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SOCIAL INTERACTION AMONG LATE ARCHAIC AND INCIPIENT AGRICULTURAL GROUPS IN THE NORTH AMERICAN SOUTHWEST

A DISSERTATION APPROVED FOR THE DEPARTMENT OF ANTHROPOLOGY

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Abstract

This study proposes that the transition to agriculture in the North American Southwest caused changes in social group relationships, especially in terms of cooperation and competition over land use. The research will provide new insights into the interaction of Late Archaic (1200-800 B.C.) and incipient agricultural (800 B.C.-A.D. 200) groups by analyzing the differences and similarities of projectile point attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson of the North American Southwest. The expectations of this study are that it will show that mobility and subsistence strategies permitted Late Archaic groups to be more cooperative and in less competition for resources, and therefore they would have similar projectile point morphology due to group interactions. In contrast, the later incipient agricultural groups across the North American Southwest who relied more on agriculture would have had smaller territories and would have been in competition with each other for suitable farmlands. Therefore, projectile point design styles between each region should show statistically significant differences in their attributes. Evidence from the research indicates that groups from the Tucson Basin, Black Mesa, and the Hueco Bolson had complex and dynamic social interaction resulting from acculturation during the Late Archaic and incipient agricultural periods.

Chapter I

Social Interaction among Late Archaic and Incipient Agricultural Groups in the North American Southwest

In the past two decades, our understanding of the Late Archaic and the period of time immediately following the Late Archaic in the North American Southwest has changed dramatically. New evidence of early maize has challenged the idea that Late Archaic groups were only hunting and gathering bands. Recently, researchers in the Tucson Basin have noted that groups from different phases within the Late Archaic period (1200-800 B.C.) had highly variable subsistence strategies. For example, some Late Archaic groups in the North American Southwest used casual agriculture, while other groups relied predominantly on a highly mobile hunting and gathering subsistence strategy. In contrast, some incipient agricultural (800 B.C.-A.D. 200) groups relied more heavily on an agricultural subsistence strategy (Adams 2005; Diehl 1997a, 1997b, 2001, 2003; Doleman 2005; Fish et al. 1992; Gregory and Diehl 2002; Huckell 1996; Mabry 2005, 2008b; Sliva 2005).

I plan to extend this discussion by evaluating how changes in subsistence strategies would have affected the social interactions of groups throughout the Late Archaic and incipient agricultural periods in the North American Southwest. Specifically, I propose that the transition to agriculture in the North American Southwest caused changes in social relationships among groups, especially in terms of cooperation and competition over land use. Tostevin (2007:342) suggests that cooperation and competition can be evaluated by the similarities and differences of tools between different groups. My research will provide new insights into Late Archaic and incipient agricultural group interaction by analyzing the differences and similarities of projectile points across the North American Southwest during the Late Archaic and incipient agricultural periods. Specifically, I expect that this study will show that Late Archaic groups from the different regions had more contact with each other, because they were more mobile, and the incipient agriculturalists would have been tied to their fields limiting social interaction.

Until this point, archaeologists have not concentrated on the social interactions of Late Archaic and incipient agricultural groups over large areas. In contrast, I will use data from three regions of the North American Southwest, including the Tucson Basin, Black Mesa, and the Hueco Bolson (Figure I-1), to evaluate and measure social interaction among these groups and changes in this interaction between the Late Archaic and incipient agricultural periods. I should be able to identify broader trends of social interaction among Late Archaic and incipient agricultural groups by distinguishing the patterns of stylistic similarities and differences of projectile points from these three regions. This comparison is possible because researchers have noted that the morphology of some projectile points is similar across the North American Southwest (Justice 2002b:1). I selected these regions because of their varied environmental settings from each other, the amount of available archaeological data, and the basic morphological similarities of the projectile points.

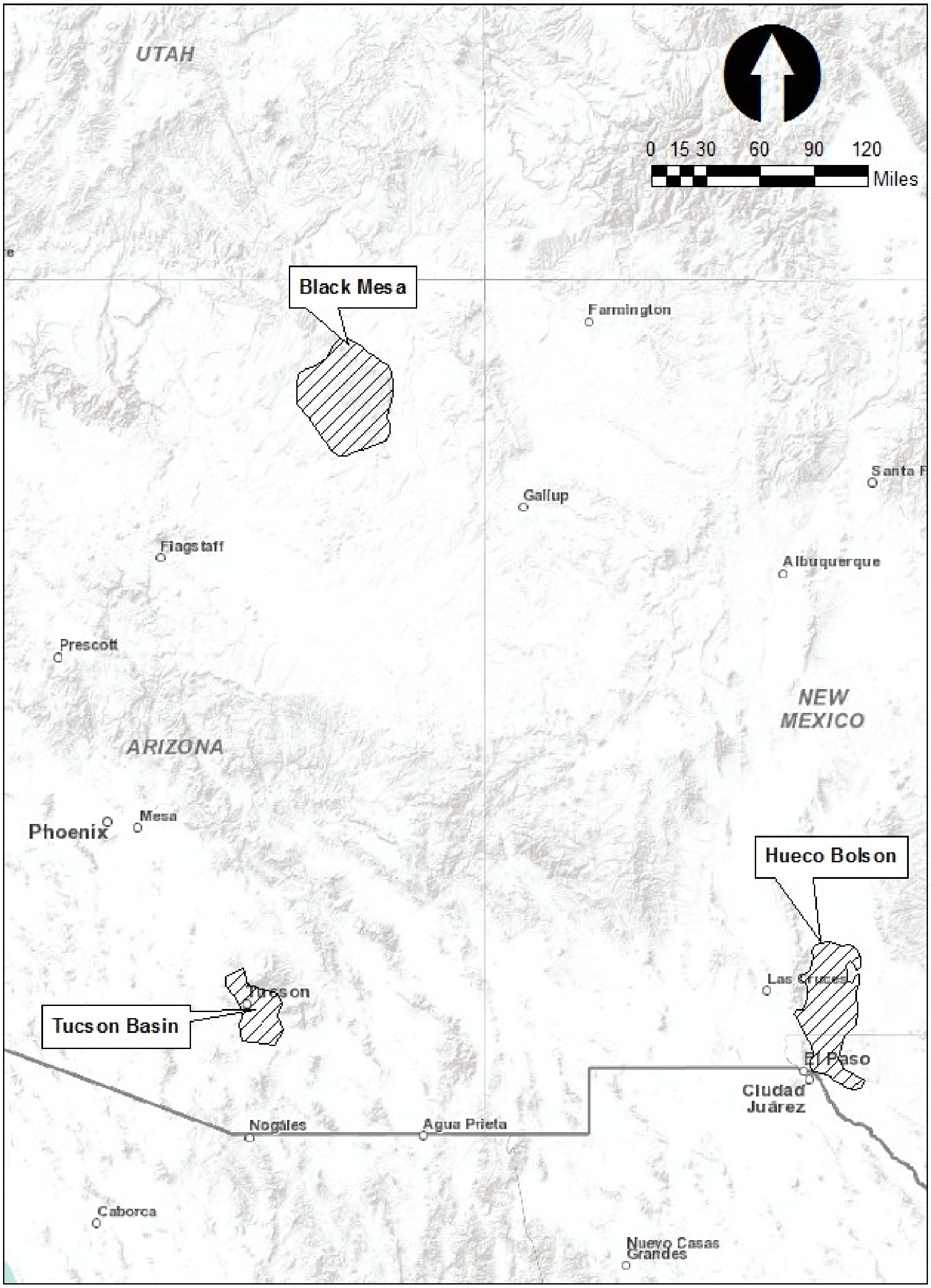

Figure I-1. Location of the Tucson Basin, Black Mesa, and the Hueco Bolson in the North American Southwest.

Pilot Study

In a pilot study (Beale 2007), I identified statistically significant differences in San Pedro points, one Late Archaic projectile point style, from three regions in the North American Southwest/northwestern Mexico: the Tucson Basin, the San Simon drainage in southeastern Arizona, and Cerro Juanaqueña in northwestern Mexico. My research had several conclusions. First, evaluating one projectile point style across different regions can illuminate mobility patterns and subsistence strategies by measuring morphological variables and how they relate to curation. The results of my analysis indicated that statistically significant differences do exist in the morphological variables of the projectile point blades. For example, the statistical results suggested that the San Simon Valley San Pedro points show more evidence of resharpening, indicating curation techniques. On the other hand, curating San Pedro points at Cerro Juanaqueña and the Tucson Basin was not as high a priority for residents of those localities, which suggests that these groups were less mobile and dependent more on agriculture.

Furthermore, similarities and differences in hafting elements provided clues about the standardization and style of projectile points from the three groups. Cluster analyses showed that the San Pedro points from the San Simon have much in common with points from the Tucson Basin and Cerro Juanaqueña, which may be due to Late Archaic groups in the San Simon interacting with the other regions. In contrast, the San Pedro points from Cerro Juanaqueña and the Tucson Basin clustered by region, indicating considerable differences between the points from these two regions, and suggesting that these people may have had less contact with one another.

My research indicated that by performing an in-depth analysis it is possible to evaluate both differences and similarities in the projectile points of Late Archaic groups. This pilot study provides a foundation for researching other regions of the Southwest using the morphological variables of projectile points to illuminate interaction and social relationships, and I build upon that investigation in the current research.

Social Interaction: Cooperation and Competition

Barth's (1969) seminal edited volume on ethnicity and social boundaries changed anthropologists' understanding of ethnicity and identity. According to Barth, ethnicity is how the individual and the group see both themselves and others, and so he focused on social boundaries between groups. He suggested that individuals and their identities are fluid, and that people move between groups and within groups when it was advantageous. With these concepts in mind, Barth proposed that social groups compete or cooperate depending on their economic and ecological niches.

Barth (1969:19-20) had several assumptions. The first was that two social groups who inhabit the same ecological niche but use different economic strategies likely would operate cooperatively. In contrast, if two groups occupied the same ecological niche and had the same economic strategy, they would be more likely to compete. Finally, Barth suggested that groups who had the same economic niche but inhabited a different ecological niche would not need to compete with each other.

Tostevin's idea of social interaction dovetails nicely with Barth's notion of social boundaries by providing a measure for the type of interaction occurring between groups. Tostevin (2007:4) has stated that as individuals have more acquiescent contact they may become more willing to interact with one another and share their ideas of artifact design. Following this line of logic, groups who have contact with each other, but who are in competition, will not share their tool design and may actively seek to differentiate themselves by using distinct design styles. Therefore, Barth's (1969) assumptions can be rephrased in terms of Tostevin's notion of social interaction. Barth's first assumption can be stated as two social groups inhabiting the same ecological niche but employing different economic strategies are more likely to cooperate with one another and share tool designs. On the other hand, two groups using the same ecological and economic niches are more likely to compete and maintain distinct tool design styles. Further, groups who use the same economic niche, but different ecological niches would have not been in competition with each other and would have overlap in their tool designs. Finally, if there were no contact among the groups, then there would, of course, be no social interaction and no similar tool designs.

Using Barth's and Tostevin's ideas, I hypothesize that there would have been more competition among incipient agricultural groups than Late Archaic groups based on the following model:

1) Groups during the Late Archaic would have been more likely to cooperate with each other because through varied subsistence strategies or resource scheduling

they would not have occupied the same ecological niches simultaneously. Different subsistence strategies (more hunting and gathering versus a higher dependence on agriculture), or resource scheduling would have mitigated conflict, because territorial overlap would have been during different seasons. Evidence of this cooperation should be manifested by the similarities of projectile point design style as suggested by Justice's (2002) identification of morphological projectile point clusters found in the Tucson Basin, Black Mesa, and the Hueco Bolson regions.

2) Groups during the incipient agricultural period who relied more on agriculture would have occupied smaller territories and would have been in competition with each other for suitable farmlands, or would have no contact with each other because they were tied to their fields. Therefore, projectile point design style between each region should show statistically significant differences in their attributes.

Because relationships between social groups are assumed to be manifested through projectile point style, each of these hypotheses has testable implications. I will discuss these implications in the expectations section of this chapter.

Style/Function

Social interaction among groups during the Late Archaic and incipient agricultural periods may be delineated through the stylistic elements of artifacts (Diaz-Andreu et al. 2005; Jones 1997; Kelly 1995; McBrinn 2005; Sackett 1990; Tostevin 2007; Wiessner 1983), in this case projectile points. Groups who have varied subsistence strategies will design their projectile points for both tool function and style, using the latter to differentiate themselves from others or indicate social interaction. The differences and similarities between projectile point attributes can illuminate the social interactions of different groups across the landscape (Beale 2007; Beale and Taliaferro 2005; Pitblado 2003; Roth and Huckell 1992). I will combine the concepts of social interaction and design style, of which tool function is a part, as part of the theoretical framework for my study.

The concept of style has been a source of constant discussion and debate in the archaeological literature. Hegmon (1992:517-518) noted that there are two points upon which archaeologists seem to agree for a definition of style. The first is that style is a way of doing something, and the second is that style involves a choice among many alternatives. Several approaches to style that archaeologists have used include design theory (Bamforth 1986; Bleed 1986; Hayden et al. 1996; Nelson 1991; Odell 1996; Shott 1986), interaction theory (Hoffman 1997; Longacre 1970), information-exchange (Plog 1990; Wiessner 1983, 1985, 1990; Wobst 1977), isochrestic style (Sackett 1990), technological style (Dietler and Herbich 1998; Stark 1998), and the unified middle-range theory of artifact design (Carr 1995b). Carr's theory combines all of the previous approaches to style and takes into account social and functional requirements, and passive and active strategies. His approach is more holistic than previous theories of style, and it is consistent with the latest concepts of style. Carr ranked the attributes of artifact design into a visibility hierarchy, a decision hierarchy, and a production hierarchy. For this study, I use the visibility hierarchy of attributes to develop testable expectations. I discuss in detail Carr's theory and visibility hierarchy in chapter two.

Expectations

To test my hypotheses that competition increased between groups in different regions from the Late Archaic to the incipient agricultural period, I have developed six expectations modeled after Barth's (1969) concept of ethnic group boundaries and Tostevin's (2007) ideas about social interaction, and how this interaction can be measured by using the visibility hierarchy of Carr's unified middle-range theory of artifact design.

- The first expectation is that groups from the same region but different time periods would have projectile points with similar high, moderate, and low visibility attributes, because Carr (1995b) has suggested that similarities in these attributes reflect social continuity transgenerationally. I also expect that attributes associated with utilitarian purposes will be statistically different because of the shift from a foraging subsistence strategy during the Late Archaic to one more dependent on agriculture during incipient agricultural periods. Specifically the high visibility attributes of total length, total width, blade length, and blade width will be smaller during the Late Archaic because of resharpening (Beale 2007).

- The second is that people during the Late Archaic and incipient agricultural periods who were a part of the same social group would have cooperated, and their projectile points would have similar high, moderate, and low visibility attributes as defined by Carr (1995b).

- The third expectation is that social groups who used the same territory but engaged in different subsistence strategies would likely form alliances to share environmental resources (e.g., food, lithic raw materials) and social resources (e.g., potential mates, exchange networks), which would suggest high social interaction. In this case, the groups would have similar overall projectile point design as well as stem styles, because the groups would have readily shared their technological styles (Hoffman 1997). These groups with high social interaction would have similar high, moderate, and low visibility projectile point attributes, except for the high visibility attributes of the projectile points that may reflect function (Carr 1995:219). Projectile points from the group more reliant on hunting and gathering would have statistically significantly shorter total length, blade length, total width, and blade width because of the need for curation and resharpening (Beale 2007; Binford 1979).

- The fourth expectation is that groups who used the same territory and relied on the same subsistence strategy would compete for resources. The groups would likely actively differentiate themselves by producing projectile points with similar overall morphologies, such as shape, but differences in high, moderate, and low visibility attributes to denote group differences (Carr 1995b:189). Their points would also have different stem styles, which are low visibility (Carr

1995b:192) because the shaft would obscure the stems, indicating that each group had a unique way of making projectile points and did not share their techniques. On the other hand, because these competing groups were in the same territory and had the same subsistence strategy, the raw material use and blade attributes would be the same, indicating their comparable reliance on hunting. Therefore, the projectile point attributes would be statistically similar for the high visibility attributes that correspond to function.

- The fifth expectation is that groups who predominantly used different territories but had the same subsistence strategy may have exchanged technical innovations. These groups might have similar overall point morphology and intermediate and high visibility attributes, but the stem styles might be different, because of the people having less social interaction. In addition, the groups would use different raw materials from different locales, but they would have similar blade attributes indicating the same reliance on hunting. Tostevin (2007) has suggested that this pattern would indicate moderate social interaction when the morphology of the projectile points is similar between the different groups, but low visibility attributes such as the haft and the technological style may be different.

- The sixth expectation is that groups who inhabited different territories and had different subsistence strategies would have produced significantly different projectile points. These groups would have different overall projectile point morphology, stem styles, blade attributes, and raw materials. The differences in these attributes indicate that the groups had low social interaction and should have statistically different high, moderate, and low visibility attributes. These groups would not be competing or in alliance with each other and therefore would have had little contact or influence on each other's cultural practices, including the production of projectile points.

Late Archaic period groups should have a higher percentage of projectile points that fall in the first two expectations and the fourth expectation - similar projectile points and high to moderate social interaction - because these groups could have used residential mobility and resource scheduling as a coping mechanism to alleviate competition with other groups using the same resources (Kelly 1995). As groups relied more on agriculture and became more sedentary during the incipient agricultural period, competition for suitable nutrient-rich land for their crops would increase. Because these groups would not have been able to use residential mobility over as wide an area as a viable coping mechanism, this increasing competition would result in a higher percentage of projectile points falling into the pattern of the third or fourth expectations. The third and fourth expectations suggest that these groups would have a higher percentage of projectile points that are statistically different because of lower social interaction.

The Regions and Datasets

To evaluate the proposed hypotheses, I use a large number of Late Archaic and incipient agricultural projectile points available in museums and associated with radiocarbon dates from three regions in the North American Southwest. I collected data from all dated Late Archaic and incipient agricultural projectile points with stems (n = 957) from three regions where there are large datasets and evidence of both hunting and gathering and incipient agricultural. The regions that have a substantial sample size of projectile points associated radiocarbon dates are the Tucson Basin in southern Arizona, Black Mesa in northeastern Arizona, and the Hueco Bolson in western Texas.

Summary

I use a theoretical foundation provided by Barth's (1969) concept of social boundaries and Tostevin's (2007) model of social interaction to determine the relationships of contemporary Late Archaic groups to each other and to compare them to later incipient agricultural groups in the three regions. Because these time periods span from the beginning of casual agriculture to a higher dependence on agriculture, relationships among the groups occupying the Southwest changed, and this change is manifested in projectile point style. I use Carr's unified theory of artifact design style develop my hypothesis that during the Late Archaic groups would have been more amenable to cooperation and in less competition for resources than groups during the incipient agricultural period.

I identify different social groups during the Late Archaic and incipient agricultural periods in the North American Southwest by distinguishing patterns of stylistic similarities and differences of projectile points. By selecting three distinct environmental regions in the North American Southwest – the Tucson Basin, Black Mesa, and the Hueco Bolson – I identify broad trends of social interaction among Late Archaic and incipient agricultural groups, which is a novel approach that will lead to a better understanding of the ancient preceramic people who inhabited the North American Southwest.

Dissertation Organization

To effectively explore my argument that I can identify broad trends of social interaction among Late Archaic and incipient agricultural groups by distinguishing the patterns of stylistic similarities and differences of projectile points from the Tucson Basin, Black Mesa, and the Hueco Bolson, my second chapter delves into the theoretical aspects of social interaction and projectile point style. I pay special attention to Barth's concepts of social interaction and Carr's unified theory of artifact design, as these provide the theoretical foundation of my study.

The third chapter discusses past research and our current understanding of the Late Archaic and the period of incipient agriculture for each of the three study regions. In this chapter, I outline how I address the differences in nomenclature and the standardization that I use.

In the fourth chapter, I discuss the geology of the three regions. Because the geology of a region determines the raw materials present as well as procurement locations, this chapter delves into the locations of the raw materials and where they can be found across the landscape. Only by having a thorough understanding of the geology and the raw materials available to these Late Archaic and incipient agriculture groups can I begin to consider social interaction and projectile point style.

In the fifth chapter, I present the methods that I used for this analysis. I specifically discuss the morphological variables that I chose to examine, focusing on those that fit into Carr's visibility hierarchy, which I discuss in chapter two. Furthermore, I explain why I selected certain types of statistical analyses that may demonstrate the differences and similarities of the projectile points from the Tucson Basin, Black Mesa, and the Hueco Bolson.

Chapters six through eleven present the results of the study as well as my interpretations. Chapter six discusses the raw materials found in each of the three regions and includes a discussion of how the evidence of the raw material analysis supports my hypothesis. Also, this chapter identifies the projectile point clusters that I use for the statistical tests in later chapters. Chapters seven through eleven present the results and interpretations of statistical tests of projectile point clusters both inter- and intra-regionally. Chapter seven deals with high, moderate, and low visibility attributes of the Tucson Basin. Chapter eight discusses the high moderate, and low visibility attributes from the Hueco Bolson. I am unable to compare the visibility attributes between the Late Archaic and incipient agriculture period of the Black Mesa, because there are too few specimens that date to the Late Archaic. Chapters nine, ten, and eleven compare the high, moderate, and low visibility attributes between the regions. I pay considerable attention to similarities and differences between individual morphological attributes of projectile points from the Tucson Basin, Black Mesa, and the Hueco Bolson.

In the twelfth chapter, I discuss the results from this study and whether and how they support my hypotheses and expectations. The thirteenth and final chapter I discuss my conclusions and how they contribute to the overarching archaeological discourse. Furthermore, I present areas where there is a need for further research and possible avenues that archeologists may take so we can develop a better understanding of lifeways during the Late Archaic and incipient agricultural periods in the North American Southwest.

Chapter II

Social Interaction, Style, and the Unified Theory of Artifact Design

Several studies suggest that there is a link between material culture and social interaction in conjunction with communication and the visibility of the material culture attributes (Carr 1995b; Clark 2001; Lyons 2003; Reed 2011a; Sackett 1977). In this chapter, I discuss the theoretical underpinnings of my research including Carr's (1995b) unified middle-range theory of artifact design, which is built upon earlier concepts of social theory advanced by Barth (1969) and archaeological concepts such as design theory, interaction theory, information-exchange theory, isochrestic style, and technological style. Although this study does not attempt to define or determine the ethnic group affiliation of Late Archaic and incipient agricultural groups in the North American Southwest, Barth's (1969) discussion of ethnicity and social boundaries provides a satisfactory framework within which to understand the nuances of social interaction between groups from Black Mesa, the Hueco Bolson, and the Tucson Basin.

