

**THE SOCIAL ORGANIZATION OF GROUND STONE PRODUCTION,
DISTRIBUTION, AND CONSUMPTION IN THE QUIJOS VALLEY, EASTERN
ECUADOR**

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Abstract

This thesis explores the Quijos Valley ground stone economy in relation to broader social, political, and economic aspects of the Quijos chiefdoms during the Late Period (AD 500 – 1500). In particular, this research examines the extent to which ground stone craft production was a dimension of social differentiation during a period marked by the greatest sociopolitical transformations. Ultimately, this research suggests that Late Period ground stone production was an independent and part-time household activity, and not an avenue of elite aggrandizement. However, aspects of this research have aimed to show that certain forms of ground stone were important implements of household maintenance, both socially and economically. This research is embedded within the Quijos Valley Regional Archaeological Project (QVRAP) and has aimed to contribute to our understanding of the development of social complexity within this region, as well as contributing to our understanding of ground stone craft production more generally.

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1 CHAPTER 1: INTRODUCTION AND THEORETICAL BACKGROUND

In the older writers in general I find nothing indicating that they had cognizance of a Stone Age: and modern travellers ... do not seem to have given serious attention to this matter. Such discoveries as may be made in the future, I anticipate, will confirm the opinion that the most part of these objects and implements in stone were already Antiquities at the time of the Spanish Conquest: and belong to an age long anterior to the times when Inca Tupac conquered the 'Kingdom of Quito,' and Huayna-Capac ravaged Imbabura.

Travels Amongst the Great Andes of the Equator, Edward Whymper 1892:277

1.1 INTRODUCTION

This thesis evaluates the organization of production, circulation, and consumption of ground stone tools in the Quijos and Cosanga valleys of Eastern Ecuador during the Late Period (AD 500 – 1500). The Late Period is clearly marked by the emergence of a regionally complex society, as evidenced by several large-scale chiefly centers (or central places) found throughout the region (Cuéllar 2009a). This thesis aims to contribute to our understanding of broader social and economic systems present during this period, and ultimately aims to question the extent to which ground stone craft production was a dimension of social differentiation in the Quijos and Cosanga valleys during the Late Period. In particular, this will be achieved by exploring four interrelated scenarios: A.) whether the organization of ground stone craft production was specialized and/or under the direct sponsorship or patronage of elites, or whether production was independent and open to all segments of society; B.) whether the access to and circulation of particular raw materials was open to all craft producers, or whether it was restricted, and; C.) whether elites engaged in more diversified economic activities.

1.2 THEORETICAL BACKGROUND

Craft production is thought to be a key aspect of chiefly authority (Helms 1979; Pauketat 1997). The role of specialized craft production, and the exchange of craft items, is thought to have contributed to the emergence and maintenance of political authority among a number of pre-Columbian societies throughout the Andes (e.g. Vaughn 2006), and more generally, is thought to be an important aspect to the evolution of social complexity (Clark and Parry 1990; Costin 1991). Political activities can be either directly financed by staple production and/or by the controlled production and distribution of luxury craft goods, which Earle (1996) has argued was the case for the Hawaiian chiefdoms and the Inca empire. Helms (1979) has argued that chiefly Panamanian elites actively sought to control the distribution and consumption of long-distance prestige goods, and the “esoteric knowledge” embedded in these items. This was a means for aspiring elites to finance political endeavors and maintain their social standing.

Literature on chiefdom development in the Northern Andes has, at times, placed a greater emphasis on social and political factors over those of solely an economic nature in the development of social complexity. In a study of one of the central places in the San Agustín region of the Alto Magdalena, González (2007a) has suggested that in the central place of Mesitas, craft specialization played a role in the development of social complexity, though it did not reach an intensity that would suggest this was the primary mechanism of social and political transformations.

In the northern highlands of Ecuador, Bray (2008) has argued that though evidence of trade and specialized craft production exist, a lack of archaeological markers of wealth among the Caranqui, Puruha, and Cañari suggests that the dynamics of power

in these regions were not necessarily based on a wealth/staple financed model of leadership. Our current understanding of chiefly authority among the Quijos chiefdoms does not suggest that this was directly related to the organization of the agrarian economy. Presently, the data suggests that productive differences did not exist within the agrarian economy at a regional scale during the Late Period, making it less likely that this was an avenue of control for incipient elites (Cuéllar 2009a). The foundations of political leadership, present on a regional scale by AD 500, may be related to other as of yet unknown variables. This study aims to explore the relationship between the ground stone economy and social complexity in the Quijos region.

1.2.1 SPECIALIZATION AND THE ORGANIZATION OF PRODUCTION

Archaeologists have long viewed specialization as an important aspect in the emergence of chiefdoms and, more specifically, the production and distribution of craft items is thought to be a means to enhance political authority (Brumfiel and Earle 1987; Earle 1987; Helms 1987). Specialization is a broad concept that is comprised of various types of productive organization, which, as Costin (1991) has detailed, includes 1.) the context of production (attached and independent specialization), 2.) the concentration of production (the spatial location of producers in relation to consumers), 3.) the constitution of production (household vs. workshop production), and 4.) the intensity of production (part-time and full-time producers). In general, the study of specialized craft production is focused on the production of craft goods that are exchanged and consumed outside of the areas they were produced (Costin 1991; Hirth 2009; Schortman and Urban 2004). Furthermore, goods that are produced under the direct patronage or sponsorship of elites are almost exclusively circulated and consumed by elites, which ultimately serve to

legitimize or maintain political authority (Junker 1994:3). As Hirth (2009:2) describes, these goods

are specialized in the sense that craft goods were produced for specific purposes beyond the household ranging from exchange and gift giving, to meeting broader social, political, or ritual needs... In general, archaeologists identify specialized craft production in domestic contexts when production residues from the goods produced exceed what would be expected for auto-consumption and internal use.

Following Clark and Parry (1990), this model, at its most basic, defines specialization as the production of goods intended for consumption outside of the producer's household. From an economic standpoint, craft specialization is characterized by the efficiency of production and product output, as well as a standardization of form.

Within a broader theoretical context, there has been much debate over the role of specialized craft production in the sociopolitical structures of past societies (Schortman and Urban 2004). A commonly held perspective involves the significance of craft specialization in relation to processes of political centralization and the creation of social differentiation and inequality. As mentioned above, models of craft production at a macro-scale have been tied to cultural evolutionary frameworks in which the degree and scale of production is thought to increase alongside the development of cultural complexity. In particular, this relationship is commonly demarcated by a varied continuum of attached or independent systems of production, which are thought to be useful distinctions in defining the modes of specialized craft production among chiefdoms (e.g. Brumfiel and Earle 1987; Earle 1991). Furthermore, It has been suggested that craft specialization may have shared a causal relationship with the development of social complexity rather than merely being epiphenomenal to social complexity. More specifically, attached specialization is thought to have played an

important role in the evolution of middle-range societies (Clark and Parry 1990:290). By definition, *attached production* (also referred to as *attached specialization*) necessitates some aspects of elite control over the system of production, which ultimately would have served as a means to enhance political and economic control. These may include control of the aesthetic appearance and informational content of the products, the access to raw materials necessary to create the object, the organization of labour and areas of production, as well as the distribution and consumption of the finished product (Costin 2004:210). By means of controlling local production as well as the long distance exchange of craft items, elites are able to form a relationship of dependency between themselves and the rest of the population, who rely on elites for access to these socially valuable items. *Independent production* on the other hand does not entail any direct form of elite control. In theory, access to independently produced goods should be open to everyone and possession of these items may not bestow any form of political or social advantage over others.

The concentration of production, as viewed by Costin (1991), involves the spatial relationship between those who produce goods and those who consume them. This may include increased transportation efforts when producers are concentrated within a population, yet would be minimized when producers are dispersed throughout the population. The constitution of production, on the other hand, presents the social relations and structures of the producers themselves, whose relationships may be structured around a household (and kin-based) mode of production at one extreme, and that of a workshop (through labour tax or wage labour) on the other. The final related aspect of production – that of intensity – involves the amount of time individuals spend

producing craft items. At its most basic, the opposite extremes of this would be part-time and full-time producers.

What should be noted is that although the dichotomy between attached and independent, and full- and part-time forms of production are useful constructs for interpreting the nature of production, others have argued that a disjuncture exists between the nature of production (as embedded in a ‘political economy’ approach) and the actual economic goals of households, and, at times, it may be beneficial to view production outside of the more political economy-centered explanation of long-term social change. Hirth (2009) has suggested that the domestic context of specialized craft production highlights the adaptability and diversity of households (or household strategies) as able to produce specialized craft goods without drastically impacting regular subsistence activities. Though this model is clearly focused on the consumption of goods outside of the households where they were produced, the distinction from more traditional models of full- and part-time production is that, here, craft production is not necessarily defined by the amount of time spent producing craft goods. As an alternative, Hirth (2006) proposes two models, *intermittent crafting* and *multicrafting*, which highlight factors such as agricultural cycles (production during the agricultural dry season), among others, as a means by which households undertake small scale production, alongside regular subsistence activities such as maize agriculture, while meeting local as well as external demands (such as tribute, taxation, or other social obligations). For the purpose of this study, here I define craft specialization at its most basic – the production of craft goods, at a household level, with an intended distribution beyond the household they were produced in.

One example of the specialized production of polished stone axes, as related to the development of social complexity, can be found in Central and Western Panama. Cook and Ranere (1984) explored the role which polished stone axes may have had as prestige items and suggest that the controlled production and distribution of polished axes, during the first millennium BC in Western Panama, might have provided a means for social elevation and increased status among incipient elites, who were able to exert control over a greater aspect of the political economy. Moreover, a recent study by Haller (2008) in the Río Parita Valley of Central Panama also tentatively supported Cooke and Ranere's (1984) hypothesis that the control of polished stone axe production and distribution may have been an avenue for the aggrandizement of chiefly authority. However, in the Volcán Barú region of Western Panama, Palumbo (2009) has suggested that ceramic and lithic production (which includes polished stone axes) were part-time domestic activities, marked by gradual increases in stone tool production between both formative villages and isolated farmsteads from AD 300 to 900. This scenario contrasts the more centralized role of stone axe production in Western Panama suggested by Cook and Ranere (1984) and Haller (2008).

It has been suggested that the standardization of form of certain craft items is a viable avenue used to explore specialized craft production, especially in absence of direct evidence of production such as manufacturing sites and the tools used to manufacture the craft items (Costin and Hagstrum 1995:619). The premise behind the standardization hypothesis, as defined by Blackman *et al.* (1993), at its most basic, is that specialized producers have a tendency to produce more standardized products, whereas nonspecialist products are more varied. As a distinctive aspect of specialization,

standardization develops in line with various other technological and organizational attributes such as labour investment and skill as well as responding to various social, economic, and environmental factors.

As in the case of Paquimé, Chihuahua, Mexico, Vanpool and Leonard (2002) tested the standardization hypothesis on metates as a means of specialized manufacture during the Medio period (AD 1200-1450). This study was used as an avenue to explore political and economic organization at the site of Paquimé and the Cases Grandes region as a whole. The authors determined that the presence of specialized producers at Paquimé was tied to increases in regional complexity. For this to occur, the authors argue that a political structure existed which controlled access to material resources and the distribution of ground stone items. They concluded that the morphological standardization of certain metate forms is directly indicative of social differentiation and hierarchical order occurring at a regional scale (2002:725).

Anne Ford (2004) also used the standardization model to study ground stone production at a manufacturing site in Henan Province, China. The site of Huizui, occupied during the Neolithic and Early Bronze Age (~3000-2000 BC), was contemporaneous to the emergence of one of the earliest states in China (Erlitou). Ford used macroscopic analysis to determine that certain ground stone axes underwent the same manufacturing process, indicating a specialized form of craft production. Ford also suggests that evidence may support a form of *spatial specialization* (2004:76) in which specialized production occurs at different locales on a regional scale. Each site maintains control over the production of specific items, resulting in a segmented regional economy. This may have allowed local emergent elites easier access to the control of certain

aspects of the economy. In the case of the Huizui manufacturing site, Ford (2004:77) concludes that certain items were produced for local consumption while others may have been mass-produced for regional export to the state center of Erlitou.

In order to test whether Late Period ground stone production in the Quijos and Cosanga valleys was a form of attached specialization, I would expect that certain forms of ground stone tools would exhibit a high degree of standardization. Other evidence that may be used to support this model are the presence of large-scale workshops and/or quarrying sites, or such evidence that would suggest differential participation in craft production activities (though the latter may not directly imply that craft production was attached). Ideally, the location of these production locales would be concentrated in proximity to areas of elite habitations (such as elite central places), or within distinct areas within these centers.

1.2.2 ACCESS TO AND CIRCULATION OF RAW MATERIALS

This study also explores the patterns of acquisition and circulation of raw material used to make ground stone tools throughout the Quijos and Cosanga valleys during the Late Period. Assessing the ways in which raw materials were acquired, circulated, and consumed is thought to be an important means to understand the development of social complexity (Rathje 1971; Schortman 1989). Restricted participation in the exchange of non-local goods and/or the manufacture of prestige goods is thought to be a source of status among elites (Hayden 1998). The control and exchange of foreign “esoteric knowledge” in the form of prestigious craft items may have served as a mechanism of political aggrandizement and further justification of social status among elite sectors of a society (Helms 1979). In general, the basic premise

of this model is that restricted access to key resources and the goods produced from them allows specialized producers an economic advantage over other producers and consumers, which would limit the sociopolitical and economic benefits inherent to the exploitation of these resources to a particular segment of society. Another aspect of this model is that knowledge regarding the extraction of raw materials and processing and production techniques required to produce a particular item (and the tools used in these processes) may also serve to limit who has access to a particular material (Michaels 1989:145). This study aims to determine whether the access to and circulation of certain raw materials used in the production of ground stone tools were restricted to particular segments of Quijos society, or, conversely, whether access to these materials was unrestricted and open to all segments of Quijos society.

As in the case of the Toledo District, Belize, Abramiuk *et al.* (2006) argued that the exploitation of material sources related to the production of mano and metate ground stones might have served as a mechanism for the creation of inter-community relationships during the Late and Terminal Classic Period Maya. The authors found that the economic status of a community could have been elevated through the acquisition and restrictive distribution of ground stone materials thus enabling the community to gain regional status, and, in turn, creating a dynamic social and economic interaction with other regional communities. Like the stone axes studied by Cook and Ranere (1984), or Palumbo (2009), the production and circulation of mano and metate ground stone tools may therefore have been a means through which incipient elites sought political authority.

A key aspect of control over the distribution of particular goods, such as ground stone tools, is directly linked to the availability or scarcity of raw materials used to produce the items. In regions where resources are scarce or do not naturally occur, methods may be employed to acquire and control nonlocal resources. In the Phoenix Basin of Arizona, Stone (1994) suggests that nonlocal vesicular basalt, having qualities beneficial for maize processing, as well as local materials of poorer quality (less-vesicular), were sought by Classic-period Hohokam mano and metate producers. A majority of the metates produced in the Phoenix Basin were of non-local vesicular basalt, allowing for the production of a more efficient tool, while the manos were often of local, less-vesicular, materials. In a similar study, Bostwick and Burton (1993) identified a number of regional basalt sources that were exploited as quarries by the Hohokam. Using microscopic sourcing techniques, the authors concluded that these quarry sites served as the primary means of raw material procurement for areas without adequate local sources, such as the Phoenix and Tucson basins. Though it has been suggested that basalt ground stone may have been circulated among the Hohokam by means of a ballcourt-centered redistribution system, which would suggest an elite involvement in their distribution, Stone (1994) and Bostwick and Burton (1993) do not directly explore the sociopolitical implications of resource scarcity and non-local resource exploitation for this region. Other studies have directly linked resource scarcity to the elevation of social and economic status. Rathje (1971) suggests that the development of complex socio-political organization during the Preclassic of the Mayan lowlands was an adaptive response to resource scarcity. This adaptionist model included the need to acquire basalt from highland regions in order to manufacture metates, as well

as other nonlocal resources useful to household survival and maintenance, which ultimately served as an avenue of elite aggrandizement.

However, it has been suggested that when suitable raw materials are available, it may not be necessary to seek out nonlocal materials, requiring less time and energy to meet local production demands, which, ultimately, makes it less likely that the production and distribution of items from these materials was an avenue of elite aggrandizement. It has been suggested that the proximity to local sources may allow for increased production efforts, and ultimately, more efficient and standardized tools, without a drastic increase in production costs (Fratt and Biancaniello 1993). At the Anasazi site of Homol'ovi III, Fratt and Biancaniello (1993) suggest that the Puebloan inhabitants exploited local sandstone sources and, as evidenced by the particular materials chosen to make manos and metates, had a detailed knowledge of the material properties of the various stone types available to them. The presence of locally available and unrestricted raw materials is an important indicator that the production of craft goods may not necessarily have been tied to elite interests, though other factors such as labour investment and the skill and knowledge necessary to produce particular craft goods also needs to be taken into consideration. In the Quijos region, Knight *et al.* (2011) have suggested that patterns of obsidian distribution indicate that access to raw materials was primarily related to proximity to local sources (also see Knight 2009).

In order to determine whether the access to and circulation of raw materials used in the production of ground stone tools during the Late Period was restricted to particular segments of Quijos society, I would expect that certain forms of raw materials, as well as the distribution of certain ground stone tools based on raw material type, would be

restricted in their distribution. It may be that certain raw materials are geographically localized, or that certain raw materials are restricted within and between particular communities (central places or dispersed settlements), which would further suggest that only certain segments of the Quijos society had access to these materials.

1.2.3 SOCIAL STATUS AND THE DIVERSIFICATION OF PRODUCTIVE ACTIVITIES

It has been suggested that increases in household group size and the intensification and diversification of productive activities (including both staple crop production and specialized craft production) may be tied to social status and political aggrandizement (Earle 1977; Hayden 1987; Muse 1991), though not necessarily as a direct result of elite control of productive activities (Henderson 1998, 2003).

Earle (1978) has suggested that, under the direct influence of elite demands for labour and goods, farming households would have acted to minimize economic activities, which, in turn would minimize economic risk. Furthermore, in contrast to the more conservative farming households, elites would have actively sought to increase and diversify production efforts in order to increase and maintain social standing. In general, this presents a model through which the emergence of social differentiation parallels the intensification and diversification of productive activities among socially and politically distinct households and residential groups.

In a study of staple crop production at K'axob, Belize, Henderson (2003) has suggested that though elites did not appear to have direct control over staple crop production or the organization of household labour, the development of political hierarchies on a regional scale did indirectly impact local household economies. In part,

this may have been the result of wealth differentiations between residential groups of varying size, along with the ability of certain households to accommodate various obligations to regional elites. Though primarily focused on the organization of staple crop production between various residential groups (from small household groups to large corporate households), Henderson does question whether the larger residential groups (which showed evidence of wealth differentiation between those of the smaller households) diversified their productive activities to include craft production. In short, Henderson (2003:491) suggests that “[l]arger labor pools would have enabled corporate households to simultaneously coordinate staple production and craft production. In this case I expect to see greater diversity in the proportions of raw materials and tool types in larger corporate households”.

Given that ground stone tools are often directly associated with both subsistence activities, such as the clearance and maintenance of agricultural land and the processing of foodstuffs, as well their use in craft production activities, I would expect, at its most basic, that differences may exist among the various ground stone assemblages of central places and dispersed settlements in the Quijos region, which, if they prove to represent a diversification of productive activities occurring among certain sites, this may be suggestive of status differentiation, or more generally the impact of political aggrandizement on regional scale.

1.3 ARCHAEOLOGY AND ETHNOHISTORY OF THE QUIJOS REGION

The Quijos and Cosanga valleys are located in the eastern piedmont of the Ecuadorian Andes and this region is often characterized as an intermediate area between the Upper Andes to the west and the Amazon to the east. Traditionally, the

archaeological cultures of this region have often been associated with those of the lowland Amazon regions, though geographically speaking the region shares more physical similarities with the colder and mountainous Andes (Cuéllar 2009a:9). The 137 km² research area of the Quijos Valley Regional Archaeological Project (QVRAP) is located approximately 80 km southeast of the modern capital of Quito, in the province of Napo (Figure 1.1). The QVRAP has undertaken a full-coverage systematic regional survey of the region, which documents a long-term history of social change beginning around 500 BC to AD 1500. The Late Period (AD 500 – 1500) is thought to be marked by the emergence of complex social organization, which corresponds to the ethnohistorically documented Quijos chiefdoms of the sixteenth century (Oberem 1980). Though this region has often been regarded as an area of trade and interaction between the better-known highland cultures and those of the Amazonian basin (Bray 1995; Oberem 1980; Uzendoski 2004), the local dynamics of sociopolitical change in the Quijos region were not well understood until recently (Cuéllar 2009a).

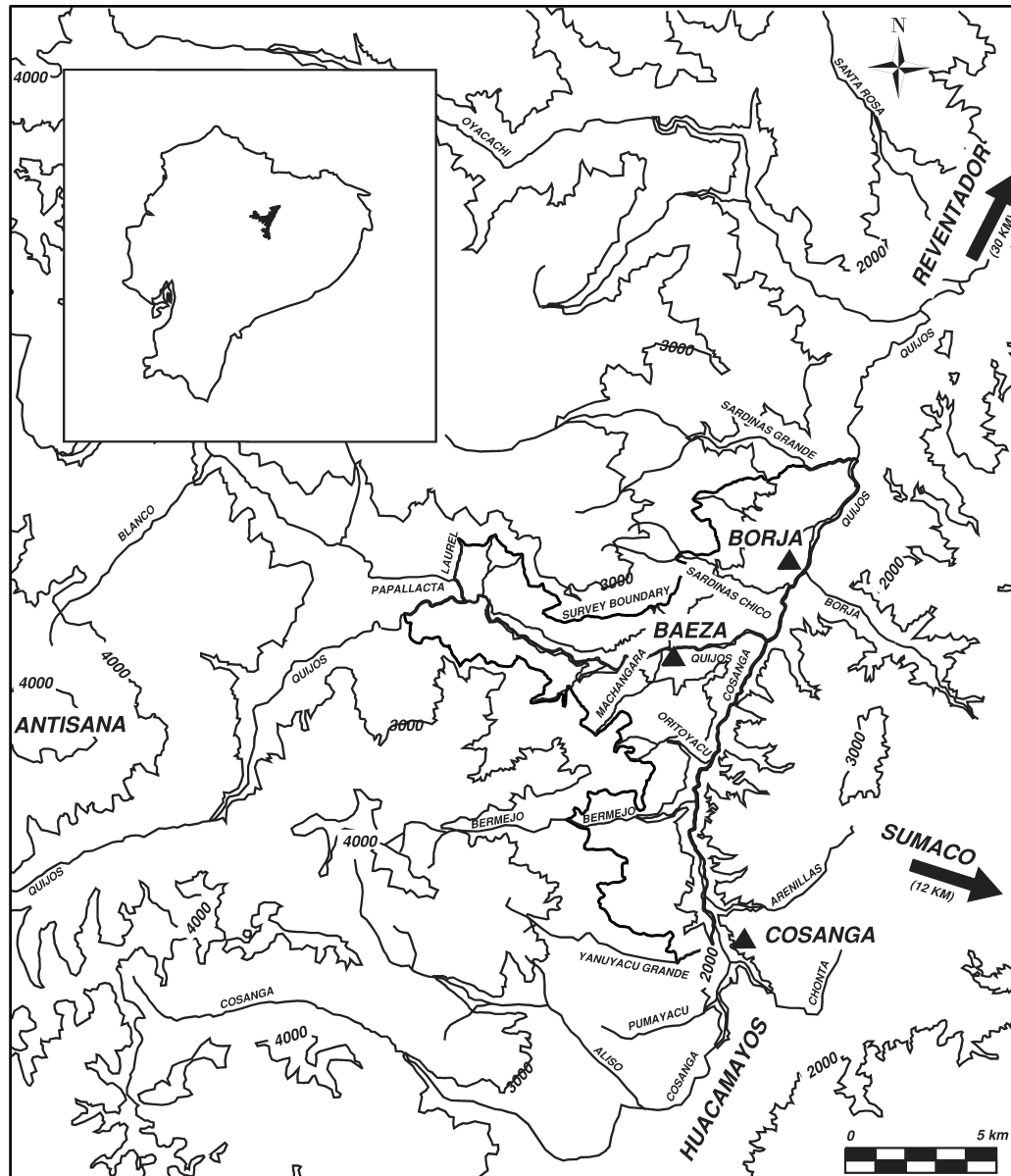


Figure 1.1: Regional map and survey boundary (after Cuéllar 2009a:65).

The QVRAP was started in 2002 by Andrea Cuéllar, who focused her research on the sociopolitical and economic organization of the region, and more specifically agricultural production as a lens through which to view sociopolitical change across time and space. At the time of writing, the QVRAP is ongoing. To complement this research, the work presented here on the social organization of ground stone production,

circulation, and consumption is ultimately another avenue to further this goal. This study will provide an additional perspective to further our understanding of the emergence of chiefly societies in the Quijos region of eastern Ecuador. As well, it aims to contribute to a growing body of literature focused on craft production and consumption.

Outside of contract work, the only report detailing archaeological remains in the region was undertaken by Porras (1975) in the 1960s, during which time he collected a large amount of materials including a number of ground stone tools. His main area of interest was focused on reconstructing the pre-Columbian occupation of the region, as well as investigating the often-questioned origins of the Panzaleo type pottery, which have been recovered from both highland and Eastern montaña (foothills) contexts (e.g. Bray 1995). Porras later published his findings in several volumes (1975, 1980). Porras' documentation of ground stone artifacts, which included the establishment of a basic tool typology, several scaled drawings, and a simple chart of sequences and dates for the artifacts, remains the only published report of ground stone artifacts for the region (Porras 1975:159-188).

In *Fase Cosanga* (Porras 1975), Porras presents a chronological synthesis of over 200 axes and celts obtained from survey and excavations carried out in the Quijos and Papallacta valleys. Porras presented a chronology of formal ground stone types ranging from the 400 BC to the AD 1200 (Porras 1975:Figure 33), though support for these chronological associations are lacking. For this reason Porras' work is of limited applicability to this study.

In summary, this research aims to examine the extent to which the ground stone economy was a dimension of social differentiation among Quijos society during the Late

Period. This will be achieved by examining three interrelated scenarios: A.) whether the organization of craft production was independent or attached to elite interests; B.) whether access to and the circulation of raw materials was open or restricted, and; B.) whether there is a relationship between productive activities and social status. The following chapter presents the raw material and tool typologies used to analyze the QVRAP ground stone assemblage, along with a discussion of the physiography of the region and methods used to analyze the materials.

2 CHAPTER 2: METHODOLOGY AND TYPOLOGICAL CLASSIFICATIONS

2.1 INTRODUCTION

This research presents three main objectives related to the extent to which the pre-Columbian Quijos ground stone economy was a dimension of social differentiation during the Late Period. A.) The first examines whether the organization of ground stone craft production was specialized and/or under the direct sponsorship or patronage of elites, or not. B.) The second objective is to evaluate whether the access to and distribution of raw materials used in ground stone production was restricted to certain segments of society. In particular, this study questions whether access to raw materials was primarily related to proximity to local sources, or if distribution was controlled through differential access. The selection and availability of specific stone material types may have impacted the choices, actions, and constraints of tool production on a local scale. The raw material typology serves as an important instrument for the analysis of intra-regional distribution, tool production, and consumption. C.) The final objective of this thesis is an analysis of the relationship between social status and the potential diversification of activities related to ground stone consumption among the Late Period central places.

The first section of this chapter aims to define the physical geography of the Quijos and Cosanga valleys, especially in regards to volcanic and geologic processes, and how they relate to the creation of specific raw materials. This study is crucial to formulating an understanding of the relationship between raw materials, tool design and distribution, and the spatial contexts they are found in. In the subsequent section, the

various field and laboratory methods used to collect and analyze the ground stone artifacts are defined. The third section presents the raw material typology in relation to environmental and geological information relative to the region, which is followed by an explanation of the results of a preliminary river survey undertaken to identify potential sources of local raw materials used in ground stone production. Lastly, the ground stone tool typology is presented in relation to distinct forms as well as a general discussion of technological and functional attributes for each artifact type.

2.2 PHYSIOGRAPHY

The Ecuadorian Andes are defined by two north-south trending volcanic Cordilleras (mountain chains); the Cordillera Occidental in the west and the Cordillera Real in the east. These two volcanic zones are separated by the inter-Andean depression (Barragan et al. 1998:156). The research area surveyed by the Quijos Valley Regional Archaeological Project (QVRAP) is situated on the eastern flanks of the Cordillera Real and is bordered by a smaller mountain chain, the Cordillera Huacamayos, along its eastern extent (see Figure 1.1). This area comprises a 137 km² portion of the province of Napo. In pre-Columbian times, the region had an agricultural economy, and as some have argued, represented an important trade route connecting the Andean highlands with the Amazon basin (Oberem 1980). The town of Baeza, at an elevation of 1900 m, is centrally located within the study limits, and is approximately 80 km southeast of the country's capital, Quito. Several volcanoes of varying size and geologic age typify the geography of the surrounding region. Antisana volcano, located approximately 25 km west, southwest, of Baeza, ascends to an elevation greater than 5700 m, and is one of the highest mountains in Ecuador. Adjacent to the study zone lies Pan de Azúcar volcano to

the east and Sumaco volcano to the southeast, which ultimately demarcate the western edge of the Amazon basin. A fourth major volcano, Reventador, lies to northeast. The surrounding region is also characterized by a number of recently identified volcanoes referred to as the “young Cosanga volcanoes” (Hall and Mothes 2010).

Volcanic processes resulting from vertical uplift and tectonic movement have heavily impacted the northern Andean geology. This area is categorized as the Northern Volcanic Zone (NVZ), which is comprised of 54 volcanoes (Garrison 2004:17). According to Thorpe and Francis (1978), the NVZ of Ecuador and Colombia is primarily characterized by the presence of basalts, andesites, and basaltic-andesites that form as magma through the interplay of partial melting and fractional crystallization processes occurring within the earth’s mantle and crust. The process of partial melting primarily occurs at crust depths, whereas fractional crystallization primarily occurs at mantle depths and is more common to the eastern portions of the Northern Andean chain. In Ecuador, these volcanic processes have resulted in the dispersal of volcanic flows, volcanic conglomerate materials, and igneous andesites throughout most of the surface geology of the Ecuadorian Andes (Miller 1959:189). Much like the Andean highlands proper, and being part of the NVZ, the petrology of the QVRAP study region appears to be similarly characterized by large quantities of pyroclastic materials, of which andesites and basalts are the most prominent.

According to a study conducted by FUNAN (1998:4), the area between Baeza and Laguna de Papallacta (approximately 13 km west) is largely characterized by andesitic-basaltic materials that correspond to the volcanic formations of Antisana and date to the Plio-Pleistocene (circa 5 million years ago). Common to geologic processes

of the upper Cordillera Real, the volcanic formations of Antisana rest on a strata known as the Pisayambo Formation (a grouping of volcanic deposits), which is predominantly composed of pyroclastic andesitic conglomerates interspersed with thick blankets of andesitic lava (Ivanhoe Ecuador Energy 2008:12). A preliminary study has documented andesitic, basaltic, and dacitic materials originating from Antisana and suggests that various magmatic flows may have originated along the flanks of Antisana, in a similar fashion to two historic andesitic lava flows (Potrerillos and Antisanilla) found along the northwest flank of the volcano (Bourdon et al. 1999). Figure 2.1 presents the distribution of geologic materials throughout the study region and adjacent areas. If we assume that the Quijos River (which originates at the southern base of Antisana) and various other smaller tributaries cut across such flows and outcrops, then it is likely that the riverine system served to transport volcanic materials (referred in Instituto Geográfico Militar 1982 as being part of the Cotopaxi Gp) associated with Antisana volcano into the survey zone. The primary distribution of andesitic lavas and other pyroclastic materials are found around Antisana and Sumaco volcanoes. Other materials such as schists, shales, quartzite, limestone, and sandstone are found within the study region as well.

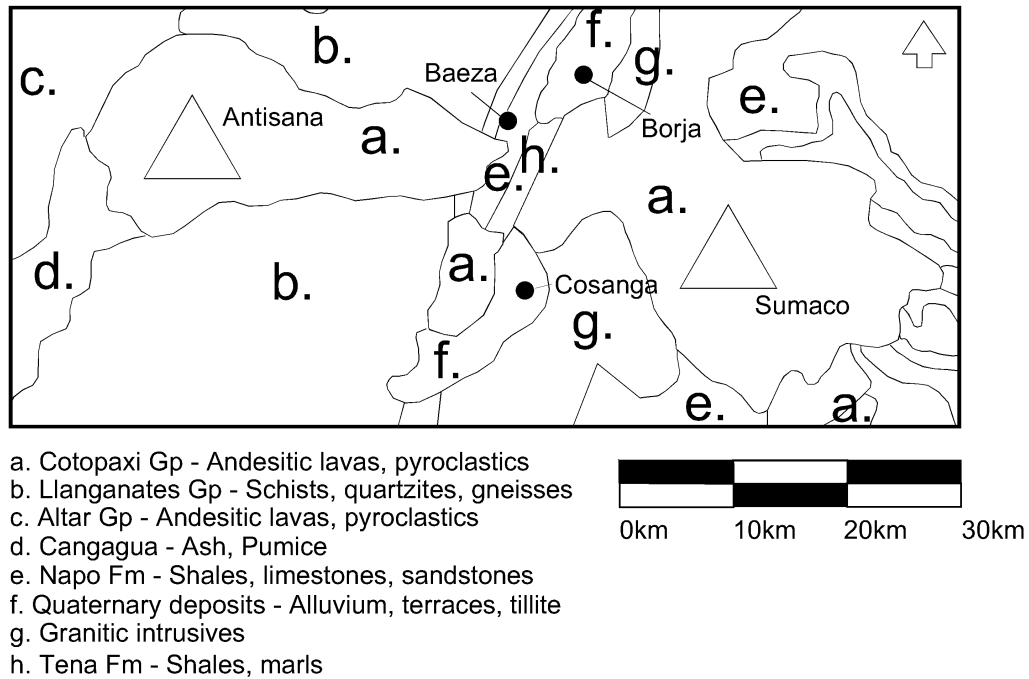


Figure 2.1: Regional geologic map (after Instituto Geográfico Militar 1982).

The Quijos and Cosanga valleys have several major rivers and tributaries that serve to drain the eastern slopes of the Andes. The Quijos River, originating at the southern base of Antisana, flows northeast towards the Papallacta River a few km west of Baeza. From their confluence, it continues east converging with the south-north trending Cosanga River. Numerous smaller rivers and tributaries flow into this system. This is a region characterized by high annual precipitation (which ranges between 2,000 and 3,000 mm [FUNAN-PROBONA 1997]). Outside of any potential human action (past or present), this fluvial system is an important mechanism for the movement and transportation of raw stone materials throughout the valley. Aside from fluvial transportation, rock types within the region may also appear at or close to their point of origin in the form of rock outcrops, though these were not identified during a preliminary

survey of the region's river system. As mentioned previously, geologic processes, such as plate subduction and uplifting, create specific intrusive outcrops of rock types, which may have been sought out and quarried by people in the past, though at this point in the study, it appears that andesitic, dacitic, and basaltic rock types are common throughout the region's major rivers. The development of a sound raw material typology will greatly aid in our understanding of the processes of material selection, distribution, and consumption of ground stone artifacts throughout the region.

2.3 FIELD AND LABORATORY PROCEDURES

To date, the ground stone materials that were examined and analyzed were recovered during four separate field seasons of the Quijos Valley Regional Archaeological Project (QVRAP). These materials were collected by means of a 137 km² full-coverage systematic regional survey carried out in 2002 (Cuéllar 2009a). From this survey, over 2500 artifact collections were gathered. In addition, collections were analyzed from 46 test units located throughout the region. Thus the data analyzed represents the full range of settlement and geographical diversity within the valleys. In Pucalpa, one of the Late Period central places, an intensive site survey was conducted in 2007 and completed in 2009, which included 38 test units and close to 3900 additional collections. The most recent field season was dedicated to the intensive survey of another Late Period central place, Bermejo, as well as detailed mapping and an additional 10 test units and close to 1100 collections. A more comprehensive explanation of the project's field and excavation procedures can be found in Cuéllar (2009a, 2009b).

In total, 89 ground stone artifacts have been recovered during the four field seasons of the QVRAP. These include 29 artifacts from the regional survey along with

12 artifacts from a series of stratigraphic test units undertaken in 2002, 6 artifacts from the first phase of an intensive survey of the Late Period settlement of Pucalpa in 2007, and a single artifact recovered during the completion of the Pucalpa intensive survey in 2009. The remaining 41 artifacts examined in this study were recovered during the first phase of an intensive survey at the Late Period settlement of Bermejo in 2010. The very nature of the regional and intensive surveys and excavations speaks to the systematic and scalar nature of the QVRAP collection. The data represents the full range of settlement and geographical diversity within the Quijos and Cosanga valleys. This is of particular interest in that of all the test units and collections carried out throughout the survey area, under 90 ground stone tools were recovered. In part, this may have to do with factors related to minimal soil exposure throughout the region, making surface detection a difficult process, though it is more likely that processes related to site occupation and abandonment had a far greater impact on the distribution of ground stone artifacts (for an example of the effects of abandonment and post-abandonment processes on ground stone distribution see Schlanger 1991:470). Various factors may have impacted the distribution of ground stone artifacts, which may be the result of differences in site-formation, abandonment, and post-abandonment processes. At its most basic, the accumulation of discarded and stored tools tends to increase the longer a site is occupied, making occupation duration an important factor to consider. Equally important, factors such as the use lives of tools, which can differ greatly, or the value of a tool can also greatly impact the distribution of ground stone artifacts. For example, in Guatemala, Horsfell (1987) notes that manos made of vesicular basalt had a use-life of up to 20 years. Likewise, many of the ground stone artifacts from the QVRAP would have entailed a

considerable investment of labour to produce, and possibly with the exception of the larger metates, most would not have been difficult to transport during abandonment processes. Though post-abandonment scavenging may also act to remove parts of an assemblage, I believe it was less likely a factor for the Quijos region given the limited ground visibility and the rapid growth of vegetation. In places where soil exposure is relatively high, such as the Southwestern United States, ground stone collections are often substantial, whereas areas with limited visibility often yield smaller collections. For example, in a nearby region with similar ground coverage and collection methodology, excavations at San Agustín in the southern highlands of Colombia yielded relatively small numbers of ground stone artifacts (González 2007a, 2007b). In comparison to the QVRAP, under 20 polished stone axes were recovered from approximately 5000 shovel probes.

The QVRAP ground stone collection speaks to the strengths and goals of this project and is befitting of a detailed and thoughtful analysis. Moreover, the significance and overall implications for social and political organization, in relation to other ground stone assemblages from the Northern and Central Andes will be discussed further in Chapter 5 (Comparative Analysis). This study includes assemblages from the central Peruvian Andes and eastern foothills, the Ecuadorian highlands, coastal plains, and eastern foothills.

Each artifact from the QVRAP ground stone assemblage was classified according to a variety of characteristics and features that are primarily based on technological attributes related to the manufacture, use, and design (see Section 2.5 Tool Typology). These typological groups include the following: perforated axes, “regular” or square

axes, T-shaped axes, chisels/celts, hammerstones, manos, metates, mortars, pestles, and polishing stones.

After classification was completed, each artifact, besides the metates, was weighed with an electronic scale. Weight was recorded in grams and measurements were taken with an electronic caliper to the third decimal place in millimeters. All artifacts were observed under 10x magnification for evidence of manufacture and use.

Variables related to the manufacture of each artifact were recorded. These included:

- The raw material used to create the item (see Section 2.4 Raw Material Typology)
- The type of tool design (strategic or expedient)
- Reduction and late-stage finishing techniques (polishing marks and striations, flaking, and pecking)
- Stages of production (unfinished, blank, finished)

The artifacts were also examined for evidence of use. Certain tool types were evaluated for damage along their working surfaces. Axes, when used, were often complete or more frequently broken along their perforations, which is characteristic of breakage during manufacture or use. The edges of axes were often worn down through use and re-sharpening, altering the original length and shape of the tool. Edgeless tool types, such as hammerstones, manos, and polishing stones were examined for evidence of either percussive or abrasive wear. Stones used as percussive instruments primarily had damage localized to a specific area, whereas tools used in an abrasive manner tend to show signs of wear along multiple working surfaces. As in the case with tools made of rough or vesicular materials, abrasive wear causes the natural rough peaks of the rock's surface to be smoothed, while leaving the troughs open and rough. When visible,

identifying this type of wear, a common result of rock-against-rock abrasion, allows one to determine whether the surface of rock is natural and unweathered; natural and weathered; or a ground surface modified through use or manufacture.

Scaled photos were taken of all artifacts, and detailed drawings were produced for most of the diagnostic pieces. Reference numbers were assigned to all diagnostic artifacts discussed in this thesis, which correspond to the QVRAP provenience designations (e.g. No.40 [ground stone reference number] Lot 3282 [QVRAP provenience]).

Given that one of the primary focuses of this thesis includes the production of ground stone artifacts, a careful analysis and understanding of the various signatures of production, and identification of the productive stages, allows for a more succinct analysis of the context in which ground stone tools were produced, consumed, and eventually discarded. At its core, the production of material culture is a form of social interaction (Clark 1986), which manifests itself at various levels of organization. A careful analysis of the stage in which a tool was abandoned can provide valuable insight into the social aspects of its consumption. This may come in the form of late stage tools that were rejected before completion, unfinished tools that were repurposed for other tasks, completed tools that have been exhausted to the point of depletion and discard, or a variety of other possible scenarios. For example, this type of analysis can allow for a clear differentiation between areas of craft production versus those of other subsistence activities, or the classification of a small fragment of a tool (and how it was ultimately discarded), through the identification of production signatures and what stage in a tools life history these signify.

Wilson (2001) presented a series of stages for the production of utilitarian and non-utilitarian greenstone artifacts among the Mississippian chiefdoms at Moundville. Wilson proposed three general stages of celt manufacture. Stage 1 details the selection of greenstone cobbles, followed by the production of blanks (or preforms) by means of direct percussion flaking, which would ultimately result in a substantial amount of unpolished flakes, rejected materials, and exhausted tools such as hammerstones. The second stage involves the basic shaping of the tool by controlled pecking, leaving behind smaller unpolished production flakes, exhausted tools of various sizes, and late-stage tool rejects. The final, and most labour intensive, is the grinding or polishing of the tools, which in Wilson's study, may have been achieved by polishing the celts against wetted sandstone slabs, leaving little archaeological signatures of production behind besides the slabs themselves. Wilson used patterns of production and recycling (both formal and expedient recycling) to conclude that though the initial stages of production for utilitarian items were not occurring directly at Moundville, the prevalence of the items and patterns of use-wear suggested that these were common household items (unrestricted). Furthermore, Wilson suggested that Moundville elites did not directly benefit from the production of these items.

Where applicable, this study aims to make use of Wilson's (2001) three general stages of production for polished stone tools. This will not only aid in the development of a cogent classificatory model, but may allow for a better understanding of the social conditions which impacted the production, distribution, and consumption of these items.

Private collections held by local landowners were examined throughout the Quijos and Cosanga valleys. Given that these collections do not have an established

provenience, they were primarily used as a somewhat tentative point of comparison with those of the QVRAP. Though the collections will be discussed at various points throughout this thesis, for the most part, they are not meant to be taken as direct parallels to the QVRAP ground stone assemblage, but rather as another avenue of exploration with qualified applicability.

2.4 RAW MATERIAL TYPOLOGY

The raw material used to create a stone tool has a direct impact on the technological processes available for its manufacture. The characteristics of any given stone or stone type, such as texture, size, granularity, and overall durability, share a relationship with the tools that can be fashioned from them (Adams 2002:19-20). Thus, the selection of a stone, and subsequent design, manufacture, and use of the tool is related to the access and availability of raw materials, and the intended function of the tool. For example, manos and metates used to grind maize or other materials are often constructed out of a durable stone, such as basalt. A stone material of poorer quality has the potential to deteriorate faster, allowing small fragments of debris to enter into the substance being processed (Adams 2002). The procurement of these materials are based on a number of factors based on both the quality and quantity of a material at any given locale, as well as distance to the source. Another factor, which is often overlooked by archaeologists, is that of seasonality. As is the case in the eastern Andes and Amazon, heavy rain and flooding events are common. These may change ground conditions and raise river levels, leaving river cobbles and other raw materials inaccessible during certain times of the year (Hayden 1987:10). This may also result in an influx of “new” raw materials into the rivers after a period of heavy inundation.

The raw material typology developed for this study was designed to recognize and differentiate basic stone types and is based on macroscopically observable characteristics such as colour, texture, and overall structure. Though raw material samples were collected during a preliminary survey of the region's riverine system, a comprehensive trace-element analysis is not within the scope and applicability of this study, nor would it necessarily serve to better clarify the raw material typology at this stage. This is due to the widely variable nature of these rock types that, unlike the QVRAP's obsidian assemblage for example, show a great deal of structural and mineralogical differences within and between different rocks which could have potentially originated in the same location.

At its most basic level, there are only three, and a possible fourth, major rock types that make up the assemblage, most of which are generally igneous-volcanic in nature (andesites and basalts). From these primary types, some samples were further categorized in sub-types based on observably distinct characteristics within each major rock type (see Type 4). This is important in that although, as mentioned earlier, material type informs tool type and function and is impacted by availability and access; the designation of an actual "type" is a social construct that warrants further consideration. For example, two stones, which originated from the same source may appear visually different to the user (or the researcher classifying the stone). The substantial visual variability within any given stone source has, at times, proven challenging in the identification of stone types.

For this reason, there are three main issues to consider when developing a raw material typology; (1.) the uniformity of mineral composition for each specific material

type may not parallel observable differences such as color and texture *within* and *between* different material types; and (2.) the organization and classification of a “type” is a social construct. How people of the past interacted with and categorized their environment is most surely different from how an archaeologist or geologist would organize theirs today. The properties and attributes deemed important by past stone toolmakers and users may not necessarily be analogous to those presented in this study. That said, the overall applicability of raw materials can be discussed in regards to functional and behavioral qualities which may in turn be reflected in their patterns of distribution. Finally; (3.) the researcher’s familiarity (or lack thereof) with regional stone types needs to be considered when attempting to identify material types.

The basic typology was achieved by organizing 22 artifacts and unworked stone into “types” based on visually identifiable characteristics. The subsequent groupings are meant to represent the material properties and diversity of the QVRAP ground stone collection as a whole. The samples were taken to volcanologist Dr. Minard L. Hall at the Instituto Geofísico in Quito, Ecuador for aid in identification (Table 2.1). Dr. Hall was generous in offering his expertise and advice as to the identification of stone types, their mineral characteristics, as well as potential sourcing information. From this, the newly categorized and identified types were further broken down into subsections denoting specific differences, usually based on changes in colour. It should be noted that many of the type designations (in reference to the use of “cookie,” “blue/grey,” and “fine-grained/flecked”) are artificial and do not correspond to any known geologic definitions. Rather, they serve as simple descriptors aimed at differentiating visual characteristics

among what are generally very similar rocks (though often heterogeneous in appearance, it is plausible that these rock types share a petrogenetical relationship).

Table 2.1: Pieces used to develop raw material typology.

| Artifact Ref. # | Provenience | Material Type | Tool Type |
|----------------------------|--------------------|--------------------------|------------------|
| 4 | Lot 214 | 8.1 | Axe |
| 5 | Lot 223 | 6 | Pestle |
| 8 | Lot 2244 | 3 | Perforated Axe |
| 11 | Lot 851 | 5 | Unidentified |
| 15 | Lot 1061 | 1 | Perforated Axe |
| 18 | Lot 1166 (c.) | 8.3 | Perforated Axe |
| 19 | Lot 1166 (d.) | 2 | Perforated Axe |
| 20 | Lot 1166 (e.) | 3 | Perforated Axe |
| 21 | Lot 1166 (f.) | 4.2 | Perforated Axe |
| 22 | Lot 1166 (g.) | 8.4 | Perforated Axe |
| 23 | Lot 1166 (h.) | 4.1 | Axe |
| 30 | Lot 1320 | 1 | Perforated Axe |
| 33 | Lot 1805 | 7 | Unidentified |
| 40 | Lot 3282 | 8.2 | Celt |
| 41 | Lot 3301 | 3 | Unidentified |
| 67 | VQ008 | 1 | Axe |
| 78 | VQ087 | 5 | Mano irregular |
| N/A | VQ027 | 8 | Unworked Stone |
| N/A | VQ027 | 8 | Unworked Stone |
| N/A | VQ070 | 9 | Unworked Stone |
| N/A | VQ084 | 10 | Unworked Stone |
| N/A | Lot 3481 | 10 | Unworked Stone |

The current typology will be used in conjunction with specific tool types to analyze the spatial and temporal distribution and patterning of artifacts within the Quijos and Cosanga valleys. The selection and availability of specific stone types may have impacted the choices, actions, and constraints of tool production on a local scale. The raw material typology serves as an important instrument for the analysis of intra-regional distribution, tool production, and consumption.

Andesites, Basalts, and Dacites:

In general, basaltic, andesitic, and dacitic materials share many compositional and chemical similarities. Gill (1981) defined andesites as being volcanic rocks that have been differentiated from basaltic materials through the process of crystallization, and primarily include plagioclase, olivine, and augite phenocrysts. In a detailed study of wedge-shaped tool (axes, adzes, and celts) literature of the Northern Andes and Amazon, Kornbacher (2010:304) stated that andesite is the most commonly attributed material type to wedge-shaped tools by archaeologists in this region. This is not surprising given the dominance of andesitic-basaltic materials in the Northern Andes. In general, andesites are the most common rock type within the QVRAP ground stone assemblage. Though they have been separated into individual types based on colouration and structural compositions, the overall quality of andesitic stone in relation to durability and functionality appears to be fairly uniform throughout the various andesite types. This may imply that the selection of differing andesitic materials may not have been based on a functional requirement, but rather may have been based on the selection and prevalence of good-sized stones within any given locale. Moreover, given the prevalence and quality of andesitic and basaltic materials, these materials may have been sought above other local stones of poorer quality. Therefore, andesites and basalts of quality were most likely advantageous to the production of formal strategically designed technologies such as axes, celts, manos and metates.

2.4.1 Type 1 – Greenstone

The first material type, commonly referred to as greenstone, is a metamorphic volcanic stone with hornblende and plagioclase inclusions. It stands out from the rest of

the material types given its characteristically green colour and soapstone-like texture. Greenstone is a loosely definitional term used by archaeologists to describe a range of stone types, including jade, serpentine, and jadeite, and is often associated with prestige and exotic trade goods (Kipler 2000). The distinctive characteristics of the QVRAP greenstone clearly differentiate it from the other material types. Kornbacher's (2010) petrographic and XRF analysis of various greenstone artifacts common to the Northern Andes has suggested that these are a type of metamorphosed basalt, which is consistent with the prevalence of other andesitic and basaltic materials in the QVRAP study zone.

