentage of grains in this sample (4%) is high for

[45] Here, when I refer to the local scale, I mean processes occurring within the fields immediately surrounding the reservoir and on along the canal leading to the reservoir.

[46] In discussing food taxa here (and by contrast with many Andean pollen studies), I do not assume that *Cheno-Ams* represent food taxa. Although a portion of the recovered *Cheno-Am* pollen may well have originated in either quinoa or kiñiwa cultivation, there are many wild *Cheno-Ams* that are just as, if not more, likely to have contributed to the pollen assemblage.

maize and suggestive of intensive production in nearby fields. The subsequent absence of maize pollen in later strata does not conclusively rule out maize cultivation on those fields in later periods—and certainly maize remained the most important cultigen in the Ollantaytambo region—however, Solanaceae *Solanum* pollen in the upper strata of the reservoir suggest a transition in cultivation around the reservoir towards potato growing. This shift is also signaled by the presence of a potato seed at the sample depth of 120-125 cm, which may well have been charred during post-harvest seasonal burning, and by a drastic increase in potato seeds recovered from domestic contexts (see Chapter 6).

A change in cultivation practice from maize to potatoes likely aligns with the infrastructural history of the canal and reservoir. Maize is, and was, a highly valued crop that likely would have been grown wherever possible. Its replacement in the record may signal that the fields *immediately surrounding the reservoir* changed such that maize cultivation was no longer possible—infrastructures had degraded to the point that the long growing season maize demands could not be maintained. The rise of potato cultivation is consistent with this conclusion. Unlike maize, potatoes can be easily grown without irrigation in Ollantaytambo. Potatoes require a much shorter growing season and can be successfully farmed using only seasonal rainwater.[47] This shift in cultigens around the reservoir likely represents a transition in agricultural practice directly reflective of the degradation of irrigation infrastructure.

[47] Potato maturation times can vary depending on altitude, but the main crop around Ollantaytambo is generally sown in September and is ready for harvest after a growing season of about five months, as compared to the eight to nine month growing season for the primary maize crop (Gade 1975).

Table 5-1: Selected rare pollen counts and depths from the Muyupata sequence.

Sample Depth (cm) / Rare Pollen	105-113	113-120	120-125	125-130	130-136	136-140	140-145	145-153
Agavaceae (Agave)					2			
Anacardiaceae *Schinus Molle*		21						
Annonaceae			4					
Apiaceae		12						
Arecaceae *Bactris*		1						
Malpighiaceae *cf. Bunchosia*				3				
Myrtaceae				1				

A final datum point from the pollen record that signals local transitions in agriculture is the rare occurrence of pollen from fruiting trees, including Annonaceae (likely chirimoya fruit), Arecaceae *Bactris* (likely *pijuayo*—a fruiting palm), and Malpighiaceae.[48] The inclusions of macrobotanical remains from several of these taxa, as well as *Passiflora* (passion fruit vine), further suggests that these taxa were likely locally grown. These taxa are largely zoophilous, so they are almost certainly underrepresented in pollen sampling. Today, some of these fruit trees can be grown in especially suitable microclimates around Ollantaytambo, but they are generally found in warmer and more humid lower altitude ecotones between mountain and jungle.[49] While this evidence is not definitive, the ubiquity of pollen and macrobotanical remains from these taxa

[48] Several species of this genus of small tree or climbing vine produce edible fruit and are endemic to the lower altitude eastern slopes of the Andes. Gade (1975) noted Malphighiaceae *Bunchosia armeniaca* (*ciruelo*) cultivation in the Urubamba Valley, although at lower altitudes than Ollantaytambo.

[49] The slightly warmer and wetter climate of the Inka period may also have made the production of these crops slightly easier around Ollantaytambo. Several studies have noted the impact of the "Little Ice Age" in lowering cultivation limits in the Andes through the Colonial Period (Cardich 1985; Kosiba and Hunter 2017; Wernke 2010).

suggest that the "*guerta*" (garden or orchard) near Simapuqio referenced in documents from the end of the 16th century may have been a place where Inka farmers maintained special fields in order to grow exotic fruits. The fields where these plants were located would have demanded particular care to maintain suitable microclimates and keep the plants productive. This cultivation seemingly continued for some time after the fall of the Inka state, but the absence of edible fruit pollen and macrobotanical remains from the upper levels of the reservoir suggests that these taxa disappeared from the landscape during the Colonial Period.

5.6 Discussion: Inka Infrastructures in the Colonial Agroecology

Even given the limitations of these data and the difficulty of situating the sequence definitively in absolute time, botanical evidence from the Muyupata reservoir suggests significant transitions in the use of some Inka-built infrastructures during the Colonial Period and points towards the material impacts of the emerging colonial agroecology at regional and local scales. The ubiquity of ruderals—notably Asteraceae—in both the pollen and macrobotanical assemblage may indicate an increase in disturbed land, uncultivated fields, or eroded slopes consistent with regional terrace failure (see Chepstow-Lusty et al. 2009). Increased proportions of drought tolerant plants suggest an overall drier landscape and the breakdown of irrigation infrastructure. Canal and terrace degradation would have gone hand in hand, given that without the presence of irrigation water, terraces lose their utility as hydraulic infrastructure. These transitions, in turn, seemingly prompted a shift from irrigated maize production to dry-farmed tuber cultivation. *In toto* these data point towards a *deintensification* of agricultural practice. Rather than intensive maize production, at least some field systems were not maintained and were instead used for potato cultivation and pasturage (see below). This shift in practice is indicative of a change in how the land was situated socially, transitions in its productive potential, and a transformation in its social value (both monetary value, and symbolic value as maize land).

The failure of irrigation infrastructures and related changes in agricultural practice may have been a consequence of population collapse and a decrease in available labor. However, this explanation for de-intensification is not an entirely satisfactory justification for the degradation of agrarian infrastructure during the Colonial Period. For one, a universalized explanatory framework that relates demography to intensification elides socially mediated decisions about which infrastructures to maintain, and the allocation of labor in actualizing those decisions. Rather, evaluating the use and disuse of these infrastructures—the processes of dereliction and deintensification associated with the collapse of terrace and canal systems—requires attention not just to the availability of labor, but also to the intertwined material and social elements that sustained agricultural infrastructures, including choices about how to distribute labor across the landscape (e.g., Wernke 2010).

The coordination of water use and infrastructure maintenance demand social articulation. For instance, in 1559 when the *kuraka* Mayontopa made an agreement to "donate" fields at Pachar to the Cusco convent of Santa Clara the "donation" included an agreement that Ollantaytambo's ayllus would continue to maintain canals that serviced the fields (ARC, *Benficencia Publica*, *Colegio Ciencias*, 1555-1729). In effect, the legal instrument of the donation document stood in for ties of kinship or allegiance to the same local lords that might have otherwise facilitated the synchronization of irrigation. As numerous Andean ethnographies have demonstrated, canals do not simply link fields, they also connect people via the coordination of irrigation timing, maintenance responsibilities, and water rights (Gelles 2000; Trawick 2003). Mayer (2002), for instance, suggests that political decisions at the intersection of land tenure and water rights essentially structure what plants can be grown on a given plot of land, and when it must be planted, meaning that even on private fields cropping decisions are not independent.

Comparing the historical trajectories of fields at Muyupata and Simapuqio illustrates this point clearly. As neither maize nor potato pollen travel far from the producing plant, the maize to potato transition recorded in the Muyupata sequence and associated transitions in infrastructure use are likely reflective of highly localized processes limited to the fields immediately adjoining the reservoir. At Simapuqio, the short and self-contained irrigation system would have been more easily maintained to allow for the continuous cultivation of maize and other high value crops. The historical record bears this out. Simapuqio is continually defined explicitly as land for growing maize through repeated iterations of sixteenth century surveying, even as the terrace complex passed into private Spanish hands (ARC: *Colegio Ciencias*, N:26: 1555-1725; *f*: 443v; see Chapter 4). During the 1594 *composición y repartimiento*, lands at the site were explicitly defined as intended for maize production when distributed to six people from the *Chinchaysuyu*, *Aracama*, and *Yanaconas del Rey* ayllus of the *repartimiento*. By the next iteration of *composición* in 1628, the fields had been acquired by a single Spaniard, Miguel de Mora, but they were still defined explicitly as maize fields (see Chapter 4).

In the 1594 and 1628 iterations of *composición*, two *topos* of land at Muyupata were distributed to a group of '*Indios Chachapoyas'* in 1594.[50] That grant—which described the fields

[50] It is unclear exactly who these people were. They may well have been remnant *yanakuna* resettled from the northern Chachapoyas region, or the term may have had a more generic meaning of "outsider." However, it is clear that they did not belong to Ollantaytambo's ayllus. Indeed, given that many of the Inka workers who had been based at Ollantaytambo became part of the *Yanaconas del Rey* ayllu, and that these Chachapoyas were not reduced into that ayllu. It is possible that they came to the area during the Colonial Period. In any case, the Chachapoyas retained their holdings at Muyupata for decades. As late as 1658, lands around Muyupata were

as "vacant and available"—included four *topos* of land in two other locations, Nauinpata and Guayllapata, for a total of ten *topos*. These sets of fields are not located together, and while each is within the command area of the broader Kachiqhata canal system, they would have been irrigated by distinct branches of the system. The entire set of lands were described as being for maize and potato cultivation. By 1659, the same fields at Muyupata, still controlled by the Chachapoyas, were described as "*tierras de poco fruto*"—poorly productive lands upon which little can be grown.[51]

described by reference to their boundaries with the "lands of the Chachapoyas" (ARC, *F: Colegio Ciencas*, L: 26, l. 16, 1555-1725, *f.* 443v).

[51] As I discuss in the conclusion to this dissertation, these lands were classified as "natural pasture" during the Agrarian Reform, demonstrating the solidification of their categorization as unsuitable for cultivation.

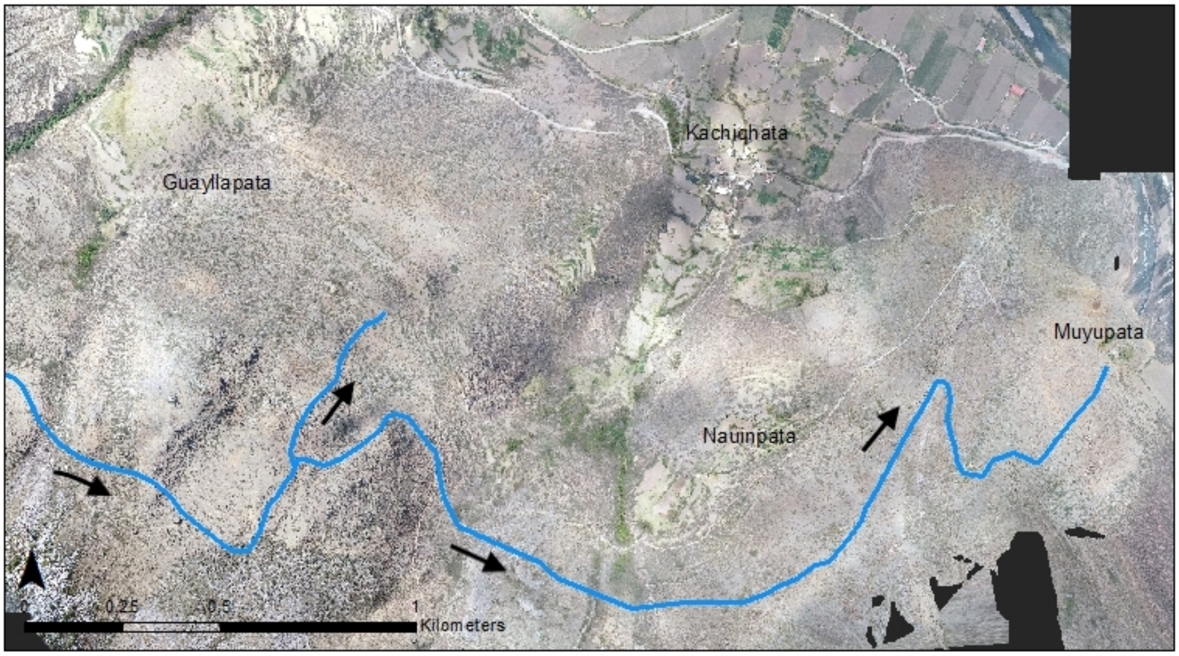

Figure 5-12: Locations of fields assigned to the Chachapoyas at Muyupata, Guayllapata, and Nauinpata in relation to the canal (in blue) and the Kachiqhata area, where Vizente had an estancia. Arrows indicate direction of canal flow. The base of this image is a high resolution orthophoto created using drone imagery. The Kachiqhata quarries are located to the lower center. The quarries are located at an elevation of around 3200masl, by comparison, the riverbank fields to the northern edge of this map are at an elevation of around 2800masl. Arrows indicate direction of canal flow.

Apart from the grant to the Chachapoyas, lands along the Kachiqhata canal system are not mentioned in either the 1594 or 1628 *composición y repartimiento*, implying that field systems within the command area of the canal were alienated from community control during or before those land distributions.[52] Although ownership and usufruct of these lands in the sixteenth century remains opaque, by the seventeenth century at least some of the remaining lands within the Kachiqhata command area had been taken over by Luis Vizente, the same man who had first extended *dominio* over land at Markaqocha (see Chapter 4). In his will, dated 1618, Vizente

[52] It is also possible that some of these lands were listed using toponyms that no longer apply to the fields today, and thus are unidentifiable.

described his holdings at Kachiqhata as an estancia that stretched "from the bridge of Ollantaytambo to the lower part with lands of Francisco Xuarez, and from one boundary to the other with the big river of Yucay" (ARC: *Protocolos Notariales*, N:260, 1618-1619).[53] This will also noted that some years before he had sold additional land at Kachiqhata to another Spaniard, Juan de Zapata. So, the document clarifies at least three Spanish landowners in the immediate Kachiqhata area—Vizente himself, Xuarez, and Zapata—in the early seventeenth century, as well as the Chachapoyas. Given that use and maintenance of irrigation infrastructure like the Kachiqhata canal would have demanded coordination between all of these landowners, it is unsurprising that the canal fell into disrepair. Although all of their fields were located within the body of a single broad canal system, these farmers did not constitute a socially articulated irrigation cluster, and had disparate motivations that curtailed intensive cultivation. Whereas terrace walls and the irrigation system at Simapuqio were maintained to ensure the continued productivity of maize plants, terraces at Muyupata were allowed to collapse amidst an emerging agroecology predicated on dry farming potatoes and pasturing introduced animals. While it would be presumptive to assume regional conclusions from the comparison of infrastructural trajectories at Simapuqio and Muyupata, patterns of maintenance and degradation suggest that some infrastructures that necessitated coordination amongst different groups of people were allowed to decay.[54]

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[53] "…Primeramente mi estancia llamada Cachicata linde por la una parte con la puente de Ollantaytambo y por la parte de abajo con tierras de Francisco Xuarez de un linde a otro con el rrio grande de Yucay…" The exact locations of these boundaries are opaque but given the extent of the harvest and animals kept at the estancia, it is safe to assume the holdings were fairly extensive.

[54] These data and historical trends align closely with presumptions about land use and infrastructure failure after the arrival of Spanish colonizers in the Andes (Denevan 2001; Kosiba and Hunter 2017; Wernke 2010).

Indeed, while Vizente used some of the lands around Kachiqhata for maize production, he described his holdings as an estancia and seemingly devoted much of the land to pasturing newly introduced animals.[55] According to his will, Vizente pastured six teams of oxen, ten mules, an additional four to six cattle, ten to twelve sheep, and two hundred goats at Kachiqhata (ARC: *Protocolos Notariales*, N:260, 1618-1619). The documentary record demonstrates that estancias, primarily for keeping sheep and cattle, were common around Ollantaytambo by the middle of the seventeenth century. Other estancias were established at Chilipahua (1595), Socma (before 1648), in the high reaches of the Sillque valley (before 1582), at Utquibamba (by 1594), Huaipon (by 1594), at Huayllabamba (by 1594), around Curimarca and Marcoray (before 1608), and at Tiaparo, where Augustinian friars acquired a grant in 1568 and, by 1586, kept 53 pigs, 52 mares, 2 stallions, 22 steers and a donkey on 300 *fanegadas* of pastureland.[56]

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[55] In his will, Vizente made clear that the estancia included land for planting by describing the amount of maize and wheat harvested from his land at Kachiqhata (600 fanegadas of wheat, and 150 of maize) but he did not describe the amount of land planted to yield that harvest.

[56] References for these estancias come from a variety of documents and published sources: Kachiqhata (ARC: *Protocolos Notariales*, N:260, 1618-1619), Markaqocha (*ARC*: F: *Colegio Educandas*, L: 02, 1568-1722), Huaipon (ARC. F: *Colegio Ciencias*, L: 26, 1555-1725), Chillipahua, above Sillque, Curimarca and Marcoray, Socma, Tiaparo, Utquibamba, Huallabamba (Glave and Remy 1983). The reference to an estancia above Sillque likely corresponds to the Primavera area, based on textual descriptions, and may refer to a location where an Inka noble, Carlos Inka, kept hundreds of cattle, sheep, and pigs (Glave and Remy 1983). It is notable that many of these dates align with the *composición* in 1594, this suggests that many of these holdings may have existed prior to that date illegitimately but were legitimized during the *composición* (see Chapter 4). This is likely only a sample of the actual extent of estancia holdings; as I discuss below, there was a tendency to use grazing to expropriate ostensibly common lands. Note that Tiaparo estancia was one of the few parcels of land that can be accurately described as a “grant” or “*merced”* from the king around Ollantaytambo. Most other lands were (at least nominally) purchased from the crown during the *composición de tierras* (see Chapter 4).

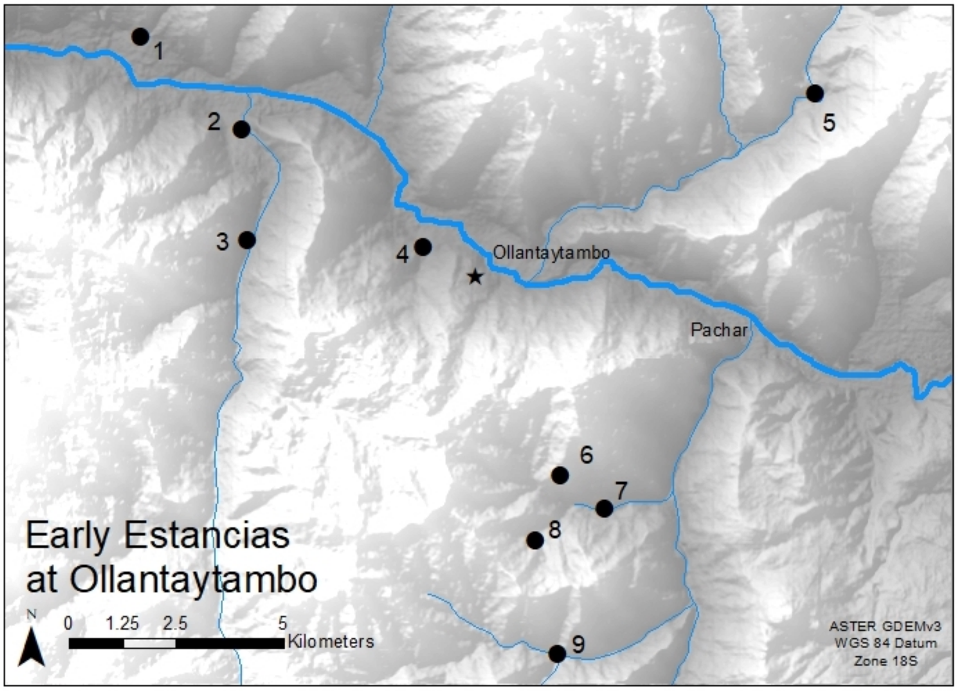

Figure 5-13: The locations of early estancias identified in the documentary record for Ollantaytambo. Note that there were likely others, so this record is only a partial sample. Nontheless the locations of these estancias are telling; for the most part, in higher altitude reaches close to common grazing lands. The exceptions, Tiaparo, Kachiqhata, and estancias around Sillque, would become the foundations of hacienda landholdings. Estancias noted here are 1) Tiaparo, 2) near Sillque (Utquibamba), 3) Huayllabamba, 4) Kachiqhata, 5) Markaqocha, 6) Curimarka, 7) Socma, 8) Marcoray, 9) Chilipahua. Note that the estancias of Huaipon mentioned in the text is not included here, that estancia was likely located to the west, further down the Urubamba Valley. The star in this map indicates the location of Simapuqio-Muyupata. These locations are based on toponyms from Kosiba and Hunter (2017), toponym mapping recorded by the Cusco ministry of Culture (1985), and Glave and Remy (1983).

The land rights associated with these estancias were, with some exceptions such as at Tiaparo, rather limited in extent. Grants and purchases often included only a few *topos* for corrals and outbuildings, and shepherds depended on common highland pastures and hillsides for grazing. Recall, for instance, that the original purchase of land to establish the estancia at Markaqocha in 1594 included only two and a half *fanegadas* of land: space for limited planting, houses, corrals, and shelters for animals, but with the understanding that animals would be grazed in high pasturelands that were, in theory, to remain open for common use (ARC: *Colegio Educandas*, L: 02, 1568-1722: *f*: 473; see Chapter 4).

How did this emergent colonial agroecology of new animals trampling, chewing, and grazing, alongside the cultivation of an emergent crop complex of mixed maize, wheat, and potato growing transform land at Ollantaytambo? As elsewhere in the Americas, the introduction and proliferation of introduced taxa had a plethora of material-ecological consequences. Lands that were once used for cultivation instead became pasture; the action of many hooved creatures exacerbated erosion, especially on slopes. Even in high altitude pasturelands traditionally used for grazing camelids, introduced ruminants had significant effects (e.g., Melville 1994; Sluyter 1991). Unlike camelids, introduced animals had horns and tusks for digging into the soil, walked on sharp hooves rather than the comparatively soft camelid footpads, and, lacking camelids' prehensile lips, were indiscriminate grazers (Baied and Wheeler 1991). There can be little doubt that as Vizente's 200 goats browsed the slopes of Kachiqhata, when the pigs the Augustinians kept at Tiaparo rooted for tubers leftover after potato harvest, and when oxen trampled terrace walls on their way to water, these animals dramatically impacted ground stability, soil compactness, and plant assemblages.

What's more, pastoralism was inherently expansionist. The presence of animals challenged both relatively longstanding traditions of land use and more recently established rights to usufruct or *dominio directo* (see Chapter 4). Animals directly threatened the infrastructure required for cultivation. As they grazed on terraces and drank at canals, they degraded the stability of slopes and retaining walls. Indeed, using animals to threaten tenure by breaking canals and trampling fields was a common colonial practice. In his famous letter to the King of Spain, Guaman Poma de Ayala (ca. 1615, 944) outlined how animals could be used to take over land: "they [the *indios*] lose their fields for want of water…the Spaniards loose their beasts, their mules, mares, or cattle, and drive their goats and sheep, and do great damage …breaking the canals."[57] Ramírez describes how this process played out on the North Coast of Peru where continued threats from wandering cattle prompted native agriculturalists to vacate fields:

> …native farmers usually moved their fields outside the range of the roaming beasts … intruding cattle broke down canal walls, allowing soil and brush to dam the flow of irrigation water. Once an irrigation ditch ceased to function, the native peasants could no longer sow the land, and brambles, weeds, brush, and trees eventually covered it. Once the peasants abandoned the land, the Spanish moved in permanently and grazed it or cleared it (Ramírez 1996, 73-74).

There is ample historical documentation of similar conflicts around Ollantaytambo—for one, the conflict between the Mercedarian convent and the *kuraka* Mayontopa over fields at Tambobamba and Colcabamba referenced in the introduction to this chapter (and Chapter 4). The possibility that Spaniards might use animals to threaten canals and fields on the valley floor was the pretext deployed to rearrange ayllu holdings during the *composición* of 1628, when the surveyor worried that animals would eat the fruit of the fields and trample the canals used to irrigate native holdings (see Chapter 4). Animals were also grazed on common or fallow land to establish a pattern of use that could subsequently be used to undergird claims to ownership and official title. For instance, in 1608 an Andean noble who pastured sheep and camelids and grew tubers near Curimarka, petitioned against the claims of a Spaniard, Juan de Espinosa, who was

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[57] "…se pierde todas las sementeras por falta de agua. Desto pierde los yndios sus haziendas y pierde su quinto rreal su Magestad y pierde la santa madre yglecia el diesmo que le deue. Y ací en este tienpo los españoles sueltan sus bestias y rreguas de mula o ganados y pasen las cabras, obejas y hazen grandes daños. Y se sacan las dichas aguas y se quiebran las asecyas que no se pueden aderesar con nengún dinero. Y la poca agua sólo quitan a los yndios pobres. Y ací se ausentan los yndios de sus pueblos…"

encroaching on planted fields with his animals in order to establish use rights that could be transformed into title (ARC, *Benficencia Publica, Colegio Ciencias*, 1555-1729, L:46, f:222). Deployed thus, animals became unwitting agents of colonization and land appropriation, remaking not just material ecologies with hoof and horn, but also challenging native land tenure and reorienting patterns of land use.

Even as Ollantaytambo's ecologies were transformed, and Inka built agrarian infrastructures were re-shaped, data from Muyupata make clear that even terraces that were no longer used for intensive cultivation were not truly abandoned. Rather, they were transformed through differential incorporation into the emerging colonial agroecology. Seemingly, some terraces on the sides of the valley became pasture or potato land even as the continued intensive cultivation of maize and wheat in valley-floor fields sought after by *hacendados* illustrates that those lands retained their value for producing grain. In either case, the infrastructures built by the Inka at Ollantaytambo had afterlives that lent structure to the emergent Colonial agroecology.

Troubling the dichotomy of "continuity" and "abandonment" in land use is not just a semantic distinction. Rather, it highlights the importance of foregrounding agentive action in understanding colonial transformations. In studies of the Andean Spanish Colonial Period, researchers have tended to understand the endurance of pre-Hispanic forms as evidence of Indigenous agency in a formulation wherein continuity equates to resistance. The data from this chapter show that in some circumstances, changes in practice towards de-intensification should also be understood as dynamic intentional acts that wrought transformations to infrastructures, ecologies, and landscapes. As infrastructures were differently used in the Colonial Period, and transformed through that use, the essential character of the land changed. Under the Inka, fields at Muyupata were sown with crops of maize that literally undergirded state power and the *yanakuna* who worked those fields literally cultivated political authority. The shift of practice from intensive maize growing to potato cultivation and pasturing was a fundamental reorientation of how the land was situated within political-ecological entanglements and local power structures.

5.7 Conclusion

Casper Bruun Jensen (2015; 2004) argues that environmental infrastructures are not simply material "second nature" built atop a "pristine" "first nature," rather, he suggests, environmental infrastructures are more like "cauldrons in which multiple forms of material intermingle," in the process remaking both the "natural and the social" and transforming "practical ontologies." Infrastructures do not just reflect social relationships, they "reconfigure them in the same process as they reconfigure "natural environments"" (Jensen and Morita 2017, 618). As infrastructures change, they work transformations on subjects and objects, and together with the humans and non-humans with which they interact, they constitute ecologies. These changes are far from predictable. Infrastructures are "open ended experimental systems" that unite diverse agencies and "spin out new relations between them" (Jensen and Morita 2017, 617) Unexpected results emerge from these "interminglings" that, in Bruun Jensen and Morita's reading, amount to a kind of world-building. Both the supposedly "natural" and political, as well as distinctions between them, are constituted through the use, disuse, construction, renovation, or abandonment of infrastructures. Even where they fail, or cease to "deliver as intended," infrastructures continue to engender emergent effects that shape the world (Harvey et al. 2017). Understood thus, the erosion of terraces, collapse of canals, and dereliction of field systems at Ollantaytambo was simultaneously destructive *and* generative of new ecologies. Colonial agriculture wasn't just about building Spanish-inflected agrarian forms atop Inka landscapes, or the destruction of the Inka agrarian system. Rather, the emergence of the hacienda was a process profoundly shaped by the extant material and social values embedded in the agrarian infrastructures of the Ollantaytambo region.

In this chapter, I demonstrated how Inka built infrastructures around Muyupata were used through the Colonial period and explored how the components of the emergent colonial agroecology were materialized in transformations to those infrastructures. The data I use here demonstrate that even where Inka constructions ceased to be used for the purposes for which they were built, they were not truly abandoned. Rather, they were differently incorporated into the colonial agroecology as practices like pasturing introduced animals became more and more common in a process of agricultural deintensification. By outlining this history, I traced how lands that once undergirded the power structure of the Inka Empire itself were transformed in the Colonial Period such that they became spaces considered only suitable for grazing or tuber cultivation. This transformation highlights that fields in the Ollantaytambo region were (and are) inherently political constructions that demand coordinated labor for ongoing maintenance and use, even as they were also constituted by a range of non-human presences, including plants, animals, and irrigation waters.

Even as agricultural production around Ollantaytambo de-intensified during the Colonial Period as the population living around the town diminished and land was expropriated by private landholders, the data presented in this chapter show that framing the processes that occurred in fields that ceased to be farmed intensively as “abandonment” elides the diverse human and non-human driven processes that continued to play out on once-intensively farmed terraced fields. Even when, at Muyupata, the labor-intensive production of maize ceased in the Colonial Period as the irrigation system fell into disrepair, the ubiquity of *Solanum* pollen in the later samples of the reservoir deposition sequence indicates that the fields were still used to grow dry-farmed potatoes. The influx of weedy pollen from herbaceous plants, combined with historical data detailing the importance of pastoralism in the Colonial Period (see below), suggests that some maize fields were also converted to pastureland as irrigation systems failed—indeed, the contemporary use of dry slopes around Muyupata for pasturing cattle and sheep demonstrates the continued use of scrubland for less intensive pastoral production.

The new colonial ecologies that emerged through this process shaped the historical process of hacienda formation at Ollantaytambo. At an instrumental level, grazing animals created a set of facts on the ground with regards to land tenure. Indeed, the archival record suggests a pattern around Ollantaytambo whereby relatively early grants and purchases of land for grazing ultimately became the foundation of hacienda holdings; Luis Vizente's estancia at Kachiqhata is just one example. Further down the valley, the grant of land to keep cattle and sheep at Tiaparo in 1568 would become the Hacienda Chillca. The titles to the Hacienda Pachar indicate that the nuns of the Convent of Santa Clara created that hacienda by adding numerous smaller estancias, including several around Curimarca and Socma, to their valley bottom maize fields. These documents indicate that conflicts over land and grazing rights to areas initially intended to be held in common were resolved by solidifying *mojones* and granting *dominio* rights to distinct parcels, which the nuns subsequently unified under the umbrella of the Hacienda Pachar (see also Burns 1999).[58] A similar process played out around Markaqocha where

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[58] Burns' (1999) descriptions of the activity of Cusco's convents leads her to argue that Cusco had a distinctly "spiritual economy" wherein money, credit, goods, people, and land, all circulated through networks anchored by the convents and monasteries that sprung up in the city in the sixteenth and seventeenth centuries. The importance of these institutions in promoting wheat agriculture and pastoralism, purchasing and accepting donations of land, and in financing the expansion of other Spanish holdings, suggests also the expansion of a *spiritual ecology* in the Colonial Period.

estancias gradually swallowed up common grasslands prior to the purchase of the entire expanse of upland holdings by the Hacienda Huatabamba (see Chapter 4).

Moreover, patterns of land use during this period of initial colonization and landscape transformation solidified such that they endured through the Colonial Period and beyond. For instance, adjudicators during the agrarian reform of the mid-twentieth century classified hacienda lands as either "*pampa"*—flat valley bottom lands suitable for maize growing—or "*puna"*—land suitable for tuber cultivation or grazing. *Pampas* were the lands used for commercial production by the hacienda. *Punas* were lands used to graze hacienda flocks and divided in usufruct amongst hacienda workers—*peónes*—for personal support. *Punas* were generally at higher altitudes where haciendas did not maintain agrarian infrastructures; yet, the ruins of extensive terraces in the *punas* testify to the construction of fields in those locales under the Inka and illustrate disparities in land use between Inka and hacienda regimes of land use. Even as these shifts in land use might be explained by factors like climatic cooling lowering the absolute elevation of cropping limits, they demonstrate that physical factors such as land and environment are not stable or static backdrops to socio-historical processes. Moreover, the local level variation in histories of land use between, for instance, the terraces at Simapuqio and fields around Muyupata highlights that while regional scale analysis might be useful for understanding broad patterns of land use, more localized perspectives (i.e., a terrace-by-terrace view) is essential to a detailed understanding of agrarian transformation.

My focus on infrastructure use and transformation in this chapter makes it clear how the agencies that effected this project of ecological colonization were emergent from relations among humans, non-humans, and the land itself. Even as Spaniards like Antonio de Porras and Luis Vizente introduced animals to the region, Andean people, such as the community at

Ollantaytambo, were forging agreements with those Spaniards to improve their lot. The Chachapoyas changed how the lands around Muyupata were used, growing potatoes instead of maize, in order to keep the lands productive even as irrigation infrastructure failed. Given that land tenure was at least nominally predicated on use (see Chapter 4), it is possible that adopting potatoes allowed these farmers to retain control over land in the face of encroachment by aspirant *hacendados* to the east and west. Plants and animals caught up in these long running conflicts over land wrought transformations of their own as they trampled fields and broke the walls of canals.

My contention here concerning the emergent agentive properties of the colonial ecology is not meant to discount the effects of colonial power, which, although entangled and deflected by the actions of local people and extant Andean social structures, and at times thwarted by the sheer materiality of the landscape itself, was nonetheless a major force in determining the legal context of agricultural production and land management (see Chapter 4). Nor though, do I wish to suggest that Spanish colonists were able to exercise a domineering ecological imperialism to remake the Andean region. Rather my point is that Ollantaytambo's hacienda ecologies were not shaped whole-cloth by landowners or Andean people, but emerged from a historical process during which ecologies were constituted through the comingling of human and non-human labor. As the literature on infrastructures I invoked in this chapter highlights, the products of infrastructures and the ecologies that are constituted by them are emergent and unpredictable. These properties are evident around Ollantaytambo in, for instance, the intermittent destruction of *pampa* fields during the colonial period due to the failure of river-walls built to contain flood waters.[59] The very properties of these infrastructures underscore the fact that the colonial power of the hacienda—the imperial power to remake ecologies—was itself shaped by the ecological properties emergent in the use and disuse of extant infrastructures.

Introductions of plants and animals with unintended and ramifying effects have continued from the early Colonial Period to the contemporary era in the Andes. Early in the Colonial Period, Polygonaceae *Rumex* (dock or sorrel) seed was brought to the Andes—likely in a shipment of wheat (Rull 2005). Although not as nutritious as native grasses and toxic in large quantities, this plant is now abundant in mid-altitude grasslands and an essential fodder for sheep, especially in the southern Andes. *Eucalyptus globulus* was introduced to the central Andes in the late nineteenth century. Stands of the tree are now ubiquitous across Peru. Rapid straight growth makes the tree a short-term boon as lumber and fuel, yet eucalyptus is increasingly recognized as water-greedy and destructive to soil quality. The grass Poaceae *Pennisetum clandestinum*, native to eastern Africa, was introduced by a *hacendado* in the Apurimac region in the 1940s as fodder for his (also imported) Arabian horses. It is now pervasive in the central Andes, and its deep, rapidly growing roots have dramatically increased the labor required to maintain field systems—terrace walls that have stood for centuries now collapse within a decade if care is not taken to regularly pull out the plant. As Trawick (2003, 182) explains, the excess labor now involved in maintaining terrace walls has led some landholders to merge terraces into steep unified fields that are less efficient at retaining irrigation water, encouraging erosion and making cultivation more difficult. In effect, the introduction of

[59] For instance, in 1727 the Bethlehemite friars—by that point owners of haciendas stretching along much of the southern bank of the Urubamba—took out a loan to repair retaining walls and clear fields of gravel left behind when the river flooded its banks and inundated their fields (Glave and Remy 1983).

Pennisetum clandestinum has prompted the transformation of cultivated spaces into pasture. The spiraling material effects of these introductions demonstrates that the colonization of Andean ecologies should be understood as an extended and ongoing process that reverberate into the present.

Chapter 6
From *Yanakuna* to *Yanacona:* Land and Labor Under Inka and Hacienda Rule

6.1 Introduction

In Chapter 2 of this dissertation, I drew on the anthropologist Enrique Mayer's (2002) concept of "articulated peasants" to highlight the deep relationship between Andean farmers and the land they work. As Mayer argues, relationships to land, and relationships mediated by land, are an important domain through which farmers negotiate their social and political lives. Mayer's observations are primarily based on twentieth century ethnographic fieldwork in the central-Andean community of Tangor, but he also uses historical and archaeological comparison to extend his arguments back into periods of Inka and Colonial rule, demonstrating that peasant households are not static, but rather are always constituting themselves in relation to social, political, and ecological circumstances (see also Weismantel 1989, 56). That said, Mayer writes primarily of a particular mode of agrarian life centered around the community or ayllu as corporate land holding body—a mode of landholding that, as Allen (2002) shows based on ethnographic and historical fieldwork in Cusco, emerged during the Colonial Period in at least some communities. What though, of agriculturalists with contingent claims to land? How did workers like *yanakuna* laborers on Inka royal estates, or *yanacona* resident workers on Colonial haciendas experience the fields and pastures they worked as political entities? How did those laborers access products from those fields as agroecologies shifted under Inka and Spanish colonial tenure?

As I have discussed previously in this dissertation, under the Inka, much of the agricultural surplus of the Cusco region was appropriated by the state. Ethnohistorical research corroborated by archaeology demonstrates that the Inka centered maize as an economically and ritually important crop (Bray 2003). At the same time, though, excavations in Inka storehouses have also yielded evidence that stocks of other crops, including potatoes, quinoa, peppers, beans, fruits, and cactus were maintained by the Inka state (Covey et al. 2016; see also Quave et al. 2019). This array of crops, many of which were likely cultivated by laborers on Ollantaytambo's fields, was important for provisioning Inka expansionary expeditions, fueling reciprocal exchanges that reinforced Inka power, and in politically important and symbolically charged rituals in monumental centers (Bauer 2004; Bray 2003; Covey 2009; Covey and Quave 2017; Kosiba 2015; 2018; Niles 1999).

During the Colonial Period, the focus of agricultural production in Cusco shifted. Haciendas continued to grow grain on Inka-built fields, however, those crops were largely produced for sale in urban centers, including mining markets at considerable distances. Wheat became an important cultigen, particularly early in the Colonial Period when Spaniards eagerly sought the bread to which they were accustomed (Bell 2013). However, over time, maize likely regained primary importance at Ollantaytambo as a high-yielding commodity crop that could fetch elevated prices in mining towns (Covey 2021; Glave and Remy 1983). Even as valley floor fields were maintained as maize and wheat production terrain, other fields that had been intensively worked under the Inka were no longer likely intensively cultivated in the Colonial Era. At the same time, pastoralism increased in importance as introduced animals were run on newly established estancias (see Chapter 5; Kosiba and Hunter 2017).

Recently, archaeologists studying Inka royal estates have shifted focus from the monumental architecture at their centers to consider the quotidian lives of the *yanakuna* workers that worked estate fields (e.g., Hu and Quave 2020; Quave 2012; Quave et al. 2019). This work has begun to explain how estates operated as systems of production, clarifying a stratified labor organization in which access to high value goods was mediated by elite redistribution while the bulk of *yanakuna* subsistence needs were met by the direct cultivation of assigned usufruct plots. By comparison, little archaeological work has queried the domestic economy of hacienda laborers in the central Andes, and historical research has generally focused on hacienda production for commercial purposes (i.e., commodity production for markets, Glave and Remy 1979; 1983; see Covey 2021). Hacienda workers may have been integrated in emerging markets and accessed some goods through redistribution from hacienda owners, or may have been expected to provide for themselves via the cultivation of high-altitude usufruct plots on hacienda lands. In the latter scenario, the diet of hacienda workers was likely dominated by tubers and other high-altitude cultigens, perhaps supplemented with flora from kitchen gardens and wild foods. These workers would have been largely reliant on land relatively close to their homes that was legally possessed by *hacendados*. On the surface, these two modes of agrarian production had many similarities: laborers worked on fields to which they had few formal rights, and labor was oriented to the production of surpluses that empowered elites. On the other hand, there were clearly differences between the two eras; the emergence of the hacienda coincided with the introduction of new flora and fauna as well as transformations to social life and changes in tribute and labor demands made of Andean *repartimientos*.

In this chapter, I turn to botanical and zooarchaeological data from my excavations in domestic contexts at Simapuqio-Muyupata to understand how the articulations between agricultural workers and agrarian land may have shifted during the first century following the Spanish invasion. While my datasets are provisional, they gesture towards how the people living at the site under Inka and hacienda control produced, accessed, and consumed the products of their labor on the fields and pastures of the Ollantaytambo region. As I argue, the data suggest a transformation in the organization of agricultural labor that would have altered how people experienced land as a political object. Under the Inka, botanical evidence suggests centralized processing and redistribution of agricultural products: workers labored on estate fields and in turn were assured of products from estate storehouses. Under hacienda management, botanical evidence indicates crop processing was managed at the household level, indicating relatively independent production even within relationships of servitude: hacienda labor was reciprocated with access to land to farm, rather than through the reciprocal exchange of goods. As I discuss in at the close of this chapter, this transformation would have shifted the terms of agrarian exploitation under hacienda rule.

The occupations of Simapuqio-Muyupata from the fourteenth to the seventeenth century follows the trajectory I outlined in Chapter 3: the site was built as housing for resident workers for the Inka estate at Ollantaytambo, who abandoned the settlement soon after the fall of the Inka Empire. Later, some Inka-built houses in Sector C were occupied by workers for the hacienda estates that acquired and administered surrounding lands from the beginning of the seventeenth century. Because of this trajectory of occupation, my approach in this chapter departs from the explication of socio-historical *process* I have undertaken in prior chapters. Rather, here I employ a comparative strategy, drawing on archaeological data to tease out differences between two distinct regimes of land management, the first (Inka, pre-abandonment) spanning the fifteenth century and first decades of the sixteenth, the second (Colonial, hacienda, re-occupation) beginning in the seventeenth century and lasting into the eighteenth. In structure, this chapter first outlines in more detail the datasets I use to explore shifting articulations between agrarian workers and land at Simapuqio-Muyupata. I then turn to the data themselves, discussing macrobotanical, microbotanical, and zooarchaeological findings from Inka and Colonial contexts at the site.

6.2 Datasets

In this chapter, to examine transformations in how agrarian workers at Ollantaytambo were using land—and the products of that land—I consider consumption within domestic structures and production in surrounding fields via botanical and zooarchaeological data. My use of data from inside houses to examine agricultural activities that took place on nearby lands is supported by ethnographic studies that demonstrate the integration of house and field in Andean households. Mayer (2002, 2-4) argues that house and field are inseparable; production in the peasant household was (and is) centered around the house, but stretched out from domestic structures to encompass fields and pasturelands. Similarly, Sikkink's (1988; 2001) studies demonstrate that products of agricultural labor in fields are preserved as charred botanical remains in worker houses. Within this framing, the house itself can be conceptualized archaeologically as a node of particularly concentrated material culture representative of activities of production and consumption that extended across the agricultural landscape (e.g., Hastorf and D'Altroy 2001).