Social Interaction

Barth's (1969:10) edited volume on ethnicity and social boundaries challenges the idea that different ethnic groups exist in geographical and social seclusion. Furthermore, he effectively argues that ethnicity does not have a one-to-one relationship with race, culture, or language (Emberling 1997). So rather than concentrating on the differences of ethnic groups, Barth (1969:10) focuses on the maintenance of social boundaries between ethnic groups.

Because Barth (1969) acknowledges ethnicity as the individual and the group's reflexive perception of themselves and their distinctiveness from others, he focused on the social boundaries of groups. Barth proposes the idea that individuals and their identities are fluid, and that people could move between groups and within groups when advantageous. With these concepts in mind, Barth suggested that, under certain conditions, social groups would either compete or cooperate depending on their economic and ecological niches.

Barth (1969) has three important assumptions. The first assumption is that two social groups that inhabit the same ecological niche but use a different economic niche would cooperate (Barth 1969:19). In contrast, if two groups occupy the same ecological niche as well as the same economic niche, the two groups would be in conflict (Barth 1969:19). Finally, Barth (1969:19) suggests that groups using the same economic niche but inhabiting different ecological niches would not be in conflict with each other. Based on these assumptions, many archaeologists (Cordell 2008; Lyons and Clark 2008; McBrinn 2005, 2008) have linked Barth's assumptions with material culture, style, and social interaction.

Material Culture and Style in Archaeology

One of the main aspects of this study is to understand how style and the change in style relate to social interaction. In order to accomplish this, the following section discusses the concept of style and how it has evolved, culminating in Carr's (1995b) unified middle-range theory of artifact design, which is predicated on the previous notions of artifact style.

The concept of the "style" of material culture has long been a part of the archeological lexicon. Prior to the 1960s, the style or morphology of artifacts was used to construct chronologies and define cultural areas (Shanks and Tilley 1992; Trigger 1989). Archaeologists were more concerned with describing an artifact and its morphology than interpreting how the artifact was used. For example, Bordes (1961) identified different Mousterian scraper styles and immediately attributed the differences to distinct cultural groups. Bordes' interpretation of the Mousterian artifacts neglected the possibility that the artifacts may have been produced by the same group but used for different tasks.

Because archaeologists who employed this approach concentrated on description, they failed to consider the behavior associated with the artifacts. Bordes' interpretation of the Mousterian artifacts came at time when archaeologists had begun to shift from addressing the "where" and "when" questions to more sophisticated questions such as "how" and "why." Binford and Binford (1966) debated Bordes regarding his interpretation of the Mousterian lithic artifacts. At this time, Binford proceeded to revolutionize the way the archaeologists used the term "style."

Binford and Binford (1966) suggested that the Mousterian lithic artifacts, which Bordes attributed to different cultures, were actually used by the same culture but for different functions. With Lewis Binford's assertion that function was independent of style, he opened a whole new discussion of the concept of style. Binford (1962, 1965) proposes that a lithic artifact contains three different and independent components. The first component is function or the intended use of the artifact. The second component is the technological process or how the artifact was made. Finally, Binford suggests that style is the third component of an artifact, residual and independent from function and technology. Only by controlling for the technological processes and an artifact's function could a researcher begin to identify style. Binford's ideas led to the task of trying to separate style from function.

Design Theory

With the concept of design theory, Bleed (1986) was one of the first archaeologists to address this separation and focus on function. Although, at the time, archaeologists did not view design theory as addressing style, but instead as addressing the function of lithic artifacts, design theory has many components that addresses the style of lithic artifacts. Several of these factors include the raw material, design for multiple uses and transportation, tool maintenance and modification, and hafting techniques. All of these factors directly relevant to my study, especially tool maintenance. I use tool maintenance such as resharpening that affect high visibility attributes as a measure for change in curation relating to subsistence strategies

Raw Material. Raw material selection is one of the most important processes when making lithic tools. The first aspect of the raw material is that it must be available to the user (Hoffman 1997). Second, lithicists maintain that the raw material must be isotrophic and relatively homogenous (Andrefsky 1998; Crabtree 1974; Odell 2003; Pitblado 2003; Whittaker 1994). Isotrophic means that the raw material must break in all directions. Raw materials in the Southwest that do not conform to this aspect are hornfels and petrified wood, which are rarely found in the archaeological record as lithic tools. Another aspect of a raw material is that it must be durable enough to withstand its intended use.

Design for Multiple Uses and Transportation. Multi-functionality is another aspect that may affect the morphology and the style of lithic tools (Bamforth 1986; Bleed 1986; Hayden et al. 1996; Nelson 1991; Odell 1996; Shott 1986). In order to decrease the weight that a person has to carry during times of mobility, the weight of the lithic tools become very important. One of the ways to alleviate the weight of tools being carried is to design a lithic tool to perform several functions.

Tool Maintenance and Modification. Another aspect that determines the style of an artifact is tool maintenance and modification (Bamforth 1986; Bleed 1986; Hayden et al. 1996; Odell 1996). Tool maintenance includes the reuse of a lithic tool. In the case of a projectile point, a hunter may resharpen the lateral edges of the tool to increase the use-life. Secondly, if a tool is damaged or exhausted to the extent that it could no longer be used for its primary purpose, an individual may recycle the lithic material to create another tool.

Hafting Techniques. Nelson (1996) identifies three different hafting techniques that influence the design style. These ideas are based solely on projectile points. The first type of hafting technique that she identifies is stemmed. Nelson suggests that a stemmed point will remain in the animal but may be easily separated from the shaft. She proposes that this type of hafting is good for a variety of hunting techniques. The second hafting technique she recognizes is side notched. This type of notching makes it easier to remove the point from the animal. The final hafting technique that Nelson categorizes is corner notched, where the projectile point is designed to stay in the animal and attached to the shaft. This type of hafting technique is also good for a variety of hunting strategies, but the shaft would be damaged and unusable.

Interaction Theory

One of the first theories to address the social aspect of style is interaction theory (Hoffman 1997; Tilley and Shanks 1992). This theory assumes that style is passive, meaning that the creator of the tool does not consciously imbue stylistic aspects on the tool. Instead, interaction theory attempts to explain differences in style as a reflection of enculturation and learning to make a tool from either a kin group or teacher. This theory emphasizes the similarities of lithic tools within groups. Unfortunately, interaction theory attributes style only to enculturation and not to communicative purposes or technology.

Information-Exchange Theory

The information-exchange theory supposes that artifact style is the active communication of an individual or group trying to convey some meaning. Wobst (1977), Wiessner (1983, 1985, 1990), Plog and Braun (1982), MacDonald (1990), and Hodder (1979, 1982) champion this theory.

Wiessner (1983) divides active style into two categories: emblemic style and assertive style. She argues that emblemic style transmits group identity and is influenced by culture. In contrast, she argues that assertive style is the individual communicating his or her individual identity, which is not constrained by the group. MacDonald (1990) builds on upon Wiessner's dichotomy of emblemic style versus assertive style and calls them respectively "protocol" and "panache."

During Wiessner's (1983) work among the !San, she noticed that the projectile point design style correlated with language groups. She attributes the stylistic differences among projectile points to be a form of communication to other !San groups who spoke another language.

The focus of the information-exchange theory of style is on the active communication and the differences of stone tool styles. Therefore, this theory does not take into account enculturation, ecological constraints, or technology, all of which also affect style.

Isochrestic Style

Sackett (1977, 1982, 1985, 1986a, 1986b, 1990) defines isochrestic style as the selected option among many alternatives. He contrasts isochrestic style with what he terms iconological style. Isochrestic style is more reminiscent of a passive use of style, and iconological style is what Sackett considers Weissner's emblemic and assertive styles. Sackett is the first to suggest that style, technology, and function cannot be separated from one another.

Technological Style

Although Lechtman (1977) first defined technological style, the concept did not become popular until the mid to late 1990s when post-processualism became entrenched. This type of style looks at the technological processes of a lithic tool usually called the *chaîne opératoire*, literally meaning the chain of operations, which is identifying and recreating the individual steps of artifact construction. The *chaîne opératoire* takes into account the steps used to make and alter a tool starting with the raw material acquisition through the end of the tool's use-life.

Schiffer (1976) proposes a similar concept that he calls the "behavioral chain." It must be noted that, although Schiffer's concept of the behavioral chain is strikingly similar to the French notion, the concepts were constructed independently. One of the notable differences between the *chaîne opératoire* and the behavioral chain is that the latter considers the taphonomic processes that may affect the design of the artifact after it has been abandoned (Skibo and Schiffer 2008).

The advantage of technological style is that it takes into account that style is imbued throughout the formation and decision process of making and using a lithic tool. Because of the tendency of technological style analyses to describe one artifact and follow it through the different processes, archaeologists may be able to identify the individual's thought process. One limitation to this approach is that trying to follow this process is tedious at best, and at many sites, there are not enough artifacts left in the archaeological record to identify the entire tool making process. In order to use the *chaîne opératoire* or the behavioral chain correctly, the lithic debitage from the tool must also be recovered.

The Unified Middle-Range Theory of Artifact Design

Carr's (1995a, 1995b) unified middle-range theory of artifact design incorporates all of the aspects of style from the aforementioned theories. He then ranks attributes into several different hierarchies, including a visibility hierarchy, decision hierarchy, and production hierarchy. Carr's visibility hierarchy relates to the different active and passive definitions of style including isochrestic and communicative. On the other hand, the decision and production hierarchies take into account technological style.

Visibility Hierarchy. Carr (1995b:185) specifies three levels of artifact attribute visibility: high, moderate, and low. High visibility attributes can be seen at a distance and relate to the information-exchange theory of style, which supposes that artifact style represents the active communication of an individual or group and is a signifier of acculturation (Plog 1990; Wiessner 1983, 1985, 1990; Wobst 1977). Late Archaic and incipient agricultural groups may use high visibility attributes as active messaging to convey information about the individual, group, or society (Hoffman 1997; Wiessner 1983, 1985, 1990). High visibility attributes of projectile points (Table II-1) include the raw material and raw material color, the overall morphology of the point, the presence or absence of heat treatment, the total length and width of the point, the presence or absence of barbs, the total length and width of the blade, the shoulder width, and the blade thickness (Hoffman 1997:103).

Table II-1. Visibility Hierarchy and Projectile Point Attributes (adapted from Carr 1995b; Hoffman 1997).

Visibility Hierarchy	Type of Communication	Location of Attribute	Type of Variable	Name of Attribute
High visibility – easily seen from a distance	Active messaging- conveys information about the individual, group, or society and acculturation	Entire point	Nominal	Raw material Raw material color Overall form/shape Heat treatment
			Numerical	Total length Total width
		Blade	Nominal	Barbs
			Numerical	Blade length Shoulder width Blade thickness
Moderate visibility – less visible at a distance but can be seen without close inspection	Active or passive messaging- conveys social affiliation within the group, distinction of rank or prestige, and acculturation	Blade	Nominal	Serration Raw material texture Flake patterns
			Numerical	Barb depth Barb length Barb angle Blade width
		Haft	Nominal	Type of haft
			Numerical	Base width Proximal shoulder angle Distal shoulder angle
Low visibility – only visible upon close inspection	Passive social interaction, passive components of enculturation, shared histories of interaction, active or passive messages pertaining the individual, and enculturation	Haft	Numerical	Notch width Notch depth Notch angle
		Stem	Nominal	Base shape
			Numerical	Stem length Neck width Base width

Moderate visibility attributes - those that are less visible at a distance but can be seen without close inspection - reflect active or passive messaging to convey information including social affiliation within the group, rank or prestige distinctions, and acculturation (Carr 1995b; Hoffman 1997). These attributes (Table II-1) consist of the presence or absence of serration, raw material texture, flake patterns, barb depth, length and angle, widths of the mid-blade, blade tip and base, type of haft, and the angles of the proximal and distal shoulders (Hoffman 1997:103).

The concept of low visibility is consistent with interaction theory. The interaction theory of style addresses the social aspect of style (Hoffman 1997), which assumes that style is passive, meaning that the creator of the tool does not consciously imbue stylistic aspects on the tool. Instead, the interaction theory of style explains differences in style as a reflection of enculturation, in which a kin group or teacher instructs in tool making. This theory emphasizes the similarities among lithic tools. Therefore, low visibility attributes such as haft and stem design may indicate passive social interaction, the passive components of enculturation, shared histories of interaction, and passive messages pertaining to personal level processes (Carr 1995b; Hoffman 1997). Projectile point attributes that correspond to low visibility (Table II-1) are the notch width, depth and angle, base shape and width, neck width, stem length, and the height and width of the stem shoulder (Hoffman 1997:103).

Decision Hierarchy. Carr's second hierarchy, the decision hierarchy, is the sequence of choices that an individual makes before and during the production of a projectile point (Hoffman 1997:105). According to Carr (1995b:219), early decisions affect the overall morphology of a projectile point and its purpose, such as hunting or warfare (Table II-2). Carr's decision hierarchy correlates with design theory, which considers many components that influence the overall morphology and style of a lithic artifact. These include raw material, design for multiple uses and transportation, tool maintenance and modification, and hafting techniques (Andrefsky 1998; Bamforth 1986; Bleed 1986; Crabtree 1972; Hayden et al. 1996; Nelson 1991, 1996; Odell 1996, 2001; Pitblado 2003; Shott 1986; Whittaker 1994).

Table II-2. Decision and Production Hierarchies and Projectile Point Attributes (adapted from Carr 1995b; Hoffman 1997).

Decision Hierarchy	**Production Hierarchy**	**Type of Communication**	**Location of Attribute**	**Type of Variable**	**Name of Attribute**
Early decisions – determine the function of the projectile point (e.g., hunting, warfare, active social processes)	Early production – the physical manifesta-tion of early decisions	Active messaging - conveys information about the individual, group, or society, and acculturation	Entire point	Nominal Numerical	Raw material Total length Total width Thickness
Intermediate decisions – general characteristics of the blade and haft	Intermediate production – the physical manifesta-tion of intermediate decisions	Active or passive messaging - conveys social affiliation within the group, distinction of rank or prestige, and acculturation	Blade	Nominal Numerical	Barbs Blade length Shoulder width Blade thickness Barb depth Barb length Barb angle Mid-blade width
			Haft	Nominal Numerical	Blade tip width Type of haft Notch width Notch depth Notch angle Proximal shoulder angle Distal shoulder angle
Late decisions – general characteristics of the stem and fine detail of the blade	Late production – the physical manifesta-tion of late decisions	Passive social interaction, passive components of enculturation, shared histories of interaction, and active or passive messages pertaining the individual	Blade Stem	Nominal Nominal Numerical	Serration Flake patterns Base shape Base width Stem length Neck width Base width

In relation to projectile point manufacturing, earlier decisions tend to have higher visibility (Hoffman 1997:105). In contrast, decisions made at later stages of the decision hierarchy pertain to attributes that are more detailed such as flake patterns and serration.

Production Hierarchy. Carr's production hierarchy is similar to the *chaîne opératoire* and technological style, which take into account the production steps used to make a tool, starting from the raw material acquisition until the end of the tool's use-life

(Lechtman 1977). The production hierarchy may directly correspond to the decision hierarchy in that the early production sequences tend to relate to raw material constraints and overall size (Hoffman 1997:108) (Table II- 2). Furthermore, the decision hierarchy and the production hierarchy may have a strong direct correlation, because the production hierarchy is the physical manifestation of the decisions of the toolmaker. An example of when these two hierarchies may not have a strong direct correlation is if the toolmakers constructed the projectile points in stages rather than one continuous process. This case should not affect the current study because southwestern archaeologists have found very few caches of projectile points in their different production stages, suggesting that the points were created in a continuous fashion. Because projectile point manufacturing is a reductive strategy, early production steps constrain the later steps in the production hierarchy, and so I will combine the production and decision hierarchies.

Early production attributes are the physical manifestations of early decisions that the toolmaker makes. These types of decisions include the function of the projectile point such as hunting, warfare, and/or social active messaging (Carr 1995b:174). The active messaging that may be involved pertains to information about the individual, group, or society (Carr 1995b:174). Projectile point attributes that correspond to early production (Table II-2) include raw material, total length and width, and thickness (Hoffman 1997:110).

The intermediate production of projectile points includes the general attributes of the blade and hafting element that pertain to the overall point form and morphology. These characteristics may indicate active or passive messaging of social affiliation within the group (Carr 1995b:174). The intermediate production attributes of projectile points (Table II-2) are presence or absence of barbs and their depth, length and angle, type of haft, notch width, notch depth and angle, proximal and distal angles of the shoulder, width of the shoulder, mid-blade and blade tip, blade length, and blade thickness (Hoffman 1997:110).

The late production stage includes the general characteristics of the stem and the fine detail of the blade. These attributes are indicative of passive social interaction at the group level but may have active messaging pertaining to the individual (Carr 1995b:174). Late production attributes of projectile points (Table 2) include the presence or absence of serration, flake patterns, base shape and width, stem length, neck width, and stem-shoulder height and width (Hoffman 1997:110).

Uniting Social Interaction Theory with Carr's Unified Middle-Range Theory of Artifact Design

Recently, archaeologists have begun to investigate social interaction by using one aspect of Carr's unified middle-range theory of artifact design, specifically the visibility hierarchy (Abbott 2000; Clark and Reed 2011; Lyons and Clark 2008; Mabry et al. 2008; Reed 2011a, 2011b; Tostevin 2007; Webster 2011), which I follow for this study. Based on this recent literature (Clark and Reed 2011; Lyons and Clark 2008; Mabry et al. 2008; Reed 2011a, 2011b; Tostevin 2007; Webster 2011), it has become apparent that the visibility hierarchy best represents group interaction, and therefore I only use Carr's visibility hierarchy in this study. For instance, Abbott (2000) has studied social interaction in relation to social distance and material culture exchange. His study of plain Hohokam ceramics posits that as the social distance between individuals or groups decreases, there is an increase in similarities of the low visibility attributes of the material culture.

Similar to Abbot's (2000) study, Tostevin (2007) takes the ideas of social interaction and couches them in terms that may be scientifically tested. He asserts that archaeologists can measure social intimacy, enculturation, and acculturation by similarities and differences in material culture (Tostevin 2007:342). He contends that the degree of social intimacy an individual or group has with another can be interpreted using Carr's visibility hierarchy of the unified theory of artifact design.

Tostevin (2007:342) defines social intimacy as the material evidence of social contact. Social intimacy can be viewed as a continuum of how much contact an individual or group has with another individual or group. Accordingly, Tostevin argues that increased social interaction will lead to a higher degree of social intimacy, which will manifest in the archaeological record as similar high visibility and low visibility attributes (Table II-3). He suggests that this pattern is due to enculturation where individuals would learn to make a material object directly from a teacher. Conversely, groups with little to no social interaction would have low social intimacy and few to no similarities in their material culture. The third option Tostevin suggests is if there is moderate social interaction, social intimacy will be apparent in similarities of high visibility attributes, but low visibility attributes would be different. He indicates that this pattern is due to the process of acculturation.

Table II-3. Similarities of Attributes in Relationship to the Amount of Interaction.

Amount of Social Interaction Continuum	Similarities in Attributes	Process of Learning
Low Interaction	No similarities	
↕	High and moderate visibility attributes are similar	Acculturation
High Interaction	High, moderate, and low visibility attributes are similar	Enculturation

Tostevin's (2007) concept of social intimacy and Barth's (1969) assumptions regarding competition and cooperation, in conjunction with Carr's (1995) visibility hierarchy from his unified middle-range theory of artifact design, provide the theoretical structure of this study. By integrating these theories, I present the following postulates, which I first introduced in chapter 1.

The first expectation is that groups from the same region, but different time periods would have projectile points with similar attributes from the first, second and third orders of the visibility hierarchy, because Carr (1995b) suggests that similarities with these attributes reflect social continuity transgenerationally (Table II-4). I also expect that attributes associated with utilitarian purposes, which are a part of the first order of the visibility hierarchy will be statistically different because of the shift from a foraging subsistence strategy during the Late Archaic to one more dependent on agriculture during incipient agricultural periods. Specifically the attributes of total length, total width, blade length, and blade width will be smaller during the Late Archaic because of curation and thus resharpening (Beale 2007).

Table II-4. Expected Changes in Visibility Attributes Indicating Social Continuity.

Visibility Level	Attribute	ELA	LLA
High visibility	Raw material	More non-local	Less non-local
	Overall morphology	No difference	No difference
	Total length	Smaller	Larger
	Total width	Smaller	Larger
	Blade length	Smaller	Larger
	Blade Width	Smaller	Larger
	Blade thickness	No difference	No difference
Moderate visibility	Serration	No difference	No difference
	Flake pattern	No difference	No difference
	Neck width	No difference	No difference
	Blade tip thickness	No difference	No difference
Low visibility	Weight	No difference	No difference
	Stem length	No difference	No difference
	Base width	No difference	No difference
	Stem thickness	No difference	No difference
	Base shape	No difference	No difference

The next expectation is that groups who predominantly used different territories but had the same subsistence strategy may have exchanged technical innovations (resulting in acculturation. These groups would have similar overall point morphology and intermediate and high visibility attributes, but the stem styles would be different, because of the people having less social interaction. In addition, the groups would use different raw materials from different locales, but they would have similar blade attributes indicating the same reliance on hunting and mobility. Tostevin (2007) has suggested that this pattern would indicate moderate social interaction when the morphology of the projectile points is similar between the different groups, but low visibility attributes such as the haft and the technological style may be different.

Table II-5. Expected Patterns in Visibility Attributes Between Regions Due to Acculturation.

Visibility Level	**Attribute**	**Tucson Basin**	**Black Mesa**	**Hueco Bolson**
High	Raw material	Local	Local	Local
	Overall morphology	No difference	No difference	No difference
	Total length	No difference	No difference	No difference
	Total width	No difference	No difference	No difference
	Blade length	No difference	No difference	No difference
	Blade Width	No difference	No difference	No difference
	Blade thickness	No difference	No difference	No difference
Moderate	Serration	No difference	No difference	No difference
	Flake pattern	No difference	No difference	No difference
	Neck width	No difference	No difference	No difference
	Blade tip thickness	No difference	No difference	No difference
Low	Weight	Different	Different	Different
	Stem length	Different	Different	Different
	Base width	Different	Different	Different
	Stem thickness	Different	Different	Different
	Base shape	Different	Different	Different

The final expectation is that groups who inhabited different territories and had different subsistence strategies would have produced significantly different projectile points. These groups would have different overall projectile point morphology, stem styles, blade attributes, and raw materials. The differences in these attributes indicate that the groups had low social interaction and should have statistically different attributes for all three orders of the visibility hierarchy. These groups would not be competing or in alliance with each other and therefore would have had little contact or influence on each other's cultural practices, including the production of projectile points.

Table II-6. Expected Patterns in Visibility Attributes Between Regions with No Contact.