Three rivers were specifically targeted (the Quijos, Papallacta, and Aliso) to determine a potential regional source for this stone. All three rivers contain greenstone but it appears to be more abundant and of better quality in the Quijos, and to a limited degree in the Aliso. The large greenstone cobbles viewed in the Papallacta River, upriver from its confluence with the Quijos River, appear to be primarily coarser in nature and lighter in colouration, and therefore may not have been an optimal source of procurement. All of the greenstone artifacts of the QVRAP ground stone collection have a medium to deep green colouration and a soapstone-like texture. Given the quality of stone used to create perforated axe-heads within the collection, the Quijos River may have provided a key area of greenstone procurement, though a survey of the Quijos River in the northeastern arm of the survey zone may serve to clarify this in the future. Figure 2.2 shows a greenstone cobble with a large inclusion of quartzite recovered from the Quijos River near the conjunction of the Quijos and Papallacta rivers.



Figure 2.2: Quijos River greenstone cobble.

Metamorphic-volcanic greenstone has also been identified in various other Andean/Amazonian contexts. At the Ecuadorian highland site of La Chimba, Athens (1990) identified a number of axe fragments and flakes along with a single small (or “miniature”) greenstone axe. These materials correspond to occupation dating from approximately 900 BC to AD 200. The neighbouring site of Cotocollao, which was abandoned by 400 BC, also yielded a number of greenstone artifacts, including 14 stone axes, 2 of which were recovered from burial contexts (Villalba 1988). These materials were later identified as being of basaltic andesite, andesite, and dacite (Kornbacher 2010). Meggers and Evans (1968) also identified a type of greenstone used for making ground stone tools, alongside various other andesitic and granitic materials, along the Upper Napo River of Eastern Ecuador (*oriente*). Recent evidence has suggested that products made of greenstone were used as ceremonial offerings in the southeastern Ecuadorian *oriente* (Santa Ana-La Florida) as early as 2270 BC, which is a period contemporaneous with the middle phase of the coastal Valdivia culture (Zeidler 2008:480). These items included a greenstone mask and anthropomorphic pendant, as

well as other items of shell that suggest interaction with coastal cultures. Further excavations at Santa Ana-La Florida (Valdez 2009) have also yielded a number of greenstone beads. A single greenstone bead was recovered from the Late Period site of Bermejo in the Cosanga Valley.

It has been suggested that large-scale networks centered on the trade of greenstone items, such as amulets, existed throughout much of southern and central Amazonia by the late pre-Columbian period (Eriksen 2011). Boomert (1987) suggested that one such system, centered on greenstone ornaments (referred to as *muiraquitãs*), was in place during the pre-Columbian and colonial periods of the Brazilian Amazon. The distribution of these items extended throughout the Amazon and Orinoco basins, and possibly even as far as the Caribbean Islands, and may have been exchanged between chiefs for the purposes of alliances or other ancestral and cosmological reasons (Boomert 1987).

Also of note, a second type of greenstone was identified while studying the Porras' Cosanga and Cotundo collection at the Universidad Católica in Quito. This stone appears to be like that found in the QVRAP collection, having a similar colouration, but in all cases the material contains large amounts of black mineral inclusions (possibly augite). As will be discussed later, many of the tools created from this material have technological distinctions from that of the QVRAP collection. At this point, this stone type has not been identified within the QVRAP collection (beyond one possible example from the Late Period site of Bermejo) nor was it found during the preliminary survey of the rivers. For these reasons, this second greenstone material is not included within the

project's raw material typology, though it will be discussed later on for its potential as an indicator of inter-regional interaction.

Greenstone of varying quality was identified in most of the rivers and tributaries surveyed throughout the QVRAP survey zone excluding the Bermejo and Machángara rivers. These were primarily in the form of large boulders and smaller river cobbles of varying colour and quality. Table 2.2 presents the distribution of greenstone artifacts found within the QVRAP ground stone assemblage. This includes six complete or fragmented axes and four pieces of worked stone and debitage which are presumably related to axe production and use.

Table 2.2: Raw material distribution of Type 1 artifacts.

| Artifact Type | Count |
|-----------------|-------|
| Axe | 6 |
| Chisel/Celt | 0 |
| Hammerstone | 0 |
| Mano/handstone | 0 |
| Metate | 0 |
| Pestle | 0 |
| Polishing Stone | 0 |
| Unknown | 0 |
| Worked/Debitage | 4 |

2.4.2 Type 2 – “Cookie” Andesite

The first of three main andesites has been termed “cookie” andesite for its light brown coloration and inclusions of large black augite crystals. It may contain hornblende minerals as well. Though not uncommon throughout the major rivers and tributaries of the region, it is possible that these materials were primarily acquired and consumed in the southern arm of the survey zone. This is in part supported by the fact that all six of

the artifacts manufactured with this kind of material were found in this subregion, and more specifically, at the Late Period central place of Bermejo (see Chapter 4). The material itself is of a durable quality, though the only Type 2 perforated axe (Figure 2.3) is of inferior (more crumbly) structure compared to the other artifacts manufactured with this kind of material.



Figure 2.3: Type 2 andesite.

“Cookie” andesite was identified in most of the rivers and tributaries surveyed excluding the Machángara River. Table 2.3 presents the distribution of Type 2 artifacts found within the QVRAP ground stone assemblage. This includes one axe fragment (Figure 2.3), two manos, and two expedient handstones.

Table 2.3: Raw material distribution of Type 2 artifacts.

| Artifact Type | Count |
|----------------------|--------------|
| Axe | 1 |
| Chisel/Celt | 0 |
| Hammerstone | 0 |
| Mano/handstone | 4 |
| Metate | 0 |
| Pestle | 0 |
| Polishing Stone | 0 |
| Unknown | 0 |
| Worked/Debitage | 0 |

2.4.3 Type 3 – “Blue/grey” Andesite

The second main andesite is a grayish-blue stone with varying levels of hornblende, plagioclase, and, at times, pyroxene (similar to augite) mineral inclusions (Figure 2.4). Many of the Type 3 artifacts contain a heavy concentration of large mineral inclusions, which may imply crystallization at depth (Hall 2010, personal communication). The texture is often intrusive and similar to flagstone or other dike (intrusive) rocks. Given the size of the phenocryst inclusions, it may also be a porphyritic andesite, implying the upward movement of andesitic magma from deep to shallow or surface depths (as in the case of volcanic magmas). Outcrops of porphyritic andesite are thought to characterize the region just east of the Cosanga River and correspond to the volcanic formations of Sumaco dated to the Plio-Pleistocene (FUNAN 1998:3). That said, the inclusion of larger phenocrysts ranging from 3-5 mm are not uncommon to other rock types within the collection or those observed throughout the major rivers of the region.



Figure 2.4: Type 3 andesite.

Type 3 andesite has been identified throughout the Papallacta, Quijos, Cosanga, and Aliso rivers. Table 2.4 presents the distribution of Type 3 artifacts found within the QVRAP ground stone assemblage. This includes seven complete or fragmented axes, two hammerstones, two manos and an expedient handstones, one pestle, one polishing stones, and two pieces of worked stone debitage. This suggests that though Type 3 andesite was primarily used in the production of axes, it was also used for a wider range of tool types.

Table 2.4: Raw material distribution of Type 3 artifacts.

| Artifact Type | Count |
|----------------------|--------------|
| Axe | 7 |
| Chisel/Celt | 0 |
| Hammerstone | 2 |
| Mano/handstone | 3 |
| Metate | 0 |
| Pestle | 1 |
| Polishing Stone | 1 |
| Unknown | 1 |
| Worked/Debitage | 2 |

2.4.4 Type 4 – “Fine-grained/Flecked” Andesite

In general, Type 4 is another andesite with augite and pyroxene inclusions. The type has further been broken down into three subsections based on structural differences:

Type 4.1 is characterized by a fine-grained matrix with the pyroxene being more prominent than the plagioclases (augites) (Figure 2.5). It is most likely an older metamorphic-igneous rock, in the late stages of metamorphism (Hall 2010, personal communication).



Figure 2.5: Type 4.1 andesite.

Type 4.2 is a volcanic andesite with pyroxene and plagioclase inclusion (Figure 2.6).



Figure 2.6: Type 4.2 andesite.

Type 4.3 is an intrusive and fine-grained stone (Figure 2.7). Though categorized as a Type 4, the artifact used for the typology is most likely a diabase, which is either a basalt or silicone-poor andesite.

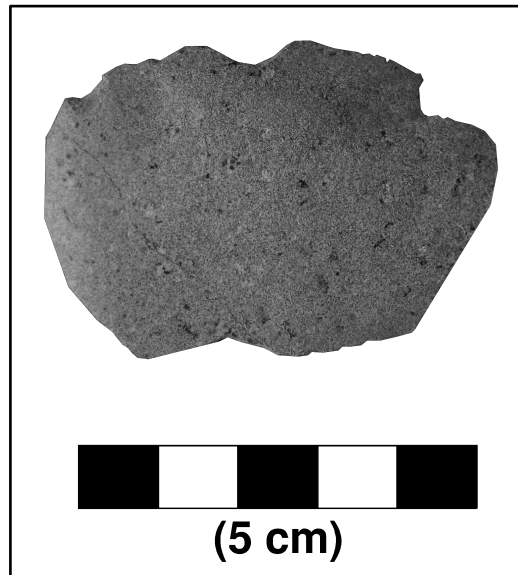


Figure 2.7: Type 4.3 intrusive diabase/andesite.

Type 4 andesites have been identified in most of the rivers and tributaries surveyed. Table 2.5 presents the distribution of Type 4 artifacts found within the QVRAP ground stone assemblage. This includes 11 complete or fragmented axes, one hammerstone, and one polishing stone, one unidentified tool, and piece of worked stone debitage.

Table 2.5: Raw material distribution of Type 4 artifacts.

| Artifact Type | Count |
|----------------------|--------------|
| Axe | 11 |
| Chisel/Celt | 0 |
| Hammerstone | 1 |
| Mano/handstone | 0 |
| Metate | 0 |
| Pestle | 0 |
| Polishing Stone | 1 |
| Unknown | 1 |
| Worked/Debitage | 1 |

2.4.5 Type 5 – Vesicular Basalt

Vesicular basalt is a common stone used to create ground stone tools throughout the world. It is primarily black or grey in colour with varying degrees of vesicularity and mineral inclusions, which is largely a result of the various points in which the magmatic flows were exposed to oxygen and other mineral formations. Within the QVRAP assemblage, the material was used to make various tools ranging from manos and metates to smaller polishing stones (Figure 2.8).

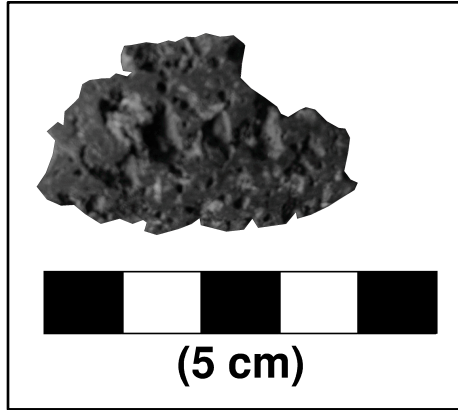


Figure 2.8: Type 5 vesicular basalt.

Vesicular basalt is found throughout many of the rivers and tributaries of the region and the most prominent source is located at a main lava flow terminating near the police control station just west of the town of Baeza, along the Quijos River (Hall 2010, personal communication). Table 2.6 presents the distribution of Type 5 artifacts found within the QVRAP ground stone assemblage. This includes 13 manos, seven metates or metate fragments, one polishing stone, and one unidentified piece.

Table 2.6: Raw material distribution of Type 5 artifacts.

| Artifact Type | Count |
|-----------------|-------|
| Axe | 0 |
| Chisel/Celt | 0 |
| Hammerstone | 0 |
| Mano/handstone | 13 |
| Metate | 7 |
| Pestle | 0 |
| Polishing Stone | 1 |
| Unknown | 1 |
| Worked/Debitage | 0 |

2.4.6 Type 6 – “Fine-grained” Basalt

Type 6 is a fine-grained basalt (Figure 2.9). This variety of basalt does not share the frequency of vesicles as Type 5 does. Often there are few or no obvious crystals present in the matrix of the stone, which, in part, has made it hard to identify or differentiate from other fine-grained materials within the survey region.



Figure 2.9: Type 6 basalt.

The material is of a highly durable quality. Table 2.7 presents the distribution of Type 6 artifacts found within the QVRAP ground stone assemblage. This includes one hammerstone, one circular mano, two pestles, one polishing stone, and one expedient handstone.

Table 2.7: Raw material distribution of Type 6 artifacts.

| Artifact Type | Count |
|-----------------|-------|
| Axe | 0 |
| Chisel/Celt | 0 |
| Hammerstone | 1 |
| Mano/handstone | 2 |
| Metate | 0 |
| Pestle | 2 |
| Polishing Stone | 1 |
| Unknown | 0 |
| Worked/Debitage | 0 |

2.4.7 Type 7- “Black” Basalt

Type 7 basalt is common to the QVRAP lithic assemblage in the form of chipped-stone flakes anddebitage. A light to dark grey natural patina often characterizes exposed areas of the rock. The patina, created by natural weathering processes over time, resembles human-made abrasive polish or wear (Figure 2.10). For this reason, Type 7 basalt items were frequently mistaken for ground stone tools during survey and excavation, but are not technically ground stone artifacts, as a majority of the pieces collected were worked by methods associated with chipped-stone techniques.



Figure 2.10: Type 7 basalt.

Type 7 basaltic river cobbles have been visually identified among the gravel bars of the Quijos River; yet have not been identified in the Papallacta River, suggesting the likelihood of a local source of these materials along the banks of the Quijos River (Knight 2009). Table 2.8 presents the distribution of a single Type 7 artifact, which has tentatively been included within the QVRAP ground stone assemblage.

Table 2.8: Raw material distribution of Type 7 artifacts.

| Artifact Type | Count |
|-----------------|-------|
| Axe | 0 |
| Chisel/Celt | 0 |
| Hammerstone | 0 |
| Mano/handstone | 0 |
| Metate | 0 |
| Pestle | 0 |
| Polishing Stone | 0 |
| Unknown | 1 |
| Worked/Debitage | 0 |

2.4.8 Type 8 – Metamorphic Dacite

Dacite is a solicious andesite, and throughout the QVRAP collection, is often characterized by a soapstone-like texture and quality, similar to that of greenstone, yet the colour ranges from a light blue-grey to darker blue (Figure 2.11).

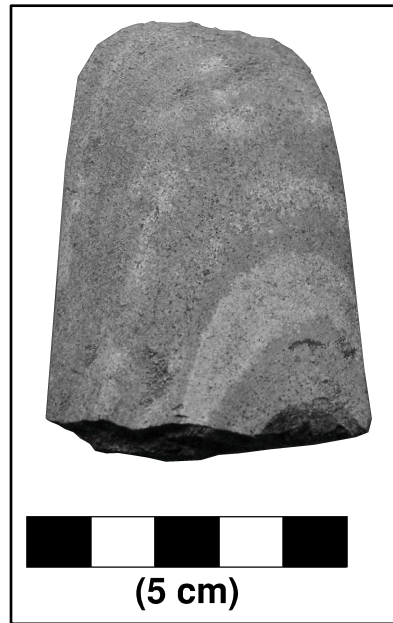


Figure 2.11: Type 8 metamorphic dacite.

At this point, metamorphic dacite has only been observed/identified within the Quijos River. Aside from one mano/handstone in the QVRAP assemblage, dacite was used to make axes and the collection's single celt. Table 2.9 presents the distribution of Type 8 artifacts. This includes four axes, one celt, and one unidentified piece.

Table 2.9: Raw material distribution of Type 8 artifacts.

| Artifact Type | Count |
|----------------------|--------------|
| Axe | 4 |
| Chisel/Celt | 1 |
| Hammerstone | 0 |
| Mano/handstone | 0 |
| Metate | 0 |
| Pestle | 0 |
| Polishing Stone | 0 |
| Unknown | 1 |
| Worked/Debitage | 0 |

2.4.9 Type 9 – Black/Napo Shale

Type 9 is a naturally occurring sedimentary rock commonly referred to as black or Napo shale. The way in which shale tends to break often leaves a smooth flat surface that, on occasion, was mistaken for ground stone. Shale is not a favourable material type for the construction of stone tools due to its fragility and inability to maintain a sharp edge.

2.4.10 Type 10 – Other/Unknown

Given that not all rock types were identifiable, or at times an artifact or stone is too weathered or damaged for proper identification, Type 10 is used for these items.

Though there is a fair amount of heterogeneity between form and raw material within the QVRAP ground stone assemblage, one of the more suggestive patterns to emerge from this study is the relationship between greenstone and axes. Seven of the pieces in the greenstone assemblage are perforated axes, and as I will argue at a later

point, the three polished greenstone flakes and two pieces of worked greenstone are directly related to perforated greenstone axe production and consumption. Of particular interest to this study is that greenstone appears to have been used in the manufacturing of axes in other Northern Andean and Amazonia contexts (e.g. Athens 1990; Valdez 2009; Villalba 1987), and, more generally, axes have been discussed as ritual and prestige items in similar contexts (e.g. Athens 1990; Izumi and Terada 1972; McAndrews 2005a; Meggers, Evans, and Estrada 1965; Villalba 1988; Weber 1975). For these reasons I developed a preliminary survey of several of the rivers throughout the survey zone. It was my hope that I would find a single source (outcrop) of greenstone that could then be used to make inferences regarding the social and political aspects of perforated greenstone axe consumption. Though somewhat of secondary importance at the time, the preliminary survey was expanded to collect and observe other local raw materials as well.

2.5 PRELIMINARY RIVER SURVEY

In order to better understand the regional distribution of raw materials, a preliminary raw material survey was undertaken in select locales along the Quijos and Cosanga rivers, as well as around the meeting of the Quijos and the Papallacta Rivers and several smaller rivers and tributaries throughout the study area. The methodology of the survey involved targeting purposive locales along the Quijos and Cosanga rivers, with the heaviest concentration of surveyed points centered on the meeting of the Quijos and Papallacta rivers. Seventeen points were targeted within the survey zone with an additional six points south of the survey boundary along the Cosanga and Aliso rivers. Of all the areas surveyed, rock samples were collected from 16 points and observations

about the various rock types present were recorded from all 23 points. This survey was originally designed to locate potential sources of greenstone and though observations were recorded about various other rock types, the survey itself was not meant to be a detailed and systematic survey of the rock types present throughout regional river systems. That said, initial observations give the impression that many of the raw material types used in the production of ground stone artifacts throughout the study area appear to be common to many of the rivers and tributaries (Figure 2.12, Table 2.10). A survey of the northeastern arm of the survey zone may serve to further clarify the nature of local materials available throughout the Quijos region.

Table 2.10: Preliminary river survey.

| Preliminary River Survey | | |
|---------------------------------|---|---|
| River | Sampled Raw Material Types | Observations |
| Aliso | Greenstone (Type 1) “cookie” andesite (Type 2) “blue/grey” andesite (Type 3) “fine-grained” andesite (Type 4) Vesicular basalt (Type 5) | All of the major rock-types were identified within the Aliso River with the exception of Type 7 – Metamorphic dacite. |
| Bermejo | “cookie” andesite (Type 2) “blue/grey” andesite (Type 3) Vesicular basalt (Type 5) | Most of the major rock-types were either visually identified or sampled within the Bermejo River with the major exception of Type 1 – greenstone. |
| Cosanga | Greenstone (Type 1) “cookie” andesite (Type 2) “blue/grey” andesite (Type 3) Vesicular basalt (Type 5) | All of the major rock-types were identified within the Cosanga River with the exception of Type 4 – “fine-grained/flecked” andesite. Type 7 – Metamorphic dacite. |
| Machángara | “blue/grey” andesite (Type 3) “fine-grained” andesite (Type 4) Vesicular basalt (Type 5) | The major rock-types identified within the Machángara River ranged from Type 3 – “blue/grey” andesite, Type 4 – “fine-grained/flecked” andesite, and Type 5 – vesicular basalt, along with a number of unidentified rock types. Greenstone was not identified within the Machángara River |
| Papallacta | “cookie” andesite (Type 2) “blue/grey” andesite (Type 3) Vesicular basalt (Type 5) | Most of the major rock-types were either visually identified or sampled within the Papallacta River. Most of the large greenstone river cobbles are of a lighter colour than those of the QVRAP assemblage, and I was unable to locate any smaller stones for collection. |
| Quijos | Greenstone (Type 1) “cookie” andesite (Type 2) “blue/grey” andesite (Type 3) “fine-grained” andesite (Type 4) Vesicular basalt (Type 5) Black basalt (Type 6) Metamorphic dacite (Type 7) | All of the major rock-types were identified within the Quijos River. |

2.6 TOOL TYPOLOGY

In this section, the ground stone assemblage collected during the QVRAP is classified according to a variety of characteristics and features that, to a large degree, are based on technological attributes related to the manufacture, use, and design of the artifacts. These are analytical constructs used to evaluate the manufacture and use of an item. While the variables that characterize a raw material may include colour, texture, granularity, rock size, and overall structure, tool types are also distinguished by a set of features or characteristics. These may include decorative motifs, explicit shapes or designs, or other manufactured features specific to a tool's function or use (Adams 2002:19).

As stated earlier, no other report of ground stone tools in and around the region has been published beyond that of Porras' (1975, 1980) in the 1960s. For this reason, the following tool typology was initially informed by Porras' classification, yet ultimately proved incompatible. The ground stone tool typology, to a large degree, has been based on Adams' (2002) technological approach to ground stone analysis, as well as that of Clark's (1988) analysis of ground stone artifacts in La Libertad, Mexico. This is beneficial in that outside of recent efforts by some archaeologists, there is no standardized set of terms or techniques used to describe and categorize ground stone.

The primary classification types assigned to the QVRAP ground stone collection are as follows: axes, chisels/celts, hand/hammer stones, polishing stones, manos, metates, pestles, and more generally percussive and abrasive unmodified hand stones, and worked stone and debitage.

2.6.1 Axes

Though a detailed analysis of northern Andean axe-literature is beyond the scope of this thesis, Kornbacher (2010) managed to compile a fairly concise review and critique of northern Andean “wedge tool” (axes, adzes, and celts) literature, including her own analysis of 61 tools from ten sites in Ecuador. Though the particular cases range from a fairly broad and disparate suite of contexts, levels of observation, and are characteristically small in assemblage size, her analysis primarily focused on well-provenienced artifacts from secularly dated contexts (2010:283). To date, this is the only attempt that I am aware of that focuses on a broad analysis and synthesis of northern Andean axe-heads. In particular, Kornbacher has aimed to challenge some of the more questionable assertions and observations pertaining to cultural interaction, exchange, and trade between lowland and highland populations based on the presence of axe-heads (particularly the “T-shaped axe”). Many of these claims, as Kornbacher argued, are based on very little actual data, or if the data exists, it is poorly documented, particularly in absence of any attempt at temporal sequencing and sound functional analysis. Kornbacher (2010:103) contends that

No culture historical record of wedge tools exists for South America. That is, archaeologists have not succeeded in building a developmental history of changing tool attributes in time and space that would allow us to identify temporally, ethnically, or functionally diagnostic forms. We have no sequence of wedge tools analogous to the seriation-driven sequences of other stone tools, such as projectile points.

In general, the most commonly identified axe-type throughout Ecuador and Northern Peru is the “T-shaped axe”, also referred to as the “Andean axe”. Interestingly, this is in contrast to the strong presence of the perforated axe form in the Quijos and Cosanga valleys. Though it is difficult to make any sort of definitive claims about the

unique character of the QVRAP perforated axes in relation to the overall distribution of axe-heads in the northern Andes (though, for a in depth discussion see Chapter 5), what is clear at this point is that they have yet to identified archaeologically in coastal and highland settings with any certainty. Figure 2.13 presents a hypothetical reconstruction of a T-axe and perforated axe.

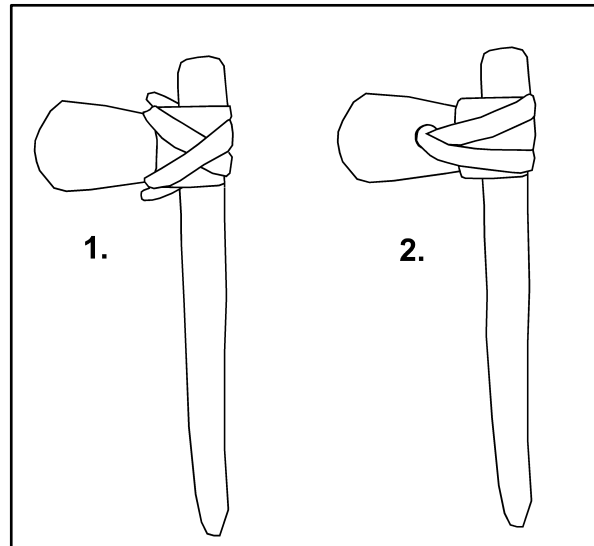


Figure 2.13: Reconstruction of hafting methods.

1. hafted T-Shaped axe 2. hafted perforated axe.

2.6.2 Perforated Axe

The perforated axe is possibly one of the most common and distinctive tool types found in the region. Though the perforation of an axe-head is not unheard of in other parts of the world (see Ford 2004; Moore 1903), nor is it completely uncommon to northern South America (e.g. French Guiana - Boomert 1979; Rostain and Wack 1987) and the central Andes (Bolivia - McAndrews 1998; McAndrews and Rivera 2007), examples and discussions of perforated axe-heads are largely absent within the archaeological literature. This, in large part, may be due to the fact that fashioning a hole

through the tool creates structural instability, furthering the chance of the tool being broken during use or manufacture. In fact, many of the axes studied throughout the region, as well as within the collection, are fragmented along their perforation. A more common means of hafting often entails the establishment of grooves, notches, or protruding features, in combination with rope, to secure the implement to the haft. The shape of the perforation itself is double conical, meeting in the center, and the shape is most likely the result of drilling action from both sides (Figure 2.14). One feasible means of drilling a hole through stone was undertaken by Evans (1897, in Kornbacher 2010:152) during the late twentieth century. This method involved twirling a wooden stick within a small sand-filled indentation on the stone, while another less-efficient method involved using a flake of flint as a drill to perforate the stone.

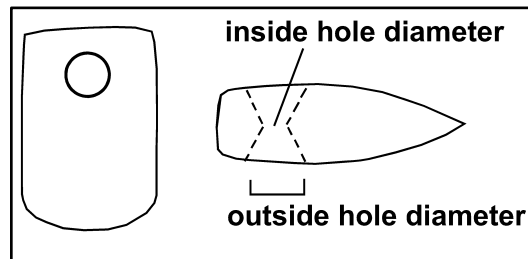


Figure 2.14: Axe perforation model.

Another potential mode of hafting has been noted in Suriname and French Guiana (as well as parts of Australia), which uses tree-resin to form a protective enclosure around the axe-head and handle. Perforated axes have also been identified in these regions and Versteeg and Rostain (1999) suggested that the perforations might have served as a hole for a transverse pin to secure the axe-head to the haft. The Amahuaca peoples of the southeastern Peruvian Amazon recall using T-shaped axes

during the early years of the 20th century, which were secured to a wooden haft by means of beeswax and the fibers of the *Cecropia* tree (Dole 1998:158). As discussed below, the perforated axe is a category that not only denotes the presence of a hole drilled through the tool, but also, as this research presents, indicates that the items were meant to be hafted.

Among the QVRAP axe assemblage, the axes average 5-9 cm in length, with the width averaging $\frac{3}{4}$ of the length, and a thickness of 1-3.5 cm. Both smaller and larger specimens have been found, though these are far less common. The drilled hole, which almost always features an inner and outer diameter (like that of a cone) one each side of the axe (see figure 2.14), is generally 0.7-1.5 cm in diameter on the insides which then tapers out to between 2 and 3 cm for the outer extent of the hole. The placement of the hole is usually about a third of the way up from the base, though, as Porras noted (1975:164), it may be positioned closer to the center as a result of the edge being worn down through use and re-sharpening (altering the original shape of the tool).

An important distinction to note among the axes is the shape of distal and medial sides. Whereas the proximal end –or edge- of the tool is often shaped for cutting, the base is often flat, convex (curved outward), or slightly concave (curved inward). The sides are usually flat and flush with the base, slightly curved outwards, or potentially shaped in a similar fashion to the working edge.

The axes are some of the most heavily polished and crafted artifacts of the collection and tend to be made from a variety of durable rock materials such as greenstone or andesite. British explorer Edward Whymper (1892:272), who traveled throughout the equatorial Andes during the 1880s, commented that this type was

... found in numbers, in many localities, and have evidently been amongst the most common and generally used implements during the Equatorial Stone Age ...[the perforated axe] was the most numerous, and I brought home more than fifty examples. The greater part [proximal end] have holes drilled from each side, though in some the aperture is as broad internally as externally, that is to say, it passes straight through. The positions of the holes vary, - some being central, though most of them are nearest to the top. The lower edge is always the sharpest; and, *while many would not have cut butter*, there are a few sharp enough to cut wood... they have been fashioned from a diversity of rocks (emphasis added).

Aside from the somewhat odd conclusions Whympers reached as to the effectiveness of these tools, it is interesting to note the importance he places on the prominence of these axes, which may have been collected during his travels to and around Antisana (Whympers 1892:184-204).

Whereas Porras (1975:164-168) drew distinctions between axe types based primarily on overall shape, these distinctions are somewhat arbitrary and prove problematic in certain regards. He is correct in noting that perforation is not implicit to these categories, yet he fails to fully address a reason for this. The presence or absence of perforation is a defining feature of the QVRAP axe assemblage as a whole, particularly in regards to how the items may have been hafted. Porras (1975) suggested that a number of axes collected during his travels through the Papallacta and Quijos regions were used as hand axes (though he does not elaborate on how he came to this conclusion). I suggest that the perforated axe form was clearly meant to be hafted.

Questions regarding the design, manufacture, and use of these artifacts are important components to better understanding the overall role these items played amongst the pre-Columbian inhabitants of the region. Axes may have served a wide variety of purposes ranging from land clearance and maintenance (felling trees and clearing vegetation), to constructing houses and finer woodworking. Stone axes are

found throughout the region, and given that the region is characteristically densely forested, it is likely that stone axes were used to fell trees and clear land.

2.6.3 Regular (or square) Axe

This is simply a designation given to the above, which lack perforation. Some of the QVRAP axes appear to have broken during use, resulting in a transverse break parallel to the base, leaving only the proximal end for identification. These tools have been placed within the category of regular axe, though it may have been the case that some of these were perforated axes that fractured above the perforation. Likewise, as I argue in Chapter 4, a number of square-shaped axes were recovered that show little, if any, evidence of use, and do not exhibit the characteristic polish of other axes, and are most likely unfinished axes (that may have served as preforms for the perforated axe form).

2.6.4 T-Shaped Axe (Simple and Complex)

Outside of examples held within local private collections, the T-shaped axe is not present within the QVRAP collection. Though they have been identified within private landholder collections associated with two of the Late Period centralized settlements, Pucalpa and Bermejo, the provenience of these artifacts remains uncertain. The T-shaped axe will therefore be discussed in relation to overall trends of morphological distribution throughout the Northern Andes and Amazon more generally (for a detailed discussion see Chapter 5). Porras (1975:164) divided this category into two forms; T-Simple and T-Complex. The axe is usually rectangular in shape with a small protrusion shaped on each side of the axes base. This allows for the axe to be attached to the haft of a stick (figure

2.15). The difference between simple and complex is based on the thickness of the protrusions. If they are found to be greater or equal to that of the thickness of the artifact itself, then it is T-Complex, and vice-versa, if the protrusions are thinner than the artifact is, it is referred to as T-Simple.

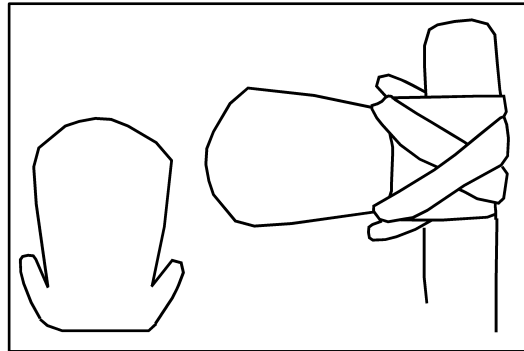


Figure 2.15: T-shaped axe profile with hafting.

As mentioned previously, the T-axe is the most commonly identified axe-type throughout Ecuador and Northern Peru. As a broad definitional category, the T-axe has been identified in different areas (as well as temporal periods) ranging from the Peruvian and Ecuadorian Amazon basin (e.g. Dole 1998; Evans and Meggers 1968; Lathrap 1962; Rostain 1999; Valdez 2009; Weber 1975), the Ecuadorian highlands (e.g. Athens 1978; Bruhns 2003; Villalba 1988), the eastern Andes of Peru (e.g. Izumi and Sono 1963 cited in Kornbacher 2010), to the southern Ecuadorian coast (e.g. Meggers et al. 1965). The “Andean” axe has often been used to support claims of trade and interaction between the coast, the highlands, and the Amazon basin (Lathrap 1970:60), but as Kornbacher (2010:3) contended, the “...existing data on the spatial and temporal distribution of the tools are insufficient for investigating the issue seriously. Aspects of form that may potentially be useful for looking at homologous relations have not been identified and

tested. Consequently, inferences about interregional interaction and cultural origins based on the occurrence of a particular tool form are premature”.

2.6.5 Chisel/Celt

This second category of tool type has been traditionally called celts by archaeologists but has fallen somewhat out of favour recently. That said, chisel might not be the most apt replacement either. The celt often tends to imply woodworking specifically, whereas the chisel may conjure up images of stone working. For our purposes, the term is interchangeable. As in the case of La Libertad, Mexico, John Clark (1988:147) used the term celt to refer to a number of functions based on their size. He presented the idea that the smallest celts may have been used as chisels, the medium-sized celts as axes or adzes, and the largest may have been used to cut wood. In the case of the Mayan highlands, Hayden (1987:101) suggested that blunt-edge celts, not completely dissimilar to the QVRAP celt, may have been used to repeck the surfaces of manos and metates, or even potentially used in the overall manufacture of these items. He further argued that these celts may have been initially used on wood, but having lost their edge through continued use, were repurposed for working on stone. That said, the QVRAP celt shows little, if any, evidence of use, leaving the function of this tool somewhat questionable.

Celts are generally described as having a blunt, hafted, end and an opposing end which tapers to a symmetrical point. The single celt found in the QVRAP collection (Figure 2.16) is 8.3 cm in length, 5 cm wide, and 2.2 cm thick, with a weight of 151 g.

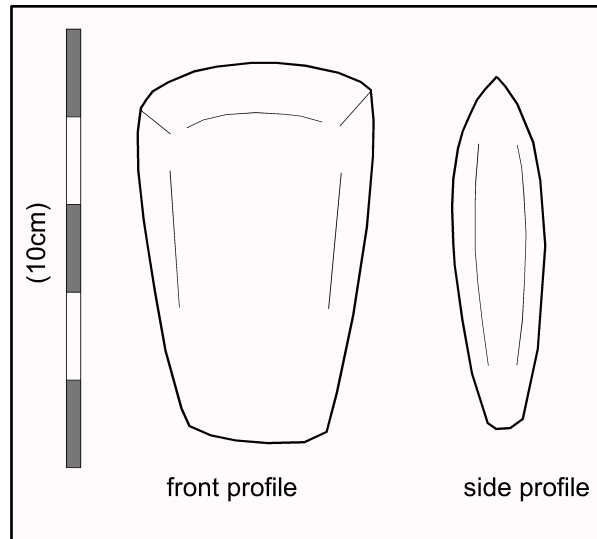


Figure 2.16: Celt profile.

Again, these items may have been hafted at times, or they may have been used as hand tools in conjunction with a hammerstone or other tool. Regardless, the differentiation between Axe and Chisel/Celt, within this study, is meant to represent the primary function of the tool. Whereas an axe is often swung somewhat parallel to the body (e.g., when cutting a tree), the primary direction of a chisel or celt is down. According to Porras' classification (1975:167-168) both the celt (*hacha petaloide*) and rectangular axe were used as hand axes, yet he did not provide a rationale for this claim.

2.6.6 Handstones, Hammerstones, and General Expedient Ground Stone

This broad category of tool refers to any stone tool used in a percussive or hammer-like manner as well as the more basic expedient stones that may have been used to process non-foodstuffs. As in the case of the QVRAP assemblage, the stones are often unshaped natural stones (expedient) that fit in one or both hands and show evidence of heavy use or damage on one or multiple ends (Figure 2.17).

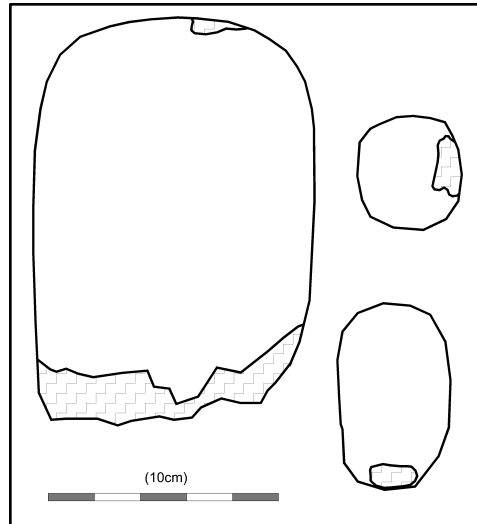


Figure 2.17: Hammerstones variability in size and morphology.

2.6.7 Polishing Stone

Depending on their size and coarseness (granularity), stones can be used for a variety of manufacturing sequences, be it the early stages of reduction, which remove surface material (when shaping a tool), or late stages used to polish a tool. Larger coarse stones alter another surface through abrasive wear. This process removes (or grinds away) material from the surface. Smaller smooth stones alter a material through adhesive and tribochemical processes. These processes remove material from a surface and move them to another, resulting in a sheen or polish (Adams 2002:77). These stones have been associated with the manufacture of many archaeological implements from materials such as pottery, stone, wood, and even bone (2002:91).

The QVRAP collection's polishing stones are primarily small (2-4 cm in diameter) natural river stones that were most likely used during late stage manufacturing of ceramics and ground stone tools, such as axes. Smaller finer-grained river pebbles are often characterized by a single flat surface, which indicates the area of use.

2.6.8 Mano

Mano is a generally known archaeological designation for stone hand tools used to process plant materials (as opposed to tools used to process non-food items against netherstones rather than metates [Adams 1996]). More specifically, they often refer to a round or oblong stone that may fit easily in the palm of a hand or are considerably larger, requiring two hands (or in some cases, two people) to use. Manos are commonly found throughout the Southwest United States, Mexico, Mesoamerica, and South America (as well as other parts of the world), and are often associated with the emergence of agriculturally based subsistence. Though they are frequently paired with the metate, the tool on which the mano is used, and as in the case of the study zone, does not always remain in situ with its associated metate. The QVRAP mano assemblage is primarily comprised of vesicular basalt and can generally be distinguished as having been used by one or two hands (Figure 2.18).

One-handed manos – One-handed manos, after final use, generally take three distinct shapes, which in turn reflects the method by which they were used:

(A.) Unifacial mano – Typically discoidal or ovoid in shape, the unifacial mano is primarily used on one side, while the remainder of it is left unshaped. This is often the result of expedient use of a river cobble. The dimensions vary.

(B.) Bifacial mano – The bifacial mano is subrectangular in shape, which is the result of an even distribution of wear through use in a metate. The average dimensions are 9-11 cm in length; 7 to 8 cm in width; and 2 to 3.5 cm thick.

(C.) Rounded mano – This category represents manos that show an more-or-less even distribution of use along the surface of the stone, more often then not resulting in a

rounded, spherical, or somewhat egged shape. The diameter ranges from 4 to 12 cm. The smaller ones may have been used to grind materials such as *aji* (chili peppers) and other plant materials. The characteristic shape of this type of mano is often associated with circular or irregular (basin) metates (Adams 1999).

Two-handed manos – Two-handed manos are separated into two categories:

(D.) Two-handed trough mano – The trough mano, as its name would imply, is associated with the trough metate. The shape is similar to that of the bifacial mano but with elongated dimensions.

(E.) Large two-handed river cobble mano – The large two-handed river cobble mano is different than the other manos in the collection given its sheer size and weight. Large river cobbles are commonly found during excavations in the valleys, though only a small number of them were analyzed for use-wear. At present, large river cobbles have been identified during the intensive surveys undertaken at the Late Period settlements of Pucalpa and Bermejo. Use-wear was difficult to distinguish in field conditions under 10X magnification, but the cobbles themselves bare similarities to those still used by individuals in the community of Jondachi approximately 35 km east of the study area. The difference being that those used in Jondachi are used against large wooden dish-shaped bases locally referred to as a *batea or batáng* (or *batán*), whereas all that is known at this point about the two pieces analyzed in the collection is that they show some minor use-wear along the sides. At this point the large two-handed river cobble mano is a tentative designation that warrants further studies.

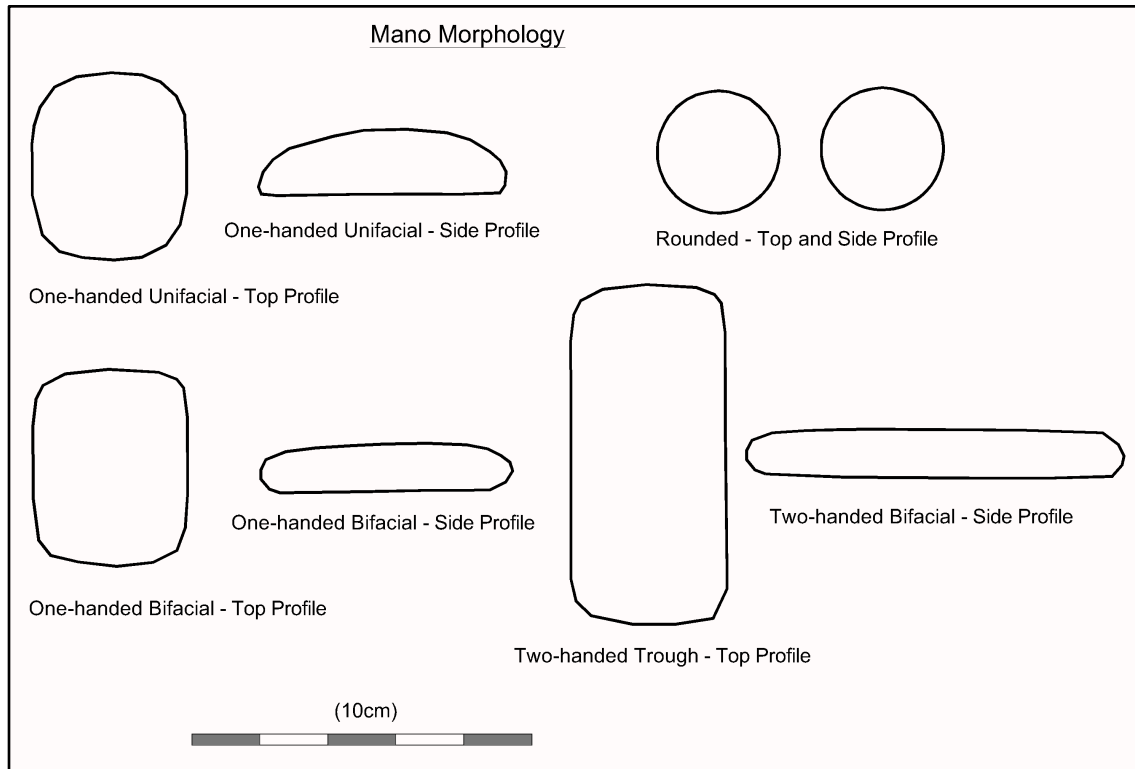


Figure 2.18: Mano morphology.

2.6.9 Metate

Metates are important implements, used in conjunction with manos, to grind plant materials such as maize. Because maize appears to have been central to the Late Period Quijos diet (Cuéllar 2009a), metates were most likely vital to household food processing. Both basalt and andesite are well suited for being shaped into mano and metate forms (Bostwick et al. 1993:35) but in all available cases of the QVRAP collection, metates were produced from basaltic materials. Figure 2.19 presents the QVRAP metate typology.

Expediently designed metates – The form of expediently designed metates, as the name would suggest, are unshaped natural stones that are altered through the process

of use. It may be the case that specifically shaped river stones were selected that allowed for ease of use. Within this typology, expediently designed metates have been assigned the designation of irregular, though, as mentioned earlier, regularly shaped river stones, when available, were most likely sought out regardless of the intent of the producer to further shape the stone.

Strategically designed metates – The shape of strategically designed metates on the other hand is unique to their production. Strategically designed metates may be viewed as an extension of the processes used to select expediently designed metates. In many cases, these metates retain much of their natural shape (as river stones) but were altered to varying degrees, with modifications to their overall shape, implying a potential increase in labour investment. Though the morphological variations may differ to a certain extent, three basic forms have been assigned to the QVRAP metates (Figure 2.19 - square, ovoid, and circular).

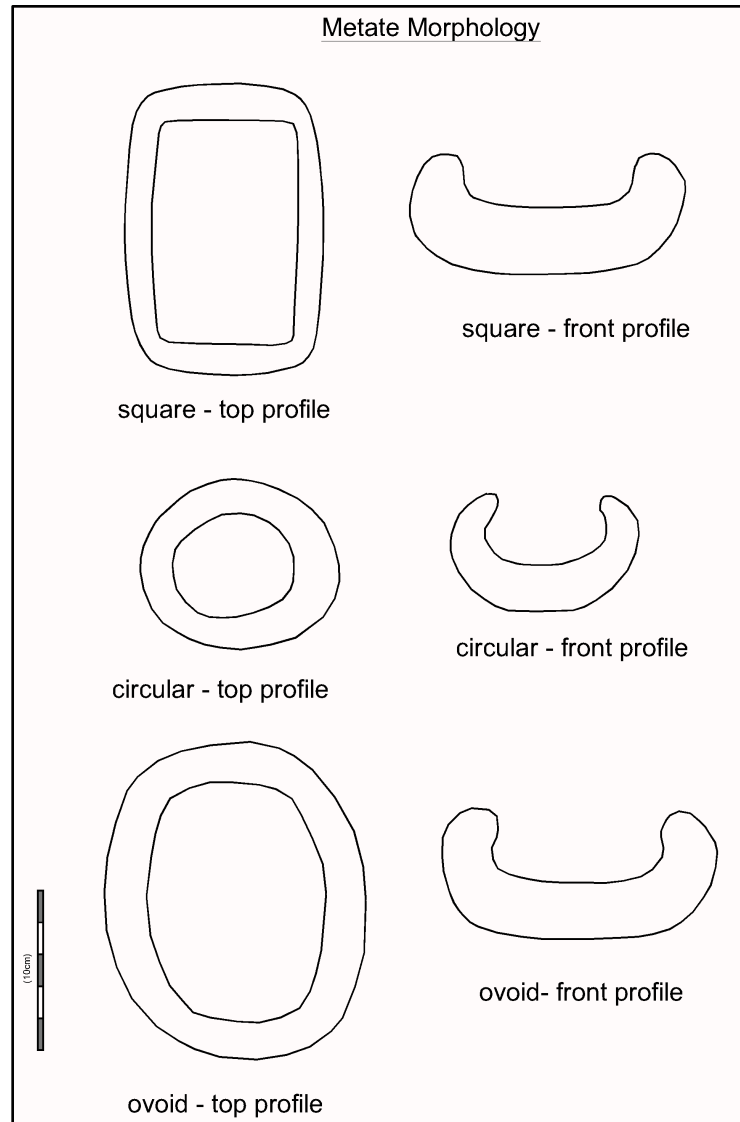


Figure 2.19: Metate morphology.

The five metates of the QVRAP collection are all incomplete in form and, being broken horizontally across their middle, comprise approximately half of their original size. They range from 25 to 33.5 cm in length (estimated 30 to 45 cm complete), and are between 24 and 33 cm wide. The lengths of the basins (working surfaces) are between 12 and 27 cm (estimated 23 to 30 cm complete), with an average minimum depth of 4.7 cm and an average maximum depth of 9.8 cm. The borders (walls) range between 5 and

8 cm thick, though, the measurements of the border thickness and basin depth are dependent upon use accrual and would have changed throughout the life history of the tool. The overall thickness of the metates ranges between 13 and 18 cm. The overall shape of the metates range from a trough-style to circular- and ovoid-shaped metates (also referred to as basin metates when defined by a circular depression [Adams 1999:481]). These characteristics are largely the result of mechanical use and maintenance, which define the shape of both manos and metates (this is ultimately the result of the type of stroke applied against the metate, be it reciprocal, rocking, or circular). Figure 2.20 presents the basic attributes used to analyze the QVRAP ground stone assemblage.

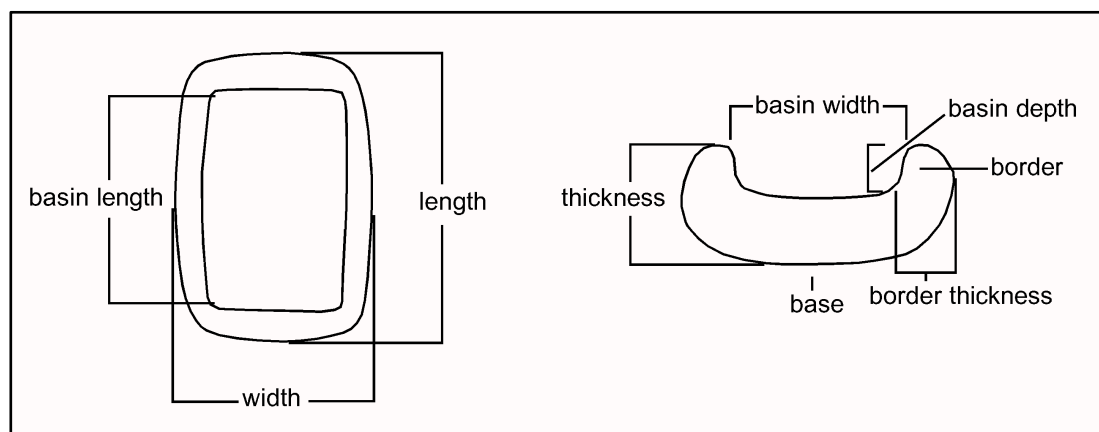


Figure 2.20: Metate attributes.

2.6.10 Mortar and Pestle

Mortars and pestles are in many ways similar to their cousins – manos and metates – but often differ in size as well as the way in which they are used. Unlike manos and metates, which process foodstuffs by means of grinding, mortars and pestles

are most commonly associated with crushing, stirring, and pounding motions (Adams 2002).

Mortars are generally bowl-like in shape, with a deep inner depression with a diameter of 10-15 cm. Though there are no mortars in the QVRAP collection, four mortars were examined at a landowner's collection in the town of Borja, 6 km northeast of Baeza, which showed a significant diversity of form. Two of which were flat-based with ornamental rims, one had a regular rim and a footed base, and the last had a regular rim and a hallowed pedestal base.