My approach in this chapter builds on a broad body of archaeological studies in the Andes that use botanical and zooarchaeological data derived from excavations in domestic contexts to understand household and community level responses to socio-historical transformations like colonization and imperial expansion (Cutright 2009; 2010; D'Altroy and

Hastorf 2001; deFrance 1996; Hastorf 1990; Kennedy and VanValkenburgh 2015; Kennedy et al. 2019; Quave et al. 2019).[1] In particular, I draw on recent archaeological work in the Cusco region that has begun to clarify how the *yanakuna* subjects that labored on the Inka royal estates were caught up in the economy of estate production.

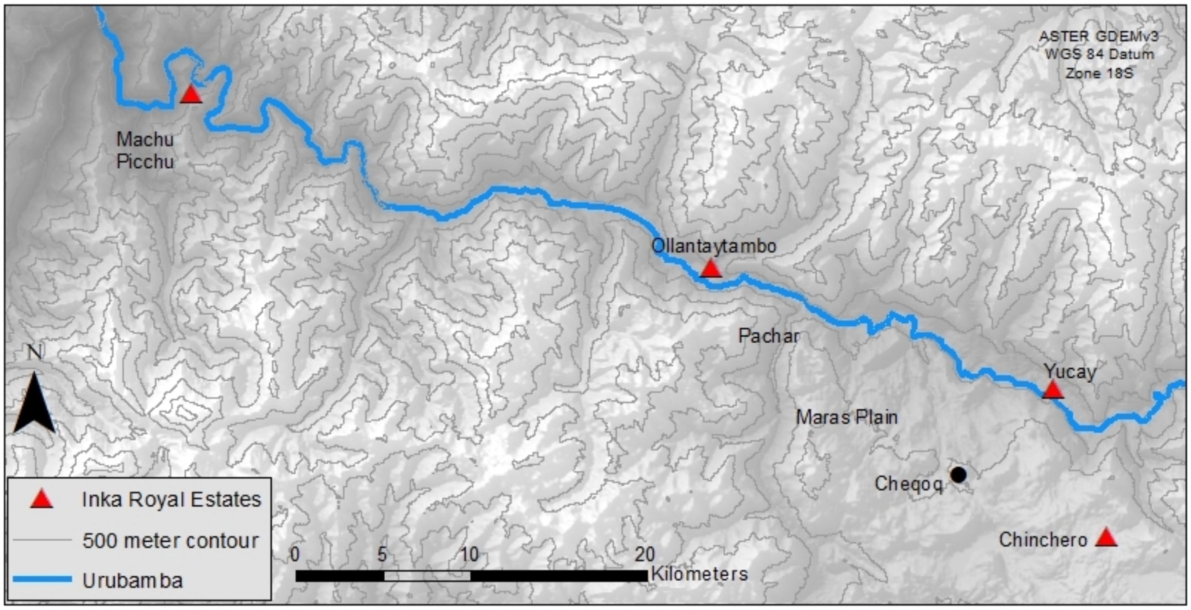

Figure 6-1: Map of the Urubamba region showing location of Cheqoq relative to select Inka estates.

For instance, Quave (2012) excavated households at the site of Cheqoq, a *yanakuna* settlement associated with Huayna Capac's estate of Yucay (see Chapter 4). Quave's study

[1] Much of this work has emphasized the household as a unit of analysis, broadly following Netting's (1989) definition, which references a "socially recognized domestic group whose members usually share a residence and both organize and carry on a range of production, consumption, inheritance, and reproductive activities" (Netting 1989, 231). Because the specificities of my data make it difficult to delineate the limits of households, my analysis uses site occupation as a whole as the unit of analysis. Similarly, while I draw on Enrique Mayer's (2002) notion of "articulated peasants" to frame my data in this chapter, it is debatable whether the people who left the archaeological remains I study here were true peasants in sense of the economic literature that Mayer draws on, given that their freedom to choose their own productive activities likely varied considerably in relation to first Inka and then Spanish power.

included macrobotanical and zooarchaeological analysis, which focused on comparing the distribution of foodstuffs between households. Her findings indicate that locally produced taxa like quinoa (*Chenopodium spp.*), potato (Solanaceae *Solanum*), and legumes (e.g., Fabaceae), as well as camelid meat were important to worker diet. Flora like maize (*Zea mays*) and coca (*Erythroxylum coca*) that were not produced in the immediate vicinity of Cheqoq were also present in worker houses, but access to those imports was limited, and may have been restricted (Quave 2012). Quave uses these data to suggest that *yanakuna* at Cheqoq largely provided for their own subsistence by farming assigned lands within the estate, but also had access to some higher value foods via top-down redistribution from elites (see also Hu and Quave 2020; Quave et al. 2019). This finding is broadly in line with ethnohistorical suggestions that *yanakuna* were assigned usufruct plots, perhaps bordering on the lands they worked for the benefit of the estate, (see Covey and Amado 2008; La Lone and La Lone 1987), while also highlighting the importance of the Inka redistributive economy to cementing political authority.

As I outlined in detail in Chapter 3, excavations at Simapuqio-Muyupata exposed structures occupied during the Inka and Colonial periods. In sectors A and B excavation teams recovered evidence of Inka era construction and occupations as well as some ephemeral Colonial building use, in Sector C, excavated evidence indicated a similar Inka era occupation and abandonment, followed by a re-occupation of some buildings during the Colonial Period. Based on these findings, in this chapter I categorize excavated contexts as either "Occupation One" or "Occupation Two" for comparison.[2] "Occupation One" contexts are those that were created prior

[2] The botanical and zooarchaeological samples from Simapuqio-Muyupata are not large enough for rigorous spatial comparison within the site, so here I focus on temporal change and aggregate samples from different buildings and units.

to the initial abandonment of the site—which likely happened shortly after the Spanish invasion. These contexts are predominantly Inka-era, but are not necessarily limited to the pre-1532 era; for instance, the context recovered from Unit SM-B10 that I discussed in Chapter 3 as indicative of an offering created upon abandonment of the house is categorized as a first occupation context, even as it was likely created shortly after the Spanish invasion of the Andes (see Chapter 3). Occupation two contexts are those that were created following the reoccupation of the site in the Colonial Period. These contexts were defined based on stratigraphy or material indices of occupations dating well after the Spanish invasion, such as glazed ceramics or glass artifacts.

Dates for the first occupation are relatively secure, given that the Inka use of the site was relatively short in the fifteenth and sixteenth centuries prior to abandonment around the time of the Spanish invasion.[3] The second occupation contexts are less securely dated given that the site was probably occupied for a longer span of time in the Colonial Period. Colonial occupations in Sector C likely began at the beginning of the seventeenth century and endured well into the eighteenth century.[4] Given this chronology, the comparison I draw here between the two occupations is coarse-grained. Moreover, my comparative approach in this chapter masks variation in status *between* households within a given period, potentially obscuring disparities in

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[3] This chronology is based on the radiocarbon date from the Inka context in Sector C that is indicative of Inka construction (BP 515 ± 28; 95.4% confidence 1410–1456) and assumes that the Inka occupation ended relatively close to 1532, around the time of the offering recovered from SM-B10 (BP 284±24; 95.45% confidence 1512-1799, based on the full distribution of RC probabilities for this date, it is likely to have happened before 1547 (see Appendix 1).

[4] A rental agreement from 1820 wherein the owners of the Hacienda Simapuqio let out lands in the terrace complex makes no mention of resident workers, and the renters were seemingly residents in the town, which seems to suggest that buildings in the site were abandoned by this point (ARC, *Protocolo Notarial*: Gamarra, Pedro Joaquin, 87, 1820-1821).

consumption between supervisors and manual laborers.[5] While evidence suggests that agricultural workers lived at the site during both the first, Inka, occupation, and later during the hacienda era, this does not necessarily imply that these workers were of a similar status. For instance, *yanakuna* under Inka rule may have enjoyed relatively high status due to their proximity to elites and direct service to ethnic Inkas. Even with these caveats, the diachronic comparison I undertake in this chapter remains useful as it demonstrates how the aggregate consequences of the historical processes of colonization were expressed in the reorganization of agrarian production.

The data I draw on in this chapter come from archaeological contexts including architectural elements such as floors and construction fills, discrete features such as ephemeral hearths and short-term burning events, and the remains of distinct events, including an Inka burial and a ritual offering created prior to the abandonment of an Inka house (see Chapter 3). Thus, these data include both the ephemera of the everyday and more specialized use of plants and animals in particular contexts. Where significant, I distinguish between these types of contexts below.

Table 6-1: Context types sampled for this chapter.

Context Type	**Occupation One**	**Occupation Two**
Use Surface	11	4
Construction Fill	1	8
Ritual Deposit	3	0
Midden/Burning Event	4	3
Total	19	15

[5] For instance, at the Abancay state farm ayllus of laborers were headed by *kurakas* that did not themselves provide physical labor, but rather oversaw work and the distribution of products from Inka elites to workers. These *kurakas* also were given valued gifts befitting their elevated status by the Inka (Espinoza 1973, 245-46, cited in Quave 2012, 350). The comparison I draw between occupations in this chapter masks such variation within occupations.

I discuss the particularities of sampling in each section below; however, overall, the first occupation sample is considerably larger than the second occupation sample (see Table 6.1).[6] The variation in these sample sizes—biases towards floors in the earlier occupation sample and construction fills in the later occupation—is reflective of the occupation histories of the site. More floors (use surfaces) are to be expected in the earlier sample simply because Inka buildings were constructed as new buildings. Construction fills are more common in the later sample because Colonial-era occupations were located in remodeled extant buildings. In both occupations the "midden/burning event" category reflects carbon-dense or ashy contexts that yielded high concentrations of material culture (including bone, ceramic, and botanical remains), but that in context appeared unlikely to have been regularly used cooking hearths. In what follows I first outline the results of botanical analysis before turning to zooarchaeological findings.

6.3 Botanical Findings

Because the total area, number of buildings, and number of contexts sampled in this study was low, carbonized macrobotanical remains alone are unlikely to provide a complete understanding of plant use at Simapuqio-Muyupata. Taxa that were infrequently used or infrequently charred risk being overlooked in the macrobotanical assemblage. To compensate for this small sample size archaeological contexts were sampled for microbotanical evidence—phytoliths and starch grains—in addition to macrobotanicals. Grinding stones recovered in

[6] Figures in this table vary slightly between macrobotanical, microbotanical, and zooarchaeological data. Several contexts were processed for macrobotanicals from which phytoliths were not taken, and vice versa. Several contexts also have multiple microbotanical samples because food-processing tools were sampled from those contexts in addition to sedimentary samples.

excavations were also directly sampled for microbotanicals. All botanical remains were analyzed by Dr. Luis Huamán Mesia at the *Universidad Peruana Cayetano Heredia.* In what follows, I first outline sampling procedures and results of macrobotanical analysis, and then turn to the microbotanical assemblage.

Macrobotanical Results

Excavators took macrobotanical samples from all excavated contexts at Simapuqio-Muyupata excluding surface humus layers. Excavation teams collected bulk point samples from discrete archaeological features and used a "pinch" approach to sample across floors and construction fills. Pinch sampling is better than other sampling techniques (i.e., bulk point sampling) for getting a broad sense of plant taxa present at a site than it is at targeting the locations of particular activities, and was chosen for this study as the goal was to assess diachronic change in the plant taxa used by the people living at Simapuqio-Muyupata rather than to examine the spatial distribution of domestic practices (D'Alpoim Guedes and Spengler 2014).[7] Excavation teams aimed to standardize samples to six liters of volume, however this was not always possible, so sample volumes were also measured exactly prior to flotation to allow for density calculations. Samples were floated in Ollantaytambo, where the heavy fraction was sorted and the light fraction dried. Subsequently, the light fraction was transported to Lima for analysis.[8]

[7] The 6l sample size is smaller than that than was ideal, however, our approach shaped by the need to carry each sample for several kilometers at the end of each day. These relatively small samples are supplemented here by phytolith and starch data.

[8] Full processing and analytic procedures, including floatation methodologies, are presented in Appendix 4.

Here I discuss the results of analysis of 34 macrobotanical samples; 2 samples from Sector A, 20 from Sector B, and 12 from Sector C.[9] Analyzed samples included sediment recovered from structure floors, construction fills, and discrete depositional features (a burial, a ritual offering, burning events). The results presented in this chapter are based on the analysis of a total 196.25 liters of sediment. As is the case with the archaeological assemblage more broadly, there are more samples from first occupation (n=19) than second occupation (n=15) contexts. The first occupation samples represent a volume of 122.25 liters, while second occupation samples comprised of 74 liters of sediment. Because of these sample biases I use coarse archaeobotanical metrics (ubiquity and density) to compare the two assemblages.

The carbonized botanical remains I discuss in this section of the chapter entered the archaeological record through three possible modes of deposition; accidentally or intentionally burned plants used by people living in houses at the site, the use of plants as fuel, and "seed rain." The first category includes plants intentionally used, whether as food, medicine, or construction material, that were either discarded in fires or incidentally charred. The second category includes plants burned directly as fuel and also may include fodder or seeds charred through inclusion in dung-fuel. The third category includes charred taxa incidentally deposited in the structures excavated at the site, including taxa charred outside of archaeological contexts and transported into structures, whether attached to clothes, carried by wind, or incidentally included with other products brought into the house (Langlie 2020).

Hastorf (1990) suggests that macrobotanical remains recovered from within houses are more likely to reflect agricultural production and crop processing than directly correlate to

[9] In total, macrobotanical analysis was conducted on 55 samples, however, 21 of these samples were from the reservoir in Sector B (Unit SM-B4), so I do not discuss them here (see Chapter 5). Including the samples from Unit SM-B4 a total of 318.5 liters of sediment were analyzed.

consumption. Sikkink's (1988; 2001) ethnographic studies in the Andes nuance Hastorf's point by demonstrating that foods were frequently charred around the central hearth of a home, and so archaeological remains located immediately adjacent to hearths likely index consumption. Three samples included in this assemblage (from units SM-B8, SM-B9, and SM-B10), are from contexts with indications of intentional burning in situ (i.e., soot and ash accumulation), two expedient hearths (Second Occupation, Unit SM-B8; First Occupation, Unit SM-B9), and a burnt ritual deposit (First Occupation, Unit SM-B10). Remains from these contexts were likely burned where they were recovered, all other remains are likely secondary deposits. As such, macrobotanical remains discussed in this section of the chapter only indirectly reflect food consumption at Simapuqio-Muyupata, rather, they directly index *plant preservation* indicative of practices of production and processing.

The macrobotanical assemblage is comprised primarily of unidentified carbon, wood charcoal, and seeds. In total 1242 botanical elements were counted. The breakdown of these elements by plant part is presented in Table 6.2, which includes both raw counts and density. Density is the count of a given taxa relative to the volume or weight of soil analyzed, in this study calculated as plant part per liter of soil sampled (Marston 2014; Pearsall 2000). Density is an especially important measure in this study given the different total sizes of the samples from the two occupations.

Table 6-2: Composition of the Macrobotanical Assemblage by occupation ("One" or "Two"). Density is expressed in count/liter soil.

	Total Count	One Count	Two Count	Total Density	One Density	Two Density
Total Counted Remains	1242	679	563	6.33	5.55	7.60
Unidentified Carbon	810	464	346	4.13	3.8	4.67
Wood Charcoal	49	49	0	0.249	0.399	0
Seed	426	205	221	2.17	1.67	2.98
Unidentified plant part	48	43	5	0.244	0.35	0.07
Leaf	9	3	6	0.045	0.025	0.08
Cactus Spine	2	2	0	0.01	0.015	0
Inflorescence	1	0	1	0.005	0	0.014

Overall, the second occupation assemblage contains a slightly higher density of unidentifiable carbon as compared to the first occupation samples, however, wood charcoal is entirely absent from the second occupation samples. Significantly, the seed density in the later samples is almost twice that of the earlier era. This may indicate that there was a transition in burning practice from one occupation to another that made the preservation of certain charred seeds more likely—perhaps indicating that herbaceous plants or dung as fuel became more common in light of ongoing deforestation (see Chapter 5).

The taxa represented in the seed assemblage are broadly similar to remains recovered in other archaeobotanical projects in the Andes (e.g., Bruno 2008; 2014; Hastorf 1990; 1993; 2001; Langlie 2020; Quave 2012), although both the frequency of jungle fruits and absence of maize set this assemblage apart.[10] The most frequently occurring cultigens are Solanaceae *Capsicum*

[10] Of the 323 seeds recovered, 12 could not be identified. Charred maize grains, cobs, and cupules are near ubiquitous in Andean projects, except in high altitude locales where maize cannot be grown (e.g., Langlie 2020), so the absence of maize is remarkable, especially as the Inka were nearly certainly devoting huge areas at Ollantaytambo to maize production. As I

(chili pepper) and Solanaceae *Solanum* (potato). Two *Solanum* seed morphologies were recovered, likely indicating different potato cultivars. Other taxa with high raw counts include the fruit Apocynaceae *Parahancornia*[11] and the flowering vine Asteraceae *Tilesia* (included with the weed group below).[12] Rarer taxa of interest included Fabaceae *Inga*,[13] Passifloraceae *Passiflora* (granadilla or passionfruit), Canabaceae *Celtis* (hackberry) and Solanaceae *Physalis* (aguaymanto berry).[14] For the interpretations that follow I have grouped several taxa together as "weeds and forage" (Malvaceae, Poaceae, Asteraceae).[15] There are also a number of taxa with

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discuss at length below, the absence of maize macrobotanical remains may indicate a preference for *chicha* beer as a mode of maize consumption.

[11] These seeds are probably Apocynaceae *Parahancornia peruviana*. This tree yields a fleshy fruit with sweet citrus-like taste, giving it its common name "*naranja podrida*" or "rotten orange." It is generally assumed to be a wild plant but may have been semi-domesticated historically. References in scientific literature are rare, but Vasquez and Gentry (1989) report it as among the most sought-after fruit in the Iquitos region of the Peruvian Amazon, but difficult to find by the 1980s due to overexploitation. It is a lowland taxon, but I list it here distinct from the "Yungas" analytical group because of its frequency across samples. Because it is a low-altitude fruit, it is unlikely that it grew around Ollantaytambo. If it did grow at Ollantaytambo it could have only grown as a cultigen in highly controlled circumstances because of its environmental demands. It is more likely that these fruits were brought to Ollantaytambo from the *Yungas* region. Similarly, Canabaceae *Celtis* also most likely grew at lower altitudes.

[12] I discuss this at length below, but it is notable that Asteraceae *Tilesia* were concentrated in one context; the ritual deposit uncovered in unit B10 (see Chapter 3). These seeds were likely either introduced to the ritual assemblage as Asteraceae flower or were included as fuel (see below).

[13] The leguminous Fabaceae *Inga* is a pod bearing tree, the part of the fruit that is consumed is the white pulp that surrounds the seeds in the pod, rather than the seeds themselves. This tree grows best at elevations considerably lower than Ollantaytambo (below approximately 1900 masl based on Gade's [1975] survey).

[14] A solitary aguaymanto seed was recovered from a colonial context, because of this low overall count, I do not discuss the taxa at length below.

[15] It cannot be absolutely ruled out that the Malvaceae seeds represented here could be cotton, which is sometimes grown in the lower reaches of the Urubamba (below 2000masl, Gade 1975). However, it is more likely that it is one of a number of mallows that flourish in higher altitude Andean pastures.

low raw counts and densities that are unlikely to have grown at Ollantaytambo, which I group together as "*Yungas* taxa," borrowing the geographer Pulgar Vidal's (1967) term for the cloud forests ecological tier of the eastern slopes of the Andes: seeds of Moraceae *Clarisa*, Boraginaceae *Cordia*, Fabaceae *Inga*, Ulmaceae *Ampelocera*, Sapindaceae *Talisia*, and Anacardiceae *Spondias* probably originated in the hotter and more humid lower altitude locales (although it cannot be absolutely ruled out that some of these taxa could have been cultivated in especially suitable microclimates closer to Ollantaytambo).[16] Table 3 shows the counts and densities of the most common taxa and grouped taxa, full counts of all recovered plants, including rare taxa, are presented in Appendix 5.

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[16] Gade (1975) distinguishes between the "absolute" and "effective" limits of plant cultivation, where the absolute limit is the rage of ecological zones where it is *possible* to grow a given crop, (broadly, but not exclusively determined by altitude; slope, irrigation, and valley depth are also factors) and the effective limit is the rage of emically defined zones where a given crop is productive enough and sufficiently low risk to merit regular cultivation. These are not exclusively ecological differentiations, political factors and culturally mediated expectations of satisfactory yields are relevant factors (see Wernke 2013, 52).

Table 6-3: Raw counts and density (element/liter) of most frequently recovered seeds at the Simapuqio-Muyupata.

	Absolute Count	Occupation One Count	Occupation Two Count	Total Density	Occupation One Density	Occupation Two Density
Solanaceae *Capsicum*	79	39	40	0.402	0.319	0.504
Solanaceae *Solanum* 1	60	0	60	0.305	0	0.81
Solanaceae *Solanum* 2	20	0	20	0.10	0	0.27
Fabaceae *Inga*	16	0	16	0.082	0	0.251
Apocynaceae *Parahancornia*	48	12	36	0.244	0.01	0.486
Passifloraceae *Passiflora*	8	0	8	0.041	0	0.108
Canabaceae *Celtis*	8	0	8	0.04	0.0	0.108
Annonaceae *cf. Xylopia*[17]	11	4	7	0.056	0.033	0.095
Weeds/Forage	148	138	10	0.738	1.12	0.095
Yungas Taxa	22	11	11	0.10	0.09	0.135

These data suggest several trends in plant use from the first to the second occupation at Simapuqio-Muyupata. Shifts in density suggest that there was a drastic increase in the prevalence of Solanaceae *Solanum* from the one occupation to the next. Density data also suggest that several fruit taxa, notably *Parahancornia, Passiflora*, and *Celtis* also increased in importance in the later occupation. While the density data also suggest an increase in the importance of Solanaceae *Capsicum* and Fabaceae *Inga*, this increase is deceptive, as seeds from those taxa in later contexts originate entirely in a single sample (see ubiquity data below). Density calculations for the weed/forage category are similarly biased by the inclusion of 138 seeds of Asteraceae

[17] Annonaceae is the custard apple (soursop) family, which includes important Andean fruits like cherimoya. However, these seeds were not cherimoya, and only provisionally identified as *Xylopia*, a jungle tree that may have been used as a medicinal historically. As this identification is not secure, I do not discuss it at length here.

Tilesia in a single first occupation sample (see below). Excluding this sample, all of the weed/forage seeds counted in this study were recovered from second occupation contexts.

While the raw counts and density of these taxa are illustrative of the basic composition of the macrobotanical assemblage from Simapuqio-Muyupata, biases introduced by the differential volume of samples from the two occupations make these measures problematic for diachronic comparison. To circumvent these sampling biases, archaeobotanists use ubiquity measures to compare the relative importance of different taxa across time or space. Ubiquity is a percentage measure of the number of samples from a group that contain a given taxa, where whether the sample contains one or many of a given taxa, it counts as present. This measure reduces the impact of biases introduced through variation in sample size, preservation, and sample processing (Bruno 2014; Langlie 2020; Marston 2014; Miller 1988; Popper 1989; VanDerwarker and Peres 2010). Hastorf (1990) suggests that ubiquity is an appropriate comparative measure where preservation conditions and sampling procedures were similar, and where samples were taken from similar kinds of contexts.[18] As such, ubiquity is a suitable metric for diachronic comparison at Simapuqio-Muyupata.

[18] Ubiquity is a problematic measure where the total number of samples is low. Hubbard (1976, 60) suggests a minimum of 10 samples are needed to reduce the probability of sampling error, but the more samples available the greater the reliability. For this reason, the Inka results may better reflect historical plant use than the Colonial results in this comparison (see also VanDerwarker and Peres 2010).

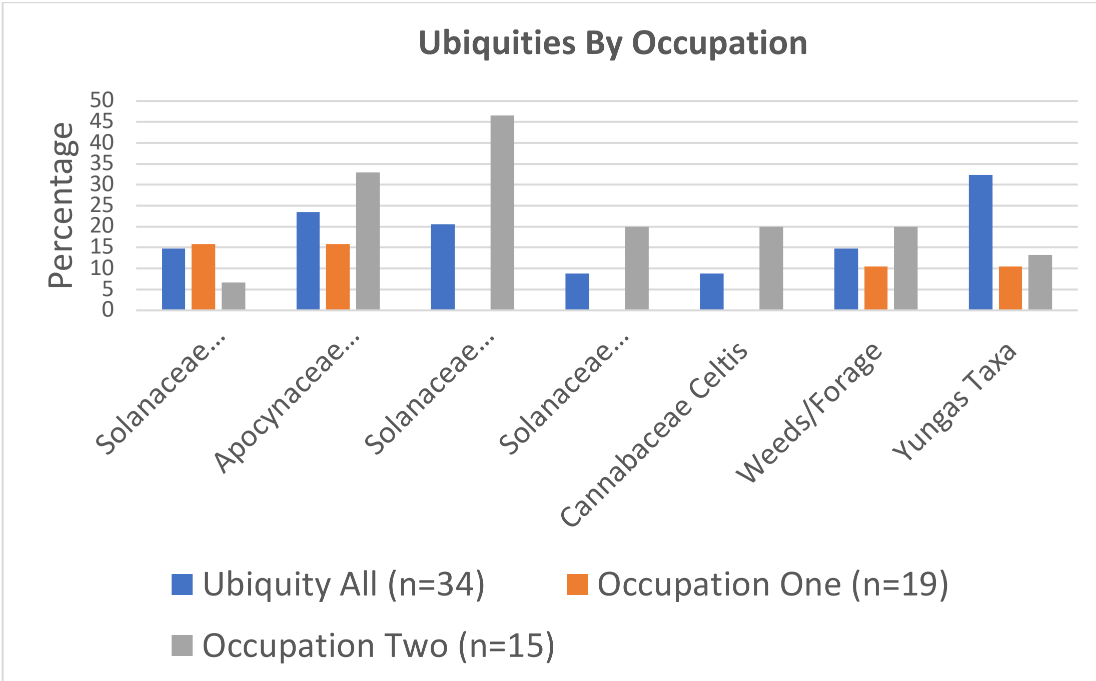

Figure 6-2: Ubiquities of common taxa from Simapuqio-Muyupata. Taxa included here if they are likely economically important taxa ubiquitous in more than 5% of contexts across the site.

Ubiquity data from Simapuqio-Muyupata offer nuance to the image of plant use at the site both across the entirety of the sample and between the first and second occupations. Notably, ubiquity data counter the apparent trend towards increased *Capsicum sp.* use over time suggested by raw counts and densities. Using ubiquity, *Capsicum sp.* seeds *decrease* in prevalence in the later occupation (only present in 8.3% of samples (n=1) by contrast with 18% (n=4) of occupation one samples). This shift contrasts markedly with Solanaceae *Solanum*, wherein both seed morphologies are present in a high percentage of occupation two samples despite being absent from occupation one contexts. Interestingly, the jungle fruit Apocynaceae *Parahancornia* is present in both occupations, but increases in ubiquity in the latter, suggesting that it became more important in the Colonial Period. The ubiquity of weed/forage taxa also increases, which suggests a change in practice wherein seeds were more likely to preserve inside houses, indicating the use of herbaceous plants as fuel (directly, or in dung) or increased crop processing (i.e., crop sorting, winnowing) in domestic contexts. Interestingly, the ubiquity of the *Yungas* taxa category is remarkably stable across both occupations, even as densities indicate that those plants were more prevalent in the later occupation. This suggests that connections to lower altitudes through which those plants were brought to Ollantaytambo were retained across the Inka to Colonial transformation of the region, even if the specific social mechanisms through which those connections were actualized might have changed.

Microbotanical Data

Starch grain and phytolith data complement macrobotanical remains from archaeological contexts at Simapuqio-Muyupata. Phytoliths are microscopic fossils formed as plants take up water and deposit silica in intercellular spaces. As plants decay, the mineralized phytoliths remain as deposits in soil (Mayle and Iriarte 2014; Piperno 2009; Piperno and McMichael 2020). These structures are frequently diagnostic of plant genus and can also sometimes be identified to plant part, as in the case of *Zea mays*, where cobs and leaves/stalks create differently shaped phytoliths (Doolittle and Frederick 1991; Pearsall and Chandler-Ezell 2003; Piperno 1984).[19] The other microbotanical remain considered in this study, starch grains, are durable granules created by plants during the photosynthesis process to store energy. Starch grains accumulate primarily in in tubers, seeds, and root tissue —plant parts that are frequently especially valuable as foods—and so offer a useful perspective on diet and food production, including for plants that do not produce diagnostic phytoliths (Iriarte et al. 2020; Piperno and Holst 1998). Like

[19] Many phytoliths are morphological types present in a wide range of taxa and cannot be accurately assigned to the family or genus level. In this study these phytolith types were counted, but I do not discuss them at length here. Full counts of these morphologies are presented in Appendix 5.

phytoliths, starch grains preserve even after plant tissues have decomposed, and can frequently be identified to genus (Henry 2014; Piperno et al. 2009; Piperno et al. 2000). These granules are also often found on stone tools and so can provide direct evidence of crop processing (e.g., Bria 2017; Louderbeck et al. 2015). As they offer a lens on plants not preserved through charring, phytoliths and starch grains broaden the range of archaeologically observable plants and plant parts from Simapuqio-Muyupata.

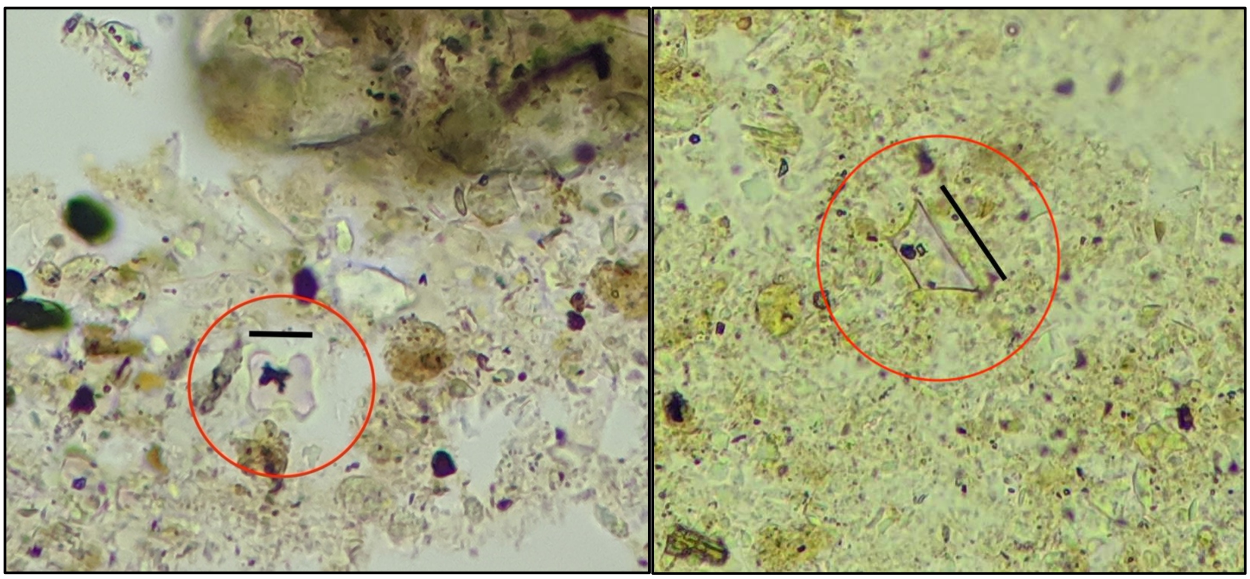

Figure 6-3: Maize cross (left) and rondel (right) phytoliths from Simapuqio-Muyupata, indicative of stalk/leaf and cob remains respectively. The black line at left is approximately 12.5μm in length, the line at right is approximately 15μm in length.

To sample for microbotanical analysis, excavation teams collected 150 ml soil samples directly from excavation contexts with a clean trowel.[20] Excavators sampled contexts in a "pinch" style wherein a given sample was comprised of sediment from across contexts such as use surfaces and construction fills. In addition to the 150ml soil samples five grinding stones

[20] These samples were distinct from macrobotanical samples.

were tested directly for starch and phytolith residues. The stone tools analyzed for microbotanical remains were bagged in the field separately from other artifacts and were left sealed until analyzed. All samples were analyzed at the paleoethnobotany laboratory at *UPCH*.[21]

Unfortunately, several 150ml soil samples were contaminated in storage, so the total number of soil samples for microbotanical analysis (n=27) is slightly lower than the macrobotanical sample. Including grinding stones, the entire microbotanical assemblage consists of a total of 32 samples.[22] Of the soil samples, 5 yielded no starch grains and 8 yielded no phytoliths, but only two samples yielded neither starch nor phytolith evidence. Of the five stone tools, three are from contexts that were also sampled via soil, so the total number of distinct contexts sampled was 29. Of these contexts, 21 were Inka, and 8 were Colonial.[23] To avoid double counting contexts sampled via grinding stone and soil, I consider the two kinds of sample separately below.

[21] One grinding stone sample (from context B10-6) was processed slightly differently because it was exceptionally large and heavy and could not be transported to *UPCH* from Cusco. This stone was washed with deionized water and a disposable toothbrush and the water used in the wash was sent to the laboratory. A sixth grinding stone was also sampled and analyzed, however, it had been inadvertently washed prior to processing, and only negligible quantities of unidentifiable microremains were recovered, so I exclude it henceforth from my discussion. I decided to sample this stone despite it having been washed because I hoped phytoliths or starch may have been retained in surface grooves (e.g., Louderback et al. 2015; Piperno and Holst 1998).

[22] Both sediment samples and the stone tools were sent to the paleoethnobotany laboratory at the *UPCH* for analysis. Full descriptions of processing and analytic procedures are included in Appendix 4.

[23] This imbalance in sample lessens the strength of percentage ubiquity comparisons as ubiquity is sensitive to sample number (Marston 2015; Popper 1988). Hubbard (1976, 60) suggest ubiquity is reliable when more than 10 samples are tested, and the more samples the greater the strength (VanDerwarker and Peres 2010). While I still present those calculations below they should be understood as provisional.

Phytolith and starch grain data complement macrobotanical data by indicating the presence of plant taxa that were unlikely to preserve through carbonization, including foods most often cooked through boiling or stewing. The stone tool analysis is particularly important as a direct indicator of food processing. Microbotanical remains also reveal the presence of fodder and construction material at the site not evinced in macrobotanical remains. Phytolith and starch grains are most useful as indicators of the presence of a given taxa (ubiquity) rather than as indicators of rates of consumption or dietary proportions of specific taxa; however, below I include the raw counts and percentage-count of each discussed taxa to provide a sense of relative abundance (full data are also presented in Appendix 5). In what follows I first consider the results of analysis on grinding stones, and then turn to the soil samples.

Grinding Stone Analysis

The five grinding stones analyzed in this study yielded both phytoliths and starch grain indicators of plant use. Here, I first discuss starch grains and subsequently phytoliths. Starch remains on these stones include evidence of *Cheno-Ams*, *Cucurbita sp*. (gourd), *Phaseolus sp.* and *Phaseolus vulgaris* (beans), and *Zea mays* (maize). Of these taxa, all were present on samples from both occupations, with the exception of *Cheno-Ams*, which were only present on one occupation one sample, and *Phaseolus vulgaris*, which was only identified conclusively on one occupation two sample (*Phaseolus sp.* were more broadly ubiquitous). As such, data from these grinding stones suggest continuities in processing of cucurbits, beans, and maize at the site over time.

Table 6-4: Starch grain ubiquity and total counts from grinding stones. Because of the low overall sample size I do not present ubiquity as a percentage here.

	Ubiquity		Total Counts	
	One (n=3)	Two (n=2)	One	Two
Cheno-Am	1	0	6	0
Cucurbita sp.	2	1	2	3
Phaseolus sp.	2	2	4	9
Phaseolus vulgaris	0	1	0	1
Zea mays	2	2	2	2

Phytoliths complement these starch grain data. As is the case with soil samples (see below), phytolith assemblages on grinding stones are dominated by various genera of grasses, including bamboos. Food taxa present in the phytolith assemblage on these stones include *Zea mays* and Cannaceae *Canna* (edible lily, locally *achira*). Maize phytoliths are present in both rondel (cob) and cross (leaf) morphologies, and there are also Panicoideae phytoliths that could not be identified more definitively but that may also be indicative of maize (maize belongs to the Poaceae Panicoideae sub-family). The *Canna* phytoliths are almost certainly *Canna edulis* (achira), a lily that produces a large and easily digested tuber. Gade (1975) notes that this plant grows best at elevations well below Ollantaytambo (approximately 2100 masl and below), so its presence in archaeological deposits indicates connections to lower ecological zones.[24] It is only present on a single Inka-era grinding stone and was entirely absent from the soil samples.

[24] Gade's survey recorded only sparing use of the plant in the Urubamba valley by the middle of the 20th century, but he noted that it remained an important crop in the nearby Apurimac region where it was commonly served at festivals (1975, 66).

Table 6-5: Phytolith ubiquities and raw counts from grinding stones for select taxa. Full phytolith data, including counts of unidentified morphologies and rarer identified taxa, are presented in Appendix 5. Here the percentage count is the percentage of that taxa from each occupation.

	Ubiquity		Counts		Count Percentage	
	Occupation One (n=3)	Occupation Two (n=2)	Occupation One	Occupation Two	Occupation One	Occupation Two
Panicoideae	2	1	16	8	7.9	2.7
Bambusoideae	2	2	8	22	3.9	7.5
Bromeliaceae	2	2	27	15	13.3	5
Cannaceae *Canna*	1	0	2	0	1	0
Zea Mays rondel (cob)	1	1	2	1	1	0.4
Zea Mays cross (stalk/leaf)	0	1	0	2	0	0.7

Data from these griding stones are indicative of food processing and consumption at Simapuqio-Muyupata, adding cucurbits, beans, maize, and *achira*—all of which were absent from the macrobotanical assemblage—to the list of cultigens evinced in samples from the site. This may indicate that these taxa were preferentially processed and consumed through boiling or stewing such that they were unlikely to char. The ubiquity of both grass taxa and food taxa on these stones suggests that these tools may have been used for crafting or cutting reeds and grasses in addition to food processing. It is also possible that Panicoideae phytoliths on the stones from colonial contexts are indicative of sugarcane, which was prevalent in the lower altitude regions of the Urubamba by the seventeenth century (Gade 1975).

Microbotanical Soil Samples

The microbotanical assemblage derived from directly sampling soils is comprised of a total of 27 samples, 20 of which are from Inka contexts and seven of which were recovered from colonial-era deposits. I first discuss the findings of starch grain analysis, and then consider the results of phytolith analysis. Of the 27 total samples, five were devoid of starch grains entirely, four from occupation one contexts, and one from a second occupation deposit. Culinary taxa represented in the starch grains recovered from the sedimentary samples included those present on the grinding stones: cucurbits, beans, maize, and *Cheno-Ams*. However, two of the first occupation samples also contained starch grains from *Manihot esculenta* (manioc, locally *yuca*), a tuber with an effective upper altitudinal range of approximately 2000masl (Gade 1975, 183). Table 6.8 displays counts and count percentages of these taxa across the assemblage, Figure 4 shows ubiquities.

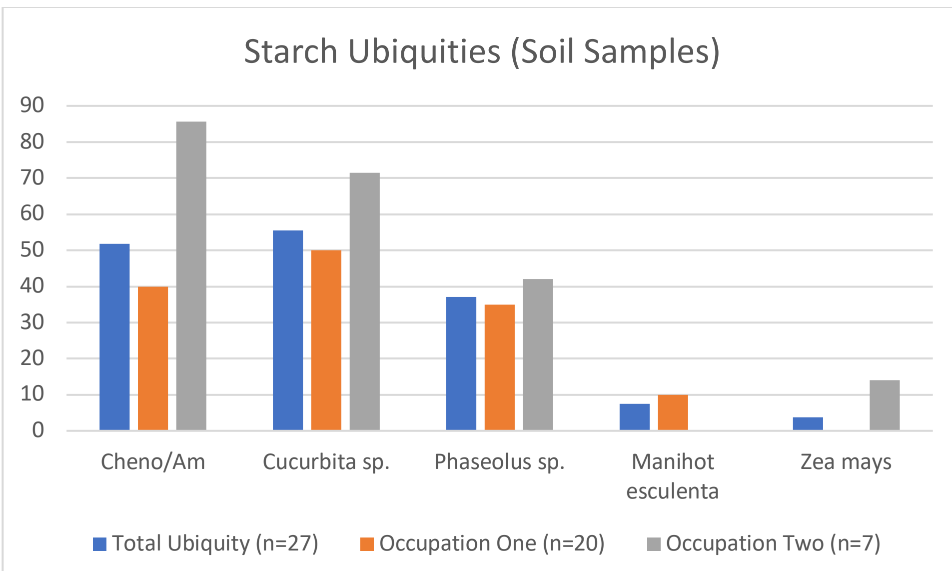

Figure 6-4: Starch grain ubiquities from sedimentary samples. Note that the colonial sample size is small, so those results should be treated with caution.

Table 6-6: Absolute and percentage counts of starch grains from sedimentary samples.

	Absolute Counts		Percentage of Count	
	Occupation One	Occupation Two	Occupation One (n=132)	Occupation Two (n=314)
Cheno-Am	49	208	41.8	67
Cucurbita sp.	40	64	34	20
Phaseolus sp.	14	35	11.9	11.29
Manihot esculenta	2	0	1.7	0
Zea mays	0	3	0	0.97

These data offer further confirmation to the findings from grinding stones that *Cheno-Ams*, cucurbits, beans, and maize were present at the site during both occupations, but they also suggest several trends from one occupation to the other that were not evident in data from grinding stones. All taxa except *Manihot esculenta* increase in percentage ubiquity from the earlier to later occupation.[25] *Cheno-Ams* are present in a high percentage of samples from both occupations, which is particularly interesting given the absence of evidence of quinoa or kañiwa seeds in the macrobotanical assemblage. Strikingly, the raw count of *Cheno-Am* starch grains is more than quadruple in occupation two contexts as compared to occupation one, even as there are more than twice as many earlier contexts sampled as later contexts. Given that conditions of preservation were likely quite similar between the periods, this suggests a shift whereby *Cheno-Am* starch grains were more frequently brought into houses over time.

Phytoliths recovered from sedimentary remains also evince food taxa at the site, but are overwhelmingly dominated by canes and grasses, and thus offer a lens on non-culinary food use

[25] The low sample size from Colonial-era makes the ubiquity measure problematic here, so trends in ubiquity percentages should be approached with caution.

at the site. As in the samples from the grinding stones, the majority of the phytoliths counted could not be identified to the level of genus, and rather are categorized by morphology, family, or sub-family (full counts in Appendix 5). Table 6-7 presents food plants for which phytolith evidence was recovered and the most commonly occurring non-food phytoliths. These data further demonstrate the presence of maize at the site, and notably include the only microbotanical evidence of potato, a low count of phytoliths ubiquitous in only one Inka-era sample (also the only Inka-era evidence of potato at the site). The distribution of maize rondel and cross phytoliths implies a weak trend that the consumable parts of maize may have been more common in domestic contexts in the Inka Period relative to the Colonial Period, and that leaves were more common in the Colonial Period (perhaps introduced to dwellings as fodder), but these data are too sparse to draw definitive conclusions.