Visibility Level	**Attribute**	**Tucson Basin**	**Black Mesa**	**Hueco Bolson**
High	Raw material	Local	Local	Local
	Overall morphology	Different	Different	Different
	Total length	Different	Different	Different
	Total width	Different	Different	Different
	Blade length	Different	Different	Different
	Blade Width	Different	Different	Different
	Blade thickness	Different	Different	Different
Moderate	Serration	Different	Different	Different
	Flake pattern	Different	Different	Different
	Neck width	Different	Different	Different
	Blade tip thickness	Different	Different	Different
Low	Weight	Different	Different	Different
	Stem length	Different	Different	Different
	Base width	Different	Different	Different
	Stem thickness	Different	Different	Different
	Base shape	Different	Different	Different

Summary

In this chapter, I have discussed the theoretical framework on which I base my study. By using Barth's (1969) assumptions of social boundaries, Tostevin's (2007) idea of social intimacy, and Carr's (1995) visibility hierarchy from his unified middle-range theory of artifact design, I am able to investigate the relationships groups had during the Late Archaic and incipient agricultural periods and how they may have changed between regions and through time.

Chapter III

Archaic and Incipient Agriculture Research in the North American Southwest

Many archaeologists have defined and described the Archaic in the Southwest. Jennings (1957, 1964) used the Desert Culture concept, which homogenizes the variation of artifacts and relies on the similarities of both the artifacts and the environmental zones to suggest one overarching culture covering the entire Southwest. The Desert Culture concept was in use until the late 1960s when archaeologists began to question the validity of such a homogenizing model (Aikens 1970). Archeologists such as Irwin-Williams (1973) have focused on artifact variability to identify discrete Archaic cultures within the Southwest. Most of these typologies are based on a few type-sites, which have become the standard for all other Archaic sites in the Southwest. They are still in use today, although they are falling out of favor.

Our understanding of preceramic people in the Southwest has dramatically changed since the research done by Jennings (1957) on the Desert Culture concept. Originally, archaeologists focused on building chronologies, but recently there is a shift from chronology building to understanding foraging and incipient agriculture organization and systems (Vierra 1994:32-33).

This chapter outlines the history of the Late Archaic and incipient agricultural periods in the Southwest and how they relate to these periods at Black Mesa, the Tucson Basin, and the Hueco Bolson. Archaeologists have identified four traditions during these periods: San Dieguito, Oshara, Cochise, and Chihuahua, but only the latter three traditions are a part of my research (Figure III-1). I briefly discuss the phases and periods directly relevant to this study, namely the time of the Late Archaic and incipient agriculture. Furthermore, I introduce the terms early Late Archaic (ELA) and late Late Archaic (LLA) in an attempt to provide a consistent framework that can be applied to Tucson Basin, Hueco Bolson, and Black Mesa time periods to allow easy comparison.

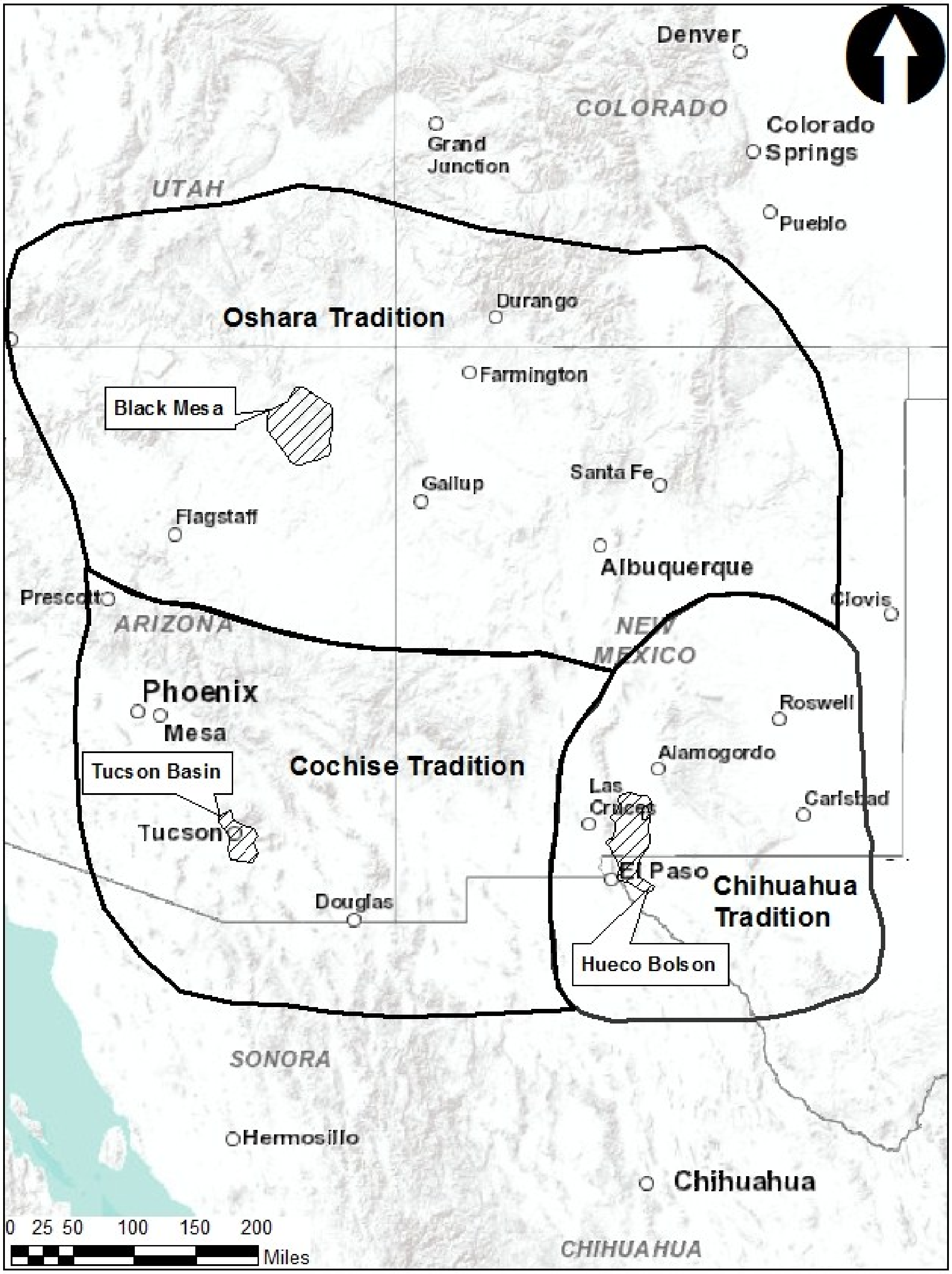

Figure III-1. Location of the three cultural traditions relevant to this study.

Desert Culture

Jennings (1957, 1964) was one of the first archaeologists to tackle the concept of the Archaic in the Southwest as a comprehensive whole. He coined the term "Desert Culture," sometimes referred to in the archaeological literature as the "Desert West" or "Desert Archaic," to explain the preceramic manifestations in the Southwest (Jennings 1957, 1964; Jennings and Norbeck 1955). Originally, Jennings (Jennings and Norbeck 1955) applied the Desert Culture concept to the Great Basin. His later works (Jennings 1957, 1964) suggest that this entity included the entire intermontane area from British Columbia to Mexico. The Desert Culture concept described any preceramic groups participating in similar foraging lifeways in arid environmental zones from 8000 to 3000 B.C. (Jennings 1964).

Jennings (1964) believed that Desert Culture groups were highly mobile, inhabited the desert landscape, and used a foraging subsistence strategy. He assumed that the chipped stone forms used during the Archaic were remnants of the same technology used by Paleoindians. Another defining characteristic of the Desert Culture was the introduction of plant processing tools, specifically milling stones.

Jennings' interpretations of the Desert Culture oversimplified the variation found throughout the intermontane area during the Archaic period. Ultimately, Jennings (1973) acknowledged the problems with the Desert Culture concept and rightfully noted that this concept had outlasted its usefulness for understanding Archaic populations.

Partly in response to the homogenizing Desert Culture concept and partly in an effort to find the ancestors of the Anasazi, Mogollon, and Hohokam peoples, archaeologists began to build typological classifications of the southwestern Archaic artifacts in their study regions to contrast different traditions within the Desert Culture (Cordell 1997; Irwin-Williams 1973; McBrinn 2005), and to identify "type" sites on which to base further investigations (Roth 1989). The North American Southwest was, thus, divided into four regional traditions (Cordell 1997): San Dieguito (western tradition), Oshara (northern tradition), Chihuahua (southeastern tradition), and Cochise (southern tradition). The latter three are discussed below. I do not use the San Dieguito tradition because none of the three regions that I study are a part of this tradition.

Oshara Tradition

Irwin-Williams (1973) proposed the Oshara tradition to identify the Archaic manifestations in the northern Southwest. Her intentions were two-fold: the first was a reaction to the generalizations that Jennings proposed in his Desert Culture concept (McBrinn 2005), and the second entailed finding the ancestors of the Anasazi in north-central New Mexico (Irwin-Williams 1973, 1994). Irwin-Williams (1973:1) criticized archaeologists for disregarding the ancestors of the Anasazi prior to the adoption of agriculture. Her Oshara classification is based on sites found in the Arroyo Cuervo area of north-central New Mexico, and it emphasizes the continuity between the different Archaic phases through Basketmaker II (Cordell 1997; Irwin-Williams 1973). Irwin-Williams (1973; see also Cordell 1997) divided the Oshara tradition into five phases:

Jay (5500-4800 B.C.), Bajada (4800-3200 B.C.), San José (3200-1800 B.C.), Armijo (1800-800 B.C.), and En Medio (800 B.C.-A.D. 400).

The Black Mesa region predominantly falls within the Oshara tradition, but archaeologists from the Black Mesa Archaeological Project (BMAP) also combine the Oshara tradition with the Pecos classification for the Late Archaic and incipient agricultural periods. Thus, in lieu of using the terms Armijo phase and En Medio phase of the Oshara tradition, Black Mesa archaeologists use the overarching term Basketmaker II, which is split into the White Dog and Lolomai phases (Powell and Smiley 2002).

White Dog Phase of the Basketmaker II Period (1800-800 B.C.)

In the Black Mesa region, the White Dog phase is a part of the Basketmaker II period of the Pecos classification. The major characteristic during this phase is the introduction of maize. Irwin-Williams (1973) argued that people during the White Dog phase used a limited amount of maize agriculture similar to people of earlier periods, but groups began to participate in seasonal aggregation. Irwin-Williams argued that the possibility of a maize surplus would have led to greater population aggregation for mate exchange, social interaction, and ceremonial activities.

Another characteristic of the White Dog phase is the introduction of new tool classes. Irwin-Williams (1973) has suggested that objects that may have represented magico-religious or ideological significance appeared during this phase, but she does not identify these artifacts. Ground stone such as manos and metates appear to be more prevalent during this phase than in earlier phases. Also, projectile point styles begin to show evidence of corner notching.

Lolomai Phase of the Basketmaker II Period (800 B.C.-A.D. 400)

En Medio is the latest phase within the Oshara tradition, and it corresponds to the terminal Late Archaic to Early Anasazi (Cordell 1997). In the Black Mesa region, the term Lolomai is substituted for En Medio. Almost all Basketmaker II sites identified from the BMAP that I use for my study date to this phase.

Artifacts during the Lolomai phase are similar to those in the White Dog phase. Corner-notched points that first appeared during the White Dog phase become common. Furthermore, at this time people produced more ground stone. Also, the Lolomai phase includes evidence of leather and fibers common to both Basketmaker II and later Anasazi occupations, which suggests the continuity between the Oshara tradition and the Anasazi.

Chihuahua Tradition

The Chihuahua tradition is a relatively new concept. Beckett and MacNeish (1994) introduced this model to explain the variation of artifacts found in south-central New Mexico and the northeast area of the Chihuahua Desert, which encompasses the Hueco Bolson region. Before the introduction of the Chihuahua tradition, this area was part of the periphery of the Cochise tradition to the west and the Oshara tradition to the north. This cultural sequence is based on the findings from eight sites in southeastern New Mexico and eastern Chihuahua, Mexico, that yielded over 40 radiocarbon and obsidian hydration dates (Beckett and MacNeish 1994). Phases within the Chihuahua tradition are the Gardner Springs phase (6000-4300 B.C.), the Keystone phase (4300-

2600 B.C.), the Fresnal phase (2600-900 B.C.), the Hueco phase (900 B.C.-A.D. 200), and the Early Mesilla phase (A.D. 200-750). The Early Mesilla phase marks the transition between the Chihuahua tradition and the Formative period. I focus on the later two phases because these directly relate to the sites from the Hueco Bolson that I compare with Tucson Basin and Black Mesa sites.

Hueco Phase (900 B.C.-A.D. 200)

The most recent phase of the Chihuahua tradition is the Hueco phase (900 B.C.-A.D. 200) (Beckett and MacNeish 1994). It is the best defined within the Chihuahua tradition, because there have been more excavated sites associated with the Hueco phase compared to earlier phases. Graves et al. (2010) point out that these Late Archaic sites are found in every environmental zone but are densest on basin landforms such as the Hueco Bolson.

Some of the artifacts diagnostic of the Hueco phase are wedge-shaped manos, trough metates, cobble pestles, small disc choppers, and Hatch and Hueco points (Beckett and MacNeish 1994; Cordell 1997). Projectile point technology shifts during this phase. Previously, the archaeological record is dominated by stemmed points, but the Hueco phase is distinguished by the introduction of smaller corner-notched and side-notched points, indicating the transition to bow and arrow technology (Graves et al. 2010).

Faunal, botanical, and ground stone evidence suggests that the subsistence strategies of these Archaic people changed drastically from earlier Archaic phases. No longer are faunal remains dominated by big game such as deer (although still present), and contents from roasting and storage pits include beans as well as domesticated corn.

This shift to domesticated corn probably indicates greater sedentism. Interestingly, only sites in rock shelters have yielded evidence of cultigens. In contrast, archaeologists have failed to recover any remains of cultigens from open sites, but this pattern may be due to differences in preservation or site function (Graves et al. 2010).

Early Mesilla Phase (A.D. 200-750)

The Early Mesilla phase is the transition between the Chihuahua tradition and the Formative period (Graves et al. 2010; Sale et al. 1999). During this phase, there is evidence of the first ceramic technology, including plain brown pottery, in the Hueco Bolson, although it is very sparse until after A.D. 750 (Graves et al. 2010). As with the previous phase, people of the Early Mesilla phase were becoming more sedentary, but not to the degree that is found in other regions in the Southwest, such as the Tucson Basin and Black Mesa. Mbutu (1997:15) states that the Early Mesilla phase in the "Hueco Bolson represents little more than an Archaic adaptive strategy with the addition of ceramics," and many researchers concur (Carmichael 1986; Hard 1983; O'Laughlin 1979, 1980). Hence, seasonal rounds still played a part in peoples' daily lives (Hard 1983). In contrast, Whalen (1977, 1978, 1980, 1994) suggests that although the primary subsistence strategy of Early Mesilla phase groups may have been foraging, this was supplemented by agriculture.

One of the main indicators for Early Mesilla phase is the presence of shallow circular or rectangular pithouses with formal hearths and large storage pits. Sites in the Hueco Bolson at this time tend to be comprised of a cluster of pithouses. Furthermore, the increased number of Early Mesilla phase sites in the Hueco Bolson compared to earlier phases suggests that the area saw a rise in population density (Mbutu 1997).

Controversy over the Chihuahua Tradition

Since the identification of the Chihuahua tradition, archaeologists have questioned the validity of this cultural sequence (Cordell 1997; Doleman 2005). Cordell (1997:111) has suggested that interpreting the results that Beckett and MacNeish have presented is difficult because much of their data has not been published. Doleman (2005:115) has stated that archaeologists have been reluctant to accept the Chihuahua tradition based solely on a few excavated sites. Furthermore, sites that have been assigned to the Chihuahua sequence also yield type artifacts of both the Oshara and the Cochise traditions. Therefore, some archaeologists in the region forego using the Chihuahua chronology and instead use the terms Early Archaic, Middle Archaic, and Late Archaic. For this study, I use the terms the Hueco phase and Early Mesilla phase to compare with the similar phases of the other traditions from Black Mesa and the Tucson Basin.

Cochise Tradition

The Tucson Basin falls within the Cochise tradition. Sayles and Antevs (1941) coined the term Cochise culture because of the need to describe the people, their behavior, and their artifacts that lived between the big-game hunters of the Paleoindian period and the ancient agriculturalists in the southern Southwest. Originally, they defined the Cochise tradition based on projectile points, milling stones, and core tools, but since its original conception, the sequence has been revised temporally (Thompson 1983). The artifacts suggest a transition from big-game hunting to a subsistence strategy that included hunting small game and foraging for local plants to supplement the diet (Cordell 1997). Originally, Sayles and Antevs (1941) identified three phases, Sulphur Spring (5000-3500 B.C.), Chiricahua (3500-1000 B.C.), and San Pedro (1000 B.C. to A.D. 1). With subsequent research, the San Pedro phase now dates from 1000 to 500 B.C. and the newly defined Cienega phase dates from 500 B.C. to A.D. 150. These two phases are directly relevant to my research, and an overview is presented of the San Pedro and Cienega phases below.

San Pedro Phase (1000 to 500 B.C.)

Of the three phases in the original Cochise cultural sequence, the San Pedro phase has been studied the most. The San Pedro (1000 to 500 B.C.) phase is characterized by an environmental shift from the warm and dry Altithermal to a climate with more effective moisture similar to the modern environment in the Southwest (Antevs 1955; Sayles 1983a).

Although groups during the San Pedro phase were highly mobile, the architecture and its associated features show signs of occupational intensity and duration (Huckell 1995:119). Architecture in the form of oval or round pithouses or houses-in-pits accompanied by intramural and extramural bell-shaped pits were used during this phase (Huckell 1995; Mabry 2008a; Minnis and Nelson 1980; Oakes 1999). These structures lack plaster floors, roof supports, and well-defined hearths (Sayles 1983a).

During the San Pedro phase, a dichotomy occurs between both mobility and subsistence strategies. In the Tucson Basin, increased sedentism became a viable strategy for groups who had a growing dependence on maize (Diehl 2001; Gregory

2001a, 2001c; Gregory and Diehl 2002; Hard and Roney 2005; Huckell 1995; Mabry 2005, 2008a, 2008b). Other cultigens that the San Pedro phase groups used include pepo squash, amaranth, goosefoot, tansy mustard, and dropseed grasses (Diehl 1997b, 2001; Mabry 2005, 2008a). On the other hand, sites like the Milagro site (AZ BB:10:46 (ASM)) in the eastern Tucson Basin yield clues that some people during the San Pedro phase continued a mobile foraging strategy that included small bands reoccupying sites on a seasonal basis with little dependence on cultigens (Huckell et al. 1994; Windmiller 1973).

Artifacts recovered from San Pedro phase contexts suggest that some groups used both agricultural and foraging subsistence strategies to some degree. Not only did people use manos and metates for processing cultigens, but they also adopted the use of mortars and pestles (Sayles 1983:129). Furthermore, the metates that have been recovered have deeper basins than earlier metates (Cordell 1997:110; Mabry 2008a:11). The deeper basin metates indicate an increase in processing vegetal materials (Adams 2001, 2005; Cordell 1997). These artifacts suggest that intense processing was taking place. Maize residue on grinding tools also indicates the presence of agriculture (Sayles 1983:131).

On the other hand, the development of corner-notched and side-notched projectile points such as the San Pedro, Empire, and Cienega points, and their ubiquity suggest that hunting was still an important part of the subsistence strategy (Mabry 2008a:9; Sayles 1983b:131).

Cienega Phase (500 B.C. to A.D. 150)

The Cienega phase is not part of the original Cochise tradition. Similar to the San Pedro phase, the Cienega phase has both circular and oval pithouses and houses-in-pits, although the circular style dominates the archaeological record (Gregory 2001c:257; Huckell 1996:345). Furthermore, Cienega phase sites tend to have at least one considerably larger pit structure that may serve a community function (Gregory 2001c:256). Also, in contrast to the earlier San Pedro phase, Cienega phase sites show a significant drop in the frequency of extramural pits, but the frequency of intramural storage features increases (Gregory 2001c:258).

The Cienega phase has a higher number of inhumations (Gregory and Diehl 2002; Huckell 1996; Mabry et al. 1997; Minturn and Lincoln-Babb 2001) than the San Pedro phase, and some cremations are evident. Although there are few grave goods associated with these burials, there is a higher frequency of grave goods during the Cienega phase than the San Pedro phase. The grave goods include utilitarian objects such as manos and metates (Gregory 2001b:86).

The archaeological record suggests that groups living during the Cienega phase continued to practice a farmer-forager subsistence strategy, but the cultivation aspect was becoming more prevalent than during earlier phases (Diehl 1997b, 2001; Gregory and Diehl 2002; Mabry 2005; Ogilvie 2005). During this phase, maize is almost ubiquitous at Cienega sites (Huckell 1996).

One of the major differences between the Cienega and San Pedro phases is the increase in different types of ground stone tools during the Cienega (Huckell 1996). There is a continuation of the manos and metates found during the San Pedro phase, but ground stone such as large perforated stone rings, discoids, palettes and stone trays, small disks, and rods first make their appearance in the archaeological record during the Cienega phase (Adams 2001; Huckell 1996:345).

Overall, the chipped stone of the Cienega phase mirrors that of the earlier San Pedro phase (Huckell 1996:345), but there are some subtle differences between the two phases. Cienega phase sites yield more flake tools and fewer bifaces. Although the San Pedro point still existed in the archaeological record, several different Cienega point styles were beginning to replace it. These styles include the Cienega Short, Cienega Long, Cienega Flared, and Cienega Stemmed projectile points (Sliva 2001).

The summation of the cultural history for the San Pedro and Cienega phases in the Tucson Basin indicates a shift from mobile foraging lifeways to more sedentism and dependence on . For instance, the increased number of inhumations and grave goods suggest that the people had cultural ties to the land (Bar-Yosef 2002; Fitzhugh 2003; Hodder 1990; Mabry 2008b; Price 2002; Wilson 1988). Also, a trend towards deeper and larger metates indicates greater processing of vegetal materials and possible sedentism (Adams 2001, 2005).