As well, pestles are not that common to the QVRAP collection. The few examples that show up ($n = 3$) are conically shaped with a roundish and/or slightly convex working surface. One piece shows evidence of use on both a roundish top and flat bottom surface, possibly indicating both primary and secondary use surface (multifunctional). Figure 2.21 presents the basic profile of the collections single strategically designed pestle.

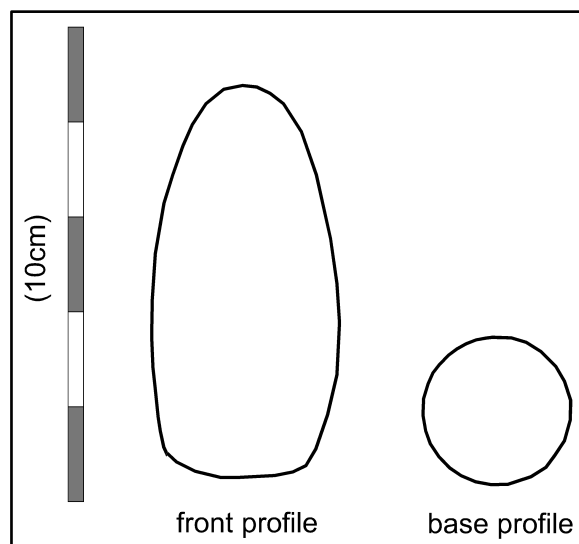


Figure 2.21: Strategically designed pestle profile.

Of the three pestles identified within the QVRAP collection, two are naturally shaped conical stones with evidence of use wear on their curved bases. The three pestles range in length from 8 and 10.5 cm, and have a width/thickness between 3.6 and 5.3 cm. Their average weight is 184.5 grams.

2.6.11 Polished Flakes and Production Debitage

This category is comprised of two variations of ground stonedebitage:

Polished Flakes – Polished flakes are defined here as a portion of stone removed from a tool during use. What differentiates this type from other lithicdebitage is the presence of a polished outer surface, which is highly suggestive of reduction during use. The rationale being that the act of polishing is the final stage of tool production (particularly for axes [Wilson 2001]) before the tool is used, leaving it less likely that this sort ofdebitage would be the result of production activities.

Production Debitage - Outside of particular production contexts such as stone quarrying, ground stone productiondebitage may be difficult to identify within the archaeological record. In the case of the Quijos and Cosanga valleys, basaltic (and potentially andesitic) materials were used in the production of both chipped-stone and ground stone tools, making it difficult to differentiate basic lithicdebitage between the two production techniques (especially since the early stages of ground stone production often entails chipped-stone reductive techniques to shape out the basic tool form). However, the presence of productiondebitage of a raw materials directly associated with ground stone tools (such as greenstone) provides direct evidence of ground stone production.

Figure 2.22 presents two pieces of ground stone debitage. The first (1) details a polished greenstone flake, while the second (2 and 3) presents the front and back of a piece of greenstone production debitage. The surface of the latter shows the naturally river-worn surface of the original greenstone cobble and the percussive fracture lines of the rock's interior. This piece, among a few others, has aided in defining the nature of raw material selection, which I argue was primarily related to local reverine sources.

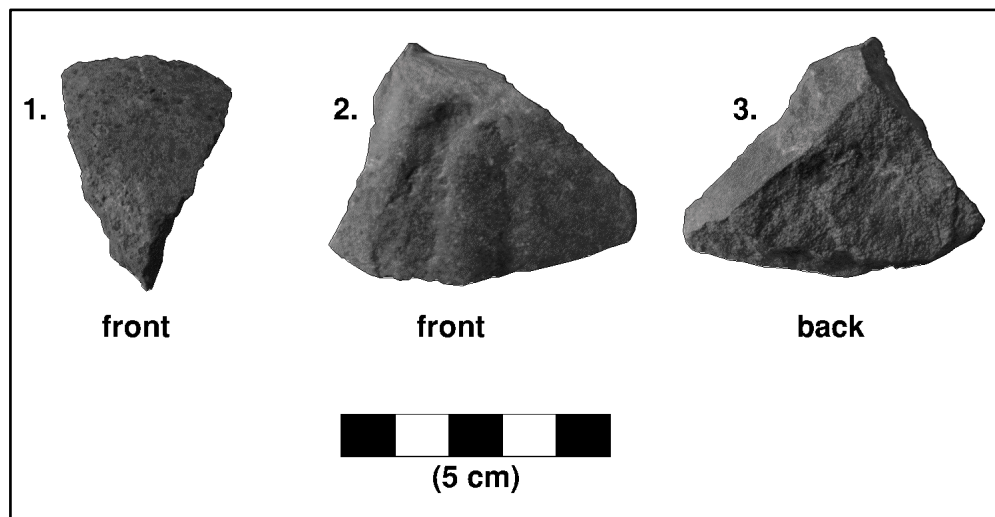


Figure 2.22: Polished flakes and production debitage.

Table 2.11 presents the complete distribution of all 89 diagnostic ground stone artifacts presented in this study based on tool and material types. The most common tool recovered during the QVRAP is the axe, which comprises approximately 35% ($n = 31$) of the total collection. The three primary materials used in axe production are Type 4 (fine-grained) andesite, Type 3 (blue/grey) andesite, and Type 1 greenstone respectively. The second most common artifact within the QVRAP ground stone assemblage is the mano, which comprises approximately 25% ($n = 22$) of the assemblage and was primarily manufactured from Type 5 vesicular basalt. The remaining 39% of the

assemblage, in order from greatest to least, is comprised of metates and metates fragments, polishing stones, hammerstones, pestles, and a single celt. The most common material used in tool production is Type 5 vesicular basalt, which is a prevalent throughout the region, and is useful in producing items such as manos and metates. This is followed by Type 3 (blue/grey) andesite, Type 4 (fine-grained) andesite, and Type 1 greenstone, which were primarily used in the manufacturing of axes, though Type 3 (blue/grey) Type 4 (fine-grained) andesites were also used to produce polishing stones, pestles, and circular manos.

Table 2.11: Distribution of diagnostic pieces based on material and tool type.

| Tool Type Material Type | Axe | Celt | Hammer- stone | Mano | Metate and Metate Fragments | Pestle | Polish Stone | Other * | Total |
|--|------------|-------------|--------------------------|-------------|--|---------------|-------------------------|--------------------|--------------|
| Type 1 - Greenstone | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 10 |
| Type 2 - "Cookie" Andesite | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 5 |
| Type 3 - "Blue/Grey" Andesite | 7 | 0 | 2 | 3 | 0 | 1 | 1 | 3 | 17 |
| Type 4 - Fine- Grained Andesite | 11 | 0 | 1 | 0 | 0 | 0 | 1 | 2 | 15 |
| Type 5 - Vesicular Basalt | 0 | 0 | 0 | 13 | 7 | 0 | 1 | 1 | 22 |
| Type 6 -Basalt | 0 | 0 | 1 | 2 | 0 | 2 | 1 | 0 | 6 |
| Type 7 - "Black" Basalt | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Type 8 - Dacite | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 6 |
| Type 9 -Other | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 8 |
| Total | 31 | 1 | 4 | 22 | 7 | 3 | 6 | 15 | 89 |
| *includes ground stone debitage | | | | | | | | | |

3 CHAPTER 3: CHRONOLOGICAL ASSOCIATIONS

3.1 INTRODUCTION

The central research objective of this thesis is an examination of the extent to which craft production was a dimension of social differentiation during the Late Period. This will be achieved by examining three interrelated scenarios: A.) whether the production of certain ground stone tools was specialized and/or under the direct sponsorship or patronage of elites; B.) whether the access to and distribution of raw materials used in ground stone production was restricted to certain segments of Quijos society, and; C.) whether the potential diversification of activities related to ground stone consumption among the Late Period central places was related to social status.

What is critical to the exploration of these scenarios is the emphasis on the Late Period, and this chapter presents the rationale behind situating the discussion of the Quijos Valley Regional Archaeological Project (QVRAP) ground stone assemblage in relation to the Late Period.

3.2 GROUND STONE CHROLOGICAL ASSOCIATIONS

One of the key strengths of the QVRAP data is the systematic and scalar nature of the collection. The data represents the full range of settlement and geographical diversity within the valleys and at its center is a full-coverage extensive regional survey. In this section the ground stone artifacts collected during the regional survey are 1.) analyzed in relation to collection units containing Early Period ceramic materials, units that yielded both Early and Late Period ceramic materials, and units that yielded only Late Period ceramics materials. After which, 2.) ground stone artifacts recovered from

stratigraphic tests conducted during the regional survey will be also be investigated for diachronic patterns of ground stone tool type and form. Finally, 3.) collections from the intensive surveys of the Late Period central place of Bermejo and Pucalpa are analyzed for chronological associations with Early and Late Period ceramic materials. This will allow for the establishment of indirect chronological associations specific to individual periods.

The QVRAP ceramic typology is comprised of three types that generally correspond to Early or Late Period occupations. The first, Bermejo Thick, is associated with the Early 1 Period (500 BC – AD 100). The second, Pituro Dark Polished, is associated with the Early 2 Period (AD 100 – 500) occupation. It should be noted that the exact stratigraphic relationship between Early 1 and Early 2 Period ceramics remains somewhat unclear at this point. However, both Early Period ceramic types clearly precede those of the Late Period (500 AD – 1500) ceramic type, Cosanga, allowing comparisons to be made between Early and Late Period assemblages.

3.2.1 REGIONAL SURVEY GROUND STONE DISTRIBUTION

The total number of collections containing ceramics from the regional survey component of the QVRAP is 2,123 (of a total 2,256), of which 1.3% (n = 29) contained ground stone artifacts. 66% of the regional ground stone assemblage is comprised of hafted axe tools, followed by 17% which have yet to identified, 10% are mano-type tools, and 7% have been placed in the category of other (Figure 3.2). Figure 3.1 and Table 3.1 present the distribution of 29 ground stone artifacts collected during the regional survey (including artifact reference numbers).

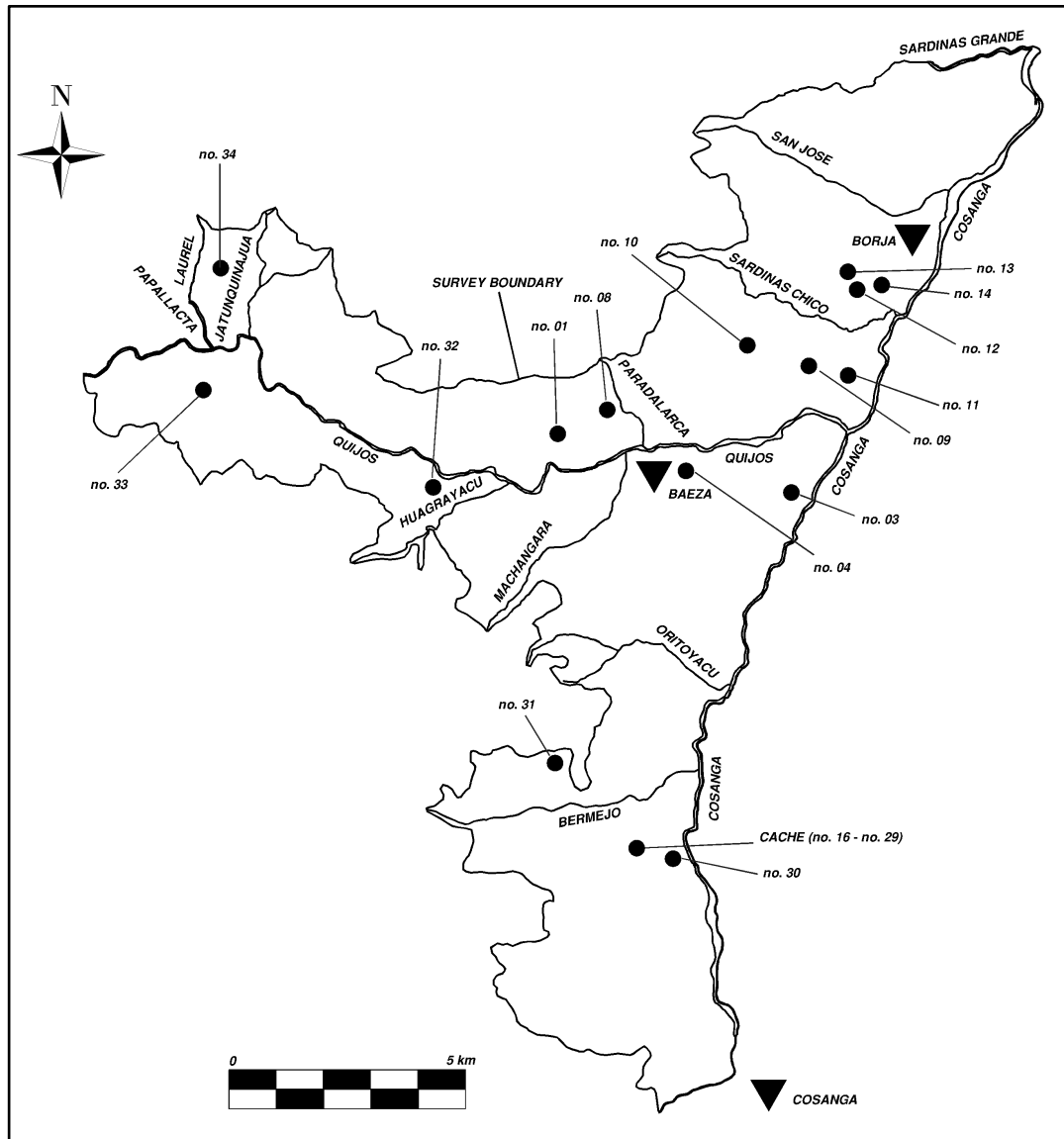


Figure 3.1: Regional survey ground stone distribution.

Table 3.1: Regional survey ground stone distribution.

| Reference # | Lot # | Tool Type | Portion | Ceramic Association* | | |
|-------------|-------|-------------------------|----------|------------------------|----|-----|
| | | | | Bermejo/Pituro/Cosanga | | |
| 1 | 87 | Unidentified | Fragment | 0 | 0 | 399 |
| 3 | 187 | Mano rounded | Complete | 0 | 1 | 8 |
| 4 | 214 | Axe | Unknown | 0 | 0 | 38 |
| 8 | 2244 | Perforated Axe | Fragment | 0 | 0 | 0 |
| 9 | 611 | Mano two-hand unifacial | Fragment | 0 | 0 | 4 |
| 10 | 615 | Worked Greenstone | Complete | 0 | 0 | 1 |
| 11 | 851 | Unidentified | Fragment | 0 | 18 | 64 |
| 12 | 954 | Perforated Axe | Fragment | 1 | 0 | 151 |
| 13 | 991 | Perforated Axe | Complete | 0 | 5 | 20 |
| 14 | 1001 | Mano one-hand bifacial | Complete | 0 | 0 | 15 |
| 16 | 1166 | Perforated Axe | Complete | 2 | 8 | 259 |
| 17 | 1166 | Perforated Axe | Complete | 2 | 8 | 259 |
| 18 | 1166 | Perforated Axe | Complete | 2 | 8 | 259 |
| 19 | 1166 | Perforated Axe | Fragment | 2 | 8 | 259 |
| 20 | 1166 | Perforated Axe | Fragment | 2 | 8 | 259 |
| 21 | 1166 | Perforated Axe | Fragment | 2 | 8 | 259 |
| 22 | 1166 | Perforated Axe | Complete | 2 | 8 | 259 |
| 23 | 1166 | Axe | Complete | 2 | 8 | 259 |
| 24 | 1166 | Unidentified | Unknown | 2 | 8 | 259 |
| 25 | 1166 | Unidentified | Complete | 2 | 8 | 259 |
| 26 | 1166 | Axe | Complete | 2 | 8 | 259 |
| 27 | 1166 | Axe | Complete | 2 | 8 | 259 |
| 28 | 1166 | Axe | Complete | 2 | 8 | 259 |
| 29 | 1166 | Hammerstone | Complete | 2 | 8 | 259 |
| 30 | 1320 | Perforated Axe | Complete | 1 | 0 | 124 |
| 31 | 1470 | Perforated Axe | Complete | 0 | 0 | 21 |
| 32 | 1457 | Perforated Axe | Fragment | 0 | 0 | 2 |
| 33 | 1805 | Unidentified | Unknown | 0 | 0 | 3 |
| 34 | 1867 | Axe | Complete | 0 | 0 | 3 |

* Sherd counts per lot

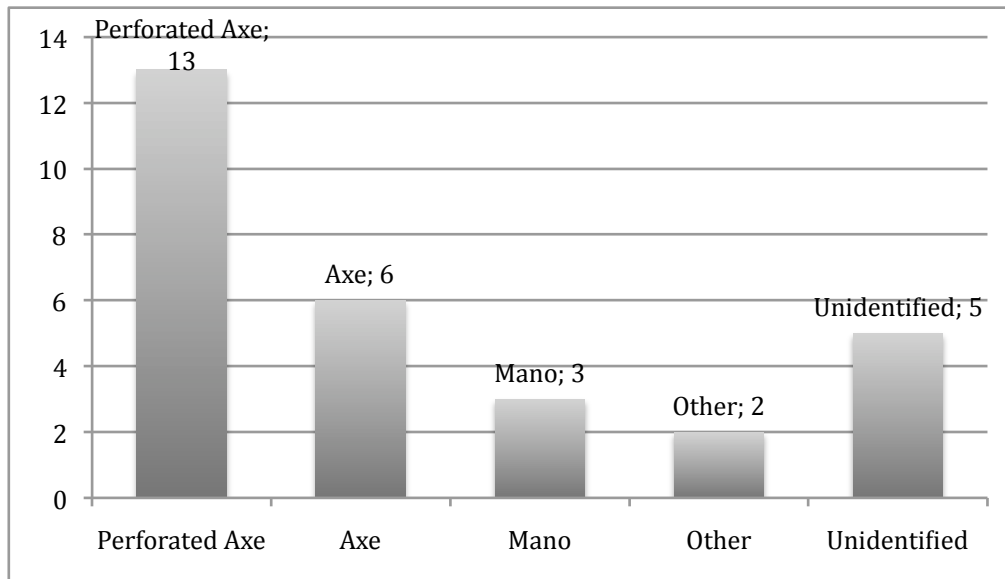


Figure 3.2: Regional survey ground stone distribution.

3.2.2 Ceramic Associations

Of the 2,123 regional survey collections, 19 yielded only Bermejo ceramics. Ground stone materials were not recovered from these lots. Likewise, ground stone was not present within the 18 lots containing only Pituro ceramics. Had ground stone been present within any of the collections yielding *only* Early Period ceramics, a clear case could be made for that particular tool type and/or form having been present within the Early Period, however as of the time of this writing, our understanding of ground stone ceramic/chronological associations remains somewhat unclear. What does emerge is a pattern of association in which, in all but one case¹, the regional survey ground stone assemblage was recovered alongside Late Period/Cosanga ceramic materials. In some cases these also included early ceramic types.

¹ Lot 2244 yielded one small, heavily polished Type 3 (blue/grey andesite) perforated axe in absence of any ceramic materials.

3.2.3 Early Period Ceramic Associations – Regional Survey

313 regional survey lots yielded Bermejo ceramics, of which three contained ground stone materials. Lot 954, located near the modern town of Borja, yielded one Bermejo sherd, 151 Cosanga sherds and a fragment of a perforated greenstone axe (No. 12), which is characterized by a flat base and curved sides. In Bermejo, lot 1320 yielded one Bermejo sherd, 124 Cosanga sherds and a near complete perforated greenstone axe (No. 30) with a flat base and curved sides. The latter materials were recovered by means of surface collection. Lot 1166, located in the southern subregion of the regional survey, yielded two Bermejo sherds, eight Pituro sherds, and 259 Cosanga sherds. This lot also yielded 14 ground stone artifacts, many of which are broken axes, suggesting that was a cache or secondary refuse pit. I examine these in detail in a latter section.

335 lots yielded Pituro ceramics, of which four contained ground stone materials. Lot 187, located close to the stratigraphic test units in Pituro, yielded one Pituro sherd, eight Cosanga sherds, and a rounded mano (No. 3). Lot 851, located along the Cosanga River between Borja and Pituro, yielded 18 Pituro sherds, 64 Cosanga sherds, and an as yet identified ground stone artifact (No. 11). Lot 991, also near Borja, yielded five Pituro sherds, 20 Cosanga sherds and an unusual flat perforated stone (No. 13) with “vague” characteristics suggestive of an axe. The rough nature of the material and design suggests that this piece was not meant to serve as a tool and may have been a discarded practice piece. Regardless, the ground stone recovered from lots 851 and 991 do little to shed light on the chronological associations of the ground stone assemblage as a whole. As mentioned above, Lot 1166 also contained eight Pituro sherds.

To summarize, beyond those artifacts found within the “cache”, three diagnostic ground stone artifacts, and two as yet identified artifacts, of the regional survey assemblage were recovered from lots that also contained Early Period ceramics (two perforated greenstone axes and a rounded mano).

3.2.4 Late Period Ceramic Associations – Regional Survey

Of the 2,123 lots in which ceramic materials were recovered, 1598 lots (75.3%) yielded only Cosanga ceramic materials. Of these, nine lots yielded ground stone materials. Lot 1470, located in the southern subregion, yielded a complete type three perforated axe (No. 31) and 21 Cosanga sherds. Lot 1457, located between the Huagrayacu and Quijos rivers in the Northwestern subregion, yielded a small heavily polished Type 3 perforated axe (No. 32) and two Cosanga sherds. This axe is similar to the axe (No. 8) recovered from lot 2244, located north of Baeza along the Paradalarca River. This is significant in that, although lot 2244 did not yield any ceramic materials, both of these axes are highly similar in design. They are two of the smallest axes in the collection and are unique to the perforated axe assemblage. This type of perforated axe is attributed to the Late Period and will be discussed further in Chapter 4.

Lot 214, located east of Baeza, yielded one axe (No. 4) with a rough (possibly broken) base and curved sides, alongside 38 Cosanga sherds. Lot 1867, located in proximity to the Papallacta River in the upper corner of the northwestern subregion, yielded another axe (No. 34) with a rough (broken?) base and slightly curved sides, alongside three Cosanga sherds. These axes are both formally distinct and produced from different materials, suggesting independent production and distribution.

The other major tool category attributed to the Late Period is the loaf mano. Lot 611, located between Borja and Pituro along the Cosanga River, yielded the only two-handed unifacial mano (No. 9) within the assemblage, alongside four Cosanga sherds. The rest of the loaf mano assemblage is comprised of 6 one-handed bifacial manos, one of which was recovered from lot 1001 (No. 14), alongside 15 Cosanga ceramics, in Borja.

Lots 87 and 1805 yielded two unidentified ground stone artifacts that do not serve to further define the Late Period ground stone assemblage. Finally, lot 615, located near the conjunction of the Quijos and Sardinas Chico rivers, yielded a piece of worked greenstone. This piece may be a preform axe, though the poorer quality of the material suggests that it simply may have been an attempt at making an axe that was discarded. Table 3.2 presents the distribution of regional survey lots based on ceramic types and the presence of ground stone materials.

Table 3.2: Regional survey ground stone ceramic associations.

| | Lot (n) Count | Lots (n) Containing Ground Stone | Ground Stone Count (n) | % of Regional Ground Stone Assemblage |
|--|------------------|--|------------------------------|---|
| Lots yielding only Bermejo Ceramics | 9 | 0 | 0 | 0.00% |
| All Lots yielding Bermejo Ceramics | 313 | 3 | 16 | 55.2% |
| Lots yielding only Pituro Ceramics | 18 | 0 | 0 | 0.00% |
| All Lots yielding Pituro Ceramics | 335 | 4 | 17 | 58.6% |
| All Lots yielding Bermejo and Pituro Ceramics | 125 | 1 | 14 | 48.3% |
| Lots containing only Bermejo and Pituro Ceramics | 7 | 0 | 0 | 0.00% |
| Lots yielding only Cosanga Ceramics | 1598 | 7 | 7 | 24.1% |
| All Lots yielding Cosanga Ceramics | 2067 | 14 | 28 | 96.5% |

3.2.5 Ceramic Associations – Stratigraphic Test Units

The QVRAP regional survey also entailed the excavation of fifteen 2x1 m and thirty-one 1x1 m units. From these, six units from five different sites yielded ground stone materials (Figure 3.3, Table 3.3). A detailed description, including stratigraphic drawings, of these units can be found online at the Quijos Settlement Dataset (Cuéllar 2009b) within the University of Pittsburgh’s Comparative Archaeology Database. Figure 3.3 presents the distribution of ground stone artifacts from these units, with artifact reference numbers in parenthesis.

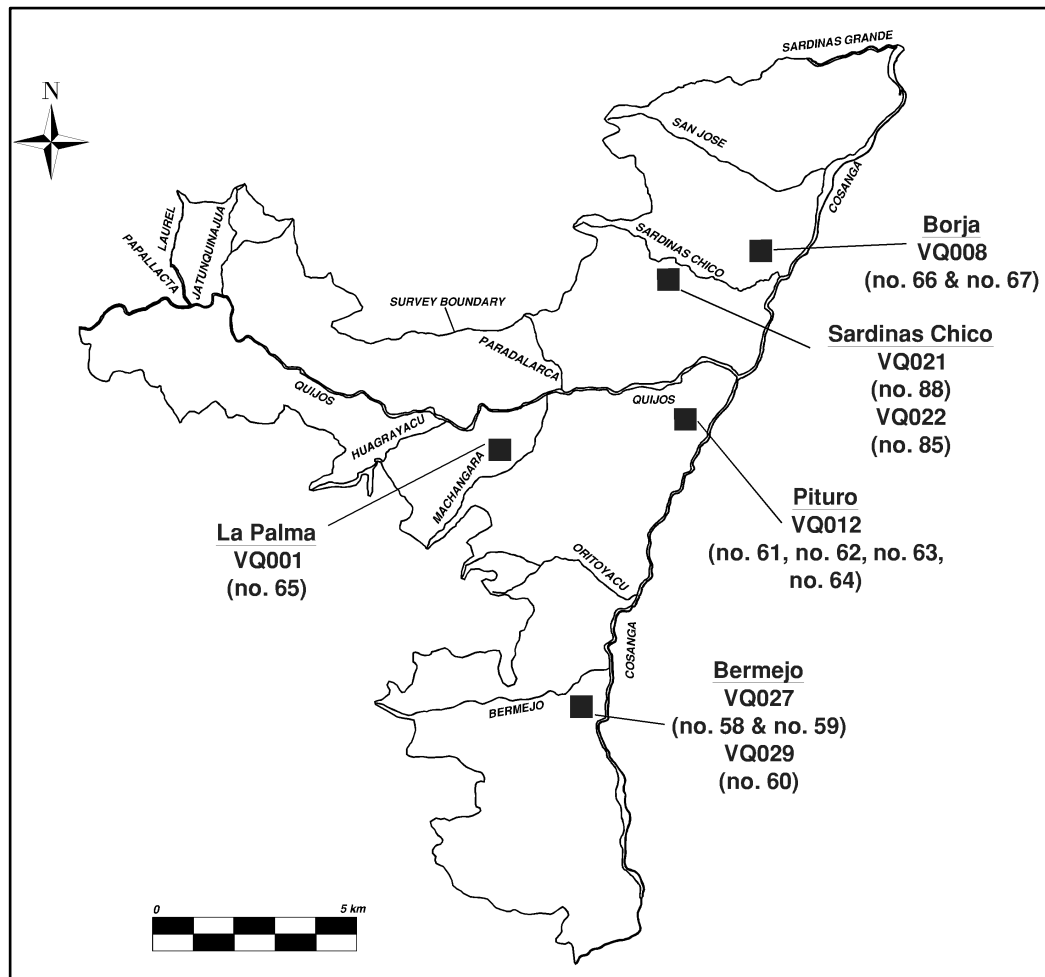


Figure 3.3: Stratigraphic test unit distribution.

Table 3.3: Stratigraphic test unit ground stone distribution.

| Ground Stone Ref. # | Unit & Level | Site | Tool Type | Portion |
|---------------------|------------------|----------------|-----------------|----------|
| 65 | VQ001 - Level 02 | La Palma | Perforated Axe | Complete |
| 66 | VQ008 - Level 04 | Borja | Mano rounded | Complete |
| 67 | VQ008 - Level 07 | Borja | Axe | Complete |
| 61 | VQ012 - Level 02 | Pituro | Perforated Axe | Fragment |
| 62 | VQ012 - Level 10 | Pituro | Hammerstone | Unknown |
| 63 | VQ012 - Level 10 | Pituro | Hammerstone | Unknown |
| 64 | VQ012 - Level 10 | Pituro | Mano bifacial | Fragment |
| 88 | VQ021 - Level 03 | Sardinas Chico | Worked Debitage | Fragment |
| 85 | VQ022 - Level 13 | Sardinas Chico | Polished Flake | Fragment |
| 58 | VQ027 - Level 03 | Bermejo | Polished Flake | Fragment |
| 59 | VQ027 - Level 12 | Bermejo | Perforated Axe | Fragment |
| 60 | VQ029 - Level 03 | Bermejo | Polishing stone | Complete |

3.2.5.1 Bermejo

VQ027

This test was excavated along the center of a set of terraces running across the north slope of the mountain, and yielded a deep deposit with clear stratigraphy. A single piece of Type 4 andesite polished stone (No. 58) was recovered at a depth of 20-30 cm (possibly a cultivated surface), and is primarily associated with Cosanga ceramics (92.5%), alongside a small proportion of Bermejo (5.7%) and Pituro (1.9%). At this depth, Cosanga is the most prominent ceramic type. This polished stone is most likely a piece of an axe that flaked off during use. A Type 4 perforated axe (No. 59) was recovered at a depth of 120-130 cm, and is also primarily associated with Cosanga ceramics (96.6%), alongside a small proportion of Bermejo (3.4%). At this depth, Cosanga is the most prominent ceramic type. The perforated axe is medially broken along its perforation, with heavy flaked scarring along the distal end/edge. The length

from perforation to edge (6 cm) is uncommon to the perforated axe assemblage, which, alongside the heavy use-wear damage, suggests that the tool broke early on in its life, before constant resharpening and curation would have reduced the overall length of the tool.

VQ029

This test was excavated on a flat area on top of the mountain with a stratigraphy complicated by soil mixing. A single ovoid shaped, Type 4 andesite, polishing stone was recovered at a depth of 20-30 cm, and is primarily associated with Cosanga ceramics (97.5%), alongside a small proportion of Bermejo (2.5%). At this depth, Cosanga is the most prominent ceramic type. The polishing stone, approximately 3x2 cm, is fine-grained, suggesting it was used in the late stage production of ground stone and/or ceramics.

3.2.5.2 La Palma

VQ001

The site of La Palma is located 1 km southwest of Baeza. This test yielded a single perforated greenstone axe (No. 65) at a depth of 10-20 cm. This axe has a slightly concave base and curved sides. This unit was a shallow deposit that only yielded Cosanga ceramics.

3.2.5.3 Pituro

VQ012

The site of Pituro is located at approximately 1,900 m above sea level near the intersection of the Quijos and Cosanga rivers. This test yielded two hammerstones and a

one-handed bifacial mano at a depth of 90-100 cm. This layer is predominantly characterized by Cosanga ceramics (96.3%), with a small proportion of Bermejo (3.7%). At 10-20 cm, a perforated greenstone axe with a flat base and curved sides (No. 64) was recovered. This stratum only contained Cosanga ceramics and was useful in further establishing an association between perforated greenstone axes and the Late Period. All six of the assemblage's perforated axes have flat, or slightly concave, bases and curved sides. As discussed above, lots 954 and 1320 contained perforated greenstone axes with flat bases and curved sides. These lots were predominantly Cosanga and each yielded a single Bermejo sherd. As will be discussed at a latter point, two other perforated greenstone axes were recovered from collection lots undertaken during the first phase of the intensive survey at Pucalpa and are associated with Late Period ceramics. These axes also have flat bases and curved sides. The axe recovered from Pituro, alongside that of La Palma, show that both axe forms (if we separate slightly concave and flat bases) are attributed to the Late Period. Likewise, this is further supported by the presence of the worked greenstone piece from lot 615. All of which suggest that greenstone perforated axes were a phenomena of the Late Period.

3.2.5.4 Borja

VQ008

This test yielded a rounded mano (No. 66) at a depth of 30-40 cm. This strata is primarily comprised of Cosanga ceramics (81.0%), with a small proportion of Bermejo (14.6%) and Pituro (4.4%). An unusual heavily polished black andesite axe (No. 67) was recovered at a depth of 60-70 cm. This axe has concentrations of parallel striations along much of the surface, and is associated with both Cosanga (55.6%), Pituro (33.3%), and

too a lesser extent, Bermejo ceramics (11.1%). This piece is unique to the QVRAP axe assemblage, and therefore does not help to clarify the chronology of any formal tool assemblage.

3.2.5.5 Sardinas Chico

VQ021

This test yielded primarily Cosanga ceramics (95.0%) with a smaller proportion of Bermejo (4.3%) and Pituro (0.7%). At a depth of 20 – 30 cm a single small piece of Type 3 (bluish) andesite was recovered. This piece was worked and its exterior exhibits a natural river worn patina, which suggests the piece is early stage production debris. Though Type 3 andesite was primarily used in the production of axes, it has also been used for manos, hammerstones, pestles, and polishing stones. This stratum yielded primarily Cosanga ceramics (98.3%), along with a single Bermejo sherd.

VQ022

This test yielded primarily Cosanga ceramics (95.5%) with a smaller proportion of Bermejo (4.5%) and was excavated up to a depth of 140 cm where a number of complete and near-complete Cosanga pots were recovered in association with what may have been a tomb. A single polished greenstone flake was recovered at a depth of 120-130 cm, which yielded predominantly Cosanga ceramics (93.3%), with a small proportion of Bermejo (6.7%).

3.2.6 Late Period Central Places – Ceramic Associations

Intensive surveys of the Late Period central places of Pucalpa and Bermejo also yielded evidence to support the strong association between the QVRAP ground stone assemblage and the Late Period (Cuéllar 2011, personal communication).

3.2.6.1 Pucalpa

VQ049 yielded a single polished greenstone flake at a depth of 10-20 cm. This excavation yielded only Cosanga ceramics. Similarly, lot 1061 yielded a perforated greenstone axe (No.15) and lot 111 (No.90) yielded a piece of worked greenstone. These lots yielded only Cosanga ceramics. Lot 223 yielded the collection's single strategically designed pestle (No.5), along with two Cosanga sherds. Lot 458 was predominantly Cosanga (99%), with small proportion of Pituro (1%), and yielded a perforated greenstone axe (No.6) and a fragment possibly from a metate or mortar (No.7). Lastly, lot 174 was predominantly Cosanga (93%), with a small proportion of Pituro (7%), and yielded a single polishing stone (No.2).

3.2.6.2 Bermejo

Of the 24 lots that yielded ground stone materials, a majority (83%) were comprised solely of Late Period ceramics. Four lots also yielded Bermejo and/or Pituro ceramics, though with the exception of lot 3160 which yielded a large Type 2 rounded mano, along with 38 Cosanga and a single Bermejo, these lots did not yield diagnostically significant ground stone tools (i.e., unidentified or expedient tools). Tool types from these lots that can be directly associated with the Late Period are perforated

axes, one-handed bifacial manos, rounded manos, expedient pestles, celts, polishing stones, irregular manos, and metates.

Nine excavation units in Bermejo yielded ground stone materials, which were primarily recovered from depths where the predominance of Cosanga ceramics far outweighed those of Early Period materials, which are generally more frequent in the lower depths. In all cases, ground stone materials were recovered in association with Cosanga ceramics (Cuéllar 2011, personal communication). VQ085, at a depth of 70-80 cm, yielded a one-handed bifacial mano (No.75) in absence of Early Period materials. Other tool types indirectly associated with the Late Period are perforated axes, polishing stones, rounded manos, and metates.

To summarize, the test and collection units reveal that the QVRAP ground stone assemblage has, as a whole, a strong association with the Late Period. Most of the artifacts were recovered from the upper-most levels of excavation where Cosanga ceramics peak, whereas Bermejo and Pituro ceramics are more frequent in the lower levels. Moreover, these tests served to define the chronological placement of the perforated greenstone axes and one-handed bifacial manos within the Late Period. Though the QVRAP ground stone collection is largely associated with the Late Period, this does not preclude its presence from the Early Periods. There is evidence, however tentative, to suggest the presence of ground stone use before 500 AD. According to Porras (1975:fig. 32), the *Perforada trapeizoidal* was in use between 300 BC and AD 1200. Likewise, the second of two perforated axe forms, a longer, more irregularly shaped axe, is attributed to 300 BC to AD 400. Other tool types (not comparable in form to the QVRAP assemblage) were attributed to dates as early as the 300 BC. While there

is no reason to assume that ground stone tools were not being used before the beginning of the Late Period, Porras' classification schema does little to account for the formal variation of tool types that are clearly present within the Universidad Católica collection, let alone that of the QVRAP ground stone assemblage. Likewise, Porras' understanding of the chronology of the region, overall, is not reliable. It is plausible that ground stone axes, among other tool types, were present during the Early 1 and 2 Periods, yet the quantity and distribution of Early Period material remains are far less common within the archaeological record, making the potential for identifying Early Period ground stone even more challenging. What the data does suggest though is that ground stone was clearly being produced and consumed during the Late Period, which, possibly most important of all to this study, is a period characterized by the most visible transformations of social and political organization throughout pre-Columbian Quijos society.

3.3 GROUND STONE DISTRIBUTION AS A SYNCHRONIC WHOLE

This section will briefly outline and describe the distribution of the QVRAP ground stone assemblage as a whole. This includes all of the artifact distributions from the regional survey, the test units from 2002, as well as both of the intensively surveyed Late Period settlements. Given that all but two ground stone artifacts were recovered from contexts that yielded Late Period ceramics, which justifies a strong association with the Late Period, this section presents the distribution of the QVRAP ground stone assemblage as a synchronic whole. The areas in which ground stone were recovered from are primarily centered around the three Late Period central places in each arm of

the survey zone, but are also found among several of the smaller dispersed settlements along the Quijos River and the northern portion of the Cosanga River (Figure 3.4).

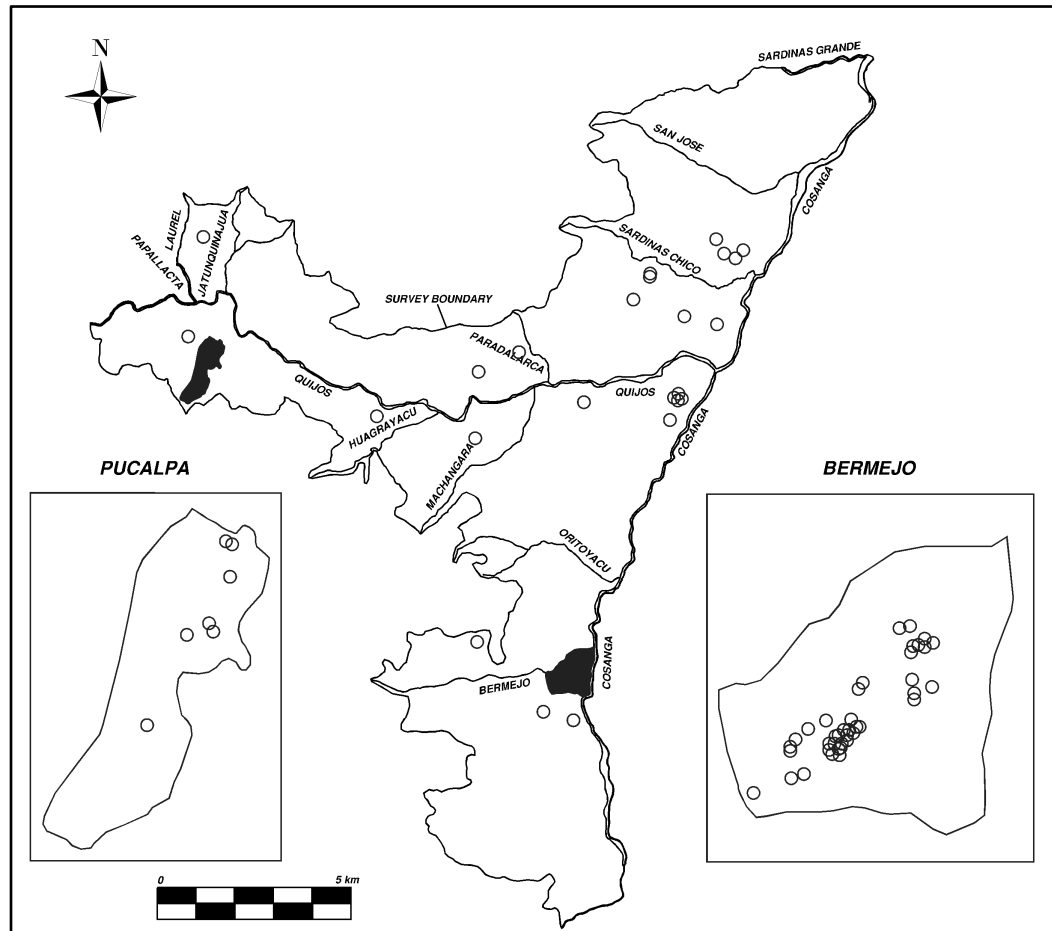


Figure 3.4: Distribution of ground stone artifacts as a synchronic whole.

By the Late Period, three large nucleated settlements emerged within the Quijos and Cosanga valleys, yet the majority of Early Period settlements underwent minimal growth or remained at low densities, suggesting that the dynamics of settlement did not generally tend towards nucleation, though this is by no means an absolute. The overall settlement tendency is in rather stark contrast to the three large Late Period population

concentrations, which have been interpreted as instances of individual chiefdoms or hierarchical polities (Cuéllar 2009a).

Having established a connection between the QVRAP ground stone assemblage and Late Period occupation (all but one artifact was found in association with Late Period ceramics), the next step is to determine the relationship between the spatial organization of ground stone distribution and that of the Late Period. The regional survey yielded important patterns related to the emergence of population aggregations during the Late Period, which, when compared to the percentage of total occupied area and total surveyed area within each subregion, presents a particular pattern of regional settlement dynamics.

The overall settlement distribution for the region by the Late Period is characterized by a concentration of occupation in the northeastern subregion and somewhat lower occupation densities in the northwestern and southern subregions. What is of particular interest to this model is that, between the Early 2 and Late Period two divergent patterns of settlement histories emerge. The northwestern subregion underwent a relatively sudden increase in density during the Late Period while the northeastern and southern subregions maintained a more regular pattern of growth from the earlier to Late Period (Cuéllar 2009a:51). In fact, the northwestern subregion increased in density more than 20 times in relation to the Early 2. If we exclude the artifact count of lot 1166 (Table 3.4), the percentage of ground stone artifacts in each subregion appears to roughly correspond to the percentage of the total occupied area. However, when this lot is included, the dynamic changes somewhat. The southern subregion now yields 55% ($n = 29$) of the regional survey ground stone assemblage. Moreover, roughly 68% ($n = 59$) of

the entire QVRAP ground stone assemblage was recovered from the southern arm. Excavations at the Late Period central place of Bermejo in the southern subregion have yielded a substantial amount of materials, especially when compared to the Late Period central Place of Pucalpa in the northwestern subregion.

Table 3.4: Distribution of regional survey ground stone by subregion.

| Subregion | % of Total Surveyed Area | # of Lots / # of Ground Stone | % of Ground Stone Artifacts | % of Total Occupied Area (Late Period) |
|--|--------------------------|-------------------------------|-----------------------------|--|
| Northwest | 27% | 4 / 4 | 13.7% (26.7%*) | 18% |
| Northeast | 41% | 9 / 9 | 31.0% (60.0%*) | 59% |
| South | 31% | 3/16 (2 / 2*) | 55.2% (13.3%*) | 22% |
| *excluding the lot and artifact count for Lot 1161 which contained 14 ground stone tools | | | | |

The greatest range of ground stone artifact distributions are concentrated at 2000-2200 meters above sea level (Table 3.5), which, of the 623.1 ha of Late Period occupation, nearly 60% appear at the 2000-2000 m range (Cuéllar 2009a:73).

Table 3.5: Distribution of regional survey ground stone by elevation zone.

| TOTAL DISTRIBUTION OF STRATIGRAPHIC TEST UNIT, REGIONAL, AND INTENSIVE SURVEY GROUND STONE ARTIFACTS BY ELEVATION ZONE | | | | | | | |
|--|------|------|------|------|------|------|------|
| Elevation Zone | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 |
| Count | 0 | 8 | 19 | 51 | 9 | 2 | 0 |
| % of QVGS | 0 | 8.3 | 22.6 | 57.1 | 9.5 | 2.4 | 0.0 |

To briefly summarize, this chapter has served to define the chronological association between the QVRAP ground stone assemblage and the Late Period. Tool types such as the perforated greenstone axe and loaf mano were recovered from contexts that yielded only Late Period ceramic materials, while other tool types were recovered from contexts that yielded both Early and Late Period ceramics. When viewed as a synchronic whole, the distribution of the QRAP ground stone assemblage is dispersed

throughout the study zone, with the greatest concentrations of artifacts found within the southern subregion and along the Cosanga River and the eastern extent of the Quijos River.

4 CHAPTER 4: GROUND STONE AND SOCIAL DIFFERENTIATION

4.1 INTRODUCTION

This chapter aims to explore the QVRAP ground stone collection in relation to the extent to which the ground stone economy, and ground stone craft production more specifically, was a dimension of social differentiation in the Quijos and Cosanga valleys during the Late Period. The objective is to determine whether patterns of ground stone production, distribution, and consumption are available to either support or reject the following scenarios: A.) whether the production of ground stone tools was specialized and/or under the direct sponsorship or patronage of elites; B.) whether the access to and circulation of certain raw materials used in ground stone production were restricted to particular segments of Quijos society, and; C.) the relationship between social status and the potential diversification of productive activities among the Late Period central places.

4.2 SPECIALIZATION AND GROUND STONE PRODUCTION

One of the initial aims of this study was to determine to what degree, if any, specialized craft production may have been employed during the production of ground stone tools, and in turn, to what extent this may have been a dimension of social differentiation during the Late Period. Many different theoretical approaches exist that deal with production on various social and organizational levels. Several dominant approaches have involved the study of morphological homogeneity among artifact assemblages as indicators of attached production (e.g. Costin and Hagstrum 1995), or focused on the spatial concentration of particular artifacts between different households

or household groupings as indicators of spatially distinct craft production areas (e.g. González 2007). While the latter will be explored in Section 4.4 of this chapter, this section primarily aims to examine whether there is any degree of homogeneity among the QVRAP axe assemblages, and if so, whether this would constitute some form of attached specialization.

The production of craft goods is commonly seen to be attached when goods that are produced under the direct patronage or sponsorship of elites are almost exclusively circulated and consumed among elites, ultimately serving as a means to legitimize or maintain political authority (Junker 1994:3). As stated previously, in order to test whether Late Period ground stone production in the Quijos and Cosanga valleys was a form of attached specialization, I would expect that certain forms of ground stone tools would exhibit a high degree of standardization. The basic tenet of the standardization hypothesis is that attached producers tend to make more standardized tools, which ultimately reflect organized and efficient manufacturing techniques. In turn, this would allow for the production of significant quantities of a particular product. Standardization is particularly useful when direct evidence of specialized production areas, such as large-scale workshops or quarrying sites are lacking within the archaeological record.

Given that the QVRAP ground stone assemblage is comprised of a fairly diverse selection of both informal expedient tools and formal strategically designed tools, which in and of itself is telling, only a small selection of tools are directly comparable for evidence of standardization. This section examines the presence of three heavily polished and quite small perforated axes, the perforated greenstone axe assemblage more generally, and a cache of ground stone artifacts (primarily axes) recovered from the Late

Period central place of Bermejo. My criteria for comparing axes and not other tool forms is largely due to the formal nature of the tool, which unlike other tools such as manos and polishing, axes retain much of their original shape. Furthermore, the axe is one of the most prevalent tool types within the QVRAP assemblage (33%), while other tool assemblages are quite small and often geographically dispersed.

4.2.1 Small Perforated Axe Production

As discussed in Chapter 3, the regional survey yielded two small, heavily polished perforated axes, and an additional small perforated axe (No. 69) was recovered within the Late Period central place of Bermejo during the intensive survey. The first two axes are of a visually identical material (Type 3 – blue/grey andesite) with flat bases and sides forming the overall design. The first (No. 8) is smaller in length by 1.78 cm, which is consistent with a transverse break above the perforation along the distal end, resulting in a reduction in overall length. Likewise, the second (No. 32) is broken diagonally along the perforation, resulting in a reduction of overall width. Measurements taken of greatest thickness, the thickness of the base, and the inner and outer diameters of the perforations are nearly identical (Table 4.1, Figure 4.1). So, qualitatively speaking, these two axes share many characteristics that may suggest standardized manufacturing techniques.

Table 4.1: Comparison of small perforated axes.

| Ref. # | Length (cm) | Width (cm) | Thickness (cm) | Thickness of Base (cm) | Weight (g) | Diameter of Inner-Hole (cm) | Diameter of Outer-Hole (cm) |
|--------|-------------|------------|----------------|------------------------|------------|-----------------------------|-----------------------------|
| No. 08 | 3.78 | 4.58 | 1.67 | 1.20 | 57 | 0.82 | 1.84 |
| No. 32 | 5.50 | 3.60 | 1.50 | 1.28 | 41 | 0.80 | 1.85 |
| No. 69 | 4.10 | 3.00 | 1.60 | 1.40 | 25 | 1.00 | 1.55 |

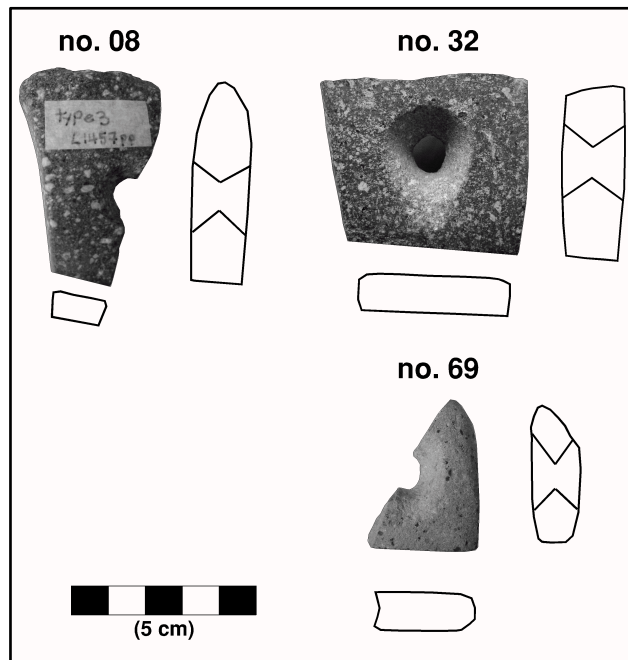


Figure 4.1: Comparison of three small perforated axes.