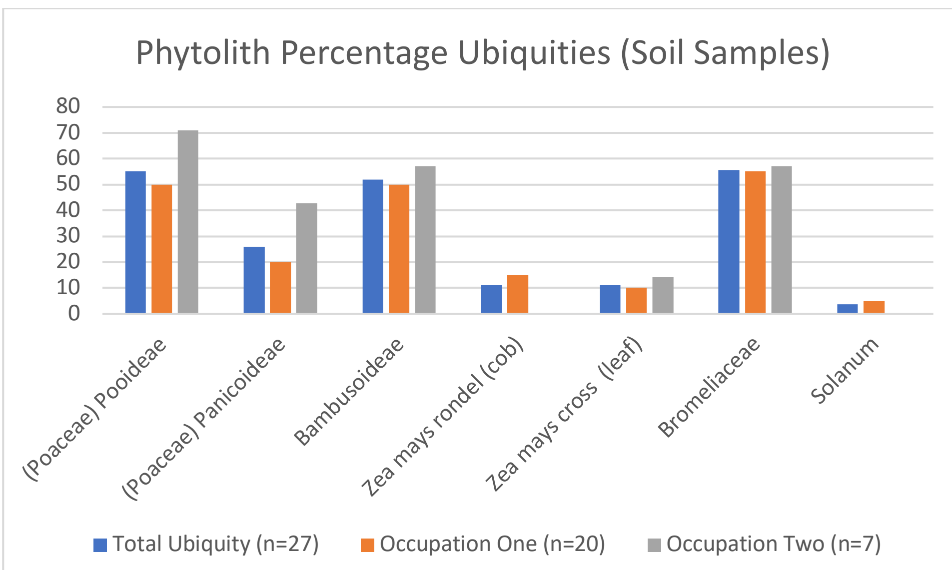

Figure 6-5: Phytolith percentage ubiquity from soil samples.

Table 6-7: Phytolith ubiquities and raw counts from soil samples for select taxa. Full phytolith data, including counts of shapes and rarer identified taxa, are presented in Appendix 5.

	Total Counts		Percentage of Count	
	Occupation One	Occupation Two	Occupation One (n=6740)	Occupation Two (n=3038)
(Poaceae) Pooideae	1093	369	16.2	12.1
(Poaceae) Panicoideae	244	183	2.8	2.0
Bambusoideae	701	261	10.8	8.5
Zea mays rondel (cob)	50	0	0.77	0
Zea mays cross (leaf)	21	40	0.3	1.3
Bromeliaceae	686	266	10.5	8.7
Solanum	5	0	0.1	0

Given high absolute counts of Poaceae, Bromeliaceae, and Bambusoideae phytoliths, the majority of the phytoliths counted in soil samples are likely indicative of materials used as either construction or fodder—grasses, bamboos, and bromeliads—that decayed in place on floors during building use and after abandonment. Bamboo phytoliths may be from poles placed along rafters to support thatch roofing. Grass phytoliths (Pooideae, Panicoideae) are likely indicative of either thatch or grasses brought into houses as fodder for the guinea pigs that are near-ubiquitous in high altitude Andean houses. Bromelaids could conceivably be indicative of pineapple (pineapple grows well in the lower reaches of the valley) but given their ubiquity they are more likely to have originated in building materials. Bromelaid fibers were commonly used for making ropes and chords in the pre-Hispanic Andes (Jolie et al. 2011), and the large *puya* cactus-like plants common around Ollantaytambo both yield a useful fiber and feature a tall, straight, woody, inflorescence frequently used in construction, especially where wood is scarce. The similarity in the distribution of these phytoliths over time may suggest continuity in building practice.

Interpretation

Considered together, microbotanical and macrobotanical data provide a preliminary glimpse of the plants that workers living at Simapuqio-Muyupata under Inka and hacienda land management regimes brought into their homes. Here I first outline what these data suggest about cultigens used for food, and then outline what the assemblage suggests about non-culinary plant uses. In the discussion section below, I infer conclusions regarding agricultural practice and land use from these data.

Food Production and Consumption

The assemblage of macro and microbotanical samples from Inka contexts—that is, the first occupation of the site—suggests a broad array of culinary taxa were used by *yanakuna* that labored on the Inka estate. Macrobotanical evidence is strongest for Solanaceae *Capsicum.* The jungle fruit Apocynaceae *Parahancornia* is also common in samples from this period, which is highly suggestive of robust connections to low altitude ecotones, perhaps the area around Machu Picchu, accessed by traveling down the Urubamba Valley, or perhaps the Ocabamba region, accessed via the Patacancha Valley. Microbotanical data extend the list of cultigens present at the site by indicating the presence of maize, chenopods, achira, manioc, *Cucurbita sp.,* and beans. Phytoliths and starch grains from grinding stones provide direct evidence of Inka-era processing for consumption of *Cheno-Ams*, cucurbits, beans, maize, and achira.

The later occupation samples yielded a more restricted assemblage of culinary taxa, potentially as a function of sampling, but also possibly indicating a more restricted set of available plants. Macrobotanical remains include Solanaceae Solanum, Passifloraceae *Passiflora*, Solanaceae *Capsicum*, and Fabaceae *Inga,* although the latter three taxa were each ubiquitous in only one sample. Microbotanical remains indicate the presence of beans, cucurbits, *Cheno-Ams*, and maize, all of which were present on both grinding stones and in 150ml soil samples. It is notable that the crops present in the earlier assemblage but absent from the later assemblage—*yuca* and *achira*—are two that are best grown in low altitude ecotones. By contrast, plant crops that can be easily grown around Ollantaytambo like cucurbits and beans are very common in samples from both occupations in the microbotanical assemblage. This pattern suggests that the production of local crops may have continued at the household level in kitchen gardens and usufruct plots even as the Inka estate, and later haciendas, dominated production on the best maize and wheat growing lands. The absence of achira and manioc in later contexts may indicate a more locally focused diet. Gade (1975) suggests that these crops were infrequently consumed at higher altitudes in the twentieth century because they fulfilled the same dietary requirements as potato; these data seem to suggest this pattern may not have held in the Inka era. By contrast, both the density and ubiquity of Apocynaceae *Parahancornia,* a low-altitude fruit, increases dramatically in the Colonial Period, which suggests that the people living around Ollantaytambo retained articulations to lower altitude production zones over time.

The most obvious diachronic trend in the macrobotanical data is the absence of potato seeds in the earlier samples and the presence of high counts and ubiquities of two Solanaceae *Solanum* (potato) seed cultivars in later, Colonial, contexts. Potato seeds are not eaten—the fruit of the plant is toxic—so the presence of these seeds is not directly indicative of an increase in consumption. Rather, these seeds are indirect evidence of consumption that may correspond to increased potato production, but certainly indicates a shift in practice that resulted in increased seed *preservation*. There are three potential shifts in practice that might account for increased charring of potato seeds: 1) feeding potato plants to animals and using dung as fuel, 2) burning stubble in fields and inadvertently transporting charred seeds into homes, and 3) directly using dried stalks and fruits as fuel. While all of these are possible, and indeed, are not mutually exclusive, using stalks as fuel or burning dung are likely the most important of these contributing factors. In Gade's (1975) ethnographic study at Ollantaytambo he found that potato plants were commonly used as fuel in the months after harvest; he noted that children would frequently be sent to comb harvested fields for dried stalks that could be burnt. However, Gade also indicates that potato stalks are used as fodder, so dung fuel is also a very real possibility; elsewhere in the Andes, dung burning has been recorded ethnographically and archeologically (including in the context of ceramic firings, see Bruno and Hastorf 2016; Roddick and Cuyent 2020; Sillar 2000). In either case, this change in practice was likely a response to deforestation in the Colonial Period (see Chapter 5).

While the increase in potato seeds should not be directly correlated to culinary use, it is quite likely that consumption of the crop in worker homes did also increase along with production; Bruno (2014) equates an increase in the ubiquity of *Solanum* seeds with increased presence of the crop on the landscape in the Titicaca region. As pollen data presented in Chapter 5 show, production of potato plants became more common on fields first developed by the Inka where infrastructural degradation meant maize could no longer be cultivated. The absence of direct evidence of potato consumption—i.e., charred tubers or parenchyma—may also indicate that the most common methods of cooking involve boiling, rather than charring.

Trends from the first to second occupation in the production and consumption of Solanaceae *Capsicum,* the second most absolutely common of the cultigens recovered in the macrobotanical assemblage, are less clear due to disagreement between trajectories in density and ubiquity measurements. *Capsicum* seeds are denser in the colonial period, but more ubiquitous in Inka samples. However, all the *Capsicum* seeds recovered from second occupation contexts were from a single sample, and the high count in that sample skews the density data considerably. This sample, which also contained all the Fabaceae *Inga* remains recovered in the excavation, was from an expedient Colonial-era hearth in an Inka-era building. This is to say that the context is unlikely to be representative of common domestic practice at the site in the Colonial period, and the ubiquity of *Capsicum* in the sample should not be interpreted as an indicator that chili peppers retained their importance in the Colonial Period. Rather, given ubiquity data, the use of chili peppers may have decreased from the Inka to the Colonial periods.[26]

Notably, maize and quinoa, which are commonly found in archaeological projects in the Andes, were entirely absent from the macrobotanical assemblage. Given the many hectares of excellent maize land the Inka developed around Ollantaytambo the crop was certainly intensively cultivated in the region. Moreover, maize kernels were found in Kosiba's excavations at Wat'a (Kosiba 2010), and cupules and kernels were recovered in Colonial contexts at Markaqocha (see Chapter 3). Indeed, the encomienda *tasa* for Ollantaytambo confirms that maize remained an important cultigen into the Colonial Period (Julien 2000). Maize consumption amongst retainer populations may have been restricted by the Inka, but even so the total lack of maize in the macrobotanical assemblage is remarkable. Of course, the absence of maize from the macrobotanical assemblage is not evidence that the plant was not consumed at the site—indeed, phytolith and starch grain data confirm that at least some maize was used by people living at Simapuqio-Muyupata—rather, the absence of maize kernels or cobs in the macrobotanical assemblage suggests that maize was not processed or cooked after a fashion that preserved it

[26] Note though, that peppers were still included as a requirement in the encomienda *tasa*, so production clearly did not cease (Julien 2000).

through charring. Maize may have been more frequently consumed in forms like corn-beer (*chicha*).[27] The absence of evidence of maize processing—cupules or cobs—suggests that processing of the plant took place outside of domestic contexts and may have been a closely monitored activity on the Inka estate.

The absence of quinoa (*Chenopodium quinoa*) remains from the Simapuqio-Muyupata macrobotanical samples is also notable. The small size and durability of quinoa seeds makes them especially frequent finds in Andean contexts (e.g., Bruno 2014; Bruno and Whitehead 2003; Hastorf 2001; Langlie 2018; 2020; Quave 2012).[28] While these plants are less likely to have been important cultigens around Ollantaytambo than at higher elevations, it is still remarkable that they are entirely absent from the macrobotanical assemblage. Starch grain and phytolith data confirm that despite the absence of *Cheno-Ams* in the macrobotanical assemblage, *Cheno-Ams* were present in worker homes at Simapuqio-Muyupata during both the Inka and Colonial periods. The presence of the cultigen in the microbotanical assemblage, combined with its absence from the macrobotanical assemblage, may indicate that the *Cheno-Ams* consumed at the site were eaten as greens, rather than as seeds (the high counts of *Cheno-Am* starch grains are likely indicative of seed consumption, but this is not definitive). Gade's (1975) survey recorded several species of chenopods and amaranths used as potherbs, many of which were wild or semi-

[27] Quave (2012, 260-261) found maize macrobotanicals in some household groups at Cheqoq, which she interprets as evidence that access to maize for roasting was restricted. For comparison, Burger et al. (2003) argue from isotopic data that maize was a central component of diet amongst retainer populations at Machu Picchu. For a discussion of the importance of Chicha in Inka dietary and ritual practices see Bray (2003) and for the Andes more broadly see (Logan et al. 2012)

[28] For instance, Langlie (2020) reports recovering over a million *Chenopodium quinoa* seeds in excavations at a single site in the southern highlands of Peru.

domesticated. Gade notes these plants were commonly used as famine foods, so they may have been eaten to supplement meager worker-diets.

It is striking, particularly in light of the variation in the zooarchaeological assemblage I discuss below, that non-native cultigens were completely absent from the botanical assemblage at Simapuqio-Muyupata. This pattern suggests that while hacienda workers may have been involved in the production of crops like wheat, such crops were not preserved in worker homes. This may indicate that workers did not incorporate them into their diets, a seeming illustration of a pattern observed elsewhere in the Andes whereby divergent “Spanish” and “Andean” foodways developed over the course of the sixteenth and seventeenth centuries (see Covey 2021; Kennedy and VanValkenburgh 2015).[29]

Non-Culinary Plant Use

In addition to elucidating patterns of plant consumption, botanical remains from Simapuqio-Muyupata clarify non-culinary uses of plants through the two occupations of the site. Broad trends in both overall raw counts and density of unidentified carbon, wood charcoal, and carbonized seeds suggest a trend towards a decreased use of wood as fuel from the Inka to Colonial period and an increase in the use of herbaceous taxa or dung as fuel; such a transition would explain the increased carbonization of unidentified plant remains and seeds in the latter period. As discussed above, this may explain why there was a sharp increase in the density of potato seeds in later contexts.

[29] It is difficult to make this conclusion definitively; the most important introduced crops—wheat and barley—were likely processed on threshing floors, transported to mills for grinding, and thence to markets and thus would have had little opportunity for incorporation into the homes of workers. Gade (1975, 137) suggests that Andean people in the Urubamba region may not have regularly grown wheat for their own consumption until as late as the eighteenth century, but were likely producing it for tribute (see also Kosiba and Hunter 2017).

Phytoliths provide a further indication of plants used at the site for non-culinary purposes. The high ubiquities of grasses in both Inka and Colonial contexts likely indicates either foddering of *cuy* (guinea pigs) inside houses or thatch that decomposed in place. Similarly, frequently occurring bamboo and bromeliad phytoliths are likely indicative of rafters and support for thatch roofing or chords used to secure thatch. The ubiquity and percentage counts of these taxa remain broadly stable between the two occupations, suggesting continuity in the plant materials incorporated into houses or used as fodder between the two periods.

The 137 Asteraceae *Tilesia* seeds recovered in a single sample from the context created during the ritualized abandonment of a house at the end of the Inka era (see Chapter 3) are of particular interest. The exceptionally high count of *Tilesia* seeds is especially remarkable as the sample from that context was almost entirely devoid of macrobotanical remains except for those seeds (although starches and/or phytoliths of *Cheno-Ams*, beans, maize, and *yuca* were present). *Tilesia*, known locally as *suncchu,* is a common wildflower in the Ollantaytambo region.[30] Members of the agrarian cooperative at Simapuqio report that they use it as a fodder for grazing animals and guinea pigs, and that the flower was used historically to create an orange dye. While it is impossible to state with certainty how the *Tilesia* seeds were incorporated into the archaeological record, the high count and concentration suggests intentional inclusion in the ritual assemblage. Today, flowers—and in particular yellow flowers—are commonly included in ritual deposits (*pagos* or *despachos*) in which participants are guided by ritual specialists to

[30] The plant flowers in the middle of the rainy season – roughly from December to March – and seeds develop towards the end of that period, so the ritual almost certainly took place in the austral autumn.

express gratitude for the bounty of the *Pachamama*. The inclusion of these seeds suggests that seed-bearing flowerheads may have also been included in offerings historically.

Figure 6-6: The *pago* offering prepared by ritual specialists from the Simapuqio agrarian cooperative in advance of excavations at Simapuqio-Muyupata. Note yellow flowers on central plates, here mixed with coca leaves and llama fat. Beer, wine, anis seed liquor, chicha (in blue jug), coca (in green bag), sweets, and cigarettes were all essential components of the *pago*, which was assembled over the course of an afternoon and then burnt and buried adjacent to the site.

A final point from the macrobotanical data related to the incorporation of agrarian laborers around Ollantaytambo into the broader regional agroecology; samples from both occupations contained significant evidence that workers were able to access goods from lower altitudes. According to density and ubiquity calculations Apocynaceae *Parahancornia* was more common in the later samples than in earlier contexts. While overall ubiquities of the *Yungas* taxa remain stable over time, the specific taxa that make up the group varied between periods. Moraceae *Clarisia*, Sapindaceae *Talisia,* and Anacardiaceae *Spondias* are present in in the first occupation, while Boraginaceae *Cordia*, Euphorbiaceae *Sapium*, and Ulmaceae *Ampelocera* are present in second occupation samples. It is unclear how this shift may be reflective of a change in practice—indeed, it is not apparent how the seeds of these taxa were incorporated into archaeological assemblages—but they suggest that people living at Simapuqio-Muyupata during both the Inka and Colonial periods had access to products from the lower altitudes, even if the specific products or modes of access varied as the Inka estate collapsed and Colonial market structures were established.

6.4 Zooarchaeological Data

Botanical data from Simapuqio-Muyupata are complemented by zooarchaeological findings. Osteological remains collected at the site were analyzed in Cusco by Lic. Karen Durand, a local faunal specialist, using her reference collection.[31] The entirety of the bone sample from the site is small, comprising only 592 elements. For the analyses that follow, I exclude elements collected from surface contexts and those from Unit SM-B4 (the reservoir), leaving a total of 494 elements with a total weight of 2842g.[32] The majority of these are from occupation two contexts, despite the excavated volume of occupation one contexts being considerably higher than occupation two contexts across the site as a whole.[33] As conditions of preservation are virtually identical for the two occupations, this different is reflective of changes

[31] Zooarchaeological remains were separated by context in excavations. To ensure recovery of small bones, all excavated soil was screened through ¼'' mesh.

[32] I eliminate surface contexts here to ensure comparability with the archaeobotanical assemblage, this also eliminates any potential modern trash from the assemblage.

[33] Here I exclude the volume excavated from units SM-C1, SM-B4 and SM-A3, the reservoir and canal excavations (see Chapter 3, Chapter 5) from this calculation, excluding these units the excavated volume at Simapuqio-Muyupata was low relative to excavated area (total volume 43.5m^3, area 82m^2). Inka contexts comprised an excavated volume of 26.85m^3, Colonial contexts amounted to 16.6m^3.

in practice, rather than preservation biases. In what follows, I focus on fragments that could be identified to at least genus level, which further restricts counts.[34]

Table 6-8: Counts, weights, and density of the zooarchaeological assemblage from Simapuqio-Muyupata.

	Element Count	Weight	Density g/m^2	Identifiable Element Count
Total	494	2842g	65.3	166
Occupation One	124	926g	34.5	46
Occupation Two	370	1918g	115.1	120

While the small size of the zooarchaeological collection restricts analytic potential, the limited size of the assemblage—and the small count from earlier contexts in particular—may itself be informative. While in part the low number of bones recovered from these contexts is likely reflective of the short period in which people lived in Inka-era houses, it also may indicate a retainer diet that featured little meat, or where the majority of meat was consumed as *charki* prepared outside of houses. More extended excavations at the site will allow for the elaboration of these datasets and more conclusive findings. Here, I first discuss information that can be derived from the first occupation assemblage and then turn to remains recovered from occupation two contexts. Because of the small sample size, I do not differentiate between units within this comparison, however, MNI were calculated independently for each unit and then summed.

[34] I eliminate bones that could only be identified as "mammal" but keep bones that were identified as "bird" as the fragility of bird bones left very few identifiable bird specimens. The Inka sample is skewed considerably due to the discovery of the deer in SM-B10, which comprises a large portion of the "Inka-era" assemblage.

Occupation One Assemblage

The occupation one assemblage is comprised of bones of guinea pig (locally "*cuy*," *Cavia porcellus*), deer (Cervidae), Camelids ("llama," *Lama glama*, and "alpaca," *Vicugna pacos*).[35] A single bird-bone fragment may be from Muscovy duck (*Cairina moschata*). Table 6.9 presents the number of identified specimens (NISP) for each of these taxa, the percentage each taxa comprises of the total NISP, and the minimum number of individuals (MNI).[36]

Table 6-9: NISP, %NISP, and MNI of major taxa from Occupation One contexts.

	NISP	% NISP	MNI
Camelidae	19	41.3	9
Cervidae	20	43.4	1
Cavia porcellus	4	9	4
Mus musculus	1	2.2	1
Large bird	1	2.2	1
Ovis aries	1	2.2	1

The taxa represented in this assemblage are broadly similar to, although not as species-rich as, other Inka-era assemblages excavated near Ollantaytambo (e.g., Kosiba 2010; Quave 2012; Quave et al. 2019). It is unsurprising that camelids dominate the assemblage given the prominent role camelid meat played in Andean diets, and the importance of llamas and alpacas for wool, fertilizer, as beasts of burden, and in rituals (see Bray 2003; Sandefur 2001). Guinea pigs may well be underrepresented given the fragility of their small bones and potential biases in recovery. These animals are commonly kept in contemporary houses and likely were in the past

[35] During analysis camelid bones were provisionally differentiated between llama and alpaca, however, ultimately we decided that the sample size was too small for this distinction to be confirmed, so here I report all bones as simply Camelidae.

[36] MNI was calculated for each unit separately based on anatomical side, element section, fusion and dental eruption (age at death), bone size, and location in the site (Reitz and Wing 199)

as well. As the MNI data indicate, the high proportion of Cervidae bones in the NISP count is deceptive. All of these deer bones were recovered from a single context—the ritual deposit already discussed in this chapter—and were almost certainly from the same animal, which was likely burned in place given charring and calcification on the bones.[37] As at Yucay (Niles 1999, 145-46) hunting grounds around the estate were likely limited to elite use, so it may be the case that workers at the site did not have regular access to deer; these remains are not likely representative of common practice or regular consumption during the Inka period.[38]

Occupation Two Assemblage

As is to be expected given the numerous introductions to the Andes in the Colonial Period and historical documentation of a rapidly emerging colonial pastoral economy around Cusco in the sixteenth century, the later occupation zooarchaeological assemblage is much more species rich than that from Inka contexts. Along with native Andean taxa, sheep (*Ovis aries*), cattle (*Bos taurus*), horses (*Equus sp.*),[39] pigs (*Sus scrofa*), and chickens (*Gallus gallus*) are all present in the occupation two assemblage. Excavators also recovered the bones of rare taxa—a feline (likely *Puma concolor*) and dog (*Canis lupus*) from later contexts.[40] Table 6.10 presents the NISP and MNI data for the assemblage.

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[37] A large number of unidentified bones from this context also likely originated in the same animal.

[38] For comparison, Quave (2012) identified no deer bones in excavations in retainer compounds at Cheqoq.

[39] Provisionally, all *Equus* bones were identified as *Equus ferus*, domesticated horse, however it could not be absolutely ruled out that some fragments may have been from donkey (*Equus asinus*) or mules.

[40] The feline bone (a fragment of scapula) may also be from the Andean pampas cat*, Leopardus jacobita*, however, the scapula was large enough that puma is more likely.

Table 6-10: NISP, %NISP, and MNI of taxa from Occupation Two contexts.

	NISP	% NISP	MNI
Ovis aries	34	28.3	8
Bos taurus	31	25.8	7
Camelidae	22	18.3	6
Gallus gallus (Large bird)[41]	6 (10)	5 (8.3)	4
Equus	9	7.5	3
Cavia porcellus	3	2.5	3
Sus scrofa	2	1.6	1
Felidae	1	0.8	1
Canis lupus	1	0.8	1
Ruminantia (Cervidae)	1	0.8	1

Given historical evidence for pasturing introduced animals around Ollantaytambo in the Colonial Period (see Chapter 5) it is unsurprising that introduced animals like cattle and sheep are the most common in the assemblage. These animals were likely raised throughout the Cusco region for wool, dairy, and meat, and many were likely also transported for sale to urban centers. The replacement of camelids as the most important pastoral taxa may have been accelerated by disease; Spanish sources of the sixteenth century reported that in the 1540s huge numbers of camelids in the Cusco region were killed as a result of a highly contagious mange (Acosta 1986, cited in Cheptstow-Lusty et al. 2007).[42]

Birds in the assemblage—many specifically identified as chickens, which were introduced early and included in the encomienda *tasa* (ducks and chickens were considered

[41] Here I include both identified chicken bones and unidentified large bird bones together. Parentheses indicate the unidentified fraction of the sample. The MNI calculation does not differentiate between unidentified and identified bird bones.

[42] Here though, while disease may explain the sudden loss of many animals, it does not account for their failure to recover or replacement as the most important pastoral animals. Rather, this transformation in pastoral practice is reflective of a shift towards a preference for sheep, cattle, or pig husbandry.

interchangeable in the *tasa,* which also required eggs as tribute, see Julien [2000])—likely represent household production of animals kept for eggs and butchered at the end of their laying lives. It is unclear whether the horses recovered in excavations were eaten. Equids were primarily kept as draft animals, for instance, in his 1618 will Luis Vizente noted he kept ten mules and their tack at Kachiqhata (ARC *Protocolos Notariales,* N:260, 1618-1619); however, they may also have been eaten at the end of their useful lives as traction. As in earlier contexts, *cuy* are likely underrepresented in the zooarchaeological sample due to preservation and collection biases. It is striking that pigs, an early introduction that reproduce rapidly and likely became common fairly quickly, are relatively rare in the assemblage.[43] This may indicate that hacienda workers like those that lived at Simapuqio from the end of the sixteenth century had little access to pork, although they may still have raised pigs for sale or as part of their labor obligations to the hacienda.

Interpretation

While the small size of the Simapuqio-Muyupata assemblage makes it difficult to conclusively compare between the two occupations or elucidate pastoral practices that emerged in the Colonial Period, some general conclusions can be insinuated. Data from contexts associated with the first occupation suggest that *yanakuna* at the site ate little meat, and what meat they did eat was largely limited to camelids, *cuy*, and birds. Alternatively, it is possible that meat was

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[43] For instance, pigs were required on an annual basis in the Ollantaytambo encomienda *ta*sa, indicating at least a nominal expectation that pigs could be produced in the first half of the sixteenth century. This may have been a more idealized than actual reality though, as provisions were included in the *tasa* to replace absent pigs with chickens or ducks (one pig was considered the equivalent of 12 birds; see Julien 2000). There is considerable historical evidence of pigs kept in large numbers around Ollantaytambo by the end of the sixteenth century, including by the Augustinian friars at Tiaparo (see Chapter 5) and in a large herd by deposed Inka nobles above Sillque (Glave and Remy 1983).

primarily consumed as *charki*, which would leave no faunal signature if prepared outside of the house. Ethnohistorical data indicate that Inka elites maintained large herds of animals in the pasturelands above the royal estates (Niles 1999). Low overall zooarchaeological counts seemingly indicate that *yanakuna* living at the site had little access to royal herds kept at Ollantaytambo. This finding is in contrast with other projects in the Andes that have found that Ink-era commoner and elite populations enjoyed diets that featured a variety of domesticated animals (Kosiba 2010; Sandefur 2001; Quave 2012; Quave et al. 2019). However, it is in agreement with Bernabé Cobo, a sixteenth century chronicler of Inka histories, who noted that save for dried *charki*, non-elites in the Inka Empire had access to very little meat (1990 [1653]: Pt. II, Ch. 5). T he comparative richness of the second occupation assemblage suggests that, in contrast with botanical findings, foreign fauna were eagerly incorporated into worker diets at Simapuqio-Muyupata.[44] Hacienda workers seemingly had access to and took advantage of taxa like cattle, sheep, and chickens. Given the small sample size, these data are of only limited utility for understanding the pastoral economy that emerged around Ollantaytambo in the sixteenth century, however, they do suggest that hacienda workers were participating in a pastoral economy on Ollantaytambo's fields that featured a range of taxa.

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[44] There have been few colonial archaeology projects in the Andes that have generated comparable zooarchaeological data, and none that have looked directly at hacienda laborers. Hu's (2016) excavations at the *obraje* of Pomacocha, where Andean laborers worked to produce textiles, recovered an assemblage dominated by cattle, sheep, goats, and chickens without any camelid remains. As Smit (2018) found, workers in the mining town of Santa Barbara consumed a diet dominated by sheep, cattle, and camelids. In the Moquegua valley of southern Peru deFrance (1996) compared zooarchaeological remains from a *reducción* and colonial wineries, finding that Andean residents of the *reducción* were conservative adopters of non-native taxa in the 16th century; large introduced taxa were rare, while smaller foreign domesticates such as sheep and pigs were more likely to be adopted. Strikingly, by contrast with remains from Simapuqio-Muyupata, no cattle or horses were recovered in deFrance's *reducción* assemblage.

6.5 Labor, Domestic Economy, and Land Use Under Inka and Spanish Rule

In this section, I draw on the data presented above to suggest some potential changes in diet and agricultural practice between the first and second occupations at Simapuqio-Muyupata. Data from the first occupation contexts—primarily dating to the Inka era—suggest that *yanakuna* laborers that worked fields for the Inka estate had access to a wide range of foods. *Yanakuna* diet was comprised of plants—achira, potato, cucurbits, chenopods, chilis, yuca, amongst others—and a more limited array of animals—*cuy,* camelids, and perhaps deer. This array of foods suggests access to the products of land in a variety of ecological zones—*yungas* lowlands, temperate maize and tuber producing zones, and high-altitude pastureland. *Yanakuna* at the estate seemingly acquired plant and animal products through the direct cultivation of dooryard gardens and usufruct plots, redistribution of goods intensively farmed in estate fields, and importation of foods from other ecotones.

As I discussed in Chapter 4, ethnohistorical evidence suggests that lands of the Inka estates were held by *panaca* cults, wealthy individuals, and powerful Inka nobles, and were worked by *yanakuna* subjects of those elites. Herds were kept in the high pasturelands above the estates (see Niles 1999, 149; Quave 2012). Ethnohistorical sources suggest that *yanakuna* workers were allotted plots for their own sustenance. For instance, the chronicler Betanzos describes how the Inka Pachakuti Yupanqui assigned many *yanakuna* to care for the mummy of his father, ordering "that the *yanaconas…*should have houses, towns, and farmland in the valley and towns around the city of Cusco" (1996 [1557], Part 1, XVII, 112). In another example, La Lone and La Lone (1987) describe how at what they term Inka *production enclaves*—their examples include state farms at Cochabamba, Bolivia, and Abancay, to the west of Cusco—

intensive state-sponsored agriculture was supported by the labor of a permanent force of transplanted workers who were allotted fields for their own use and were also permitted to cultivate the margins of state lands. Such a system may also have been in place at Ollantaytambo. *Yanakuna* serving the estate farmed the vast majority of the land the Inka developed at Ollantaytambo to support elites, but some fields were likely set aside for workers to support themselves. These workers produced goods like potatoes, cucurbits, and beans evinced in the Simapuqio-Muyupata assemblage on such plots and in gardens adjacent to their houses.

However, some of the plants used by *yanakuna* working for the estate almost certainly *did not* grow in the immediate vicinity of Ollantaytambo. Crops like achira and *yuca,* and fruit like Apocynaceae *Parahancornia,* originated in the lower reaches of the Urubamba, if not further afield.[45] The presence of these lowland taxa in *yanakuna* houses suggests vertically oriented redistributive networks. Here though, rather than redistribution within the ayllu or community as in Murra's (1980) vertical archipelago model, redistribution to resettled workers was more likely mediated by the estate. While these plants could have originated from many low-altitude locales, a likely possibility is estate fields at other locations. As Quave (2012) and Niles (1999) outline, estates were not continuous. Pachakuti's estates included low altitude lands for producing coca, fruits, and other *yungas* taxa like achira or yuca.[46] Indeed, there is considerable evidence for exchange between estate fields at different ecotones. Isotope studies by Burger et al. (2003)

[45] For instance, these foods may have been brought via the high-altitude pass in the Patacancha Valley from what is today the Ocabamba region, an area that was likely an important coca producing zone in the Inka and Colonial periods from whence jungle products may have been regularly sent to the Cusco region via Ollantaytambo.

[46] Ramírez (2005) argues that discontinuous estate fields cannot properly be said to have "belonged" to anyone. Rather, possession was rather predicated on labor by subjects. In this sense, the estate could be said to encompass fields worked by *yanakuna* subjects of the *pananca*, regardless of where those fields happened to be located.

showed that workers at Machu Picchu—another of Pachakuti's holdings—consumed high quantities of maize, which is difficult to grow at Machu Picchu's relatively low altitude. Quave's (2012) excavations also recovered maize and coca at higher elevations than the effective limits of those crops, suggesting that those cultigens may have been redistributed from Huayna Capac's lower altitude fields.

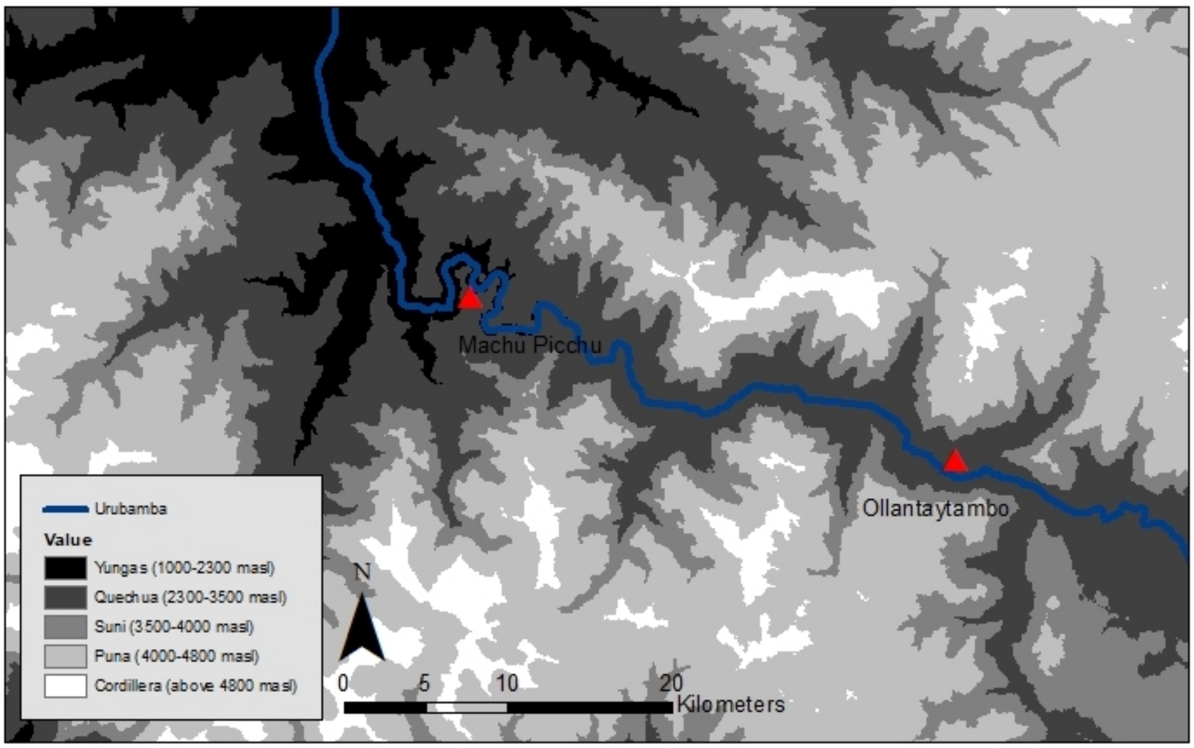

Figure 6-7: Ecological zones of the broader Ollantaytambo region according to the schema of the geographer Pulgar Vidal (1967). These regions are very imperfect representations of ecological reality; they don't account for microclimactic variability or human modification, including the creation of production zones (see Chapter 2). I include this figure here simply to give a sense of the distance between Ollantaytambo and lower altitudes where jungle or *Yungas* crops were produced. In this dissertation, when I use "Puna" I do so in accordance with its colloquial meaning (high altitude pasture) rather than in Pulgar Vidal's more restricted sense.

While there are several possible explanations for findings from Simapuqio-Muyupata, one is that top-down redistribution, mediated by elites, was a mechanism through which *yanakuna* supplemented the food they could produce for themselves. Under such a scenario, estate organization and labor demands on Inka fields may have left workers without enough time or land to adequately provide for themselves. The yields of intensive production on estate fields were centrally managed, and may have been taken directly to the storehouses that line the cliffs above the monumental core of Ollantaytambo. The near absence of evidence of crop processing (e.g., weed seeds, plant by-products, maize cobs or cupules) in Inka contexts supports this centralized model of crop management. The paucity of evidence for maize in worker houses also supports this theory, it suggests that access to that crop may have been tightly controlled and mediated through redistribution. Given the absence of macrobotanical remains maize may have been redistributed as *chicha* beer, or, alternatively, it may be the case that when maize was roasted for consumption this occurred in public settings, and so evidence was not preserved in houses. This is to say, the consumption of this valued crop may have been limited to ostentatious public displays sponsored by elites.

Within such a system of labor organization the redistribution of foodstuffs—tubers and fruits from lower altitudes, maize from estate fields, and meat from estate herds—would have mediated relationships between workers and administrators on the estate. Such top-down redistribution would have operated as a means to solidify Inka authority over laboring subjects. In her analysis of Huayna Capac's Yucay estate, Niles (1999, 228-229) examined the morphology of terraces, including sightlines and access routes between terraces and from one complex to another, ultimately suggesting that terrace systems were designed to control not just land and water, but also to facilitate the supervision and control of large groups of ethnically diverse workers brought from across the empire. Administration of these workers was made more straightforward by open sightlines, and movement was restricted by limited access points.[47] Land use and access was tightly monitored. The data presented above suggest that the distribution of agricultural products may have operated as a parallel mechanism of social control on royal estates; by collecting the products of fields they developed, and by redistributing products from other production zones, Inka elites positioned themselves as mediators between labor and subsistence within a social system fundamentally organized around the redistribution of foods (see below; Ramírez 2005).

Zooarchaeological and botanical data demonstrates dramatic transformations in how agricultural workers were articulated to land in the emergent hacienda agroecology. The starkest difference between the first and second occupation archaeological assemblages is the adoption of non-native grazing animals into the diet of hacienda laborers; It is particularly striking that foreign fauna were rapidly adopted given the seeming reluctance to adopt non-native flora into dietary assemblages. While there are many complicating evidentiary factors, the relative prevalence of animal bone in Inka and Colonial contexts suggests an agroecology more oriented towards pastoral production, a transformation that likely went along with agricultural deintensification (see Chapter 5). In their investigation of how foodways at the settlement of Carrizales on the Peruvian north coast changed between the Inka and Colonial periods, Kennedy and VanValkenburgh (2015) suggest that given biological differences between camelids and European taxa, farming introduced taxa may have afforded Andean people the ability to produce

[47] At Cheqoq, Quave (2012) links control of this type to the foods, arguing that wild foods, including hunted rodents and a possible peccary, may indicate that *yanakuna* turned to non-domesticates to supplement the limited foods they could produce for themselves on estate lands.

enough meat to both provide for themselves and meet tribute demands. This may also have been the case at Ollantaytambo.

Even as workers living at Simapuqio-Muyupata seemingly did not rapidly adopt non-native flora, there were still changes in plant use indicative of shifting patterns of *land use* in the Colonial Period. For one, the richness of the culinary assemblage declined from one occupation to the next at the site as crops like achira and *yuca* vanished from the assemblage (see table 6.11).[48] It is notable that even as those lower-altitude crops disappeared from the later assemblage, others, most notably Apocynaceae *Parahancornia*, seemingly increased in importance. The ubiquity of this semi-domesticated jungle fruit and other *yungas* taxa in occuption two contexts indicates that connections to lower altitude locales were retained across the Inka to Colonial transformation of the region, even as the specific mechanism of access likely shifted. Rather than redistribution via the estate, colonial *yanacona* may have accessed these lower altitude products via engagement with emerging markets or while working in hacienda holdings at lower altitudes. Indeed, the increased commodification of coca in the Colonial Period (Covey 2021) and emergence of sugar as a lower altitude cash crop may have increased exchange between temperate zones and warmer lowlands.[49] The presence of these taxa in worker

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[48] Because of low colonial sample sizes, this conclusion is provisional.

[49] Many of Ollantaytambo's *hacendados* also owned sugar mills at lower altitudes (Glave and Remy 1983), including likely Luis Vizente, the creator of the estancia of Markaqocha and among the first *hacendados* of the region, who declared lands in Amaybamba in his will (ARC: *Protocolos Notariales*, N:260, 1618-1619). The encomienda *tasa* for Ollantaytambo also required that workers from the town travel to lower altitudes to work coca fields belonging to the *encomendero*, however, this labor had likely largely ceased by the time the buildings in Sector C were reoccupied in the Colonial Period, and would not have been required of hacienda-dwelling *yanacona* under the terms of the encomienda.

homes affirms that the hacienda was not an entirely self-contained institution; boundaries were porous, and workers were able to access products from outside the bounds of usufruct plots.

Table 6-11: Presence of different plant taxa at Simapuqio-Muyupata, comparing between Inka and Colonial contexts and between evidentiary forms. Letters indicate kind of evidence for presence: M=Macrobotanical, P=Phytolith, S= Starch grains. The "*" indicates that the taxon was ubiquitous in only one sample.

	Occupation One Presence	Occupation Two Presence
Solanum (Potato)	P*	M
Chili Pepper	M	M*
Fabaceae *Inga*		M*
Apocynaceae *Parahancornia*	M	M
Passifloraceae *Passiflora*		M*
Cheno-Am	S, P	P
Curcurbita sp. (gourds)	S, P	S, P
Phaseolus sp. (beans)	S, P	S, P
Zea mays (maize)	S, P	S, P
Cannaceae *Canna* (achira)	S*	
Manihot esculenta (*yuca*)	S	

The most striking difference between the botanical samples from the two occupations is the dramatic shift from total absence to high counts of potato seeds from the first to the second. While the presence of potato seeds in domestic contexts is likely reflective of the use of stalks as fuel (or as fodder, where dung was burned), it is also suggestive of shifts in agricultural production; namely, an increase in potato growing (Bruno 2014). There are several reasons why the importance of potatoes may have changed. For instance, in the Mantaro Valley Hastorf (2001) relates a *decrease* in potato production to the advent of Inka rule. Hastorf argues that the Inka deemphasized potatoes by simultaneously encouraging maize cultivation and relocating settlements to lower altitudes better suited for growing the grain. At Simapuqio-Muyupata, Colonial period contexts were located amidst ideal maize production lands, so population movement is an unsatisfactory explanation for a rise in the importance of potatoes. The increase in potato cultivation may instead relate to a shift in modes of subsistence wherein workers were more reliant on foods that they could produce for themselves than on redistribution from estate storehouses.