Chronological Differences

Jennings' (1964) concept of the Desert Culture led to the interpretation that Archaic people were culturally homogeneous, which in turn caused a simplified understanding of peoples' behavior over a long period and broad area (Roth 1989). Conversely, archaeologists such as Irwin-Williams (1973), Sayles and Antevs (1941), and Beckett and MacNeish (1994) concentrated on regional variation. The focal point of their research was to identify different Archaic groups by studying the variation of artifact assemblages in a specific region based on only a few sites. By relying only on a few sites, Archaic groups were reduced to assemblages that may not be representative of an entire culture (Huckell 1984:4). Furthermore, Berry and Berry (1986) suggest that cultural sequencing causes "phase-stacking" by trying to reconstruct a continuum for the Archaic and pigeonholing sites to fit a continuum. Ultimately, it "...produce[s] a model that no longer describes the data patterning in a realistic manner and one in which structure is more of an impediment than an aid to understanding" (Berry and Berry 1986:321).

Huckell (1984:2) has identified several factors that have caused problems for understanding the Archaic in the Southwest. The first is a scarcity of archaeologists studying the Archaic and a consequent lack of long-term systematic research, although recently more archaeologists have delved into the understanding of Late Archaic organization and processes. Huckell's second factor corresponds to Berry and Berry's (1986) criticism of phase-stacking where archaeologists assign traditions to each geographic region without understanding the relationship to the broader picture of the Archaic period and how groups within a region may have interacted with groups outside of their geographic region. Therefore, Huckell (1984:3) states that archaeologists trying to understand the people during the Archaic are left without a well-founded cultural model. My study tries to rectify this problem by considering the possible interaction of different geographical groups with each other. Huckell’s third factor that he states hinders our understanding of the Archaic in the Southwest is that archaeologists assume that artifacts found at a site are representative of a culture. Because many Archaic sites are ephemeral in nature and only yield lithic material, the behavior that these artifacts suggest may be overrepresented.

Chronology and Terms Used in This Study

In light of the issues with chronologies discussed in the previous section, as well as trying to compare three regions that have been identified as part of different traditions and chronologies, it would be inappropriate to use a term from one region for the other two. To alleviate any misunderstanding, I call the early phase from each of the three regions the early Late Archaic (ELA) and the later phase from the three regions the late Late Archaic (LLA), during which there is a higher dependence on agriculture and increasing sedentism (Table III-1).

Table III-1. The Phases Used in This Study and Their Approximate Equivalents in the Three Study Areas.

Phase Names Used in This Study	Tucson Basin Phases	Black Mesa Phases	Hueco Bolson Phases
Early Late Archaic (ELA)	San Pedro	White Dog	Hueco
Late Late Archaic (LLA)	Cienega	Lolomai	Early Mesilla

It is possible to conflate these phases into the ELA and LLA for the purposes of comparison, because each of the regions has similar major characteristics. For instance, the ELA phases – White Dog phase from the Black Mesa region, the Hueco phase from the Hueco Bolson, and the San Pedro phase of the Tucson Basin – represent similar time ranges and show less evidence of dependence on agriculture. Furthermore, during the ELA, the introduction of notched projectile points becomes prominent.

During the LLA, the Lolomai phase of Black Mesa, the Early Mesilla phase of the Hueco Bolson, and the Cienega phase of the Tucson Basin are also similar. Most notable in each of the three regions is evidence of decreased mobility, including a greater proportion of deep basin metates as well as more evidence of LLA groups relying on cultigens like maize.

Summary

In this chapter, I have discussed the characteristics of the different phases from the three traditions pertinent to this study, namely the White Dog and Lolomai phases used in the Black Mesa region, the Hueco and Early Mesilla phases used in the Hueco Bolson, and the San Pedro and Cienega phases used in the Tucson Basin. I have acknowledged some of the problems with the chronologies and identified a possible issue with using data from three regions that are a part of different traditions. In order to address these problems, I have chosen to use the terms ELA and LLA to describe the Late Archaic and incipient agricultural phases, respectively. On advantage to using the terms ELA and LLA is that they are temporal descriptors and are not associated with any cultural phenomena. Finally, I have suggested that using the terms ELA and LLA will not only mitigate any confusion, but because of the similarities with subsistence strategies, mobility patterns, and projectile point technology of the groups from the Black Mesa, Hueco Bolson, and Tucson Basin during the ELA and LLA, the regions can be appropriately compared.

Chapter IV

The Geographic Setting and Geology of Black Mesa, the Tucson Basin, and the Hueco Bolson

In this chapter, I discuss the geographic setting of Black Mesa on the Colorado Plateau, the Tucson Basin in the Sonoran desert, and the Hueco Bolson near the northern boundary of the Chihuahuan desert. I provide an overview of each desert biome in order to describe the environment and how it may relate to the ELA and LLA. Special attention is paid to geology in each of the three regions; geology is pertinent to raw material availability and lithic procurement for the projectile points used by the people during the ELA and LLA. The main reason for identifying the raw material of the projectile points from the Black Mesa, Tucson Basin, and the Hueco Bolson is that finding a raw material that is local to a region, yet found in another, would show that there is some sort of interaction among the groups of the regions. Also, raw material type is a high visibility attribute, because most of the raw materials can be identified at least by color at a distance. Each of the raw materials discussed is present in my dataset for this study.

Black Mesa on the Colorado Plateau

Black Mesa lies within the larger physiographic province of the Colorado Plateau, which covers part of northeastern Arizona, northwestern New Mexico, southeastern Utah, and southwestern Colorado. On average, the Colorado Plateau has elevations ranging from 4000 feet to 8000 feet above sea level (Plog 1997:29). Within this province, precipitation increases with elevation (Cordell 1997; Plog 1986), but it is still very arid with an annual rainfall that varies from 10 to 16 inches (Plog and Powell 1984) . The plateau has several physiographic regions that include desert valleys, canyons, mesas, and mountains with pine and fir trees (Plog 1986). Black Mesa is one of the most prominent geological features of the Colorado Plateau.

Black Mesa is in the southwestern portion of the Colorado Plateau physiographic province, just east of modern day Tuba City, Arizona (Figure IV-1). The mesa spans approximately 120 kilometers east to west and 80 kilometers north to south (Green 1985:57; Plog 1986:17). Black Mesa elevations range from a maximum of 8110 feet to a minimum of 6299 feet (Plog and Powell 1984:2).

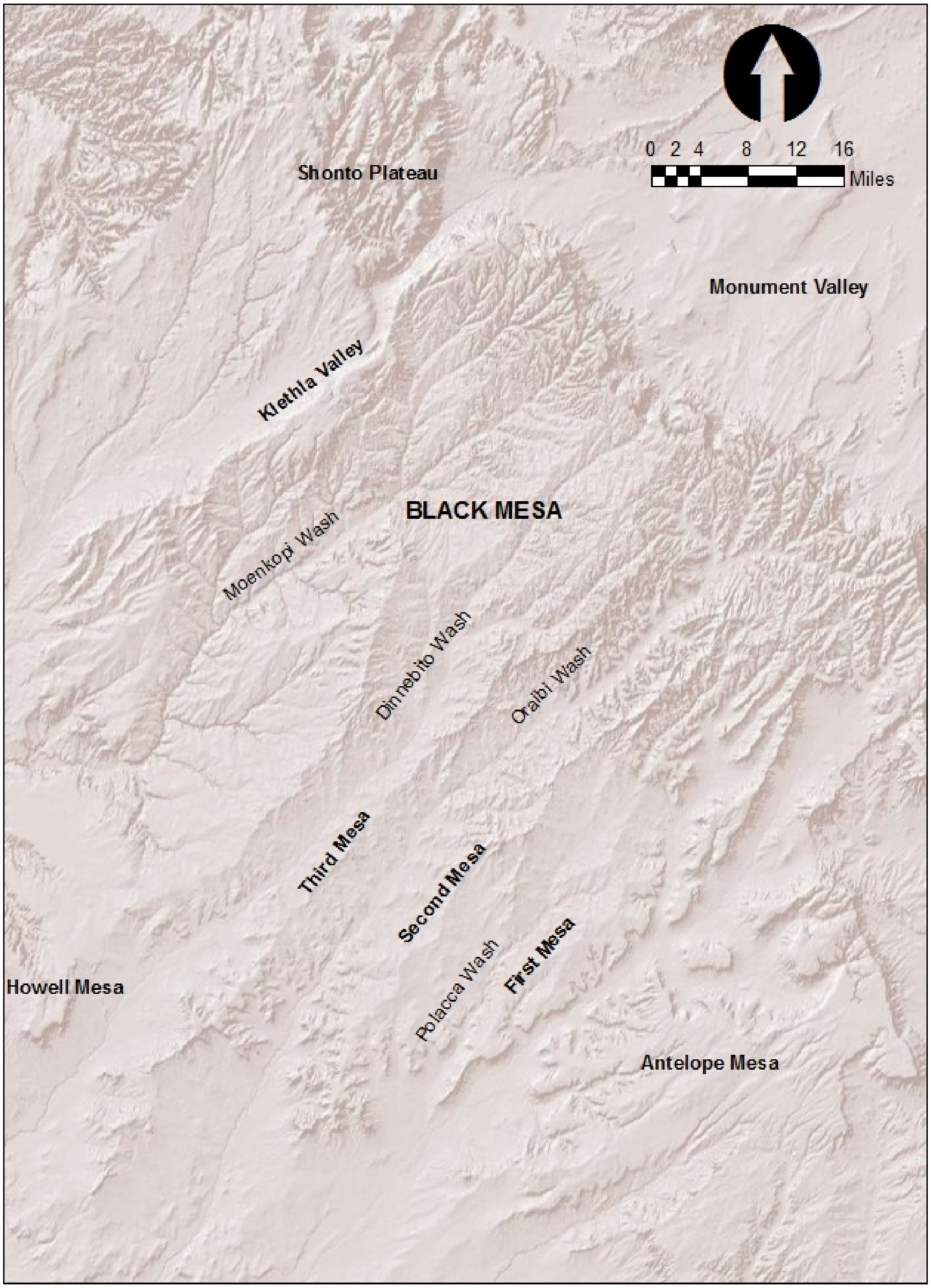

Figure IV-1. Map of Black Mesa.

Geology

Unlike the Tucson Basin and the Hueco Bolson, the geology and raw materials found in the Black Mesa have been well documented because of Green's (1985) seminal volume about the raw materials in the area. I am limiting my discussion to the geologic formations and raw materials used as chipped stone by the people on Black Mesa during the ELA and LLA (Table IV-1).

Table IV-1. Geologic Strata Bearing Raw Materials Used by ELA and LLA Groups from Black Mesa.

System	Series	Group	Stratigraphic Unit	Raw Material
Cretaceous	Upper	Mesa Verde	Wepo Formation	Baked siltstone Petrified wood Siderite
			Toreva Formation	Quartz Quartzite Purple conglomerate sandstone
Jurassic	Upper		Morrison Formation	Creamy opaque silicified chert
Jurassic and Triassic		Glen Canyon	Navajo Sandstone	Navajo chert
Triassic	Upper	none	Chinle Formation	Owl Rock chert Purple/white chert/chalcedony Chinle chert

Adapted from Green (1985:64).

Green (1985) identified five major geologic formations from which people procured raw materials. Two of these formations fall within the Mesa Verde group – the Wepo Formation and the Toreva Formation. This group is the youngest found at Black Mesa and is made of sedimentary rock. The Wepo formation is comprised of siltstone, mudstone, and sandstone. Raw materials form the Wepo formation used by ELA and LLA peoples include baked siltstone (Figures IV-2 through IV-5), vitreous and non-vitreous petrified wood (Figures IV-6 and IV-7), and siderite (Figure IV-8)

(Green 1985). Also part of the Mesa Verde group is the Toreva formation that directly underlies the Wepo formation. Lithic raw materials used prehistorically from this strata are quartz, quartzite, and purple conglomerate sandstone (Green 1985).

Figure IV-2. Unmodified white baked siltstone in tabular form from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

Figure IV-3. Unmodified gray baked siltstone in tabular form from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

Figure IV-4. Unmodified pink baked siltstone from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

Figure IV-5. Unmodified yellow baked siltstone in tabular form from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

Figure IV-6. Unmodified vitreous petrified wood from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

Figure IV-7. Unmodified non-vitreous petrified wood from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

Figure IV-8. Unmodified siderite from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

The Morrison formation of the earlier Jurassic period is a sedimentary formation. The only usable lithic material identified from this formation is creamy-opaque chert (Green 1985:71) (Figure IV-9).

Figure IV-9. Unmodified creamy opaque chert from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

The next oldest lithic bearing formation is Navajo Sandstone, which is a part of the Glen Canyon group. This sedimentary formation is comprised predominantly of sandstone and cherty limestone. Knappable Navajo chert (Figure IV-10) is found in the veins of the cherty limestone (Green 1985).

Figure IV-10. Unmodified Navajo chert from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

The oldest formation of Black Mesa that people used for lithic raw materials is the Chinle formation of the Triassic period. This sedimentary formation yields Owl Rock chert (Figure IV-11), purple-white chalcedonic chert (Figure IV-12), and Chinle chert (Figure IV-13) (Green 1985).

Figure IV-11. Unmodified Owl Rock chert from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

Figure IV-12. Unmodified purple-white chalcedonic chert from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

Figure IV-13. Unmodified Chinle chert from Black Mesa (raw material type collection housed at Center for Archeological Investigations, Carbondale, Illinois; photographed by Nicholas Beale).

The Tucson Basin in the Sonoran Desert

The Sonoran desert spans nearly 100,000 square miles (160,934.4 km^2) in southeastern California, the Baja California peninsula, and most of the southern half of Arizona, and it extends well into the state of Sonora, Mexico (Dimmitt 2000). In relation to other North American deserts such as the Chihuahuan desert, the Sonoran desert vegetation is more robust, and this desert has milder winters.

The Tucson Basin is located in the Sonoran desert and is part of the Basin and Range physiographic province; it contains the modern city of Tucson, Arizona. Furthermore, the Tucson Basin falls into the Arizona Upland subdivision of the Sonoran desert (Dimmitt 2000) (Figure IV-14). The Arizona Upland has two distinct periods of precipitation during the year: the summer monsoon and winter months. This biome's yearly precipitation is approximately 12 inches evenly divided between the two rainy seasons (Dimmitt 2000:16; Ingram 2000).

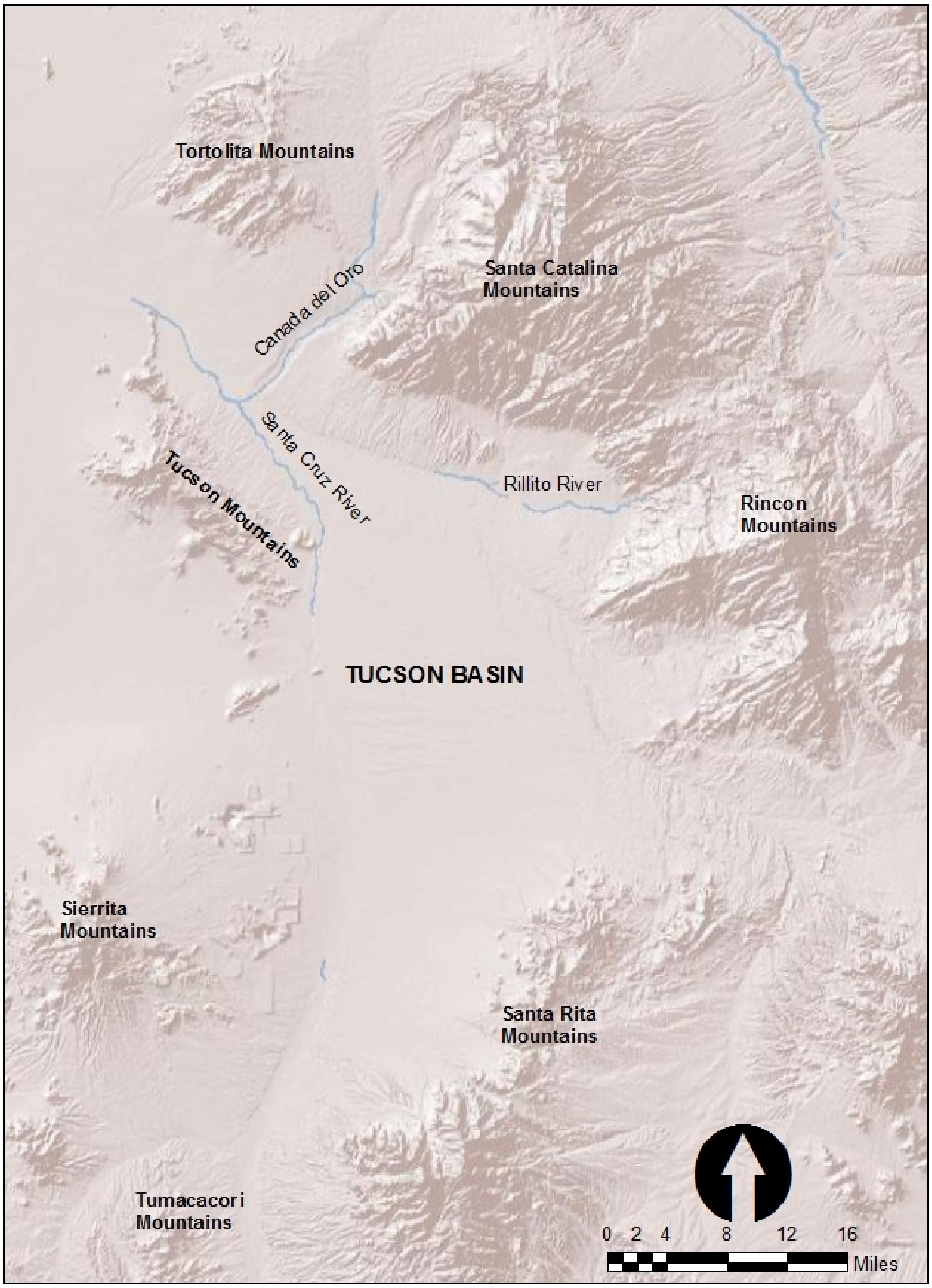

Figure IV-14. Map of the Tucson Basin.

Geology

The geology of the Tucson Basin region is very complex (Nations and Stump 1981). Large volcanic upheavals caused the formation of the Basin and Range province (Dimmitt 2000), and the mountain ranges surrounding the Tucson Basin were formed during the Miocene and Pliocene eras by block faulting (Roth 1989). Therefore, volcanic and meta-volcanic raw materials are dominant in this region, including basalts and rhyolites.

Six major mountain ranges surround the Tucson Basin. The western boundary is formed by the Tucson Mountains, which are predominantly comprised of several kinds of rhyolite (Nations and Stump 1981) (Table IV-2). The northern boundary of the Tucson Basin is formed by the Tortolita Mountains and the Santa Catalina Mountains (Gootee 2012). The Tortolita Mountains are granitic (Skotnicki 2000), but the Santa Catalina Mountains contain fine-grained rhyolite and fine-grained quartzite (Force 1997), which would have been available for prehistoric exploitation. The Rincon Mountains, which are granitic (Dickinson 1991), and the aforementioned Santa Catalina Mountains form the eastern edge of the Tucson Basin. Finally, the Santa Rita Mountains and the Tumacacori Mountains define the southern boundary of the Tucson Basin. The Santa Rita Mountains are primarily composed of granite (Drewes 1968) and the Tumacacori Mountains of Tertiary rhyolites (Seaman 1999).

Table IV-2. Rhyolites within the Tucson Basin Used by ELA and LLA Groups.

Location	Grain Size	Color	Phenocrysts (Color)
Tucson Mountains	medium	brown	yes (white)
Tucson Mountains	medium	light gray-brown	no
Tucson Mountains	fine	brown	possible
Tucson Mountains	coarse	brown	yes (white)
Tucson Mountains	medium	pink-gray	no
Tucson Mountains	fine	pink-gray	yes (black and white)
Tucson Mountains	coarse	pink	yes (white)
Santa Cruz River	fine	gray	yes (black and white)
Santa Cruz River	medium	gray	yes (black and white)
Santa Cruz River	fine	black	yes (white)
Santa Cruz River	fine	ashy gray	yes (black and white)
Santa Cruz River	medium	black	yes (white)
Santa Cruz River	medium	brown	yes (black and white)
Santa Cruz River	fine	brown	yes (black and white)
Santa Cruz River	medium	black	yes (black and white)
Santa Cruz River	medium	red	yes (black and white)
Santa Cruz River	medium	red	yes (white)

Adapted from Sliva (1999:35, 2001:92).

All of the previously mentioned mountain ranges produce a plethora of diverse raw materials that the ELA and LLA peoples of the region could have exploited and that are present in the Tucson Basin dataset. The Santa Cruz drainage provided additional access to raw materials by transporting them from their sources in the mountains and depositing them along the bajada slopes and in the drainages themselves. Sliva (2003:229) notes that most of the lithic assemblages found within the Tucson Basin are composed of local raw materials (Table IV-3). Although some of the cherts have not been precisely sourced, they are probably associated with the chalcedony and jasper outcroppings found throughout the basin.

Table IV-3. Raw Materials in the Tucson Basin Used by ELA and LLA Groups.

Raw Material Type	Texture
Basalt	fine-grained
Dacite	fine-grained
Andesite	medium-grained
Chalcedony	cryptocrystalline
Chert	cryptocrystalline
Jasper	cryptocrystalline
Agate	cryptocrystalline
Quartz	glassy
Metasediment	fine-grained
Silicified limestone	fine-grained
Quartzite	fine-, medium-, coarse-grained
Rhyolite	fine-, medium-, coarse-grained

Adapted from Sliva (1999:34, 2001:92).

Non-local raw material such as obsidian and Windy Hill chert were also available to the ELA and LLA peoples of the Tucson Basin. These non-local raw materials are present in my dataset. Most of the obsidian nodules are found in secondary deposits from Cow Canyon near the San Simon Valley to the east, Superior to the north of the basin, and the Sauceda Mountains to the west (Shackley 2005:5; Sliva 2001:92). Windy Hill chert (Figure IV-15) is found to the north of the Tucson Basin in the Tonto Basin just northeast the modern city of Phoenix (Sliva 2001:96).

Figure IV-15. Examples of Unmodified Windy Hill chert from the Tonto Basin (photo courtesy of Desert Inc., Tucson, Arizona).

The Hueco Bolson in the Chihuahuan Desert

The Chihuahuan desert extends from central Mexico to just south of Albuquerque, New Mexico (Van Devender 1990), and falls within the Mexican Highlands of the Basin and Range Province in the United States. The western boundary of the desert is adjacent to the Sonoran desert in southern Arizona. The elevation of the Chihuahuan desert ranges from 1000 feet (304.8 meters) to upwards of 5500 feet (1676.4 meters) (R. Schmidt 1979). The study area of the Hueco Bolson is within the northern extent of the Chihuahua desert.