The homogeneous nature of the first two axes does seem to suggest that, at the very least, the same producer manufactured these axes. Yet, is the homogeneity of form enough to consider this as direct evidence of attached specialization? I believe that this was most likely not the case and several other factors need to be considered. First, axe No. 32 was recovered west of Baeza, near the Huagrayacu River, and No. 08 was recovered north of Baeza, near the Paradalarca River (separated by approximately 4 kilometers). While one was recovered from a relatively small Late Period settlement, the

other was recovered from an area with an almost non-existent Late Period population. This does not directly suggest that the consumption of these items were concentrated within or around areas of elite habitation. However, a third small perforated axe (No. 69) was recovered from the Late Period central place of Bermejo. Although this axe was not produced from the same material, the overall measurements and form are very similar to that of the two axes recovered along the Quijos River. This axe, like No. 32, is diagonally broken along its perforation and is characterized by a flat base and flat sides. This axe appears to have broken during its manufacture. Though the axe was recovered from an area marked by various productive tools and lithic debitage, also suggesting it was manufactured in this area, if we consider these three axes as a single tool “type”, the presence of the two other small axes outside of elite areas does not suggest an overall restriction of this tool form to the chiefly centers alone.

Interestingly, the size of the axes leads me to believe that they would not have been very functional as tools, and may actually have served as adornments. However, axe No. 32 shows possible evidence of use-wear along the distal end/edge, and the near-vertical breakage along the perforation is characteristic of breakage during either production or use. Similarly, axe No. 8 is medially broken above the perforation, which, although not as common, is characteristic of breakage along a fault internal to the material, which results in breakage during use (Dickson 1981). At this point I am hesitant to guess as to a possible function of these axes, however it is plausible, given their size, that if they were used, they would have been better suited for more intricate or small-scale woodworking than the larger perforated axes. If the damage found along the edge of the one axe (No. 32) resulted from use, then the use of an axe this size,

especially when hafted, is far from an optimal and efficient tool form for regular use. At the most, a complete axe of this size would not weigh more than 65-75 g, which, when hafted would have little force behind it (unless additional weight was somehow added). The average weight of the larger perforated axes range between 150 and 300 g, with the heaviest axe weighing 407 g. In Figure 4.2, a simple stem-and-leaf chart is used to show the weight distribution of all of the complete or near-complete perforated axes from the QVRAP ground stone assemblage, with the three smaller axes represented between 00-99 g.

| Weight (g) | Stems | Leaves | | |
|------------|-------|--------|---|--------------|
| 25 | 0 | 25 | | |
| 41 | 0 | 41 | | |
| 57 | 0 | 57 | 0 | <div>□</div> |
| 68 | 0 | 68 | 0 | <div>□</div> |
| 102 | 1 | 02 | 1 | <div>□</div> |
| 161 | 1 | 61 | 1 | <div>□</div> |
| 207 | 2 | 07 | 2 | <div>□</div> |
| 220 | 2 | 20 | 2 | <div>□</div> |
| 236 | 0 | 36 | 2 | <div>□</div> |
| 271 | 2 | 71 | 3 | <div>□</div> |
| 380 | 3 | 80 | 3 | <div>□</div> |
| 407 | 4 | 07 | 4 | <div>□</div> |
| | | | 4 | <div>□</div> |
| | | | | (00 - 49) |
| | | | | (50 - 99) |
| | | | | (100 - 149) |
| | | | | (150 - 199) |
| | | | | (200 - 249) |
| | | | | (250 - 299) |
| | | | | (300 - 349) |
| | | | | (350 - 399) |
| | | | | (400 - 449) |
| | | | | (450 - 499) |

Figure 4.2: Comparison of perforated axe weight.

Likewise, if, as discussed earlier, the perforation served to house a transverse pin or hafting cordage, the smaller the diameter of the inner-perforation, the smaller the pin or amount of cordage able to fit through the perforation. Figure 4.3 presents a stem-and-leaf chart of 15 perforated axes, which situates two of the smaller axes between 0.60 and 0.99 mm, and the third axe (No. 69) falling just below the lowest diameter radius of the larger axes (1.00-1.19 cm).

| Diameter (cm) | Stems | Leaves | | | |
|---------------|-------|--------|---|--|---------------|
| 0.79 | 0 | 79 | | | |
| 0.80 | 0 | 80 | | | |
| 1.00 | 1 | 00 | | | |
| 1.05 | 1 | 05 | 0 | | (0.40 - 0.59) |
| 1.12 | 1 | 12 | 0 | | (0.60 - 0.79) |
| 1.14 | 1 | 14 | 0 | | (0.80 - 0.99) |
| 1.17 | 1 | 17 | 1 | | (1.00 - 1.19) |
| 1.21 | 1 | 21 | 1 | | (1.20 - 1.39) |
| 1.22 | 1 | 22 | 1 | | (1.40 - 1.59) |
| 1.31 | 1 | 31 | 1 | | (1.60 - 1.79) |
| 1.46 | 1 | 46 | 1 | | (1.80 - 1.99) |
| 1.49 | 1 | 49 | 1 | | |
| 1.55 | 1 | 55 | | | |
| 1.56 | 1 | 56 | | | |
| 1.71 | 1 | 71 | | | |

Figure 4.3: Comparison of inner-perforation of axes.

I suggest here that the three small axes most likely served a purpose beyond utilitarian function. The production of these items, in my opinion, is not one of economic rationalization, but possibly a form of symbolic consumption, though I cannot rule out the possibility that these axes may have been used for more intricate craft activities, such as woodworking. As established earlier, the first two small perforated axes were recovered from contexts that only yielded Late Period ceramics (see Chapter 3). Though these axes share enough similarities to suggest, at the very least, the existence of a formal understanding of production and design, the location of the two axes within smaller settlements along the Quijos River demonstrates that the distribution of these items was not restricted to Late Period central places, nor does it directly suggest a scenario of attached production. I would also argue that if these axes were the product of a standardized means of manufacture, they would be more prevalent among the axe assemblage as a whole, yet they comprise less than 10% of all axes recovered within the region.

4.2.2 Greenstone Perforated Axe Production

As discussed in Chapter 3, the perforated greenstone axe assemblage (Figure 4.4) shares some basic formal characteristics, and this section seeks to determine whether the Late Period perforated greenstone axes were the result of an attached form of specialized craft production. These axes are characterized by flat, or slightly concave, bases and curved sides, and were recovered from contexts that primarily or, in the case of two of the axes, exclusively yielded Late Period ceramics. Outside of one example recovered from the Late Period central place of Bermejo, all of the perforated greenstone axes were recovered from the northern subregion of the survey area. Table 4.2 presents a comparison of the QVRAP greenstone perforated axe assemblage.

Table 4.2: Comparison of greenstone perforated axe assemblage.

| Provenience (Ref. #) | Length (cm) | Width (cm) | Thick (cm) | Weight (g) | Diameter of Inner-Hole (cm) | Diameter of Outer-Hole (cm) | Base/Side Type |
|-------------------------|----------------|---------------|---------------|---------------|-----------------------------------|-----------------------------------|----------------|
| Lot 458 (No. 06) | 5.40 | 8.10 | 2.80 | 204 | - | - | Flat/Curved |
| Lot 954 (No. 12) | 6.60 | 4.20 | 2.60 | 73 | 1.71 | 2.72 | Flat/Curved |
| Lot 1061 (No. 15) | 6.50 | 3.40 | 1.50 | 42 | 1.56 | 2.53 | Flat/Curved |
| Lot 1320 (No. 30) | 8.90 | 8.00 | 2.50 | 236 | 1.46 | 3.04 | Flat/Curved |
| VQ012 (No. 64) | 5.30 | 4.50 | 1.80 | 71 | 0.80 | 2.06 | Concave/Curved |
| VQ001 (No. 65) | 4.80 | 5.80 | 1.80 | 68 | 1.17 | 2.53 | Concave/Curved |

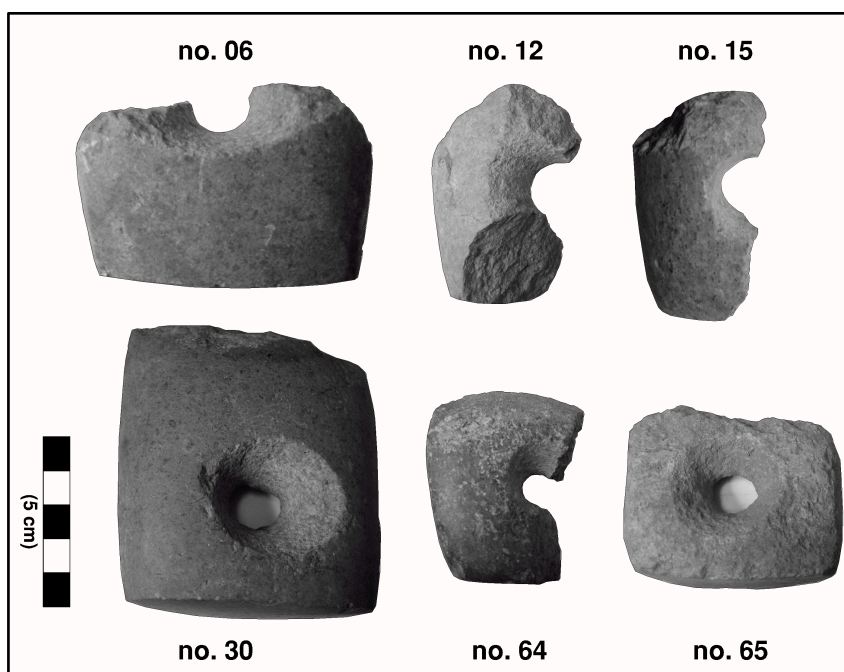


Figure 4.4: Comparison of perforated greenstone axe assemblage.

Though the axes do share some basic formal characteristics, an analysis of the basic attributes, such as overall length, width, thickness, and the diameters of the inner- and outer-perforations, highlights the variability in overall size and form of this assemblage. As discussed previously, the difficulties of verifying the provenience of artifacts from local privately owned ground stone collections cannot be overstated, yet an analysis of a privately owned ground stone collection from the Late Period central place of Pucalpa (Table 4.3) does serve to explicate the nature of QVRAP greenstone perforated axe assemblage overall, if not somewhat tentatively. I believe a comparison of this nature warrants consideration given that the landowner who holds the collection has lived on and worked the land for over 50 years, and the site itself is relatively isolated in comparison to other *fincas* (farmsteads) in the area. The collection consists of five

perforated axes, one T-shaped axe, several unmodified handstones, and a small mortar made of vesicular basalt. All of the axes were produced from greenstone.

Table 4.3: Comparison of Pucalpa greenstone perforated axe collection.

| Reference | Length (cm) | Width (cm) | Thickness (cm) | Portion | Diameter of Inner-Hole (cm) | Diameter of Outer-Hole (cm) | Base/Side Type |
|-----------|-------------|------------|----------------|----------|-----------------------------|-----------------------------|----------------|
| a. | 8.90 | 8.60 | 2.80 | Complete | 1.68 | 3.70 | Flat/Curved |
| b. | 5.1 | 6.35 | 2.70 | Fragment | 1.20 | 3.00 | Flat/Curved |
| c. | 6.40 | 7.11 | 2.70 | Fragment | 1.36 | 2.48 | Flat/Curved |
| d. | 6.35 | 6.85 | 2.50 | Complete | 1.30 | 2.50 | Concave/Curved |
| e. | 8.91 | 8.80 | 3.00 | Complete | 1.80 | 2.90 | Flat/Curved |

Earlier, I had presented the idea that the prominence of greenstone artifacts within the northern subregions, and specifically in the Late Period central place of Pucalpa, seemed to suggest Pucalpa might have been a locus of perforated greenstone axe consumption, if not production. The QVRAP perforated greenstone axes and those of the private collection from Pucalpa tend to share some basic characteristics with each other. The bases of the axes are all flat or slightly convex and the sides are curved. The diameters of the inner-perforations range anywhere from 0.80 to 1.80 cm. Likewise, the diameters of the outer-perforation range between 2.50 and 3.70 cm. The overall measurements of greatest length, width, and height, between the larger axes of the two collections is somewhat more telling, though neither of the complete perforated greenstone axes of the QVRAP assemblage were local to Pucalpa (one was recovered from Bermejo, while the other was recovered from the site of La Palma in the northeastern subregion). Though not beyond the realm of possibility, there is little evidence to support the idea of a localized and standardized means of producing perforated greenstone axes. That said, though the overall sizes of the axes vary somewhat, morphological similarities, at their most basic, suggests that localized ideas

of basic tool form existed in more than one area, and appear to have been concentrated in the northern subregions more generally. At the time of writing, only two greenstone artifacts have been recovered from the Late Period site of Bermejo, which include a complete greenstone axe (No. 30) and a single greenstone bead recovered during the regional survey.

As discussed in Chapter 2, greenstone river cobbles have been positively identified in the Quijos, Cosanga, Papallacta, and Aliso rivers. For the most part, these were identified in the form of large boulders along the banks or within the rivers themselves, or as small riverworn pebbles. I did not encounter any river cobbles of adequate size for producing perforated greenstone axes, though a more systematic survey of the region's riverine system in the future may shed further light on this. It is possible that suitable greenstone cobbles are less common today than they were in the past, as a result of human exploitation. In a similar case, Stroulia (2003) suggested that raw materials used in the production of celts in the Northeastern Peloponnese of Greece might have been significantly reduced from river sources through human exploitation. Regardless, greenstone artifacts are almost exclusively found within the Quijos Valley, where evidence of both production and consumption exist. Evidence of production has not been identified in the southern subregion, and outside of the single perforated greenstone axe (No. 30) from Bermejo, evidence for consumption is nonexistent. Moreover, of the 10 axes recovered from the cache at Bermejo (below), which represent a fairly broad range of material and formal characteristics of axes found in the southern subregion, greenstone was not used in their production. All of which may suggest the movement of this artifact type into the Cosanga Valley during the Late Period. While

future research will aid in addressing the nature of greenstone production, distribution, and consumption throughout the Quijos and Cosanga valleys, at present, an examination of the QVRAP perforated greenstone axe assemblage does not support a scenario of attached production.

4.2.3 The Bermejo Cache

Possibly one of the more unusual characteristics of the QVRAP ground stone assemblage is the presence of a large number of axe-heads recovered from a single shovel probe during the extensive regional survey in 2002. This section aims to analyze this collection in relation to its potential for furthering our understanding of ground stone production and consumption. As the previous two sections have suggested, it does not appear to have been the case that any form of attached specialization of ground stone tools was occurring during the Late Period. Given that this collection of axes was recovered from the Late Period central place of Bermejo, an analysis of this collection provides, in addition to the greenstone axes at Pucalpa, another avenue of exploring Late Period axe production at a central place. Alternatively, if an analysis of this collection, which I refer to as a cache, further supports a model of part-time independent craft production, the unique nature of the Bermejo cache itself may shed further light on other social aspects of ground stone production and consumption.

The Bermejo cache (lot 1166) yielded two Bermejo, eight Pituro, and 259 Cosanga sherds, alongside 14 ground stone artifacts. Interestingly, it also yielded 190 pieces of obsidian, which is the largest single concentration of obsidian recovered from the regional survey (Knight 2009) as well as being roughly four times the size of the second largest concentration of obsidian found within lots also containing ground stone

(12 lots yielded both obsidian and ground stone materials). Initial impressions of the overall condition and characteristics of the recovered ground stone tools might suggest that this was a secondary refuse deposit on the periphery of an area of production, or evidence of provisional discard, in which broken yet still potentially useful items are stored for future use (Tani 1995:234). However, on closer inspection, the collection of ground stone tools has a number of unusual characteristics that may be suggestive of something entirely different.

The Bermejo cache is comprised of seven perforated axes, three square axes, two unidentified pieces, an unusually shaped axe (No. 28), and a large strategically designed hammerstone, which was likely meant to be hafted. Roughly half of the axes exhibit evidence of use or are fragmented in a manner that would suggest that they were broken during use. By itself, this would suggest that this was simply a midden of broken axes, however, the inclusion of two complete perforated axes, one of which shows no evidence of having been used, further complicates my initial interpretation of this cache. Furthermore, the heterogeneity of the tools, in both form and material, may suggest production from various part-time craft producers rather than a single workshop. The following sections present a detailed discussion of the cache based on the characteristics of each individual tool types.

4.2.3.1 Perforated Axes

The formal and material variation found between the perforated axes is telling. Of the seven perforated axes recovered from the cache, three were produced from Type 4 andesite (No. 16, No. 17, and No. 21), two axes were produced from Type 8 metamorphic dacite (No. 18 and No. 22), and the remaining two (No. 19 and No. 20)

were produced from Type 2 and Type 3 andesites respectively. No. 16 is a complete axe with a flat base and flat sides. Polishing striations parallel to the working edge are visible along the distal end of the piece, which, had the axe been used, would have been replaced by abrasive damage and transverse striations caused by use. The second complete perforated axe (No. 17) is comprised of the same material and shares some of the overall dimensions as the first, yet is characterized by curved sides and shows clear evidence of use and edge curation, which most likely reduced the overall length of the piece from its original form. The presence of two fully functional axes alone would suggest they were cached for future use, yet in association with the other artifacts, this interpretation seems less likely.

Three of the perforated axes (No. 18, No. 19, and No. 20) are largely fragmentary and were most likely broken during use. The first (No. 18) is characterized by a flat base and curved, almost edge-like, sides. The piece is broken diagonally across the middle, yet just outside of the perforation. This would suggest that the piece was broken during use, rather than as a result of production. As discussed previously, the process of perforation weakens the integrity of a tool, which may result in a transverse break either during the boring process or during use, which, as in the case of axe No. 19, could have been the result of either process. This axe is also characterized by a flat base and curved sides and was produced from Type 2 andesite, which as of this writing, has only been identified within Bermejo. The final axe fragment (No. 20) is comprised of the same bluish andesite (Type 3) with large crystalline inclusions, the same as the two small axes recovered along the Quijos River (as well as the unusually shaped axe discussed below). The piece itself is a large thin flake off one of the faces of a perforated axe. The only

measurable diagnostic attribute is the diameter of the outer-perforation, which at 3.30 cm, is in the upper ranges of outer-hole diameters, suggesting that the axe would have been larger than most axes in the QVRAP perforated axe assemblage. Figure 4.5 presents the perforated axes recovered from the Bermejo Cache.

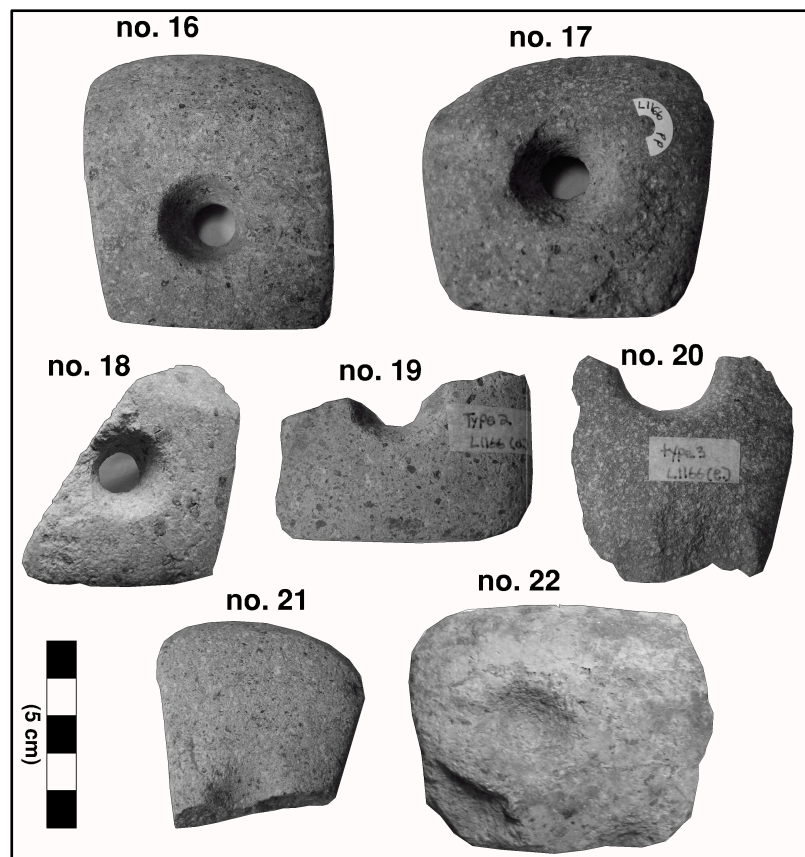


Figure 4.5: Bermejo cache perforated axes.

The remaining two perforated axes (No. 21 and 22) are also telling of the nature of the cache as a whole. The first (No. 21) is the unfinished distal end of an axe, which, given the transverse break along the incomplete perforation, was clearly broken during production. The length of this piece is estimated to be around 8 cm, which puts it in line with other medium sized perforated axes. This axe is very similar to a perforated axe

recovered from another test unit (VQ027, No. 58) located in Bermejo. Both are broken distal ends with flat sides and are broken along their perforations, while the latter appears to have broken early on in its life, rather than during production. A tapering proximal end and wider distal end characterizes their overall form. The final perforated axe (No. 22) is rather unusual in several regards. Like axe No. 21, the piece is unfinished, yet did not break during production. A perforation was started on the “front” face to a depth of 0.85 cm, with a slight depression on the opposing face. This seems to suggest that the process of perforation was initiated from each side, which corresponds to the “hourglass” shape of perforation inherent to the QVRAP perforated axe assemblage. Interestingly, this piece was not finished, yet the deteriorated nature of the axe’s surface, as well as considerable damage to the proximal end might suggest secondary use and post-depositional damage. Given the overall condition of the rest of the axes, if the damage done to the surface of the axe resulted from post-depositional processes, they did not occur within this particular depositional context. This might suggest that this piece was collected from another context and re-deposited here. Both No. 21 and No. 22 helped define the stages of production inherent to the QVRAP perforated axe assemblage. These pieces suggest that late stage production most likely entailed the complete polishing of axes, after which the piece would have been worked from each side until meeting in the center of the axe, resulting in the characteristic “hourglass” perforation.

4.2.3.2 Square Axes

The analysis and identification what I refer to as square or regular axes is far from straight forward. Within the QVRAP ground stone assemblage are seven axes categorized as regular axes, which in part, covers artifacts that were broken in such a

manner that it is not possible to determine if they were originally a piece from a perforated axe (No. 46), or other tool forms that are unique to the QVRAP assemblage (No. 4 and No. 28). The Bermejo cache yielded three square axes (No. 23, No. 26, and No. 27) (Figure 4.6) that, outside of one example (No. 34, see Appendix A) located in far northwestern corner of study area near the meeting of the Papallacta and Quijos rivers, are not represented anywhere else among the collection. Overall, these three pieces are characterized by their square shape, with flat sides, rough and uneven bases, dull working edge, and a courser surface than other hafted artifacts in the QVRAP ground stone assemblage (which appear to have been pecked, yet not heavily polished). Both No. 23 and No. 26 have fairly straight bases, while the base of axe No. 27 is uneven. Though there is some evidence of damage among these pieces, the fact that they appear to be unpolished and unperforated, yet complete tools, may suggest that these are perforated axe preforms. At its most basic, these pieces appear to be unfinished. At this point, this identification remains tentative, yet the presence of square axes within the QVRAP ground stone collection is minimal in comparison to the dominant perforated axe form, suggesting an overall preference for perforated axes. Porras (1975) identified several non-perforated axe types, yet these tool forms do not coincide with the square axe form as defined here. It is plausible that the square axes are actually preforms or blanks, yet this remains unclear at this point. Preforms or blanks have often served as a means of incomplete shaping, which reduces the overall material and weight of the stone, allowing for easier transportation of the item before reaching the point of final production through grinding, pecking, or flaking. The use of preforms in the Quijos and Cosanga valleys may have served as a means of storing raw materials, which would have

been particularly important during the rainy seasons when rivers were frequently inundated and access to raw materials in the form of river cobbles would have been limited. Preforms or blanks may have also taken the form of simple, unworked river cobbles, which have been identified in the upper parts of Bermejo within several excavations (e.g. several river cobbles were noted in excavations along the flat hilltop of Bermejo, which measured approximately 60 x 20 cm. One of these was of a Type 3 blue/grey andesite, which is a material frequently used in the production of ground stone tools).



Figure 4.6: Bermejo cache square axes.

A final feature unique to the Bermejo cache is the inclusion of axe No. 28, which remains unique to the QVRAP ground stone collection. This piece is made of Type 4 andesite and measures approximately 12 cm in length and is characterized by a broad roundish distal end measuring almost 7 cm in width, tapering down to 3 cm in width at

the proximal end. One side has been flattened, serving to define the overall shape of the tool. The tool shows evidence of damage along the working edge and breakage along the proximal end. Clusters of parallel striations are present, indicating late stage polishing/finishing. Though the material type is common to the Quijos and Cosanga valleys, this tool form was not identified anywhere else in the study region and its presence within the Bermejo cache may have served a significant purpose, though this remains unclear at this point. Figure 4.7 presents four artifacts unique to the Bermejo cache. This includes the unusual axe (No. 28), what may be a large hammerstone or unfinished axe (there is an interesting incised line that runs around the top half of the tool) (No. 29), also what may be a roughly formed axe (No. 24), and an as yet identified piece of worked stone (No. 25).

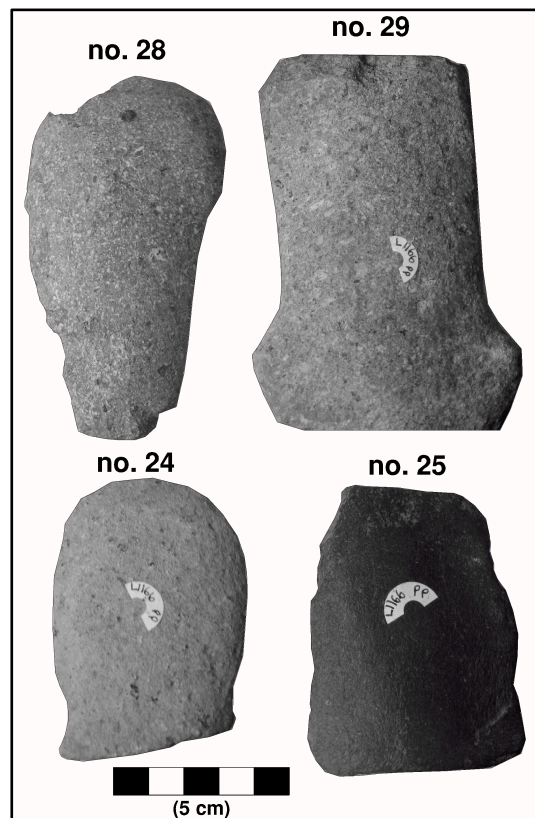


Figure 4.7: Bermejo cache other artifacts.

To summarize, the Bermejo cache presents a unique chance to explore Late Period ground stone tool use within Bermejo, which is characterized by:

- The heterogeneity of tool forms and raw material used in their production;
- The diversity of stages of production, which range from (possible) preforms, unfinished pieces, an unfinished piece with evidence of secondary use, a finished unused piece, and finished used pieces;
- The presence of tool forms common to the region, as well as the presence of two tool forms not found outside of the Bermejo cache;
- The various conditions of the artifacts, which, at least in one case (No. 22), may suggest that a discarded or recycled tool was collected and redeposited within this specific context.
- All of which leads to the hypothesis that this cache may have served a purpose beyond that of a production midden or secondary refuse deposit.

It is not unheard of in the Andes for domestic or utilitarian tools (which, at times, may have been ritually broken) to be cached as a form of ritual consumption. At the Early Formative site of Real Alto located within Ecuador's Santa Elena Peninsula, Marcos (1978:39-42) reported several pottery and ground stone caches in association with ceremonial mounds, including a high status female burial lined with broken metates and manos. Likewise, in the Jequetepeque Valley of northern Peru, a cache of fishing net weights was recovered from a Late Moche Period ceremonial mound (Swenson 2007:273). At a Wankarani site in the central Bolivian highlands, Bermann and Castillo (1995) argued that patterns of differential discard and the caching of ground stone artifacts within households is evidence of domestic items being used for ritual purposes.

The authors suggested that the ground stone implements, particularly the presence of both used and unused agricultural hoes found in ritual caches, may have served in household rituals related to “house dedication or abandonment” (1995:397). Other, less utilitarian items, such as ceramic figurines, have been reported as ritually cached items in association with the Formative Chorrera culture in southeastern Ecuador (Cummins 2003), among other documented cases in the northern Andes. What is of interest here is the possibility of viewing material aspects of ritual within the archaeological record. The caching of ritual objects may have served a variety of purposes, as has been documented in various ethnographic and archaeological contexts around the world (e.g. Eastern North America: Johnson and Brookes, 1989; Mesoamerica: Lucero 2003; New Guinea: Hampton 1999; North West England: Bradley and Edmonds 1993; Southern Cook Islands: Walter and Sheppard 1996; Western Siberia: Fitzhugh and Golovnev 1998). In a similar fashion to Bermann and Castillo (1995), Pauketat and Alt (2004) presented a scenario in which the caching of axe-heads in prehistoric Mississippi may have served as a sort of integrative commemorative ritual through which peripheral and local populations were able to consolidate within the greater framework of Cahokian social and political order. The act of ritual caching may have been the culmination of a series of activities that involved the felling of trees, clearing of land, and construction of a newly founded settlement, followed by commemoration through the ritualized caching of the tools used during these activities. If anything, the following discussion has presented a range of interpretive possibilities of stone tool caching that goes beyond general economic practices of storing items for future needs and uses. Though further investigation of the context in which the Bermejo cache was recovered from may serve

to clarify these interpretations, I suggest that the evidence does not support a model of provisional discard or use as a secondary refuse deposit. Rather, the particular purpose of this axe-head cache may be something more akin to some form of agricultural ritual associated with the clearing and maintenance of land at Bermejo, or possibly even one associated with the foundation of Bermejo as a Late Period nucleated settlement (though I find the latter argument a far greater challenge to make without additional evidence). Regardless, if we choose not to follow this interpretation, the cache still provides further direct evidence of perforated axe production at the Late Period central place of Bermejo, yet does not support a model of attached specialization.

To briefly summarize, this section has analyzed three separate axe assemblages for potential indicators of standardized production. The fact that these tools do not appear to have been produced by attached specialists seems to be more or less in line with the overall formal and materials diversity of the QVRAP ground stone assemblage as a whole. Furthermore, the basic tool forms, as discussed in the following section, do not appear to have been restricted in their distribution. All of which leads me to conclude that, during the Late Period, the production of ground stone tools was not under the direct sponsorship or patronage of elites.

4.3 ACCESS TO AND DISTRIBUTION OF RAW MATERIALS

The second scenario, that of the restricted participation in the acquisition and exchange of non-local resources and the subsequent manufacture of goods is thought to be another means through which elites gained and maintained authority (Hayden 1998). In general, the basic premise of this model is that restricted access to key resources and the goods produced from them allows specialized producers an economic advantage over

other producers and consumers, which served to limit the sociopolitical and economic benefits inherent to the exploitation of these resources to a particular segment of society. This study has aimed to determine whether the access to and circulation of certain raw materials used to produce ground stone tools were restricted to particular segments of Quijos society, or conversely, whether the access to these materials was unrestricted and open to all segments of Quijos society.

4.3.1 Raw Material Distributions

This section details the distribution of ground stone tools and debitage by raw material type.

4.3.1.1 Type 1 Greenstone Material Distribution

By means of preliminary investigations of potential raw material sources (see Chapter 2), greenstone was identified within the Papallacta, Quijos, and Cosanga rivers. One aspect of this survey examined the northwestern portion of the study zone, in particular around the confluence of the Papallacta and Quijos, as well as several other areas of the Quijos River in the northwestern subregion. This initial investigation, alongside a detailed analysis of the Pucalpa ground stone assemblage, suggests that greenstone cobbles, of varying quality, may have been common to the northwestern subregion during the Late Period. However, a material survey of the Quijos River along the northeastern arm may serve to clarify the relationship between greenstone in the northwestern and northeastern subregion. Aside from one example found in Bermejo, all of the greenstone axes are limited to the northern subregions (Figure 4.8).

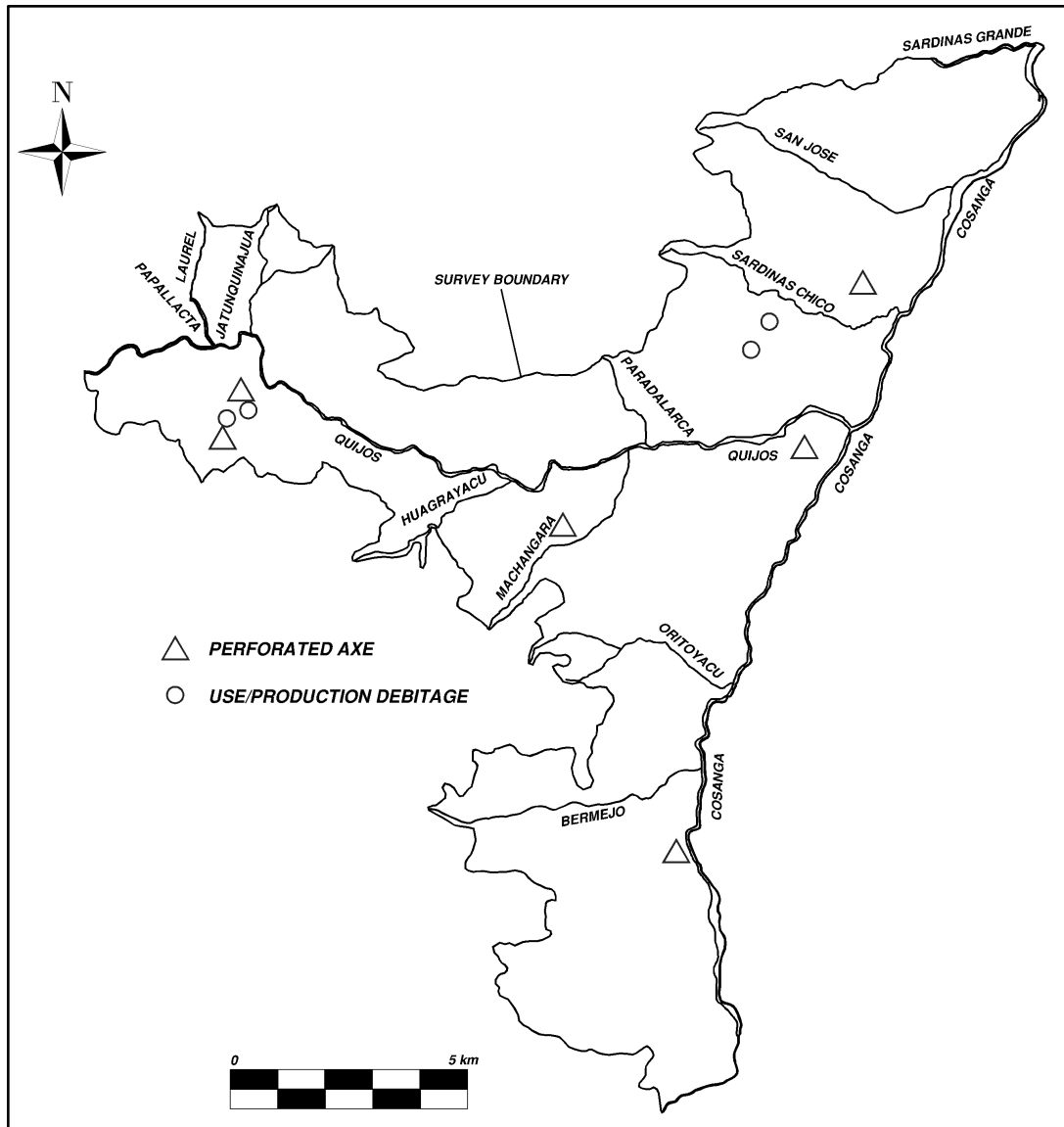


Figure 4.8: Greenstone distribution.

4.3.1.2 Type 2 Andesite Distribution.

The distribution of Type 2 “cookie” andesite is limited to the Late Period central place of Bermejo (Figure 4.9). Though Type 2 andesite has only been recovered from the southern subregion, the material has been identified throughout many of region’s rivers and tributaries.

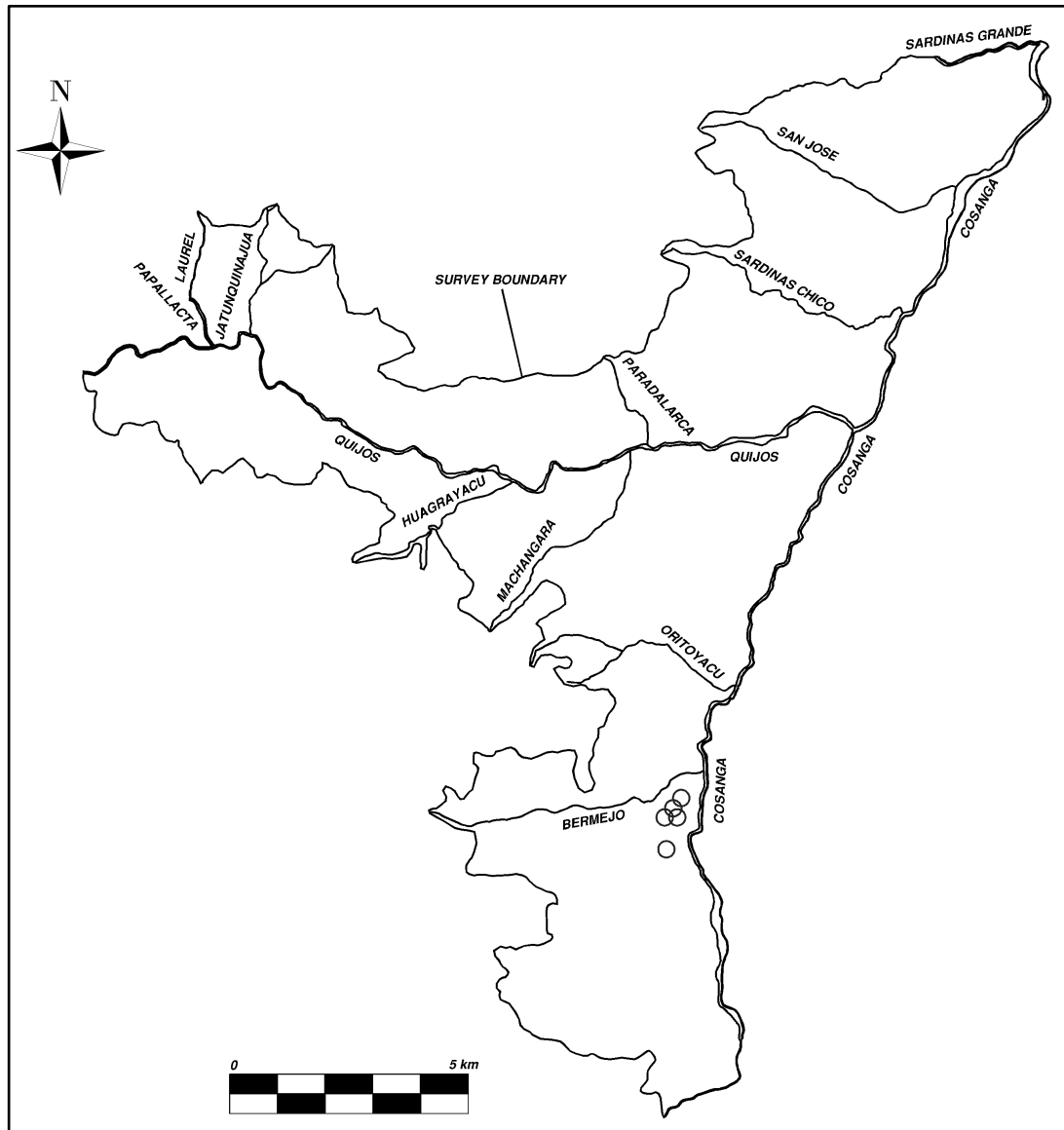


Figure 4.9: Type 2 andesite distribution.

4.3.1.3 Type 3 Andesite Distribution.

The distribution of Type 3 “blue/grey” andesite is concentrated in the southern arm of the survey zone, though a number of artifacts were recovered in or near the sites of Sardinas Chicho, and Pituro in the northeastern subregion, La Palma in the northwestern subregion, and one between the Huagrayacu and Quijos rivers (Figure 4.10).

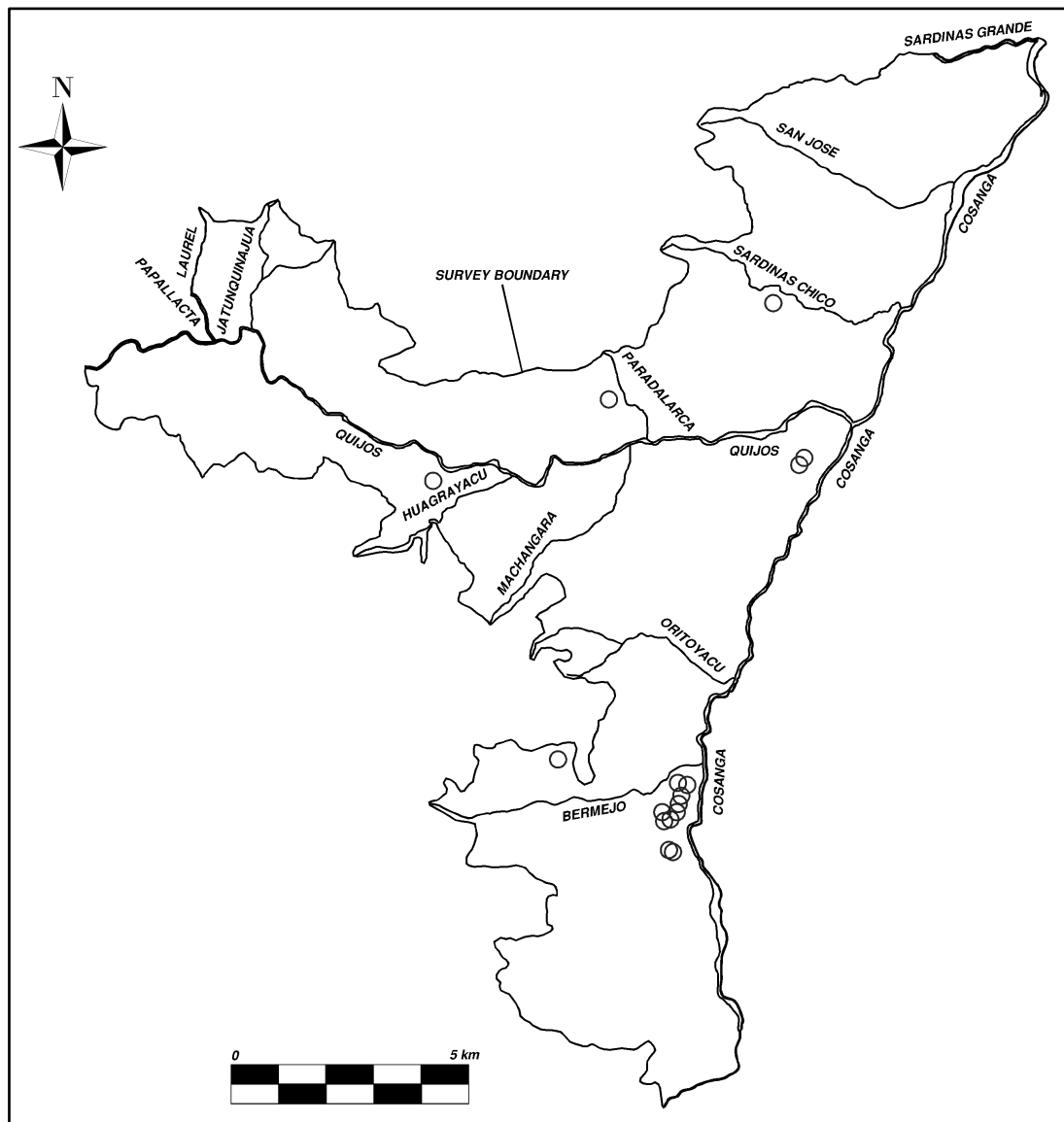


Figure 4.10: Type 3 andesite distribution.

4.3.1.4 Type 4 Andesite Distribution

The distribution of Type 4 andesite is primarily limited to the southern subregion, with one artifact located in the far corner of the northwestern subregion (Figure 4.11). The visual identification of Type 4 andesite, along with Type 6 basalt, and Type 8 metamorphic dacite is somewhat difficult given the characteristic variability within material types, as well as some of the similarities between them. For this reason it remains unclear whether the pieces in Bermejo are necessarily related to the one recovered from the southwestern subregion.

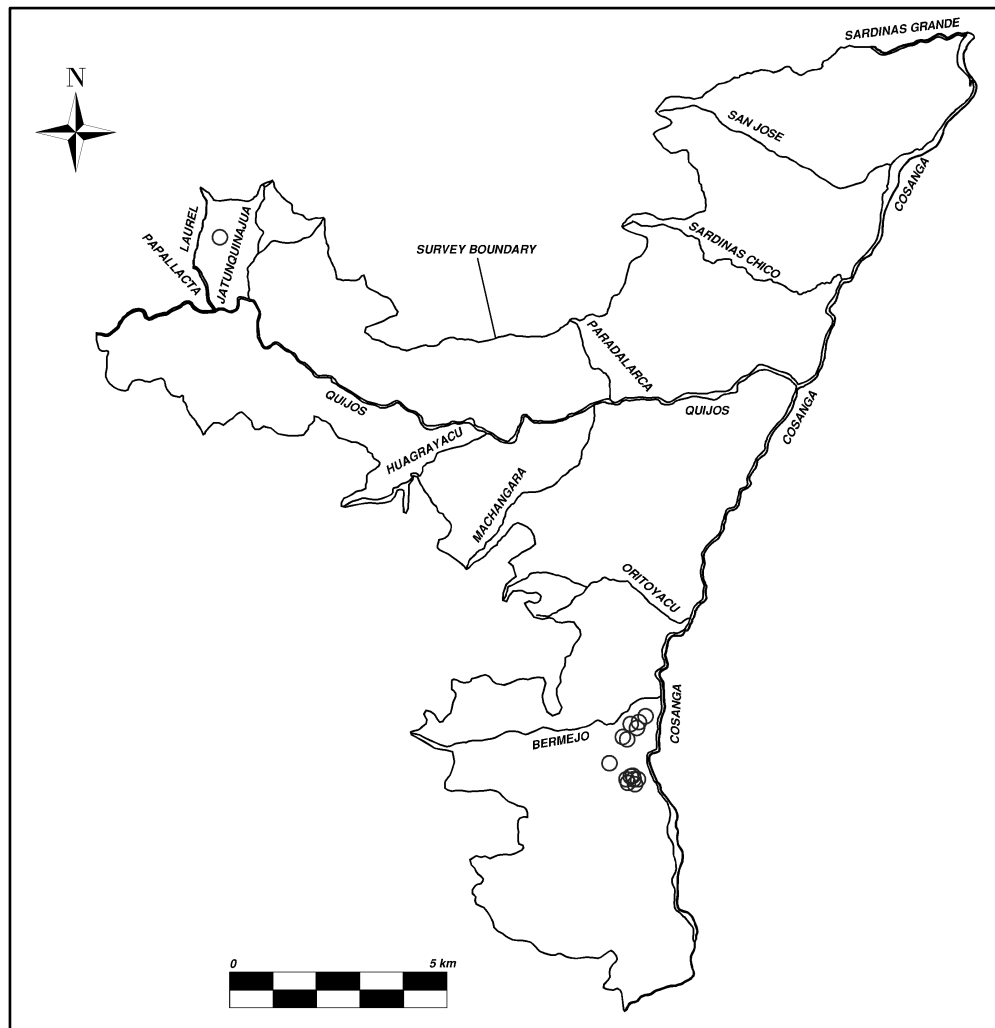


Figure 4.11: Type 4 andesite distribution.

4.3.1.5 Type 5 Vesicular Basalt Distribution.

The distribution of Type 5 vesicular basalt is primarily found along the eastern boarder of the survey zone, with one piece identified at the Late Period central place of Bermejo (Figure 4.12).

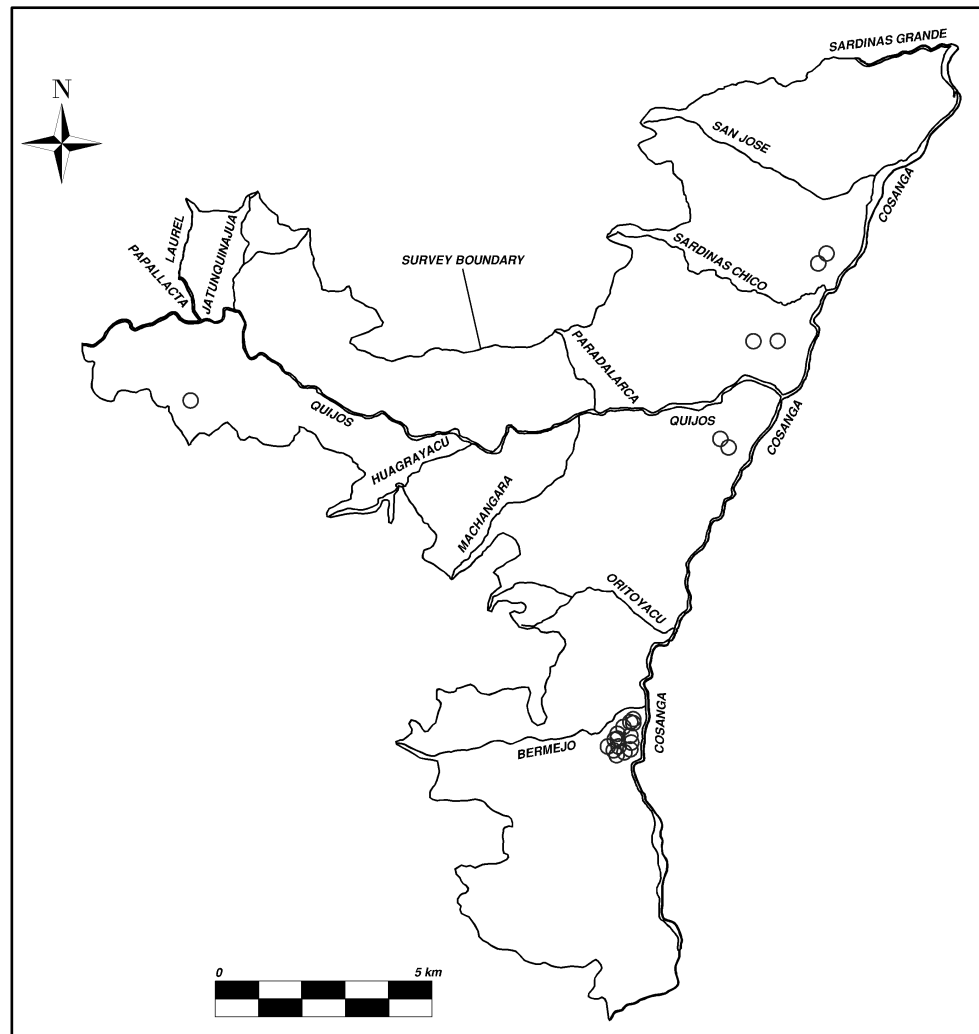


Figure 4.12: Type 5 vesicular basalt distribution.