The importance of commercialized maize and wheat in hacienda production suggests that hacendados would have dedicated the maximum area possible to the production of those crops.[50] Even as the *yanacona* hacienda workers at Simapuqio-Muyupata literally lived amidst maize fields, the ascendency of commercialized maize and wheat growing across the sixteenth and seventeenth centuries probably curtailed their access to lands suitable for grain cultivation. Hacienda *yanacona* were likely limited to usufruct plots where the production of valued grains was more difficult or impossible, either due to the absence of irrigation or other ecological factors like altitude. Commercialized hacienda production likely also structured the rhythms of *yanacona* labor; these workers would have been obligated to work for the hacienda at times of sowing and reaping when maize demanded the most intensive work. As such, potatoes may have increased in importance as a calorie-dense crop with complementary rather than conflicting labor demands to maize and wheat.[51] Assuming that commercially valuable grains were planted for

[50] Labor and land were both limiting factors. The area of suitable maize land likely shrunk during the Colonial Period as irrigation infrastructures failed and cultivation de-intensified due to initial population loss and as introduction of new fauna afforded new uses of lands (see Chapter 5). The introduction of wheat is a bit more complicated, as wheat can be farmed productively without irrigation. Wheat may even have allowed some farmers to bring new lands into production that were unsuitable for maize growing (Kosiba and Hunter 2017). However, while wheat was particularly important early in the Colonial Period, maize had regained prominence as the most important commercial crop produced around Ollantaytambo by the middle of the seventeenth century (Glave and Remy 1983; see also Covey 2021).

[51] Hastorf (1993) provides estimates of the caloric values of common Andean cultigens. Potatoes, maize, quinoa, and kañihua are the highest value cultigen, ranging from an estimated 320-351 calories/100g weight. While maize and potatoes have similar planting and harvest schedules around Ollantaytambo, generally planted September to October and harvested in May

hacienda production where they could be most productively grown—which is to say, on lower altitude terraced and irrigated lands—this suggests that *yanacona* were likely limited to more marginally located usufruct plots, likely at higher altitudes, and were regulated by labor scheduling to planting less labor intensive crops like potatoes. Changes in the land itself—for instance, infrastructural degradation like that discussed in Chapter 5—may also have influenced patterns of land use by altering the ecological affordances of given plots.

At the same time as the details of the native taxa consumed at Simapuqio-Muyupata seemingly shifted between the Inka and Hacienda periods of land tenure, the broad contours of the botanical data also suggest a shift towards practices of crop processing and plant handling that resulted in the more frequent preservation of charred botanical remains inside houses. The increased density of total plant parts between occupations (5.55 fragments/l to 7.608), density of seeds (1.67 to 2.98 seeds/l), and density of unidentified carbon (3.8 to 4.67 count/l) is indicative of transformations in practice that made remains more likely to preserve; namely, either increased combustion of plants and plant parts inside houses or increased processing and incidental burning of processing byproducts inside houses. This may indicate that under Inka management crop processing was centrally controlled and took place in public settings. By contrast, more individualized production on haciendas prompted a spatial shift to processing inside the house. The increased prevalence of weed seeds in Colonial-era contexts (Asteraceae *Tilesia* aside) lends further support to this interpretation.

In toto these conclusions suggest a shift in how land and labor were organized under Inka and Hacienda land management. Under the Inka, the data are consistent with a scenario wherein

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or June, potatoes offer considerable flexibility while the requirements of maize are quite rigid (Gade 1975).

yanakuna labor was closely controlled, and the products of estate lands closely guarded. Within such a scenario, *Yanakuna* produced some their own foods through direct cultivation on assigned lands but were also rewarded for their labor through the distribution of foodstuffs from the storehouses of the estate. Inka elites were an interface through which workers accessed goods produced on estate fields in other ecological tiers. By contrast, hacienda workers produced more of their own foods by directly farming what were likely high altitude marginal fields. Political relationships between workers and landowners were mediated not by the products of land, but rather by access to the land itself, a product of the *dominio* authority *hacendados* established over the fields to which they held title (see Chapter 4). The colonial power structure of the hacienda fundamentally changed how land was situated politically and instrumentalized as a political object.

While these findings are provision given limited datasets, they do demonstrate that the structural reorganization of agrarian lifeways that made the hacienda possible penetrated into the kitchens of agrarian laborers. Shifts in land management had real consequences in the day-to-day of agricultural labor, and in the relationships between agriculturalists and agroecologies. Botanical and zooarchaeological data from Simapuqio-Muyupata are indicative of shifts in the multispecies relationships formed on Ollantaytambo's fields under Inka and Spanish administration. Recalling Ingold's (2000) characterization of agriculture as a process of growth that simultaneously shapes plants and animals *and* agricultural workers (see Chapter 2), we can infer that as the emphasis of agriculture shifted as hacienda control over land consolidated, agricultural workers would have developed different relationships with the plants and animals they farmed. The ecological requirements of both hacienda products (e.g., maize and wheat) and *yanacona* subsistence crops (e.g., tubers) would have shaped workers day-to-day lives and seasonal patterns of labor. Caring for and accommodating the ecological demands of assemblages of familiar and unfamiliar species would have placed strains on existing social and political formations at Ollantaytambo, even as new opportunities would have emerged as a result (see Kosiba and Hunter 2017). For instance, an increase in the importance of potatoes as a subsistence crop likely reflects both the cessation of Inka preferences for maize and the limitations of usufruct plots worked under hacienda rule (limitations that may also be partially social, see Chapter 5). But at the same time, increased tuber cultivation would have reshaped social and political life, perhaps affording *yanacona* opportunities to labor in high altitude fields beyond the purview of hacienda overseers and providing the foundation to land claims predicated on ongoing use, even if the legal recognition of those claims was unlikely within Colonial regimes of governance.[52]

6.6 Conclusion

In this chapter I drew on botanical and zooarchaeological data from excavations in domestic contexts at Simapuqio-Muyupata to explore how articulations between agrarian laborers and the lands they worked for their subsistence shifted under Inka and Hacienda systems of land management. These data demonstrate that while there were certainly continuities between the two periods—workers in both made extensive use of taxa that could be produced on local usufruct plots and had limited access to the products of intensively cultivated maize and wheat lands—there were also major transformations in how land was situated politically.

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[52] For instance, in 1846 a group of men claiming membership in a "Markaqocha Ayllu" collectively launched legal action in Cusco over usufruct rights to lands around Markaqocha that were legally owned by the Hacineda Guatabamba (Compone). The outcome and details of the case remain opaque, but the very existence of the claim and the ayllu testifies to the development of political ties to lands that were cemented in the Colonial Period in the face of hacienda governance of land (ARC, *Protocolos Notariales*, N: 54, 1842-1847).

Between the Inka and Colonial periods—roughly aligned with the first and second occupations of Simapuqio-Muyupata—introduced animals became important to worker subsistence as land changed, agricultural production deintensified, and Inka redistributive networks disappeared. Consequentially, potatoes became more important as a subsistence crop that could be farmed despite the onerous hacienda labor demands associated with commercialized grain production. Vertical exchange remained important to worker subsistence, but the mechanisms of that exchange shifted.

These data show that the distinction between Inka *yanakuna* workers and *yanacona* on haciendas was materialized in the households of those workers. Under the Inka, *yanakuna* labor—even on tightly controlled and heavily administered royal estates—was deeply connected to modes of reciprocity in which workers labored for the estate but were in turn rewarded with products from estate fields in other ecological zones. Ramírez (2005) argues that the basis of Inka authority was the power to mediate between subjects and the deceased ancestors that controlled fortunes in the mortal world. This power manifested itself in exchange; by feeding the ancestors, the Inka (or local *kurakas*) assured that subjects would in turn be fed. Elites had power because they could act as intermediaries between the living and the dead, and, by feeding ancestors, could ensure that fields remained productive; political-economic power was cosmological power. The basis of authority was not so much the land itself as it was the ability to make land productive by commanding the labor to work it and communicating with the divine beings that could bestowed bounty.[53] By contrast, the grounds of colonial authority on haciendas

[53] As Mannheim and Salas Carreño (2015) point out, food circulation and commensal consumption are foundational aspects of society in contemporary Quechua communities. The authors draw from several ethnographic accounts to illustrate this point, including Van Vleet (2008) and Weismantel (1995), who argue from different ethnographic contexts to show that the act of providing food creates kinship, including between people who lack biological relation.

was governance of the land itself. By actualizing their *dominio directo* rights through quintrent-like arrangements *hacendados* assured a steady supply of labor to work in hacienda fields. This transformation emphasizes that land was inherently political; it mediated relationships between elites and workers in different ways at different times, but it was nonetheless central to the maintenance of those relationships.

Chapter 7

From the Inka Estate to the Agrarian Reform

7.1 Introduction

Two imperial projects grafted indices of power onto the land of the Ollantaytambo region between the fourteenth and sixteenth centuries. The Inka dramatically reshaped the region through monumental projects of earth building and refigured social geographies by transplanting *yanakuna* workers to labor on newly developed fields. In turn, these laborers made homes and inaugurated *huaca* shrines that they venerated to cultivate relationships with the lands upon which they lived and worked. The effects of this Inka imperial project carried over as Spaniards re-inscribed the landscape as colonial territory, marked it with *mojones*, and imposed the hacienda as a rural power structure. As I have outlined across the previous chapters of this dissertation, the creation of the hacienda at Ollantaytambo was an uncertain process that built on the past rather than erasing it; as hacienda *yanacona* worked Inka-built fields they simultaneously fostered Inka legacies embedded in the land and transformed material remnants of Inka rule, creating distinctly colonial ecologies of "new" and "old" plants, animals, practices, and politics.

In this dissertation I have explored various dimensions of the political and ecological shifts that occurred at Ollantaytambo as fields in the region were transformed into the grounds of colonial-hacienda power. To review: Chapter 3 drew on extant research and my excavations at the sites of Simapuqio-Muyupata and Markaqocha to trace changes in the social composition and occupation of the region from the fourteenth to the sixteenth centuries, demonstrating how the political transformations of Inka and Colonial rule manifested in the occupation of distinct archaeological sites. In Chapter 4 I considered how the application of Spanish customs and legal structures shaped patterns of land tenure across the same period by tracking the creation of individualized forms of possession that allowed for the expansion of hacienda landholding. By tracing this process I explored the situated interactions through which Colonial power was made tangible in Ollantaytambo's fields as possession of land—*dominio*—was enacted in the region. In Chapter 5 I examined the use and disuse of Inka-built agricultural infrastructures via stratigraphic pollen data to show that shifts in political control, occupation, and land tenure coincided with material transformations to the regional agroecology. By doing so, I demonstrated that the agricultural land exploited by emergent haciendas was a social product that was reshaped over the Colonial Period, even as haciendas continued to depend on valley-floor Inka fields for maize and wheat production. Chapter 6 drew on botanical and zooarchaeological data from Simapuqio-Muyupata to show how changes in political organization and agricultural practice were reflected in the homes of agricultural workers under Inka and hacienda regimes of land management.

These chapters support my overarching arguments: The transformations to land use and governance, and changes in the land itself, associated with the establishment of haciendas around Ollantaytambo cannot be completely understood without attention to Inka histories of land development, modification, and use; Spanish colonialism prompted a realignment of how agricultural land around Ollantaytambo was positioned in local politics, but this realignment was structured by latent properties of the Inka landscape and shaped at every turn by a wide array of human and non-human agencies; the hacienda was not just a different system of governing land or producing agricultural goods, it was a power structure that changed how land conducted politics within the agroecology of the Ollantaytambo region. In turn, these arguments support a series of broader points: materials are active forces in history that shape politics; the ecological shifts associated with colonial or imperial histories have legacies that cut across time and exceed the temporal bounds of the entities that initiate them (i.e., institutions like the Inka estates or Colonial haciendas); and finally, a focus on ecological transformation can elucidate complicated and drawn out processes of socio-historical change like those that precipitate from colonialism.

The hacienda era in Peru was, at least nominally, ended in 1969. In that year Peru's military government, under pressure from a rising movement of Indigenous peasants and in response to decades of repeated land invasions, promulgated *Ley No. 17716,* The Land Reform Act, and initiated the largest agrarian reform in South American history. During the reform government land judges acting under the aegis of the new law set out from urban centers to survey hacienda fields, evaluate land use, and appraise hacienda assets. Like the colonial administrators who surveyed lands for the *composición*, these state officials walked terraces, interviewed landlords and farmers, and mapped buildings, canals, and plantings. They then categorized lands according to their use and value: irrigated or dry-farmed; woodland, pasture, or "*tierras de cultivo*"; planted by the hacienda, rented to "*feudatarios*," or unused. Based on these classifications, lands were redistributed to farmers organized in cooperatives or left in private hands. In the process, these judges produced a vast corpus of *afectación* documents (implementation of land transfers) that reveal how *latifundia* control over agricultural production in the Colonial and Republican periods reshaped the Ollantaytambo region. Ultimately nearly half of Peru's agrarian land was transferred to cooperative control, bringing the "*tiempo de la hacienda*,"—the "time of the hacienda," as many farmers at Ollantaytambo refer to it—to a close.

In this final chapter, I begin by reviewing the empirical findings of this dissertation and noting its contributions to the archaeology of the Cusco region and the Colonial Andes. To conclude the dissertation, I look to records from the agrarian reform to explore the legacy of the hacienda as a mode of landholding that endured in the region for four centuries. These documents show that while Inka legacies at Ollantaytambo remain overt in the terrace systems and canals that still anchor agricultural production, and in the ruins that draw hundreds of thousands of tourists each year, the afterlives of haciendas also continue to shape land and landholding at Ollantaytambo. The consequences of Inka and Colonial land management continue to ramify into the contemporary era.

7.2 Empirical Contributions of the Work

I framed this investigation of the emergence of colonial forms of landholding and agriculture at Ollantaytambo as a *political ecology of hacienda formation*. As I explained in Chapter 2, by this I mean an approach to the question of how the hacienda was created at Ollantaytambo that simultaneously queries material-ecological transformations to environments, looks to understand contested understandings of those ecologies—the "Natural" world— through the colonial encounter, and that interrogates the social and political processes through which people accessed particular resources. In this study, I focused on the fields and pastures—the agricultural land—of the Ollantaytambo region as an object of study. I focused on land as both a resource of agricultural production and a material that actively participates in the processes of growth through which people and environments (agriculturalists, plants, animals, land…) brought one another into being in the Inka and Colonial Andes (see Ingold 2000). This study was steered by three guiding questions: How did practices of land-use change during the period of hacienda formation? How did land governance and access to land change across the Inka and Colonial Periods? How was the land itself transformed during these processes?

By exploring these questions, I demonstrated the situated historical processes through which a diverse group of actors—local *kurakas*, wealth-seeking Spaniards, Andean farmers, native and introduced plants and animals, and the land itself—shaped the transformation of the Inka estate at Ollantaytambo into the hacienda system of landholding. Here, I discuss the empirical contributions of this investigation to Andean archaeology. I focus on three themes: (1) the archaeology and ethnohistory of Inka royal estates; (2) the historical archaeology of Spanish colonialism in Peru; and (3) scholarly understandings of the intertwined social and environmental transformations prompted by successive waves of Inka and Spanish imperialism. Below, I engage with each of these items in turn. I conclude the section by outlining future directions of inquiry suggested by this research.

Archaeological and ethnohistorical attention to the Inka estates like Ollantaytambo, Yucay, or Machu Picchu, has demonstrated that they functioned simultaneously as metonyms of Inka power and as places dedicated to intensive agricultural production (Covey 2006; Kosiba 2017; Niles 1999). Recently, researchers have also focused directly on the workers—*yanakuna* and *mitmaqkuna*—who worked to build the estates and make estate fields productive (Hu and Quave 2019; Quave 2012; Quave et al. 2019). Excavations at Markaqocha and Simapuqio-Muyupata clarify how different kinds of places—Markaqocha a long-occupied town on the fringes of the Inka estate, and Simapuqio-Muyupata a newly-built settlement near the monumental core—were differently included in Inka labor systems associated with the estate at Ollantaytambo. Data from these excavations suggest that people who lived at Markaqocha were incorporated into the Inka Empire through a process of statecraft involving the inauguration of new spaces and reorientation of political practices like feasting (see also Kosiba 2010; 2011). By contrast, Simapuqio was purpose built to house agricultural laborers that the Inka brought to the region to build and labor on new agricultural complexes surrounding the palatial core of Ollantaytambo. These findings highlight that Inka estates were cosmopolitan places where different categories of people lived and worked under Inka rule. *Yanakuna, mitmaqkuna,* local people, Inka elites, and non-human beings anchored to prominent features of the landscape were all critical to the functioning of the estates.

The macrobotanical and microbotanical datasets presented in Chapters 5 and 6 of this dissertation provide important data on the quotidian lives of laborers under Inka direction. These data clarify the provisioning of laborers on the estate and highlight the vertical movement of agricultural products up and down the cordillera. For instance, the presence of foods like achira (Cannaceae *Canna edulis)*, manioc (*Manihot esculenta)*, or *naranja podrido* (Apocynaceae *Parahancornia*) demonstrate that Inka workers at Ollantaytambo were able to access foods from a wide range of production zones, including the lowland jungle. The presence of locally produced foodstuffs like gourds (*Cucurbita sp.*) and beans (*Phaseolus sp.*) demonstrate that these workers likely also depended on products from house-yard gardens or small usufruct plots in the estate.

As well as clarifying the composition of worker diets, these data also provide archaeological corollaries to ethnohistorical arguments about the derivation of Inka power and the nature of authority in the pre-Hispanic Andes. For instance, Ramírez (2005) argues that Inka elites and local Andean lords consolidated their authority by mediating between the "feeding" of ancestral and non-human powers that inhabited the Andean landscape and the "being fed" of receiving food back from the earth (see also Bray 2003; Mannheim and Salas Carreño 2015;

Chapter 2). Botanical data from Simapuqio support this ethnohistorical argument by suggesting the redistribution of foodstuffs between production zones within the Inka estates. Excavations in *yanakuna* domestic contexts yielded very few indicators of crop processing, and no evidence of maize by-products, suggesting that agricultural products were centrally managed within the estate. Coupled with the presence of foodstuffs from other production zones, these data imply that within the estate the authority of Inka *panacas* and elite land managers was cemented in redistributive terms. By directing laborers to produce a bounty that was kept in state storehouses and used to feed both workers and the *huacas* that mediated between agricultural workers and the yields of estate fields, the Inka demonstrated their power over land and labor. That is, by directing the laborers that cultivated the land, the Inka reproduced their own authority as rulers over workers, over fields, and over an empire that stretched the length and breadth of the Andes.

This project also makes empirical contributions to the historical archaeology of the Colonial Andes. In the past decades, researchers have begun to examine different valences of Spanish Colonialism in the Andes (Chase 2016; deFrance 1996; Kennedy and VanValkenburgh 2015; Norman 2019; Rice 1989; Smith 1991; Smit 2018; VanValkenburgh 2012; Weaver 2015; Wernke 2013). This emerging field of Andean historical archaeology informs historic and ethnohistoric interpretations of the region's history. For instance, demonstrating how structures of power in the Peruvian viceroyalty were shaped by longstanding Andean principles of ecological and communitarian organization (Wernke 2013), showing how mining boomtowns were situated within broader networks of commodity exchange (Smit 2018); and demonstrating how the production of commodities like wine was predicated on the forced labor of enslaved peoples (Weaver 2018).

However, while historians have long noted the importance of haciendas as institutions that shaped the Spanish colonial world (e.g., Lockhart 1968), haciendas in highland Peru have not been subject to systematic archaeological attention. By exploring colonial conflicts predicated on contested imaginaries of the Inka past that facilitated the accumulation of land as possession, investigating the dramatic agroecological transformations wrought by the introduction of new flora, fauna, and agricultural practices, and by showing how colonial power operated on and through fields built to reproduce Inka authority, this dissertation marks a first step towards more systematic archaeological investigations of the hacienda as a social, political, and ecological institution that structured life in the rural Andes for centuries. For instance, botanical data from domestic contexts demonstrate that hacienda workers were more dependent on tuber cultivation at Ollantaytambo than their *yanakuna* predecessors, highlighting that hacienda laborers developed new practices in Ollantaytambo's shifting agroecology to accommodate the demands of hacienda labor. These workers also adopted foreign animals and shifted their domestic practices to compensate for the loss of Inka-era forest management (i.e., dung or scrub burning in houses). At the same time, hacienda workers retained connections to lower altitude production zones where fruits like Apocynaceae *Parahancornia* were grown and continued to farm local products. As such, these data demonstrate that Andean agriculturalists developed novel approaches to subsistence in the face of forced labor and the ever-present risk of dispossession inherent to life on the hacienda.

These data are also important corollaries to paleoenvironmental research exploring the ecological consequences of Spanish colonialism in the Andes. For instance, at Markaqocha, published data from the lake core suggest fluctuations in the populations of grazing animals pastured near the site: ratios of coprophilous mites suggest that animal populations were high during the Inka period, dropped immediately following the Spanish Invasion, and rose again around the end of the sixteenth century (Chepstow-Lusty et al. 2019). Excavation data presented herein show that high concentrations of mites align with the Inka incorporation of the site into imperial trade networks—evinced by the construction of new buildings in distinctly Inka styles and the inauguration of new practices like commensal feasting—and later with Luis Vizente's *dominio* creation of an estancia worked by resident *yanacona* at the site. These data facilitate a more complete understanding of the social context of ecological transformations across the Inka to the Colonial eras. Similarly, the botanical and zooarchaeological datasets derived through excavations in domestic contexts at Simapuqio-Muyupata nuance scholarly understanding of colonial ecologies by showing how ecological transformations were intertwined with changes in agricultural production and domestic consumption. For instance, the increase in potato seeds in later contexts at the site coupled with increased proportions of potato pollen from the reservoir suggests that potato cultivation became more important in the Colonial Period as Inka infrastructures failed and pasturing introduced animals increased in importance. The full ramifications of these shifts in production remain to be explored, however, it is clear that new practices mediated emergent relationships to land in the early Colonial Era after a fashion that remade local and regional ecologies.

The findings presented in this dissertation suggest several future directions for archaeological research on both Inka-era and hacienda governance and land management at Ollantaytambo. For instance, I interpret the limited artifact assemblages and radiocarbon dates from the two units in Sector A of Simapuqio-Muyupata as indications that the many small expediently built structures in that sector may have been Inka-era labor camps for temporary workers brought to the region to develop agricultural fields or work in the Kachiqhata quarries.

This interpretation suggests the possibility of a detailed study that would clarify how the Inka organized, provisioned, and controlled the vast numbers of workers that labored on state projects; such a project would inform both scholarly understandings of Inka labor administration and would also provide a mechanism to evaluate the actualization of political power by an expansionist empire.

The findings of this project are also suggestive of future research directions on haciendas in the Colonial Andes. In this work I focused on the transitional period in which the hacienda was brought into being and the first decades of their operation. However, these institutions were widely variable across the four centuries in which they controlled agricultural land at Ollantaytambo. Future research will build on the findings presented herein to explore how the hacienda changed through the Colonial and Republican eras of governance in the rural Andes. More expansive excavations in hacienda workers quarters will allow for an examination of how relations between hacienda laborers, landowners, and ecologies shifted over time. Such a study might, for example, evaluate how hacienda owners and workers changed their practices of land management in response to the nineteenth century rise of international trade in commodities, or consider how activism for land reform in the Republican Era, when liberal values of individual freedom espoused at the national level clashed with the reality of hacienda servitude, were reflected in shifting labor relations within Ollantaytambo's hacienda fields.

Beyond the specificities of agricultural labor and ecological transformation at Inka and Colonial Ollantaytambo, the data presented in this dissertation demonstrate that even relatively rapid social and ecological changes like those that followed from the Spanish invasion of the Andes were not the inevitable result of invasion and colonization. By demonstrating this point, this dissertation emphasizes the value of deploying historical, archaeological, and paleoenvironmental data together to understand socio-historical processes. The ecological perspective I use in this dissertation makes the lingering effects of political institutions like Inka estates or Colonial haciendas obvious, and cuts against periodization predicated on sharp political shifts. I explore this theme at greater length in the paragraphs that follow by considering the legacies of Inka and Colonial rule at Ollantaytambo.

7.3 Inka and Hacienda Legacies

Catherine Julien (2000, 229) writes:

> Seen through the eyes of the archaeologist, Inca estates are the remains of residential buildings and their peripheral constructions, such as terraces, gardens, lakes, and other aesthetic or practical features (Niles 1988; 1992; 1999; Protzen 1993). From the perspective of the historian, these estates largely disappear within the encomienda awards made after 1534 by Francisco Pizarro.

Broadly, I am in agreement with Julien's analysis. The remains of the Inka estates are, of course, differently legible through historical and archaeological epistemologies. The monumental architecture, complexes of agricultural fields, and sculpted landscapes at places like Pisac, Ollantaytambo, and Machu Picchu certainly are overt ruins that continue to draw archaeological attention, as they have for generations. And it is also the case that the archival documentation of encomienda grants, the establishment of *repartimientos*, and the formation of haciendas make few references to the Inka history of the region.

However, it's not so much that the Inka estates disappear in early colonial documents as it is that they were *disappeared* during what were ongoing debates over Inka histories in the Colonial Andes. As I've discussed in this dissertation, land histories were a subject of conflict in the colonial Andes (see also Burns 1999; Chase 2016; Chapter 4). Whether in the publication of histories like Sarmiento de Gamboa's treatise, written to cast the Inka as tyrants, or more particular moments of "on the ground" interaction like the contested categorization of the fields of Colcabamba and Tambobamba as "*tierras del inga y del sol,*" (see Chapter 4) the past was a contested basis of political authority from which Spanish colonists sought to break (see VanValkenburgh 2018).

These efforts align with what Povinelli (2011), writing of settler colonialism, refers to as the creation of a "prior." For Povinelli, "the prior" is the colonial invention of a bygone era of unjust rule that precedes colonial governance. By relegating Indigenous sovereignty to the past colonial states justify the appropriation of land and other resources and render questions about Indigenous sovereignty irrelevant (see also Winchell 2020). While Spanish colonizers attempted to displace the Inka era to the past, one of the conclusions of this dissertation is that even as the Inka estate at Ollantaytambo was rendered history (as Kosiba [2017] discusses, a pastness rooted in Iberian understandings of a linear historical time), the estate did not disappear as an active force within Ollantaytambo's colonial political ecology. While obscured archivally, the estate remained salient in the practice of agriculture and negotiations over the governance of land; it had lingering effects on the Ollantaytambo region in both material and socio-historical terms that cut against colonial efforts to instantiate a break with the past.

At Ollantaytambo, the most overt expression of Inka legacies is simply the morphology of the Inka-built fields in the region. However, the morphology of the landscape was not just a visual reminder of Inka power; the forms of terrace complexes and canal systems raised by laborers working under Inka direction actively directed agricultural possibilities into the Colonial Period, and indeed, still do today. Even where, for instance, the introduction of wheat allowed valuable crops to be cultivated on small and relatively unimproved plots (Kosiba and Hunter 2017), or where or the proliferation of non-native grazers prompted the transformation of some gardens into pasture (see Chapter 5), the material form of the land built by the Inka shaped the potential of specific fields. The fields of Colcabamba and Tambobamba that I discussed in Chapter 4, for example, were valuable for producing maize and wheat precisely because that is what the Inka built them to be.

In other words, socially mediated values embedded in materials like land are not easily displaced. Even as the land itself was changed, legacies of Inka land management lingered. Scholars have discussed the tendency of materials from the past to direct human action in different terms: historical ecologists (e.g., Crumley 1994; Balée and Erickson 2002), for instance, emphasize a dialectic between landscape and agricultural practice; Morehart (2018) notes that "inherited legacies" of land use frame the possibilities of subsequent action; Bauer and Kosiba (2017) describe how political action is "entrained" in particular flows by materials like land; Richard (2018) characterizes Senegal's colonial landscapes as "reluctant" due to the constraints they imposed on political projects.[1] The STS literature on infrastructures I drew on in Chapter 5 makes a similar point from a different perspective; infrastructures, including environmental infrastructures, shape the creation of political distinctions in human social and political life.

These points do not imply that materials like land are static or only offer impediments to historical transformation. Rather, data in this dissertation show that these lands were active political conduits that both constrained and enabled action. Even as new plants and animals dramatically reshaped the possibilities of agricultural production and changed, in Ingold's (2000) terms, the "conditions of growth" through which both human and nonhuman lives were

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[1] Richard writes: "landscapes are reluctant because they are composite historical, natural, and cultural productions and because they implicate a mix of spaces that do not necessarily cohabit seamlessly and carry effects that bear unevenly on different social actors" (2018, 39).

constituted, Inka histories of land use materialized in Ollantaytambo's fields remained active in the Colonial agroecology that emerged in the sixteenth century.

Of course, just as the material and social legacies of the Inka estate shaped haciendas, haciendas also have socio-historical and material legacies that shape the contemporary Andes. These legacies continue to manifest in the Ollantaytambo region now, even decades after the agrarian reform brought the "*tiempo de la hacienda*" to a close. For example, the adobe ruins of hacienda *casonas* like those at Simapuqio or Sillque are tangible evidence that the hacienda era is past—"the prior"—relative to the era of contemporary land governance, but those ruins also haunt the landscape as reminders of the proximity of racialized historical violence and forced labor. For instance, the dramatic ruins of the Bethlehemite house at Sillque (Figure 7.1) anchor both ghost stories of wrathful abused servants and the promise of buried riches from a former era of opulence (see Weaver 2020 for similar analysis of Peru's coastal haciendas). Haciendas also remain salient in the distribution of landholding, patterns of land use, and the ecology of hacienda fields. As Winchell (2018; 2020) shows through ethnographic research with former hacienda workers in Bolivia, the hacienda past continues to animate contemporary questions regarding land tenure, social inequality, and ecology. Winchell writes, "land does not just narrate (Mar and Edmonds 2010:2), but also *materializes* enduring indigenous dispossession" (2020, 579, emphasis in original).

Figure 7-1: Ruins of the main house of the Hacienda Sillque, dating from the Bethlehemite ownership of that hacienda in the eighteenth century.

At Ollantaytambo, vestiges of the hacienda remain in lands retained by former landlords and in the boundaries of field systems that were solidified during the agrarian reform by government surveyors. The historical trajectories of land at Muyupata and Simapuqio illustrate this point. As I outlined in Chapter 5, the fields "*de regado*" at Simapuqio, irrigated by a largely self-contained and spring fed irrigation system, made hacienda maize production possible early in the Colonial Period.[2] By contrast, land around the reservoir at Muyupata—fields that had been irrigated lands under the Inka—became seasonal potato fields after the collapse of irrigation infrastructures. Farmers reinforced the distinction between these sets of fields through the Colonial Period by using the fields in different ways. In turn, agrarian reform surveyors codified differences between these lands in the middle of the twentieth century. In the *afectaciónes*

[2] These terraces are now divided; most are worked by the agrarian cooperative, but a small area is retained by the former hacienda owners.

produced by the state during the agrarian reform, the Simapuqio terraces were classified as irrigated land for cultivation, just as they had been four centuries previously. By contrast, lands at Muyupata that feature the ruins of Inka agrarian infrastructures and that pollen data demonstrate were used for intensive maize cultivation during the period of Inka rule, were characterized as "natural pasture," a classification that elided plentiful evidence of cultivation, including terraces in the sector (ADRAC, *Afectaciones* Simapuqio II, 1989).

This "natural" classification was the result of decidedly historical patterns of land use; the stark distinction between *"tierra de cultivo"* and *"*natural pasture" recorded in *afectación* documents was a product of human and non-human action on the land. At Muyupata, as animals trampled canals and eroded terrace walls they reshaped land and changed what fields were good for by curtailing growing seasons on some plots of land. In turn, this shifted how fields were valued and how they were positioned as political objects. Materials, as Ingold (2007) emphasizes, do not so much have "attributes" as they have "histories." Moreover, the historical trajectory of these lands highlights the capacity of materials like land and actors like animals to intervene in social and political life. As the fields and pastures of Ollantaytambo changed, so did their position in the political ecological entanglements of agricultural production in the region. I conclude this dissertation with an ethnographic example from my 2019 fieldwork that illustrates this point concretely.

7.4 Concluding Thoughts

In June of 2019, early in my fieldwork at Simapuqio-Muyupata, a friend and member of the agricultural cooperative at Simapuqio pointed out a boulder on the hillside above Muyupata, near our excavations in Sector A. He drew my attention to a faint red marking on the rock; a stripe he told me a member of the cooperative would re-paint periodically that marked the boundary between lands of the cooperative and adjacent fields titled to private owners. While the paint demanded regular renewal, my friend explained to me that the boundary was largely ignored in daily practice. As a broad extent on either side of was unirrigated scrubland suitable only for pasturing animals—the so-called "natural pasture" of the agrarian reform—neither the cooperative nor the private owners expressed particular concern with asserting exclusive rights to use the land; animals belonging to both parties were pastured on either side of the boundary without issue.

During my fieldwork this changed. The owner of the privately held lands at Muyupata arranged to bring water to Muyupata via a three-kilometer hose from a spring near Kachiqhata. This was a substantial investment. As the landowner explained to me, costs included the hose itself, labor, and water-right fees paid to the agrarian cooperative that controlled the spring. However, there was an immediate payoff: fields that had been suitable only for dry farming potatoes or pasture for generations—perhaps since the beginnings of the hacienda in the early Colonial Period—sprang to life. The land could suddenly once again support intensive maize production across an extended growing season.

This renewed capacity of the land instantly sparked political questions that were hotly debated both within the cooperative and between the cooperative and the private landowner. The poorly defined (and largely ignored) boundary between parcels of land immediately became contentious: what did the markings on the large rock really mean, in practical terms—was the rock the boundary? Or the paint? Did the boundary extend directly from the rock down to the Urubamba River, bisecting a large terrace, or was the line crooked to go around that terrace? The markings had first been painted shortly after the agrarian reform based on lines drawn on a sketch map; might modern GPS surveying instruments demonstrate that those markings weren't even accurate? In that case, would the line on the ground or the coordinates written into the titles it purported to represent be taken as the "real" border? While these questions remained unresolved, could the landowner use the water to cultivate? Could animals belonging to cooperative members graze nearby, where they might wander onto newly planted fields or drink water brought to the land at great cost? The introduction of new infrastructure—the hose—changed the fields around Muyupata and, in doing so, introduced a new set of political problems about land access, use, and possession that disrupted longstanding practices.

The political questions raised by the transformation in land via the introduction of irrigation water are difficult to understand outside of the deep historical context of hacienda and Inka legacies that shaped contemporary land use and the distribution of landholding. They illustrate that the ramifications of historical land management stretch from the past into the present. These political questions arose from the combined histories of Inka infrastructure creation, Colonial land management, and changes in the lands themselves. Contemporary title that distinguished cooperative fields from privately held lands was predicated on decisions made by state adjudicators during the agrarian reform, decisions that were ultimately rooted in hacienda histories of land use. Those land use histories were, in turn, shaped by the agroecological potential of individual fields, determined, in part, by infrastructures built around the site by the Inka.

All this is to say, these fields demonstrate that trajectories of social and ecological change initiated in the Colonial Period still ramify in the Andes today. They show that the accretional ecological effects of land management practices exceed the temporal boundaries of politically defined eras. Indeed, the consequences of colonial processes are also manifested at much broader scales. For instance, in their conclusion to an article presenting the results of a high-altitude glacier core that documents ecological transformations across a wide swath of the Andes, Brugger et al. (2019, 10) write:

> Unprecedented human-shaped colonial ecosystems emerged after AD 1740 following a wide establishment of novel land-use practices by the Spanish viceroyalty. The colonial land use played a much larger role for the emergence of modern ecosystems than pre-Columbian societies. The rapid shift to humanized ecosystems was further reinforced in the modern era post-AD 1950, with industrial tree plantations and coal exploitation.

By explicitly linking the ecological transformation wrought in the colonial era to the more familiar ecological consequences of industrialization and fossil fuel use we now frequently associate with the Anthropocene, these authors make a parallel point to that offered by Davis and Todd (2017) that I summarized in the introduction to this dissertation: if we are to acknowledge the contemporary era as one of totalizing difference from the breadth of human history, we should acknowledge that the contemporary moment is the product of histories of colonial extraction and dispossession. To do so recognizes that material remnants of colonialism do not so much signal the past of colonial encounters as they signal that the colonial legacies remain salient forces in contemporary ecologies. This is to say, even as we might push back against colonial efforts to instantiate or reify a break in time between the pre-colonial and colonial eras—the constitution of "the prior"—we should also challenge attempts to radically distinguish between the contemporary era and colonial pasts. Emphasizing processes of ecological transformation over "golden-spike" narratives of totalizing transformation is one approach to this problem. As I have shown in this dissertation, such a perspective demonstrates that the ecological effects of political acts are not limited to, but rather exceed, their historicization as particular "eras" or "periods." Framed in ecological terms, colonial relations are ongoing structures that continue to shape relationships between people and the “natural” world as colonial dispossession is materialized in landscapes and ecologies

Appendices

Appendix 1: Radiocarbon Dates

All radiocarbon dates were calibrated with the most recent Southern Hemisphere calibration curve (SHCCal 20) using the OxCal 202 Calibration software.

Table 0-1: Markaqocha Radiocarbon Dates

Sample ID (Unit)	**Radiocarbon Age**		**Associated Ceramic**	**CalAD (95.4%)**	**CalAD (68.3%)**
	BP	1 sigma error			
Sample #3 (MQ – A2)	275	23	Inka and Colonial	1518(2.1%) 1540 1627(65.9%) 1675 1737(27.5%) 1800	1641(57%)1670 1784(11.3)1794
Sample #4 (MQ –UA2)	325	31	Inka	1501(63.4%)1600 1611(32.1%) 1665	1510(32.5)1550 1560(12.9) 1579 1623(22.9)1649
Sample #5 (MQ-UA6)	185	28	Colonial	1669 (49.3%) 1785 1793 (11.5%) 1823 1829(23.2%) 1893 1921 (11.5%)	1673(19.5%)1708 1720(11.5%)1741 1755(3.4%)1764 1774(2.1%)1779 1798(8.5%)1813 1836(6.1%)1880 1926 (10.1%)
Sample #6 (MQ –UA5)	190	26	Colonial	1668 (55.7) 1785 1792(11.6%)1832 1832(18.5%)1891 1923 (9.7%)	1672(19.5%)1701 1721(13.9%)1745 1752(6.9%)1767 1772(4.5%)1782 1797(9.8%)1812 1838(4.4%)1848 1868(4.2%)1878 1928(5%)1940

Table 0-2: Simapuqio-Muyupata Dates: Domestic

Sample ID	**Radiocarbon Age**		**Associated Ceramic**	**CalAD (95.4%)**	**CalAD (68.3%)**
	BP	1 sigma error			
A1-1	424	26	Inka	1448(66.6%)1510 1550(1.5%) 1560 1579(27.4%)1623	1457 (56.3) 1500 1600 (12) 1611
B10-3 (Con. 6)	284	24	Inka	1512(8.7%)1547 1565(0.6%)1571 1625(71.1%)1674 1741(2.8%)1755 1763(2.1%)1774 1780(10.2%) 1799	1634 (64.3%)1668 1787 (4%) 1792
C4-3 (Con. 3)	515	28	Inka, Colonial	1410(95.4%)1456	1425(68.3%) 1450

Table 0-3: Simapuqio-Muyupata Dates: Reservoir

Sample ID	**Radiocarbon Age**		**Associated Ceramic/ Depth**	**CalAD (95.4%)**	**CalAD (68.3%)**
	BP	1 sigma error			
B4-10 (context 5b)	431	32	Inka	1422 (90.1%) 1506 1596 (5.3%) 1617	1435 (68.3)1475
B4-3 (Context 7A)	405	33	Inka	1434 (74.9%) 1523 1575 (20.6%) 1625	1443 (60.7) 1496 1601 (20.6) 1612
B4-11 (context 8a)	1115	29	None	895(29.8%)936 957(65.7%)1025	903 (17.8) 921 970(27.7)995 1002(22.8)1020
B4-12 (context 12a)	2463	28	None	751BC(18.4%) 684 668(8.2%)634 622(1.0%)612 591(67.9%)401BC	723(5.9%)707 662(3.7%)652 544(58.6%)410

Appendix 2: Simapuqio-Muyupata Excavation Unit Descriptions

Table 0-4: Simapuqio-Muyupata Excavation Units

Unit	Size (m)	Location	UTM Coordinates (NW corner)	Brief Description and Interpretation
SM-A1	2x1	Inside circular building in Sector A	E 794549.33 N 8532127.48	This unit revealed a floor surface of compacted earth beneath a thin (~10cm) layer of rock fall and overburden. Artifacts were Inka era in terms of form and paste, but undecorated. This structure is hypothesized to have been used as temporary workers quarters during the Inka Period.
SM-A2	2x2	Inside circular building in Sector A	E 794644.26; N 8532151.03	This unit revealed a floor surface of compacted earth beneath a thin (~10cm) layer of rock fall and overburden. Artifacts were Inka era in terms of form and paste, but undecorated. This structure is hypothesized to have been used as temporary workers quarters during the Inka Period.
SM-A3	3x1	Along the canal running through Sector A	E794624.07; N 8532167.46.	This unit was placed along the canal in hopes of recovering material to date the canal's construction. No such material was recovered.
SM-B2	2x2	Outside door of chapel in Sector B	E 794759.81; N 8532324.25	This unit was excavated in order to understand the construction sequence of the adobe chapel in Sector B. A series of contexts over a meter deep indicated that the chapel was built in a location leveled through the application of Inka and early Colonial detritus that had accumulated over a period of time rather than being deposited at once as a construction fill. Artifacts suggested the building was constructed during the Late Colonial or Early Republican eras.

Table 0-4 Continued

SM-B4	2x2	Northwest corner of the dry reservoir in Sector B	E 794735.05; N 8532362.41	This unit was excavated in the NW corner of the reservoir in Sector B with the goals of recording construction techniques, recovering stratigraphic pollen and macrobotanical samples, and dating the construction of the reservoir. Radiocarbon samples recovered in excavations suggest that the reservoir may date from the Formative Period, but was certainly used during the Inka era, and silted in across the first century of the Colonial Period. Pollen data indicated this occurred at the same time as a shift from maize to potato cultivation and an increase in ruderal plants in surrounding fields.
SM-B5	2x2	Inside Inka era structure to the north of the road running through the site.	E 795006.00; N 8532119.50	This unit revealed a floor after only a 10-15cm layer of rockfall and overburden. The unit showed that the Inka builders of the house also raised a bench along the interior wall. Artifacts from the unit suggest that the house was built and used exclusively during the Inka Period.
SM-B6	3x2	Inside foyer or patio adjoining Inka structure to the north of road running through the site.	E 795008.00; N 8532115.50	This unit was excavated to sample for material from the external (foyer) space associated with a large Inka structure. Excavations revealed a floor surface after approximately 10-15cm of overburden was removed. Material culture included Inka ceramic wares and no remains from other eras, suggesting that the associated building was constructed and used exclusively during the Inka Period.

Table 0-4 Continued

SM-B7	3x3	Inside Inka building adjoining unit SM-B6	E 795013.76; N 8532110.58	This unit was placed inside a quadrangular Inka structure in order to date construction and use and sample for botanical remains. Artifacts demonstrated that the building was built and used during the Inka Period. Notably, the unit revealed the burial of an adolescent in a pit in the floor of the structure, covered by large fragments of broken ceramic.
SM-B8	2x2	Inside small quadrangular building to the south of the road, through the site. The unit was placed against the interior door of the building.	E 795078.59; N 8532166.81	This unit revealed that the structure in which it was placed, which was likely of Inka construction, had been looted in the deep past (likely in the Colonial period) as evinced by the mixing of material culture from the Inka period in deep strata below a series of hearths that contained colonial artifacts. These hearths indicate that the building was regularly used in ephemeral occupations during the Colonial and Republican periods.
SM-B9	2x2	Placed at the intersection of walls to the north of the road through the site.	E 795096.94 N 8532155.62	This unit was placed at the intersection of two walls hypothesized to have been built during the Inka Period to determine whether they were inside a structure or part of a patio. It revealed a third wall bisecting the unit that was once likely the wall of an Inka structure. Excavated material culture was largely Inka, although there were also limited indications that Colonial era trash was deposited in this location.