The Hueco Bolson is a semiarid to arid graben valley that abuts the Tularosa Basin to the north, although some investigators consider the Tularosa Basin a part of the Hueco Bolson (Condon et al. 2008). This bolson runs north-south and is bounded by mountains on the east and west and by the Rio Grande to the south (Figure IV-16). Similar to the Tucson Basin, the Hueco Bolson has two rainy seasons. The average annual rainfall is 9 inches. Summer thunderstorms between June and October produce over 65 percent of the annual rainfall (Condon et al. 2008:10). The remaining precipitation comes from snowfall during the winter.

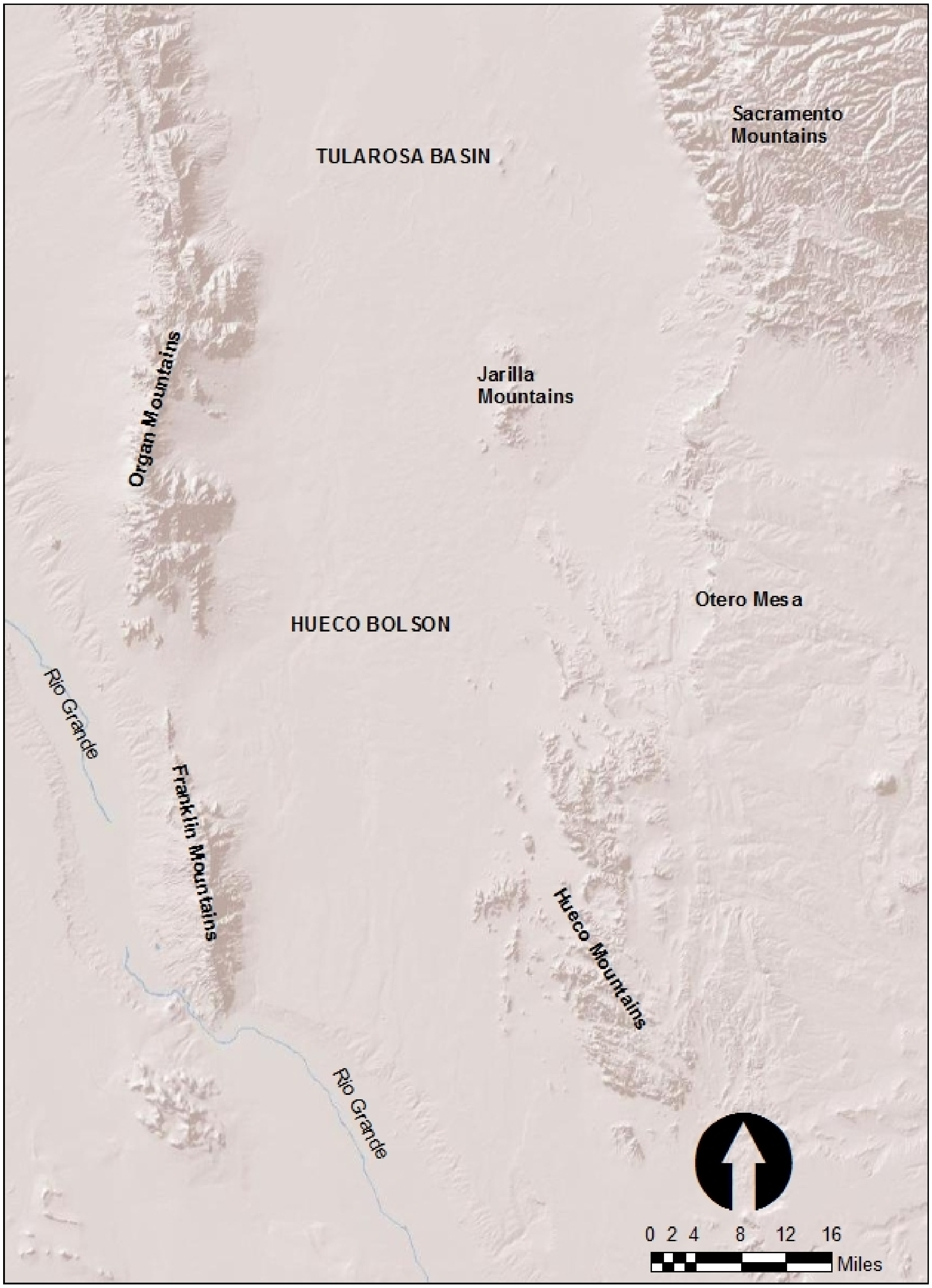

Figure IV-16. Map of the Hueco Bolson.

Geology

The geology of the Hueco Bolson and surrounding mountains is more complex than the other two study regions. The Hueco Bolson proper was formed during the Late Tertiary period (Clark et al. 2010). The surface of this bolson is composed of blow-sand (Church et al. 1996). The western-most edge of the Hueco Bolson abuts the San Andres, Organ, and Franklin Mountains. In the center of the Hueco Bolson are the Jarilla Mountains. The eastern edge of the bolson terminates at the Sacramento Mountains, Otero Mesa, and the Hueco Mountains. The southern boundary is formed by the Rio Grande.

The San Andres Mountains form the northwestern-most boundary of the Hueco Bolson. They are a part of the same mountain range as the Organ and Franklin Mountains, all of which formed along fault lines. Most of the rocks from this formation are sedimentary, but the usable raw material identified from this region is rhyolite (Pigott and Dulaney 1977).

The Organ Mountains are comprised of volcanic, metamorphic, and sedimentary rocks (Clark et al. 2010). The most viable raw material from these mountains for chipped stone tool use is rhyolite (Church et al. 1996; Church et al. 2007). Other lithic materials include marble and jasper (Church et al. 1996).

The Franklin Mountains are a part of a chain that includes the San Andres and Organ Mountains. Tectonic movements during the Tertiary period formed this group of mountains. Both the normal faults and thrust faults remain active. Raw materials from the Franklin Mountains include hornfels, chert, rhyolite, crystal quartz, and quartzite (Church et al. 1996).

The Jarilla Mountains, which are situated in the middle of the bolson, are sedimentary and metamorphic in nature (Clark et al. 2010) and are approximately 40 by 30 km (Church et al. 1996). Some of the lithic material found in the Jarilla Mountains are silicified wood, orthoquartzite, jasper, and hornfels (Church et al. 1996).

The Sacramento Mountains are a part of the Southern Rockies Belt. Lithics from the Sacramento Mountains include dark gray and black chert, novaculite (Pigott and Dulaney 1977), silicified wood, silicified shale, quartzite, and hornfels (Church et al. 1996).

Otero Mesa lies between the Hueco and Sacramento Mountains. Raw material found at this location consists of reddish siltstone (Pigott and Dulaney 1977).

The Hueco Mountains primarily consist of sedimentary rocks with some volcanic rocks. Raw materials include black and dark gray chert, gray veinlet chert, and yellowish brown and red siltstone (Pigott and Dulaney 1977).

The southern boundary of the Hueco Bolson is formed by the Rio Grande. This river transports lithic material in the form of gravels including Jemez obsidian, chalcedony, chert, and quartzite (Church et al. 1996).

Other chipped stone materials found throughout the Hueco Bolson and surrounding area are fine-grained limestone, gray to brown chert, pink to red fusulinid chert, banded gray chert, and crystal quartz (Church et al. 1996; Pigott and Dulaney 1977).

Because of the complex geology of the Hueco Bolson and surrounding area, a considerable variety of raw material was available for people to use for projectile points during the ELA and LLA. Alluvial and fluvial taphonomic processes have transported many raw materials from their mountain sources near the Hueco Bolson. Church et al (1996) and Pigott and Dulaney (1977) have noted that almost no non-local lithic material has been found in the region for chipped stone use.

Summary

This chapter identifies the raw materials available to the ELA and LLA peoples in their respective regions. One purpose for this detailed analysis is to identify the local raw materials to a region, such that the same material in another region may suggest that there was some form of interaction between groups (Binford 1979, 1980; Hayden et al. 1996; Justice 2002b; Nelson 1996; Odell 1996; Thacker 1996). Second, raw material is a high visibility attribute, and I discuss its implications for social acculturation in chapter five. All of the raw materials that I have discussed in this chapter are in my dataset.

Chapter V

Methodology: Attributes and Statistical Tests

This chapter provides a description of the methods that I use for the study as well as a discussion of each of the high, moderate, and low attributes that Carr (1995b) and Hoffman (1997) have identified. First, I created a database in Access in order to input the high, moderate, and low visibility attributes, because it provides an easy way to import a large amount of data as well as a tool for data manipulation.

I gathered data from 956 ELA and LLA projectile points (Appendices A, B, C, and D) from the three study areas, and I took pictures of each specimen. The Tucson Basin sample from 14 sites was obtained from the Arizona State Museum. These sites yielded 159 ELA and 175 LLA projectile points. The data for the Hueco Bolson region came from 94 sites whose artifacts are housed at the Fort Bliss curation facility in El Paso, Texas. At this repository, I measured 284 ELA specimens and 129 LLA specimens. The Black Mesa data set came from 24 sites and 224 projectile points, which are curated at the Center for Archaeological Investigations (CAI) on the Southern Illinois University campus in Carbondale, Illinois. A total of 210 of the projectile points from the Black Mesa are from the LLA. Since I found only 14 projectiles points from the Black Mesa ELA, I did not use these latter data for my study, because of such a small sample size.

Researchers in different regions of the Southwest use different projectile point names to describe the same morphology. For instance, Sliva (1999) and other scholars within the Tucson Basin use the term Cienega Flared, but Justice (2002b) identifies the same point as a Guadalupe point (Figure V-1). For the sake of consistency, all of the projectile point names that I use are in accordance with Justice's (2002b) definitions. Once I determined the projectile point type, I grouped them into clusters created by Justice (1987, 2002a, 2002b). Justice (2002a:1-6) bases his projectile point clusters on morphological and technological similarities, distribution across the landscape, and age.

Figure V-1. Cienega Flared Point in the Tucson Basin, also called a Guadalupe Point in the Hueco Bolson (specimen #FB 6271 2007-11-0014; see Appendix A; photographed by Nicholas Beale).

I imported the Access database into the JMP statistical package to analyze the visibility attributes from the projectile point clusters. I used JMP because of its availability and ease in performing statistical tests.

Attributes

I use the high, moderate, and low visibility attributes that were defined by Carr (1995b) and discussed in chapter two. I have divided this section into high visibility, moderate visibility, and low visibility attributes, and I discuss them in detail below.

I use the appropriate metric measurement depending on the attribute. Weight is measured in grams and all other measurements are in millimeters. If a specimen is incomplete, only complete variables are used in the analysis. For instance, if a point is missing its stem, the blade length, thickness, and width are still used, but total length, stem length, weight, and base width are not.

High Visibility Attributes

As stated in chapter two, high visibility attributes may represent the active communication of an individual or group (Plog 1990; Wiessner 1983, 1985, 1990; Wobst 1977) and acculturation (Carr 1995b), and they can be seen without close inspection of the projectile point. The high visibility attributes of projectile points defined by Carr (1995b) and Hoffman (1997) that I use in this study are the raw material, the overall morphology of the point, the presence or absence of heat treatment, the total length, blade length, total width, blade width, and blade thickness. Although the presence of barbs is considered a high visibility attribute (Hoffman 1997:103), Justice (2002b) uses this attribute to develop his clusters and therefore barbs are already accounted for. Consequently, I have omitted it from this portion of the study.

Raw Material. The raw material of the points is one of the most important attributes examined in this study to identify interaction among the groups from the

Tucson Basin, Black Mesa, and the Hueco Bolson. Raw material is a high visibility attribute because it can be seen at a distance. Also, on a functional level, the quality and size of the raw material dictate the dimensions of a stone tool (Dibble 1985; Shott 1994), which can influence the size of the high, moderate, and low visibility attributes.

Raw material and its distribution across the landscape can aid in determining patterns of raw material sources and selection. The type of raw material and where it is found in the archaeological record compared to its source can help ascertain where ELA and LLA groups acquired their raw material and possible interaction with groups from other regions (Binford 1979, 1980; Hayden et al. 1996; Justice 2002b; Nelson 1996; Odell 1996; Thacker 1996). To evaluate the selection of raw materials by people in the three regions, I identified the frequencies of the raw materials such as andesite, jasper, obsidian, quartzite, agate, dacite, silicified limestone, chert, basalt, and rhyolite used in each of the three regions. Calculating the percentages of raw materials allows comparison among Black Mesa, the Tucson Basin, and the Hueco Bolson. By analyzing the percentages of the raw materials in the archaeological record, it may be possible to identify patterns of social interaction among the groups from the three regions during the ELA and LLA.

Overall Morphology. Archaeologists have used projectile point types to signify cultural groups for a long time. Researchers (Justice 2002b:13) have suggested that identifying the overall morphology of a point and its geographic location can help to shed light on distribution patterns that may indicate trade or interaction. The overall shape and size of a projectile is one of the most notable attributes of a projectile point. Therefore, identifying the projectile point type provides a foundation for this study, so that I can compare the high, moderate, and low visibility attributes of the same projectile point types among all three regions.

Heat Treatment. Heat treatment is the thermal alteration of raw material. Since Crabtree's (1964) seminal study, archaeologists have shown that heat-treating a raw material changes its chemical composition and makes it easier for knappers to reduce the material. The trade-off is that heat treatment causes the raw material to become more brittle and may shorten the use-life of a tool.

Because some raw materials change color with thermal alteration, which can be seen at a distance, the presence of heat treatment is a high visibility attribute (Christenson 1977). Furthermore, Barfield's (2004) study shows that heat treatment is not only a technological attribute but may also indicate cultural belonging. He has demonstrated that among groups during the Neolithic in Europe some culturally distinct groups chose to thermally alter the raw material, while other groups used the same raw material but do not heat treat it.

For this study, I note the presence or absence of thermal alteration. In almost all cases, there did not seem to be any evidence of heat treatment that led to the modification of the color of the raw material. There are a few specimens that may have been thermally altered based on texture, but only by using a microscope can a researcher identify this change. Such heat treatment would not be a high visibility attribute and because heat-treating was infrequent among my samples, I have chosen to disregard thermal alteration in my analyses.

Total Length. Because the total length of a projectile point can be seen at a distance, this is a high visibility attribute. I measured the total length of each projectile point from its most distal point to its proximal end (Figure V-2). Total length is affected by raw material, reworking, and resharpening. The size of the available raw material limits how large a point may be. Reworking and resharpening will modify the size of a point and reduce it from its original size (Andrefsky 2006). Cultural parameters also contribute to the total length of a projectile point. It is possible that people during the ELA and LLA had a template of what a projectile point should look like and that determined, at least in part, the length of the point.

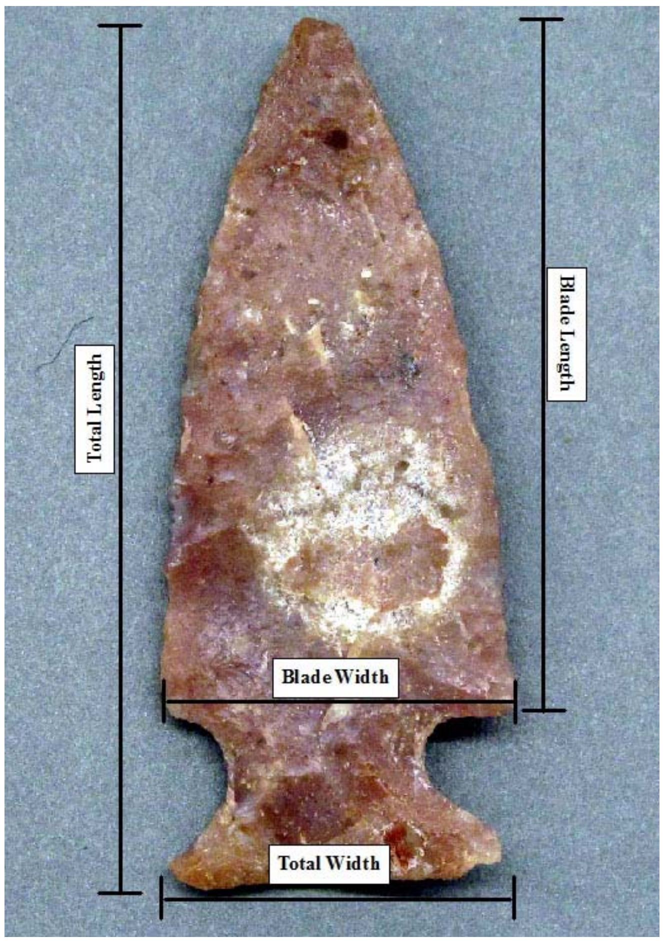

Figure V-2. Selected High Visibility Measurements (specimen #BM D-07-152 1131-xx-264; Appendix A; photographed by Nicholas Beale).

Blade Length. Blade length is not obscured by the hafting element and is the most prominent attribute visible at a distance. I measured the blade length from the distal end to the hafting element - the part of the projectile point that is attached to the foreshaft of an arrow, dart, or spear (Figure V-2) (Andrefsky 1998). This attribute reflects the piercing element of the projectile point. Similar to total length, raw material, reworking, and social considerations can affect the blade length.

Total Width. Although this attribute is not as prominent as total length and blade length, it does affect the overall size of the projectile point, and it is not obscured by the hafting element. Therefore, this attribute can be seen at a distance. Total width is the maximum width of the projectile point (Figure V-2), which is usually the shoulder of the projectile point. Raw material, reworking, and cultural determinants dictate the shoulder width of a projectile point.

Blade Width. Blade width is the maximum width associated with the blade of the projectile point (Figure V-2). In most cases, this is synonymous with the total width, but in some instances where there is evidence of resharpening, the blade width is less than the total width due to resharpening. Similar to total point length, viewing the blade width is not impeded by a foreshaft.

Blade Thickness. Although this attribute is less visible than the aforementioned attributes, Carr (1995b) still considers it a high visibility attribute because it affects the overall size of the projectile point that can be seen at a distance. Thickness is measured at the maximum thickness on the blade. Usually the thickest part of a point is along the medial section.

Moderate Visibility

Moderate visibility attributes - attributes that are less visible at a distance but can be seen without close inspection - may reflect active or passive messaging to convey information including social affiliation within the group, rank or prestige distinctions, and acculturation (Carr 1995; Hoffman 1997). These attributes are not completely hidden by the foreshaft, but they cannot be seen at a distance. The moderate visibility attributes that I use are the presence or absence of serration, flake patterns, and blade tip thickness (Hoffman 1997:103). Although type of haft is considered a moderate visibility attribute (Hoffman 1997:103), Justice (2002b) uses this attribute to develop his clusters and therefore types of hafting are already accounted for. Therefore, I have omitted it from this study.

Serration. Serrations are saw-like teeth on the lateral margins of the blade made by either notching or retouching (Christenson 1977:285) (Figure V-3). Serration on projectile points can aid in cutting or can cause extensive trauma to an animal and will incapacitate the animal more quickly than a projectile point without this attribute (Christenson 1977). Because these protrusions are smaller than barbs, serration can only be seen at a moderate distance. For the purpose of this study, I indicate the presence or absence of serration.

Figure V-3. An Example of a Serrated Projectile Point (specimen #TB AA-12-111 2008-459-187; see Appendix A; photographed by Nicholas Beale).

Flake Patterns. Flake patterns refer to the positioning of flake scars on the projectile points. Because this attribute is not covered by a foreshaft nor are the flake scars large enough to be readily seen at a distance, flake patterns are a moderate visibility attribute. Some researchers have hypothesized that individual knappers may be distinguished based on the flake patterns, because toolmakers usually produce tools in a consistent manner (Whittaker 1994:292). Pitblado (2003:183) suggests that the selection of a certain type of flake pattern may indicate a stylistic choice, which may reveal regional variability. Furthermore, the angle of the flake scars can indicate the dominant hand of a knapper. For this study, I determined if a flake pattern, such as parallel flake scars, was present.

Blade Tip Thickness. Blade tip thickness is measured at the maximum thickness on the tip of the blade and is only recorded when the tip of the projectile point was present. The blade tip is the smallest attribute that can be found on the blade. It is not obscured by the foreshaft, but blade tip thickness cannot be discerned without closer inspection.

Low Visibility

Low visibility attributes may indicate passive social interaction, the passive components of enculturation, shared histories of interaction, and passive messages pertaining to personal level processes (Carr 1995b; Hoffman 1997). Almost all of the low visibility attributes, except for weight, are obscured by the foreshaft, and therefore cannot be seen without close inspection by detaching the projectile point from the foreshaft. Low visibility attributes of projectile points used for this study are weight, stem length, neck width, base width, and stem thickness. Although stem type and ground base are low visibility attributes (Hoffman 1997:103), Justice (2002b) uses this attribute to develop his clusters and therefore ground base is already taken into account. Also, I realized that I had changed my methods for measuring the notch depth, and therefore it rendered my analysis for this attribute unusable. Consequently, I have omitted these three low visibility attributes from this portion of the study.

Weight. Weight is an important factor in determining the amount of reduction that has been performed on a tool (Andrefsky 2006; Shott 1994), and it indicates the mass of the tool. The more mass a projectile point has, the greater the chance of penetrating the hide of an animal. On the other hand, if the mass is too great, it slows the velocity of the projectile and may then limit its ability to penetrate the hide. Therefore, knappers had to find the appropriate weight for the projectile point to penetrate the hide without adversely affecting the velocity (Cheshier and Kelly 2006). I only consider whole specimens, and I measured weight to tenths of grams using a digital scale. The only way an individual can deduce the weight of a projectile is by holding it. Therefore, it cannot be seen and is a low visibility attribute.

Stem Length. The stem is the part of the point that is attached to and obscured by the foreshaft of a dart or arrow, and it is therefore a low visibility attribute. Stem length is measured from the distal point of the hafting element to the proximal end (Figure V-4). Because the stem of a point is usually protected by the foreshaft or sinew used to attach the point to the foreshaft, there is less need to modify its shape after its original production (Keeley 1982:807). Hence, the stem is less affected by reworking than the blade. Although stem length is not constrained by resharpening, other functional needs such as the size of the shaft that the point is hafted to may influence the stem length. Also, it is possible that differences and/or similarities in stem length may indicate stylistic phenomena and closely approximate the mental template of people making projectile points resulting from enculturation.