4.3.1.6 Type 6 Fine-grained Basalt Distribution.

The distribution of Type 6 fine-grained basalt is primarily limited to the southern subregion, with one piece identified at the Late Period central place of Bermejo (Figure 4.13).

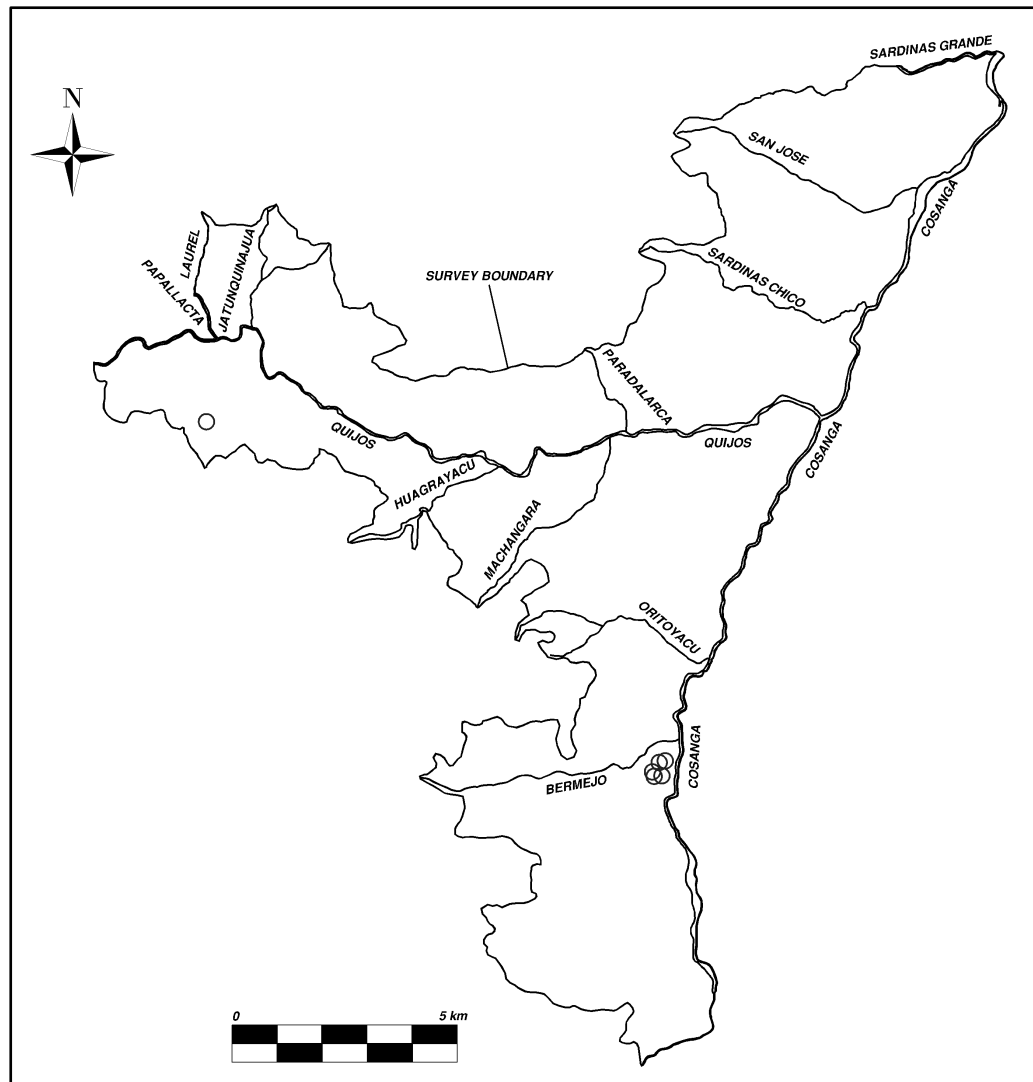


Figure 4.13: Type 6 basalt distribution.

4.3.1.7 Type 8 Metamorphic Dacite Distribution.

The final material type described in this section, Type 8 metamorphic dacite, is primarily limited to the southern subregion, with a single piece recovered in the northeastern subregion near the Quijos River (Figure 4.14).

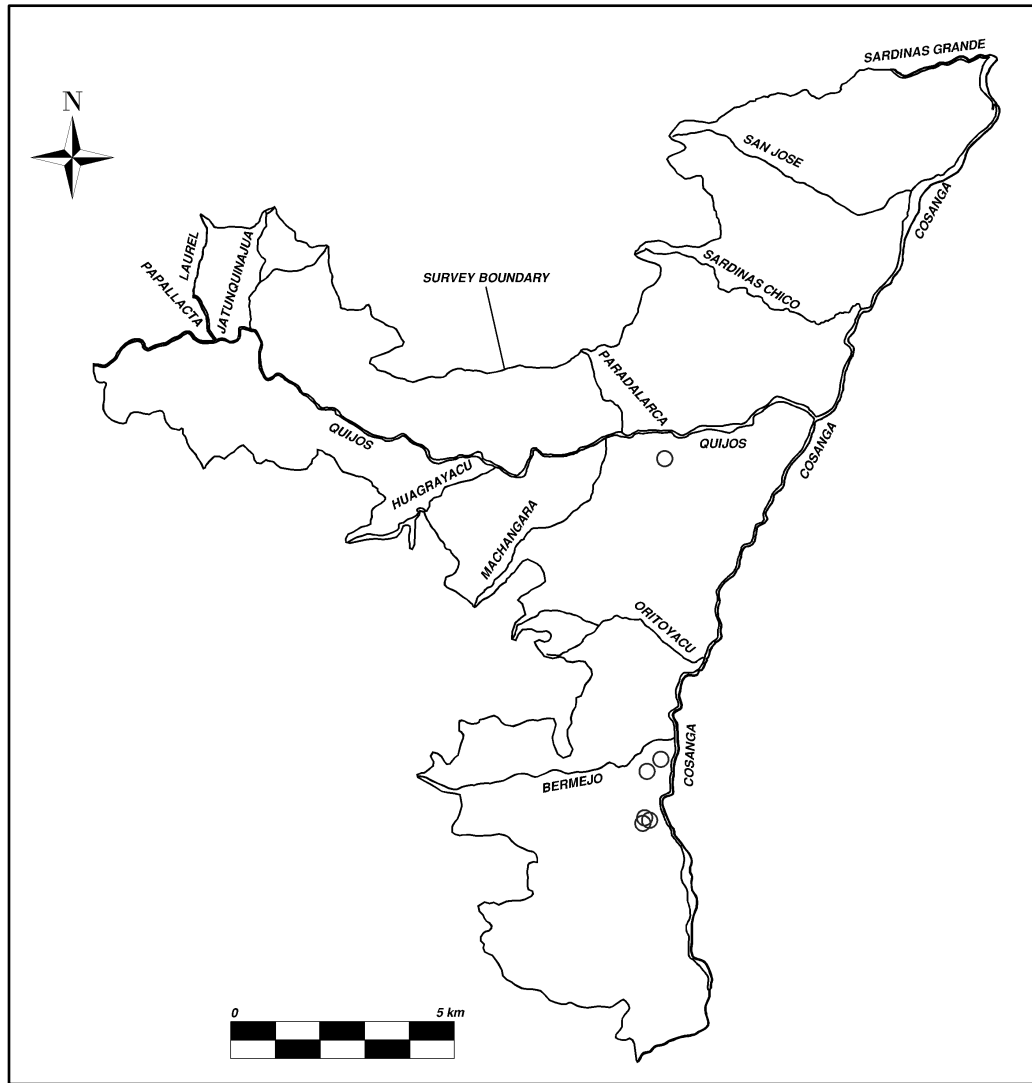


Figure 4.14: Type 8 metamorphic dacite distribution,

As discussed previously, the best evidence against a model of restricted access to raw materials was identified during the preliminary river survey, which served to clarify

the nature of local raw materials. Most, if not all, of the raw materials used in the production of ground stone tools appear to be common throughout the region. Furthermore, an analysis of tool and raw material distribution does not present a scenario in which these were restricted to any segment of Late Period Quijos society (Section 4.4.2.10 details the distribution of raw materials within the Late Period central place of Bermejo, which, for the most part, appear to have been largely unrestricted as well).

4.4 SOCIAL STATUS AND THE DIVERSIFICATION OF PRODUCTIVE ACTIVITIES

This section aims to determine whether the kinds of activities present at the Late Period central places were a reflection of elite activities. More specifically, it aims to determine the extent to which the potential diversification of productive activities at the Late Period central place of Bermejo is a reflection of social status.

Given that ground stone tools are often directly associated with a variety of activities such as basic subsistence practices and craft production, this section will explore the various tasks associated with ground stone consumption at the Late Period central places of Bermejo and Pucalpa.

As of this writing, most of the large-scale Late Period central places have been intensively surveyed by the QVRAP: Pucalpa in the northwestern subregion and Bermejo in the southern subregion (Figure 4.15). Nonetheless, both of these sites may be characteristic of different processes of centralization, and a detailed examination of inter- and intra-settlement ground stone distribution may further shed light on the social and economic activities present in Late Period central places. Interestingly, 60 artifacts were recovered from the southern subregion, and all but one of those was from the Late Period

central place of Bermejo. The concentration of artifacts in Bermejo constitutes 68% (n=59) of the entire QVRAP ground stone assemblage (both inside and out of the intensive survey zone), and at the time of writing, only half of the site has been intensively surveyed. This is particularly telling when compared to the Late Period settlement of Pucalpa which, having undergone two phases of intensive survey, yielded only seven ground stone artifacts. The following sections aim to explore this unusual pattern in detail, with a particular emphasis on what, if any, implications it may have on our understanding of the extent to which the ground stone economy was a dimension of social differentiation during the Late Period.

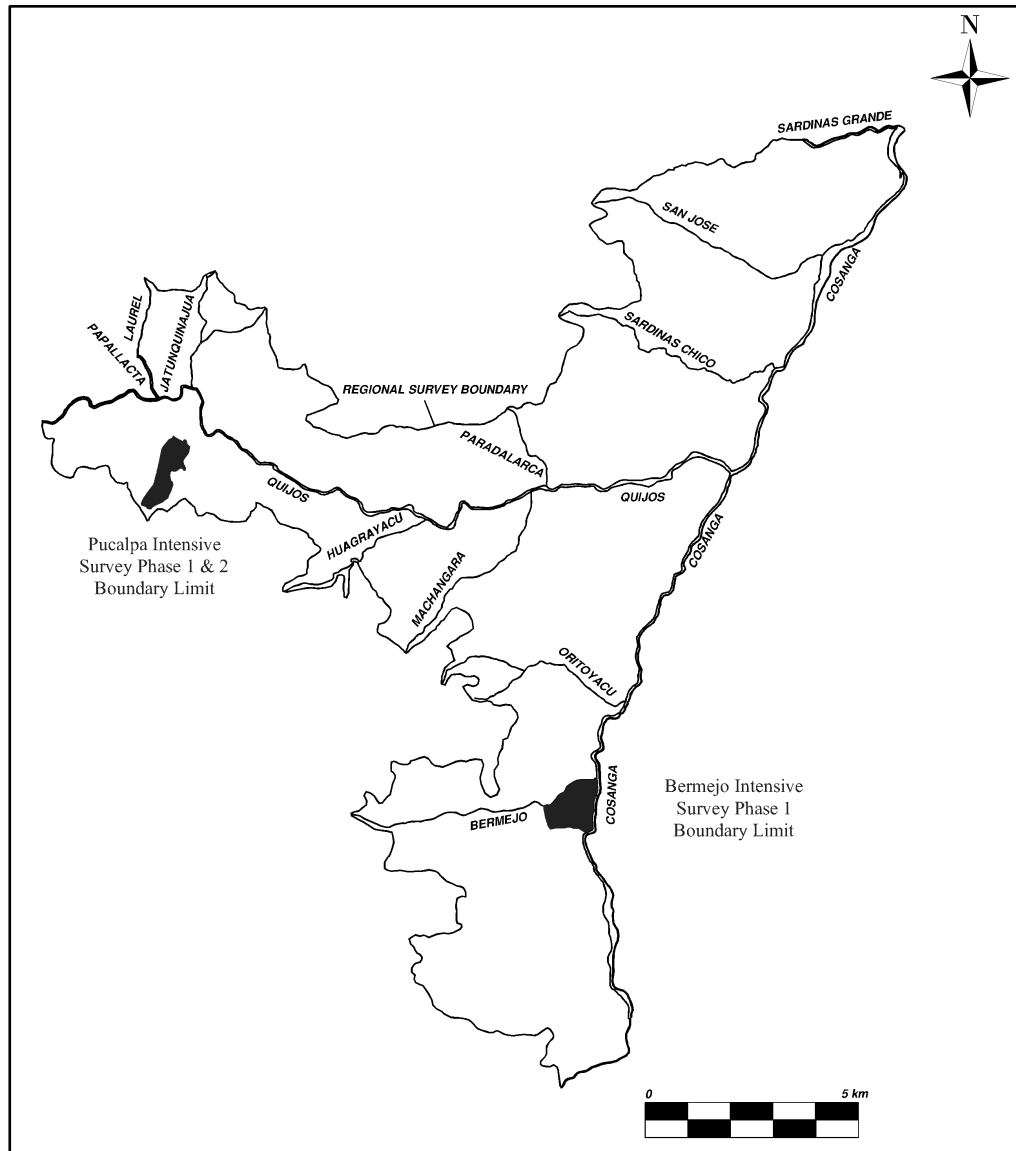


Figure 4.15: Intensive survey boundaries of Late Period central places.

4.4.1 Bermejo

The Late Period site of Bermejo is a dense and compact nucleated settlement located at approximately 2000 m above sea level. It is the largest settlement within the southern subregion and features the largest set of agricultural terraces within the survey area (Cuéllar 2009a:139). Moreover, at this point in the QVRAP, Bermejo also features

the densest concentration of ground stone artifacts, most of which are associated with tasks directly related to agricultural production. The site boundary of the intensive survey at Bermejo is located along the western slopes of the Cosanga Valley in the southern arm of the regional survey, between the Bermejo and Cosanga rivers. The intensive survey yielded 41 ground stone artifacts. Figure 4.16 presents the distribution of 44 ground stone artifacts, which include artifacts recovered during the intensive survey as well as three additional artifacts recovered from test units in 2002.

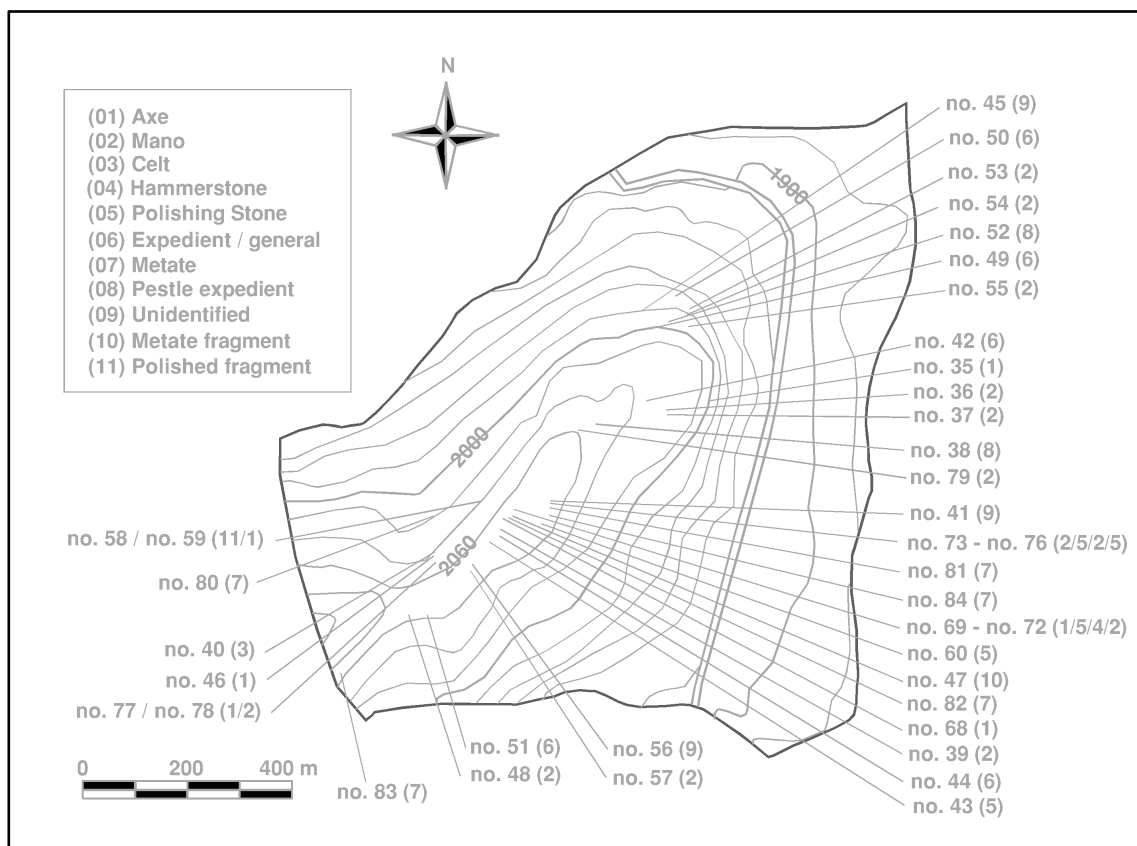


Figure 4.16: Bermejo intensive survey and test unit distribution.

Before beginning a discussion of the kinds of activities present at the Late Period central place of Bermejo, I will first present the distribution of ground stone artifacts based on collection methods.

4.4.1.1 Bermejo Intensive Survey Shovel Probe and Surface Find Collections

Of the 44 ground stone artifacts located within the intensive survey limits, 24 were recovered from shovel probes, and three artifacts were recovered from surface finds. The remaining 17 artifacts were recovered from 2 x 1 m and 1 x 1 m test units, as discussed in the next section. Table 4.4 presents the 27 artifacts recovered by shovel probe and surface find.

Table 4.4: Bermejo ground stone intensive survey collection.

| Ref. # | Lot # | Tool Type | Portion |
|--------|--------------|--------------------------|----------|
| 35 | 3044 | Perforated Axe | Complete |
| 36 | 3158 | Mano One-handed bifacial | Complete |
| 37 | 3160 | Mano Rounded | Complete |
| 38 | 3221 | Pestle Expedient | Complete |
| 39 | 3248 | Mano Irregular | Complete |
| 40 | 3282 | Celt | Complete |
| 41 | 3301 | Unidentified | Fragment |
| 42 | 3347 | Expedient General | Complete |
| 43 | 3374 | Polishing Stone | Complete |
| 44 | 3381 | Expedient General | Complete |
| 45 | 3428 | Unidentified | Fragment |
| 46 | 3494 | Axe | Fragment |
| 47 | 3523 | Metate Fragment | Fragment |
| 48 | 3554 | Mano Rounded | Complete |
| 49 | 3619 | Expedient General | Complete |
| 50 | 3712 | Expedient General | Complete |
| 51 | 3731 | Expedient General | Complete |
| 52 | 3773 | Pestle Expedient | Complete |
| 53 | 3834 | Mano One-handed Bifacial | Fragment |
| 54 | 3844 | Mano Rounded | Complete |
| 55 | 3856 | Mano Rounded | Fragment |
| 56 | 3915 | Unidentified (foreign) | Fragment |
| 57 | 3918 | Mano Irregular | Fragment |
| 80 | Surface Find | Metate Square | Fragment |
| 81 | Surface Find | Metate Irregular | Fragment |
| 82 | 3523 | Metate Ovoid | Fragment |
| 83 | Surface Find | Metate Ovoid | Fragment |

Figure 4.17 presents the distribution of these artifacts in relation to topographic elevation.



Figure 4.17: Ground stone from Bermejo intensive survey.

4.4.1.2 Bermejo Test Unit Distribution

Likewise, of the 44 ground stone artifacts located within the intensive survey limits, 17 ground stone artifacts were recovered from 1x1 and 2x1 m test units, including three ground stone artifacts from tests undertaken in 2002 (Table 4.5).

Table 4.5: Bermejo ground stone test unit distribution.

| Ref. # | Excavation Unit (Level-Zone) | Tool Type | Portion |
|-----------|------------------------------------|--------------------------|----------|
| 58 | VQ027* | Polished Fragment | n/a |
| 59 | VQ027* | Perforated Axe | Fragment |
| 60 | VQ029* | Polishing Stone | Complete |
| 68 | VQ082 (4-4) | Perforated Axe | Fragment |
| 69 | VQ083 (4-4) | Perforated Axe | Fragment |
| 70 | VQ083 (4-4) | Polishing Stone | Complete |
| 71 | VQ083 (4-4) | Hammerstone | Unknown |
| 72 | VQ083 (6-6) | Mano One-handed bifacial | Complete |
| 73 | VQ085 (7-10) | Mano Rounded | Fragment |
| 74 | VQ085 (7-10) | Polishing Stone | Complete |
| 75 | VQ085 (8-14) | Mano One-handed bifacial | Complete |
| 76 | VQ086 (4-4) | Polishing Stone | Complete |
| 77 | VQ087 (24-24) | Mano Fragment | Fragment |
| 78 | VQ087 (6-6) | Perforated Axe | Fragment |
| 79 | VQ090 (6-9) | Mano Rounded | Complete |
| 84 | VQ084 (9-11) | Metate Square | Fragment |
| 88 | VQ090 (5-8) | Worked Debitage | Fragment |

* Including Regional Survey Stratigraphic Test Units

Figure 4.18 presents the distribution of ground stone recovered from the test units, with artifact counts above one in parenthesis.

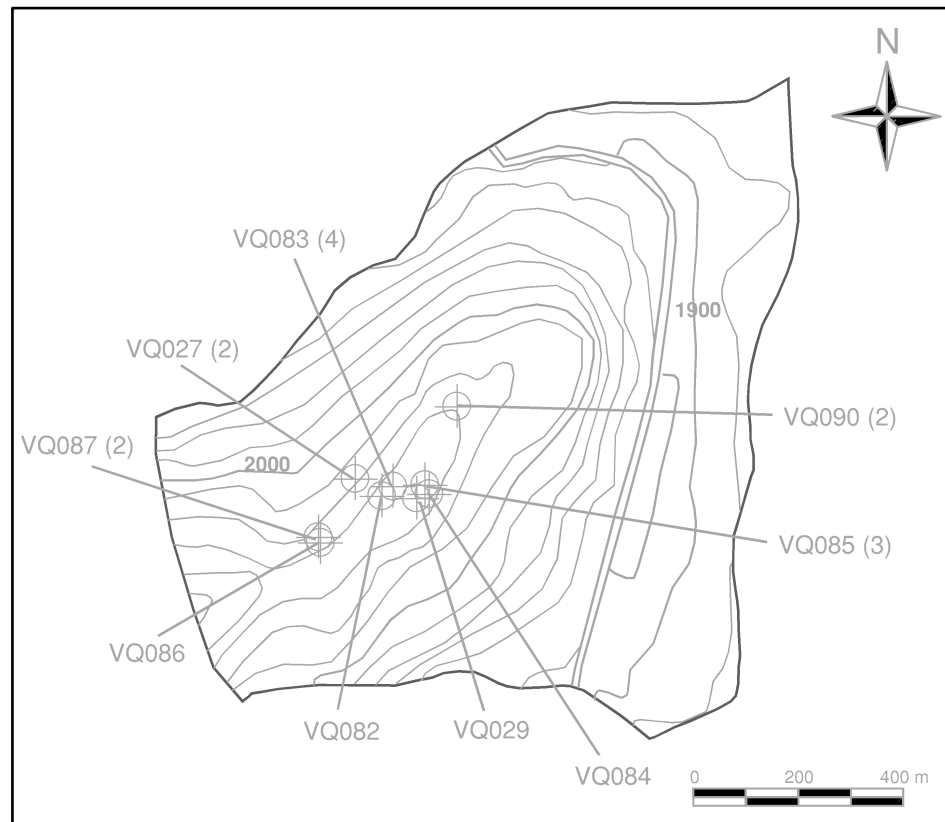


Figure 4.18: Bermejo test distribution (count above one in parentheses).

4.4.1.3 Bermejo Total (shovel probe and test unit) Distribution

The following figure (Figure 4.19) presents the total distribution of ground stone artifacts recovered within the Bermejo intensive survey boundary. This includes ground stone recovered from the intensive survey, test units, and surface finds.



Figure 4.19: Bermejo total ground stone distribution.

The geographic distributions of these artifacts are concentrated within two loosely defined areas. The first (southwest), situated along a relatively flat, most likely anthropogenic, hilltop that overlooks a large set of agricultural terraces along the west side of the mountain. Another concentration of artifacts is located along the northern extent of the mountain on a gradually sloping hillside overlooking the Bermejo River to the north and the Cosanga River to the east. Several other small clusters of ground stone artifacts are dispersed between these two main concentrations as well as further down the western slope. Moreover, the hilltop appears to be an area of dense occupation, and overlooks the most significant concentration of agricultural terraces.

4.4.1.4 Bermejo Ground Stone Activities

The following section aims to discuss the distribution of ground stone artifacts in relation to the various tasks associated with ground stone consumption at the Late Period site of Bermejo. More specifically, this section evaluates the spatial organization of tasks related to food processing and the maintenance of agricultural land, while ultimately serving as a means to discuss the potential diversification of activities present at this site.

Outside of any potential association in which the organization of food production can be tied to political development and change, the processing, preparation, and consumption of staple food products such as maize (*zea mays*), needs to, first, be considered in the context of domestic processes. In many ways, the production, preparation, and consumption of food is fundamentally a household task. In the Andean region, the preparation of maize and *chicha* beer is commonly attributed to women's activities (Hastorf and Johannessen 1993).

The range of artifact assemblages from Bermejo are primarily focused on tasks related to the processing of foods, such as manos and metates, and the clearing and maintenance of agricultural land by means of stone axes, though several other tool types such as celts, polishing stones, and hammerstones are present, which are suggestive of activities related to the production and curation of other tools (Table 4.6).

Table 4.6: Bermejo total ground stone distribution.

| Artifact Type | Count | Avg. Length | Avg. Width | Avg. Thick | Avg. Weight (g) | Material Range | % within Bermejo |
|--------------------------------|-------|-------------|------------|------------|-----------------|----------------|------------------|
| Perforated Axe | 5 | 5.2* | 4.0 | 2.3 | 134* | 4 | 11.4 |
| Axe | 1 | 6.1* | 7.6 | 2.7 | 163* | 3 | 2.2 |
| Chisel/Celt | 1 | 8.3 | 5 | 2.2 | 151 | 8 | 2.2 |
| Hammerstone | 1 | 14.8 | 10.3 | 5.7 | 1365 | 6 | 2.2 |
| Pestle | 2 | 9.15 | 4.55 | 4.45 | 178.5 | 3,6 | 4.6 |
| Polishing Stone | 5 | 3.86 | 2.98 | 2.26 | 43.6 | 2,3,4,5,6 | 11.4 |
| Unmodified / General handstone | 5 | 5.2 | 4.38 | 3.7 | 100.25 | 0,2,3,6 | 11.4 |
| Mano one-hand bifacial | 4 | 10.5 | 8.36 | 4 | 415 | 5 | 9.2 |
| Mano rounded | 5 | 8.5 | 8.52 | 6.25 | 674 | 3,5,6 | 11.4 |
| Mano Irregular | 3 | 7.15 | 5.3 | 4.05 | 470 | 2,5 | 6.8 |
| Metate | 5 | 27.7* | 27.4 | 13.7 | n/a | 5 | 11.4 |
| Metate Frag. | 1 | 3.3 | 2.4 | 1.2 | n/a | 5 | 2.2 |
| Polished Frag. | 1 | | | | | | 2.2 |
| Worked Debitage | 1 | 10.0 | 9.5 | 4.0 | n/a | 3 | 2.2 |
| Unidentified | 4 | n/a | n/a | n/a | n/a | 0,3,8 | 9.2 |
| TOTAL | 44 | | | | | | 100 |

4.4.1.5 Food Processing Activities

The following section discusses the nature and distribution of tools related to food processing, followed by an analysis of tools related to production activities, and land maintenance. Though the category of unmodified/general handstones makes up nearly 12% of the Bermejo ground stone assemblage, I have chosen not to represent them within either of these broad activity categories. The rationale behind this has to do with the difficult nature of determining specific uses for these tools, which are unmodified stones that may have served a range of activities throughout their life-history. These activities may have included both the processing of foodstuff (grain

dehusking or grinding) as well as the maintenance and production of other tools (as percussive and pecking tools), yet diagnostic patterns of use-wear were difficult to determine under 10x magnification. This is suggestive of the limited life-history of the tools in that they were not used long enough for the characteristic patterns of use to become apparent. Figure 4.20 presents the distribution of 21 tools directly related to food processing, which comprises 48% of the artifacts recovered within the Bermejo intensive survey boundary.

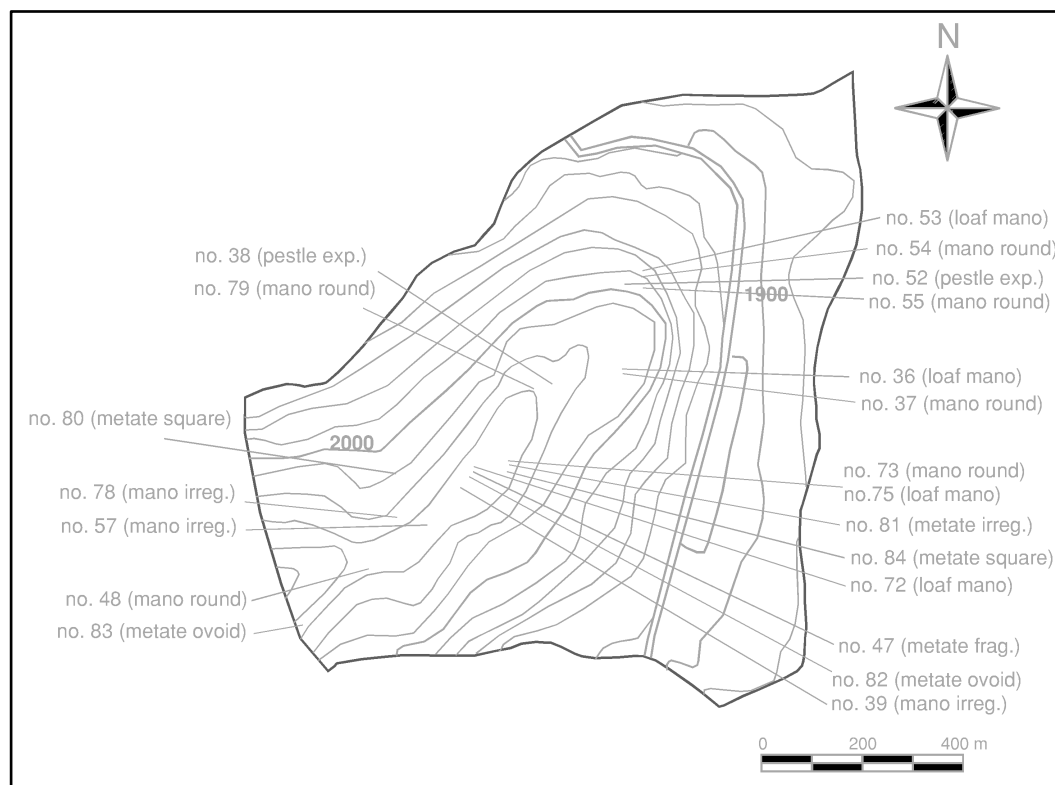


Figure 4.20: Bermejo food-processing ground stone.

These artifacts are evenly distributed among the various excavations and shovel probes, which suggests that food processing activities were equally dispersed among

these locales. However, a more detailed exploration of the tools themselves may reveal the subtlety of organizational production occurring at the site.

4.4.1.6 Mano and Metate Use

During the intensive survey, four of the five metates were recovered along the flat hilltop, with a fifth (No. 80) located at the base of the western slope. Given that only two of these metates (No. 82 and No. 84), located along the plateau, were not recovered by means of surface collection, it may difficult to assume any sort of meaningful pattern related to the distribution of metates (though by no means small, I do not believe that these metates are as unmovable as Binford's [1981] idea of "site furniture"). However, metates only make up half of the quintessential food processing tool kit. The presence of manos, in particular the loaf (one-handed bifacial) and rounded mano can be directly linked to use with a metate. Given the characteristic morphology of the square metate, also referred to as a basin or trough metate, the form of the loaf mano would have best served in the reciprocal grinding motion to process maize (back and forth movement across the longitudinal axes of the metate, allowing for continuous contact of the two surfaces). In a similar fashion, the more circular or irregularly shaped metates would have been better suited for use with a circular mano in order to produce the rotary grinding action necessary to process foodstuffs. To investigate this pattern further, Table 4.7 is presented to explore the variation within the Bermejo rounded mano assemblage.

Table 4.7: Comparison of Bermejo rounded mano assemblage.

| Provenience (Ref. #) | Length (cm) | Width (cm) | Thickness (cm) | Weight (g) | Portion |
|-------------------------|----------------|---------------|-------------------|---------------|----------|
| Lot 3160 (No. 37) | 7.8 | 7.1 | 5.5 | 438 | Complete |
| Lot 3554 (No. 48) | 10.0 | 8.5 | 5.7 | 780 | Complete |
| Lot 3844 (No. 54) | 10.9 | 10.4 | 8.2 | 1333 | Complete |
| Lot 3856 (No. 55) | 8.0* | 8.0* | - | 750* | Fragment |
| VQ085 (No. 73) | 6.5* | 6.5* | - | 600* | Fragment |
| VQ090 (No. 79) | 10.6 | 8.6 | 6.0 | 783 | Complete |

* estimated value

I suggest here that the difference in measurements between the rounded mano assemblage is not significant enough to consider different functions between the tools. Given that the shape and size of the rounded mano is characteristic of the nature and duration of its use, the smaller sized manos most likely signify a latter stage in their life-history before breakage and abandonment (as is the case of No. 55 and No. 73). This does not mean that the rounded mano was not used to processes different foodstuff (which may have differed on a daily basis as well as throughout the life-history of the tool), but, given their size and uniform use-wear (following Adams 1999), could have been used in conjunction with circular or irregularly shaped metates. That said, maize is the most prominent staple crop identified within the botanical assemblages (Cuéllar 2009a), and it is reasonable to assume that maize was the primary plant processed by manos and metates.

Morris (1990) has argued that in the Southwestern United States, an increased dependence and importance placed on maize directly impacted the morphology of manos and metates over time. In a straightforward fashion, as the production of cornmeal increased to meet growing local demands, the overall size of metates became larger and

two-handed manos replaced one-handed manos. An increase in population may very well account for the prevalence of food processing technology at Bermejo.

The differences in reciprocal versus rotary action probably have less to do with what foodstuffs were being processed and more to do with stylistic choices that deal with demand and efficiency (e.g. Morris 1990). A number of factors, both stylistic and economic, most likely impacted the use of various tool forms related to processing maize. The presence of ovoid, circular, and irregularly shaped (yet convexly basined) metates may suggest the diversity of behavioral choices used in processing foodstuffs. It is likely that the production of the larger square (and ovoid) metates would have necessitated a greater investment of time and labour, yet as numerous studies have suggested (e.g. Adams 1999), would also have resulted in greater productivity (though at the expense of greater user fatigue). Conversely, the production of smaller circular and irregularly shaped metates would have involved a lesser investment of labour to produce, yet would not have been as efficient at processing maize (though easier to use). The diversity of tool forms could indicate a level of demand within individual household and kin/residential groups, or simply differences in processing strategies based on the investment of labour required to create the specific tool form versus demands to be met by increases in output efficiency. The spatial distribution of both rotary and reciprocal technologies does not suggest the restriction of either task, given the relatively even distribution throughout the Bermejo assemblage.

Within the Bermejo food processing assemblage are two expedient pestles, which may suggest the processing of clays, pigments, and other non-foodstuff, yet may also have been used to process foods such as *aji* (chili) peppers. Though it is not known if

peppers were grown locally or acquired from warmer climates to the east, chili peppers have been identified within the Bermejo botanical assemblages (Cuéllar 2009a). The disproportionately small number of this artifact type in comparison to other food processing tools may be a reflection of the limited nature of this processing activity in Bermejo.

4.4.1.7 Craft Production Activities

The distribution of tools directly related to production activities (Figure 4.21) paints a somewhat different picture from that of food processing activities. These tools comprise 16% of the Bermejo ground stone assemblage.



Figure 4.21: Distribution of Bermejo craft producing ground stone.

As discussed previously, unmodified/general handstones were most likely used in production activities, as well as food processing activities, yet their application in this discussion remains limited. The prevalence of polishing stones and a single large hammerstone (No. 71) are concentrated in a single area along the flat hilltop. Both shovel probes and test units have yielded a considerable amount of stones and lithic debitage in this area (though I am hesitant to directly associate them with ground stone production). The size, shape, and granularity of the five polishing tools are suggestive of middle and late stage finishing techniques used in the production of pottery and/or ground stone tools such as perforated axes (Table 4.8).

Table 4.8: Comparison of Bermejo polishing stone assemblage.

| Provenience (Ref. #) | Length (cm) | Width (cm) | Thickness (cm) | Weight (g) | Coarseness |
|---------------------------------|------------------------|-----------------------|---------------------------|-----------------------|-------------------|
| Lot 3374 (No. 43) | 5.0 | 4.0 | 3.0 | 80 | Medium |
| VQ029 (No. 60) | 4.0 | 3.3 | 2.9 | 55 | Fine |
| VQ083 (No. 70) | 2.3 | 2.0 | 1.5 | 6 | Fine |
| VQ085 (No. 74) | 3.4 | 2.6 | 2.2 | 25 | Medium |
| VQ086 (No. 76) | 5.0 | 2.5 | 2.0 | 54 | Fine |

Interestingly, a single heavily polished dacite celt (No. 40), with minor evidence of use wear, was also found within Bermejo. As this tool type is commonly associated with tasks related to wood and stone working (Clark 1988; Hayden 1987), I have included it under the category of production tools recovered from Bermejo. However, the piece is heavily polished and shows little, if any, evidence of having been used, leaving its place within this category somewhat questionable.

As discussed previously, identifying ground stone production within the archaeological record can be difficult, if not at times impossible outside of primary loci's of production such as quarrying sites (which have not been identified within the study

zone). I have made an argument here that the raw materials used in the production of ground stone were most likely acquired from local river sources in the form of cobbles. This is partially supported by the identification of pieces of worked stone intended for axe production (e.g. No. 90 worked greenstone cobble from Pucalpa, and a piece of worked Type 3 andesite from Sardinas Chico [No. 88]) that still retain evidence of a river worn patina on their exterior, which is also very common to the chipped stone assemblage. It is also plausible that the early stages of ground stone reduction/production, if required, may have been undertaken during procurement at the local rivers. Likewise, cobbles of a particular size and material quality may have been selected to limit the investment of early stage reduction efforts, therefore greatly diminishing production debris. In this regard, polishing stones serve as important indicators of late stage ground stone production (as well as ceramic production). The prevalence of tools related to production along the flat hilltop at Bermejo is certainly suggestive of the types of activities occurring at this site.

4.4.1.8 Differentiation in Areas of Production

At the time of writing, analysis of data obtained from the intensive survey is in progress. At present, two large ‘residential’ groups have been identified at Bermejo, which seem to be contemporaneous with a series of much smaller residential groups at the site (Cuéllar 2011, personal communication). This section presents the ground stone distribution in relation to these groups.

The largest of the groups, which I refer to here as Group 1, is made up of a number of tool types: rounded manos and loaf manos, metates, perforated axes, polishing stones, hammerstones, and expedient/general handstones. The second, Group 2, is made

up of rounded and loaf manos, expedient pestles, and expedient/general handstones (Figure 4.22). Interestingly, when ground stone are compared between these groups, group 2 lacks any tools directly related to production activities. It should be noted that what appears to be a Type 3 late stage axe discard (No. 88) was found between the two groups. A number of factors lead me to place this in the category of expedient handstone. The piece shows extensive evidence of polish on one of the exteriors, which, following Wilson (2001), is the last stage of production (before perforation in the case of perforated axes). However, the piece is extensively damaged, which suggests secondary use or recycling, rather than direct production debris. Furthermore, Type 3 andesite is not present at Group 2, which further strengthens the argument that this tool was not produced at Group 2. Though this remains somewhat speculative, I hypothesize that group 1 was actively involved in craft production, while Group 2, at least as evidenced by a lack of hammerstones and polishing stones, may not have been involved in particular craft production activities. At present this is the best evidence to support the spatial differentiation of production at Bermejo, however, this discussion does not include the presence or absence of other material culture related to craft production, which, in the future, may serve to define the dynamics within and between these two residential groups.

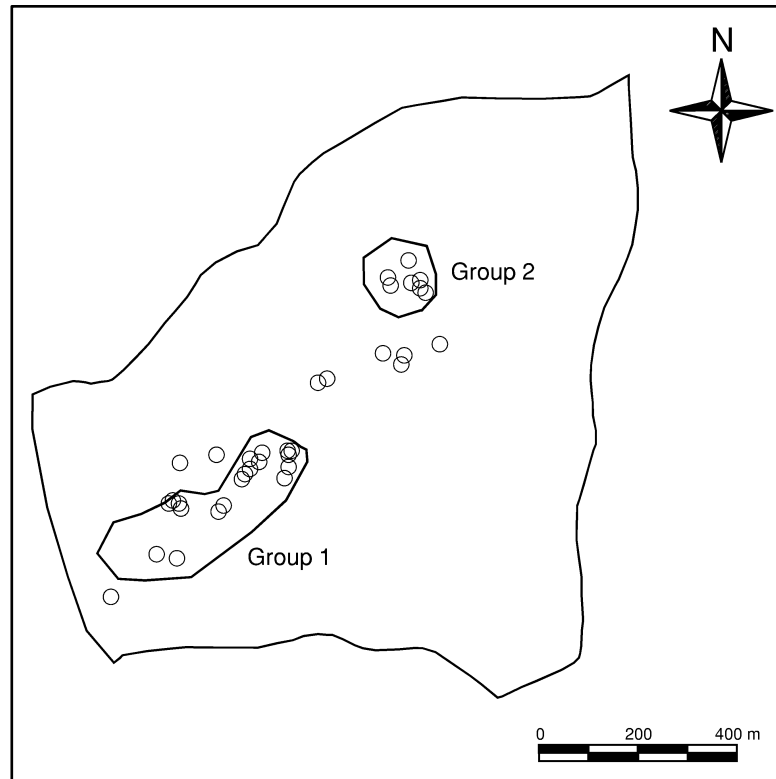


Figure 4.22: Comparison of ground stone within habitational contexts.

In a recent study in the San Agustín region of the Alto Magdalena of Colombia, González (2007a) has suggested that significant differences in ground stone distribution (as well as other cultural materials) between households and larger residential groups is indicative of elite household craft specialization areas. González (2007a:99) posited that “[t]his pattern of specialization among core households could be interpreted as some degree of community-level centralization of ceramic production, coordinated by households from different groupings – perhaps different lineages – that each featured their own potters”. In particular, this is supported by a significant concentration of polishing stones in the core household group. However, the degree in which craft specialization was occurring among high status households does not appear to have been

occurring at such an intensity that would suggest this was the primary mover of social transformations occurring at the central place of Mesitas.

4.4.1.9 Land Maintenance and Clearing Activities

The final major activity present within Bermejo involves the clearing and maintenance of land as represented by the distribution of five perforated axes and a single square axe (Figure 4.23). These artifacts comprise 14% of the Bermejo ground stone assemblage.

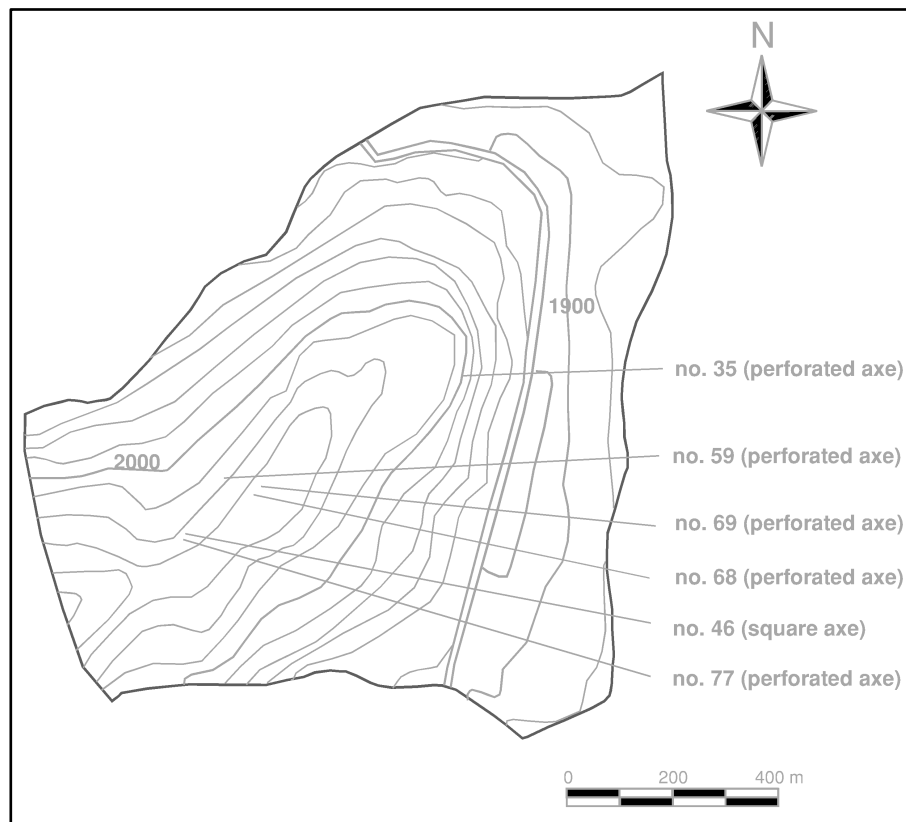


Figure 4.23: Distribution of Bermejo land clearing ground stone.

Outside of a single axe (No. 35) located along the northeastern slope, the remaining five axes were recovered along the flat hilltop as well as along the eastern slope of the mountain, where the agricultural terraces are located. The nature of the

Bermejo axe assemblage is relatively heterogeneous, though, as discussed below, do share some commonalities in material composition. Axe No. 35 is complete with evidence of having its edge reworked. The piece was produced from Type 3 andesite. Similarly, another axe (No. 46), tentatively categorized as a square axe, is a roughly shaped, unfinished axe also of Type 3 andesite. Likewise, a third axe, No. 77 (Type 4 andesite) was recovered from the upper eastern slope. This piece is the distal fragment of an axe (most likely perforated) that may have fractured along a fault in the stone during use. Further down the eastern slope, the distal half of a perforated axe (No. 59) was recovered. As discussed previously, this piece is comprised of Type 4 andesite and most likely broke early on in its life-history. The distal edge is heavily fractured, which is more characteristic of damage sustained by blunt-edged tools such as chisels (Dickson 1981:79-81). It may be that the damage was sustained during an activity that put the tool in proximity to stones and other hard debris, such as clearing out thick ground level root coverage common to the region (or more general weeding and tilling activities). Interestingly, this piece is highly similar to another axe (No. 18) recovered from the Bermejo cache, which was also produced from Type 4 andesite (as discussed in Section 4.2.3). Table 4.9 presents a comparison of the Bermejo axe assemblage.

Table 4.9: Comparison of Bermejo axe assemblage.

| Provenience (Ref. #) | Length (cm) | Width (cm) | Thickness (cm) | Weight (g) | Diameter of Inner-Hole (cm) | Diameter of Outer-Hole (cm) |
|---------------------------------|------------------------|-----------------------|---------------------------|-----------------------|--|--|
| Lot 3044 (No.35) | 10.1 | 8.4 | 3.1 | 407 | 1.12 | 2.88 |
| Lot 3494 (No.46) | 6.1 | 7.6 | 2.7 | 163 | N/A | N/A |
| VQ027 (No. 59) | 6.0 | 5.1 | 2.1 | 117 | 0.99 | 1.67 |
| VQ082 (No.68) | 5.7 | 3.7 | 3.3 | 261 | 1.49 | 3.48 |
| VQ083 (No. 69) | 4.1 | 3.0 | 1.6 | 25 | 1.00 | 1.55 |
| VQ087 (No. 77) | 3.4 | 7.6 | 2.3 | 97 | - | - |

The final two axes were recovered along the flat hilltop. The first, axe No. 68 (Type 4 andesite), is a medially broken proximal end of a perforated axe. This piece most likely broke during use, and it is possible, depending on how complex the hafting method was, that the piece was not discarded where it broke, but rather brought home to be unhafted and discarded (or kept for future use). Ethnographic research in New Guinea suggests that broken or exhausted axes are often discarded in domestic contexts. Given the investment of time and labour needed to produce the tool, along with their aesthetic qualities, and the potential for future use, a greater sense of attachment is placed on these tools (Hampton 1999; Toth et al. 1992). The second axe, No. 69 (Type 4 andesite), which was discussed in detail in Section 4.2.1, is one of the smallest axes within the QVRAP ground stone assemblage. It was recovered in context with a large hammerstone (No. 71), a small late-stage polishing stone (No. 70), and other production debris, suggesting this was a loci of production for this axe type (and possibly other axes and tools).

Though the overall conditions and use-wear patterns of the Bermejo axe assemblage suggests that these tools were continuously refurbished and reworked until their point of discard, and given their association with areas of agricultural production, it is interesting to speculate about the overall role of the perforated axe within the pre-Columbian Quijos toolkit. These tasks may have involved house building and maintenance, forest clearance and the collection of firewood, various other woodworking activities, as well as the management of secondary growth among the agricultural fields, which given the vegetation of the region, would have necessitated rigorous repression.

The prevalence of axes throughout the region, as well as the diversity of use-wear patterns and the conditions of the tools themselves (e.g. large scar flaking, medial breakage, blunting and striation patternings), are suggestive of variety associative tasks, though they most likely would not have served well as tilling or plowing implements. It is more likely that something along the lines of a *chaqui-taclla* (Andean footplow) would have been used as a hoeing implement, though transversely hafted stone hoes have been noted in the Andes (Russell 1988).

4.4.1.10 Bermejo Raw Material Distribution

The following section details the distribution of raw materials in Bermejo. The distribution of bluish (or blue/grey) andesite is comprised of eight artifacts located along the flat hilltop and gradually sloping northern hillside of the mountain. This material type does not appear to have been restricted in its overall distribution in Bermejo (Figure 4.24).



Figure 4.24: Bermejo Type 3 andesite distribution.