Table 0-4 Continued

SM-B10	4x4	Interior of Inka structure, covering majority of 1 of 3 rooms in the building.	E 795057.73; N 8532163.92	In this unit an Inka floor was revealed under a layer of overburden approximately 15cm thick. This floor was littered with Inka ceramics, including fragments of a large jar. The most notable find in this unit was a pit dug into the floor against the wall in the North East corner of the unit that contained the burnt remains of a feast, including large quantities of burnt deer bone, Inka ceramics, a grinding stone, and a *tumi* Inka knife. These finds suggest that the building was raised and used during the Inka Period before being ceremonially abandoned.
SM-C1	2x1	Inside defunct reservoir in Sector C	E 795252.87; N 8532062.33	This unit was placed in hopes of recovering stratigraphic botanical samples from the reservoir, however, excavations quickly revealed that the reservoir had been remodeled in the early 20th century, so the unit was abandoned.
SM-C2	4x5	Inside two room building in Sector C	E 795355.04; N 8532122.45	This unit was excavated in order to understand the construction and occupation sequence of buildings in Sector C. It revealed disturbed contexts that were rich in material culture from the Inka and Colonial periods, suggesting Inka construction and use through both Periods. Deeper contexts were suggestive of Inka occupations, however, given that the building was likely remodeled during the Colonial period, this contexts may well have been disturbed during that remodeling.
SM-C3	2x2	Patio in front of Sector C buildings	E 795359.73; N 8532115.59	This unit demonstrated that the patio space in front of the buildings in Sector C was entirely disturbed by agricultural activity.

Table 0-4 Continued.

SM-C4	3x3	Building in Sector C	E 795354.20; N 8532110.28	Excavations in this unit revealed two floors in sequence, the lower of which featured indications of Inka construction and use into the Colonial Period, and the latter of which indicated use in the Colonial period. Between the floors a layer of fill suggests that the building was abandoned for long enough for trash to accumulate in the structure.
SM-C5	3x4		E 7953845.00; N 8532059.50	Excavations in this unit revealed a floor level after approximately 25cm of overburden were removed. This floor, and upper strata, included both Inka and Colonial ceramics. Subfloor levels contained a low density of Inka wares. These data suggest that the building was erected during the Inka construction of the buildings in Sector C, but was used into the Colonial Period.

Simapuqio-Muyupata Excavation Illustrations

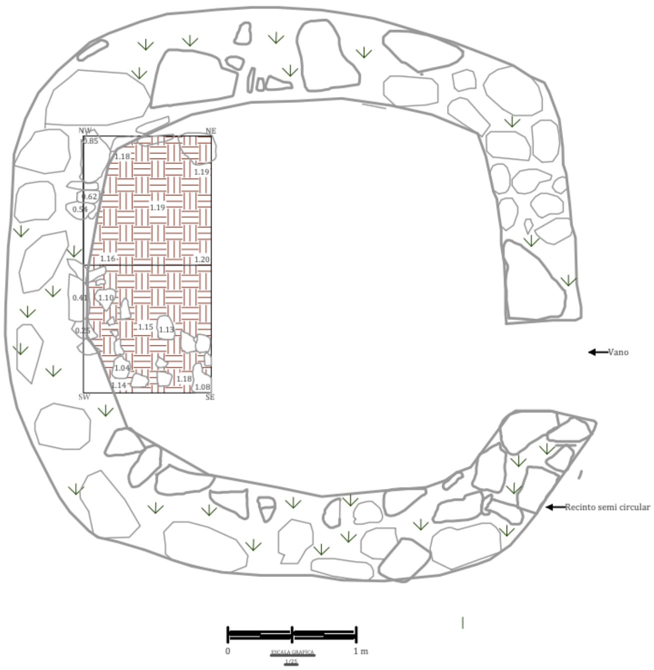

Figure 0-1: Unit SM-A1 Plan View (Context 4).

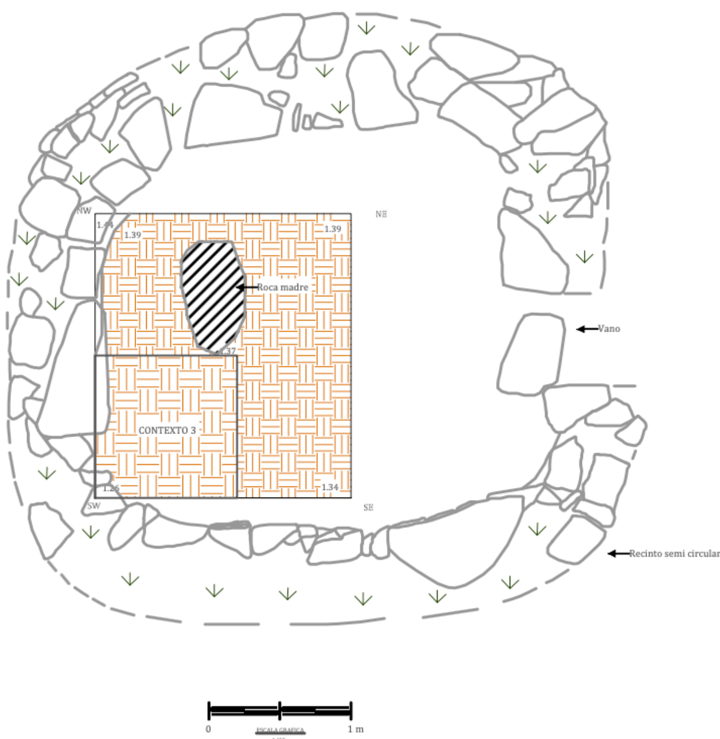

Figure 0-2: Sm-A2 Plan View, Context 4

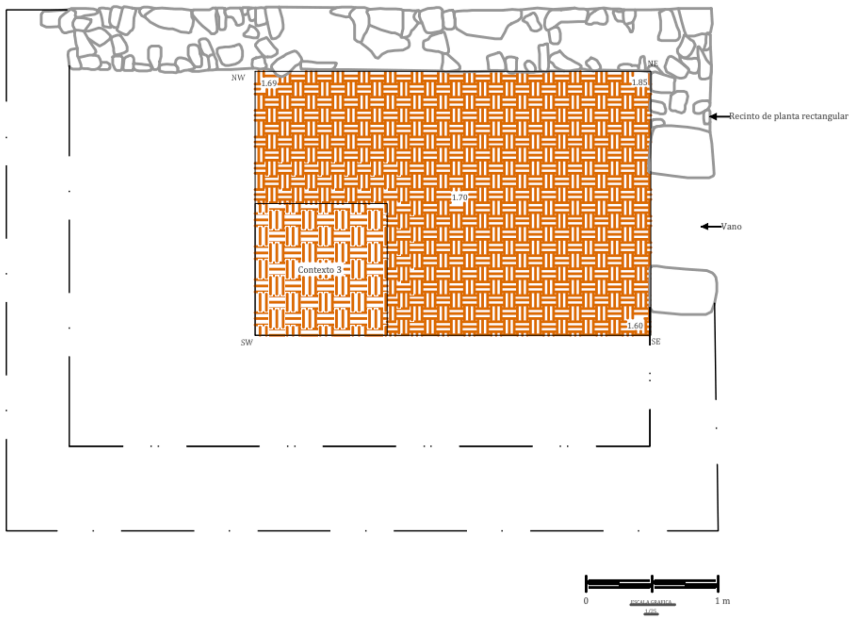

Figure 0-3: Unit SM-B6, Context 4, Plan View

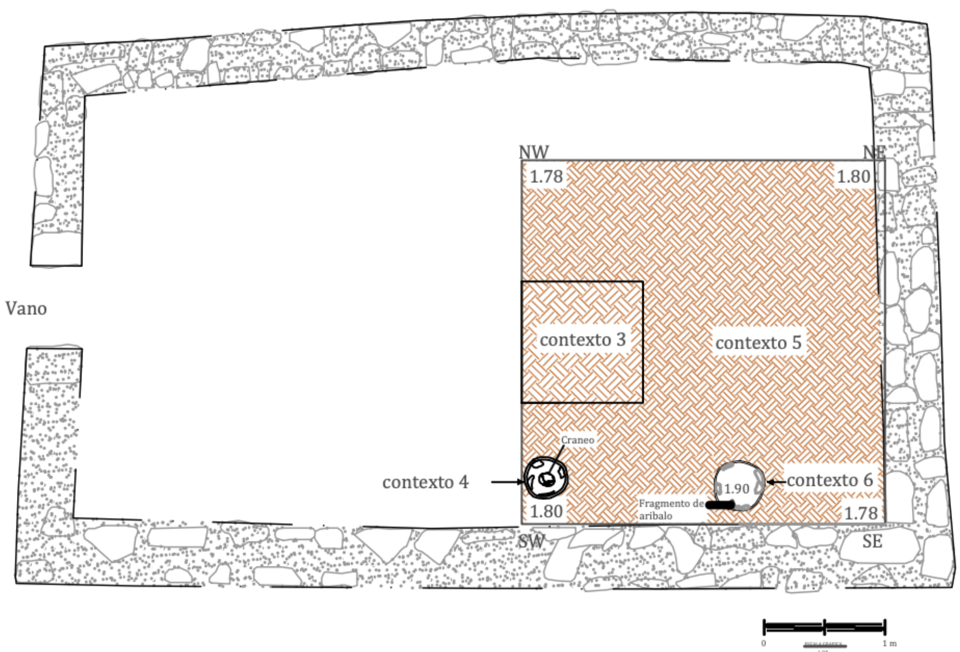

Figure 0-4: Unit SM-B7 plan view, indicating location of burial

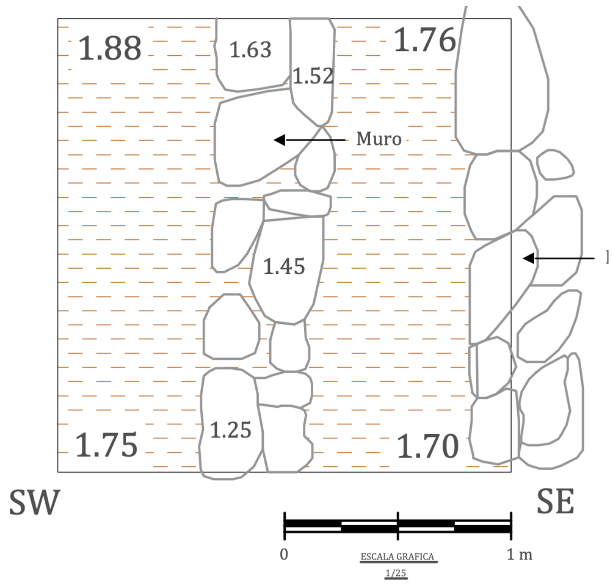

Figure 0-5:Unit SM-B9 plan view, Context 6.

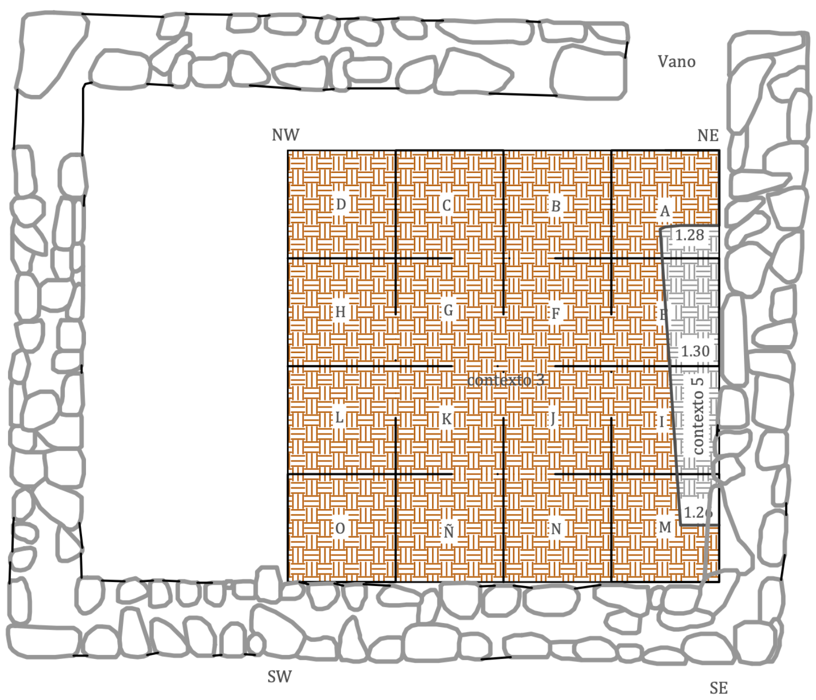

Figure 0-6: Unit SM-B10, indicating the location of ash lens above the pit in which remains of ritual feast were recovered (in the northern two subunits of Context 5).

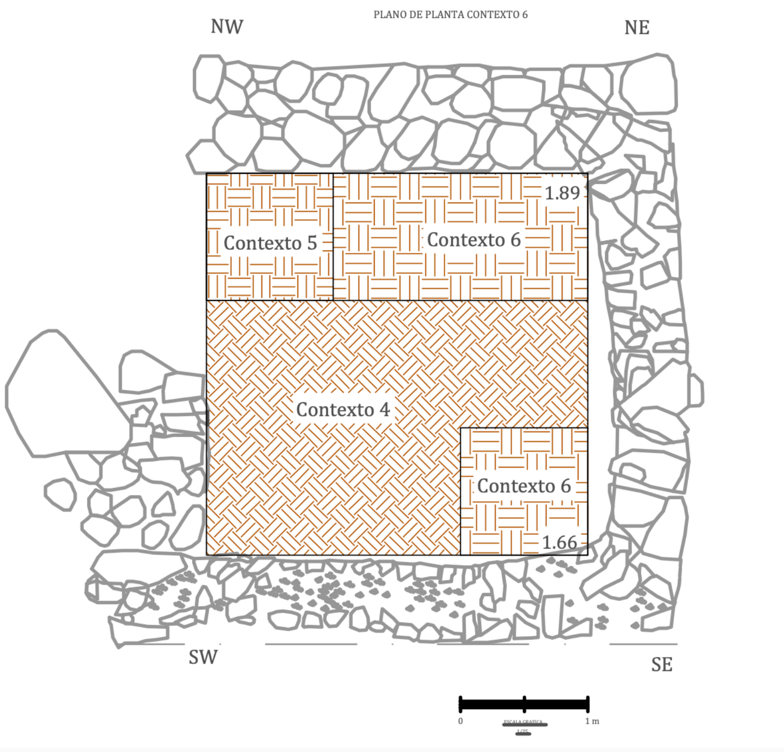

Figure 0-7: Unit SM-C4 Plan View.

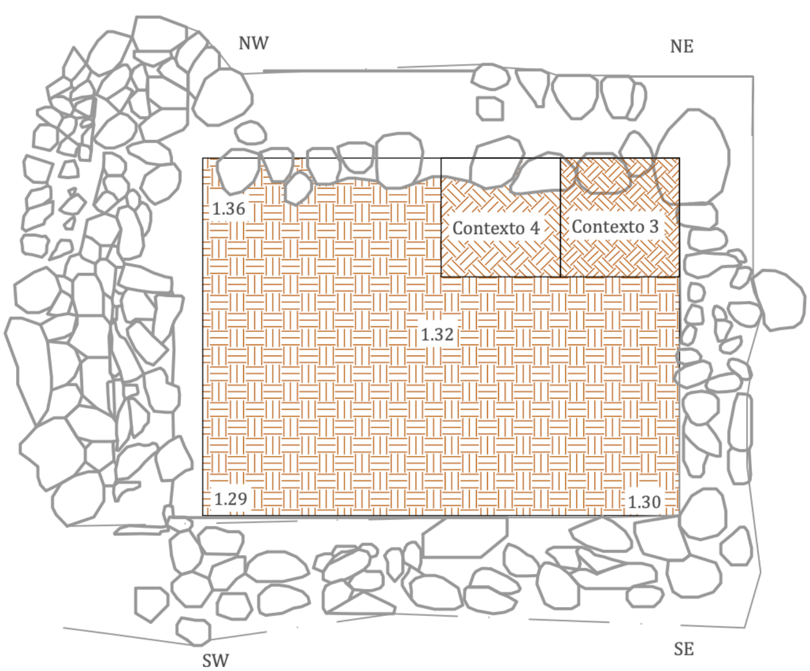

Figure 0-8: Unit SM-C5 plan view at end of excavations.

Appendix 3: Markaqocha Excavation Unit Descriptions

For more detailed descriptions of excavation units and contexts, refer to the reports prepared by each project to the Cusco Ministry of Culture (Rodríguez and Quintanilla 2018). This summary does not include units initially proposed by the project that were not ultimately excavated.

Table 0-5: Markaqocha Excavation Units

Unit	**Size (m)**	**Location**	**UTM Coordinates (NW corner)**	**Brief Description and Interpretation**
MQ-A1	1x1	Elite Inka riverside structures	E: 802730 N: 8536762	This unit revealed that subsoil contexts in this riverside structure were heavily disturbed, likely by looting and by regular inundation by river flooding. Sediments were very loose and silty, and there were no inclusions or distinctive stratigraphy.
MQ-A2	1x1	Against external wall of original chapel	E: 802744 N: 8536659	This unit, placed in a contemporary agricultural field adjacent to the external wall of the original chapel at the site, revealed a stratigraphic accumulation of trash of 1.2 meters deep dating from the Inka and Colonial periods. This unit was excavated to below the level of the chapel wall in order to recover a sample to date the construction of that building. Data suggested that the chapel was built by remodeling some Inka walls, and that the accumulation of trash outside the chapel likely began at the end of the Inka period.

Table 0-5 Continued

MQ-A3	2x1	Inside plaza space to Southwest of contemporary chapel	E: 802754 N: 8536658	This deep excavation (~1.4m) revealed a thick layer of large rocks and rubble above a floor of packed earth that yielded both Inka and Colonial ceramics. The excavations also revealed a wall below the level of the surface that would have once intersected with the current wall of the plaza to create a domestic space. Excavations continued for 20cm below the floor in contexts that revealed primarily Inka ceramics but also contained non-native Animal bones. Finds demonstrated that the building was likely originally raised in the Inka period, but was remodeled in the Colonial Period, and when abandoned, was filled with large rocks and rubble.
MQ-A5	1x1 extended to 2x2	Inside plaza due south of contemporary chapel	E: 802761 N: 8536641	This unit was initially excavated to determine whether walls of the contemporary plaza corresponded to the ruins of domestic structures. It revealed a layer of large rubble above the remains of a young human individual. Upon encountering those remains, the excavation unit was expanded to 2x2 meters in order to ensure excavation of the entire individual. Below the level of the human individual, there was a floor of compacted earth.
MQ-A6	1x2	Inside plaza due south of the Chapel	E: 802780 N: 8536636	This deep unit was capped by a thick layer of large rocks and rubble, below which two superimposed floors yielded evidence of Inka and Colonial occupation. Finds suggest that this building was first built and used in the Inka period, and was subsequently remodeled and used through the Colonial Period prior to abandonment.
MQ-A8	1x1	Riverside elite Inka structures	E: 802662 N: 8536701	This unit was excavated in the elite riverside structures. Deep silty contexts nearly devoid of material culture indicated that these buildings were thoroughly looted and filled in with silt during periodic river flooding events.

Table 0-5 Continued

MQ-B1	1x1	Against wall of round, likely domestic structure.	E: 802587 N: 8536606	In this unit a floor surface protected by a layer of large rocks (wall fall) yielded evidence of LIP and Inka occupation. Ceramic remains suggested the building was used through both of those periods, but there was no evidence of Colonial occupation.
MQ-B2	1x1	Inside Inka quadrangular structure	E: 802565 N: 8536584	Excavations in this unit were largely in contexts disturbed by contemporary ploughing. Inka ceramics recovered in excavations suggest that this building was erected and used in the Inka Period, although the regular presence of LIP ceramics highlights that Inka ceramics were not exclusively used in the structure.
MQ-B3	2x1	Inside large niched Inka building	E: 802585 N: 8536575	This unit revealed a deep layer disturbed by plowing above a very compact and thick layer of burnt reddish brown clay within which the rock walls of the Inka structure were set. Inka ceramics throughout confirm that the structure was built and used during the Inka period.
MQ-B4	2x1	Outside door of Inka building	E: 802582 N: 8536560	This unit, outside the door of a large quadrangular Inka structure, yielded evidence of Inka feasting practices above the same reddish-brown clay layer uncovered in MQ-B3. Evidence of feasting included Inka style ceramics and the bones of camelids, including a mandible and other cranial remains.
MQ-B5	1x1	Inside hypothesized domestic structure	E:802635 N: 8536522	This unit revealed disturbed contexts indicative of contemporary agriculture above what were likely construction fills placed to level a floor that has since been destroyed by agricultural activity. Ceramics recovered in this unit were largely from the LIP, however, Inka sherds were also recovered.

Table 0-5 Continued

MQ-B7	1x1	Outside Inka Structure	E: 802658 N: 8536491	This unit was only excavated to a depth of approximately 30cm, all of which was disturbed, before encountering bedrock. LIP, Inka, and contemporary remains were recovered from the disturbed upper strata.
MQ-B8	1x1	Inside round structure	E: 802685 N: 8536453	This unit was only excavated to a depth of approximately 15cm before encountering bedrock. Upper levels were disturbed and nearly devoid of ceramic remains.
MQ-B10	1x1	Inside round structure	E: 802732 N: 8536446	This unit was only excavated to a depth of approximately 20cm before encountering bedrock. Upper strata were disturbed and nearly devoid of artifacts.

Markaqocha Unit Drawings

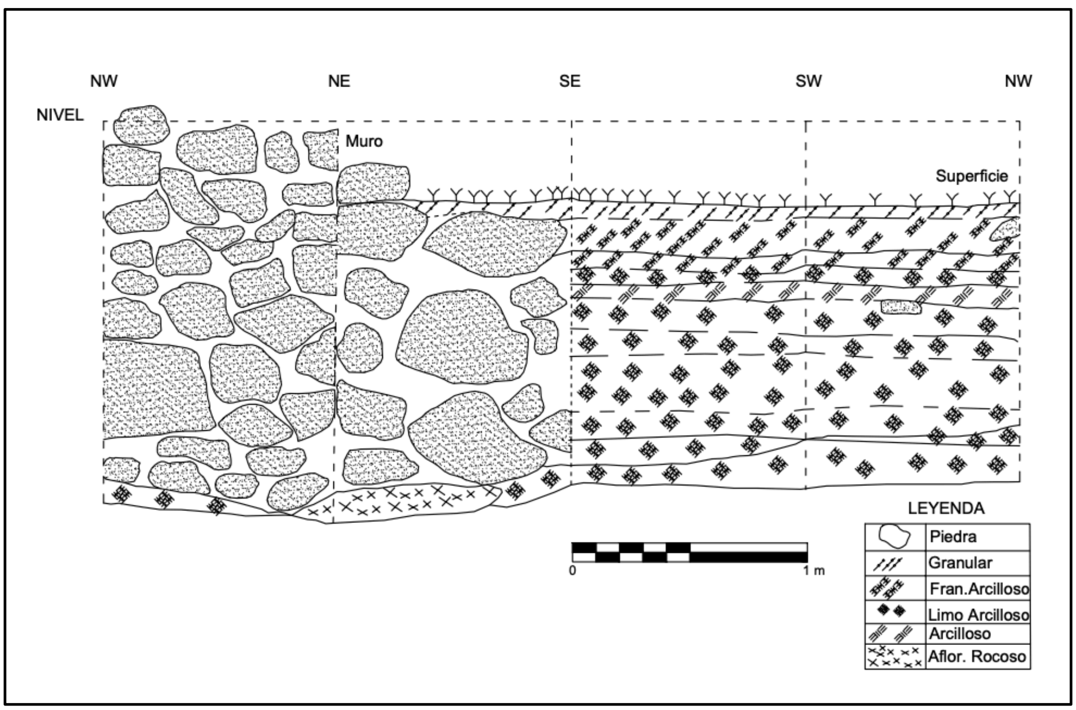

Figure 0-9: MQ-A2 Profile

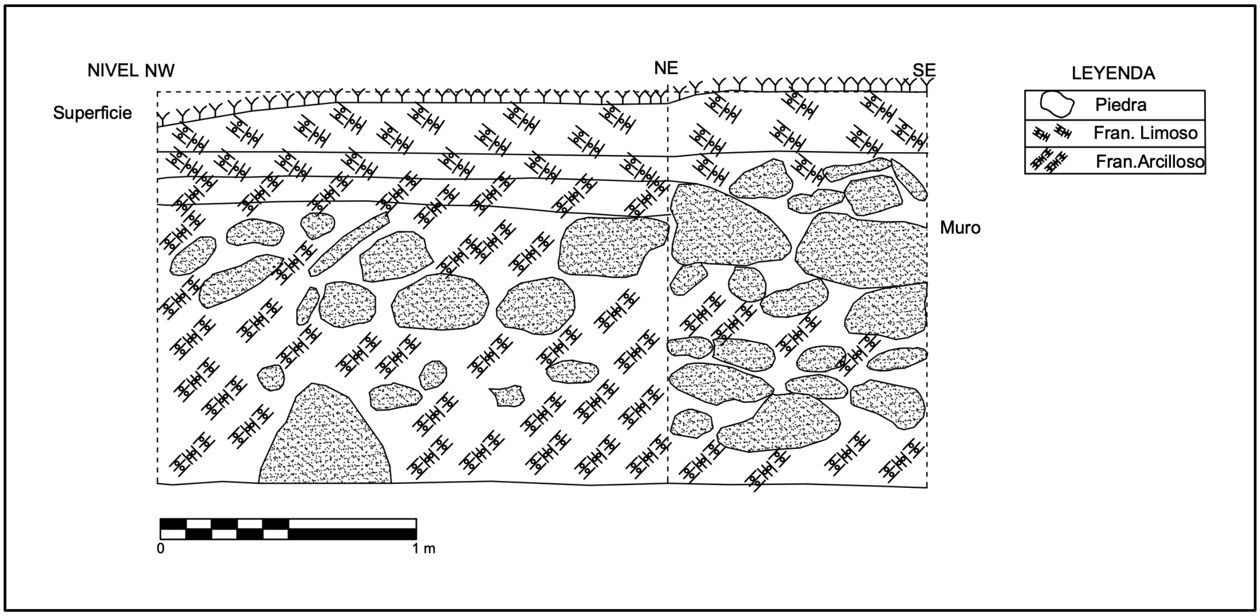

Figure 0-10: MQ-A3 Profile

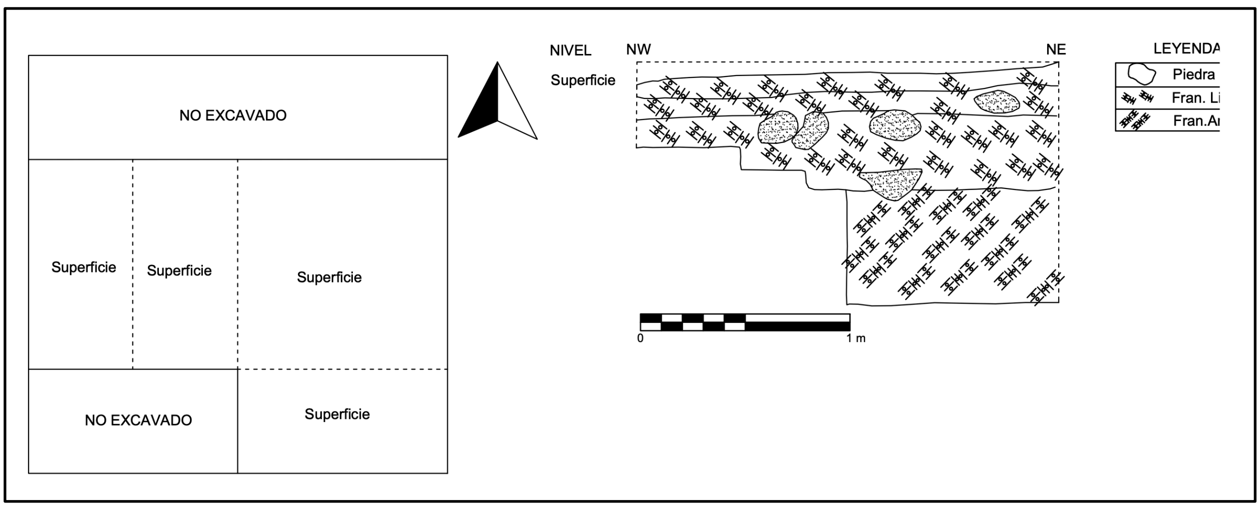

Figure 0-11: MQ-A5 Plan of Excavation and Profile

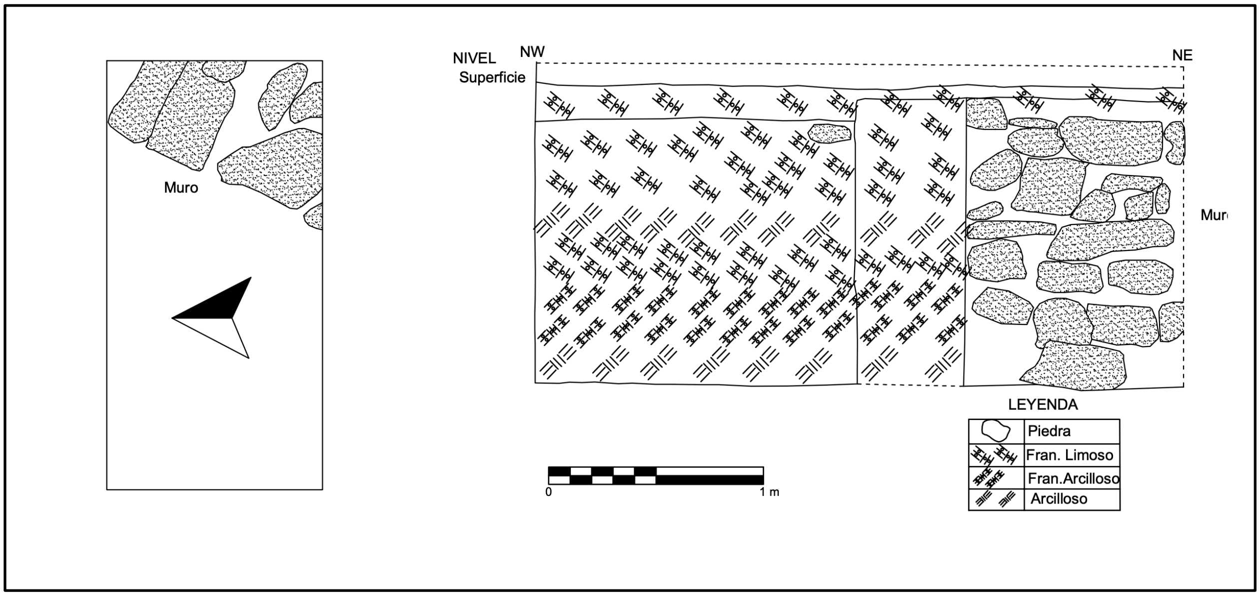

Figure 0-12: MQ-A6 Plan view and profile.

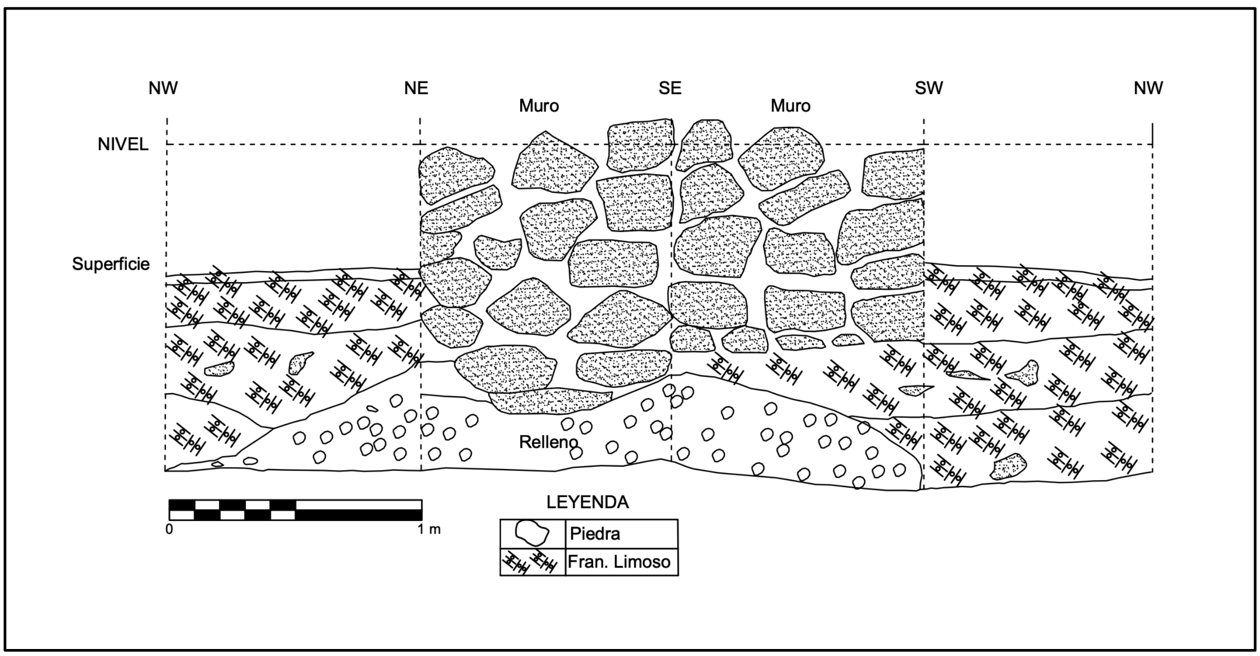

Figure 0-13: MQ-A8 Profile

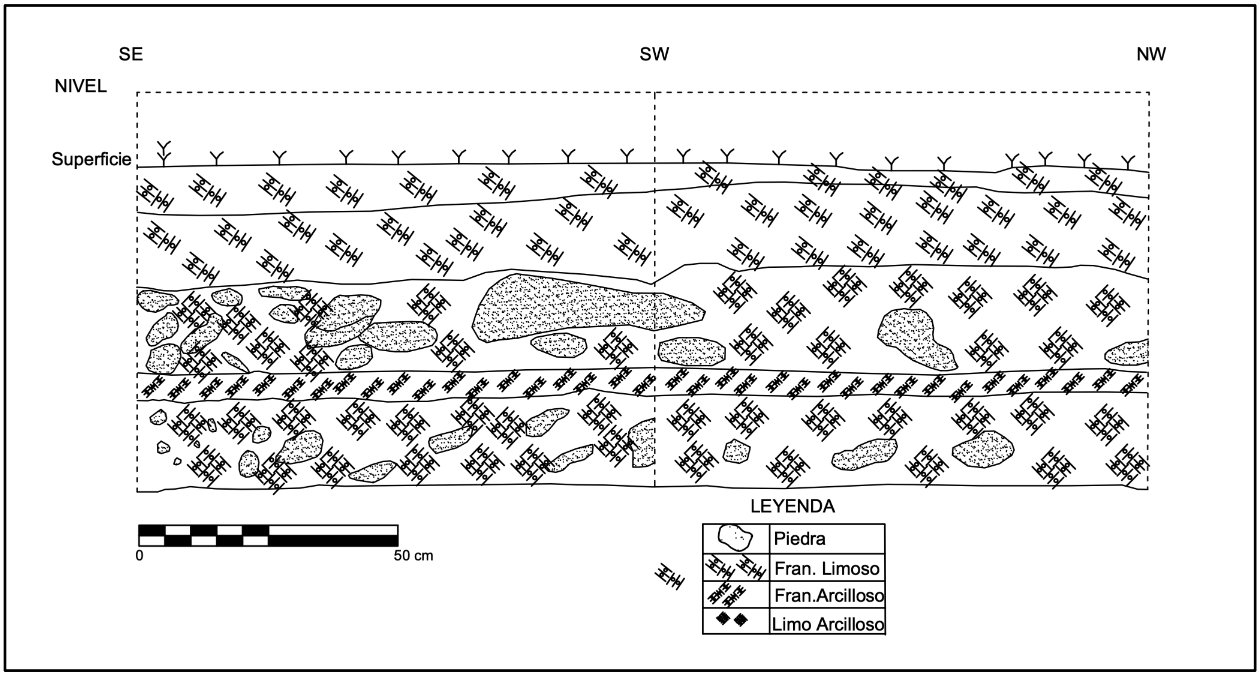

Figure 0-14: MQ-B1 Profile

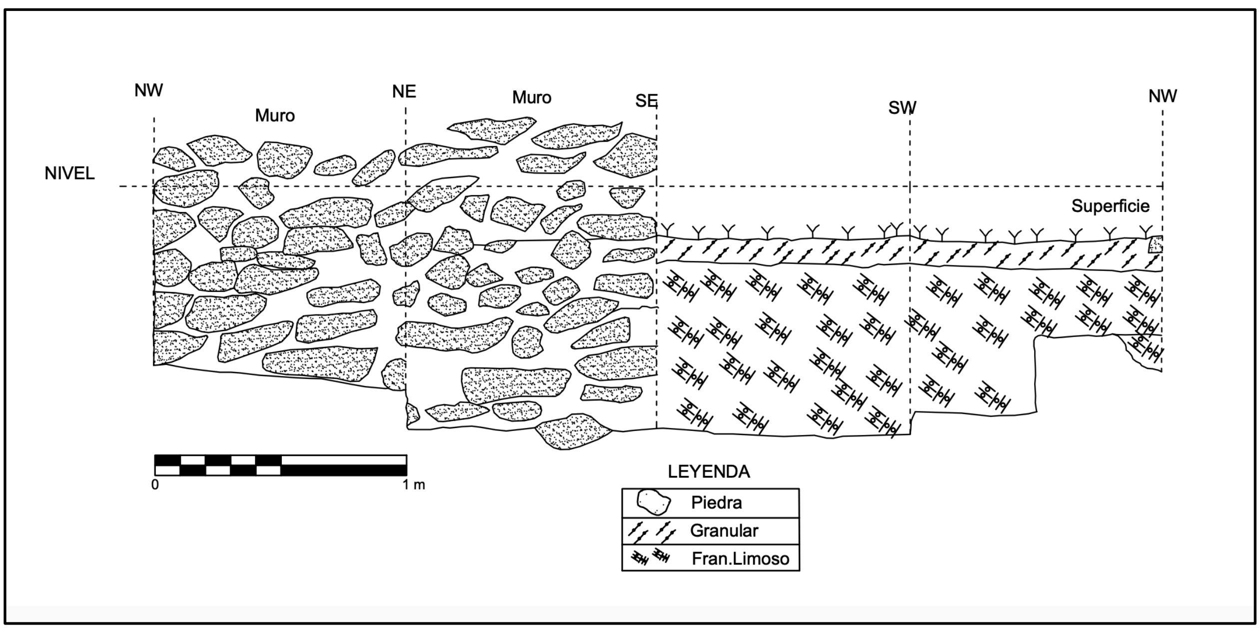

Figure 0-15: MQ-B2 Profile

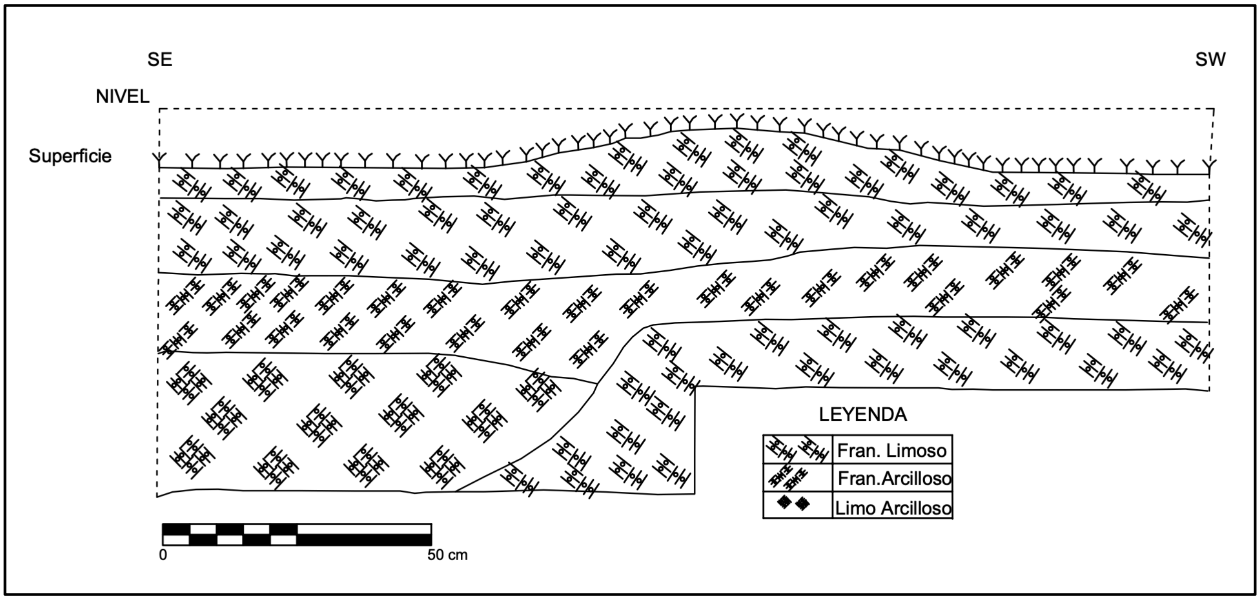

Figure 0-16: MQ-B3 Profile

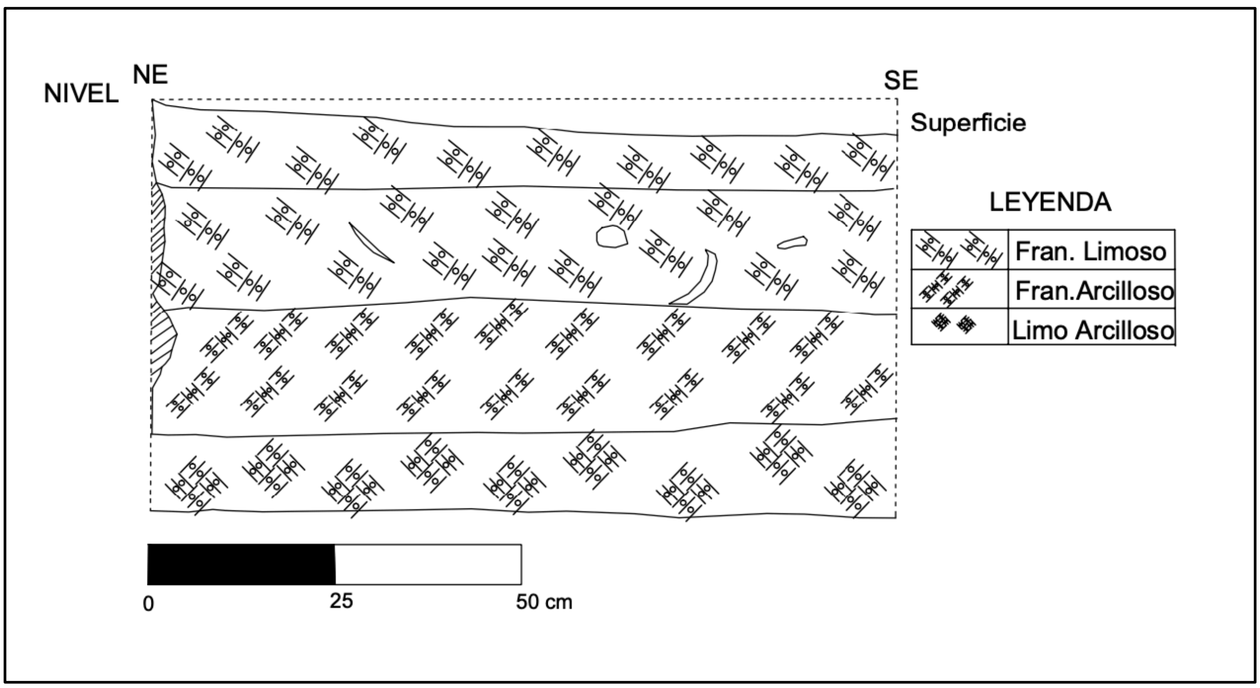

Figure 0-17: MQ-B4 Profile.