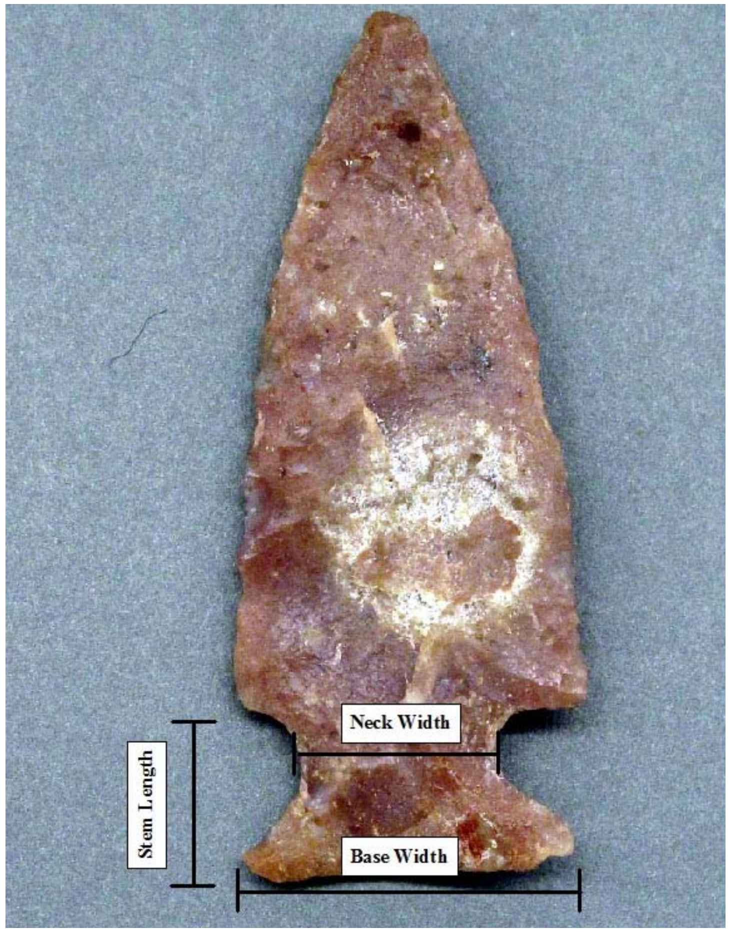

Figure V-4. Selected Low Visibility Measurements (specimen BM D-07-152 1131-xx-264, see Appendix A; photographed by Nicholas Beale).

Neck Width. The neck of a projectile point is the most distal and narrowest portion of the hafting element (Figure V-5). The width of a projectile neck correlates directly with width of the shaft to which the point was attached (Shea 2006:824). Because this attribute is typically covered by the foreshaft during use, this is a low visibility attribute.

Base Width. Base width is the measurement taken from the widest point of the lateral edges of the stem (Figure V-5) (Andrefsky 1998). The base width may indicate the original size of the point prior to reduction (Ballenger 2001; Kuhn 1994), because the base width is less likely to be modified during resharpening or reworking. Because the base is fitted into the foreshaft, it is not possible to see this attribute unless the point was removed from the foreshaft, and so it is a low visibility attribute.

Stem Thickness. This attribute is the maximum thickness of the stem. Two main factors that restrict the thickness of the stem are the diameter of the foreshaft and the propensity of the raw material to break. Either the foreshaft or the sinew used to attach the point to the foreshaft completely mask the stem thickness, and so it is a low visibility attribute.

Base Shape. The base shape refers to the type of indentation of the stem, which is fitted into the foreshaft and obstructs viewing this attribute. For each projectile point stem, I noted whether the base is straight (Figure V-5), concave (Figure V-6), or convex (Figure V-7). By classifying base shapes, it may be possible to identify patterns within each projectile style that may relate to group affiliation.

Figure V-5. An Example of a Projectile Point with a Straight Base (specimen #BM D-07-152 1131-xx-130; see Appendix A; photographed by Nicholas Beale).

Figure V-6. An Example of a Projectile Point with a Concave Base (specimen #FB 273 2004-11-815; see Appendix A; photographed by Nicholas Beale).

Figure V-7. An Example of a Projectile Point with a Convex Base (specimen #FB 1579 2007-5-24; see Appendix A; photographed by Nicholas Beale).

Statistical Tests

In order to determine similarities and differences in the attributes among projectile points from the three regions, the aforementioned variables were imported into JMP statistical software. Using JMP allows a researcher to examine data in ways designed to identify statistical patterns.

In most cases, I used parametric tests of significance with continuous variables. The distribution of the data must fit the normal curve in order for it to be appropriate to use a parametric significance test. To test if the data were normally distributed, I used the Shapiro-Wilk W test for the goodness of fit. If the raw data did not pass the goodness of fit test, I tried to normalize the data by either removing the outliers or using the standard formula of log + 1 for normalizing data. If the distributions satisfied the Shapiro-Wilk W test for the goodness of fit, I used a parametric test of significance. The most powerful of these parametric statistical tests is the ANOVA test for significance. The ANOVA measures the distance between means and the variance (Bernard 2000), a statistical test appropriate for this study because it allows me to compare the means and the variance of the individual morphological attributes and the regions in which they occur. The ANOVA test works best with normally distributed data and a large sample ($n \geq 100$). If I had a small sample size ($100 > n > 30$), but it had a normal distribution, I used a Student's t test for significance.

There were instances where a parametric test was unsuitable, such as not being able to normalize the distribution of a sample or when my sample size was less than 30. In these cases, I used Kruskall-Wallace/Mann-Whitney U test for significance, which is non-parametric and designed for small sample sizes. In all statistical tests, I used a 90 percent confidence interval (alpha level = 0.10), which means that the result has a 90 percent chance of not being random.

Attributes such as the presence/absence of serration, flake patterns, type of haft, and base shape are not continuous variables, and so the aforementioned statistical tests are inappropriate, because they compare population means. In order to compare ordinal and nominal data, it is necessary to look at the population proportions. Therefore, for nominal data, I used Pearson's Chi Square with a 90 percent confidence interval. One of the drawbacks for Pearson's Chi Square is that it requires the expected value of the proportion to be five or greater (Le 2003:229). In instances when this rule was broken, I used Fisher's Exact Test, which allows small expected values but is less powerful than Pearson's Chi Square.

Summary

I chose the aforementioned high, moderate, and low visibility attributes because previous research (Carr 1995b; Hoffman 1997) suggests that these characteristics should indicate similarities or differences between the projectile points from Black Mesa, the Tucson Basin, and the Hueco Bolson. Using statistical tests that measure variance such as ANOVA and Student's t should illuminate the similarities and differences of the attributes and variables in the three regions in order to find patterns of interaction among the three regions, and how those patterns may have changed between the ELA and LLA.

Chapter VI

Analysis and Discussion of the Raw Materials and Projectile Point Clusters from the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA and LLA

In this chapter, I specifically deal with two of the high visibility attributes – raw material and overall point morphology as represented in the projectile point clusters. I present these attributes separately because they are nominal. I show that ELA groups were more mobile than LLA groups because of a change in subsistence strategies, which would suggest more interaction during the ELA. Also, to establish whether there may have be some connection among groups from the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA and LLA, I identify the local raw materials found in each of the regions.

I present the overall morphology as separate, because only by identifying the shape of the projectile points during the ELA and LLA can I group them into clusters. Specifically, I am looking for clusters that are found in more than one region and have a large enough sample that I can compare the other high, moderate, and low visibility attributes. Therefore, this is the foundation of my research on which the rest of this study is predicated.

Raw Material

Some of the most important data concerning group interaction come from the raw materials that people used to make their projectile points. By identifying the raw material and the raw material sources, it may be possible to discern contact with other groups. Specifically, I am looking to identify frequencies of any non-local raw material within the samples. A higher frequency of non-local raw material may indicate a greater amount of mobility. Within each region, the expectation is that during the ELA, when agriculture was just beginning, these groups would have still been relatively mobile compared to the LLA. Therefore, ELA groups would have a higher percentage of non-local raw materials. Also, if a raw material local to one region is found in one of my other study regions, it would indicate some sort of interaction.

Results of Tucson Basin Raw Materials Analysis for the ELA and LLA

Because Tucson Basin groups transitioned from a more mobile society to a more sedentary lifeway with the intensification of agriculture, I expected that the frequency of non-local material would decrease through time. The data indicate that, contrary to this expectation, the LLA groups actually increased their usage of non-local materials.

Second, I expected that the groups during the LLA would use raw material that is easier to knap in comparison to the ELA raw materials. During the LLA, durability would not be as important for the projectile points, because the groups were less mobile; mobile groups rely heavily on durable raw material because of the risk that during their travels they would not be near a suitable raw material source to replace any broken projectile points.

Based on the Tucson Basin specimens, the ELA raw material consists of 98.1 percent local and no non-local materials for their projectile points (Table VI-1). Within the local raw material category, rhyolite (32.7 percent), dacite (21.6 percent), and fine-grained basalt (18.5 percent) compose the majority of the sample.

Table VI-1. Tucson Basin ELA Projectile Point Raw Material.

Location	Raw Material	Count	Percentage
Local		159	98.1
	Agate	1	0.6
	Andesite	3	1.9
	Chalcedony	3	1.9
	Chert	15	9.3
	Dacite	35	21.6
	Fine-grained basalt	30	18.5
	Jasper	2	1.2
	Limestone	1	0.6
	Metasediment	6	3.7
	Quartz	4	2.5
	Quartzite	3	1.9
	Rhyolite	53	32.7
	Unknown	3	1.9
Non-Local		0	0.0
Unknown		3	1.9
	Unknown material	3	1.9
Total		162	100.0

The LLA projectile points from the Tucson Basin again consist predominantly of local raw materials, 94.8 percent, but these groups used a higher frequency of non-local lithic materials (4.6 percent), namely obsidian and Windy Hill chert (Table VI-2). As with the ELA, the highest frequency of local raw material is rhyolite (33.3 percent). However, more interestingly, the LLA groups from the Tucson Basin appear to have dramatically reduced their use of dacite (5.1 percent) and fine-grained basalt (7.4 percent) and replaced them with local cherts (28.7 percent).

Table VI-2. Tucson Basin LLA Projectile Point Raw Material.

Location	Raw Material	Count	Percentage
Local		165	94.8
	Agate	0	0.0
	Andesite	6	3.4
	Chalcedony	8	4.6
	Chert	50	28.7
	Dacite	9	5.1
	Fine-grained basalt	13	7.4
	Jasper	8	4.6
	Limestone	0	0.0
	Metasediment	2	1.1
	Quartz	5	2.9
	Quartzite	3	1.7
	Rhyolite	58	33.3
	Unknown	3	1.7
Non-Local		8	2.3
	Obsidian	4	2.3
	Windy Hill chert	4	
Unknown			
	Unknown material	1	0.6
Total		174	100.0

Several patterns have emerged from the analysis of the raw materials that Tucson Basin ELA and LLA groups used for their projectile points. First, it is unsurprising that groups from both the ELA and LLA relied heavily on rhyolite, since is ubiquitous in the area.

Second, the presence of obsidian only within the LLA sample suggests that the overall projectile point size decreased through time, because obsidian nodules in the

Southwest are relatively small. Later in the chapter I present the results of the significance tests for the attributes that represent the projectile point size to see if this pattern holds true. Another possible explanation for this change in size is the decrease in use of dart points and the introduction of the bow and arrow during the LLA.

Finally, the shift from macro-crystalline raw material such as dacite and fine-grained basalt during the ELA to chert during the LLA may suggest that durability was no longer as important as the ease of knapping. Unlike the previous patterns, these results do conform to my expectation.

The low preponderance of non-local raw material suggests that either the ELA and LLA Tucson Basin groups did not travel far beyond their region, or more likely, if they did venture away from the Tucson Basin, they used the local raw materials of other regions. Therefore, it is necessary to ascertain whether these groups did travel outside the basin by finding similarities in projectile point morphology in other geographic regions. This scenario will be explored through the results of the significance tests for the projectile point attributes that I present in the following chapters.

Results of Black Mesa Raw Material Analysis for the LLA

Unfortunately, I found only 14 projectile point specimens from the Black Mesa ELA. Overall, there is a paucity of ELA sites that were identified during the Black Mesa Archaeological Project. There are several possibilities for the lack of ELA sites from the Black Mesa. First, many of these sites may not exist on Black Mesa, and groups did not begin to exploit the region until the LLA. More likely archaeologists have not been able to identify ELA sites on the landscape, because the sites created by ELA groups are small ephemeral hunting camps with few features (Parry et al.

1985:13). This scenario is supported by the results from the BMAP survey. Only seven sites were identified that definitively were dated to the ELA. These sites consist of small areas with few lithic artifacts found in the same context with informal hearths, indicating that ELA sites on Black Mesa were used as temporary hunting camps (Nichols and Smiley 1985:56) Because there are so few ELA sites with projectile points, I cannot compare the ELA raw material to the LLA ones. In contrast, the LLA sample consists of 196 projectile points.

The raw material frequencies from the Black Mesa LLA indicate that local materials (86.7 percent) make up the bulk of the specimens (Table VI-3). The local raw material consists primarily of chert (38.2 percent) and is closely followed by baked siltstone (36.2 percent), which is ubiquitous throughout the Black Mesa region.

Table VI-3. Black Mesa LLA Projectile Point Raw Material.

Location	Raw Material	Count	Percentage
Local		170	86.7
	Baked siltstone	71	36.2
	Gray baked siltstone	12	6.1
	Pink baked siltstone	4	2.0
	White baked siltstone	53	27.0
	Yellow baked siltstone	2	1.0
	Chalcedony	13	6.6
	Cherts	75	38.2
	Chalcedonic chert	1	0.5
	Chert gravels	6	3.1
	Navajo chert	30	15.3
	Oolitic chert	1	0.5
	Owl Rock chert	16	8.1
	Quartzitic chert	1	0.5
	Unknown local chert	20	10.2
	Jasper	3	1.5
	Quartz	1	0.5
	Quartzite	7	3.6
Non-Local		21	10.7
	Cherts	9	4.6
	Chinle chert	6	3.1
	Georgetown chert	1	0.5
	Washington Pass chert	1	0.5
	Unknown non-local chert	1	0.5
	Fine-grained basalt	5	2.6
	Obsidian	3	1.5
	Perlite	1	0.5
	Vitreous petrified wood	3	1.5
Unknown		5	2.6
	Unknown material	1	0.5
	Cherts	4	2.0
	Unknown chert	4	2.0
Total		196	100.0

Non-local raw material represents 10.7 percent of the raw material that LLA groups used for their projectile points. Similar to the local material, chert (4.6 percent) has the highest representation in the non-local sample. These non-local raw materials are found within 50 miles of Black Mesa, and are not from any of the other study regions (Green 1985).

At this point, there are not too many conclusions that can be made from these results. It is not surprising that there is a preponderance of baked siltstone because it is possible to find this raw material on the surface across Black Mesa. Although the baked siltstone was the easiest to find for the Black Mesa groups, the total amount of chert (both local and non-local – 42.8 percent) accounts for close to half of the specimens. I surmise that the higher percentage of chert, although more difficult to extract relative to baked siltstone, has to do with the durability of the raw material. Chert ranks as a 7 on Mohs scale of hardness in contrast to baked siltstone's 2 on Mohs scale of hardness, which indicates that chert has a higher durability and therefore the groups using this lithic material may be more mobile.

Results of the Hueco Bolson Raw Materials Analysis for the ELA and LLA

The Hueco Bolson ELA results indicate that 93.7 percent of the raw material was found within the vicinity of the Hueco Bolson (Table VI-4). Local chert (72.5 percent) is the most dominant raw material identified in the ELA projectile point dataset. In contrast, non-local lithic material only accounts for 4.9 percent of the Hueco Bolson sample of the ELA, which includes obsidian. These non-local raw lithic materials came from the gravels of the Rio Grande.

Table VI-4. Hueco Bolson ELA Projectile Point Raw Material.

Location	Raw Material	Count	Percentage
Local		266	93.7
	Agate	1	0.4
	Andesite	1	0.4
	Chalcedony	11	3.9
	Chert	206	72.5
	Chalcedonic chert	5	1.8
	Oolitic chert	1	0.4
	Rancheria chert	8	2.8
	Unknown local chert	192	67.6
	Fine-grained basalt	6	2.1
	Jasper	1	0.4
	Metasediment	4	1.4
	Quartz	1	0.4
	Quartzite	4	1.4
	Rhyolite	24	8.5
	Shale	1	0.4
	Siltstone	6	2.1
	Slate	0	0.0
Non-Local		14	4.9
	Obsidian	14	4.9
	Pedernal chert	1	0.4
	Cerro Toledo rhyolite obsidian	3	1.1
	Unsourced obsidian	11	3.9
Unknown		4	1.4
	Unknown material	4	1.4
Total		284	100.0

During the LLA, the frequency of local material is slightly lower (89.3 percent) (Table VI-5). As with the earlier period, local chert (68.9 percent) is the most abundant projectile point raw material. Furthermore, the percentage of non-local material during the LLA (9.0 percent) is almost double that from the ELA (4.9 percent). Similar to the ELA, the non-local raw materials are comprised of obsidian and Cerro Toledo rhyolite with the addition of Pedernal chert (n = 1) found in the Rio Grande gravels.

Table VI-5. Hueco Bolson LLA Projectile Point Raw Material.

Location	Raw Material	Count	Percentage
Local		109	89.3
	Agate	1	0.8
	Andesite	0	0.0
	Chalcedony	1	0.8
	Chert		68.9
	Chalcedonic chert	1	0.8
	Oolitic chert	0	0.0
	Rancheria chert	3	2.5
	Unknown local chert	80	65.6
	Fine-grained basalt	1	0.8
	Jasper	5	4.1
	Metasediment	2	1.6
	Quartz	2	1.6
	Quartzite	2	1.6
	Rhyolite	9	7.3
	Shale	0	0.0
	Siltstone	1	0.8
	Slate	1	0.8
Non-Local		11	9.0
	Pedernal chert	1	0.8
	Obsidian	10	8.1
	Cerro Toledo rhyolite obsidian	3	2.5
	Unsourced obsidian	7	5.7
Unknown		2	1.6
	Unknown material	2	1.6
Total		122	100.0

Again, the raw material frequencies from the Hueco Bolson do not conform to my expectations that the ELA groups would have had a higher frequency of non-local raw material for their projectile points in comparison to the later LLA groups. Although many of the obsidian specimens have not been sourced, Church et al. (1996:88) suggest that much of the obsidian found within the Hueco Bolson may come from the Mule Creek area near the Arizona and New Mexico border approximately 250 miles to the northeast.

In contrast, the obsidian specimens that have been sourced are Cerro Toledo rhyolite obsidian from the Jemez Mountains in northern New Mexico, which is approximately 320 miles from the Hueco Bolson (Church 2000 refers to Cerro Toledo Rhyolite obsidian as Obsidian Ridge obsidian). Although it is possible that ELA and LLA groups from the Hueco Bolson traveled to the Jemez Mountains to procure their obsidian or received it through trade, both Shackley (2009) and Church (2000) state that Cerro Toledo rhyolite obsidian can be found in the gravels from the Rio Grande that form the western border of the Hueco Bolson. Therefore, Cerro Toledo rhyolite obsidian may have been a local lithic source.

Pedernal chert is the other type of non-local lithic material found in the LLA projectile point assemblage. Similar to Cerro Toledo rhyolite obsidian, the Pedernal chert source is found in the Jemez Mountains (Kohler and Root 2004:142). Although Church et al. (1996) did not recognize any Pedernal chert in their study of Rio Grande gravels, it is possible that like the Cerro Toledo rhyolite obsidian the Pedernal chert was secondarily deposited by the Rio Grande near the Hueco Bolson area. Another possibility is that individuals during the LLA either travelled to the Jemez Mountains to procure both Pedernal chert and Cerro Toledo rhyolite obsidian or received the raw materials through trade.

Raw Material Use among the Regions

If there was contact between the groups from the Tucson Basin, Black Mesa, or the Hueco Bolson regions during the ELA or LLA, I would expect that there would be overlap of some of the raw materials in each of the regions. The results of the raw materials analyses suggest that people from each of these regions did not use any of the same raw materials, and on the surface, this suggests that these groups did not have any contact with each other.

An alternative explanation for lack of overlap of the raw materials during the ELA and the LLA may be attributed to the availability of suitable raw materials along their routes to other regions, which would not have required carrying an abundance of raw material while travelling. In order to develop this scenario further, it is necessary to ascertain whether there are morphological similarities of the projectile points from the Tucson Basin, Black Mesa, and the Hueco Bolson indicating social interaction, which would support this claim that the groups would have acquired their raw material on their travels.

Overall Shape and Form of the ELA and LLA Projectile Points from the Tucson Basin, Black Mesa, and the Hueco Bolson Regions

If, as I have hypothesized, ELA groups had more contact with people in other regions than those groups from the LLA, then I expect that there would be more overlap of projectile point clusters that are based on similar morphology among the projectile points from the Tucson Basin, Black Mesa, and the Hueco Bolson areas during the ELA than the LLA. In order to determine if there is an overlap of projectile point shape and form from the three regions during the ELA and LLA, I used the named clusters developed by Justice (2002b). By using previously defined clusters, I am able to compare the projectile points from the different regions and periods of time, while adhering to current theory.

One exception to Justice's (2002b) clusters is the Empire point first described and published by Stevens and Sliva (2002) (Figure VI-1). Because the publishing dates are the same, it is possible that Justice was unaware of the new diagnostic projectile point for the San Pedro phase in the Tucson Basin. In the past, Empire points had been identified as possible San Pedro points (Stevens and Sliva 2002:300). Whittlesey et al. (2010) have recognized that some San Pedro phase projectile points have attributes of both Empire points and San Pedro points, and so I have treated the Empire points as their own diagnostic type in the San Pedro cluster.

Figure VI-1. Empire Point from the Tucson Basin (specimen #TB AA-12-111 2008-459-187; see Appendix A; photographed by Nicholas Beale).

Tucson Basin Projectile Point Clusters during the ELA

Of the identifiable projectile points, the Tucson Basin ELA dataset has six clusters represented. It is unsurprising that the majority of the projectile points during the ELA from the Tucson Basin are part of the San Pedro cluster (79.2 percent) (Table VI-6). Both the Empire point and San Pedro point types comprise the San Pedro cluster (Figure VI-2), and they are diagnostic points for the ELA in the Tucson Basin (Justice 2002b; Stevens and Sliva 2002).

Table VI-6. Tucson Basin Projectile Point Clusters and Types during the ELA.

Cluster	**Type**	**Count**	**Percentage**
Cienega		11	6.9
	Tularosa Basal Notch	2	1.3
	Tularosa Corner Notch	9	5.7
Cortaro		4	2.5
	Cortaro	4	2.5
Dolores*		1	0.6
	Dolores Straight Stem	1	0.6
Livermore		2	1.3
	Guadalupe	1	0.6
	Livermore	1	0.6
San Jose		1	0.6
	San Jose	1	0.6
San Pedro		126	79.2
	Empire	62	39.0
	San Pedro	64	40.3
Unknown		14	8.8
Total		159	100.0

* non-local projectile point styles

Figure VI-2. San Pedro point in the San Pedro cluster from the Tucson Basin (specimen #TB AA-12-111 2008-796-697; see Appendix A; photographed by Nicholas Beale).