The distribution of fine-grained (or “flecked”) andesite is comprised of seven artifacts located within a concentrated area along the flat hilltop (Figure 4.25). This material type does not appear in the northern or eastern slopes of the mountain, and is primarily located in what has been identified as a residential group (Cuéllar 2011, personal communications). Interestingly, the tools made of Type 4 andesite are all complete or fragmented axes, with the exception of two polishing stones, which given the granularity of this material, would have been well suited for later stage production activities. The axe pieces are comprised of one of the smallest in the collection (No. 69), two larger perforated axes (No. 59 and No. 68), the distal end of what is presumably

from a perforated axe (No. 76), along with a polished flake (No. 58). It is interesting to note that an unfinished axe of the same material and similar design was recovered from the Bermejo cache, which is discussed in Section 4.2.3. The material itself does not appear to be restricted throughout the study zone, and was primarily used in the production of perforated axes, though the distribution of these tools are more common to the southern arm of the study zone more generally.



Figure 4.25: Bermejo Type 4 andesite distribution.

The distribution of vesicular basalt is comprised of 15 artifacts located along the flat hilltop, eastern hillside, and gradually sloping northern hillside of the mountain

(Figure 4.26). Though this material type does not appear to have been restricted in its overall distribution in Bermejo, the greatest concentration is situated along the flat hilltop, which also was the area of greatest population density.



Figure 4.26: Bermejo Type 5 vesicular basalt distribution.

The final three material types (Type 2, 6, and 8), comprised of 11 artifacts, are spread out evenly in Bermejo, suggesting that these material types were not restricted in their overall distribution (Figure 4.27).

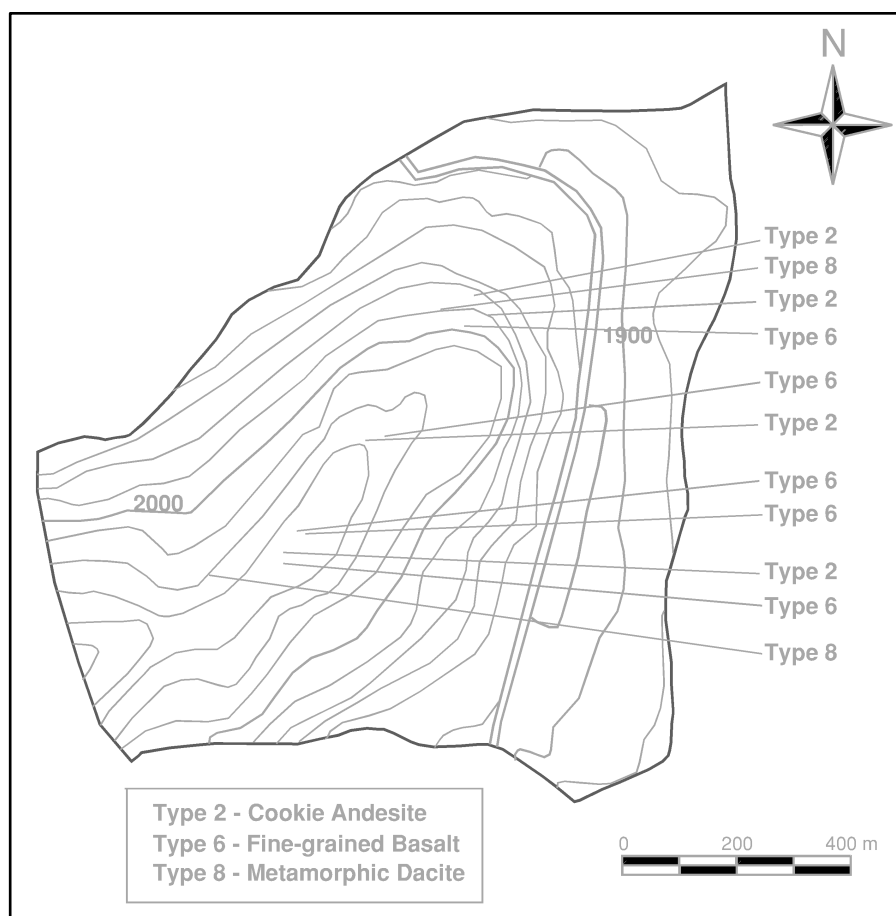


Figure 4.27: Bermejo other raw material distribution.

To summarize, the Bermejo ground stone assemblage elucidates the importance of three primary activities undertaken in the Late Period settlement of Bermejo. Food processing activities appear to be relatively spread out across the upper eastern and western slopes, and along the flat hilltop, which most likely coincide with areas where households and farm land was located. The variety of tool forms present suggests differences in food processing strategies, which, in part, may have been largely behavioral or economic choices, rather than any form of restricted access to materials or tool form. At this point, the limited evidence suggests that axes and/or ceramics were being produced within a spatially distinct area in Bermejo. It is possible that this

emphasis on production (as related to ground stone tools) had a greater focus on axe production, as the production of metates (at least for the early stages) most likely occurred closer sources of running water, though this is further complicated when we consider that the characteristic pecking reduction methods used to produce ground stone tools leave very little visible traces of production debris.

Though far from a simple matter, high variability among an assemblage is often thought to represent the presence of small-scale part time production, whereas highly standardized items are the product of large-scale production workshops (Costin 1992). The formal and material diversity of ground stone from Bermejo is similar to the QVRAP ground stone assemblage at a regional scale. Though this study has not identified site-specific locations of production related to any single tool form at a regional scale, the diversity of the Bermejo ground stone assemblage suggests that ground stone tools were being produced by small-scale part time producers, which is generally in line with interpretations of craft specialization associated with chiefdom societies (Drennan 1991). These producers appear to have been manufacturing axe-heads for local consumption, and the data, at present, does not support a model of standardized or large-scale production that acted to serve elite demands on either a local or regional scale. Likewise, these tools may have served a variety of purposes focused on clearing and maintaining land. It is reasonable to propose a scenario in which agricultural intensification resulted in the increase of agricultural tools, yet this does not appear to have directly impacted the organization of labour to any extent in which agricultural tools were being produced *en masse* to support this demand (supervised manufacture of tool forms). Rather, a variety of options may have existed for households to meet local

demands (household production goals), which is ultimately supported by a model of households being flexible and adaptive (Hirth 2006). Again, future research may reveal further complexities within the Bermejo food processing, craft production, and land maintenance models that have not been explored in this thesis.

There are several other points of interest related to Bermejo that need to be explored further. As discussed in Section 4.2.3, the Bermejo cache may suggest that the Late Period Quijos at Bermejo were consuming ground stone both physically and symbolically. Furthermore, the presence of an item unique to the QVRAP ground stone assemblage may also be telling. This piece (No. 56, see Appendix A) is a heavily polished large fragment of an as yet identified tool type that shares some similarities to greenstone. As mentioned previously, this material type is anomalous to the QVRAP collection, yet has been visually identified within the Cosanga and Cotundo Porras' collections held at the Universidad Católica. Within the Porras' collection, this type of material appears to be primarily associated with ground stone axes, of which many are perforated axes. These axes, for the most part, have one key distinguishing feature to those of the QVRAP collection. Unlike the perforated axes of the QVRAP, the perforation of these axes is not the typical hourglass shape (indicating perforation from each side), but have, what I refer to as a *straight bore* perforation. Porras identified a number of these axes as having come from the Quijos and Cosanga valleys, as well as a fair proportion of the Cotundo collection. Cotundo is located south of Bermejo, close to the contemporary town of Archidona, and the Cotundo culture is often associated with eastern lowland or Amazonian cultures of Ecuador. Given that this type of material or technological process has not been positively identified within the QVRAP ground stone

assemblage, the presence of this tool in Bermejo is somewhat suggestive of some form of interaction with cultural groups outside of the QVRAP study zone, be it direct or indirect.

The analysis of ground stone at Bermejo provides an unique snapshot of Late Period ground stone use that, at the point of writing, is unmatched anywhere else in the region. As to whether the potential diversification of productive activities occurring at Bermejo is a reflection of elite activities, from a comparative perspective, I believe it would be beneficial to first consider the kinds of activities present at the Late Period central place of Pucalpa, followed by a brief discussion of the overall distribution of tool types throughout the region.

4.4.2 Pucalpa

Pucalpa is a high-altitude (2400 m above sea level) nucleated settlement, which, much like Bermejo, emerged as a dense settlement by the Late Period, however, in contrast to Bermejo, Pucalpa did not have a comparable antecedent of population density during the earlier periods. Pucalpa is the largest settlement within the northwestern subregion and as mentioned previously, is marked by an unprecedented rate of growth between the earlier periods and that of the Late Period, by which time its occupation represented 38% of the total occupation in the northwestern subregion (Cuéllar 2009a:120). As well, terraces and landscape modifications are present within the site (along with clear evidence of plant cultivation during the Late Period), but unlike Bermejo, the presence of ground stone artifacts is greatly diminished in comparison.

Pucalpa is the highest altitude nucleated settlement identified within the study zone, and is characterized by the most productive soil zone (Cuéllar 2009a). The site is

currently accessed by a small trail, which, beginning at the Quijos River, switchbacks up a steep and densely vegetated terrain, which in total, ascends approximately four or five hundred meters to the lowest portions of Pucalpa. After which, the terrain becomes more gradual, ascending an additional two or three hundred meters to the upper limits of occupation at around 2600-2650 meters above sea level.

Figure 4.28 presents the distribution of seven ground stone artifacts recovered from the 1.05 km² (105 h) survey area. The Pucalpa ground stone assemblage only makes up 7.8% of the total QVRAP ground stone assemblage, whereas Bermejo represents 48% (65% if we consider the two lots in the southern portion of Bermejo, outside of the intensive survey boundary). This is particularly telling in that the site of Pucalpa has undergone two phases of intensive survey and has undergone a greater number of excavations and shovel probes than the first phase of the intensive survey at Bermejo. The Pucalpa ground stone assemblage is comprised of one small polishing stone of medium coarseness, one possible metate fragment, two incomplete greenstone axes, one heavily polished strategically designed pestle, and two pieces of greenstone debitage (Table 4.10).

Table 4.10: Pucalpa ground stone distribution.

| Ref. # | Provenience | Tool Type | Material Type | Portion |
|--------|-------------|-------------------|---------------------|----------|
| 2 | Lot 174 | Polishing Stone | Unknown | Complete |
| 5 | Lot 223 | Strategic Pestle | Fine-grained Basalt | Complete |
| 6 | Lot 458 | Perforated Axe | Greenstone | Fragment |
| 7 | Lot 458 | Metate Fragment | Vesicular Basalt | Fragment |
| 15 | Lot 1061 | Perforated Axe | Greenstone | Fragment |
| 86 | VQ049 | Polished Fragment | Greenstone | Fragment |
| 90 | Lot 111 | Worked Fragment | Greenstone | Fragment |

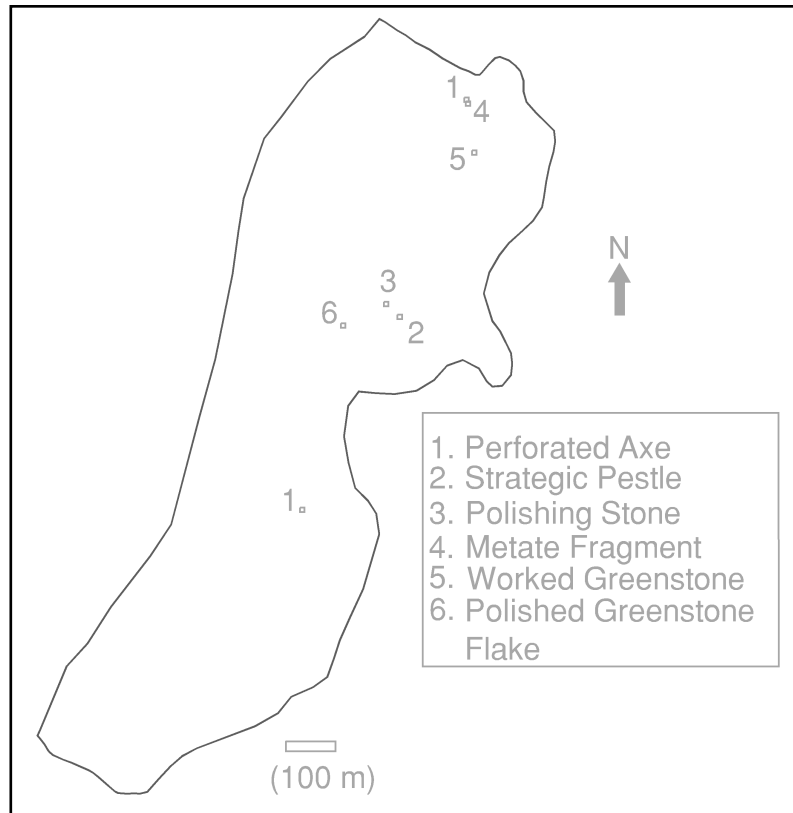


Figure 4.28: Pucalpa ground stone distribution.

Figure 4.29 presents the distribution of material types present at Pucalpa. Of the seven artifacts that comprise the Pucalpa ground stone assemblage, four are made of greenstone, two are of basaltic materials, and one has yet to be identified. It is interesting to note that four out of the seven artifacts of the Pucalpa ground stone assemblage were produced from greenstone. Though the size of the assemblage itself is rather small, the systematic nature of survey and excavations at the site should allow for a broad representation of tools and material used during the Late Period. Given the high percentage of greenstone axes at Pucalpa, it is likely that this tool type played a significant role within the ground stone toolkit.

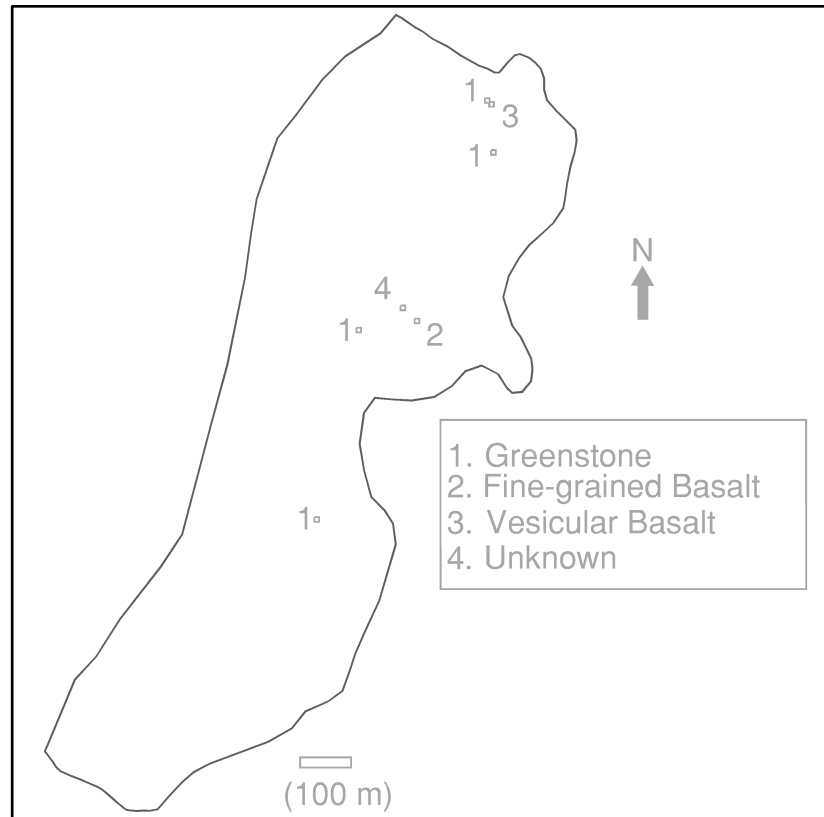


Figure 4.29: Pucalpa raw material distribution.

4.4.2.1 Pucalpa Ground Stone Activities

In a similar fashion to Bermejo, the activities associated with the Pucalpa ground stone assemblage suggest that land clearance and maintenance activities were common. Likewise, the presence of a small medium-grained polishing stone (No. 2) and a piece of worked greenstone (No. 90) are suggestive of production activities, and more specifically, the production of perforated greenstone axes. Interestingly, outside of the presence a single possible metate fragment, which is small enough that it could also have been a piece of a small mortar, there is only one other tool functionally related to food processing. This tool is a strategically designed fine-grained basalt pestle. This piece is conically shaped with a flat-shaped working surface on the distal end and a curved

working surface on the proximal end. Both surfaces show minor traces of wear and were probably used for specific purposes related to processing materials (*aji* chili peppers?), possibly in conjunction with a mortar, though the pestle does not appear to have been used extensively before its point of deposition/discard. The piece also shows numerous clusters of parallel striations along much of the body, which is indicative of late-stage finishing techniques used to polish the artifact.

The presence of greenstone artifacts at Pucalpa may be telling of production activities also occurring at the site. The first is a palm-sized piece of greenstone, which appears to have been roughly shaped or selected for its size and is most likely evidence of early stage perforated axe production. The second piece is a small greenstone flake with a heavily polished exterior, which suggests that it flaked off of a perforated axe during use in the field². Alongside the presence of two other perforated greenstone axes (also bearing the quintessential “hour-glass” perforation technology common to the study area), which were both likely fragmented during use, this evidence is suggestive of local perforated greenstone axe production and consumption.

As discussed in Section 4.2.2, the collection of ground stone artifacts held by the site’s owner consists of the six perforated axes, one T-shaped “Andean” axe, several unmodified handstones, and a small mortar made of vesicular basalt. Moreover, all of the perforated axes (including those from the QVRAP Pucalpa ground stone assemblage) appear to share some characteristics with each other. The bases of the axes are all flat or slightly convex and the sides are curved. Though the overall sizes of the axes vary

² I refer to both of these pieces as being associated with perforated axes for the simple fact that all of the identifiable tools made out of greenstone within the QVRAP ground stone collection are perforated axes (outside of a single greenstone bead recovered from Bermejo).

somewhat, the morphological similarities, at their most basic, suggest that some form of mental template was used in the production of perforated greenstone axes during the Late Period. It appears to be the case that the technology associated with perforated greenstone axe production was common to the Late Period central place of Pucalpa.

To summarize, of the two intensively surveyed large-scale central places, Pucalpa's ground stone collection is significantly different to that of Bermejo. Adams and Jones (1981) argue that larger sites are more likely to have engaged in a greater diversity of tasks that, theoretically, would necessitate an equally diverse set of tools used to achieve these tasks. Yet, the diversity of form within Pucalpa is relatively limited in comparison to the Late Period central place of Bermejo. The amount of materials recovered from Pucalpa may be proportionally smaller due to differences in occupation duration and abandonment processes, but how does this account for the rather insubstantial evidence for food processing technologies. There is clearly evidence that maize was being produced and consumed in Pucalpa during the Late Period (Cuéllar 2009a), but how was it being processed? It is plausible that differences in processing and consumption may leave less visible traces in the archaeological record. In the case of early sedentary groups in the American Southwest, Adams (1999:491) posits that "[a]s long as maize was consumed in whole-grained form – roasted, parched, popped, or cooked in stews as hominy – grinding was not of great importance, and there was no need for specialized tools, efficient designs, or intense tool use". However, I believe a more important question needs to be asked. Does agricultural complexity necessitate an equal complexity in tool form?

It is possible that maize was consumed in other forms that did not necessitate it being ground into meal, yet the high proportion of maize within the botanical assemblages suggests that maize was the prominent staple crop not only in Pucalpa but throughout the study area as a whole during the Late Period (Cuéllar 2009a). It is likely that maize was being ground into meal in Pucalpa during the Late Period, yet unlike Bermejo, the way in which this was done is not clear. A plausible scenario is that maize was being processed by a less visible means. In the central Andes the use of flat milling slabs, sometimes referred to as *batanes*, in conjunction with a “rocker-shaped” grinding stone, have been presented as a another means (compared to the mano and metate) of processing foodstuffs (e.g. Hastorf and Johannessen 1993; Russell 1988).

In the small Quichua town of Jondachi, located approximately 25 kilometers south of Baeza, large wooden *batanes* (referred to locally as *batanges*) are crafted by a local artisan and used to process foodstuffs such as yucca, manioc, maize, and chonta (Figure 4.30).



Figure 4.30: Large wooden batán in Jondachi.

In Jondachi, large river cobbles are selected from local rivers or may also be sought from sources up to a day's journey away while traveling outside of the community. These stones are then used, in conjunction with a wooden *batán*, in a back-and-forth rocking motion along their narrow sides to process the materials. The photo pictured below (Figure 4.31) shows a rocking-grinder that had been used for approximately 15 years by a single household. Given their large size, it is possible that a single stone could last significantly longer. Though I am unsure of the intensity of use for this item, in comparison, Horsfell (1987) notes that in Guatemala manos made of vesicular basalt had a use-life of up to 20 years. Interestingly, the production of a *batán* is probably not as labour intensive as that used in the production of large metates, yet, as it was explained to me, a well cared for *batán* could last anywhere between 50 and 60 years. This suggests that the use of this type of toolkit could provide a viable and efficient long-term alternative to the more labour intensive and less portable mano and metate kit.



Figure 4.31: Rocker-grinding stone in Jondachi.

As noted in Chapter 2, evidence of large river cobbles with potentially similar evidence of use-wear have been tentatively identified within the study zone, along with smaller fragments of river cobbles, yet their identification at Pucalpa has not been made at this point. I argue here that the use of a food processing technology such as the wooden *batan* and rocker-grinding stone may serve as a possible explanation for why activities related to food processing are not common within the Pucalpa ground stone assemblage, though, future research may serve to clarify the food processing technologies used during the Late Period at Pucalpa.

Given our current understanding of ground stone distributions at Pucalpa, it may be the case that ground stone tools did not play the same role as they did in the Bermejo. The presence of perforated greenstone axes (and materials directly related to their use and consumption) seems to imply a preference for this tool type.

Though not limited to Pucalpa alone, the distribution of perforated greenstone axes is primarily limited to the northwestern and northeastern subregions of the study zone (along the Quijos Valley). 50% ($n = 3$) of the greenstone axes are located in the northwestern subregion, 33.3% ($n = 2$) are located in the northeastern subregion, and 16.7% ($n = 1$) are located in the southern subregion. If we consider the overall distribution of greenstone artifacts, which includes axes as well as debitage from production and use, 50% ($n = 5$) of the materials are located in the northwestern subregion, with 40% ($n = 4$) in the northeastern subregion, and 10% ($n = 1$) in the southern subregion. Furthermore, 40% ($n = 4$) of all greenstone materials were recovered from the Late Period central place of Pucalpa, of which the intensive survey zone (1.05 km²) makes up roughly 0.8% of the total survey zone (137 km²). The total number of

axes recovered from the QVRAP is 31. The highest number from a single collection ($n = 10$) are from the Bermejo cache, none of which are made from greenstone. Moreover, of the axes recovered from Bermejo ($n = 16$), which makes up 52% of the QVRAP axe assemblage, only one (6.25%) is made from greenstone. This suggests that the presence of a single perforated greenstone axe in Bermejo is anomalous to their overall distribution, which could possibly suggest that perforated greenstone axes are a non-local tool type at the site. Moreover, evidence of perforated greenstone axe production has been noted in the northern subregions, yet not in the southern subregion.

To summarize, a comparison of the ground stone assemblages from both of the Late Period central places is somewhat telling of the kinds of activities occurring at each site, which in turn may be used to make inferences about the kinds of activities elites were involved in. At Bermejo, several basic tool types were used to process foodstuff, which include a fairly diverse selection of mano and metate forms (used in both rotary and reciprocal fashions), pestles, and possibly other expedient handstones. In comparison, the Pucalpa assemblage did yield a heavily polished strategic pestle, yet direct evidence of more efficient food processing is lacking. Furthermore, while there is significant evidence to support the production of perforated greenstone axes at Pucalpa (along with a single polishing stone and celt), the diversity of material and tool forms among the Bermejo assemblage, along with potential evidence for distinct craft production areas, suggests that a broader range of products may have been produced at Bermejo. It appears that both sites were actively involved in craft production and subsistence activities, yet, at present, there does appear to be a greater diversity of

productive activities occurring at Bermejo. Whether this is directly a reflection of elites attempting to diversify their productive activities remains to be seen.

The following section presents the distribution of the QVRAP ground stone assemblage based on individual tool types. Given that an analysis of tool distribution and associated activities among the Late Period central places has shed light on the potential diversification of productive activities among chiefly centers, the following section aims to compare this with the overall distribution of tools at a regional scale. Given that the knowledge required to extract and process raw materials, and the skill needed to produce particular tools may be restricted to certain segments of a society (Michaels 1989:145), this section aims to determine whether the types of tools present at the Late Period central places were restricted to these settlements, or whether the basic tool forms of the QVRAP ground stone assemblage were unrestricted.

4.4.3 Perforated Axe Distribution

In total, the QVRAP perforated axe assemblage consists of 23 pieces. Of which, 17.5% (n = 4) are located in the northwestern subregion, 17.5% (n = 4) are located in the northeastern subregion, and 65% (n = 15) are located in the southern subregion (Figure 4.32).

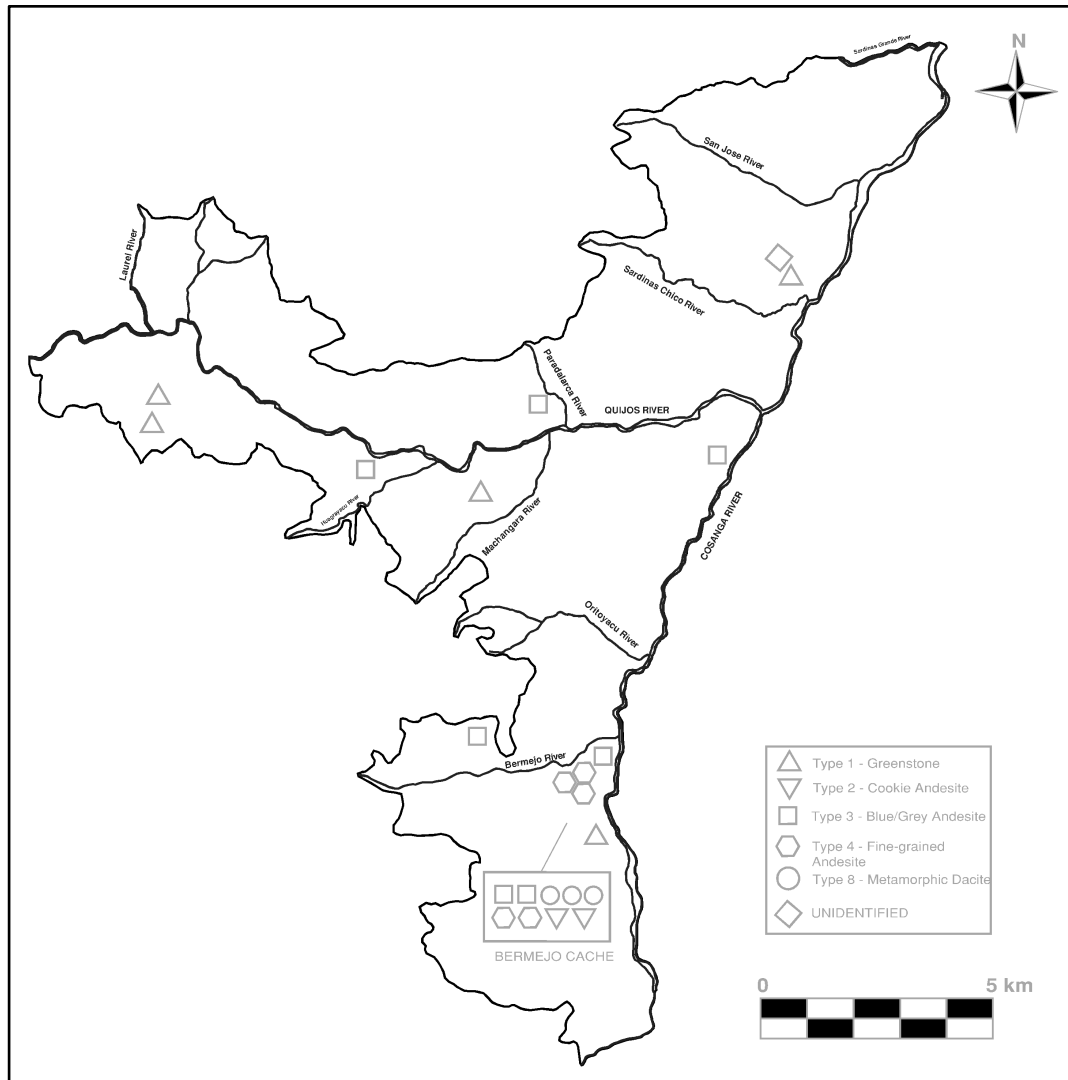


Figure 4.32: Perforated axe distribution.

4.4.4 General Axe Distribution

The distribution of non-perforated (or general) axes is primarily focused around the eastern portion of the survey zone. While a single axe is found in the upper corner of the northwestern subregion (Figure 4.33), this seems consistent with the overall population distributions. I present at several points during this chapter that the designation of general or square axes remains tentative given specific characteristics that

might suggest these are fragments of perforated axes broken transversely above their perforation, or, as discussed in Section 4.2.3, may also have served as axe preforms.

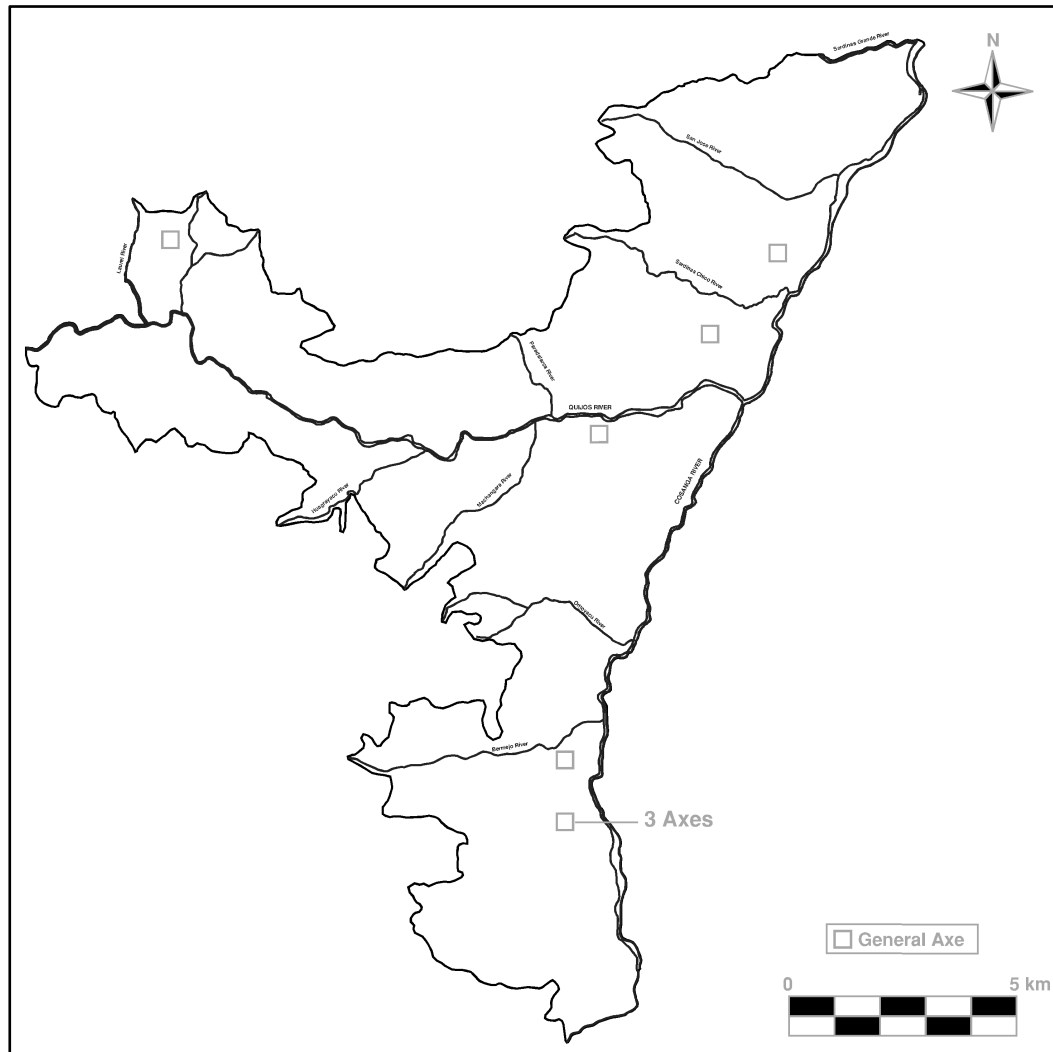


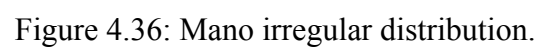
Figure 4.33: General axe distribution.

4.4.5 Mano and Handstone Distribution

The following section details the distribution of loaf-style (Figure 4.34), rounded (Figure 4.35), and irregular manos (Figure 4.36), as well as unmodified/general handstones (Figure 4.37). The dominant pattern present for all of these tool forms is their location along the eastern border of the survey.



Figure 4.34: Loaf-style mano distribution.



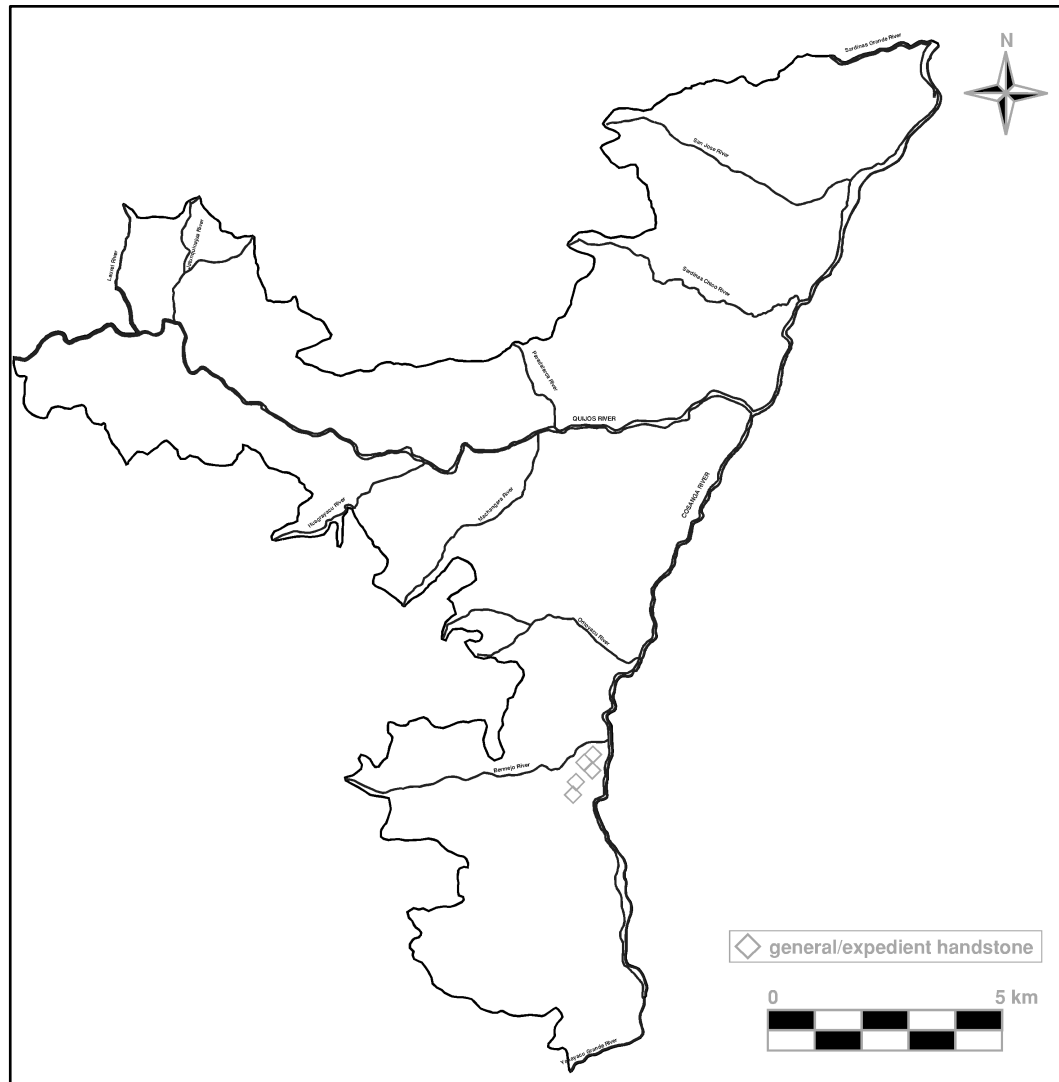


Figure 4.37: Expedient/general handstone distribution.

What this section has demonstrated is that the basic tool forms inherent to the QVRAP ground stone assemblage are not restricted to any particular subregion or settlement type. Overall, a study of the Bermejo ground stone assemblage has presented, in comparison to Pucalpa, a fairly diverse range of tool types and forms. However, from a regional perspective, these tool types or not restricted.

4.5 SUMMARY

To summarize, this chapter has provided an in depth discussion of the QVRAP ground stone assemblage, which through an analysis of three scenarios presented throughout this chapter, has aimed to determine the extent to which the ground stone economy was a dimension of social differentiation during the Late Period. Ultimately, this discussion has presented a scenario in which the production of ground stone tools was not under the direct sponsorship or patronage of elites. Furthermore, the distribution of raw material types suggests that material acquisition was unrestricted and primarily related to proximity to local sources, rather than any model of controlled distribution and differential access. It is likely that ground stone craft producers were part time or seasonal producers who manufactured tools for local consumption. A discussion of the Late Period central places of Bermejo and Pucalpa has revealed differences in ground stone assemblages between the sites. In part, this may be the result of differences in the duration of occupation and abandonment processes occurring between the sites, yet an almost complete lack of any evidence to support the presence of food processing technology at Pucalpa may suggest that other methods were being employed to processes foodstuff. Evidence from Bermejo is somewhat suggestive of a spatial differentiation in craft production activities, and a diversification of productive activities more generally. The potential implications of this study are varied and will be discussed further in the following chapter.

5 CHAPTER 5: COMPARATIVE GROUND STONE STUDY.

This chapter aims to situate the QVRAP ground stone assemblage within a broader comparative context that deals with geographically and culturally distinct locales as well as differing interpretive frameworks, levels of analysis, and research designs. By contextualizing the results of this study among various other archaeological research projects that have considered ground stone in differing capacities, the results of this study may further be explored within a broader understanding of society, the development of social complexity, and stone tool use.

In particular, by reviewing specific case studies, this chapter presents a broader exploration of ground stone ‘trends’ in the northern Andes. In a similar fashion, this chapter also outlines several well-documented non-Andean archaeological studies that, though often outside of the research aims of the projects themselves, have dealt with ground stone in a manner allowing for comparisons to be made with the QVRAP ground stone assemblage. Moreover, having dealt with broadly similar structures of social organization (i.e., chiefdoms and the development of early village-life and political hierarchy), these studies provide a multitude of interpretations to contrast with those of this study.

Though the production, distribution, and consumption of ground stone tools may not be the primary focus of many of the studies dealt with in this chapter, I argue that a comparative perspective that explores how other researchers have analyzed and interpreted ground stone, including general spatial and temporal trends, and the range of available morphological and material data, is critical to evaluating the interpretive potential of the QVRAP ground stone assemblage.

Although an exhaustive review of Andean ground stone literature is beyond the scope of this study, the following section does detail some of the general trends and characteristics of ground stone tools recovered from three broadly defined Andean regions: the eastern foothills (*ceja de selva*) and Amazon basin; the highland and intermontane valleys; and the northern coast.

5.1 Ground Stone in the Eastern Andes / Amazon Basin (*oriente*)

This section reviews the somewhat exiguous examples of archaeological ground stone recovered from the eastern Andean foothills and Amazon basin. In part, this has to do with the limited amount of systematic research undertaken in this area, making certain common assumptions regarding trade and the origins of specific tool types (such as artifacts described as Andean axes) that much more difficult to support (e.g. Carneiro 1979; Cole 1977; Lathrap 1970). Though broad in ecological and physiographic diversity, the eastern Andes and Amazon are treated here as a single unit, as cultural associations between these areas are common within anthropological/archaeological literature. This is a region characterized by high rainfall, humidity, and a diversity tropical flora and fauna. This review begins among the major tributaries of the Upper Amazon.

Early research around the Ucayali and Yarinacocha rivers of the Peruvian Amazon basin have yielded numerous reports detailing cultural development in and around the region (Lathrap 1962, 1970; Lathrap and Roys 1963; Myers 1970, 1976). Lathrap's (1962) doctoral dissertation documents the presence of 22 "T-shaped" axes, which Lathrap identified as being produced from non-local igneous materials, which given an apparent lack of suitable stone materials in the region (Lathrap 1962; Myers

1976), Lathrap argued that the “string-cut” form of stone axe was traded into the region circa 800 BC during the Huipa-ya phase. In a similar study, Lathrap and Roys (1963) recovered several T-shaped axes from the Cave of Owls in the lower montaña of Peru (Figure 5.1). The authors suggested that

The archaeological materials from the Cave of Owls have significance as a second addition to our knowledge of the culture history of the Peruvian Montaña and as a possible connecting link between the Yarinacocha area and Highland Peru. The cave, while still in the tropical forest environment, is well over half the distance from Yarinacocha to the closest known highland site, the Chavinoid site of Kotosh near Huánuco (Lathrap and Roys 1963:27).

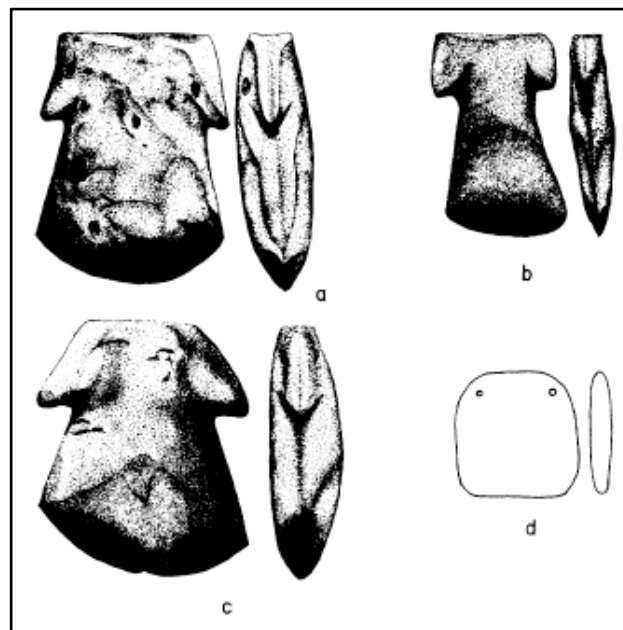


Figure 5.1: Cave of Owls T-shaped axes (from Lathrap and Roys 1963, Fig. 8)

East of Yarinacocha, Weber (1975) identified several ground stone tools that he associated with the Caimito culture (~14th Century AD), two of which were “green-colored” ground stone axes, visually identified as andesite. Interestingly, one unused axe was recovered in relation to a deposited urn burial (Figure 5.2). Both axes were “grooved for hafting with parallel sides” (Weber 197:381). Likewise, four “T-shaped” axes were

also recovered. Weber identified a majority of the axes recovered from excavations, surface collection, and at times purchased from locals, as being manufactured from andesite. For the most part, the morphology of these axes ranged from grooved sided to “T-shaped” and were also identified as having been made from andesite, which appears to be fairly commonplace to the eastern Andes and Amazonian assemblages as a whole. Outside of several spindle whorls, none of the tools were noted as having been perforated. Several other ground stone materials were recovered that may have been related to grinding activities, but these were not discussed in any detail.

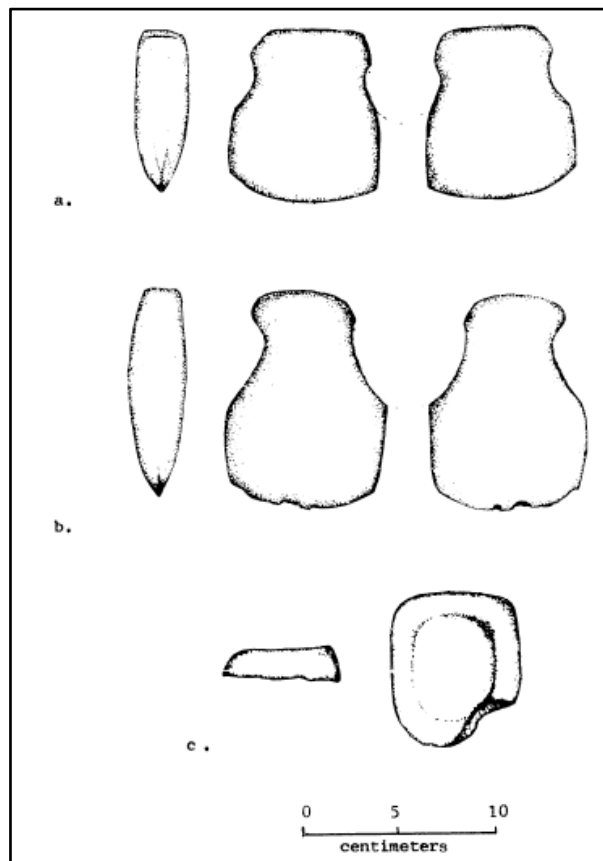


Figure 5.2: Caimito “andesite” axes (from Weber 1975, Fig. 118).

In the eastern Ecuadorian lowlands, Evans and Meggers (1968) conducted a series of excavations along the Napo River. Several excavations associated with the Napo Phase, which the authors dated between the 9th and 12th century AD (Bruhns [1994] would later calculate the Napo phase to range from AD 1050 – 1200), yielded four complete and two broken axes of sandstone, greenstone, granite, and andesite materials (Figure 5.3). Four of the axes were side notched while the remaining two were of the characteristic t-shape. A small sample of other ground stone materials were recovered and categorized as grinding stones and hammerstones. The entirety of items was recovered from seven habitation sites identified along the Napo River. The size of the ground stone assemblage was not significant in comparison to other cultural materials recovered and the majority of the ground stone survey materials were associated with the Napo Phase. As to the potential relationship between the eastern Peruvian foothills and the Ecuadorian Amazon, Weber (1975:409) noted, “[b]oth ‘T’-shaped and grooved axes have been associated with the Napo phase. Neither bears close relationships to the two known Caimito axes ... [o]ther stones that occur in the Napo phase are too simple to contribute significantly to the cultural comparison”.

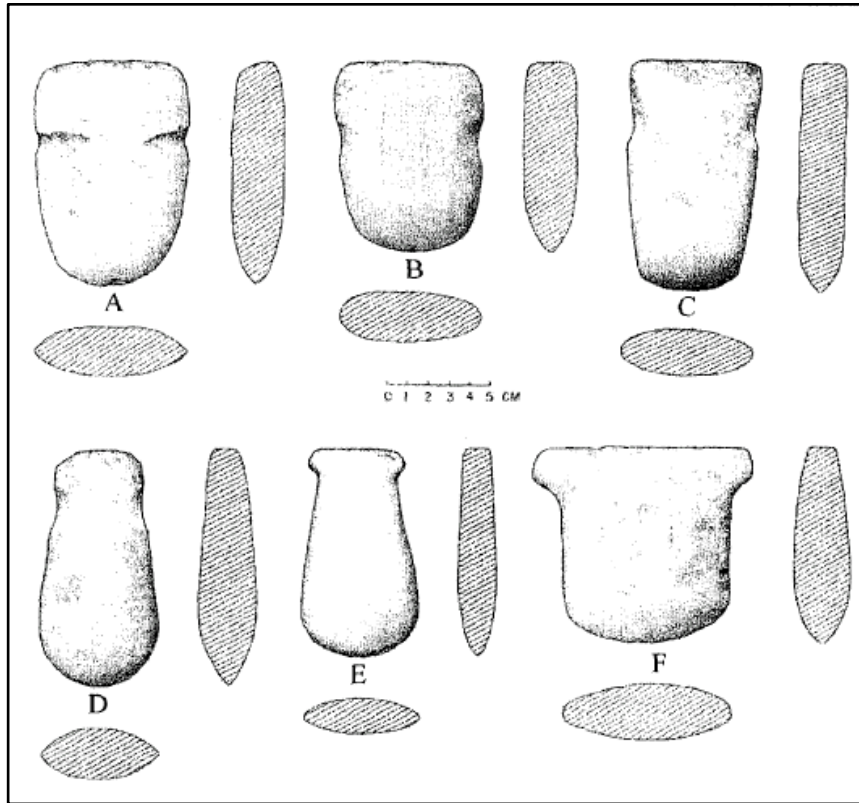


Figure 5.3: Napo River axes (from Evans and Meggers 1968, Fig. 31).

In a recent study in the Upano Valley, Morona Santiago Province, in the Ecuadorian Amazon, Rostain (1999) excavated a series of mound sites associated with early Upano settlements (700 BC – AD 400) and latter Huapula habitation (AD 700 – 1200). It has been suggested that chiefdoms of the Upano region may have acted within an exchange network between the highlands and Amazonian plains, though this may have primarily been focused on perishable goods (Salazar 2008). Rostain noted that the earlier Upano lithic assemblage is primarily comprised of ground stone axes and chisels (Figure 5.4.). While the axes are typical of the “T-shaped” variety, Rostain also noted the presence of small cutting tools that showed evidence of being retouched, some of which were perforated and, as Rostain states, may have served as pendants.

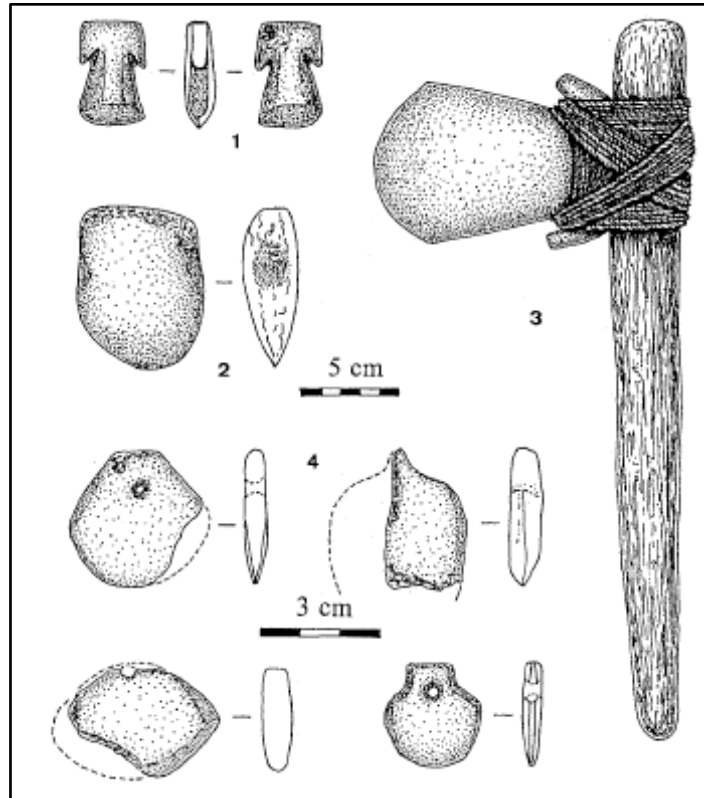


Figure 5.4: Upano ground stone artifacts (from Rostain 1999, Fig. 13).