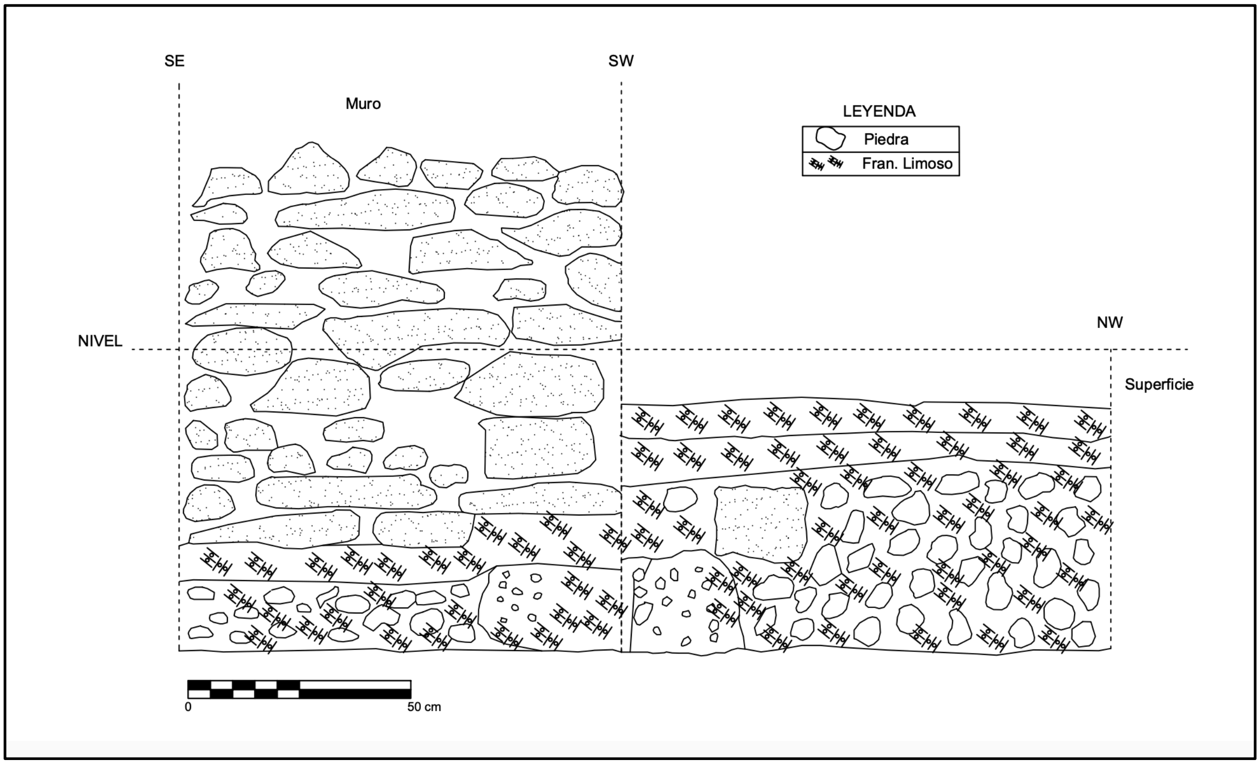

Figure 0-18: MQ-B5 profile.

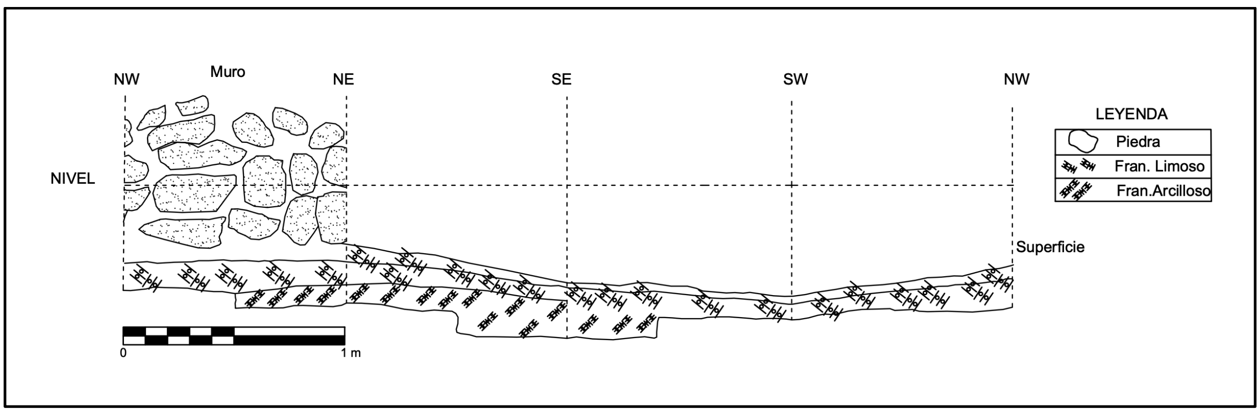

Figure 0-19: MQ-B7 Profile

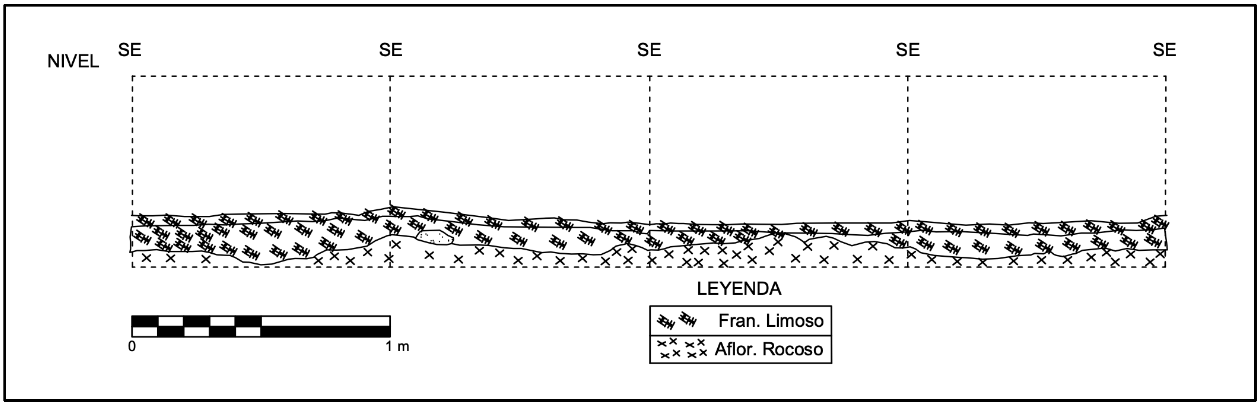

Figure 0-20: MQ-B8 Profile.

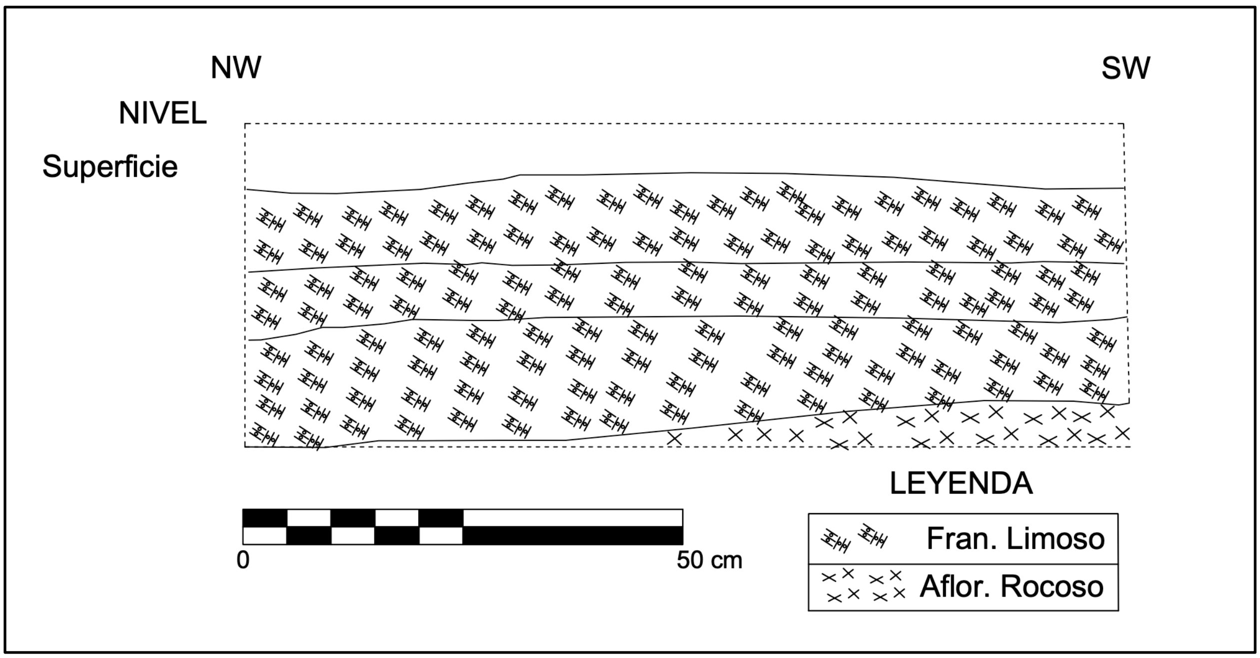

Figure 0-21: MQ-B10 Profile.

Appendix 4: Botanical Procedures

Floatation and Macrobotanical Procedures:

A manual flotation system was purpose built for this project in Ollantaytambo, and all samples were floated according to the same procedures in that float system. The floatation system was comprised of a 35 gallon plastic tub with a protruding spout which was fixed such that as water flowed out of the spout it flowed through a fine chiffon (mesh 0.3-0.5 mm). Before floating each sample, the tub was lined with 1mm window mesh (to catch the heavy fraction of each floated sample). The tub was then partially filled with water, and then the soil was gently poured into the tub. The soil was gentle agitated from below as additional water was poured into the tub through a hose, if the soil was compacted, the water was also gently stirred. As each sample was agitated and more water was added to the system, water flowed out through the spout taking with it floating matter, which was caught by the chiffon. The heavy fraction settled to the bottom of the tub. When all light fraction (floating) material was collected, each sample was removed and placed in a shaded location to dry. The heavy fraction was spread on cardboard to dry. To control for contamination, new water was used to float each sample (ample filtered water was available from the Urubamba River). Prior to use, the flotation system was tested by floating control soil samples containing a known number of quinoa seeds: an average of 91% of these seeds were recovered across five test samples. Subsequent to collection, all heavy materials were sorted in Ollantaytambo.

The light fraction was sent to the archaeobotany laboratory at the *Laboratorio de Palinología y Paleobotánica de la Universidad Peruana Cayetano Heredia* for analysis. Samples were sorted by size, and analyzed using a Stereo light microscope. Botanical remains were identified based on reference collections housed in the laboratory, electronic databases (U.S.D.A. Seed Database 2008; O.S.U. Seed Database 2009; CSU, 2004) and published reference books (Mostacero *et al* 2002; Sagastegui & Leiva, 1991; Martin y Barkley, 1961), as well as the online reference collection of the virtual herbarium of the Missouri Botanical Garden. All botanical remains first sorted by morphology, and subsequently each distinct morphology was identified. All remains were photographed and counted.

Pollen Procedures:

Strata were sampled in the field according to the procedures outlined in Bryant and Holloway (1983, 199). These samples were stored under refrigeration in Ollantaytambo until prepared for transport to the *Laboratorio de Palinología y Paleobotánica de la Universidad Peruana Cayetano Heredia* for analysis.

To extract palynomorphs (pollen and spores) from the soil, 10gr of each sample was separated and processed according to the procedures set outlined in Traverse (1988). Processing included demineralizing, acetolysis, and the addition of dye. *Lycopodium* tablets were added to each sample to allow for concentration calculations. For each sample, several slides were examined for the presence of pollen and spores (Pteridophytes). The objective of analysis was to count 200 grains of pollen. To identify grains, the laboratories reference collection was used alongside reference texts.

Phytoliths Starch Grain Procedures:

For the analysis of phytoliths and starch grains researchers at the *Laboratorio de Palinología y Paleobotánica de la Universidad Peruana Cayetano Heredia* using the combined technique for recuperating starch grains and phytoliths outlined in Horrocks (2005). Samples were separated by density using Zinc Bromide (1.8g/mL and 2.3g/mL for starch and phytoliths, respectively). During processing and mounting of samples all work was completed using talc-free gloves and sterilized materials to avoid contamination. Counts were completed by reference to the proposal of Madella et al. (2002), which suggests that minimum counts should be 250 grains. To mount grains and facilitate counts of phytoliths a Permount mounting medium was used with normal light microscopy. For the mounting of starch grains a glicerine medium was used with a polarizing light microscope. All grains were identified by using reference collections and published sources.

Appendix 5: Botanical Data Simapuqio-Muyupata

Table 0-6: Contexts Sampled for Botanical Remains at Simapuqio-Muyupata

Unit	Context	Context Type	Period	Macro Volume (l)
A1-3	3	Floor	Inka	4.25
A2-3	3	Floor	Inka	2
B5-2	2	Floor	Inka	4.5
B5-3	3	Bench	Inka	5.5
B5-4	4	Floor	Inka	5
B6-3	3	Floor	Inka	4.5
B7-3	3	Floor	Inka	7
B7-4	4	Burial	Inka	4
B7-6	6	Pit (offering)	Inka	3.5
B8-6	6	Hearth	Inka	6
B8-8	8	Floor	Inka	6
B9-2	**2**	Fire	Inka	5.25
B9-4	4	Fill	Inka	6
B9-5	5	Midden	Inka	6.5
B9-6	6	Midden	Inka	4.25
B10-4	4	Floor	Inka	23
B10-5	5	Floor	Inka	6
B10-6	6	Ritual Deposit	Inka	15
C4-5	5	Floor	Inka	4
B8-3	3	Hearth	Colonial	6
B8-4	4	Ash lens	Colonial	4.5
C2-3	3	Floor	Colonial	3
C2-4	4	Floor	Colonial	3.5
C2-5	5	Fill	Colonial	4
C2-6	6	Construction Fill	Colonial	4
C4-2	2	Floor	Colonial	7.5
C4-3	3	Fill	Colonial	7
C4-4	4	Fill	Colonial	6
C5-3	3	Floor	Colonial	6

Table 0-6 Continued

C5-4a	4	Fill	Colonial	8.5
C5-4b	4	Fill	Colonial	5.75
C4-6	6	Fill	Colonial	5
B2-5	5	Ash lens	Colonial	1.75
B2-6	6	Fill	Colonial	1.5

Table 0-7: Macrobotanical Data By Context and Unit

Unit/ Context		**Preservation**	**Plant Part**	**Family**	**Genus**	**Species**	**Common Name**	**Count**
A1	3	Frag.	Indt.	Indt.	Indt.	Indt.	Indt.	1
A1	3	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
A1	3	Comp.	Seed	POACEAE	Panicum	Panicum sp.	Indt.	1
A2 a	3a	Frag.	Indt.	Indt.	Indt.	Indt.	Indt.	1
A2 a	3a	Comp.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B4	6a	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	55
B4	5b	Frag.	Spine	FABACEAE	Acacia	Acacia sp.	Indt.	2
B4	5b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B4	5b	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	1
B4	5b	Comp.	Seed	ANNONACE AE	cf. Xylopia	Indt.	Indt.	18
B4	5b	Comp.	Seed	PASSIFLOR ACEAE	Passiflora	Passiflora sp.	Indt.	1
B4	5b	Comp.	Seed	APOCYNAC EAE	Parahancor nia	Parahancomia sp.	Indt.	15
B2	6	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B2	6	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1

Table 0-7 Continued

B2	6	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B2	5	Comp.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B2	5	Comp.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B2	5	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B2	5	Comp.	Seed	Indt.	Indt.	Indt.	Indt.	1
B4	13a	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B4	13a	Frag.	Leaf	Indt.	Indt.	Indt.	helecho	2
B4	9b	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	2
B4	9b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B4	8b	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	5
B4	8b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	4
B4	8b	Comp.	Seed	COMBRETA CEAE	Thiloa	Indt.	Indt.	1
B4	10a	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	20
B4	10a	Frag.	Seed	FABACEAE	Acacia	Acacia sp.	Indt.	1
B4	10a	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	4
B4	10b	Comp.	Seed	APOCYNAC EAE	Parahancor nia	Parahancomia sp.	Indt.	7
B4	10b	Comp.	Seed	APOCYNAC EAE	Parahancor nia	Parahancomia sp.	Indt.	2
B4	10b	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	11
B4	10b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	12
B4	10b	Comp.	Seed	BROMELIAC EAE	Neoregelia	Neoregelia sp.	Indt.	1
B4	9a	Comp.	Seed	ANNONACE AE	cf. Xylopia	Indt.	Indt.	15
B4	9a	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	5

Table 0-7 Continued

B4	9a	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
B4	11a	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	19
B4	11a	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	3
B4	11a	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	1
B4	13b	Comp.	Seed	ANNONACEAE	cf. Xylopia	Indt.	Indt.	1
B4	13b	Comp.	Seed	SOLANACEAE	Capsicum	Capsicum sp.	Indt.	1
B4	13b	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
B4	13b	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	2
B4	11b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B4	11b	Comp.	Seed	MYRTACEAE	Campomanesia	Indt.	Indt.	1
B4	11b	Comp.	Seed	MYRTACEAE	Campomanesia	Indt.	Indt.	1
B4	11b	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
B4	11b	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
B4	12a	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	11
B4	12a	Comp.	Seed	ANNONACEAE	cf. Xylopia	Indt.	Indt.	1
B4	12a	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	2
B4	8a	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	2
B4	8a	Comp.	Seed	ASTERACEAE	Tilesia	Tilesia sp.	Indt.	1
B4	14a	Frag.	Seed	SOLANACEAE	Capsicum	Capsicum sp.	Indt.	2
B4	14a	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	2
B4	7a	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	3

Table 0-7 Continued

B4	7a	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
B4	6b	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	1
B4	6b	Comp.	Seed	ANNONACE AE	cf. Xylopia	Indt.	Indt.	1
B4	6b	Comp.	Seed	ASTERACEA E	Tilesia	Tilesia sp.	Indt.	3
B4	6b	Comp.	Seed	Indt.	Indt.	Indt.	Indt.	2
B4	6b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	3
B4	5a	Comp.	Seed	SOLANACE AE	Solanum	Solanum sp.	Indt.	1
B4	5a	Comp.	Seed	ASTERACEA E	Tilesia	Tilesia sp.	Indt.	9
B4	5a	Comp.	Seed	SOLANACE AE	Solanum	Solanum sp.	Indt.	1
B4	5a	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	8
B4	5a	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	6
B4	4b	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	11
B4	4b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B4	4b	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	2
B4	4b	Comp.	Seed	ASTERACEA E	Tilesia	Tilesia sp.	Indt.	18
B4	4a	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	10
B4	4a	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	2
B4	4a	Comp.	Seed	ASTERACEA E	Tilesia	Tilesia sp.	Indt.	20
B4	6a	Frag.	Bark	Indt.	Indt.	Indt.	Indt.	1
B4	4a	Comp.	Seed	ANNONACE AE	cf. Xylopia	Indt.	Indt.	8

Table 0-7 Continued

B4	12b	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	1
B4	12b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	17
B4	12b	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	3
B4	7b	Comp.	Seed	ANNONACEAE	cf. Xylopia	Indt.	Indt.	4
B4	7b	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	5
B4	7b	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	3
B4	7b	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	2
B4	7b	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
B4	7b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	2
B4	7b	Comp.	Seed	CANNABACEAE	Celtis	Celtis sp.	Indt.	1
B5	6a	Comp.	Seed	FABACEAE	Acacia	Acacia sp.	Indt.	3
B5	3	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B5	3	Frag.	Seed	SOLANACEAE	Capsicum	Capsicum sp.	Indt.	6
B5	3	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	2
B5	4	Frag.	Indt.	Indt.	Indt.	Indt.	Indt.	1
B5	4	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B6	6a	Comp.	Seed	ANNONACEAE	cf. Xylopia	Indt.	Indt.	9
B6	3	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B6	3	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B6	3	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B6	3	Comp.	Seed	ANACARDIACEAE	Spondias	Indt.	Indt.	1

Table 0-7 Continued

B6	3	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	1
B6	3	Frag.	Leaf	SOLANACEAE	Cyphomandra	Cyphomandra sp.	Indt.	1
B7	6a	Frag.	Root	Indt.	Indt.	Indt.	Indt.	3
B7	3	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B7	3	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B7	3	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B7	3	Comp.	Seed	MALVACEAE	Indt.	Indt.	Indt.	1
B7	3	Frag.	Seed	SAPINDACEAE	Talisia	Talisia sp.	Indt.	1
B7	6	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B7	6	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B7	6	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B7	4	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B7	4	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
B7	4	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B8	8	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	23
B8	3	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	32
B8	3	Frag.	Leaf	Indt.	Indt.	Indt.	Helecho	1
B8	3	Comp.	Seed	FABACEAE	Inga	Inga sp.	Indt.	16
B8	3	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	21
B8	3	Comp.	Seed	SOLANACEAE	Capsicum	Capsicum sp.	Indt.	40
B8	3	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	6
B8	3	Comp.	Seed	PASSIFLORACEAE	Passiflora	Passiflora sp.	Indt.	8
B8	3	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	11

Table 0-7 Continued

B8	6	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	13
B8	6	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	100
B8	6	Comp.	Seed	ANNONACEAE	cf. Xylopia	Indt.	Indt.	3
B8	4	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	156
B8	4	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	8
B8	4	Comp.	Seed	BORAGINACEAE	Cordia	Indt.	Indt.	1
B8	4	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	2
B8	6a	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
B9	4	Comp.	Seed	FLACOURTIACEAE	Haseltia	Haseltia sp.	Indt.	1
B9	4	Comp.	Seed	SOLANACEAE	Capsicum	Capsicum sp.	Indt.	1
B9	4	Frag.	Bark	Indt.	Indt.	Indt.	Indt.	11
B9	6	Frag.	Bark	Indt.	Indt.	Indt.	Indt.	28
B9	6	Frag.	Leaf	Indt.	cf. Erythoxylum	E. coca	coca	3
B9	6	Comp.	Seed	MORACEAE	Clarisia	Clarisia sp.	Indt.	2
B9	6	Comp.	Seed	Indt.	Indt.	Indt.	Indt.	2
B9	5	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	19
B9	5	Frag.	Bark	Indt.	Indt.	Indt.	Indt.	12
B9	5	Frag.	Seed	EUPHORBIACEAE	Nealchornea	Indt.	Indt.	2
B9	5	Comp.	Seed	SOLANACEAE	Capsicum	Capsicum sp.	Indt.	22

Table 0-7 Continued

B9	5	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	1
B9	2	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	10
B10	5	Frag.	Wood	Indt.	Indt.	Indt.	Indt.	5
B10	5	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	20
B10	5	Frag.	Root	Indt.	Indt.	Indt.	Indt.	2
B10	6	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	24
B10	6	Comp.	Seed	ASTERACEAE	Tilesia	Tilesia sp.	Indt.	137
B10	4	Comp.	Seed	ANNONACEAE	cf. Xylopia	Indt.	Indt.	1
B10	4	Comp.	Seed	FABACEAE	Acacia	Acacia sp.	Indt.	1
B10	4	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	240
B10	4	Comp.	Spine	CACTACEAE	Indt.	Indt.	Indt.	1
B10	4	Comp.	Spine	CACTACEAE	Indt.	Indt.	Indt.	1
B10	4	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
C2	6	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	1
C2	6	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	1
C2	6	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	8
C2	6	Frag.	Inflorescence	ASTERACEAE	Tilesia	T. baccata	Indt.	1
C2	4	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	1
C2	4	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	1
C2	4	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	11
C2	6	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	23

Table 0-7 Continued

C2	6	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	7
C2	3	Comp.	Seed	EUPHORBIACEAE	Sapium	Indt.	Indt.	1
C2	3	Comp.	Seed	ASTERACEAE	Tilesia	Tilesia sp.	Indt.	2
C2	3	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	2
C2	3	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	2
C2	3	Comp.	Seed	CANNABACEAE	Celtis	Celtis sp.	Indt.	5
C2	3	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	25
C4	6	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	2
C4	6	Comp.	Seed	CANNABACEAE	Celtis	Celtis sp.	Indt.	1
C4	6	Frag.	Seed	EUPHORBIACEAE	Sapium	EUPHORBIACEAE	EUPHORBIACEAE	1
C4	6	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	19
C4	3	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
C4	3	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
C4	3	Comp.	Seed	Indt.	Indt.	Indt.	Indt.	2
C4	3	Comp.	Leaf	Indt.	Indt.	Indt.	Indt.	1
C4	4	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
C4	4	Comp.	Seed	Indt.	Indt.	Indt.	Indt.	7
C4	4	Comp.	Inflorescence	Indt.	Indt.	Indt.	Indt.	1
C4	4	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	1
C4	2	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
C4	2	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
C4	2	Comp.	Seed	CANNABACEAE	Celtis	Celtis sp.	Indt.	2

Table 0-7 Continued

C4	5	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	5
C4	5	Frag.	Leaf	Indt.	Indt.	Indt.	Indt.	1
C4	5	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	1
C5	4b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	57
C5	4b	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
C5	4b	Comp.	Seed	ANNONACEAE	cf. Xylopia	Indt.	Indt.	1
C5	4b	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	1
C5	4b	Comp.	Seed	ANNONACEAE	cf. Xylopia	Indt.	Indt.	6
C5	4	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
C5	4	Comp.	Seed	ULMACEAE	Ampelocera	Ampelocera sp.	Indt.	2
C5	4	Comp.	Seed	APOCYNACEAE	Parahancornia	Parahancomia sp.	Indt.	4
C5	3	Comp.	Seed	SOLANACEAE	Solanum	Solanum sp.	Indt.	47
C5	3	Frag.	Carbon	Indt.	Indt.	Indt.	Indt.	1
C5	3	Frag.	Stalk	Indt.	Indt.	Indt.	Indt.	15
C5	3	Comp.	Seed	ULMACEAE	Ampelocera	Ampelocera sp.	Indt.	1
C5	3	Comp.	Seed	MALVACEAE	Indt.	Indt.	Indt.	7
C5	3	Comp.	Seed	SOLANACEAE	Physalis	Physalis sp.	Indt.	1

Table 0-8: Simpuqio-Muyupata Starch Grain Data

Unit	Context	Period	Sample Type	Lab Code	Cheno-Am	Cucurbita sp.	Manihot esculenta	Phaseolus sp.	Phaseolus vulgaris	Zea mays	Indt.	TOTAL
A 2	3C	Inka	Stone	5A	0	0	0	2	0	1	0	3
A 2	3A	Inka	Stone	6A	0	1	0	0	0	0	0	1
A 1	3	Inka	Soil	7A	0	0	0	0	0	0	0	0
A 2	3	Inka	Soil	8A	0	1	0	0	0	0	0	1
A 3	2	Inka	Soil	9A	0	0	0	1	0	0	0	1
B 5	4	Inka	Soil	14A	0	0	0	0	0	0	0	0
B 6	3	Inka	Soil	15A	0	0	1	1	0	0	0	2
B 7	3	Inka	Soil	16A	0	0	0	0	0	0	0	0
B 7	4	Inka	Soil	17A	0	3	0	0	0	0	3	6
B 7	6	Inka	Soil	18A	0	2	0	3	0	0	0	5
B 8	3	Colonial	Stone	3A	0	3	0	8	1	1	0	13
B 8	5	Inka	Soil	19A	0	3	0	0	0	0	0	3
B 8	6	Inka	Soil	20A	8	7	0	1	0	0	0	16
B 8	7	Inka	Soil	21A	2	4	0	3	0	0	0	9
B 8	8	Inka	Soil	22A	6	3	0	0	0	0	2	11
B 9	2	Colonial	Stone	4A	1	0	0	0	0	0	0	1
B 9	2	Inka	Soil	23A	10	10	0	0	0	0	7	27
B 9	5	Inka	Soil	24A	6	0	0	0	0	0	0	6
B 9	6	Inka	Soil	25A	9	2	0	0	0	0	0	11
B 10	6A	Inka	Stone	1A	6	1	0	2	0	1	0	10
B 10	3D	Inka	Soil	10A	0	5	0	0	0	0	0	5

Table 0-8 Continued

B 10	4	Inka	Soil	11A	0	0	0	0	0	0	0	0
B 10	5	Inka	Soil	12A	5	0	1	0	0	0	0	6
B 10	6A	Inka	Soil	13A	3	0	0	1	0	0	0	4
C 2	1	Colo nial	Stone	2A	0	0	0	1	0	1	0	2
C 2	3	Inka	Soil	26A	10	3	0	6	0	0	0	19
C 4	2	Colo nial	Soil	27A	165	50	0	27	0	3	0	245
C 4	3	Colo nial	Soil	28A	15	8	0	0	0	0	0	23
C 4	4	Colo nial	Soil	29A	2	2	0	0	0	0	0	4
C 4	5	Colo nial	Soil	30A	0	0	0	4	0	0	0	4
C 5	3	Colo nial	Soil	31A	5	0	0	2	0	0	0	7
C 5	4C G	Colo nial	Soil	32A	11	1	0	0	0	0	0	12
C 5	4	Colo nial	Soil	33A	0	0	0	0	0	0	0	0

Table 0-9: Simapuqio Muyupata Phytolith Data

Unit	Context	Period	Sample Type	Lab Code	POOIDEAE/ FESTUCOIDEAE	PANICOIDEAE	CHLOROIDEAE	BAMBUSOIDEAE	BROMELIACEAE	ARECACEAE
A2	3C	Inka	Stone	5F	7	1	1	1	7	0
A2	3A	Inka	Stone	6F	10	15	0	0	20	0
A1	3	Inka	Soil	7F	33	18	18	30	19	0
A2	3	Inka	Soil	8F	27	0	28	21	49	0
A3	2	Inka	Soil	9F	65	0	24	9	50	0
B10	6A	Inka	Stone	1F	7	0	0	7	0	0
B10	3D	Inka	Soil	10F	0	0		43	23	0
B10	4	Inka	Soil	11F	39	0	0	23	33	0
B10	5	Inka	Soil	12F	0	0	0	0	0	0
B10	6A	Inka	Soil	13F	109	10	40	89	40	0
B5	4	Inka	Soil	14F	0	0	0	0		0
B6	3	Inka	Soil	15F	160	0	50	140	40	0
B7	3	Inka	Soil	16F	10	0	0	0	0	0
B7	4	Inka	Soil	17F	0	0	0	0	0	0
B7	6	Inka	Soil	18F	0	0	0	0	0	0
B8	3	Colonial	Stone	3F	3	0	7	2	5	0
B8	5	Inka	Soil	19F	282	35	65	90	240	0
B8	6	Inka	Soil	20F	270	120	131	220	95	0
B8	7	Inka	Soil	21F	68			36	19	

Table 0-9 Continued

B8	8	Inka	Soil	22F	0	0	0	0	0	0
B9	2	Colonial	Stone	4F	0	0	0	0	0	0
B9	2	Inka	Soil	23F	0	0	0	0	0	0
B9	5	Inka	Soil	24F					78	
B9	6	Inka	Soil	25F	0	0	0	0	0	0
C2	1	Colonial	Stone	2F	34	8	10	20	10	0
C2	3	inka	Soil	26F	30	12		10	85	
C4	2	C	Soil	27F	199	40	50	139	87	
C4	3	C	Soil	28F	0	0	0	0	0	0
C4	4	C	Soil	29F	43			29		
C4	5	C	Soil	30F	0	0	0	0	0	0
C5	3	C	Soil	31F	43	9			28	
C5	4CG	C	Soil	32F	54		9	83	66	
C5	4	C	Soil	33F	0	0	0	0	0	0

Table 0-9 Continued

Unit	Context	Period	Sample Type	Lab Code	CANNA	CHUSQUEA	ZEA MAYS (rondel)	ZEA MAYS (cruz)	BULIFORME	ELONGADO EQUINADO
A2	3C	Inka	Stone	5F	0	0	0	0	0	5
A2	3A	Inka	Stone	6F	0	0	0	0	0	30
A1	3	Inka	Soil	7F	0	0	15	0	0	29
A2	3	Inka	Soil	8F	0	0	0	0	0	0
A3	2	Inka	Soil	9F	0	0	0	0	0	15
B10	6A	Inka	Stone	1F	2	1	2	0	0	9

Table 0-9 Continued

B10	3D	Inka	Soil	10F	0	0	0	0	0	0
B10	4	Inka	Soil	11F	0	0	0	0	0	55
B10	5	Inka	Soil	12F	0	0	0	0	0	0
B10	6A	Inka	Soil	13F	0	5	5	0	0	30
B5	4	Inka	Soil	14F	0	0	0	0	0	0
B6	3	Inka	Soil	15F	0	0	0	10	0	298
B7	3	Inka	Soil	16F	0	0	0	0	0	0
B7	4	Inka	Soil	17F	0	0	0	0	0	0
B7	6	Inka	Soil	18F	0	0	0	0	0	0
B8	3	Colonial	Stone	3F	0	0	1	3	3	6
B8	5	Inka	Soil	19F	0	0	30	0	0	125
B8	6	Inka	Soil	20F	0	0	0	11	0	110
B8	7	Inka	Soil	21F						27
B8	8	Inka	Soil	22F	0	0	0	0	0	0
B9	2	Colonial	Stone	4F	0	0	0	0	0	0
B9	2	Inka	Soil	23F	0	0	0	0	0	0
B9	5	Inka	Soil	24F						55
B9	6	Inka	Soil	25F	0	0	0	0	0	0
C2	1	Colonial	Stone	2F	0	0	0	2	0	34
C2	3	inka	Soil	26F						
C4	2	C	Soil	27F				40	10	72
C4	3	C	Soil	28F	0	0	0	0	0	0
C4	4	C	Soil	29F						92
C4	5	C	Soil	30F	0	0	0	0	0	0

Table 0-9 Continued

C5	3	C	Soil	31F		17				
C5	4CG	C	Soil	32F						57
C5	4	C	Soil	33F	0	0	0	0	0	0

Table 0-9 Continued

Unit	Context	Period	Sample Type	Lab Code	TRAPEZOIDAL	TEJIDO GLANDULAR	ASTERACEAE	BOEHMERIA cf.	PHASEOLUS	MORACEAE/ URTICACEAE
A2	3C	Inka	Stone	5F	0	0				
A2	3A	Inka	Stone	6F	0	0				
A1	3	Inka	Soil	7F	6	0		6	3	
A2	3	Inka	Soil	8F	24	0				
A3	2	Inka	Soil	9F	0	0				
B10	6A	Inka	Stone	1F	0	0	3			
B10	3D	Inka	Soil	10F	11	0	4			
B10	4	Inka	Soil	11F	0	0	0	0	0	0
B10	5	Inka	Soil	12F	0	0	0	0	0	0
B10	6A	Inka	Soil	13F	10	0	0	0	5	0
B5	4	Inka	Soil	14F	0	0	0	0	0	0
B6	3	Inka	Soil	15F	0	0	0	10	0	0
B7	3	Inka	Soil	16F	0	0	0	0	0	0
B7	4	Inka	Soil	17F	0	0	0	0	0	0
B7	6	Inka	Soil	18F	0	0	0	0	0	0
B8	3	Colonial	Stone	3F	0	0				
B8	5	Inka	Soil	19F	0	0	0	0	0	35
B8	6	Inka	Soil	20F	0	10	30	0	0	89
B8	7	Inka	Soil	21F				9		
B8	8	Inka	Soil	22F	0	0	0	0	0	0
B9	2	Colonial	Stone	4F	0	0				
B9	2	Inka	Soil	23F	0	0	0	0	0	0

Table 0-9 Continued

B9	5	Inka	Soil	24F	65					
B9	6	Inka	Soil	25F	0	0	0	0	0	0
C2	1	Colo nial	Stone	2F	2	0	4			
C2	3	inka	Soil	26F						
C4	2	C	Soil	27F	20			38		
C4	3	C	Soil	28F	0	0	0	0	0	0
C4	4	C	Soil	29F						
C4	5	C	Soil	30F	0	0	0	0	0	0
C5	3	C	Soil	31F			35			
C5	4C G	C	Soil	32F						
C5	4	C	Soil	33F	0	0	0	0	0	0

Table 0-9 Continued

Unit	Context	Period	Sample Type	MUESTRA	SOLANUM	ELONGADO	MESOFILO	PARENQUIMA	POLIEDRICO	TEJIDO EPIDERMICO
A2	3C	Inka	Stone	5F		15			15	
A2	3A	Inka	Stone	6F		20				
A1	3	Inka	Soil	7F		119			32	
A2	3	Inka	Soil	8F		72			24	7
A3	2	Inka	Soil	9F		99			15	
B1 0	6A	Inka	Stone	1F		18			3	2
B1 0	3D	Inka	Soil	10F		83			12	
B1 0	4	Inka	Soil	11F	0	121	0	0	0	39
B1 0	5	Inka	Soil	12F	0	30	0	0	0	
B1 0	6A	Inka	Soil	13F	0	125	0	0	20	20
B5	4	Inka	Soil	14F	0	0	0	0	0	
B6	3	Inka	Soil	15F	0	0	0	0	80	30
B7	3	Inka	Soil	16F	0	40	0	0	0	
B7	4	Inka	Soil	17F	0	0	0	0	0	0

Table 0-9 Continued

B7	6	Inka	Soil	18F	0	0	0	0	0	
B8	3	Colo nial	Stone	3F		15				
B8	5	Inka	Soil	19F	5	315	30	0	40	75
B8	6	Inka	Soil	20F	0	165	30	10	80	93
B8	7	Inka	Soil	21F		156			92	
B8	8	Inka	Soil	22F	0	0	0	0	0	0
B9	2	Colo nial	Stone	4F		4				
B9	2	Inka	Soil	23F	0	0	0	0	0	0
B9	5	Inka	Soil	24F		172				
B9	6	Inka	Soil	25F	0	0	0	0	0	0
C2	1	Colo nial	Stone	2F		92			30	
C2	3	inka	Soil	26F		120				
C4	2	C	Soil	27F		650			172	
C4	3	C	Soil	28F	0	0	0	0	0	0
C4	4	C	Soil	29F		113			38	
C4	5	C	Soil	30F	0	0	0	0	0	0
C5	3	C	Soil	31F		192			37	
C5	4C G	C	Soil	32F		211			108	
C5	4	C	Soil	33F	0	0	0	0	0	0

Table 0-9 Continued

Unit	Context	Period	Sample Type	TRAQUEIDA	TRICOMA	DIATOMEA	ESPÍCULA	ESTOMAS	BROMUS	TOTAL
A2	3C	Inka	Stone		1	2	2	0	0	17
A2	3A	Inka	Stone			5		0	0	45
A1	3	Inka	Soil					0	0	118
A2	3	Inka	Soil					0	0	125
A3	2	Inka	Soil			10		0	0	148
B1 0	6A	Inka	Stone					0	0	14
B1 0	3D	Inka	Soil			4		0	0	66

Table 0-9 Continued

B10	4	Inka	Soil	0	0	0	0	0	0	95
B10	5	Inka	Soil	0	0	0	0	0	0	0
B10	6A	Inka	Soil	0	5	10	0	0	0	288
B5	4	Inka	Soil	0	0		0	0	0	0
B6	3	Inka	Soil	0	0	10	9	0	0	390
B7	3	Inka	Soil	0	0		0	0	0	10
B7	4	Inka	Soil	0	0	0	0	0	0	0
B7	6	Inka	Soil	0	0	0	0	0	0	0
B8	3	Colonial	Stone			7		0	1	17
B8	5	Inka	Soil	15	30	10	0	0	0	712
B8	6	Inka	Soil	0	75	30	0	1	0	836
B8	7	Inka	Soil							123
B8	8	Inka	Soil	0	0	0	0	0	0	0
B9	2	Colonial	Stone					0	0	0
B9	2	Inka	Soil	0	0	0	0	0	0	0
B9	5	Inka	Soil			18				78
B9	6	Inka	Soil	0	0	0	0	0	0	0
C2	1	Colonial	Stone			260	2	0	2	82
C2	3	Inka	Soil			10				137
C4	2	C	Soil			30				515
C4	3	C	Soil	0	0	0	0	0	0	0
C4	4	C	Soil							72
C4	5	C	Soil	0	0	0	0	0	0	0
C5	3	C	Soil							80
C5	4CG	C	Soil							212
C5	4	C	Soil	0	0	0	0	0	0	0

Table 0-10: Pollen analysis Lab Codes

Lab Code	Field Code
1920	SecB OpB4 Con4B
1921	SecB OpB4 Con5A
1922	SecB OpB4 Con5B
1923	SecB OpB4 Con7B
1924	SecB OpB4 Con8A
1925	SecB OpB4 Con8B
1926	SecB OpB4 Con9A
1927	SecB OpB4 Con10B
1928	SecB OpB4 Con11B
1929	SecB OpB4 Con12B
1930	SecB OpB4 Con13B
1931	SecB OpB4 Con14A
1932	SEC B OpB4 Con 4A
1933	SEC B OpB4 Con 10A
1934	SEC B OpB4 Con 6A
1935	SEC B OpB4 Con 6B
1936	SEC B OpB4 Con 7A
1937	SEC B OpB4 Con 9B
1938	SEC B OpB4 Con 11A
1939	SEC B OpB4 Con 12A
1940	SEC B OpB4 Con 13A