The Cienega cluster is the second most common projectile point group representing a mere 6.9 percent (Figure VI-3). The remaining clusters identified in the data set each represent less than 3 percent of the sample, and they include the Cortaro cluster (2.5 percent), Livermore cluster (1.3 percent), Dolores cluster (0.6 percent), and the San Jose cluster (0.6 percent). The one Dolores specimen is the only projectile point identified in the ELA dataset that is a non-local style, and can be found in the Black Mesa region, indicating possible connection between the Tucson Basin and Black Mesa groups.

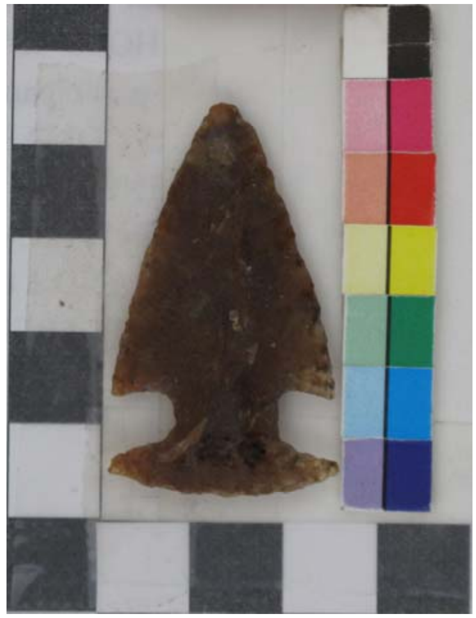

Figure VI-3. Tularosa Corner Notched point in the Cienega cluster from the Tucson Basin (specimen #TB AA-12-111 2008-796-528; see Appendix A; photographed by Nicholas Beale).

Tucson Basin Projectile Point Clusters during the LLA

Similar to the ELA in the Tucson Basin, the LLA projectile point dataset is dominated by the projectile point clusters that are diagnostic of this time, which are the Cienega cluster (29.3 percent) and Livermore cluster (24.7 percent) (Table VI-7; Figure VI-4). Also, the San Pedro cluster continues during the LLA (25.8 percent), but not at the same high frequency as during the previous ELA (79.2 percent). The LLA projectile point sample is also comprised of several non-local clusters. These clusters include the Black Mesa cluster (1.1 percent), the Dolores cluster (0.6 percent), the Durango cluster (1.1 percent), and the Elko cluster (2.9 percent). The Black Mesa and Delores clusters are found in the Black Mesa region, indicating possible contact between the Tucson Basin and Black Mesa groups.

Table VI-7. Tucson Basin Projectile Point Clusters and Types during the LLA.

Cluster	Type	Count	Percentage
Black Mesa*		2	1.1
	Black Mesa Narrow Neck	2	1.1
Cienega		51	29.3
	Tularosa Basal Notch	17	9.8
	Tularosa Corner Notch	34	19.5
Cortaro		10	5.7
	Cortaro	10	5.7
Dolores*		1	0.6
	Dolores Straight Stem	1	0.6
Durango*		2	1.1
	Durango Notched	2	1.1
Elko*		5	2.9
	Elko Corner Notch	4	2.3
	Elko Split Stem	1	0.6
Livermore		43	24.7
	Guadalupe	33	19.0
	Livermore	10	5.7
Northern Side Notch		1	0.6
	Ventana Side Notch	1	0.6
Pinto		3	1.7
	Pinto	3	1.7
San Jose		1	0.6
	San Jose	1	0.6
San Pedro		45	25.8
	Empire	6	3.4
	San Pedro	39	22.4
Unknown		10	5.7
Total		174	100.0

* non-local projectile point styles

Figure VI-4. Guadalupe point in the Livermore cluster from the Tucson Basin (specimen #TB AA-12-91 2008-796-4304; see Appendix A; photographed by Nicholas Beale).

Changes in Projectile Style between the ELA and LLA of the Tucson Basin

Overall, the clusters from the Tucson Basin during the ELA and LLA suggest a shift from points from the San Pedro cluster to those from the Cienega and Livermore clusters. Researchers have suggested that this trend is indicative of groups changing their hunting technology from dart points to arrowheads (Sliva 1999; Stevens and Sliva 2002:300). This explanation may account for the most obvious pattern of change in projectile point clusters within the Tucson Basin.

In regards to my hypothesis that the ELA should have a greater frequency of projectile points that may indicate contact between regions in comparison to the LLA, the results are unclear. The only truly non-local projectile point style found in the ELA assemblage is the one Dolores Straight Stem normally found in the Four Corners region and not the Tucson Basin (Justice 2002b:244). I am uncomfortable attributing this point to any kind of pattern, since it is only one specimen and its earliest date is post-A.D. 600 (Justice 2002b:240), which postdates the ELA by several hundred years. Therefore, I regard this specimen as an intrusive anomaly.

Another result that may illuminate regional contact is the large percentage of San Pedro points during the ELA. This greater frequency during the ELA may indicate contact between different regions because this San Pedro projectile point style is ubiquitous throughout the Southwest (Justice 2002b).

In contrast to the ELA, the LLA assemblage has four non-local projectile point clusters. First are two types of Elko points that are indigenous to the Great Basin (Justice 2002a:307). The closest part of the Elko cluster distribution area that has been found in relation to the Tucson Basin is the White Tanks, which are approximately 150 miles to the northwest, just west of Phoenix (Justice 2002a:307).

The other three non-local clusters found within the Tucson Basin are the Black Mesa cluster, the Dolores cluster, and the Durango cluster, which all can be found in the Black Mesa region. The presence of these clusters and their associated projectile points suggest some sort of connection of the LLA Tucson Basin groups with the LLA Black Mesa groups through direct procurement, trade, or style emulation.

At this point, the analysis suggests that the ELA groups from the Tucson Basin did not have more contact with groups from other regions compared to their counterparts during the LLA, and possibly the LLA groups had more contact with each other. The Tucson Basin groups from both the ELA and LLA did, however, have either direct or indirect contact with other regions.

Black Mesa Projectile Point Clusters during the LLA

The Black Mesa Narrow Neck projectile point cluster (31.4 percent) dominates the sample from the Black Mesa region during the LLA (Table VI-8; Figure VI-5). The second most common cluster during this time is the San Pedro cluster (16.9 percent) (Figure VI-6), which is ubiquitous throughout the Southwest. The Cienega cluster represents 5.8 percent of the sample (Figure VI-7) and is the third most common type in the Black Mesa region during the LLA.

Table VI-8. Black Mesa Projectile Point Clusters and Types during the LLA.

Cluster	Type	Count	Percentage
Bajada		1	0.5
	Bajada	1	0.5
Black Mesa		65	31.4
	Black Mesa Narrow Neck	65	31.4
Chaco		3	1.4
	Bonito	1	0.5
	Chaco Corner Notch	1	0.5
	Temporal	1	0.5
Cienega		12	5.8
	Tularosa Basal Notch	3	1.4
	Tularosa Corner Notch	9	4.3
Datil		5	2.4
	Datil	5	2.4
Desert Side Notch*		1	0.5
	Desert Side Notch	1	0.5
Durango		3	1.4
	Durango Notched	3	1.4
Elko*		8	3.9
	Elko Corner Notched	8	3.9
Gypsum		9	4.3
	Gypsum	9	4.3
Northern Side Notched		4	1.9
	San Rafael Side Notched	2	1.0
	Sudden Side Notched	2	1.0
Pinto		1	0.5
	Pinto	1	0.5
San Jose		12	5.8
	San Jose	12	5.8
San Pedro		35	16.9
	San Pedro	35	16.9
Western Triangular		1	0.5
	Cottonwood Triangular	1	0.5
Unknown		47	22.7
Total		207	100.0

* non-local projectile point styles

Figure VI-5. Black Mesa Narrow Neck point in the Black Mesa Narrow Neck cluster from Black Mesa (specimen #BM D-11-449 diagnostic-2027; see Appendix A; photographed by Nicholas Beale).

Figure VI-6. San Pedro point in the San Pedro cluster from Black Mesa (specimen #BM D-07-152 1131-xx-130; see Appendix A; photographed by Nicholas Beale).

Figure VI-7. Tularosa Corner Notched point in the Cienega cluster from Black Mesa (specimen #BM D-7-239 3140-238; see Appendix A; photographed by Nicholas Beale).

There are two non-local clusters identified within the Black Mesa dataset, which represent 4.4 percent of the sample. These are the Desert Side Notch cluster (0.5 percent) and the Elko cluster (3.9 percent). Although these clusters are from the Great Basin and are considered non-local, according to Justice (2002a:307) the distribution of these point types occurs north of Black Mesa in the southeastern area of Utah and to the west of Black Mesa in northwestern portions of Arizona, which are very close in geographical distance.

Hueco Bolson Projectile Point Clusters during the ELA

The Hueco Bolson has the most variation of projectile point clusters compared to the other two regions. During the ELA, the San Pedro cluster (46.5 percent) is overwhelmingly the highest represented cluster (Figure VI-8; Table VI-9). Following the San Pedro cluster in frequency is the Cienega cluster (17.4 percent; Figure VI-9). The San Jose cluster rounds out the top three clusters with only 9.7 percent.

Furthermore, the Hueco Bolson ELA dataset contains five clusters that are not indigenous to the region. Both the Abasolo (0.3 percent) and the Scallorn (0.3 percent) clusters are from the southern Plains area (Justice 1987). On the other hand, the Pinto cluster (2.1 percent) is found across California, the Great Basin, and in areas of Arizona, New Mexico, and northern Mexico (Justice 2002b:146). It is possible that this projectile point style is local, because the area that the Pinto type encompasses borders the Hueco Bolson. The Datil cluster is found through central and northern Arizona, which encompasses both the Tucson Basin and Black Mesa, and may indicate groups from the Hueco Bolson had contact with the Tucson Basin and Black Mesa groups. The Great Basin Stemmed is from the Great Basin region and dates to the Early Archaic, and is probably intrusive.

Figure VI-8. San Pedro point in the San Pedro cluster from the Hueco Bolson (specimen #FB 1579 2007-5-2; see Appendix A; photographed by Nicholas Beale).

Table VI-9. Hueco Bolson Projectile Point Clusters and Types during the ELA.

Cluster	Type	Count	Percentage
Abasolo*		1	0.3
	Abasolo	1	0.3
Bajada		8	2.8
	Bajada	8	2.8
Cienega		50	17.4
	Carlsbad	4	1.4
	Tularosa Basal Notch	16	5.6
	Tularosa Corner Notch	30	10.4
Datil*		14	4.9
	Datil	14	4.9
Great Basin Stemmed*		1	0.3
	Lake Mohave	1	0.3
Gypsum		16	5.6
	Gypsum	16	5.6
Livermore		4	1.4
	Guadalupe	3	1.0
	Livermore	1	0.3
Maljamar		3	1.0
	Maljamar	3	1.0
Pinto*		6	2.1
	Pinto	6	2.1
San Jose		28	9.7
	San Jose	28	9.7
San Pedro		134	46.5
	San Pedro	134	46.5
Scallorn*		1	0.3
	Scallorn	1	0.3
Western Triangular		1	0.3
	Cottonwood Triangular	1	0.3
Unknown		21	7.3
Total		288	100.0

* non-local projectile point styles

Figure VI-9. Tularosa Corner Notched point in the Cienega cluster from the Hueco Bolson (specimen FB 1579 2007-5-24; see Appendix A; photographed by Nicholas Beale).

Hueco Bolson Projectile Point Clusters during the LLA

The LLA projectile point clusters from the Hueco Bolson have the most projectile point variability compared to any other region or time with 14 different projectile point clusters. The three dominant clusters are the San Pedro (32.0 percent), the Cienega (13.6 percent), and the Livermore (12.8 percent) (Figure VI-10).

Table VI-10. Hueco Bolson Projectile Point Clusters and Types during the LLA.

Cluster	Type	Count	Percentage
Bajada		2	1.6
	Bajada	2	1.6
Black Mesa*		1	0.8
	Black Mesa Narrow Neck	1	0.8
Chaco*		1	0.8
	Temporal	1	0.8
Cienega		17	13.6
	Tularosa Basal Notch	7	5.6
	Tularosa Corner Notch	10	8.0
Datil*		3	2.4
	Datil	3	2.4
Dolores*		2	1.6
	Dolores	2	1.6
Gypsum		4	3.2
	Gypsum	4	3.2
Livermore		16	12.8
	Guadalupe	14	11.2
	Livermore	2	1.6
Maljamar		2	1.6
	Maljamar	2	1.6
Pueblo Side Notched		5	4.0
	Pueblo Side Notched	5	4.0
San Jose		6	4.8
	San Jose	6	4.8
San Pedro		40	32.0
	San Pedro	40	32.0
Scallorn*		5	4.0
	Scallorn	5	4.0
Western Triangular		1	0.8
	Cottonwood Triangular	1	0.8
Unknown		20	16.0
Total		125	100.0

* non-local projectile point styles

Figure VI-10. Guadalupe point in the Livermore cluster from the Hueco Bolson (specimen #FB 6271 2007-11-0014; see Appendix A; photographed by Nicholas Beale).

The LLA dataset from the Hueco Bolson has projectile points that represent five non-local clusters. The Scallorn cluster (4.0 percent) is the only group of projectile points that originates in the southern Plains. The region for the Datil cluster (2.4 percent) includes both the Tucson Basin and Black Mesa regions. The Black Mesa (0.8 percent), the Dolores (1.6 percent), and the Chaco (0.8 percent) clusters are from the Colorado Plateau region (Justice 2002b), which includes the Black Mesa.

It is surprising that a Black Mesa Narrow Neck projectile point was identified in this dataset, since the projectile point type has such a narrow geographical range. Although it is possible that I mistyped this specimen, the presence of points from the Datil, Dolores, and Chaco clusters, albeit few, suggests that LLA groups from the Hueco Bolson had some sort of contact with groups from the Black Mesa region.

Changes in Projectile Point Types between the ELA and LLA in the Hueco Bolson

In both datasets from the Hueco Bolson, the San Pedro cluster dominates the collection, although the frequency of the San Pedro cluster dramatically decreases from the ELA to the LLA. Also, the Cienega cluster has relatively the same frequency during both the ELA and LLA. This pattern is somewhat surprising since the Cienega cluster is diagnostic for the LLA in both the Tucson Basin and Black Mesa, and therefore I would expect that the Cienega cluster would have a much higher frequency in the LLA than the ELA in the Hueco Bolson rather than the modest increase of less than four percent. This may suggest that the Cienega cluster and its associated types may have originated near the Hueco Bolson and through time spread to the surrounding areas.

If, according to my expectation, the LLA groups from the Hueco Bolson, were more tied to the land because they were tethered to their agricultural fields, I would expect that there would be a lower frequency of non-local projectile points during the LLA than the ELA. Instead, it seems that there is not much difference between the two time periods. The ELA non-local points account for 9.6 percent, while the LLA has a little less with 7.6 percent. This pattern conforms with our present understanding of Hueco Bolson archaeology in that the groups did not rely on cultigens until after the LLA, unlike the Tucson Basin and Black Mesa groups (Ward et al. 2008).

ELA and LLA Projectile Point Clusters in the Tucson Basin, Black Mesa, and Hueco Bolson Regions

In order to find patterns of projectile points to illuminate the possible interactions between groups from the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA and LLA, I have discussed the projectile point clusters and types that are found in each of the regions. By identifying the projectile point clusters common to all regions, I can then compare the high, moderate, and low visibility attributes to determine social interaction between the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA and LLA.

Similar Clusters during the ELA between the Tucson Basin and Hueco Bolson

During the ELA, the Tucson Basin and Hueco Bolson datasets have four projectile point clusters in common (Table VI-11), including the Cienega, Livermore, San Jose, and San Pedro clusters. The Tucson Basin dataset has 88.1 percent of the projectile points in common with the Hueco Bolson, and the Hueco Bolson dataset has 75.0 percent of its projectile points that are similar to the points found in the Tucson Basin during the ELA. This pattern suggests that some groups in each of the regions had either direct or indirect contact with each other. Consequently, these clusters are possible candidates for comparing the high, moderate, and low visibility attributes to identify the types of relationships some of the ELA groups in the Tucson Basin and the Hueco Bolson had.

Table VI-11. Frequencies of Projectile Point Clusters during the ELA.

Cluster	Tucson Basin Percentage (n)	Hueco Bolson Percentage (n)
Abasolo	-	0.3 (1)*
Bajada	-	2.8 (8)
Cienega	6.9 (11)	17.4 (50)
Cortaro	2.5 (4)	-
Datil	-	4.9 (14)*
Dolores	0.6 (1)	-
Great Basin Stemmed	-	0.3 (1)
Gypsum	-	5.6 (16)
Livermore	1.3 (2)	1.4 (4)
Maljamar	-	1.0 (3)
Pinto	-	2.1 (6)*
San Jose	0.6 (1)	9.7 (28)
San Pedro	79.2 (126)	46.5 (134)
Scallorn	-	0.3 (1)*
Western Triangular	-	0.3 (1)
Unknown	8.8 (14)	7.3 (21)
Total	100.0 (159)	100.0 (288)

* non-local projectile point cluster for the region

Unfortunately, both the Livermore (Tucson Basin n = 2; Hueco Bolson n = 4) and San Jose (Tucson Basin n = 1; Hueco Bolson n = 28) clusters do not have an adequate sample size for statistically comparing similarities and differences in the styles of projectile points between the two regions. Therefore, only the Cienega (Tucson Basin n = 11; Hueco Bolson n = 50) and San Pedro (Tucson Basin n = 126; Hueco Bolson n = 134) clusters are appropriate for further consideration for measuring the statistical significance of differences between the two regions during the ELA, and I present these analyses in chapters seven through eleven.

Similar Clusters during the LLA among the Tucson Basin, Black Mesa, and Hueco Bolson

During the LLA, over half of each dataset has projectile point types in common with the other two regions (Table VI-12). Comparing only the percentages, it appears that overall there is greater similarity between the Tucson Basin groups and the Hueco Bolson groups than either has with the Black Mesa groups. Also, it seems that the projectile points from Black Mesa are almost equally similar to those in the Tucson Basin and the Hueco Bolson. In contrast, the Hueco Bolson dataset is less similar to the Black Mesa projectile points. If the percentage of similarity is a signifier of contact, the Tucson Basin groups had the greatest contact with the Hueco Bolson groups (82.2 percent), followed by Black Mesa groups (63.2 percent). The Black Mesa groups had more contact with the Tucson Basin groups (67.6 percent) than with the Hueco Bolson groups (65.6 percent). This pattern makes sense, because spatially the Tucson Basin region is closer to the Hueco Bolson and Black Mesa than Black Mesa and the Hueco Bolson are to each other.

Table VI-12. Percentages of Projectile Points in Common from the Tucson Basin, Black Mesa and Hueco Bolson during the LLA.

Region	**Tucson Basin Percentage (n)**	**Black Mesa Percentage (n)**	**Hueco Bolson Percentage (n)**
Tucson Basin	-	67.6 (140)	65.6 (82)
Black Mesa	63.2 (110)	-	56.8 (71)
Hueco Bolson	82.2 (143)	66.2 (137)	-
All regions	56.9 (99)	59.9 (124)	51.2 (64)

Four clusters are common to the Tucson Basin, Black Mesa, and the Hueco Bolson (Table VI-13). These include the Black Mesa, the Cienega, the San Jose, and the San Pedro clusters. Both the Black Mesa and San Jose clusters have too few samples for statistical testing. In contrast, the samples of the Cienega and San Pedro clusters are large enough to perform parametric and non-parametrical significance tests, which are presented in later chapters.

Table VI-13. Frequencies of Projectile Point Clusters during the LLA.

Cluster	Tucson Basin Percentage (n)	Black Mesa Percentage (n)	Hueco Bolson Percentage (n)
Bajada	-	0.5 (1)	1.6 (2)
Black Mesa	1.1 (2)*	31.4 (65)	0.8 (1)*
Chaco	-	1.4 (3)	0.8 (1)*
Cienega	29.3 (51)	5.8 (12)	13.6 (17)
Cortaro	5.7 (10)	-	-
Datil	-	-	2.4 (3)*
Desert Side Notch	-	2.4 (5)	-
Dolores	0.6 (1)	-	1.6 (2)*
Durango	1.1 (2)	1.4 (3)	-
Elko	2.9 (5)*	3.9 (8)*	-
Gypsum	-	4.3 (9)	3.2 (4)
Livermore	24.7 (43)	-	12.8 (16)
Maljamar	-	-	1.6 (2)
Northern Side Notch	0.6 (1)	1.9 (4)	-
Pinto	1.7 (3)	0.5 (1)	-
Pueblo Side Notch	-	-	4.0 (5)
San Jose	0.6 (1)	5.8 (12)	4.8 (6)
San Pedro	25.8 (45)	16.9 (35)	32.0 (40)
Scallorn	-	-	4.0 (5)*
Western Triangular	-	0.5 (1)	0.8 (1)
Unknown	5.7 (10)	22.7 (47)	16.0 (20)
Total	100.0 (174)	100.0 (207)	100.0 (125)

* non-local projectile point cluster for the region

Projectile Point Cluster Patterns between the ELA and LLA

The most noticeable difference in the projectile point clusters between the ELA and the LLA is the percentages of similar point clusters between the Tucson Basin groups and the Hueco Bolson groups. Black Mesa cannot be compared because there were too few ELA projectile points to analyze. The Tucson Basin has 88.1 percent in common with the Hueco Boson during the ELA, but it drops to 82.2 during the LLA. The decrease in similarity between the ELA and LLA is more dramatic for the Hueco Bolson. During the ELA, the Hueco Bolson has 75.0 percent similarity with the Tucson Basin, but decreases to 65.6 percent during the LLA. One of the expectations of this study is that, as amicable groups became more sedentary, they would have had less contact with each other, because they would be tethered to their fields, and thus the percentage of projectile points that are similar between the regions would decrease. A decrease in the percentages of similar point types and clusters does occur between the Tucson Basin groups and the Hueco Bolson groups from the ELA to the LLA.

Emerging Patterns

The results of this chapter illuminate some emerging patterns of the projectile point styles and their clusters between the groups of the Tucson Basin, Black Mesa, and the Hueco Bolson. Based on the similarities of the projectile point clusters, there was undoubtedly some form of contact between the groups from the Tucson Basin and Hueco Bolson during ELA, and the Tucson Basin, Black Mesa, and Hueco Bolson during the LLA.

According to the raw material results from each region, except for some of the obsidian and chert specimens, groups from the Tucson Basin, Black Mesa, and the Hueco Bolson during both the ELA and LLA relied heavily upon local raw material resources. Therefore, as any one group traveled to other regions, rather than transporting raw materials, they used what was available across the landscape. Another possibility is that these groups had no contact with each other and limited their movements to their home region. However, the high overlap of projectile point styles and clusters suggest that the former explanation is more plausible.