1. Pequeña hacha con ganchos. 2. Hacha simple. 3. Reconstrucción de un hacha atada con cuerdas al mango. 4. Pendientes).

Several sets of large basalt manos and metates were also found in association with the latter Huapula occupation at the mound sites, which suggests the presence of residential areas in and around the mounds. Interestingly, Rostain noted that despite the abundance and diversity of raw materials available, the Upano and Huapula lithic industries remained limited, and that, common to Amazonian cultures in general, many tools were probably manufactured from wood, bone, and other perishable materials. Though this is very much a possibility, as I have suggested for the Late Period central place of Pucalpa in the Quijos Valley, the Amazonian context of pre-Columbian ground

stone tool use is largely underrepresented in the archaeological literature, leaving any interpretation made somewhat limited.

What is clear from the examples provided above is that ground stone tool assemblages are disproportionately smaller than other cultural materials recovered from these projects. Some have argued that this is due to a lack of available raw materials (Ucayali River – Lathrap 1962, 1970; Myers 1976) while others state an abundance of well-suited local materials did not result in a greater frequency ground stone materials (Upuno Valley - Rostain, 1999). Another possible explanation that could have impacted the distribution of ground stone materials, especially in the case of stone axes, is more specific to the context in which they were used and the way they were discarded. In a somewhat questionable statement, Lathrap (1973:176) argued that

The expense and initial rarity of trade goods means that they tend to be recycled and used down to the nub. This is particularly true of stone axe heads and whetstones on the Amazonian floodplain. Because of their value they tend, as mortuary goods, to be concentrated in the graves of a few very important people rather than distributed evenly. Both processes work so that apparent rarity of trade goods in the archaeological sample is greatly increased over the actual rarity of such trade goods in the living society which produced the archaeological remains ...It is far more probable that a unique item in an archaeological sample represents an established trade pattern than that it records a unique and idiosyncratic event.

Ethnographic and ethnohistoric sources (Carneiro 1979; DeBoer 1998; Dole 1998; Erikson 2011) have documented stone tool use in the Amazon. In an unpublished manuscript, DeBoer (1998) noted that stone axes have played a significant role in Upper Amazonian Shamanic practice. In particular, stone axes are often sought, collected, and passed down from generation to generation. “The retrieval of archaeological axes was...a virtual shamanic mandate ...[and] axes are customarily retrieved and recycled from archaeological contexts and, in the process, regularly cross cultural and interpretive

boundaries separating past and present (DeBoer 1998:50-52 as cited in Kornbacher 2010:595). Though the theoretical and methodological implications of this on any archaeological investigation of stone axes is beyond our current abilities –and therefore of little concern- what I find most fascinating is the symbolic importance placed on ground stone axes in both an archaeological and contemporary Amazonian context.

Recent research at the site of Santa Ana-La Florida in the Zamora-Chinchipe province of Ecuador has yielded some very interesting results related to Formative Period occupation of the Ecuadorian oriente (Valdez 2008, 2009; Zeidler 2008). Cultural materials which include greenstone masks and anthropomorphic pendent, along with polished stone bowls have been interpreted as ceremonial objects of elite burials (Valdez 2008), which date to roughly 2200 BC. These, along with other cultural materials that suggest the presence of an expansive trade network and detailed craft production, imply the presence of a well-developed system of social hierarchy cosmological belief previously unheard of in this region and time period.

In the case of the Amazon and eastern Andean foothills, the nature of ground stone use remains blurred, especially at a regional level. The data used to support the “T-shaped” axe as trade item remains as tenuous as the claim itself, which had come to dominate discussions of ground stone tool use during the past half-century. At present, the quantitative and qualitative aspects of these studies have done little to further our understanding of the QVRAP ground stone assemblage, though studies such as those at Santa Ana-La Florida are shedding light on early ground stone craft production and the development of social complexity. Our current understanding of ground stone distribution and use in the Andean highlands and coast is somewhat clearer.

5.2 Ground Stone in the Andean Highlands and Intermontane Valleys

The northern Andean highlands are contrasted by high volcanic mountain peaks, some of which reach over 6000 meters of above sea level, and are interspersed with deep winding valleys. The altitudinal and environmental conditions present a diverse and challenging landscape, yet unlike the Andean foothills and Amazonian basin, archaeological research is on more a stable, if still somewhat tentative, ground. The highlands have a long and storied history of pre-Columbian settlement and agricultural development known long before the more recent Inca and colonial encounters. Cultivation is generally considered feasible up to 3,800 m (Knapp, 1991:4), while the less fertile upper *páramo* grasslands have provided grassing land for both wild and domesticated camilids.

The highland site of Cotocollao, located in an urban sprawl just north of the Ecuadorian capital of Quito, is a Formative Period settlement located at approximately 2800 meters above sea level. The site was most likely continuously occupied from as early as 1800 BC until 400 BC, which coincides with the eruption of Pululahua volcano east of the site. An intensive contract project under the direction of Villalba (1988:270) yielded a substantial number of ground stone artifacts (complete or fragmented) including 17 metates, 13 mortars, 204 manos, 104 stone bowls, 60 polishing stones, 20 axes (of which four were large chipped stone axes) and various other hammerstones and ornamental pieces. Most of the ground stone tools were identified as having been made of andesite, which included the manos, metates, and mortars. It is interesting to note that 14 axes (of which nine were T-shaped) were identified by Villalba as having been made of serpentine. Kornbacher (2010) sampled “wedge tools” from both Cotocollao and the

site of La Chimba, which is located in the northeastern end of the same east-west trending basin as Quito and Cotacollao. By means of x-ray fluorescence (XRF), these materials were identified as being of basaltic andesite, andesite, and dacite, which is in line with the ground stone materials recovered from the Quijos and Cosanga valleys to the east, and Northern Andean ground stone assemblages more generally. Though, as Kornbacher noted, green coloured andesite axes have been identified in both Cotacollao and La Chimba, and suggested that “[s]ince Cosanga pottery and other evidence of *montaña* materials are present at La Chimba... the eastern slopes as a source for this material is a possibility” (Kornbacher 2010:321), the provenience of these materials remains unknown.

Greenstone/green andesite was primarily used in the production of axes at Cotacollao, which is similar to the fact that most, if not all of the greenstone artifacts in the QVRAP ground stone assemblage are related to perforated axes, with the sole exception of a single greenstone bead from Late Period central place of Bermejo. Though, in the case of the QVRAP, a variety of other materials were also used in the production of axes as well. In addition, the only other items produced from “serpentine” documented at Cotacollao are seven beads (*cuentas*). At the Formative site of La Chimba, which is located approximately 55 km east of Quito, Athens (1990:73) noted the presence of a single “miniature greenstone ax”, which is suggestive of further ceremonial or prestige activities in the Ecuadorian highlands during the Formative and Late Formative periods (dates at La Chimba suggest occupations between 900 BC and AD 200 [Zeidler 2008], which overlaps with the Early periods of the QVRAP chronology). Two heavily polished “serpentine” axes from Cotacollao were also

recovered in a burial context, which Villalba (1988:305) suggested may be related to ritual activities centered on a large central cemetery complex.

In comparison to the QVRAP ground stone, the assemblage from Cotocollao is interesting. The number of manos is proportionally higher than metates, which is not uncommon in archaeological assemblages. Yet, while the number of axes may be significant, given the relatively small size of the site, there is no evidence in the Quijos region to indicate that any form of production, such as those of the stone bowl industry from Cotocollao (which bears some similarities to the Formative stone bowl industry of Santa Ana-La Florida), were occurring during the Late Period. However, the use of greenstone at highland sites, and other Andean sites more generally, may be more suggestive of activities occurring in the Quijos region.

Few if any sites in the Ecuadorian highlands have as detailed and well-documented descriptions of ground stone artifacts, as does Cotocollao. Though several other sites have yielded ground stone materials, their applicability in this discussion remains limited. The second highland assemblage reviewed in this section is from the site of Kotosh in central Peru. Though often discussed in the context of highland cultures, Kotosh is actually located along the upper edge of the eastern foothills. The site is characterized by a complex of buildings and multistoried temples, which were inhabited as early as the second millennium BC. Ground stone artifacts are present during the six post-ceramic periods identified by Izumi and Terada (1972):

- Kotosh Higuera Period (post 100 BC)
- Kotosh Sajara-patac Period (~300-100 BC)
- Kotosh Chavín Period (~800-300 BC)
- Kotosh Kotosh Period (~1000-800 BC)
- Kotosh Waira-jirca Period (~1500-1000 BC)

The authors identified a number of ground stone tool types that included axes, stone balls (“the growing frequency of their appearance coincides with an increase in the number of grinding slabs, which may have been used with the stone balls as *mano*” [Izumi and Terada 1972:251]), grinding slabs, mortars, *batáns*, rocker manos, hammerstones, polishing stones, club heads, and various other small ornamental items. The authors noted that during the Kotosh Waira-jirca Period, ground stone materials were relatively limited in comparison to other cultural materials, however “[t]he T-shaped ground ax appeared in this period in its perfected form” (1972:256). Few positively identified tool forms were present during the Kotosh Kotosh Period. Likewise, the Kotosh Chavin Period yielded few ground stone tools, though, interestingly, T-shaped axe increased in frequency, and a single small T-shaped axe was recovered, which the authors suggested, given its size and material quality, may have been “a pendant in a T-shaped ground axe form” (1972:257). The Kotosh Sajara-patac Period yielded roughly one-third of the total stone artifact assemblage, while the final period yielded a smaller number of ground stone artifacts, it also yielded a greater variety of tool forms. “New elements of stone artifacts are... *batáns*, and rocker-manos, star-, cross-shaped and girdled club heads, earplugs and perforated slates: (1972:311). Few other substantial interpretations are made of the ground stone assemblages, however, the diversity of tools used throughout the later periods has added to a growing body of literature revealing the complexity and diversity of stone tool use in the Andes.

In a recent study of long-term socio-political evolution in the Bolivian Altiplano, McAndrews (2005a) undertook a regional survey of several distinct areas within a 427 km² research zone. The study explored regional settlement patterns demarcating roughly

3000 years of occupation, with a particular focus on the Formative Period agro-pastoral Wankarani culture. The surveys entailed a combination of full coverage and sampling of the La Joya region (75 km²) and Rio Kochi (78 km²), and a quadrat sampling strategy between the two areas. The only category of ground stone materials listed under the artifacts collected during the settlement survey is ground stone manos (McAndrews 2005b). The settlement survey yielded 136 collection units, from which 34 ground stone manos were recovered. Ground stone were recovered from a total of 12,435 lithic materials (0.3%). Lithic materials were primarily chipped-stone flakes and bi-faces of basalt. Furthermore, 13,158 lithic fragments were recovered from 955 systematic surface collections, which yielded 21 manos and a single metate fragment.

Following Bermann and Estévez (1995), McAndrews (2005a:37) suggested that “[e]xcavations at the Wankarani site of San Andrés (LJ-C) in the La Joya region supports the proposition that household ritual was important to Wankarani society. Clusters of clay figurines, grinding stones, and bifaces in domestic contexts probably represent ritual caches and are specific to the household context”. Outside of the discussion of a single axe-head (see below), this study did not focus on the significance of ground stone distribution nor did it readily identify the presence of other forms of ground stone tools such as axes.

5.3 Ground Stone in the Northern Andean Coastal Settings

The northern Andean lowlands are marked by two coastal zones: a semi-arid to arid region to the south and an increasingly arid coastal zone to the north. Possibly the most extensively studied and excavated area of Ecuador is along the southern coastal plain, which is in part marked by the Santa Elena Peninsula, which forms the uppermost

extent of the Gulf of Guayaquil. A series of excavations were carried out by Meggers, Evans, and Estrada (1965) within this region during the 1950s. These excavations focused on the early formative phases of Valdivia and Machalilla (starting approx. 3500 BC) and yielded a range of ground stone artifacts. Valdivia Phase ground stone were identified as stone bowls, grinding stones (which consisted of several fragments of manos and metates), hammerstones, polishing stones, saws, and polished axes (1965:26-29). The small and fragmented nature of the collection leaves little room for comparison. However, four complete polished axes were recovered, one of which was a “T-shaped” axe found within a burial context. The authors (1965:36-37) posited that

[t]he extreme rarity of polished axes in Valdivia Phase refuse in comparison with unshaped or slightly shaped stone tools may indicate they are of trade origin. On the other hand, polished stone tools are often less abundant than cruder kinds in refuse deposits simply because they were more carefully made and less readily discarded.

Moreover, they summarize that (1965:37)

the Valdivia Phase stone artifact inventory can be characterized as an assemblage of crude and undistinctive implements persisting with rare exceptions throughout the seriated sequence without modification either in the form of individual tools or in the types presented. Since stone implements had specific practical applications, this consistency implies that the forms were well adapted to the functions they served, and that these functions did not change in any major respect throughout the Valdivia Phase.

The Machalilla Phase ground stone materials are substantially smaller than those of Valdivia, and do not appear to differ that drastically. Axes were not recovered from this phase.

In a recent study of the coastal *Spondylus* industry and the development of sociopolitical complexity during the Machalilla Phase, Martin (2009a) undertook a full-scale systematic survey in an area of approximately 100 km² in southwestern Manabí

province, Ecuador (within the *Parque Nacional Machalilla*). By method of 50 m transect surface collections, Martin and team recovered 32 ground stone pieces, which included 11 manos, one metate, seven undefined mano or metate pieces, six small polishing river stones, four large river stones, and several architectural stones (Martin 2009b). Two of these were identified as being possible Manteño chair or column fragments (Martin 2009a:69). The systematic intensive survey yielded 553 surface collections, which in comparison to the relatively small number of ground stone recovered, produced 3,112 flaked lithic pieces. In comparison, the QVRAP regional survey involved a total of 2,256 lots across a 136 km² area, which yielded a total of 2,507 lithics, of which roughly %1 (n=29) were ground stone. In both cases the use of ground stone appears to be somewhat limited in comparison to the less formal chipped stone lithic industry. Martin's study is interesting in that he presented a scenario of demographic growth and increased social complexity as, in part, a result of access to exotic shell resources, which became the center of an important trade network by the Integration Period (AD 800-1532). The research area is marked by three larger population concentrations, from which roughly one third (n=12) of the ground stone materials were recovered from, however the distribution of ground stone artifacts were not limited to these areas. Most of the tool forms from these locations were manos or unidentified mano and metate pieces. In fact, all but the smaller river stones/pebbles, are suggestive of food processing activities. Given Martin's particular focus on reconstructing the demographic history of the area, ground stone materials were not analyzed in any detail. That said, the limited number of ground stone materials is somewhat congruous with that of the QVRAP, as well as the overall distribution of artifacts within both the larger and dispersed settlements.

John Cole's (1977) doctoral research entailed a detailed analysis of stone tools in southwestern Ecuador, which included tool assemblages from ceramic period cultures (Valdivia, Machalilla, Engoroy, and Libertad). Though the dissertation is fairly detailed, at times, Cole fails to clearly demonstrate which studies are being included within his analysis, and which discussions necessarily relate to data resulting from his own excavations. However, Cole (1977:72) does note some general trends characteristic of the Santa Elena Peninsula:

If anything, there seems to be an inverse relationship between the quality of these lithics and the complexity of the cultures with which they are associated... They are characterized by sophisticated pottery, agriculture and fishing and, later, stone sculpture and metallurgy, which refute any suggestion that their relatively-crude flintknapping and rather indiscriminant stone raw material selection was the result of technical inability or "primitiveness".

In general, the chipped-stone industries of the Northern Andes appear to fit a similar pattern of being predominantly expedient in character, especially when compared to those of the Central Andes or Mesoamerica (Knight et al. 2011:1078) and Cole's (1977) research appears to support this model. This is particularly interesting when compared to certain ground stone technologies of the Northern Andes, eastern foothills, and Amazon basin. The more formal characteristics of ground stone tools are particularly apparent in large grinding tool sets (such as the mano and metate), smaller stone bowl and mortar and pestle sets, and heavily polished formal axes. In the case of the ground stone recovered from Valdivian contexts, Cole (1977:108) noted that "T-shaped" axes in Valdivia may be evidence of Amazonian interaction, yet "while T-shaped axes are notable in Valdivia, celt-like, rectangular axes are also common... Since at least one T-shaped axe is known from Vegas, they cannot be called totally diagnostic of Valdivia. The form is simple enough to have been invented more than once and thus is not

indelible proof of Tropical Forest Culture derivation and diffusion, but these artifacts are very suggestive in themselves”. Other ground stone materials such as manos and metates are also “found in all areas” (1977:110). Cole described the metates as generally being amorphous and slab-like in design (Figure 5.5). Similarly, manos of quartzite, chert, or sandstone are also largely expediently shaped tools. Cole (1977:111) posited that

[t]heir presence may suggest agriculture, but cultigens are not the only materials one might want to grind. Gathered foods are often ground, also, and even dried fishmeal “flour” may have been used in Valdivia times much as it is today... [Likewise] preparing clay for the potter by grinding it to powder is another possible use of Valdivia grinding equipment.

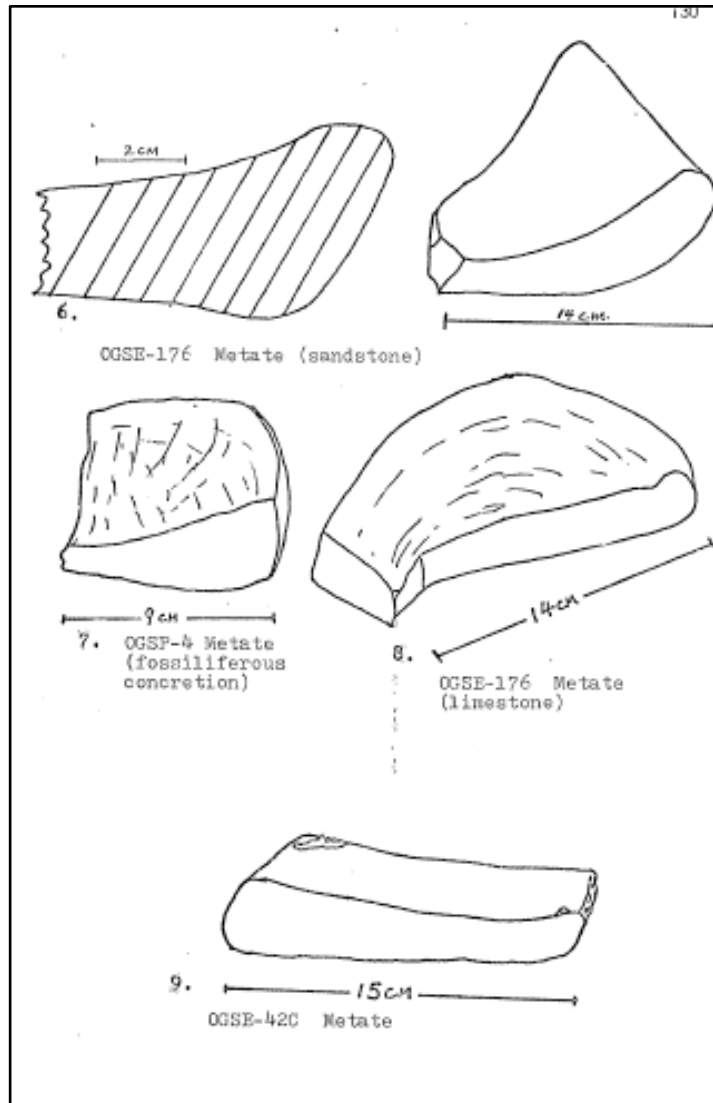


Figure 5.5: Valdivia Phase metates (from Cole 1977:130, Plate 27).

Among seven excavated sites, Cole (1977:126, Table 3) documented 54 ground stone artifacts, which in comparison to the total number of lithics recorded ($n=1196$), is approximately 4.5%. Ground stone counts and types remain underrepresented throughout the subsequent phases until the Libertad Phase, during which ground stone comprised roughly 20% of the total lithic assemblage (1977:246).

Though archaeological studies are more prevalent in Ecuador's coastal and lowland settings, this review has shown that ground stone materials remain underrepresented as a whole, and this appears to be the case for the Northern Andean studies presented in this chapter as a whole. This begs the question, is there a typical Northern Andean ground stone assemblage, and if so, is the QVRAP ground stone assemblage comparable? I will attempt to address this question after a more general discussion of ground stone tool as trade and luxury goods.

5.4 Ground Stone as Trade and Luxury Goods

The idea that ground stone may have served as trade goods is not new to archaeology (e.g., Bradley and Edmonds 1993; Hampton 1999; Milevski 2008; Welch 1996; Wright 2008), nor, as several Andeanists have suggested in this review, is it new to the Northern Andes. Ethnohistoric sources further suggest that stone and metal hatchets may have served as wealth or prestige items. In a discussion of Quito-area chiefdoms, Salomon (1986:91-93) describes an the Anónimo of 1573 which places a particular importance on hatchets

which bear resemblances to widespread kinds of treasures, whose distributions reached far beyond the sierran valleys. Yet... differ from these related wealth objects in ways that would seem to have impeded mutual circulation... A somewhat similar relationship seems to have existed between the kinds of hatchets which were treasured in different regions. From Atienza ...we know that hatchets served as Quito-area bride wealth. The Anónimo held that it was functional hatchets, "with which they cut firewood," that were highly esteemed around Quito... On the coast, too the hatchet symbolized value; indeed it evolved in a form so specifically symbolic that Olaf Holm has seen fit to write of "hatchet-coins".

Salomon suggests that stone and metal hatchets, among other sumptuary goods such as gold, shell beads, and coca, served as a form of political capital among elites.

In a recent study of pre-Columbian exchange systems and political organization in the Venezuelan foothills, Gasson (2006:41) observed that ground stone pendants of serpentine and other non-local materials might have served as prestige goods within a network of circulation between the Amazon and northeastern South America. These items may have been traded along the Orinoco River between Colombia and Venezuela during the sixteenth century AD. Furthermore, in a study of sixteenth century Muisca chiefdoms of central Colombia, Langebaek (1987) suggested that ground stone bead (*cuenta*) manufacturing was present, and that the raw materials used in their production may have been brought in from the Magdalena Valley. Among these artifacts was a beaded necklace made of a green volcanic rock, which Langebaek (1987:97-101) suggested was related to the movement of non-local raw materials, rather than finished products into the region. Langebaek also noted that ethnohistoric documents regarding concepts of disease among the Tairona chiefdoms of the Sierra Nevada de Santa Maria on the north coast of Colombia placed a particular emphasis on adornments made of greenstone, which were thought to have significant healing properties.

Research of the formative period (circa 2000 BC) Wankarani in the south-central Bolivian Altiplano has also presented the possibility of trade in axe-heads. McAndrews (2005a:77) noted that

[t]he site of Jallahuana (B-1) had a polished basalt ax head similar to Formative Period ax heads found in Cochabamba... It is not clear if the ax head is a product of trade, but its presence in the Belén region suggests that there may have been some contact between the Belén Wankarani and Formative Period groups in Cochabamba. This is further supported by the presence of Cochabamba sodalite on a number of Wankarani sites in the region.

Interestingly, this axe (Figure 5.6), as mentioned previously, is one of the few examples of a perforated axe-head that, to my knowledge, has been documented archaeologically outside of the QVRAP in the Andes, along with the few examples from Guiana and Suriname. McAndrews (1998, 2005a, 2011, personal communication) has noted that this axe type is common to Cochabamba in central Bolivia.

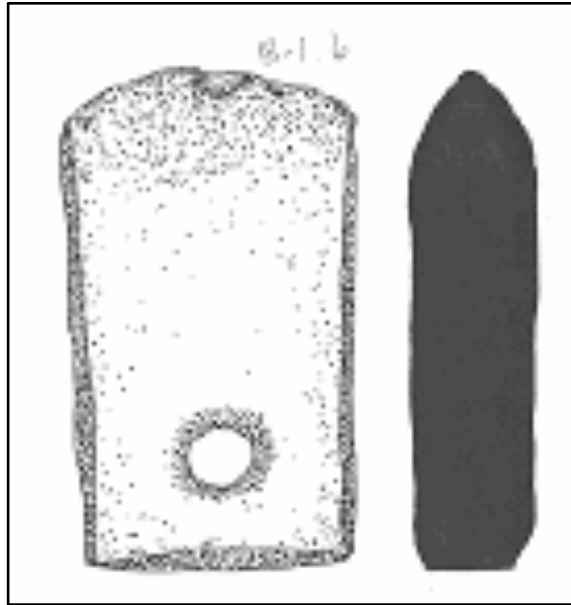


Figure 5.6: Basalt perforated axe/hoe (from McAndrews 1998:429).

Research in the Llanos de Mojos in the Bolivian Amazon also presents a scenario in which stone axes may have served as trade items. In part, this is supported by the fact that materials used in ground stone production do not appear to be local. Furthermore, Walker (2008:935) suggested

Stone axes, which are rare but are widespread in [Llanos de] Mojos, may indicated contact with the eastern slopes. Material for ground stone tools does not appear naturally in Mojos, and the best sources are in the Andes (although the Brazilian shield is another possibility). Such axes could have had symbolic value, but because they do not occur in large numbers, it is unlikely that they played a pivotal role in agriculture.

Though this is an interesting hypothesis, detailed research of the region is a fairly recent phenomena, and further studies are needed to determine the role of stone axes among the pre-Columbian Mojos.

As discussed in Chapter 1, Cook and Ranere (1984) have tentatively suggested that the controlled production and distribution of polished axes used in land clearance was a means for incipient elites to gain wealth and status during the first millennium BC in central Panama. Interestingly, this model of exchange is focused on the control of local resources on a regional scale rather than more common models that deal with long-distance exchange as a mechanism for the emergence of social ranking.

Haller (2008) undertook a full-coverage systematic regional survey of the Río Parita Valley of central Panama within an area of 104 km². The survey entailed 1,267 collection units of which 116 (9%) yielded ground stone materials (2008b). 86 Collection units yielded manos and metates. Metates were divided into slab, legged, and breadboard types. Haller noted that the manos and metates are visually identical to locally available andesite and vesicular basalt materials, though the apparent standardized manufacture of legged metates and a lack of debris associated with production suggests that this type of metate was manufactured by specialists outside of the Río Parita (2008:145). Furthermore, Haller (2008:147) posited that

[t]he amount of labor involved in manufacturing a legged metate suggests that they served more than just a functional purpose, possibly, associated with fertility rituals...Elaborate large legged-metates, from western Panama, might have been used for grinding maize and/or as seats/thrones... They have a standard iconographic style depicting jaguar, captive, and, war iconography... The legged variety of metates found in the Central Region, on the other hand, lack an explicit representational iconography, and Cooke...speculates that this difference in ideological emphasis may derive from social (i.e., “ethnic”) differentiation some time in the past.

Haller (2008:151) identified 38 polished stone axes, three axe preforms, and 23 small fragments, which may be related to manufacture or use. Haller (2008:153) noted that “[t]he parent material used to manufacture axes was not found anywhere in the survey zone and was most likely imported into the Río Parita Valley as axe preforms and then shaped for use...Thus, the distribution of stone axes supports Cooke and Ranere’s...tentative suggestion that control of the manufacture of axes might have been one mechanism for political advancement”. Haller concluded that

[s]tarting with the Late Occupation Sequence, new artifacts, based on different technological needs, come to dominate archaeological assemblages. Increasing regional standardization in pottery, polished stone axes, ground stone (legged and breadboard metates), and chipped stone demonstrates that not all goods were produced locally and exchange between different communities became increasingly important. It is not until the Cubitá phase, however, where the standardization and spatial range of goods (utilitarian and prestige) suggest that a socioeconomic interaction sphere existed throughout the Central Region (2008:161).

In the case of the Moundville chiefdoms of the Southeastern United States, who gained regional prominence by roughly AD 1000, there exists evidence to support the specialized production and trade of greenstone axes. Welch (1996:81) posited that the

production of ground stone axes was restricted to the Moundville site... The stone – greenstone and other metamorphics ...- comes from sources at least 80 km distant, and at least some of it was brought in as blocks of raw materials. Excavations at Moundville yielded axes in all stages of the production process. The absolute quantity of manufacturing debris is small, suggesting either that axe manufacture was only an occasional activity, or that debris was regularly cleaned away. Nevertheless, the manufacturing debris found at Moundville is unmatched in character by the material from any of the other settlements in the chiefdom. In contrast, finished axes and broken bits thereof are found throughout the chiefdom: at Moundville, outlying mound sites, isolated farmsteads, and nonsite areas where axes may actually have been used.

As discussed in Chapter 1, Wilson (2001) disputed this argument by reexamining ground stone celts, which, as Wilson argued, show evidence of recycling activities rather

than primary production at Moundville. In this scenario, Moundville elites did not have centralized control over utilitarian production, though the small-scale production of ceremonial greenstone artifacts at Moundville (such as spatulate celts and pendants) may have provided an avenue of elite aggrandizement.

The following case presents a scenario of axe production and trade where substantial evidence is available of quarrying and production activities. In a study of Hawaiian adze production among the prehistoric chiefdoms of the island of Hawaii, Lass (1994) examined the role in which adze production may have served to enable chiefs to gain and maintain authority. The dates of the materials studied ranged from the fifteenth century AD through to the nineteenth century. Within the study area, the industry of manufacturing adzes was quarry-based, which leaves distinct traces within the archaeological record. The adzes themselves, from several manufacturing sites and at various stages of production, showed a fair degree of homogeneity, which is often associated with a standardized form of production, though, as Lass argued, does not account for other variables that can act on the homogeneity of an assemblage. At its core, Lass's study aimed to evaluate several adze quarry sites to determine whether differences in manufacturing techniques and raw materials reflected differences in craft specialization. Though, as Lass argued, adzes clearly served as utilitarian items, it is possible that chiefs were indirectly tied to adze use by means of the activities they were used for and the people that used them, as in the case of specialist canoe or house builders. Furthermore, chiefs may have actively sought to ensure that these specialists had access to suitable tools for their crafts. That said, Lass (1994:49) concluded that "[c]urrently there is no good evidence that Hawaiian chiefs sponsored or directed adze-

makers to manufacture stone tools. In part, this is due to an apparent reliance on local sources, which does not suggest a centralized system of adze production and control”. As to the case of homogenous tool form as evidence of specialized production, Lass (pg. 66) posited that

...in this case artifact uniformity is probably not a reliable indicator of attached specialization because there are many factors other than attached craft specialization that can affect the degree of homogeneity in adze form and size. These include cultural norms not related to craft specialization, the intended use or function of adzes of various shapes and sizes and postmanufacturing processes, such as resharpening that modify the shape and size of finished adzes. It is important that standardization or other supposed indicators of craft specialization are expectable in the particular industry being studied, and many conventional indicators of specialization do not apply well to adze manufacture.

This study is particularly interesting in that it presents a scenario in which a utilitarian item such as an adze is not relegated to either the political or subsistence economy, but rather the use of such an item highlights the relationship between both, as well as the relationship between the production of utilitarian goods and wealth items.

5.5 Discussion

What the cases presented in this study have shown is the diversity of interpretations possible for ground stone studies. In the first section, a selection of Northern and Central Andean studies were presented which not only highlight the rather limited nature of ground stone studies in these regions, but also helped to clarify the unique nature of the perforated axe form of the Quijos and Cosanga valleys, especially in relation to the more ubiquitous “T-shaped axe”. Further archaeological research in the highlands and foothills east of Quito may serve clarify whether a potential relationship between raw materials (e.g. green andesite) and axe production exists between the two regions at any point in time. Or, it may be the case that the manifestation of wealth items

such as beads (and potentially axes), produced from materials such as green andesite (or greenstone more generally), is independent to various pre-Columbian societies. What these studies do show is that though often discussed in terms of trade and specialized production, our interpretations are often based on rather limited data and further research will serve to clarify stone tool use in the Northern Andes and Amazon.

It may not be a stretch to say that the most commonly discussed ground stone tool type in the Northern Andes is that of the Axe. Other tool types such as manos and metates, mortars and pestles, hammerstones, polishing stones, and stone bowls appear to be fairly common throughout many of the sites explored here, though they are often only discussed in the most general sense (though discussions of Formative Period stone bowl production at sites such as Cotocollao and Santa Ana-La Florida is becoming more prominent). Martin's (2009a) intensive study of regional development along the coast provides a sound comparison against that of the QVRAP study, yet studies of this nature are greatly lacking throughout Ecuador. Villalba's (1988) study at Cotocollao is by far the most detailed analysis of ground stone tools in the region and has provided interesting insights into Formative Period ground stone use in the northern highlands. For instance, it appears that greenstone was sought for the production of luxury items such as axes and beads in the highlands and though this remains to be fully explored, it may have been the case that greenstone tools and ornaments in the Quijos region were used in a similar fashion during the Late Period.

The temporal and geographic distribution of axes is also of interest, as they have been identified at coastal sites as early as the third millennium BC (Valdivia Phase), during the formative period in the highlands (1800 – 400 BC), and in the Peruvian Montaña by

the eighth century BC. Interestingly, all but the coastal settings show a clear continuation of axe use well into the second millennia AD. Various researchers have suggested that the primary function of axes was for use in tree felling and land clearance (e.g. Boomert 1979; Carneiro 1979; Villalba 1988), which Meggers *et al* (1965) have suggested is in line with an increase in axe frequency further inland of Ecuador's coast, where trees and forests are more common. That said, Kornbacher (2010:113) has questioned the often untested assumption that "axes" were solely used for these specific purposes, given that "... there is a tremendous range of sizes and shapes, edge angles, bit shapes, provisioning for hafting, etc. apparent in a collection of tools we term axes". Rather, as Kornbacher argues, axes may have been used for a range of activities beyond the context of agricultural functionality.

Though I have suggested that the "primary" function of the QVRAP perforated axes is that of land clearance and maintenance, I fully acknowledge that there are various other tasks in which these tools may have been used for. However, following Dickson (1981) and other experimental studies (see Carneiro, 1979), the overall formal design, edge angles, and edge-wear among the QVRAP assemblages does support the likelihood that these items were used in land clearance activities. Alternatively, as I have suggested for a number of the smaller perforated axes in the collection, these tools may have served as a type of adornment or ritual item. Several of the studies reviewed here have discussed ground stone artifacts in the context of burials (Lathrap 1973; Meggers, Evans, and Estrada 1965; Villalba 1988; Weber 1975) or as symbolically charged items more generally (Athens 1990; DeBoer 1998).

Lass's (1994) study of Hawaiian adze production is an interesting example of the potential relationship between the political economy and the subsistence economy. As may have been the case in the Quijos and Cosanga valleys, well produced, formally designed strategic tools that served a more basic utilitarian function need not be excluded from aspects of the political economy. The highly formal nature of such tools (and the substantial investment of labour and resources necessary to produce them) may in fact be a reflection of specialized use, though not necessarily requiring specialists to produce the tools. It may also be the case that these items were used to produce wealth items, such as woodcarvings and elite residences, or the formal character of these tools is reflective of a cultural norm, which, above the utilitarian use value of these items, may present an undifferentiated symbolic importance among society as a whole.

6 Chapter 6: Conclusions

The primary focus of this thesis was an evaluation of the extent to which ground stone craft production, and the ground stone economy more generally, was a dimension of social differentiation among the Late Period Quijos chiefdoms. This was achieved by exploring three interrelated scenarios: A.) whether the organization of ground stone craft production was specialized and/or under the direct sponsorship or patronage of elites; B.) whether the access to and distribution of raw materials and the tools produced from them were restricted to certain segments of Quijos society, and; C.) whether elites engaged in more diversified economic activities.

In Chapter 1, I discuss some of the theoretical considerations used to evaluate ground stone economies within broader social and political contexts. In large part, these discussions have provided a sound starting point for analyzing the Quijos Valley Regional Archaeological Project (QVRAP) ground stone assemblage within a broader investigation of regional economic and political dynamics during a period that is marked by clear manifestations of regionally complex sociopolitical organization. In Chapter 2, this research sought to develop a broad regional tool typology and raw material typology, which, at the time of writing, are lacking in many, if not most, regions throughout the Northern Andes. Furthermore, a detailed discussion of the region's physiography has shed light on the fluvial and volcanic processes, which were ultimately responsible for the dispersal of raw materials throughout the region. In Chapter 3, a careful analysis of the contexts in which the ground stone artifacts were recovered from, which focused on the association between ground stone and ceramic materials, provided a strong chronological association between the QVRAP ground stone assemblage and

the Late Period (AD 500 – 1500). The following sections present a discussion of the three scenarios tested in this thesis, which are the focus of Chapter 4.

A.) Specialization and the Organization of Ground Stone Production.

Given that the QVRAP ground stone assemblage is comprised of a diverse selection of both informal expedient tools and formal strategically designed tools, the first object of this thesis was to examine the organization of ground stone production, and more specifically, whether evidence exists to support a model of attached specialization for certain ground stone tool forms. As defined previously, I use the term specialization here simply as the production of craft goods - be it wealth or utilitarian items - at a household level, with an intended distribution beyond the households they were produced in.

There is little doubt that most of the ground stone tools found in the study zone were locally produced, given the abundance of raw materials available throughout the region's major rivers and tributaries. The small sample size of ground stone artifacts in the region, which is not uncommon among other assemblages in the Northern Andes, does not immediately suggest any form of production beyond the needs of individual households, though without a basis of direct comparison, it is difficult to judge whether this is accurate based on this fact alone. However, a model of independent part-time craft production is reinforced by a lack of evidence to support larger-scale production such as workshops, which are generally associated with forms of attached specialization. Furthermore, a selection of axes were analyzed for evidence of standardized production methods, which, much like the QVRAP ground stone assemblage as a whole, showed little evidence of standardization in form and raw material. Though an analysis of three

small perforated axes and the perforated greenstone axe assemblage did yield some overall patterns of homogeneity in form, as Barbara Lass (1994:66) has argued, artifact uniformity need not be a direct result of standardized manufacturing techniques. Rather, the degree of homogeneity in various tool forms may be an indicator of other factors that impact tool form, such as “cultural norms not related to craft specialization” and other technological choices.

Overall, the ground stone assemblages are fairly heterogeneous in form and raw material, and do not appear to be restricted to any particular subregion or settlement type, which I believe is the best evidence to support a model whereby broad segments of Late Period Quijos society were actively involved in the production, distribution, and consumption of ground stone tools. Though the QVRAP ground stone assemblage has primarily yielded information related to consumptive activities, there is evidence to support the production of ground stone tools within the Late Period central places as well as the smaller dispersed settlements. This suggests that the production of these items was not restricted to the Late Period central places, though ground stone production and consumption at Bermejo surely warrants further research. In terms of axe production, this research suggests that Quijos axe-producers were probably independent part-time specialists or even non-specialists, though the degree of skill and knowledge necessary to produce the perforated axe form seems to suggest at least some degree of the former. Ultimately, the above discussion suggests that independent part-time or seasonal craft producers were responsible for the diversity of both expedient and strategically designed tools found within the QVRAP ground stone assemblage.

An analysis of the chipped-stone industry in the region (Knight 2009) shows that the production of chipped-stone tools was an expedient process, which would have been a relatively fast and cost efficient means of creating tools. Formal ground stone tools, such as the perforated axe, on the other hand, would have entailed a significant investment of time and labour. Though polishing the exterior of a tool such as an axe does have a functional benefit, in that it may reduce the likelihood of chipping and flaking during use, the rationale behind polished stone tool production and use does not seem to be one of a direct economic rationalization. In fact, the perforation of axe-heads would seem to contradict this, given that this task introduces a major structural flaw within a tool that was most likely meant to fell trees among various other activities. The QVRAP axe assemblage shows a considerable diversity of use, often resulting in incomplete fragmented tools. This is clearly evidence that the tools were actively being used, yet the skill, care, and precision necessary for their production, as well as other lines of evidence, leads me to believe that certain tools may have been prized over other items within the basic household toolkit.

B.) Access to and Distribution of Raw Materials.

The access to and distribution of raw materials used in the production of ground stone tools does not appear to have been restricted to any segment of Late Period Quijos society. This is supported by the abundance of local raw materials throughout the region that clearly correspond to those of the QVRAP ground stone assemblage, though direct evidence of production is far more limited. Access to raw materials appears to have been largely unrestricted, leaving it less likely that this was an avenue advantageous to elite aggrandizement. Though mainly comprised of local andesitic materials, axe producers in

the Quijos and Cosanga valleys exploited numerous visually distinct andesites and basalts, which may have been selected for both functional and aesthetic purposes. As the major rivers appear to have provided the raw materials necessary to produce stone tools, proximity to sources does not seem to have been a limiting factor in their acquisition. In many ways the local availability of these materials would negate any form of restricted access or distribution (as tied to the elevation of economic or social status), yet distance is not the only factor that may have impacted the ability of producers to obtain preferable materials. One such factor that needs to be considered is the frequency of “preferable” materials entering into the riverine system and how human selection would have impacted their availability and perceived value. It is possible that better quality cobbles were less frequent at particular times in the past due to human exploitation. The exploitation of cobbles of a particular material type, size, and quality may have impacted the availability of certain resources, as I have suggested might have been the case for good-sized greenstone cobbles that were well suited for axe production. During a preliminary survey of local rivers and tributaries, I was only able to identify larger boulders of greenstone, poorer quality cobbles, or smaller river pebbles that would have been inadequate for axe production. This may also suggest that greenstone materials were acquired from sources not yet identified, which also leaves open the possibility that these materials were non-local, though I believe this to be far less likely. Regardless, an analysis of the overall distribution of raw material types does not support a model of restricted access or differential participation in the distribution of raw materials and the tools produced from them.

C.) Social Status and the Diversification of Productive Activities.

The final scenario explored in this thesis was the extent to which the diversification of productive activities at the Late Period central places was a reflection of elite activities. In particular, this study aimed to determine whether the range of activities present at the Late Period central place of Bermejo was a means by which elite households sought to increase and diversify production efforts in order to increase or maintain social standing.

An analysis of food processing technology between the Late Period central places of Bermejo and Pucalpa is somewhat telling. Whereas direct evidence of ground stone food processing technology is practically non-existent at Pucalpa, which may be the result of differences in the duration of site occupation and abandonment processes (though it might also suggest the presence of less archaeologically visible means of processing foodstuffs), the Bermejo assemblage is quite large in comparison. I argue that variability of food processing technologies at Bermejo might reflect varied processing strategies among households. This may be supported by differences among the mano and metate assemblages, which may reflect both economic and behavioral choices made at a household level. Though the presence of metates at Bermejo was rather limited, the various forms of manos that were recovered are clear indicators that mano and metate use was wide spread. This also appears to have been the case throughout much of the region, given the prevalence of manos in the northeastern and southern subregions as well.

There is also evidence of a spatially distinct area of production within Bermejo, though this may not necessarily support a model of differential participation in craft production activities as a means of social elevation. The intensive survey of the site has

yielded the densest concentration of ground stone tools directly related to food processing, land maintenance, and craft production activities, which is somewhat suggestive that this is in fact a reflection of elite activities, be it direct or indirect. It may be the case that the development of regionally complex hierarchies indirectly impacted local household economies among the Late Period central places, or throughout the region more generally, though the exact nature of this relationship remains to be seen. However, what a comparison of the two Late Period central places does seem to suggest, is that the processes of centralization and the internal social and economic dynamics of each site need not have manifested themselves in the same manner, or at least be expressed the same way in the archaeological record.

Future Research

Broadly speaking, this thesis not only aims to contribute to our understanding of aspects of the organization of ground stone production, distribution, and consumption, but also questions whether a careful analysis of the ground stone economy can shed light on the emergence of broader sociopolitical and economic systems present by the Late Period.

Though the ground stone economy does not appear to have been a dimension of social differentiation within the region during the Late Period, further research on ground stone in the Quijos and Cosanga valleys may shed light on the uniquely domestic context of both subsistence practices and Quijos society more generally. As argued by Hirth (2006), household strategies are often highly adaptable and diverse, and serve to address a broad range of social and economic functions.

A detailed study of ground stone assemblages throughout the Northern Andes and South America more generally has raised some interesting possibilities of future ground stone studies. Though primarily lacking in any systematic form of ground stone analysis, these studies have tentatively suggested that certain ground stone forms may have served purposes beyond that of utilitarian function. In several contexts, ground stone tools and adornments have been recovered from burial and/or elite contexts, or interpreted as prestigious exchange items. More generally, what these studies have suggested is that ground stone artifacts need not be viewed solely from a utilitarian/functional perspective. In part, I have attempted to view ground stone tools as both items used for basic household subsistence, and as items of symbolic consumption. An analysis of the Bermejo cache, which admittedly may have been a secondary refuse deposit, leads me to believe that it may have served as some form of household dedication or other communal activity, the implications of which provide a unique framework for future ground stone research in the region.

Additionally, research in the surrounding regions may serve to clarify the unique nature of Quijos perforated axe form, and ground stone economies more generally. Likewise, there is evidence to suggest that the use of greenstone in the production of various adornments and tools served an important role in trade and ritual activities in parts of northern South America. As to the use of greenstone and other raw materials in the Quijos and Cosanga valleys, I am hesitant to propose such a scenario, yet there is evidence that may hint at this. Only through continued research will we be able to broaden our understanding of ground stone and society.

Though the possibilities for future research are nearly limitless, there are several other possibilities that may directly inform the results of this study. First, a systematic expansion of the preliminary river survey undertaken for this project, especially in the northeastern subregion of the QVRAP study zone, will provide a more complete picture of raw material distribution. Likewise, an intensive survey of the Late Period central place of Borja in the northeastern subregion will serve as an important means of comparing and contrasting the ground stone assemblages of both Pucalpa and Bermejo. Finally, from a more technological perspective, experimental studies of ground stone production and consumption in the region would be a welcome point of comparison.

In a similar fashion to the study of the organization of the agrarian economy, which does not appear to have been directly related to the development of sociopolitical complexity (Cuellar 2009a), this research does not present an alternative means through which elites sought to gain or maintain political authority during the Late Period. This is particularly interesting given that attached craft specialization is commonly discussed in terms of the development of chiefdom societies (Clark and Parry 1990). The fact that ground stone does not appear to have been directly linked to sociopolitical change is important in and of itself. It has served to provide an additional perspective to further our understanding of the emergence of chiefly societies in the Quijos region of eastern Ecuador, as well as contributing to a growing body of literature focused on ground stone craft economies.

To summarize, our current understanding of the QVRAP ground stone economy supports a model of production situated within local domestic practices. Independent part-time craft producers produced ground stone for local consumption. In part, this is

based on a lack of any evidence of high intensity production, large-scale workshops, or standardized manufacturing techniques. Rather, the diversity of tool form and raw material, and patterns of distribution suggest that ground stone tools and the raw materials used in their manufacture was open to all aspects of Late Period Quijos society. That said, a study of the Bermejo ground stone assemblage has begun to shed light on some potential differences in craft production and the diversity of tool forms present during the Late Period, which, with further research, may serve to inform the results of this study.