Table 0-11: Simapuqio-Muyupata Pollen Data

	Depth (cm from datum)	105-113	113-120	120-125	125-130	130-136	136-140	140-145	145-153
		1932	**1920**	**1921**	**1922**	**1934**	**1935**	**1936**	**1923**
FAMILY	**Taxon**	**SEC B OpB4 Con 4A**	**SecB OpB4 Con4B**	**SecB OpB4 Con5A**	**SecB OpB4 Con5B**	**SEC B OpB4 Con 6A**	**SEC B OpB4 Con 6B**	**SEC B OpB4 Con 7A**	**SecB OpB4 Con7B**
Agavaceae	Agavaceae	0	0	0	0	2	0	0	0
Amaranthaceae	Cheno-Am	25	18	18	35	9	5	0	52
Anacardiaceae	Schinus	0	21	0	0	0	0	0	0

Table 0-11 Continued

Annonaceae	Annonaceae	0	0	4	0	0	0	0	0
Apiaceae	Apiaceae	0	12	0	0	0	0	0	0
Arecaceae	Bactris	0	1	0	0	0	0	0	0
Asclepiadaceae	Asclepiadaceae	0	0	0	0	0	0	0	0
Asteraceae	Achyrocline	0	0	0	0	0	0	0	0
Asteraceae	Ageratina	0	25	0	0	0	0	0	0
Asteraceae	Baccharis buxifolia	0	0	0	0	8	0	0	0
Asteraceae	Baccharis genistelloides	0	0	0	21	0	0	0	0
Asteraceae	Baccharis latifolia	0	0	0	0	0	0	0	0
Asteraceae	Baccharis sp.	0	0	0	0	0	5	0	0
Asteraceae	Bidens pilosa	0	0	0	1	0	0	0	23
Asteraceae	Ophryosporus	19	0	0	21	0	0	0	25
Asteraceae	Senecio	0	0	0	0	0	0	0	0
Asteraceae	Sonchus cf asper	0	24	0	19	0	0	1	1
Betulaceae	Alnus	0	22	35	25	15	8	5	0
Bignoniaceae	Bignoniaceae	0	0	0	0	0	5	0	0
Bromeliaceae	Bromeliaceae	0	0	0	0	0	0	0	0
Chloranthaceae	Hedyosmum	0	21	0	0	0	0	0	27
Commelinaceae	Commelinaceae	0	0	0	0	0	0	0	0
Ephedraceae	Ephedra	8	23	0	31	0	0	0	12
Ericaceae	Ericaceae	0	1	0	0	0	0	0	0
Euphorbiaceae	Croton	0	0	0	0	0	0	2	0
Fabaceae	Prosopis	0	0	0	0	0	0	0	1
Fabaceae	Mimosoideae poliada	0	0	0	0	12	0	0	0
Lamiaceae	Lamiaceae	0	0	0	0	0	0	0	0
Malpighiaceae	Malpighiaceae cf. Bunchosia	0	0	0	3	0	0	0	0
Malvaceae	Malvaceae	0	0	9	0	2	0	0	0
Myricaceae	Myrica	0	0	0	0	0	0	0	1
Myrtaceae		0	0	0	1	0	0	0	0
Onagraceae	Fuchsia cf. Ludwigia	0	0	0	1	0	0	0	1
Oxalidaceae	Oxalis	0	0	0	0	0	0	0	0
Polemoniaceae	Cantua cf. Gilia	0	1	4	0	0	0	0	0
Polygonaceae	Polygum	0	1	0	0	0	0	0	0
Polygalaceae	Monnina cf	0	0	0	14	0	0	0	0
Poaceae	Poaceae 30-50 um	0	0	0	0	0	0	0	0
Poaceae	Poaceae 50-70 um	0	12	5	4	0	5	2	0
Poaceae	Zea mays cf.	0	0	0	0	0	0	0	8

Table 0-11 Continued

Podocarpaceae	Podocarpus	20	16	8	8	0	0	0	49
Solanaceae	Dunalia	0	0	0	0	0	0	0	0
Solanaceae	Sol-Lyc	12	1	4	8	27	0	0	0
Solanaceae	Cestrum cf conglomeratum	0	0	0	8	0	0	0	0
Typhaceae	Typha	0	1	0	0	9	5	2	0
	Pollen Sum	84	200	87	200	84	33	12	200

Table 0-11 Continued

	Depth	153-160	160-163	163-168	168-172	170-174	174-180	180-186	186-195
		1924	**1925**	**1926**	**1937**	**1933**	**1927**	**1938**	**1928**
FAMILIY	**Taxon**	**SecB OpB4 Con8A**	**SecB OpB4 Con8B**	**SecB OpB4 Con9A**	**SEC B OpB4 Con 9B**	**SEC B OpB4 Con 10A**	**SecB OpB4 Con10B**	**SEC B OpB4 Con 11A**	**SecB OpB4 Con11B**
Agavaceae	Agavaceae	0	0	0	0	0	0	0	0
Amaranthaceae	Cheno-Am	25	9	0	0	0	0	7	0
Anacardiaceae	Schinus	0	0	0	0	0	18	6	0
Annonaceae	Annonaceae	0	0	0	0	0	0	0	0
Apiaceae	Apiaceae	0	0	0	0	0	0	0	0
Arecaceae	Bactris	0	0	0	0	0	0	0	0
Asclepiadaceae	Asclepiadaceae	0	0	0	0	0	0	0	0
Asteraceae	Achyrocline	0	0	0	0	0	0	0	0
Asteraceae	Ageratina	0	0	0	0	0	0	0	0
Asteraceae	Baccharis buxifolia	0	0	0	0	0	0	0	0
Asteraceae	Baccharis genistelloides	0	0	35	0	0	0	0	0
Asteraceae	Baccharis latifolia	0	0	0	0	0	0	2	0
Asteraceae	Baccharis sp.	0	0	26	0	0	0	0	0
Asteraceae	Bidens pilosa	0	0	0	0	0	0	0	0
Asteraceae	Ophryosporus	0	0	0	0	0	27	0	3
Asteraceae	Senecio	0	62	0	0	16	0	0	0
Asteraceae	Sonchus cf asper	24	66	17	0	0	19	0	65

Table 0-11 Continued

Betulaceae	Alnus	0	0	15	10	0	0	18	0
Bignoniaceae	Bignoniaceae	0	0	0	0	0	0	0	0
Bromeliaceae	Bromeliaceae	0	0	0	0	0	0	0	0
Chloranthaceae	Hedyosmum	8	0	0	0	0	0	0	0
Commelinaceae	Commelinaceae	0	8	0	0	0	0	0	0
Ephedraceae	Ephedra	0	0	8	0	0	0	0	0
Ericaceae	Ericaceae	0	0	0	0	0	0	0	0
Euphorbiaceae	Croton	0	0	0	0	0	0	0	0
Fabaceae	Prosopis	0	0	0	0	0	0	0	0
Fabaceae	Mimosoideae poliada	1	0	0	0	0	0	0	0
Lamiaceae	Lamiaceae	48	0	0	0	0	0	0	0
Malpighiaceae	Malpighiaceae cf. Bunchosia	0	0	0	0	0	0	0	0
Malvaceae	Malvaceae	0	0	0	0	0	0	0	0
Myricaceae	Myrica	0	0	0	0	0	0	0	0
Myrtaceae		0	0	0	0	0	0	0	0
Onagraceae	Fuchsia cf. Ludwigia	0	0	0	0	0	0	0	0
Oxalidaceae	Oxalis	0	0	0	0	0	0	0	0
Polemoniaceae	Cantua cf. Gilia	0	0	0	0	0	0	0	0
Polygonaceae	Polygum	0	0	0	0	0	0	0	0
Polygalaceae	Monnina cf	0	0	0	0	0	0	0	0
Poaceae	Poaceae 30-50 um	0	0	0	0	0	0	0	0
Poaceae	Poaceae 50-70 um	0	0	0	9	0	0	14	0
Poaceae	Zea mays cf.	0	0	0	0	0	0	0	0
Podocarpaceae	Podocarpus	21	55	16	0	0	0	0	0
Solanaceae	Dunalia	0	0	9	0	0	0	0	0
Solanaceae	Sol-Lyc	0	0	0	0	0	0	0	0
Solanaceae	Cestrum cf conglomeratum	0	0	0	0	0	0	0	0
Typhaceae	Typha	0	0	0	0	0	0	0	0
	Pollen Sum	127	200	126	19	16	64	47	68

Table 0-11 Continued

	Depth	195-198	198-202	202-210	210-216	213-224		
		1939	**1929**	**1940**	**1930**	**1931**		
FAMILIY	**Taxon**	**SEC B OpB4 Con 12A**	**SecB OpB4 Con12B**	**SEC B OpB4 Con 13A**	**SecB OpB4 Con13B**	**SecB OpB4 Con14A**		
Agavaceae	Agavaceae	0	0	0	0	0		
Amaranthaceae	Cheno-Am	7	27	35	12	4		
Anacardiaceae	Schinus	0	0	0	0	0		
Annonaceae	Annonaceae	0	0	1	0	0		
Apiaceae	Apiaceae	0	0	0	0	0		
Arecaceae	Bactris	0	0	0	0	0		
Asclepiadaceae	Asclepiadaceae	0	0	0	32	0		
Asteraceae	Achyrocline	0	0	32	0	0		
Asteraceae	Ageratina	0	0	0	0	0		
Asteraceae	Baccharis buxifolia	0	0	0	0	0		
Asteraceae	Baccharis genistelloides	0	0	0	0	0		
Asteraceae	Baccharis latifolia	0	0	0	0	0		
Asteraceae	Baccharis sp.	1	0	0	0	0		
Asteraceae	Bidens pilosa	0	0	0	0	3		
Asteraceae	Ophryosporus	4	0	0	0	0		
Asteraceae	Senecio	0	0	0	0	0		
Asteraceae	Sonchus cf asper	0	0	24	0	0		
Betulaceae	Alnus	42	54	62	0	0		
Bignoniaceae	Bignoniaceae	0	0	0	0	0		
Bromeliaceae	Bromeliaceae	0	26	0	0	0		
Chloranthaceae	Hedyosmum	0	41	0	0	0		

Table 0-11 Continued

Commelinaceae	Commelinaceae	0	0	0	0	0		
Ephedraceae	Ephedra	0	5	0	1	0		
Ericaceae	Ericaceae	0	0	0	0	0		
Euphorbiaceae	Croton	0	0	0	0	0		
Fabaceae	Prosopis	0	0	0	0	0		
Fabaceae	Mimosoideae poliada	0	0	0	0	0		
Lamiaceae	Lamiaceae	0	0	0	0	0		
Malpighiaceae	Malpighiaceae cf. Bunchosia	0	0	1	0	0		
Malvaceae	Malvaceae	0	0	0	0	0		
Myricaceae	Myrica	0	0	0	0	0		
Myrtaceae		0	0	0	0	0		
Onagraceae	Fuchsia cf. Ludwigia	0	0	0	0	0		
Oxalidaceae	Oxalis	0	0	0	7	0		
Polemoniaceae	Cantua cf. Gilia	0	0	0	0	0		
Polygonaceae	Polygum	0	0	0	0	0		
Polygalaceae	Monnina cf	0	0	0	0	0		
Poaceae	Poaceae 30-50 um	0	0	1	0	0		
Poaceae	Poaceae 50-70 um	35	0	44	0	0		
Poaceae	Zea mays cf.	0	0	0	0	0		
Podocarpaceae	Podocarpus	0	0	0	6	0		
Solanaceae	Dunalia	0	14	0	0	0		
Solanaceae	Sol-Lyc	0	28	0	7	5		
Solanaceae	Cestrum cf conglomeratum	0	0	0	0	0		
Typhaceae	Typha	0	5	0	0	0		
	Pollen Sum	89	200	200	65	12		

Table 0-12: Simapuqio-Muyupata Spore Counts

	1932	**1920**	**1921**	**1922**	**1934**	**1935**	**1923**
Taxon	**SEC B OpB4 Con 4A**	**SecB OpB4 Con4B**	**SecB OpB4 Con5A**	**SecB OpB4 Con5B**	**SEC B OpB4 Con 6A**	**SEC B OpB4 Con 6B**	**SecB OpB4 Con7B**
Monolete liso	66	26	24	2	62	60	4
Monolete liso (cf. Polypodium)	0	14	0	21	0	30	0
Huperzia	18	63	24	81	32	40	0
Trilete 1	0	0	8	0	6	0	112
Trilete escábrido	0	0	0	0	0	0	0
Trilete orn. perforada.	0	1	8	3	0	0	1
Trilete orn. Granulado	0	2	0	0	8	0	0
Trilete 2 (doble exina xd)	6	0	0	0	0	0	0
Trilete orn. liso.	69	39	76	25	38	20	20
Trilete orn. verrucada.	3	3	0	5	4	0	0
Trilete 3	0	0	0	0	0	0	0
Trilete con cingulo	12	0	16	3	18	10	12
Trilete con cíngulo grande	0	0	0	0	0	0	16
Trilete con cíngulo liso	0	0	0	0	0	0	0
Trilete equinado	6	0	0	0	0	0	4
Trilete reticular	12	0	0	0	0	10	0
Cyathea sp.	18	13	0	18	0	0	0
Pteridofita Sum	210	161	156	158	168	170	169

Table 0-12 Continued

	1924	1925	1926	1937	1933	1927	192 8
Taxon	SecB OpB4 Con8A	SecB OpB4 Con8B	SecB OpB4 Con9A	SEC B OpB4 Con 9B	SEC B OpB4 Con 10A	SecB OpB4 Con10B	SecB OpB4 Con11B
Monolete liso	0	0	0	0	0	0	0
Monolete liso (cf. Polypodium)	9	0	0	0	0	0	0
Huperzia	4	18	16	0	8	7	130
Trilete 1	76	150	44	0	0	96	0
Trilete escábrido	1	0	0	0	0	0	0
Trilete orn. perforada.	1	0	0	0	0	0	0
Trilete orn. Granulado	0	0	44	0	0	0	0
Trilete 2 (doble exina xd)	12	0	16	0	0	0	0
Trilete orn. liso.	35	9	8	2	4	19	0
Trilete orn. verrucada.	8	4	0	0	0	0	0
Trilete 3	0	0	0	0	0	0	0
Trilete con cingulo	8	48	0	0	0	21	36
Trilete con cíngulo grande	19	92	0	0	0	0	0
Trilete con cíngulo liso	0	8	8	0	0	0	0
Trilete equinado	0	0	0	0	0	0	0
Trilete reticular	0	0	0	0	0	14	0
Cyathea sp.	0	14	0	0	0	0	0
Pteridofita Sum	173	343	136	2	12	157	166

Table 0-12 Continued

	1939	1929	1940	1930	1931		
Taxon	SEC B OpB4 Con 12A	SecB OpB4 Con12B	SEC B OpB4 Con 13A	SecB OpB4 Con13B	SecB OpB4 Con14A		
Monolete liso	0	13	0	0	0		
Monolete liso (cf. Polypodium)	2	0	0	0	0		
Huperzia	1	0	0	5	13		
Trilete 1	0	52	0	0	0		
Trilete escábrido	0	0	0	0	0		
Trilete orn. perforada.	0	0	0	0	0		
Trilete orn. Granulado	0	0	0	0	0		
Trilete 2 (doble exina xd)	0	0	0	0	0		
Trilete orn. liso.	2	35	4	0	0		
Trilete orn. verrucada.	0	0	0	0	0		
Trilete 3	0	0	1	0	0		
Trilete con cingulo	0	0	0	0	0		
Trilete con cíngulo grande	0	0	0	0	0		
Trilete con cíngulo liso	0	0	0	0	0		
Trilete equinado	0	0	0	0	0		
Trilete reticular	0	0	0	1	0		
Cyathea sp.	0	0	0	0	0		
Pteridofita Sum	5	100	5	6	13		

Appendix 6: Zooarchaeological Data Simapuqio-Muyupata

Zooarchaeological Analysis of the assemblage from Simapuqio-Muyupata was completed by Lic. Karen Durand.

Table 0-13: Simapuqio-Muyupata Zooarchaeological Data

Unit	Context	Bag Weight (g)	TAXON	Element	Portion	SIDE	FUSION	Age (J-A)	Notes
A1	3	11	Mammalia	hueso plano	10	N/A	N/A	N/A	
B2	2	42	Bos Taurus	pelvis-cresta iliaca	<10	N/A	N/A	N/A	
B2	2	42	Bos Taurus	vertebra	<10	M	N/A	N/A	
B2	2	42	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
B2	2	42	Mammalia	vertebra-apofisis transversa	<10	M	N/A	N/A	
B2	2	42	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	2	42	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
B2	3	38	Bos Taurus	hueso plano	<10	N/A	N/A	N/A	
B2	3	38	Bos Taurus	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	3	38	Bos Taurus	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	3	38	Bos Taurus	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	349	Equus ferus	vertebra lumbar-2da	80	M	EF	A	
B2	4	349	Equus ferus	costilla-9na-cabeza	10	L	EF	A	
B2	4	349	Equus ferus	costilla-cuerpo	10	N/A	N/A	N/A	
B2	4	349	Equus ferus	costilla-cuerpo	10	N/A	N/A	N/A	
B2	4	349	Bos Taurus	costilla-cuerpo	10	N/A	N/A	N/A	
B2	4	349	Bos Taurus	costilla-cuerpo	<10	N/A	N/A	N/A	

Table 0-13 Continued

B2	4	34 9	Equus ferus	costilla-cuerpo	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Equus ferus	sesamoideo-rotula	100	L	N/A	A	
B2	4	34 9	Equus ferus	tarso-astragalo	90	R	N/A	N/A	quemado-carbonizado
B2	4	34 9	Equus ferus	craneo-espinas nasales	50	M	SSF	J	
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	

Table 0-13 Continued

B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B2	4	34 9	Mammalia	hueso plano	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso plano	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso plano	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	vertebra	<10	N/A	N/A	N/A	
B2	4	34 9	Ovis aries	maxilar-alveolos dentales+3molares	10	L	N/A	N/A	
B2	4	34 9	Ovis aries	maxilar-alveolos dentales+2molares	<10	R	N/A	N/A	
B2	4	34 9	Ovis aries	pieza dental-molar superior	80	R	N/A	N/A	
B2	4	34 9	Ovis aries	mandibula-alvoelos dentales	<10	N/A	N/A	N/A	
B2	4	34 9	Ovis aries	mandibula-alveolos dentales+2pm+3i+diastema+sutura sinfisiaria	30	R	SSF	J	
B2	4	34 9	Mammalia	N/A	<10	N/A	N/A	N/A	quemado-carbonizado
B2	4	34 9	Mammalia	N/A	<10	N/A	N/A	N/A	quemado-carbonizado
B2	4	34 9	Mammalia	hueso plano	<10	N/A	N/A	N/A	
B2	4	34 9	Ave?	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	4	34 9	Mammalia	craneo	<10	N/A	N/A	N/A	

Table 0-13 Continued

B2	4	349	Ave	tibiotarso-epifisis proximal	10	R	N/A	N/A	
B2	4	349	Mammalia	N/A	<10	N/A	N/A	N/A	
B2	6	49	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B2	6	49	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B2	6	49	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
B2	6	49	Mammalia	N/A	<10	N/A	N/A	N/A	
B2	6	49	Mammalia	hueso plano	<10	N/A	N/A	N/A	
B2	6	49	Lama glama	costilla-surco costal	10	R	N/A	N/A	
B2	6	49	Lama glama	mandibula-alveolos dentales+molar	10	R	N/A	J	
B2	6	49	Vicugna pacos	tibia-epifisis distal	<10	L	EA	J	
B2	6	49	Ruminantia	pieza dental-molar	100	N/A	N/A	N/A	
B2	6	49	Vicugna pacos	vertebra toraxica	90	M	EF	A	mismo individuo
B2	6	49	Vicugna pacos	vertebra toraxica	90	M	EF	A	mismo individuo
B2	7	18	Ovis aries	humero-epifisis distal	20	L	EF	A	
B2	8	15	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B2	8	15	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B2	8	15	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B2	8	15	Mammalia	hueso plano	<10	N/A	N/A	N/A	
B2	8	15	Lama glama	pieza dental-molar superior 3	100	L	N/A	J	
B2	9	16	Mammalia	hueso largo-epifisis	<10	N/A	EA	J	calcinado
B2	9	16	Mammalia	N/A	<10	N/A	N/A	N/A	calcinado
B2	9	16	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	muy deteriorado
B4	4A	6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B4	4B	17	Vicugna pacos	falange int.-1ra-miembro posterior	95	L	EF	A	
B4	4B	17	Vicugna pacos	falange ext.-2da-miembro anterior	100	L	EF	A	

Table 0-13 Continued

B4	5 A	34	Capra aegagrus	mandibula-2pm+2m+3m	80	L	N/A	A	
B4	5 A	34	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B4	5 A	34	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
B4	5 A	34	Lama glama	falange ext.-1ra-miembro anterior	100	R	EF	A	
B4	5 B	37	Lama glama	falange int.-1ra-miembro posterior	100	L	EF	A	
B4	5 B	37	Camelidae	metacarpo	80	N/A	EA	J	
B4	5 B	37	Mammalia	vertebra	<10	M	N/A	N/A	
B4	5 B	37	Mammalia	vertebra	<10	M	N/A	N/A	
B4	6 A	13	Mammalia	vertebra-cuerpo	20	M	EF	A	
B4	6 A	13	Mammalia	vertebra	<10	M	N/A	N/A	
B4	7 A	5	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
B4	8 A	10	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B4	11 A	14	Mammalia	hueso irregular	10	N/A	N/A	N/A	
B4	11 A	14	Mammalia	hueso plano	<10	N/A	N/A	N/A	
B4	11 B	10	Mammalia	vertebra	<10	M	EF	A	
B4	11 B	10	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B4	11 B	10	Mammalia	N/A	<10	N/A	N/A	N/A	
B4	11 B	10	Cavia porcellus	femur-epifisis distal	80	L	EF	A	
B4	12 A	11	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B4	12 A	11	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B4	12 A	11	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B4	12 B	8	Ovis aries	vertebra toraxica-cuerpo	30	M	EA	J	
B5	3	13	Vicugna pacos	pelvis-ala del ilion	10	R	N/A	N/A	
B5	3	13	Cavia porcellus	tibia-epifisis distal	40	L	EF	A	

Table 0-13 Continued

B5	6	75	Vicugna pacos	falange ext.-2da-miembro anterior	100	R	EF	A	
B5	6	75	Vicugna pacos	metatarso	100	R	EF	A	
B6	3	89	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B6	3	89	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla-quemado
B6	3	89	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla-quemado
B6	3	89	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla-carbonizado
B6	3	89	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado
B6	3	89	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado
B6	3	89	Mammalia	N/A	<10	N/A	N/A	N/A	
B6	3	89	Mammalia	N/A	<10	N/A	N/A	N/A	carbonizado-calcicnado
B6	3	89	Mammalia	N/A	<10	N/A	N/A	N/A	carbonizado-calcicnado
B6	3	89	Lama glama	vertebra cervical-5ta	40	M	EF	A	corte
B6	3	89	Mammalia	vertebra-apofisis articular	<10	M	N/A	N/A	
B6	3	89	Mammalia	costilla-cuerpo	30	N/A	N/A	N/A	
B6	3	89	Lama glama	sesamoideo-rotula	100	R	N/A	N/A	
B7	3	80	Lama glama	vertebra caudal	100	M	EF	A	
B7	3	80	Ovis aries	costilla-surco costal	70	R	N/A	N/A	
B7	3	80	Lama glama	femur-epifisis proximal	10	R	N/A	N/A	
B7	3	80	Lama glama	metapodio-epifisis distal	30	N/A	EA	J	
B7	3	80	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	
B7	3	80	Mammalia	hueso plano	<10	N/A	N/A	N/A	
B7	3	80	Mammalia	vertebra	<10	M	ES	J	
B7	3	80	Mammalia	hueso irregular	10	N/A	N/A	N/A	
B7	3	80	Mammalia	vertebra toraxica	100	M	EA	J	
B7	6	6	Cavia porcellus	mandibula-diastema+incisivo	40	L	N/A	N/A	
B8	2	28	Ovis aries	vertebra cervical-3ra	90	M	EA	J	

Table 0-13 Continued

B8	3	13	Puma concolor	escapula-apofisis coracoides+acromio	20	R	N/A	N/A	
B8	3	13	Gallus gallus	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B8	3	13	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B8	4	14	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B8	4	14	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B8	4	14	Mammalia	costilla-cuerpo	20	N/A	N/A	N/A	
B8	4	14	Camelidae	mandibila-diastema	<10	L	N/A	N/A	
B8	4	14	Ovis aries	falange int-1ra-miembro anterior	100	R	EF	A	
B8	4	14	Mammalia	N/A	<10	N/A	N/A	N/A	calcinado
B8	4	14	Mammalia	radio-epifisis proximal	<10	N/A	N/A	N/A	calcinado
B8	5	20	Cavia porcellus	craneo-condilo auricular	100	L	SSF	J	
B8	5	20	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	carbonizado-quemado
B8	5	20	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
B8	5	20	Mammalia	craneo	<10	N/A	N/A	N/A	fragmento trabajado-desgaste lateral
B8	5	20	Mammalia	craneo	<10	N/A	N/A	N/A	
B8	5	20	Lama glama	falange ext.-1ra-miembro anterior	50	L	EF	A	
B8	6	14	Ave?	hueso largo-diafisis	10	N/A	N/A	N/A	quemado-carbonizado
B8	6	14	Ave?	N/A	<10	N/A	N/A	N/A	carbonizado-astilla
B8	6	14	Mammalia	hueso corto-epifisis	<10	N/A	N/A	N/A	calcinado
B8	6	14	Ave pequeña	hueso largo-diafisis	20	N/A	N/A	N/A	calcinado
B8	6	14	Ave pequeña	hueso largo-diafisis	20	N/A	N/A	N/A	calcinado
B8	6	14	Mammalia	N/A	<10	N/A	N/A	N/A	calcinado
B9	1	11	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla

Table 0-13 Continued

B9	2	49	Vicugna pacos	vertebra cervical-axis	50	M	EA	J	hueso trabajado-desgaste por abrasion de apofisis transversa
B9	2	49	Cavia porcellus	pelvis-ilion+fosa acetabular	60	L	N/A	N/A	
B9	2	49	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B9	2	49	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B9	2	49	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B9	2	49	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	quemado
B9	2	49	Mammalia	hueso irregular	<10	N/A	N/A	N/A	quemado
B9	2	49	Mammalia	N/A	<10	N/A	N/A	N/A	quemado
B9	2	49	Mammalia	N/A	<10	N/A	N/A	N/A	quemado
B9	2	49	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
B9	2	49	Mammalia	N/A	<10	N/A	N/A	N/A	
B9	2	49	Lama glama	carpo-4to carpiano	100	R	N/A	N/A	
B9	3	10	Vicugna pacos	falange ext.-2da-miembro posterior	100	L	EF	A	
B9	5	48	Lama glama	vertebra cervical-7ma	20	M	N/A	N/A	
B9	5	48	Lama glama	costilla-surco costal	20	L	N/A	N/A	
B9	5	48	Lama glama	falange int.-2da-miembro anterior	100	L	ES	J	
B9	5	48	Lama glama	pieza dental-caN/Ano superior-1	100	R	N/A	N/A	
B9	5	48	Lama glama	vertebra toraxica-7ma	100	M	EF	A	
B10	3	50	Bos Taurus	vertebra cervical-4ta	30	M	EF	A	
B10	3	50	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
B10	3	50	Mammalia	costilla-surco costal	<10	L	N/A	N/A	calcinado
B10	3	50	Mammalia	N/A	<10	N/A	N/A	N/A	
B10	3	50	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	diafisis trabajada-huella de pulido

Table 0-13 Continued

B10	4	170	Cervidae	mandibula	90	L	SSF	J	mandibula muy framentada, seccion de cuerpo mandibular carbonizado
B10	4	170	Cervidae	mandibula	40	R	SSF	J	mandibula muy framentada, 1er molar carbonizado
B10	4	170	Mammalia	mandibula-angulo mandibular	<10	R	N/A	N/A	carbonizado
B10	4	170	Cervidae	vertebra cervical-cuerpo de axis	30	M	EF	A	corte-quemado carbonizado
B10	4	170	Cervidae	vertebra cervical-cuerpo	30	M	EF	A	quemado
B10	4	170	Cervidae	vertebra cervical-cuerpo	30	M	EF	A	
B10	4	170	Cervidae	vertebra-apofisis espinosa	10	M	N/A	N/A	
B10	4	170	Cervidae	vertebra	<10	M	N/A	N/A	quemado
B10	4	170	Cervidae	vertebra-tuberculo ventral	<10	M	EF	A	quemado
B10	4	170	Cervidae	vertebra-tuberculo dorsal de apofisis transversa	<10	M	N/A	N/A	carbonizado
B10	4	170	Cervidae	vertebra	<10	M	N/A	N/A	carbonizado
B10	4	170	Cervidae	vertebra-tuberculo ventral	<10	M	N/A	N/A	carbonizado
B10	4	170	Cervidae	vertebra-lamina de arco ventral	<10	M	N/A	N/A	carbonizado-calcicnado
B10	4	170	Cervidae	vertebra-apofisis articular cranial	<10	M	N/A	N/A	carbonizado-calcicnado
B10	4	170	Cervidae	vertebra	<10	M	N/A	N/A	calcinado
B10	4	170	Cervidae	vertebra	<10	M	N/A	N/A	calcinado
B10	4	170	Cervidae	vertebra	<10	M	N/A	N/A	calcinado
B10	4	170	Cervidae	vertebra	<10	M	N/A	N/A	calcinado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado

Table 0-13 Continued

B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B10	4	170	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	quemado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado

Table 0-13 Continued

B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	hueso irregular	<10	N/A	N/A	N/A	calcinado
B10	4	170	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
B10	4	170	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
B10	4	170	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
B10	4	170	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	carbonizado
B10	4	170	Lama glama	falange ext.-1ra-miembro posterior	100	L	EF	A	
B10	4	170	Ruminantia	pieza dental-molar	<10	N/A	N/A	N/A	carbonizado-calcicnado
B10	4	170	Mus musculus	escapula	80	R	N/A	N/A	
B10	4	170	Bos Taurus	hioides	50	L	N/A	N/A	corte
B10	4	170	Cervidae	hioides	30	R	N/A	N/A	corte
B10	4	170	Ave	hueso largo-epifisis	10	N/A	N/A	N/A	
B10	6	11	Vicugna pacos	tibia-epifisis distal	10	R	ES	J	
C2	1	84	Ovis aries	falange int.-2da-miembro anterior	100	R	EF	A	
C2	1	84	Capra aegagrus	escapula	20	L	N/A	A	
C2	1	84	Bos Taurus	femur-epifisis distal	<10	R	EF	A	termoalteracion+serruchado
C2	1	84	Bos Taurus	hueso largo-diafisis	<10	N/A	N/A	N/A	
C2	1	84	Bos Taurus	hueso plano	<10	N/A	N/A	N/A	
C2	2	22	Mammalia	mandibula	<10	R	N/A	N/A	
C2	2	22	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	

Table 0-13 Continued

C2	2	22	Bos Taurus	vertebra toraxica-proceso espinoso	20	N/A	N/A	N/A	
C2	3	80	Vicugna pacos	pelvis	<10	R	N/A	N/A	
C2	3	80	Vicugna pacos	falange ext.-1ra-miembro posterior	100	L	EF	A	
C2	3	80	Ovis aries	falange int.-1ra-miembro anterior	40	R	EA	J	corte
C2	3	80	Mammalia	vertebra	<10	M	N/A	N/A	quemado
C2	3	80	Mammalia	vertebra	<10	M	N/A	N/A	quemado
C2	3	80	Mammalia	vertebra	<10	M	N/A	N/A	
C2	3	80	Mammalia	vertebra	<10	M	N/A	N/A	
C2	3	80	Mammalia	costilla	<10	N/A	N/A	N/A	
C2	3	80	Mammalia	costilla	<10	N/A	N/A	N/A	
C2	3	80	Mammalia	costilla	<10	N/A	N/A	N/A	
C2	3	80	Mammalia	costilla	<10	N/A	N/A	N/A	
C2	3	80	Vicugna pacos	mandibula-procesos condilar y sub-condilar	<10	L	N/A	A	
C2	3	80	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado
C2	3	80	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C2	3	80	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C2	3	80	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C2	4	54	Vicugna pacos	vertebra lumbar-apofisis espinoza	20	M	N/A	N/A	
C2	4	54	Mammalia	vertebra	<10	M	EA	J	
C2	4	54	Vicugna pacos	vertebra caudal-1ra	90	M	EF	A	
C2	4	54	Mammalia	vertebra	<10	M	N/A	N/A	
C2	4	54	Mammalia	vertebra	<10	M	EF	A	
C2	4	54	Mammalia	costilla	30	N/A	N/A	N/A	
C2	4	54	Cavia porcellus	craneo	30	M	SF	A	
C2	4	54	Vicugna pacos	escapula-espina escapular	<10	L	N/A	N/A	
C2	4	54	Mammalia	hueso largo-epifisis	<10	N/A	EA	J	quemado
C2	4	54	Mammalia	hueso largo-epifisis	<10	N/A	EA	J	Quemado

Table 0-13 Continued

C2	4	54	Mammalia	hueso largo-epifisis	<10	N/A	EA	J	
C2	4	54	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado-carbonizado
C2	4	54	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado-carbonizado
C2	4	54	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C2	4	54	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C2	4	54	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C2	4	54	Gallus gallus	hueso largo-diafisis	<10	N/A	N/A	N/A	
C2	4	54	Mammalia	N/A	<10	N/A	N/A	N/A	carbonizado
C2	4	54	Mammalia	N/A	<10	N/A	N/A	N/A	corte
C2	4	54	Mammalia	N/A	<10	N/A	N/A	N/A	
C2	6	132	Vicugna pacos	humero-epifisis distal	50	L	EF	A	
C2	6	132	Vicugna pacos	vertebra lumbar	10	M	N/A	N/A	
C2	6	132	Bos Taurus	vertebra lumbar-5ta-porcion superior de cuerpo	10	M	ES	J	
C2	6	132	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C2	6B	19	Ovis aries	radio	60	L	EA	J	mismo individuo
C2	6B	19	Ovis aries	cubito	80	L	EA	J	mismo individuo
C3	2	22	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	1	174	Bos Taurus	tarso-astragalo	100	L	N/A	N/A	
C4	1	174	Bos Taurus	femur-epifisis proximal	<10	R	EM	J	
C4	1	174	Lama glama	escapula-cavidad glenoidea	<10	L	N/A	N/A	
C4	1	174	Bos Taurus	costilla-cabeza	<10	R	N/A	N/A	
C4	1	174	Mammalia	vertebra-apofisis transversa	<10	M	N/A	N/A	
C4	1	174	Ovis aries	craneo-condilo occipital izquierdo	<10	L	N/A	N/A	
C4	1	174	Bos Taurus	sesamoideo proximal	90	L	N/A	N/A	

Table 0-13 Continued

C4	1	174	Gallus gallus	femur	50	R	N/A	N/A	
C4	1	174	Gallus gallus	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	1	174	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	1	174	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C4	1	174	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C4	1	174	Mammalia	N/A	<10	N/A	N/A	N/A	
C4	2	72	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C4	2	72	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C4	2	72	Mammalia	costilla	<10	N/A	N/A	N/A	
C4	2	72	Vicugna pacos	vertebra lumbar	20	M	EA	J	machacado
C4	2	72	Camelidae	metapodio-epifisis distal	10	N/A	ES	J	muy deteriorado
C4	2	72	Bos Taurus	pelvis-tuberculo psoas	10	R	N/A	N/A	machacado
C4	2	72	Bos Taurus	pelvis-fosa acetabular	10	R	N/A	N/A	machacado
C4	2	72	Ave pequeña	humero-diafisis	80	R	N/A	N/A	
C4	2	72	Ave pequeña	humero-diafisis	80	L	N/A	N/A	
C4	2	72	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C4	3	406	Cavia porcellus	pelvis-acetabulo	40	L	N/A	N/A	
C4	3	406	Bos Taurus	costilla-cabeza	50	R	N/A	N/A	
C4	3	406	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	
C4	3	406	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	
C4	3	406	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	
C4	3	406	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	
C4	3	406	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	
C4	3	406	Bos Taurus	costilla-cuerpo	10	N/A	N/A	N/A	

Table 0-13 Continued

C4	3	40 6	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	costilla-cuerpo	10	L	N/A	N/A	
C4	3	40 6	Mammalia	costilla-cuerpo	10	L	N/A	N/A	
C4	3	40 6	Bos Taurus	costilla-cuerpo	10	R	N/A	N/A	
C4	3	40 6	Ovis aries	costilla-surco costal	10	R	N/A	N/A	
C4	3	40 6	Ovis aries	costilla-surco costal	10	R	N/A	N/A	
C4	3	40 6	Ovis aries	costilla-surco costal	10	L	N/A	N/A	
C4	3	40 6	Ovis aries	costilla-surco costal	10	L	N/A	N/A	
C4	3	40 6	Ovis aries	costilla-cabeza	10	R	N/A	N/A	
C4	3	40 6	Ovis aries	costilla-cabeza	10	R	N/A	N/A	
C4	3	40 6	Ovis aries	costilla-cabeza	10	L	N/A	N/A	
C4	3	40 6	Ovis aries	costilla-cabeza	<10	L	N/A	N/A	
C4	3	40 6	Bos Taurus	falange ext.-2da-miembro anterior	100	L	EF	A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla

Table 0-13 Continued

C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado-carbonizado
C4	3	406	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado-carbonizado
C4	3	406	Bos Taurus	sesamoideo-rotula	90	L	N/A	N/A	
C4	3	406	Bos Taurus	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Bos Taurus	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	406	Mammalia	hueso irregular	<10	N/A	N/A	N/A	corte
C4	3	406	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C4	3	406	Bos Taurus	carpo-escafoide	90	R	N/A	N/A	
C4	3	406	Ovis aries	mandibula-molares	<10	L	N/A	N/A	
C4	3	406	Ovis aries	craneo-hueso cigomatico	10	R	SF	A	
C4	3	406	Bos Taurus	pelvis	<10	N/A	N/A	N/A	
C4	3	406	Ovis aries	metacarpo-epifisis distal	50	R	EF	A	
C4	3	406	Ovis aries	humero-epifisis distal	10	R	EF	A	
C4	3	406	Ovis aries	tibia-epifisis distal	30	R	EF	A	
C4	3	406	Ovis aries	metacarpo-epifisis proximal	50	R	EF	A	
C4	3	406	Ovis aries	metacarpo-epifisis proximal	30	L	EF	A	

Table 0-13 Continued

C4	3	40 6	Mammalia	hueso plano	10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	vertebra	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	vertebra	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	40 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C4	3	40 6	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	N/A	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	N/A	<10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	N/A	<10	N/A	N/A	N/A	
C4	3	40 6	Bos Taurus	escapula-cavidad glenoidea	10	N/A	N/A	N/A	
C4	3	40 6	Mammalia	hueso largo-epifisis	30	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla

Table 0-13 Continued

C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	Astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C4	4	53 1	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla-corte
C4	4	53 1	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	quemado-carbonizado
C4	4	53 1	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
C4	4	53 1	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	calcinado
C4	4	53 1	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso plano	<10	N/A	N/A	N/A	

Table 0-13 Continued

C4	4	531	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C4	4	531	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C4	4	531	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C4	4	531	Ovis aries	costilla-cabeza	20	R	N/A	N/A	
C4	4	531	Ovis aries	costilla-cabeza	10	R	N/A	N/A	
C4	4	531	Ovis aries	costilla-surco costal	10	L	N/A	N/A	
C4	4	531	Ovis aries	costilla-cuerpo	20	R	N/A	N/A	
C4	4	531	Ovis aries	costilla-cuerpo	10	R	N/A	N/A	
C4	4	531	Ovis aries	costilla-cuerpo	10	L	N/A	N/A	
C4	4	531	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	
C4	4	531	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
C4	4	531	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
C4	4	531	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
C4	4	531	Ovis aries	vertebra lumbar-2 articuladas	70	M	ES	J	
C4	4	531	Ovis aries	vertebra-cuerpo	30	M	EM	J	
C4	4	531	Mammalia	vertebra-apofisis articular	10	M	N/A	N/A	
C4	4	531	Mammalia	vertebra	<10	M	N/A	N/A	
C4	4	531	Mammalia	vertebra	<10	M	N/A	N/A	
C4	4	531	Mammalia	vertebra	<10	M	N/A	N/A	quemado
C4	4	531	Ovis aries	metacarpo-diafisis	20	N/A	EA	J	
C4	4	531	Ovis aries	falange-2da-miembro posterior	100	R	EF	A	
C4	4	531	Bos Taurus	metacarpo-epifisis distal	30	L	EF	A	
C4	4	531	Equus ferus	metatarso-epifisis distal	10	R	EF	A	

Table 0-13 Continued

C4	4	53 1	Bos Taurus	craneo-maxilar-tuberculo facial+1er molar+3er pm	10	R	N/A	J	
C4	4	53 1	Bos Taurus	falange-2da	10	N/A	ES	J	
C4	4	53 1	Bos Taurus	craneo-proceso temporal del cigomatico	20	R	SSF	J	
C4	4	53 1	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	1	21 3	Bos Taurus	craneo-condilo occipital	10	R	N/A	N/A	machacado
C5	1	21 3	Bos Taurus	vertebra toraxica-apofisis espinosa	20	M	N/A	N/A	
C5	1	21 3	Ovis aries	vertebra	<10	M	EA	J	
C5	1	21 3	Ovis aries	vertebra	<10	M	EF	A	
C5	1	21 3	Mammalia	vertebra-cuerpo	<10	M	ES	J	quemado
C5	1	21 3	Mammalia	vertebra-apofisis articular	<10	M	N/A	N/A	
C5	1	21 3	Gallus gallus	vertebra cervical	90	M	N/A	N/A	mismo individuo
C5	1	21 3	Gallus gallus	vertebra	100	M	N/A	N/A	mismo individuo
C5	1	21 3	Gallus gallus	vertebra	100	M	N/A	N/A	mismo individuo
C5	1	21 3	Ave?	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Ovis aries	metacarpo-epifisis distal	10	R	EF	A	
C5	1	21 3	Mammalia	costilla-surco costal	<10	N/A	N/A	N/A	
C5	1	21 3	Ovis aries	metacarpo-diafisis	80	N/A	N/A	N/A	
C5	1	21 3	Bos Taurus	pieza dental-molar	50	N/A	N/A	N/A	
C5	1	21 3	Bos Taurus	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	1	21 3	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	1	21 3	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla

Table 0-13 Continued

C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C4	4	53 1	Bos Taurus	craneo	<10	N/A	N/A	N/A	
C4	4	53 1	Bos Taurus	escapula	<10	N/A	N/A	N/A	
C4	4	53 1	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- diafisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- epifisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso largo- epifisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C5	1	21 3	Bos Taurus	hueso largo- epifisis	<10	N/A	N/A	N/A	
C5	1	21 3	Mammalia	hueso plano	<10	N/A	N/A	N/A	

Table 0-13 Continued

C5	1	213	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C5	1	213	Sus scrofa	falange-1ra	100	N/A	EA	J	
C5	1	213	Sus scrofa	falange-1ra	100	N/A	EA	J	calcinado
C5	1	213	Gallus gallus	humero-epifisis distal	40	R	N/A	N/A	
C5	1	213	Gallus gallus	cubito-epifisis distal	50	R	N/A	N/A	
C5	1	213	Gallus gallus	tarsometatarso-epifisis distal	20	L	N/A	N/A	
C5	1	213	Ave?	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	2	81	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	2	81	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	2	81	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	2	81	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	2	81	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	2	81	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	2	81	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	2	81	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	2	81	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	2	81	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	2	81	Gallus gallus	escapula	80	R	N/A	N/A	
C5	2	81	Bos Taurus	pieza dental-molar	60	N/A	N/A	N/A	
C5	2	81	Gallus gallus	femur-diafisis	50	L	N/A	N/A	
C5	2	81	Vicugna pacos	tibia-epifisis distal	100	L	ES	J	
C5	2	81	Mammalia	hueso corto	<10	N/A	N/A	N/A	
C5	2	81	Mammalia	N/A	<10	N/A	N/A	N/A	

Table 0-13 Continued

C5	3	17 6	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	Astilla
C5	3	17 6	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C5	3	17 6	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	astilla
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	3	17 6	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis (mamifero grande)	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	

Table 0-13 Continued

C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso plano	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso irregular	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	craneo	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	craneo	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	craneo	<10	N/A	N/A	N/A	

Table 0-13 Continued

C5	3	17 6	Mammalia	craneo	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	craneo	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	craneo	<10	N/A	N/A	N/A	
C5	3	17 6	Ovis aries	costilla-cabeza	30	R	N/A	N/A	
C5	3	17 6	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	costilla-cuerpo	<10	N/A	N/A	N/A	
C5	3	17 6	Vicugna pacos	vertebra cervical-axis-apofisis odontoide	<10	M	N/A	N/A	
C5	3	17 6	Mammalia	vertebra	<10	M	N/A	N/A	
C5	3	17 6	Mammalia	vertebra	<10	M	N/A	N/A	
C5	3	17 6	Lama glama	metapodio-epifisis distal	<10	N/A	EA	J	
C5	3	17 6	Bos Taurus	falange ext.-1ra-miembro anterior	30	L	EF	A	
C5	3	17 6	Camelidae	pieza dental-molar	10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	17 6	Mammalia	sesamoideo	50	N/A	N/A	N/A	calcinado
C5	3	17 6	Mammalia	sesamoideo	40	N/A	N/A	N/A	calcinado
C5	3	17 6	Mammalia	sesamoideo	80	N/A	N/A	N/A	
C5	3	17 6	Cavia porcellus	tibia-diafisis	70	L	EA	J	
C5	3	17 6	Sus scrofa	metacarpo	20	N/A	N/A	N/A	
C5	3	17 6	Canis lupus	radio-epifisis distal	10	R	EA	J	
C5	3	17 6	Sus scrofa	tibiaperone-epifisis distal	20	L	EA	J	
C5	3	17 6	Mammalia	hueso largo-epifisis	10	N/A	EA	J	

Table 0-13 Continued

C5	3	176	Gallus gallus	femur-epifisis distal	20	L	N/A	N/A	
C5	3	176	Gallus gallus	tibiotarso-epifisis distal	40	L	N/A	N/A	
C5	3	176	Ave	carpometacarpo-metacarpal III	<10	N/A	N/A	N/A	
C5	3	176	Ave	craneo	<10	N/A	N/A	N/A	
C5	3	176	Ave	craneo	<10	N/A	N/A	N/A	
C5	3	176	Ave	pelvis	60	L	N/A	N/A	
C5	3	176	Ave	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	176	Ave	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	3	176	Ave	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	4	103	Bos Taurus	hueso largo-epifisis	<10	N/A	N/A	N/A	astilla
C5	4	103	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	astilla
C5	4	103	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	astilla
C5	4	103	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	astilla
C5	4	103	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	4	103	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	4	103	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	
C5	4	103	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	astilla-calcinado
C5	4	103	Mammalia	hueso largo-epifisis	<10	N/A	N/A	N/A	astilla-quemado
C5	4	103	Mammalia	N/A	<10	N/A	N/A	N/A	
C5	4	103	Ave	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	4	103	Gallus gallus	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	4	103	Lama glama	falange int.-2da-miembro posterior-diafisis	100	L	ES	J	

Table 0-13 Continued

C5	5	27	Canis lupus	mandibula-alveolos dentales	<10	L	N/A	N/A	
C5	5	27	Cavia porcellus	tibia	80	L	EA	J	
C5	5	27	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	astilla
C5	5	27	Mammalia	hueso largo-diafisis	<10	N/A	N/A	N/A	
C5	5	27	Mammalia	vertebra	<10	N/A	N/A	N/A	
C5	5	27	Mammalia	costilla-cuerpo	10	N/A	N/A	N/A	

Appendix 7: Simapuqio-Muyupata Ceramic Data

For the purposes of analysis, this project divided ceramic sherds into "diagnostic" and "non-diagnostic" categories. Non-diagnostics were weighed and counted by context, and a subset were analyzed further (paste category, firing, color, weight). Analysists used a more extensive analytic procedure for studying the diagnostic wares, which involved collecting attributes including dimensions, weight, decoration, decoration color, past color, inclusion size, and modeling and firing technique where possible. This analysis was completed using a modified version of the Filemaker database developed by Elizabeth Grávalos (2021).