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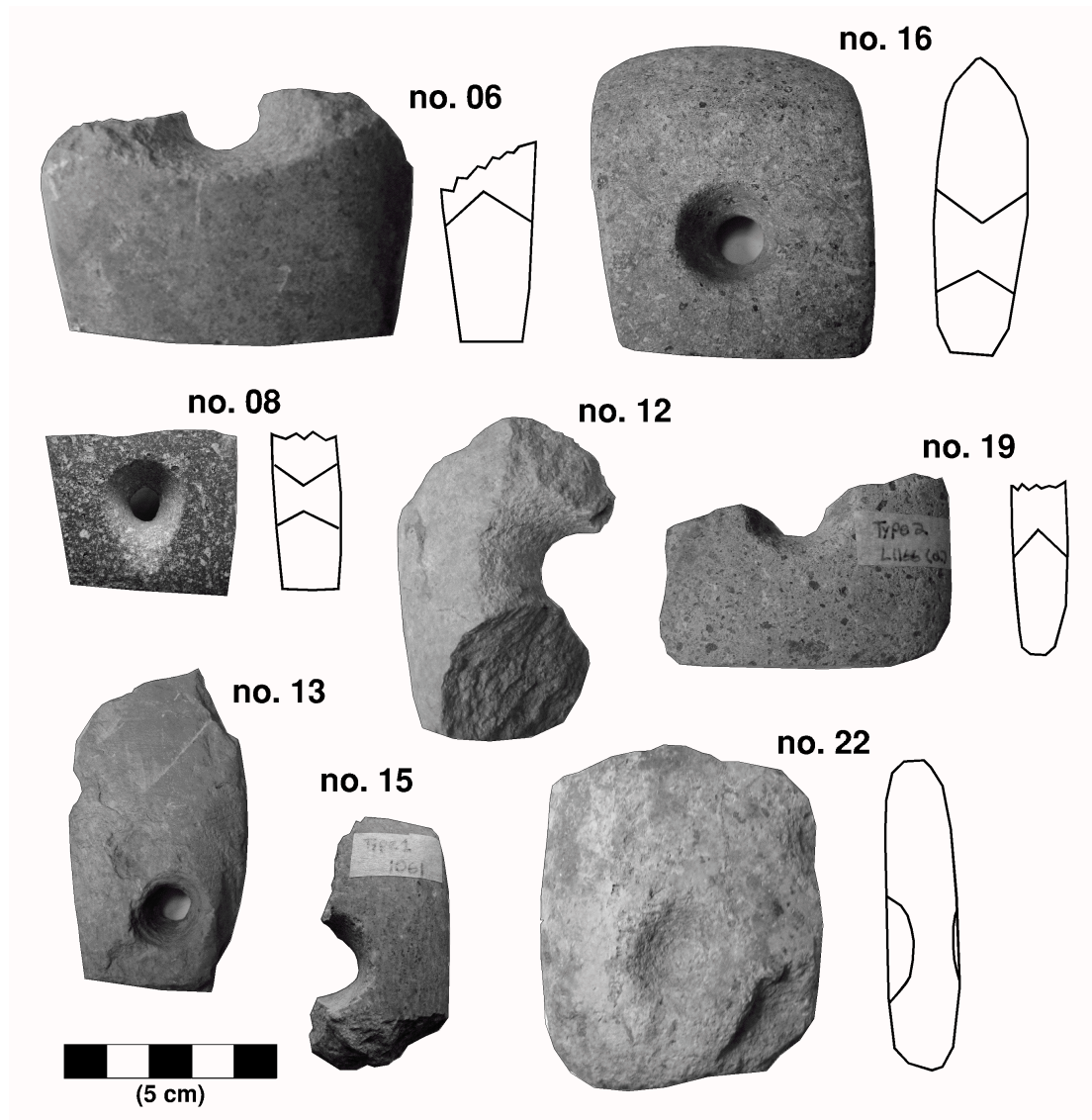
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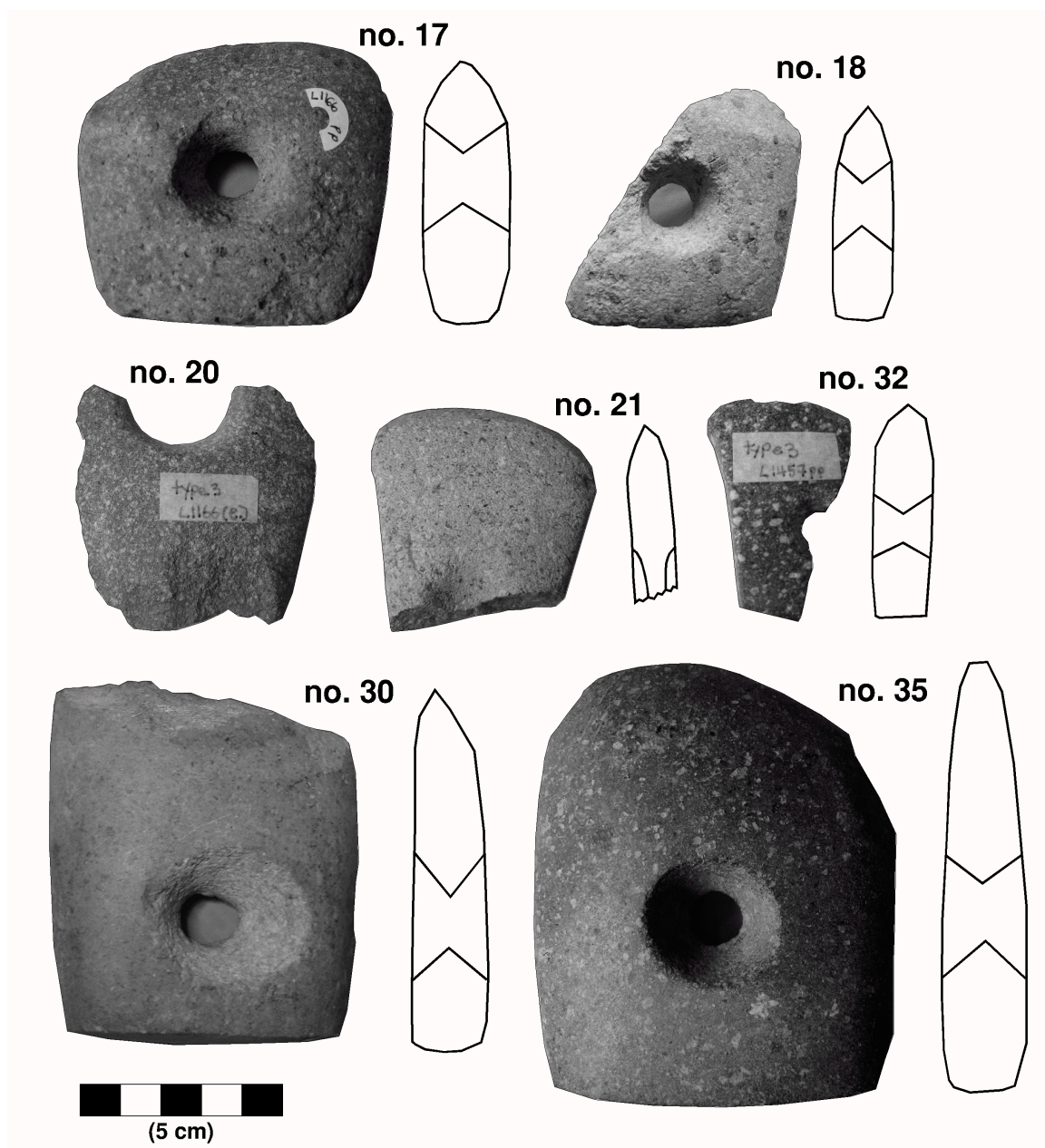
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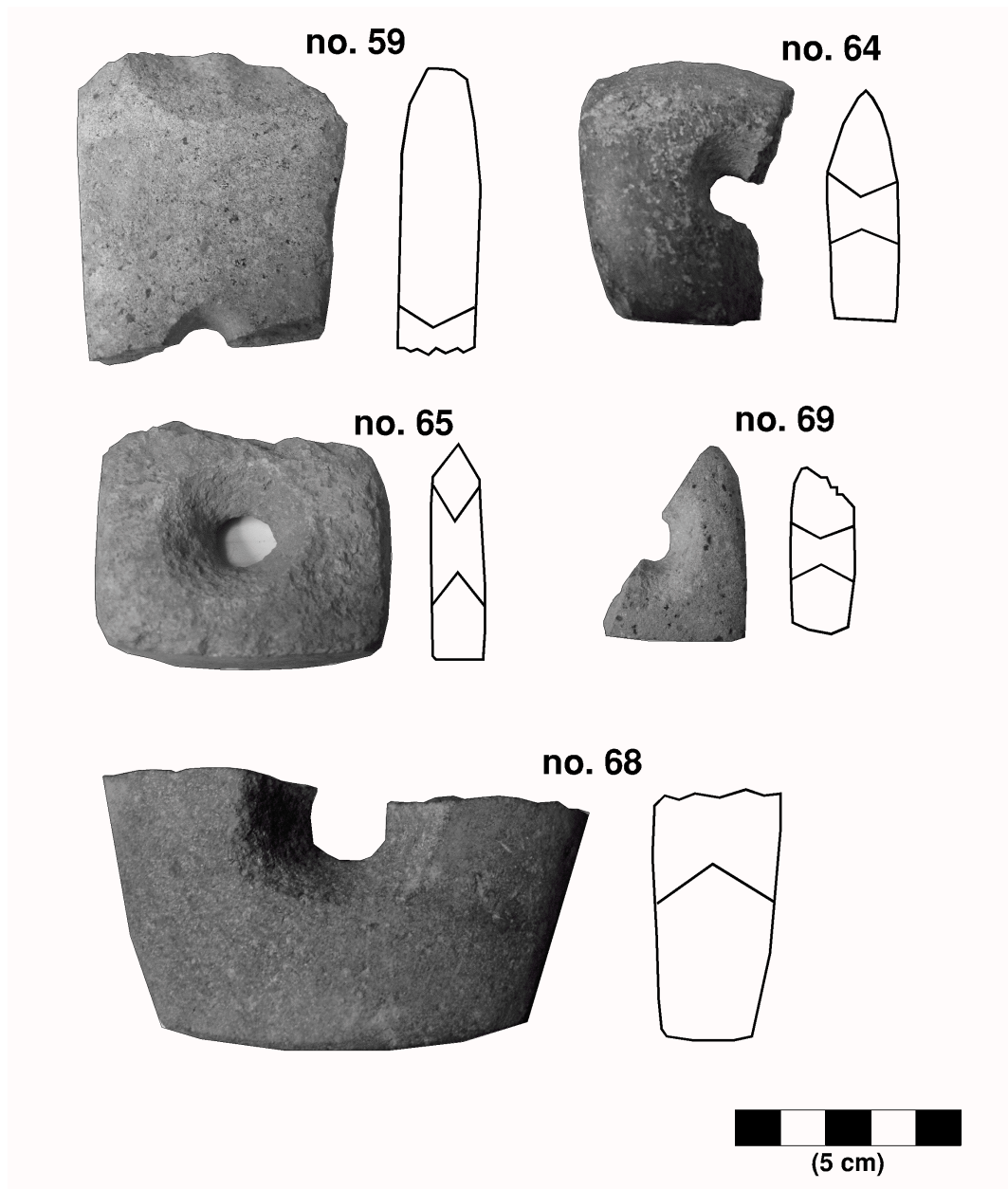
APPENDIX A



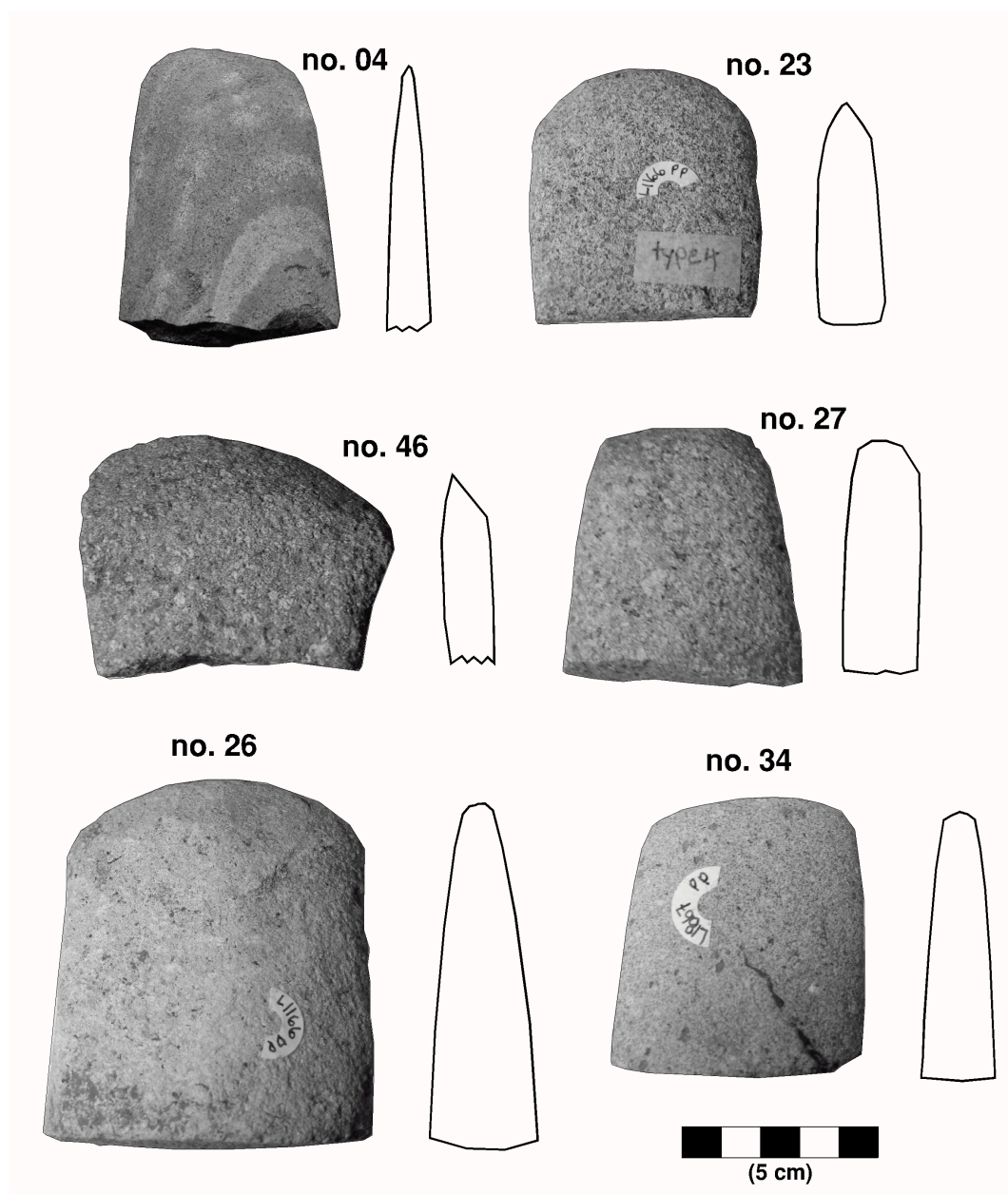
Perforated Axes



Perforated Axes



Perforated Axes



Axes

no. 24



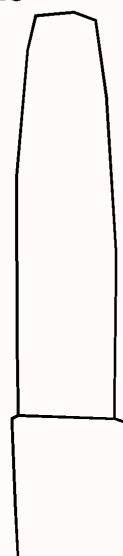
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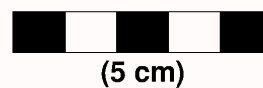
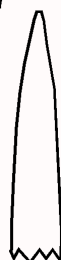
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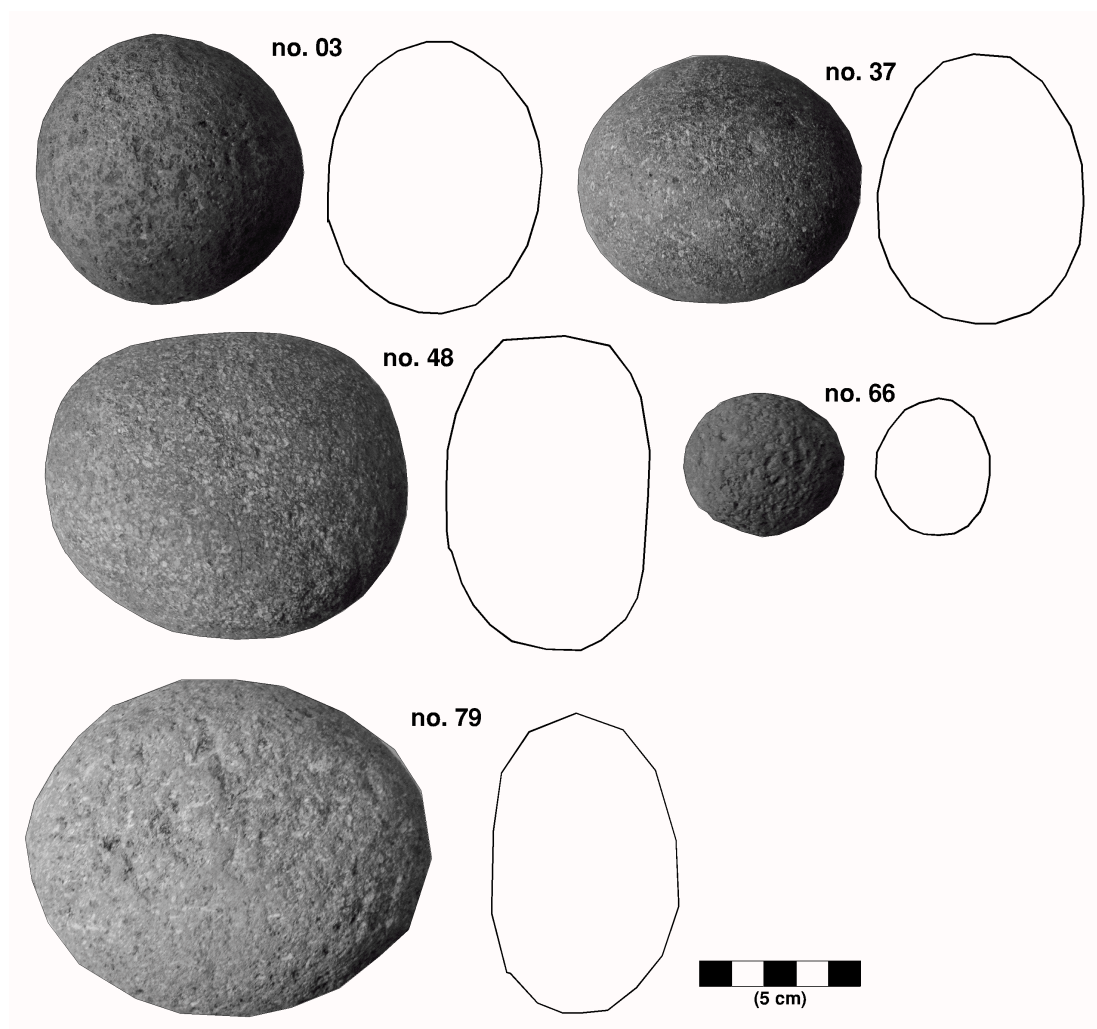
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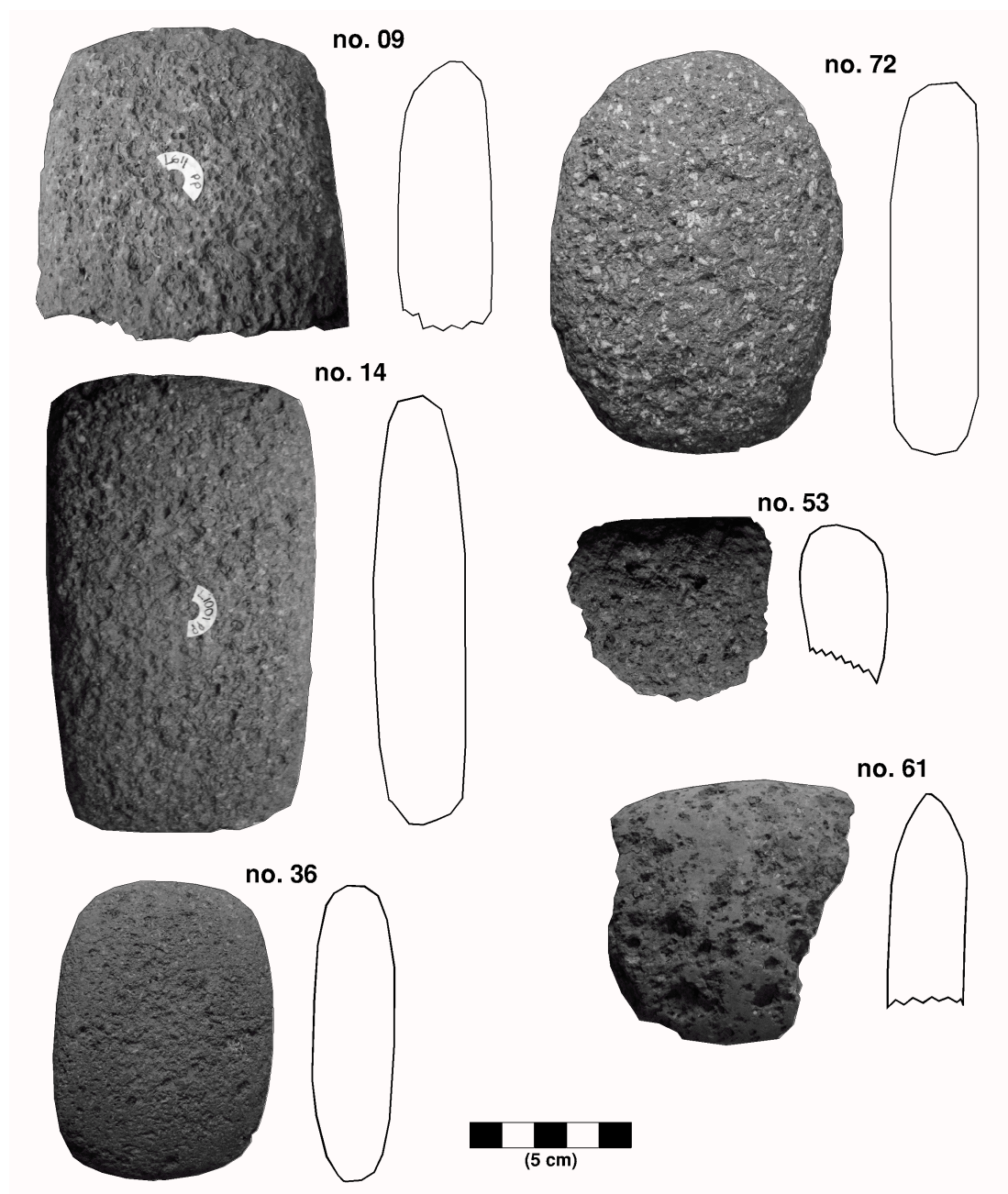
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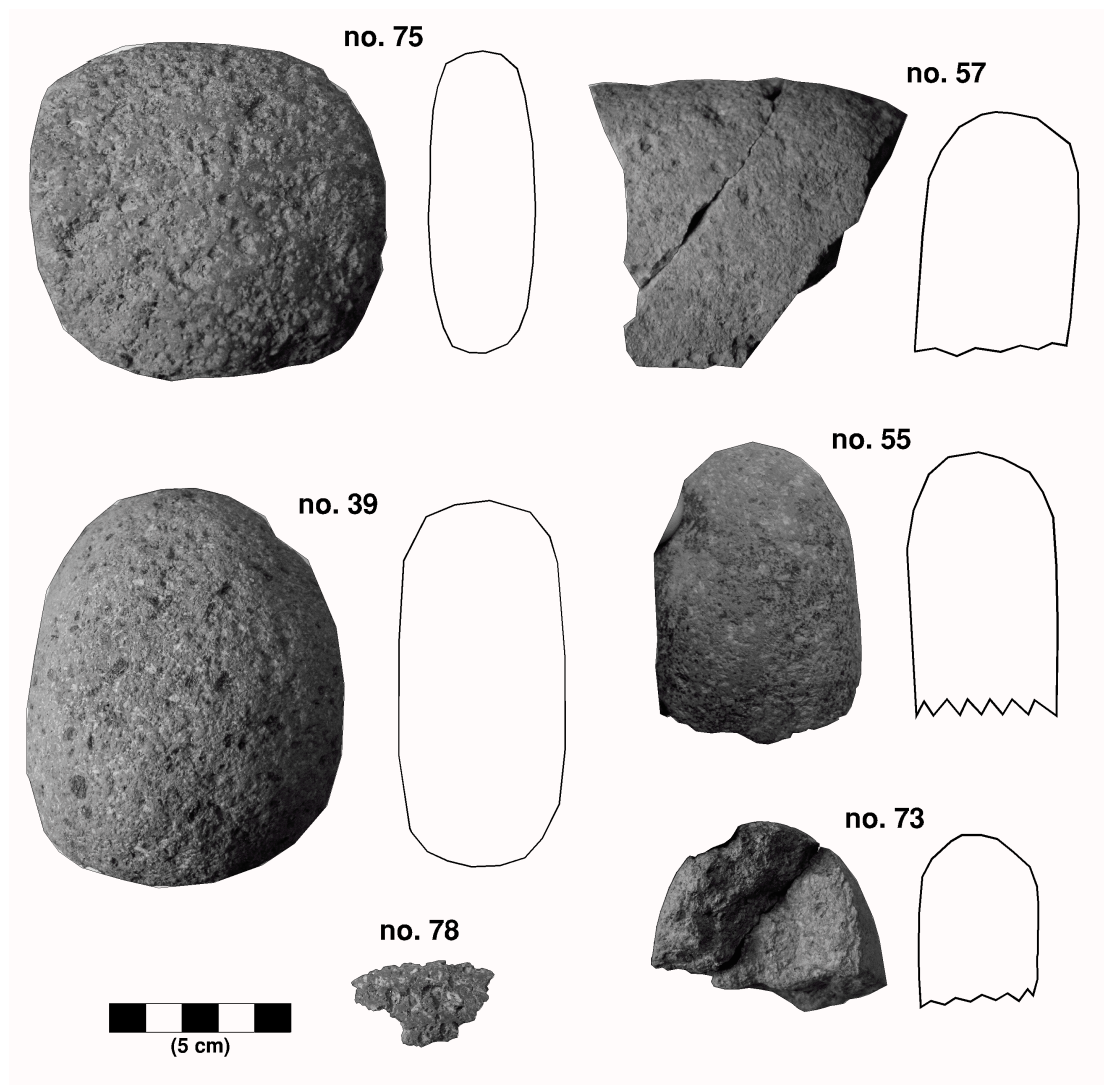
Axes and Other



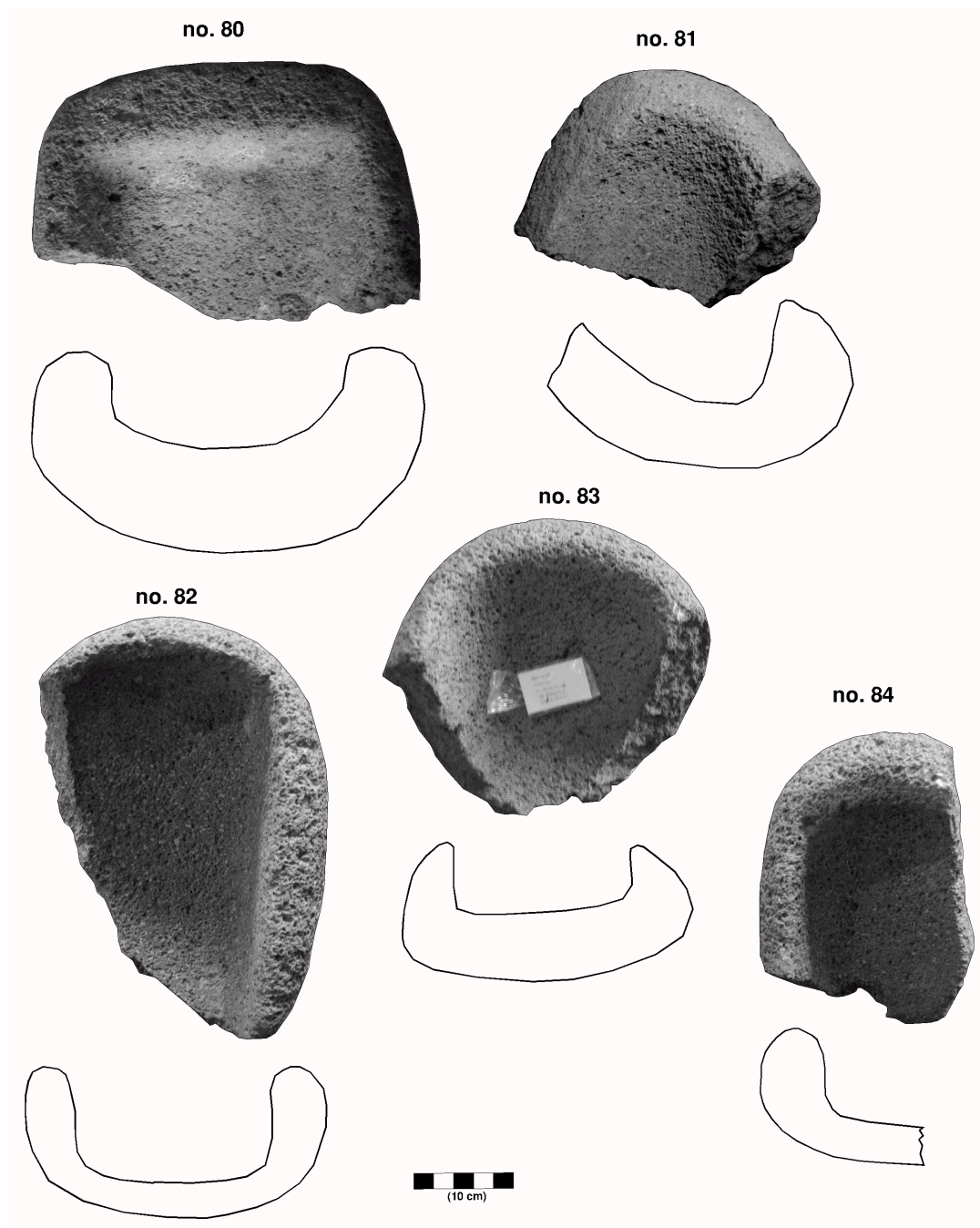
Manos



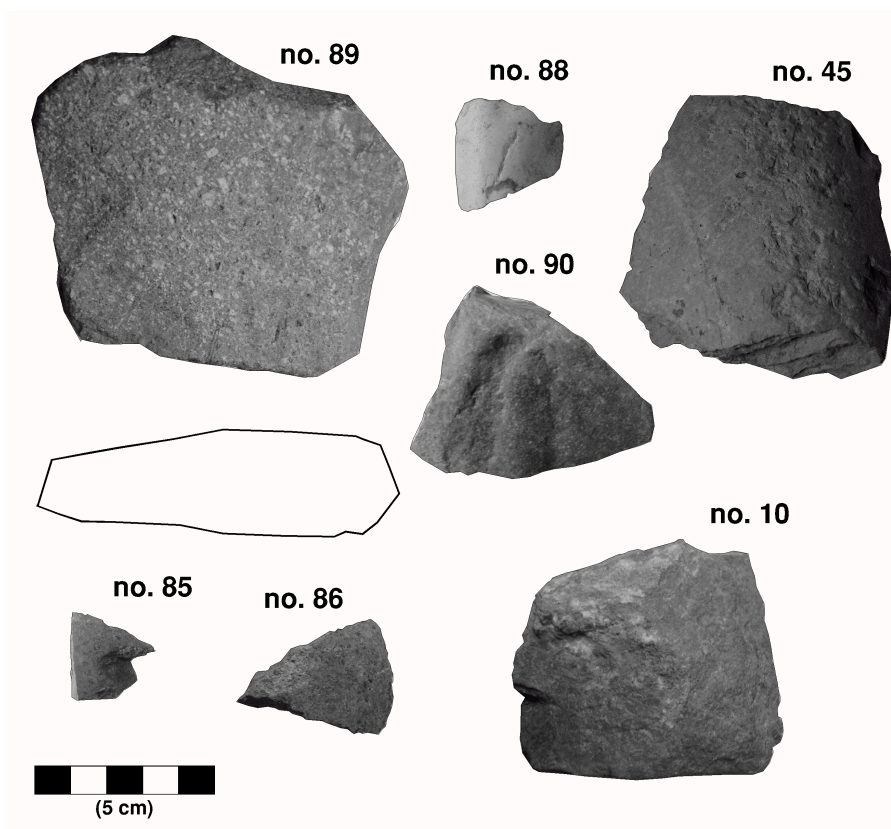
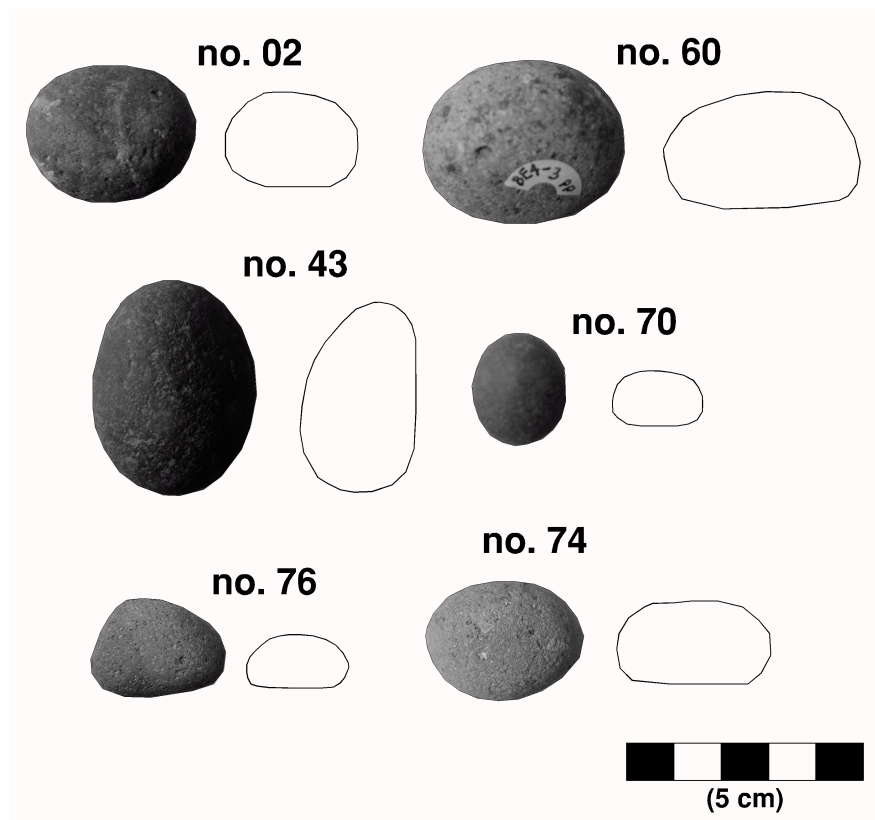
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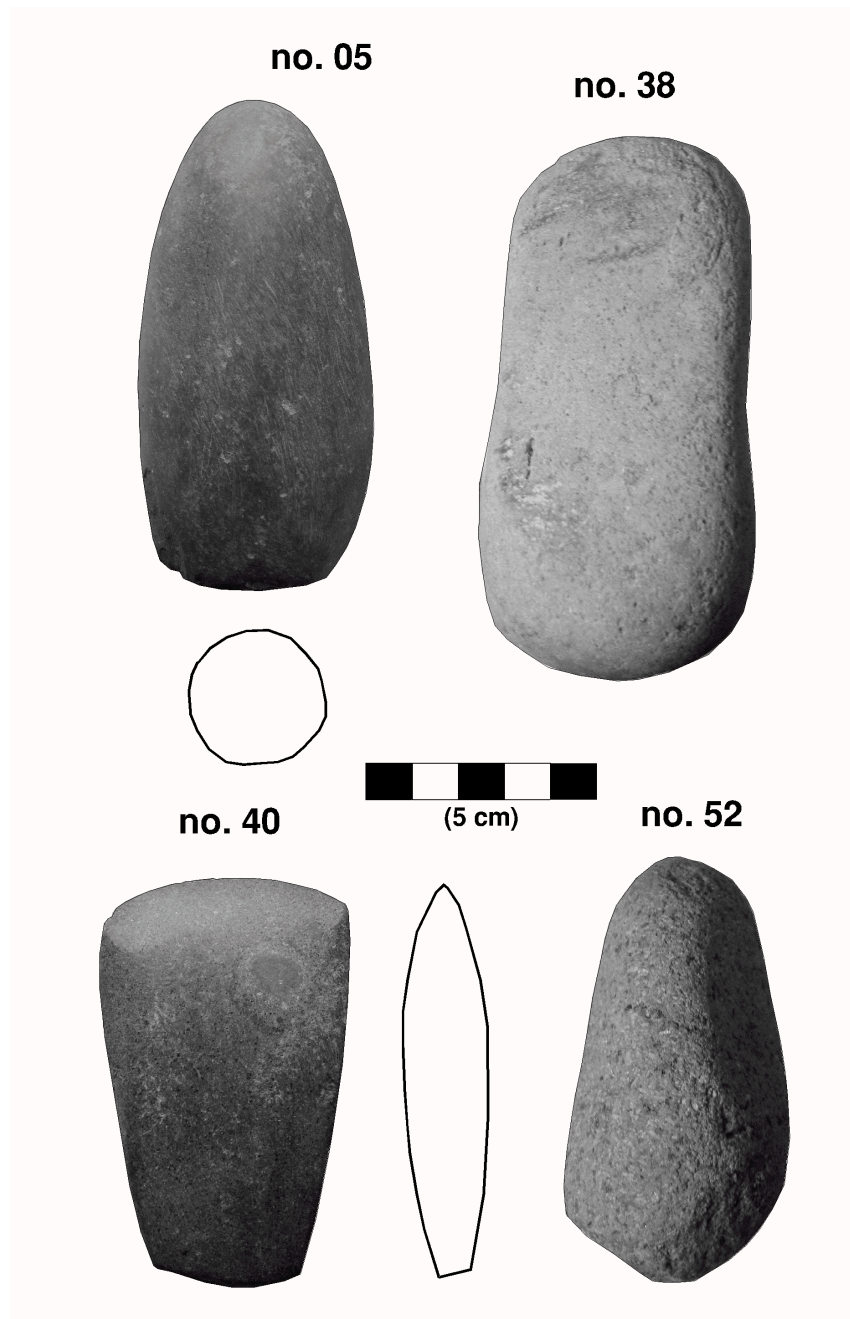
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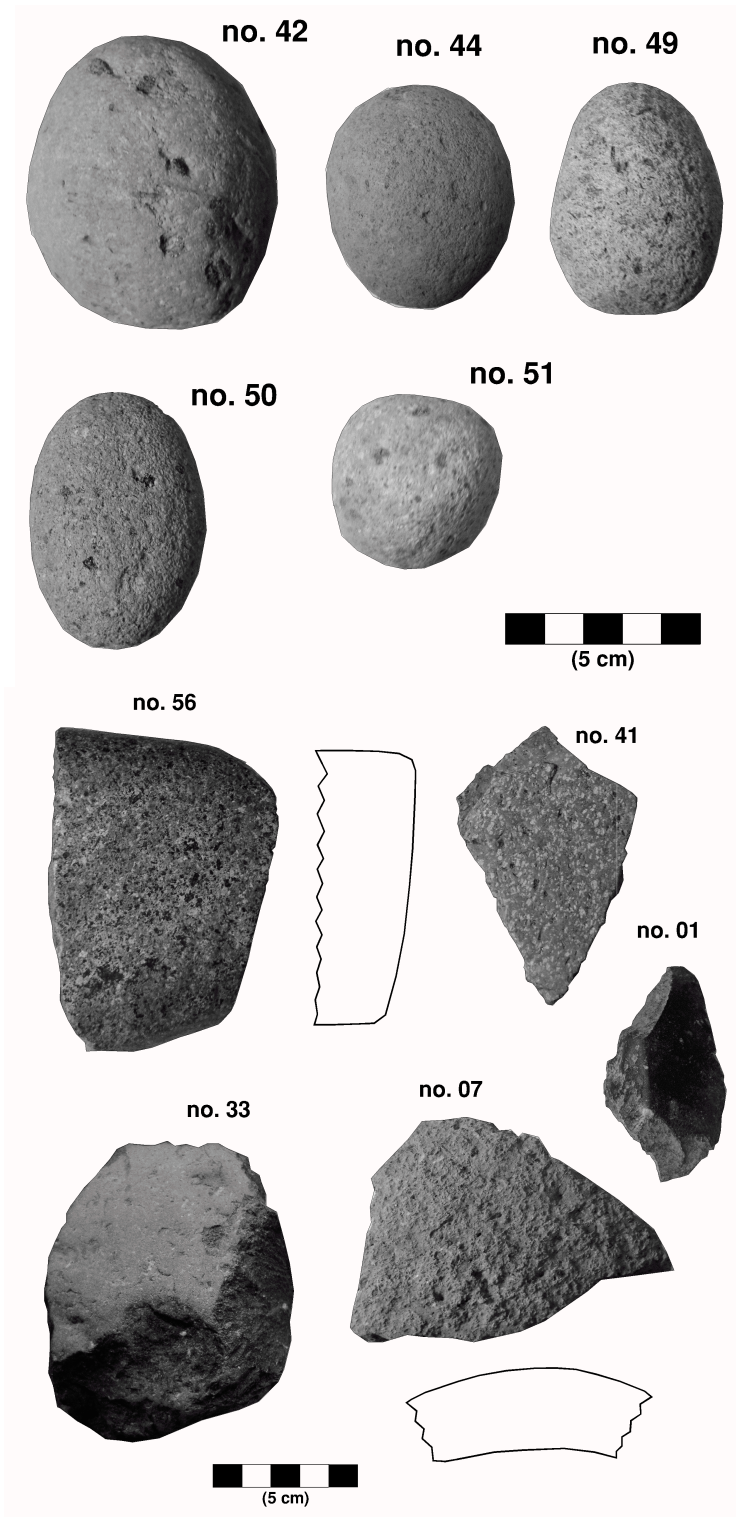
Metates



Polishing Stones and Debitage



Celts and Pestles



Expedient Handstones and Other

no. 62



no. 63



no. 71



Hammerstones

APPENDIX B

Artifact Provenience, Attributes, and Variables.

| Artifact Type | Material Type |
|-------------------------------|--|
| 1 – perforated axe | Type 1 – greenstone |
| 2 - axe | Type 2 – “cookie” andesite |
| 3 – celt | Type 3 – “blue/grey” andesite |
| 4 - hammerstone | Type 4 – “fine-grained/flecked” andesite |
| 5 – polishing stone | Type 5 – vesicular basalt |
| 6 – expedient handstone | Type 6 – basalt |
| 7 – mano one-handed unifacial | Type 7 – “black” basalt |
| 8 – mano one-handed bifacial | Type 8 – metamorphic dacite |
| 9 – mano two-handed unifacial | Type 9 – Black/Napo shale |
| 10 – mano two-handed bifacial | Type 10 -unidentified |
| 11 – mano round | |
| 12 – mano irregular | |
| 13 – two-handed river cobble | |
| 14 – metate square | |
| 15 – metate circular | |
| 16 – metate ovoid | |
| 17 – metate irregular | |
| 18 – pestle strategic | |
| 19 – pestle expedient | |
| 20 - unidentified | |
| 21 – metate fragment | |
| 22 – polished flake | |
| 23 – worked debitage | |

| Ref. | Provenience | Artifact Type | Mat. Type | Length (mm) | Width (mm) | Thick (mm) | Wt (g) | Inner Perforation | Outer Perforation |
|------|-------------|---------------|-----------|-------------|------------|------------|--------|-------------------|-------------------|
| 1 | Lot 87 | 20 | 1 | 8.4 | 4.5 | 2.1 | 61 | - | - |
| 2 | Lot 174 | 5 | 10 | 4.1 | 3.4 | 3 | 47 | - | - |
| 3 | Lot 187 | 11 | 5 | 6.5 | 6.3 | 5 | 264 | - | - |
| 4 | Lot 214 | 2 | 8 | 6.8 | 4.8 | 2.1 | 100 | - | - |
| 5 | Lot 223 | 18 | 6 | 8.6 | 4.3 | 3.6 | 197 | - | - |
| 6 | Lot 458 | 1 | 1 | 5.4 | 8.1 | 2.8 | 204 | 1.55 | 3.79 |
| 7 | Lot 458 | 21 | 5 | - | - | - | - | - | - |
| 8 | Lot 2244 | 1 | 3 | 3.78 | 4.58 | 1.6 | 57 | 0.82 | 1.84 |
| 9 | Lot 611 | 9 | 5 | 8.8 | 9 | 3.2 | 347 | - | - |
| 10 | Lot 615 | 23 | 1 | 5.8 | 6.8 | 2.7 | 132 | - | - |
| 11 | Lot 851 | 20 | 5 | 4.3 | 5 | 1.7 | 45 | - | - |
| 12 | Lot 954 | 1 | 1 | 6.6 | 4.2 | 2.6 | 73 | 1.71 | 2.72 |
| 13 | Lot 991 | 1 | 10 | 7 | 3.7 | 1.3 | 380 | - | - |
| 14 | Lot 1001 | 8 | 5 | 14.5 | 8.3 | 3.2 | 600 | - | - |
| 15 | Lot 1061 | 1 | 1 | 6.5 | 3.4 | 1.5 | 42 | 1.56 | 2.53 |

| Ref. | Provenience | Artifact Type | Mat. Type | Length (mm) | Width (mm) | Thick (mm) | Wt (g) | Inner Perforation | Outer Perforation |
|------|-------------|---------------|-----------|-------------|------------|------------|--------|-------------------|-------------------|
| 16 | Lot 1166 | 1 | 4 | 7.1 | 6 | 2.7 | 207 | 1.14 | 2.3 |
| 17 | Lot 1166 | 1 | 8 | 7 | 7.6 | 2.7 | 220 | 1.21 | 2.42 |
| 18 | Lot 1166 | 1 | 8 | 6 | 5.1 | 2 | 88 | 1.05 | 1.95 |
| 19 | Lot 1166 | 1 | 2 | 6.5 | 6.5 | 1.8 | 68 | 1.22 | 2.4 |
| 20 | Lot 1166 | 1 | 3 | 6.4 | 5.2 | 1 | 44 | - | 3.3 |
| 21 | Lot 1166 | 1 | 4 | 8 | 5.5 | 1.8 | 91 | - | 1.9 |
| 22 | Lot 1166 | 1 | 8 | 8 | 6 | 2.2 | 161 | - | 2.3 |
| 23 | Lot 1166 | 2 | 4 | 6.2 | 5.5 | 2.2 | 136 | - | - |
| 24 | Lot 1166 | 20 | 4 | 8.6 | 6 | 2 | 155 | - | - |
| 25 | Lot 1166 | 20 | 10 | 7.6 | 5.5 | 1.6 | 100 | - | - |
| 26 | Lot 1166 | 2 | 4 | 9.1 | 7.1 | 3.9 | 414 | - | - |
| 27 | Lot 1166 | 2 | 4 | 6.7 | 5.9 | 3.8 | 271 | - | - |
| 28 | Lot 1166 | 2 | 3 | 12.6 | 6.7 | 3.1 | 314 | - | - |
| 29 | Lot 1166 | 4 | 4 | 13.2 | 8 | 3.9 | 806 | - | - |
| 30 | Lot 1320 | 1 | 1 | 8.9 | 8 | 2.5 | 236 | 1.46 | 3.54 |
| 31 | Lot 1470 | 1 | 3 | 8.1 | 8.2 | 2.6 | 271 | 1.31 | 3.42 |
| 32 | Lot 1457 | 1 | 3 | 5.5 | 3.6 | 1.5 | 41 | 0.79 | 1.85 |
| 33 | Lot 1805 | 20 | 7 | 7.5 | 5.6 | 3.1 | 147 | - | - |
| 34 | Lot 1867 | 2 | 4 | 5.5 | 4.7 | 1.9 | 91 | - | - |
| 35 | Lot 3044 | 1 | 3 | 10.1 | 8.4 | 3.1 | 407 | 1.12 | 2.88 |
| 36 | Lot 3158 | 8 | 5 | 10.2 | 7.4 | 3 | 345 | - | - |
| 37 | Lot 3160 | 11 | 3 | 7.8 | 7.1 | 5.5 | 438 | - | - |
| 38 | Lot 3221 | 19 | 6 | 10.4 | 5 | 5.3 | 195 | - | - |
| 39 | Lot 3248 | 12 | 2 | 11.3 | 8.6 | 7.1 | 930 | - | - |
| 40 | Lot 3282 | 3 | 8 | 8.3 | 5 | 2.2 | 151 | - | - |
| 41 | Lot 3301 | 20 | 3 | 9.5 | 6.1 | 1.3 | 810 | - | - |
| 42 | Lot 3347 | 6 | 10 | 5.5 | 4.5 | 3.7 | 133 | - | - |
| 43 | Lot 3374 | 5 | 5 | 5.1 | 4 | 3 | 80 | - | - |
| 44 | Lot 3381 | 6 | 6 | 5.2 | 4.4 | 3.3 | 95 | - | - |
| 45 | Lot 3428 | 20 | 8 | - | - | - | - | - | - |
| 46 | Lot 3494 | 2 | 3 | 6.1 | 7.6 | 2.7 | 163 | - | - |
| 47 | Lot 3523 | 21 | 5 | 33 | 24 | 12 | - | - | - |
| 48 | Lot 3554 | 11 | 3 | 10 | 8.5 | 5.7 | 780 | - | - |
| 49 | Lot 3619 | 6 | 2 | 6.3 | 4.7 | 4.1 | - | - | - |
| 50 | Lot 3712 | 6 | 2 | 5.1 | 4.5 | 3.5 | 92 | - | - |
| 51 | Lot 3731 | 6 | 3 | 3.9 | 3.8 | 3.9 | 81 | - | - |
| 52 | Lot 3773 | 19 | 3 | 7.9 | 4.1 | 36 | 162 | - | - |
| 53 | Lot 3834 | 8 | 5 | - | - | - | 177 | - | - |
| 54 | Lot 3844 | 11 | 6 | 10.8 | 10.4 | 8.2 | 1333 | - | - |
| 55 | Lot 3856 | 11 | 5 | - | - | - | 230 | - | - |
| 56 | Lot 3915 | 20 | 10 | - | - | - | 313 | - | - |
| 57 | Lot 3918 | 12 | 5 | - | - | - | 472 | - | - |
| 58 | VQ027 | 22 | 4 | - | - | - | - | - | - |
| 59 | VQ027 | 1 | 4 | 6 | 5.1 | 2.2 | 117 | - | - |
| 60 | VQ029 | 5 | 4 | 4 | 3.3 | 2.9 | 55 | - | - |
| 61 | VQ012 | 8 | 5 | 8.3 | 8.2 | 3.2 | 226 | - | - |

| Ref. | Provenience | Artifact Type | Mat. Type | Length (mm) | Width (mm) | Thick (mm) | Wt (g) | Inner Perforation | Outer Perforation |
|------|--------------|---------------|-----------|-------------|------------|------------|--------|-------------------|-------------------|
| 62 | VQ012 | 4 | 3 | 9.6 | 6.6 | 4.7 | 489 | - | - |
| 63 | VQ012 | 4 | 3 | 8.5 | 8.8 | 3.6 | 492 | - | - |
| 64 | VQ012 | 1 | 1 | 5.3 | 4.5 | 2 | 71 | 0.8 | 2.06 |
| 65 | VQ001 | 1 | 1 | 4.8 | 5.8 | 1.8 | 68 | 1.17 | 2.53 |
| 66 | VQ008 | 11 | 5 | 4 | 3.6 | 3.4 | 56 | - | - |
| 67 | VQ008 | 2 | 1 | 5.5 | 4.7 | 1.7 | 59 | - | - |
| 68 | VQ082 | 1 | 4 | 5.7 | 3.7 | 3.3 | 261 | 1.49 | 3.48 |
| 69 | VQ083 | 1 | 4 | 4.1 | 3 | 1.6 | 25 | 1 | 1.55 |
| 70 | VQ083 | 5 | 6 | 2.3 | 2 | 1.5 | 6 | - | - |
| 71 | VQ083 | 4 | 6 | 14.8 | 10.3 | 5.7 | 1365 | - | - |
| 72 | VQ083 | 8 | 5 | 12.8 | 9.5 | 5.4 | 860 | - | - |
| 73 | VQ085 | 11 | 5 | 2.5 | 6.7 | 5.1 | 245 | - | - |
| 74 | VQ085 | 5 | 4 | 3.4 | 2.6 | 2.2 | 25 | - | - |
| 75 | VQ085 | 8 | 5 | 8.6 | 8.2 | 3.6 | 278 | - | - |
| 76 | VQ086 | 5 | 3 | - | - | - | 52 | - | - |
| 77 | VQ087 | 1 | 4 | 3.4 | 7.6 | 2.3 | - | - | - |
| 78 | VQ087 | 11 | 5 | 3 | 2 | 1 | 8 | - | - |
| 79 | VQ090 | 12 | 2 | 10.6 | 8.6 | 6 | 783 | - | - |
| 80 | Surface Find | 14 | 5 | 25 | 33 | 13 | - | - | - |
| 81 | Surface Find | 17 | 5 | 21 | 26 | 13 | - | - | - |
| 82 | Lot 3523 | 16 | 5 | 33 | 24 | 12 | - | - | - |
| 83 | Surface Find | 16 | 5 | 26 | 29 | 17.5 | - | - | - |
| 84 | VQ084 | 14 | 5 | 33.5 | 25 | 13 | - | - | - |
| 85 | VQ021 | 22 | 1 | - | - | - | - | - | - |
| 86 | VQ049 | 22 | 1 | - | - | - | - | - | - |
| 88 | VQ020 | 23 | 3 | - | - | - | - | - | - |
| 89 | VQ090 | 23 | 3 | - | - | - | - | - | - |
| 90 | Lot 111 | 23 | 1 | - | - | - | - | - | - |

| Ref. | Form | Length | Width | Thickness | Basin Length | Basin Width | Basin Depth | Border Height | Border Thickness |
|------|-----------|--------|-------|-----------|--------------|-------------|-------------|---------------|------------------|
| 80 | square | 25 | 33 | 13 | 14.5 | 21 | 4.5 | 9.5 | 8 |
| 81 | irregular | 21 | 26 | 13 | 12 | 18 | 3.5 | 7.5 | 7.7 |
| 82 | square | 33 | 24 | 12 | 27 | 18 | 4.5 | 9.5 | 5.5 |
| 83 | ovoid | 26 | 29 | 17.5 | 21.5 | 19 | 5.5 | 13 | 5 |
| 84 | square | 33.5 | 25 | 13 | 23.5 | 17 | 5.5 | 9.5 | 5.5 |