Table 0-14: Non-Diagnostic Counts and Weight by Excavation Context

Operation	Context	Bag Weight gr.	Fragment Count
A1	2	34	3
A1	3	94	8
A2	3	14	1
A3	2	30	1
A2a	2	276	20
A2a	3	703	54
B2	2	152	12
B2	3	19	2
B2	4	264	21
B2	6	11	2
B2	7	107	16
B2	8	118	7
B4	1	159	14
B4	2	83	8
B4	4	516	42
B4	5	552	34
B4	6	383	24
B4	7	72	7
B4	8	89	8
B4	9	70	10
B4	10	110	13
B4	11	207	23
B4	12	30	5
B5	1	230	2
B5	5	334	15
B5	6	488	27

Table 0-14 Continued

B6	2	46	1
B6	3	1170	53
B7	2	343	18
B7	3	479	25
B7	4	99	5
B8	2	68	7
B8	6	109	8
B8	4	138	6
B8	5	103	7
B9	1	128	9
B9	2	379	17
B9	5	419	16
B9	6	31	4
B10	1	338	6
B10	2	1376	36
B10	3	634	18
C2	1	233	8
C2	2	293	11
C2	3	207	17
C2	4	78	4
C2	6	45	2
C3	2	65	7
C4	1	620	35
C4	2	447	40
C4	3	822	35
C4	4	1383	59
C4	5	140	4
C5	1	189	9
C5	2	251	11
C5	3	831	51
C5	4	258	13
C5	5	67	7

Table 0-15: Diagnostic Weights and Counts by Context Simapuqio-Muyupata

Unit	Context	Weight gr.	Count
A1	2	54	2
A1	3	215	3
A2	3	140	6
A2a	2	46	3
A2a	3	545	10
B2	2	509	5
B2	3	7	1
B2	4	465	14
B2	7	13	2
B2	8	57	4
B2	9	20	1
B4	1	171	3
B4	2	19	1
B4	4	234	6
B4	5	100	5
B4	6	143	7
B4	7	42	3
B4	10	35	3
B4	11	147	12
B5	1	595	2
B5	4	50	1
B5	5	287	12
B5	6	729	19
B6	2	107	4
B6	3	815	31
B7	2	864	31
B7	3	1070	23
B7	4	1789	7
B7	6	200	3
B8	2	492	13
B8	3	26	1
B8	6	57	3
B8	4	106	4
B8	5	198	4
B9	1	144	7

Table 0-15 Continued

B9	2	473	9
B9	5	387	8
B9	6	61	1
B10	1	228	12
B10	2	809	21
B10	3	1284	16
B19	6	556	8
C1	4	24	2
C2	1	168	5
C2	2	37	3
C2	3	148	9
C2	4	120	6
C2	6	45	1
C3	1	52	3
C3	2	33	4
C4	1	515	21
C4	2	274	20
C4	3	344	28
C4	4	441	23
C4	5	36	3
C4	6	77	3
C5	1	697	18
C5	2	276	16
C5	3	235	21
C5	4	598	8
C5	5	46	3

Table 0-16: Ceramic Analysis Select Attributes

Operation	Context	Time Period	Ware Type	Vessel Form	Vessel Part	Rim Diameter
A1	2	Colonial	Glazed Colonial	Cup/High Sided Bowl	Partial Base and Body	6.5
A1	2	Colonial	Glazed Colonial	Cup/High Sided Bowl	Partial Base and Body	6.5
A1	3	Late Horizon	Classic Inka	Inka Aribalo jar	Complete Base Partial Body	5
A1	3	Late Horizon	Inka Domestic	Inka Aribalo jar	Partial Base and Body	4
A1	3	Late Horizon	Classic Inka	Indt	Body	-
A2	3	Late Horizon	Classic Inka	Unknown open vessel	Partial Handle and Body	-
A2	3	Late Horizon	Classic Inka	Unknown open vessel	Partial Handle and Body	-
A2	3	Late Horizon	Inka Domestic	Indt	Partial Base and Body	-
A2	3	Late Horizon	Classic Inka	Bowl	Partial Base and Body	6
A2	3	Late Horizon	Classic Inka	Indt	Body	-
A2	3	Late Horizon	Classic Inka	Indt	Body	-
A2	2	Late Horizon	Inka Domestic	Unknown open vessel	Rim	20
A2	2	Late Horizon	Classic Inka	Indt	Body	-
A2	2	Late Horizon	Classic Inka	Indt	Body	-
A2	3	Late Horizon	Inka Domestic	Indt	Partial Handle and Body	-
A2	3	Late Horizon	Inka Domestic	Indt	Partial Base and Body	-
A2	3	Late Horizon	Inka Domestic	Indt	Asa parcial	-
A2	3	Late Horizon	Inka Domestic	Indt	Asa parcial	-

Table 0-16 Continued

A2	3	Late Horizon	Inka Domestic	Indt	Partial Base and Body	3.2
A2	3	Late Horizon	Inka Domestic	Indt	Partial Rim and Body	16
A2	3	Late Horizon	Classic Inka	Indt	Rim	22
A2	3	Late Horizon	Inka Domestic	Indt	Partial Rim and Body	16
A2	3	Late Horizon	Classic Inka	Indt	Body	-
A2	3	Late Horizon	Classic Inka	Indt	Body	-
B2	2	Late Horizon	Classic Inka	Indt	Rim	8
B2	2	Colonial	Glazed Colonial	Indt	Body	-
B2	2	Late Horizon	Classic Inka	Indt	Body	-
B2	2	Colonial	Colonial Unglazed	Indt	Body	-
B2	2	Colonial	Colonial Unglazed	Indt	Body	-
B2	3	Colonial	Glazed Colonial	Indt	Body	-
B2	4	Colonial	Glazed Colonial	Colonial Plate	Rim	20
B2	4	Late Horizon	Classic Inka	Indt	Rim	18
B2	4	Late Horizon	Classic Inka	Indt	Rim	16
B2	4	Late Horizon	Classic Inka	Indt	Partial Rim and Body	20
B2	4	Colonial	Glazed Colonial	Indt	Body	-
B2	4	Colonial	Glazed Colonial	Indt	Body	-
B2	4	Colonial	Glazed Colonial	Indt	Body	-
B2	4	Colonial	Colonial Unglazed	Indt	Body	-
B2	4	Colonial	Colonial Unglazed	Indt	Body	-
B2	4	Colonial	Colonial Unglazed	Indt	Body	-

Table 0-16 Continued

B2	4	Colonial	Colonial Unglazed	Indt	Body	-
B2	4	Colonial	Colonial Unglazed	Indt	Body	-
B2	4	Late Horizon	Classic Inka	Indt	Body	-
B2	4	Late Horizon	Classic Inka	Indt	Body	-
B2	7	Late Horizon	Classic Inka	Indt	Asa parcial	-
B2	7	Late Horizon	Classic Inka	Indt	Body	-
B2	8	Late Horizon	Inka Domestic	Indt	Rim	14
B2	8	Late Horizon	Classic Inka	Indt	Rim	14
B2	8	Late Horizon	Classic Inka	Indt	Cuello	-
B2	8	Late Horizon	Classic Inka	Indt	Body	-
B2	9	Late Horizon	Classic Inka	Indt	Body	-
B4	1	Late Horizon	Inka Domestic	Indt	Partial Rim and Body	38
B4	1	Late Horizon	Classic Inka	Bowl	Rim	14
B4	1	Late Horizon	Classic Inka	Indt	Partial Base and Body	-
B4	2	Late Horizon	Classic Inka	Bowl	Partial Base and Body	-
B4	4	Late Horizon	Inka Domestic	Indt	Partial Rim and Body	38
B4	4	Formative	Formative incised	Indt	Partial Rim and Body	14
B4	4	Late Horizon	Classic Inka	Indt	Cuello	-
B4	4	Late Horizon	Classic Inka	Indt	Cuello	-
B4	4	Late Horizon	Classic Inka	Indt	Body	-
B4	4	Late Horizon	Classic Inka	Indt	Body	-
B4	5	Late Horizon	Inka Domestic	Indt	Partial Rim and Body	8

Table 0-16 Continued

B4	5	Late Horizon	Inka Domestic	Indt	Partial Rim and Body	16
B4	5	Late Horizon	Classic Inka	Indt	Partial Rim and Body	16
B4	5	Late Horizon	Classic Inka	Indt	Partial Base and Body	-
B4	5	Late Horizon	Classic Inka	Indt	Body	-
B4	6	Late Horizon	Classic Inka	Indt	Partial Rim and Body	10
B4	6	Late Horizon	Inka Domestic	Indt	Partial Rim and Body	16
B4	6	Late Horizon	Inka Domestic	Indt	Rim	12
B4	6	Late Horizon	Classic Inka	Indt	Cuello	-
B5	6	Late Horizon	Classic Inka	Indt	Cuello	-
B4	6	Late Horizon	Classic Inka	Indt	Cuello	-
B4	6	Late Horizon	Classic Inka	Indt	Body	-
B4	7	Late Horizon	Classic Inka	Indt	Partial Rim and Body	16
B4	7	Late Horizon	Classic Inka	Indt	Rim	14
B4	7	Late Horizon	Classic Inka	Indt	Body	-
B4	10	Late Horizon	Inka Domestic	Indt	Rim	20
B4	10	Formative	Formative incised	Indt	Body	-
B4	10	Formative	Formative incised	Indt	Body	-
B4	11	Late Horizon	Inka Domestic	Indt	Rim	16
B4	11	Formative	Formative incised	Indt	Partial Rim and Body	20
B4	11	Formative	Formative incised	Indt	Rim	18
B4	11	Formative	Formative incised	Indt	Rim	24
B4	11	Late Horizon	Inka Domestic	Indt	Partial Rim and Body	18

Table 0-16 Continued

B4	11	Formative	Formative incised	Indt	Rim	8
B4	11	Late Horizon	Inka Domestic	Indt	Rim	10
B4	11	Formative	Formative incised	Indt	Body	-
B4	11	Formative	Formative incised	Indt	Body	-
B4	11	Formative	Formative incised	Indt	Body	-
B4	11	Formative	Formative incised	Indt	Body	-
B4	11	Late Horizon	Inka Domestic	Indt	Body	-
B5	1	Late Horizon	Classic Inka	Inka Aribalo jar	Complete Base Partial Body	8
B5	1	Late Horizon	Classic Inka	Inka Aribalo jar	Complete Base Partial Body	4
B5	4	Late Horizon	Inka Domestic	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Partial Base and Body	-
B5	5	Late Horizon	Classic Inka	Indt	Partial Base and Body	-
B5	5	Late Horizon	Classic Inka	Indt	Partial Rim and Body	14
B5	5	Late Horizon	Classic Inka	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Body	-
B5	5	Late Horizon	Classic Inka	Indt	Body	-

Table 0-16 Continued

B5	6	Late Horizon	Classic Inka	Pot	Partial Handle and Body	-
B5	6	Late Horizon	Classic Inka	Indt	Partial Handle and Body	-
B5	6	Late Horizon	Classic Inka	Indt	Partial Handle and Body	-
B5	6	Late Horizon	Classic Inka	Bowl	Partial Base and Body	18
B5	6	Late Horizon	Classic Inka	Bowl	Complete Base Partial Body	18
B5	6	Late Horizon	Classic Inka	Bowl	Partial Base and Body	18
B5	6	Late Horizon	Classic Inka	Bowl	Partial Base and Body	10
B5	6	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	18
B5	6	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	12
B5	6	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	14
B5	6	Late Horizon	Classic Inka	Indt	Rim	16
B5	6	Late Horizon	Classic Inka	Inka Plate	Rim	8
B5	6	Late Horizon	Inka Domestic	Indt	Body	-
B5	6	Late Horizon	Classic Inka	Indt	Body	-
B5	6	Late Horizon	Classic Inka	Inka Aribalo jar	Cuello	-
B5	6	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B5	6	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B5	6	Late Horizon	Classic Inka	Indt	Body	-
B5	6	Late Horizon	Classic Inka	Indt	Body	-
B6	2	Late Horizon	Classic Inka	Bowl	Partial Base and Body	-
B6	2	Late Horizon	Classic Inka	Indt	Body	-
B6	2	Late Horizon	Classic Inka	Indt	Body	-

Table 0-16 Continued

B6	2	Late Horizon	Classic Inka	Indt	Body	-
B6	3	Late Horizon	Inka Domestic	Neckless Pot	Partial Handle and Body	-
B6	3	Late Horizon	Classic Inka	Indt	Partial Handle and Body	-
B6	3	Late Horizon	Inka Domestic	Indt	Asa parcial	-
B6	3	Late Horizon	Classic Inka	Indt	Asa parcial	-
B6	6	Late Horizon	Inka Domestic	Neckless Pot	Handle and Partial Body	-
B6	3	Late Horizon	Classic Inka	Zoomorphic Figurine	Decoración plástica	-
B6	3	Late Horizon	Classic Inka	Unknown open vessel	Rim and Neck	16
B6	3	Late Horizon	Classic Inka	Inka Plate	Partial Rim and Body	20
B6	3	Late Horizon	Classic Inka	Inka Plate	Rim	18
B6	3	Late Horizon	Classic Inka	Inka Plate	Partial Rim and Body	22
B6	3	Late Horizon	Classic Inka	Inka Plate	Partial Rim and Body	22
B6	3	Late Horizon	Classic Inka	Inka Plate	Partial Rim and Body	22
B6	3	Late Horizon	Classic Inka	Inka Plate	Partial Rim and Body	30
B6	3	Late Horizon	Classic Inka	Jar	Rim and Neck	20
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Rim and Neck	18
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	22
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	14
B5	3	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	16
B6	3	Late Horizon	Classic Inka	Pot	Partial Rim and Body	12
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Cuello	-
B6	3	Late Horizon	Classic Inka	Indt	Body	-

Table 0-16 Continued

B6	3	Late Horizon	Classic Inka	Indt	Body	-
B6	3	Late Horizon	Classic Inka	Indt	Body	-
B6	3	Late Horizon	Classic Inka	Inka Plate	Body	-
B6	3	Late Horizon	Classic Inka	Indt	Body	-
B6	3	Late Horizon	Classic Inka	Indt	Body	-
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B6	3	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B7	2	Late Horizon	Classic Inka	pot	Asa parcial	-
B7	2	Late Horizon	Classic Inka	Pot	Asa parcial	-
B7	2	Late Horizon	Inka Domestic	Jar	Partial Base and Body	4
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Base and Body	4
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Rim	26
B7	2	Late Horizon	Classic Inka	Cooking Pot	Rim and Neck	38
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Rim and Neck	20
B7	2	Late Horizon	Classic Inka	Cooking Pot	Rim and Neck	36
B7	2	Late Horizon	Classic Inka	Jar	Rim	18
B7	2	Late Horizon	Classic Inka	Raqui o Urpo	Rim and Neck	44
B7	2	Late Horizon	Classic Inka	Jar	Rim	10
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Partial Base and Body	-

Table 0-16 Continued

B7	2	Late Horizon	Classic Inka	Unknown open vessel	Partial Base and Body	-
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Base and Body	9
B7	2	Late Horizon	Classic Inka	Indt	Body	-
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B7	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	2	Late Horizon	Classic Inka	Indt	Body	-
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B7	2	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B7	3	Late Horizon	Classic Inka	Pot	Handle and Partial Body	-
B7	3	Late Horizon	Classic Inka	Pot	Handle and Partial Body	-
B7	3	Late Horizon	Classic Inka	Indt	Asa parcial	-

Table 0-16 Continued

B7	3	Late Horizon	Classic Inka	Indt	Asa parcial	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Partial Base and Body	20
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Partial Base and Body	20
B7	3	Late Horizon	Classic Inka	Inka Plate	Partial Base and Body	8
B7	3	Late Horizon	Classic Inka	Jar	Rim	14
B7	3	Late Horizon	Classic Inka	Cooking Pot	Rim and Neck	50
B7	3	Late Horizon	Classic Inka	Cooking Pot	Rim and Neck	50
B7	3	Late Horizon	Classic Inka	Cooking Pot	Rim and Neck	50
B7	3	Late Horizon	Classic Inka	Jar	Rim	12
B7	3	Late Horizon	Classic Inka	Jar	Rim	12
B7	3	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	18
B7	3	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	3	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B7	4	Late Horizon	Classic Inka	Jar	Rim	10
B7	4	Late Horizon	Classic Inka	Cooking Pot	Handle and Partial Body	-

Table 0-16 Continued

B7	4	Late Horizon	Classic Inka	Cooking Pot	Handle and Partial Body	-
B7	4	Late Horizon	Classic Inka	Cooking Pot	Body	-
B7	4	Late Horizon	Classic Inka	Cooking Pot	Body	-
B7	4	Late Horizon	Classic Inka	Cooking Pot	Body	-
B7	4	Late Horizon	Classic Inka	Cooking Pot	Body	-
B7	6	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Base and Body	-
B7	6	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	22
B7	6	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B8	2	Late Horizon	Inka Domestic	Cooking Pot	Rim and Neck	44
B8	2	Late Horizon	Classic Inka	Unknown open vessel	Partial Rim and Body	26
B8	2	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	14
B8	2	Late Horizon	Classic Inka	Unknown open vessel	Rim	26
B8	2	Late Horizon	Inka Domestic	Cooking Pot	Rim and Neck	44
B7	2	Late Horizon	6Classic Inka	Inka Plate	Rim	16
B8	2	Late Horizon	Classic Inka	Bowl	Partial Base and Body	10
B8	2	Late Horizon	Classic Inka	Inka Aribalo jar	Cuello	-
B8	2	Late Horizon	Classic Inka	Plate	Body	-
B8	2	Late Horizon	Classic Inka	Cuenco	Body	-
B8	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B8	2	Late Horizon	Classic Inka	Plate	Body	-
B8	2	Late Horizon	Classic Inka	Indt	Body	-
B8	3	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	12

Table 0-16 Continued

B8	6	Late Horizon	Inka Domestic	Pot	Partial Rim and Body	18
B8	6	Late Horizon	Inka Domestic	Pot	Partial Rim and Body	18
B8	6	Late Horizon	Classic Inka	Pot	Rim and Neck	18
B8	4	Colonial	Glazed Colonial	Unknown open vessel	Asa parcial	-
B8	4	Late Horizon	Classic Inka	Inka Plate	Rim	8
B8	4	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B8	4	Late Horizon	Classic Inka	Inka Aribalo jar	Body	-
B8	5	Late Horizon	Classic Inka	Bowl	Partial Base and Body	24
B8	5	Late Horizon	Classic Inka	Bowl	Partial Base and Body	16
B8	5	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	40
B8	5	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B9	1	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	14
B9	1	Late Horizon	Classic Inka	Bowl	Rim and Neck	15
B9	1	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	16
B9	1	Late Horizon	Classic Inka	Inka Plate	Partial Rim and Body	18
B9	1	Late Horizon	Classic Inka	Inka Plate	Partial Rim and Body	18
B9	1	Late Horizon	Classic Inka	Inka Plate	Body	-
B9	1	Late Horizon	Classic Inka	Bowl	Partial Base and Body	11
B9	2	Late Horizon	Classic Inka	Inka Aribalo jar	Handle and Partial Body	-
B9	2	Late Horizon	Inka Domestic	Pot	Partial Handle and Body	-
B9	2	Late Horizon	Inka Domestic	Pot	Partial Base and Body	-
B9	2	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	14

Table 0-16 Continued

B9	2	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	28
B9	2	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	14
B9	2	Late Horizon	Classic Inka	Inka Plate	Body	-
B9	2	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B9	2	Late Horizon	Classic Inka	Bowl	Body	-
B9	5	Late Horizon	Classic Inka	Bowl	Partial Base and Body	11
B9	5	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B9	5	Late Horizon	Classic Inka	Pot	Body	-
B9	5	Late Horizon	Classic Inka	Pot	Body	-
B9	5	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B9	5	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B9	5	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B9	5	Late Horizon	Classic Inka	Unknown open vessel	Body	-
B9	6	Late Horizon	Classic Inka	Pot	Partial Rim and Body	16
B10	1	Late Horizon	Classic Inka	Indt	Body	
B10	1	Late Horizon	Classic Inka	Indt	Body	
B10	1	Late Horizon	Classic Inka	Indt	Body	
B10	1	Late Horizon	Classic Inka	Indt	Body	
B10	1	Late Horizon	Classic Inka	Inka Plate	Rim	14
B10	1	Late Horizon	Classic Inka	Indt	Body	
B10	1	Late Horizon	Classic Inka	Indt	Body	
B10	1	Late Horizon	Classic Inka	Indt	Partial Handle and Body	

Table 0-16 Continued

B10	1	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
B10	1	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
B10	1	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
B10	1	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
B10	2	Late Horizon	Classic Inka	Indt	Body	
B10	2	Late Horizon	Classic Inka	Indt	Body	
B10	2	Late Horizon	Classic Inka	Indt	Body	
B10	2	Late Horizon	Classic Inka	Indt	Body	
	2	Late Horizon	Classic Inka	Indt	Body	
B10	2	Late Horizon	Classic Inka	Indt	Body	
B10	2	Late Horizon	Classic Inka	Indt	Partial Base and Body	
B10	2	Late Horizon	Classic Inka	Indt	Body	
B10	2	Late Horizon	Classic Inka	Indt	Body	
B10	2	Late Horizon	Classic Inka	Indt	Body	
B10	2	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
B10	2	Late Horizon	Classic Inka	Indt	Partial Handle	
B10	2	Late Horizon	Classic Inka	Indt	Rim	17
B10	2	Late Horizon	Classic Inka	Pot	Partial Rim and Body	11
B10	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	14
B10	2	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	19
B10	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	18
B10	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	40

Table 0-16 Continued

B10	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	40
B10	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	26
B10	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	16
B10	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	40
B10	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	40
B10	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	16
B10	3	Late Horizon	Classic Inka	Pot	Partial Handle and Body	18
B10	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	16
B10	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	12
B10	3	Late Horizon	Classic Inka	Indt	Rim	20
B10	3	Late Horizon	Classic Inka	Indt	Rim	18
B10	3	Late Horizon	Indt	Indt	Partial Rim and Body	14
B10	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	14
B10	3	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
B10	3	Late Horizon	Classic Inka	Indt	Body	
B10	3	Late Horizon	Classic Inka	Indt	Partial Base and Body	
B10	3	Late Horizon	Classic Inka	Indt	Body	
B10	3	Late Horizon	Classic Inka	Indt	Body	
B10	3	Late Horizon	Classic Inka	Indt	Body	
B10	6	Late Horizon	Classic Inka	Indt	Body	
B10	6	Late Horizon	Classic Inka	Indt	Handle and Partial Body	
B10	6	Late Horizon	Classic Inka	Indt	Partial Base and Body	

Table 0-16 Continued

B1 0	6	Late Horizon	Classic Inka	Inka Plate	Partial Base and Body	9
B1 0	6	Late Horizon	Classic Inka	Inka Plate	Partial Base and Body	9
B1 0	6	Late Horizon	Classic Inka	Bowl	Spoon Fragment	7
B1 0	6	Late Horizon	Classic Inka	Inka Aribalo jar	Complete Base Partial Body	4
B1 0	6	Late Horizon	Classic Inka	Indt	Partial Base and Body	4
C1	4	Late Horizon	Classic Inka	Indt	Body	
C1	4	Colonial	Glazed Colonial	Indt	Body	
C2	1	Late Horizon	Classic Inka	Indt	Partial Rim and Body	16
C2	1	Late Horizon	Classic Inka	Inka Aribalo jar	Body	
C2	1	Late Horizon	Classic Inka	Indt	Body	
C2	1	Late Horizon	Classic Inka	Indt	Body	
C2	1	Late Horizon	Classic Inka		Body	
C2	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	16
C2	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	11
C2	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	26
C2	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	12
C2	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	11
C2	3	Late Horizon	Classic Inka	Indt	Partial Rim and Body	14
C2	3	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	8
C2	3	Late Horizon	Classic Inka	Indt	Body	
C2	3	Late Horizon	Classic Inka	Indt	Body	
C2	3	Late Horizon	Classic Inka	Indt	Body	

Table 0-16 Continued

C2	3	Late Horizon	Classic Inka	Indt	Partial Handle	
C2	3	Late Horizon	Classic Inka	Indt	Handle and Partial Body	
C2	4	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
C2	4	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
C2	4	Late Horizon	Classic Inka	Indt	Partial Base and Body	11
C2	4	Late Horizon	Classic Inka	Indt	Body	
C2	4	Late Horizon	Classic Inka	Indt	Body	
C2	6	Late Horizon	Classic Inka	Plate	Partial Rim and Body	16
A3	1	Late Horizon	Classic Inka	Indt	Partial Base and Body	
C3	1	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	22
C3	1	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
C3	2	Late Horizon	Classic Inka	Indt	Partial Base and Body	
C3	2	Late Horizon	Classic Inka	Indt	Body	
C3	2	Late Horizon	Classic Inka	Indt	Partial Rim and Body	9
C3	2	Late Horizon	Classic Inka	Indt	Neck	
C4	1	Late Horizon	Classic Inka	Indt	Body	
C4	1	Late Horizon	Classic Inka	Indt	Body	
C4	1	Late Horizon	Classic Inka	Indt	Body	
C4	1	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	14
C4	1	Late Horizon	Classic Inka	Indt	Rim	22
C4	1	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	24
C4	1	Late Horizon	Classic Inka	Indt	Rim	12

Table 0-16 Continued

C4	1	Late Horizon	Classic Inka	Indt	Rim	28
C4	1	Late Horizon	Classic Inka	Unknown open vessel	Rim	14
C4	1	Late Horizon	Classic Inka	Inka Plate	Rim	18
C4	1	Late Horizon	Classic Inka	Indt	Rim	10
C4	1	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	26
C4	1	Late Horizon	Classic Inka	Pot	Partial Rim and Body	14
C4	1	Late Horizon	Classic Inka	Pot	Partial Rim and Body	16
C4	1	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
C4	1	Late Horizon	Classic Inka	Plate	Partial Rim and Body	18
C4	1	Colonial	Glazed Colonial	Indt	Partial Base and Body	10
C4	1	Colonial	Glazed Colonial	Indt	Partial Base and Body	12
C4	1	Colonial	Glazed Colonial	Indt	Body	
C4	1	Colonial	Glazed Colonial	Plate	Partial Rim and Body	16
C4	1	Colonial	Glazed Colonial	Indt	Body	
C4	2	Late Horizon	Classic Inka	Indt	Body	
C4	2	Late Horizon	Classic Inka	Indt	Body	
C4	2	Late Horizon	Classic Inka	Indt	Body	
C4	2	Late Horizon	Classic Inka	Indt	Body	
C4	2	Late Horizon	Classic Inka	Indt	Handle	
C4	2	Late Horizon	Classic Inka	Indt	Handle and Partial Body	
C4	2	Late Horizon	Classic Inka	Bowl	Rim	22
C4	2	Late Horizon	Classic Inka	Bowl	Rim	22

Table 0-16 Continued

C4	2	Late Horizon	Classic Inka	Indt	Rim	20
C4	2	Late Horizon	Classic Inka	Indt	Rim	20
C4	2	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	18
C4	2	Late Horizon	Classic Inka	Inka Plate	Partial Rim and Body	14
C4	2	Late Horizon	Classic Inka	Pot	Partial Rim and Body	16
C4	2	Late Horizon	Classic Inka	Plate	Rim	20
C4	2	Late Horizon	Classic Inka	Indt	Rim	9
C4	2	Late Horizon	Classic Inka	Indt	Rim	20
C4	2	Late Horizon	Classic Inka	Indt	Rim	8
C4	2	Colonial	Glazed Colonial	Indt	Body	
C4	2	Colonial	Glazed Colonial	Indt	Body	
C4	2	Colonial	Glazed Colonial	Indt	Body	
C4	3	Late Horizon	Classic Inka	Indt	Body	
C4	3	Late Horizon	Classic Inka	Indt	Body	
C4	3	Late Horizon	Classic Inka	Indt	Body	
C4	3	Late Horizon	Classic Inka	Indt	Body	
C4	3	Late Horizon	Classic Inka	Indt	Body	
C4	3	Late Horizon	Classic Inka	Indt	Body	
C4	3	Late Horizon	Classic Inka	Indt	Body	
C4	3	Late Horizon	Classic Inka	Indt	Handle and Partial Body	
C4	3	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	23
C4	3	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	16

Table 0-16 Continued

C4	3	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	18
C4	3	Late Horizon	Classic Inka	Plate	Partial Rim and Body	26
C4	3	Late Horizon	Classic Inka	Jar	Partial Rim and Body	16
C4	3	Late Horizon	Classic Inka	Jar	Partial Rim and Body	12
C4	3	Late Horizon	Classic Inka	Jar	Rim	12
C4	3	Late Horizon	Classic Inka	Bowl	Rim	18
C4	3	Late Horizon	Classic Inka	Cup/High Sided Bowl	Rim	13
C4	3	Late Horizon	Classic Inka	Cup/High Sided Bowl	Rim	13
C4	3	Late Horizon	Classic Inka	Bowl	Rim	17
C4	3	Late Horizon	Classic Inka	Plate	Rim	22
C4	3	Late Horizon	Classic Inka	Unknown open vessel	Rim	
C4	3	Late Horizon	Classic Inka	Cup/High Sided Bowl	Rim	12
C4	3	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	24
C4	3	Colonial	Glazed Colonial	Plate	Rim	
C4	3	Colonial	Glazed Colonial	Plate	Partial Rim and Body	20
C4	3	Colonial	Glazed Colonial	Plate	Rim	20
C4	3	Colonial	Glazed Colonial	Indt	Body	
C4	3	Colonial	Glazed Colonial	Indt	Body	
C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Neck	
C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Neck	
C4	4	Late Horizon	Classic Inka	Jar	Partial Handle and Body	
C4	4	Late Horizon	Classic Inka	Indt	Body	

Table 0-16 Continued

C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Body	
C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Rim and Body	11
C4	4	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
C4	4	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	21
C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	24
C4	4	Late Horizon	Classic Inka	Plate	Partial Rim and Body	18
C4	4	Late Horizon	Classic Inka	Plate	Partial Rim and Body	18
C4	4	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
C4	4	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	50
C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	14
C4	4	Late Horizon	Classic Inka	Jar	Body	
C4	4	Late Horizon	Classic Inka	Indt	Body	
C4	4	Late Horizon	Classic Inka	Indt	Body	
C4	4	Late Horizon	Classic Inka	Indt	Body	
C4	4	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	22
C4	4	Colonial	Glazed Colonial	Plate	Body	
C4	4	Colonial	Glazed Colonial	Indt	Body	
C4	5	Colonial	Glazed Colonial	Plate	Rim	20
C4	5	Late Horizon	Classic Inka	Indt	Body	
C4	5	Late Horizon	Classic Inka	Indt	Body	

Table 0-16 Continued

C4	6	Late Horizon	Classic Inka	Plate	Partial Rim and Body	16
C4	6		Classic Inka	Plate	Partial Rim and Body	13
C4	6	Late Horizon	Classic Inka	Indt	Body	
B3	1	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	20
B3	1	Late Horizon	Classic Inka	Olla con cuello - Pot with short neck	Rim	12
B3	1	Late Horizon	Classic Inka	Indt	Partial Handle and Body	
B3	1	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	22
B3	1	Late Horizon	Classic Inka	Inka Aribalo jar	Rim	34
B3	1	Late Horizon	Classic Inka	Plate	Partial Rim and Body	18
B3	1 1	Late Horizon	Classic Inka	Bowl	Partial Base and Body	10
B3	1	Late Horizon	Classic Inka	Indt	Body	
B3	1	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Base and Body	22
B3	1	Late Horizon	Classic Inka	Cup/High Sided Bowl	Partial Base and Body	6
B3	1	Colonial	Glazed Colonial	Unknown open vessel	Partial Base and Body	6
B3	1	Contempo rary	Glazed Colonial	Unknown open vessel	Partial Base and Body	8
B3	1	Colonial	Glazed Colonial	Plate	Partial Rim and Body	18
B3	1	Colonial	Glazed Colonial	Plate	Partial Rim and Body	24
B3	1	Colonial	Glazed Colonial	Indt	Body	
B3	1	Colonial	Glazed Colonial	Unknown open vessel	Rim	13
B3	1	Colonial	Glazed Colonial	Jar	Body	
B3	1	Colonial	Glazed Colonial	Indt	Body	
B3	2	Late Horizon	Classic Inka	Inka Aribalo jar	Body	

Table 0-16 Continued

B3	2	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	10
B3	2	Colonial	Glazed Colonial	Bowl	Partial Base and Body	12
B3	2	Late Horizon	Classic Inka	Plate	Partial Rim and Body	26
B3	2	Colonial	Glazed Colonial	Indt	Body	
B3	2	Colonial	Glazed Colonial	Indt	Body	
B3	2	Colonial	Glazed Colonial	Indt	Body	
B3	2	Colonial	Glazed Colonial	Indt	Body	
B3	2	Colonial	Glazed Colonial	Indt	Body	
B3	2	Colonial	Glazed Colonial	Plate	Partial Rim and Body	16
B3	2	Colonial	Glazed Colonial	Bowl	Partial Rim and Body	12
B3	2	Colonial	Glazed Colonial	Indt	Partial Base and Body	10
B3	2	Colonial	Glazed Colonial	Plate	Partial Rim and Body	20
B3	2	Colonial	Glazed Colonial	Plate	Partial Rim and Body	16
B3	2	Colonial	Glazed Colonial	Plate	Partial Rim and Body	20
B3	3	Late Horizon	Classic Inka	Pot	Partial Rim and Body	16
B3	3	Late Horizon	Classic Inka	Bowl	Partial Rim and Body	13
B3	3	Late Horizon	Indt	Unknown open vessel	Partial Rim and Body	35
B3	3	Late Horizon	Classic Inka	Inka Aribalo jar	Rim and Neck	8
B3	3	Late Horizon	Indt	Bowl	Partial Rim and Body	28
B3	3	Indt	Indt	Indt	Partial Rim and Body	14
B3	3	LIP	Indt		Partial Rim and Body	
B3	3	Indt	Indt	Figurine	Body	

Table 0-16 Continued

B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Indt	Body	
B3	3	Colonial	Glazed Colonial	Plate	Body	
B3	3	Colonial	Glazed Colonial	Unknown open vessel	Body	
B3	4	Late Horizon	Classic Inka	Unknown open vessel	Rim	16
B3	4	Late Horizon	Classic Inka	Inka Aribalo jar	Partial Base and Body	4
B3	4	Late Horizon	Classic Inka	Bowl	Partial Base and Body	10
B3	4	Late Horizon	Indt	Indt	Body	
B3	4	Late Horizon	Classic Inka	Indt	Body	
B3	4	Late Horizon	Classic Inka	Indt	Body	
B3	4	Late Horizon	Classic Inka	Indt	Handle and Partial Body	
B3	4	Colonial	Glazed Colonial	Indt	Body	
B3	4	Colonial	Glazed Colonial	Indt	Body	

Table 0-16 Continued

B3	5	Late Horizon	Classic Inka	Indt	Body	
B3	5	Late Horizon	Classic Inka	Bowl	Partial Base and Body	12
B3	5	Late Horizon	Classic Inka	Pot	Partial Handle and Body	

Appendix 8: Simapuqio-Muyupata Special Artifacts and Lithics

Table 0-17: Simapuqio-Muyupata Lithic Finds

Unit	Context	Weight (g)	Description	Photo
A2	3	3148	Fragmented grinding stone approximately 20cm x 17 cm x 6cm.	
A2	3	1009	Two fragments of the same grinding stone. The first measuring 12cm x 8.5cm and the second 11cm x 8cm, both with a third measurement of 4cm.	
A2a	3	5	Small cutting blade of 4.6 cm x 2.2cm x 0.6cm.	
B5	4	93	Granit sphere of 5cm diameter	
B6	3	61	Fragment of smooth stone, possibly an axe, or agricultural tool, of 5cm x 30cm x 17cm.	

Table 0-17 Continued

B8	3	810	Grinding Stone of 11cm x 8.5 cm x 6cm.	
B9	2	165	Grinding stone of dimensions 8cm x 4cm x 2.4cm	
B10	6	9840	Grinding stone of dimensions 37cm x 15cm x 10cm	
C2	1	583	Grinding stone fragment of 12cmx 5.3cm x 4cm.	
C4	4	129	Possible cutting or punching tool; triangular. Dimensions 6.3cm x 4.4cm x 2.5cm.	
C4	1	64	Polishing stone of dimensions 8cm x 2.4cm x 1.5cm.	

Table 0-17 Continued

B3	3	12	Polishing stone of dimensions 2.4cm x 2cm x 1.6cm.	
B4	9	2	Possible pendant; perferated flate stone. Dimensions 2.5cm x 1.7cm x 0.3cm.	

Table 0-18: Simapuqio-Muyupata Special Artifacts

Unit	Context	Weight (g)	Artifact	Description	
C2	3	21	Pipe	Pipe end made of stone. Dimensions 3.9cm x 2.4cm x 1.2 cm. Likely republican or contemporary.	
B3	5	1	Obsidian Blade	obsidian blade 2.2 cm x 1.3 cm x 0.5 cm.	
B6	3	4	Possible Bell	Metal cylinder with closed top, 1.7 cm x 1.5 cm x 0.1 cm. Made of bronze, perforated with four holes, one in each side.	
B9	1	11	Tupu Pin	Metal tupu pin, 11.5 cm. x 0.4 cm., made of iron, with rounded head and perforation immediately below the head. Likely Colonial.	
B10	3	31	Tumi Knife	Tumi style Inka knife of bronze; 9.5 cm x 7.3 cm x 0.25 cm. en la parte distal y 0.45 cm.	

Table 0-18 Continued

C2	3	22	Metal Fragment	Metal fragment of unknown origin, 3.9 cm x 2.7 cm x 0.45 cm. Iron.	
C4	3	5	Pendant	Bronze pendant in crescent shape; 2.45 cm x 2.3 cm x 0.3 cm.	
C4	1	45	Horseshoe	Horseshoe fragment; 9.3 cmx 5.6 cm x 0.6 cm. Iron.	
C2	3	2	Button	Button, 3.2 cm in diameter x 0.15 cm of width. Manufactured of bone, with four central holes.	
B3	3	1	Button	Button, 1.55 cm of diameter and 0.2 cm thick. Made of bone. Two central holes.	

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