In general, the similarities in the projectile point types and clusters suggest that the groups from the Tucson Basin and the Hueco Bolson during the ELA had some form of contact with each other. Contact continued during the LLA, but it seems to have decreased some, which may be due to a shift to a more sedentary lifestyle than during the ELA.

The paucity of ELA data from the Black Mesa region may suggest that that area was not heavily occupied during that time. In contrast, during the LLA, the frequencies of projectile point styles and clusters in the region indicate that Black Mesa groups had some form of contact with groups from both the Tucson Basin and the Hueco Bolson. Furthermore, the frequencies of the similar clusters suggest that the Tucson Basin groups during the LLA were more connected to those from the Hueco Bolson than to those from Black Mesa, but the Black Mesa projectile point clusters seem to have more in common with those from the Tucson Basin than with those from the Hueco Bolson. This pattern seems logical in terms of distance since the Tucson Basin is closer to the

Hueco Bolson than to the Black Mesa, and Black Mesa is closer to the Tucson Basin than the Hueco Bolson is.

I will continue exploring these patterns in the following chapters. The next two chapters deal with high, moderate, and low visibility attribute changes of the projectile point clusters within the Tucson Basin and the Hueco Bolson between the ELA and the LLA. The following three chapters compare the visibility attributes of the projectile point clusters among the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA and LLA.

Chapter VII

Changes in the High, Moderate, and Low Visibility Projectile Point Attributes in the Tucson Basin

In this chapter, I analyze the results of the parametric and nonparametric tests comparing the high, moderate, and low visibility attributes of the Tucson Basin projectile point clusters during the ELA and LLA. The purpose of evaluating the ELA and LLA projectile point clusters within the same region is to provide the data for comparing the visibility attributes between the different regions. Carr (1995b:215) has suggested that the visibility hierarchy may indicate the social interaction between groups from different regions and also that the hierarchy may suggest group history within a region. Similarities in visibility attributes within a region through time may indicate transgenerational social continuity (Carr 1995b:244).

I suggest that there is transgenerational social continuity between ELA and LLA groups within a region, and the ELA groups would have passed their technology to their descendants continuously through time into the LLA. Therefore, high, moderate, and low visibility attributes will not be statistically different between the time periods due to social continuity. If the results of comparing the visibility attributes between the ELA and LLA within the Tucson Basin are similar because of social continuity, according to Carr's (1995b) premises, it would suggest that these visibility attributes can also be used to measure social interaction between the groups of different regions during one period of time. That is, similarities in the attributes would suggest positive social interaction between groups of different regions because they would have learned to make their projectile points similarly by first-hand learning or by conscious attempts to mimic other groups with whom they had positive interaction (Carr 1995b; Hodder 1982; Hoffman 1997).

Carr (1995a:162) points out that the utilitarian need to have a functioning projectile point to perform a necessary task can influence the form of the projectile point, which can limit the social messaging attributed to the visibility attributes. I (2007) have similarly suggested that a change in subsistence strategy affects some projectile point attributes, namely, resharpening. Resharpening is a characteristic of ELA groups that relied more on hunting and gathering but not of the LLA groups who were more dependent on an agricultural subsistence strategy. It affects the high visibility attributes of total length, total width, blade length, and blade width. On the other hand, resharpening does not affect the high visibility attribute of blade thickness or moderate and low visibility attributes, and so these attributes should be similar between the projectile points of the ELA and LLA groups within the region.

The first section of this chapter discusses the results of comparing the high visibility attributes of the projectile point clusters in the Tucson Basin during the ELA and LLA. According to Carr (1995b), high visibility attributes have the potential for communicating social information about the individual, the group, and/or the society. I (2007) have suggested that some of the high visibility attributes, however, do not indicate social communication but are related to subsistence strategies. The second section reports the patterns from the comparison of the moderate visibility attributes - those attributes that may relate to active or passive messaging to convey information - during the ELA and the LLA. The third section introduces the results from the low visibility attribute analysis of the Tucson Basin ELA and LLA projectile points. The low visibility attributes may transmit passive social messaging.

Based on the results from the previous chapter, two projectile point clusters from both the ELA and LLA have large enough samples for comparison, the Cienega and San Pedro clusters. Therefore, I compare the high, moderate, and low visibility attributes of only these two clusters.

Tucson Basin High Visibility Projectile Point Attributes

In the case of the high visibility attributes, most of them represent overall size, and hence the LLA high visibility attributes should be significantly larger than their ELA counterparts, because of less resharpening due to less projectile point curation, which in turn was because of increasing agriculture. The only exception is blade thickness. Resharpening a projectile point usually only influences the lateral margins and may not affect the thickest portions of the projectile point. Therefore, the blade thickness of a projectile point was not affected by resharpening and so should stay the same between the ELA and LLA within a region, because of the social continuity through time of the groups making the projectile points.

Tucson Basin High Visibility Attributes of the ELA and LLA Projectile Points from the Cienega Cluster

Unfortunately, the Cienega cluster sample size during the ELA is extremely small. Therefore, some of the attributes are not present on enough of the specimens to adequately compare them between the ELA and LLA. Because of this restriction, I can only compare the blade length and blade thickness.

Projectile Point Blade Length of the Cienega Cluster between the ELA and LLA. The number of specimens in the Cienega cluster during the ELA is only 10. On the other hand, there are 51 cases during the LLA. Because of the small sample size, only a non-parametric test is appropriate.

The *p* value for the total length is 0.0995, which is significant at the 90 percent confidence interval level ($\alpha = 0.10$). Thus, there is a statistically significant difference between the total length of projectile points in the Cienega cluster between the ELA and LLA. According to the results, the Cienega cluster has a greater blade length during the LLA than during the previous ELA (Figure VII-1).

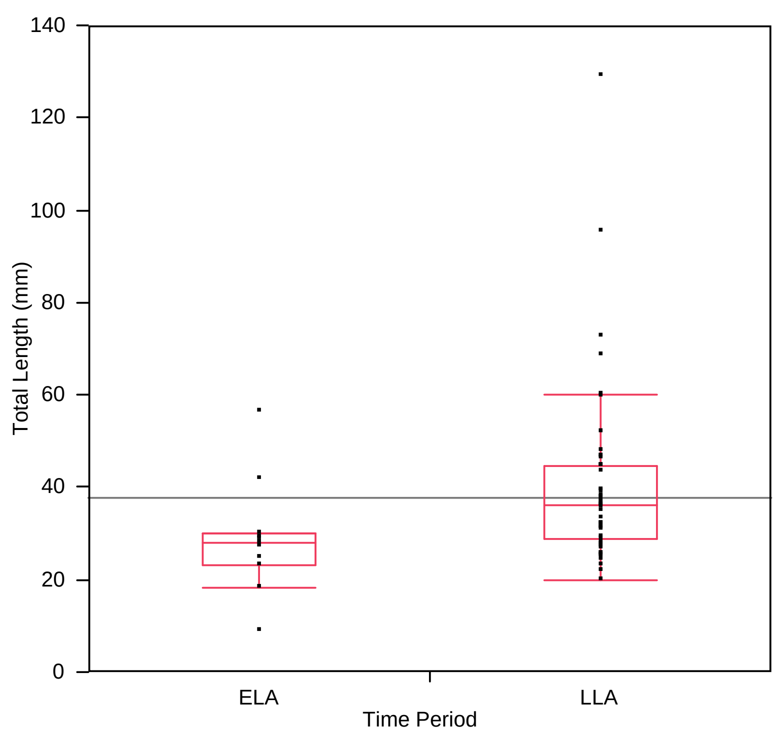

Figure VII-1. Oneway analysis of the Cienega cluster blade lengths by time period.

Projectile Point Blade Thickness of the Cienega Cluster between the ELA and LLA. Similar to the blade length, the small sample size for ELA blade thickness dictates that I had to use a non-parametric test. The sample size for blade thickness from the ELA is 11 and for the LLA is 51. The *p* score for blade thickness is 0.5249, which is not statistically significant. Therefore, the blade thickness of the Cienega cluster does not change between the ELA and LLA. Furthermore, the means of the blade thickness for the ELA (mean = 28.32 mm) and LLA (mean = 32.19 mm) are less than 4 mm in difference (Figure VII-2).

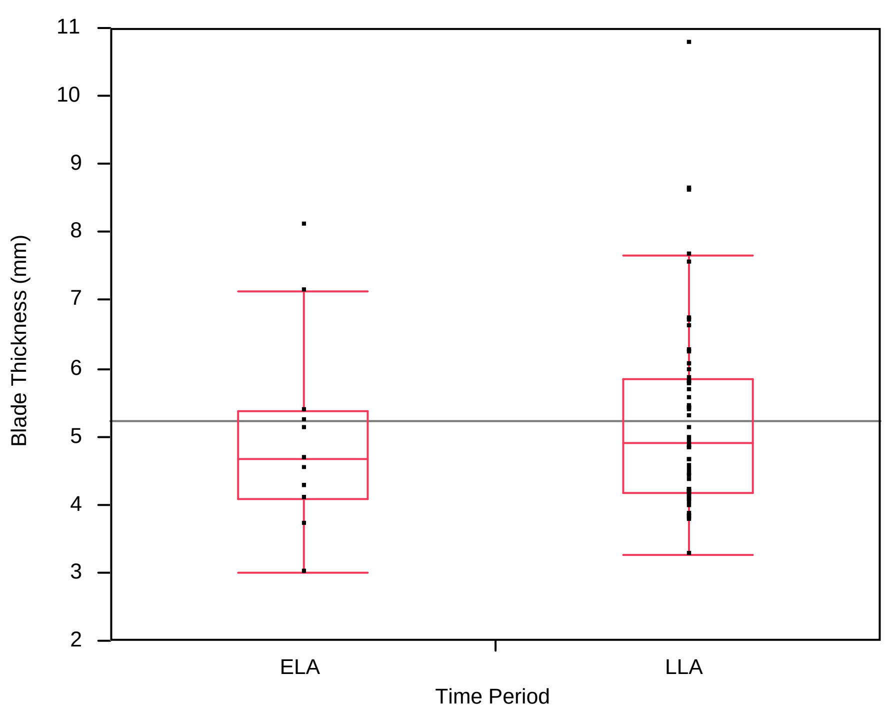

Figure VII-2. Oneway analysis of the Cienega cluster blade thicknesses by time period.

Implications of the ELA and LLA Cienega Cluster High Visibility Attribute Analysis. The expectation for the blade length of projectile points is that it should increase between the ELA and LLA because the ELA points would have been resharpened due to the need to curate projectile points. Therefore, the blade length of the Cienega points from the Tucson Basin should be statistically different, and the LLA points should be longer. According to the analysis results, this expectation holds true.

The second expectation for the Cienega cluster of projectile points is that, because resharpening a projectile point does not affect the blade thickness, there should be no statistically significant difference between the blade thicknesses. The statistical results show that not only is the blade thickness of the Cienega cluster not statistically different between the time periods, but the means are within less than 4 mm, indicating that this high visibility attribute did not change through time in the Cienega cluster. This attribute supports the assumption that there is social continuity between the ELA and LLA groups in the Tucson Basin.

Tucson Basin High Visibility Attributes of the ELA and LLA Projectile Points from the San Pedro Cluster

The sample size of the San Pedro cluster during the ELA is one of the largest for the entire study. The ELA San Pedro cluster includes 127 specimens, and the LLA sample has 45 specimens. Because the sample sizes are relatively large, and many of them have the necessary attributes present, all of the high visibility attributes – total length, total width, blade length, blade width, and blade thickness – can be evaluated for the two time periods.

Projectile Point Total Length of the San Pedro Cluster between the ELA and LLA. The sample size for the total length of the San Pedro cluster during the ELA is 78. Because the LLA has too few cases (n = 31), it is inappropriate to use an ANOVA test, but a Student's t test for significance is possible. The raw data are normally distributed.

The results of the Student's t test indicate that total length of the ELA San Pedro cluster is not significantly different from the LLA ($p = 0.3376$) at a 90 percent confidence interval ($\alpha = 0.1$) (Table VII-1). Therefore, the total length of the projectile points from the San Pedro cluster does not significantly change between the ELA and the LLA (Figure VII-3).

Table VII-1. Total Length: Comparisons of Each Pair Using Student's t.*

Time Period	**ELA**	**LLA**
ELA	-3.2016	-3.1699
LLA	-3.1699	-5.0785

*Positive values show pairs of means that are significantly different

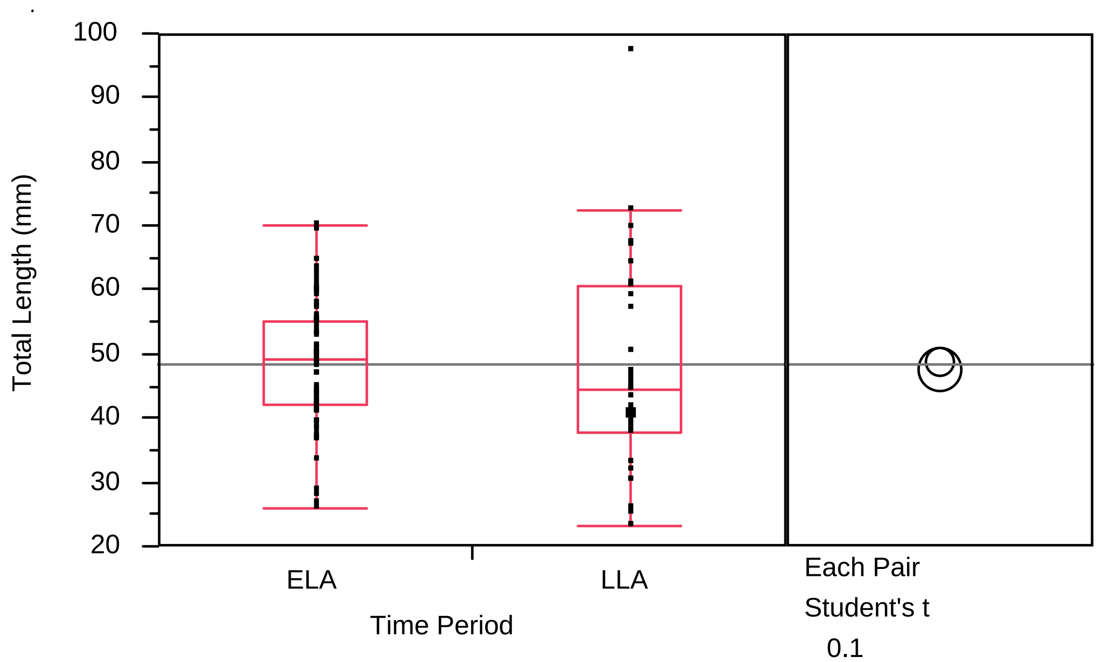

Figure VII-3. Oneway analysis of San Pedro cluster total lengths by time period.

Projectile Point Total Width of the San Pedro Cluster between the ELA and LLA. The total width datasets of the San Pedro cluster from the ELA (n = 116) and the LLA (n = 45) are large enough to use a parametric test for significance. I normalized the distribution of the two samples by using the log+1. I used the Student's t test for the comparison of the means for the total width attribute for the San Pedro cluster.

The results of the Student's t test indicate that total width of the San Pedro cluster from the ELA is significantly different from the LLA San Pedro cluster (p = 0.0003) at a 90 percent confidence interval ($\alpha = 0.1$) (Table VII-2). Therefore, the total width of the projectile points from the San Pedro cluster increases in size between the ELA and the LLA (Figure VII-4).

Table VII-2. Logtotal Width: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
LLA	0.08457	-0.06033
ELA	-0.03758	0.08457

*Positive values show pairs of means that are significantly different

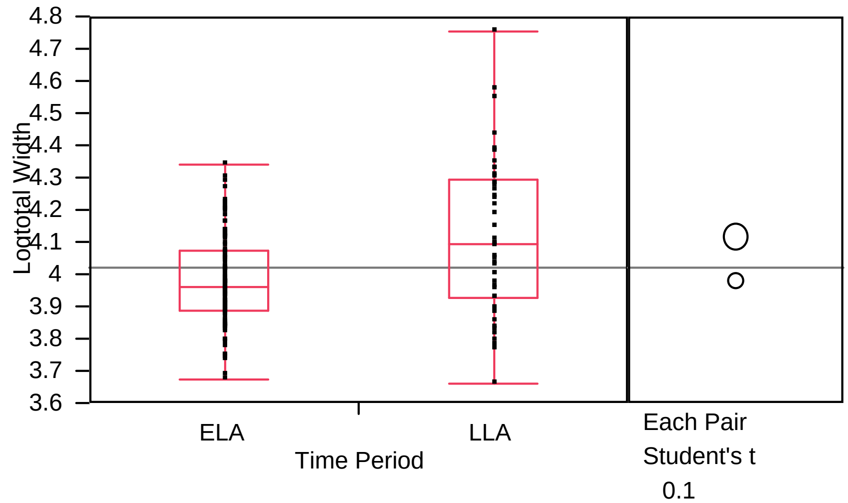

Figure VII-4. Oneway analysis of the San Pedro cluster logtotal widths by time period.

Projectile Point Blade Length of the San Pedro Cluster between the ELA and LLA. Both the ELA and the LLA samples of the blade length attribute have normal distributions. Also, the samples sizes (ELA = 80; LLA = 32) are large enough for a parametric test. Therefore, I used a Student's t test to evaluate the significance of the means for the blade length of the San Pedro cluster.

Similar to the total length, the results of the Student's t test for significance indicate that the blade length of the San Pedro cluster from the ELA is not significantly different from the LLA San Pedro cluster ($p = 0.3612$) at a 90 percent confidence interval ($\alpha = 0.1$) (Table VII-3). Therefore, the blade length of the projectile points from the San Pedro cluster does not significantly change between the ELA and the LLA (Figure VII-5).

Table VII-3. Blade Length: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-2.9502	-3.0651
LLA	-3.0651	-4.6647

*Positive values show pairs of means that are significantly different

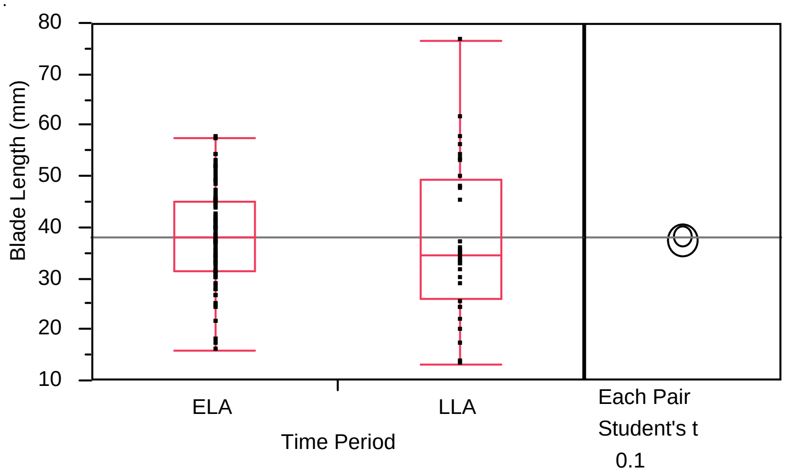

Figure VII-5. Oneway analysis of the San Pedro cluster blade lengths by time period.

Projectile Point Blade Width of the San Pedro Cluster between the ELA and LLA. Although the sample sizes for the blade width high visibility attribute of the San Pedro cluster are large enough for a Student's t test (ELA = 116; LLA = 43), I was unable to normalize the distribution of both datasets using standard techniques without excluding over 15 samples. Therefore, I chose to use a non-parametric test.

The *p* value for the blade width of the San Pedro cluster is 0.0152, which is significant at the 90 percent confidence interval level ($\alpha = 0.10$). Thus, there is a statistically significant difference between the blade width of the San Pedro cluster between the ELA and LLA. According to the results, the San Pedro cluster has a greater blade width during the LLA than during the previous ELA suggesting less reliance on projectile point curation (Figure VII-6).

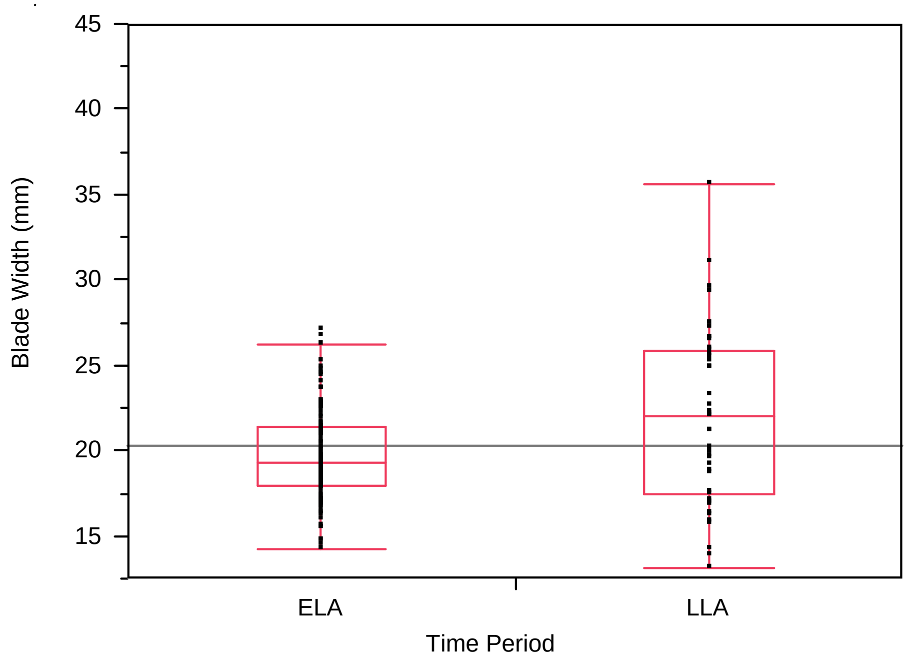

Figure VII-6. Oneway analysis of the San Pedro cluster blade widths by time period.

Projectile Point Blade Thickness of the San Pedro Cluster between the ELA and LLA. Both samples of the blade thickness attribute from the ELA and LLA have a normal distribution after excluding one outlying specimen from the ELA dataset. The sample sizes (ELA = 119; LLA = 43) are large enough for a parametric test, and so I used a Student's t test to evaluate the significance of the differences in the means for the San Pedro cluster blade thicknesses.

The results of the Student's t test indicate that the blade thickness of the ELA San Pedro cluster is significantly different from the LLA San Pedro cluster ($p = 0.0971$) at a 90 percent confidence interval ($\alpha = 0.1$) (Table VII-4). Therefore, the blade thickness of the projectile points from the San Pedro cluster significantly decreases in size between the ELA and the LLA (Figure VII-7).

Table VII-4. Blade Thickness: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.30163	0.00362
LLA	0.00362	-0.50178

*Positive values show pairs of means that are significantly different

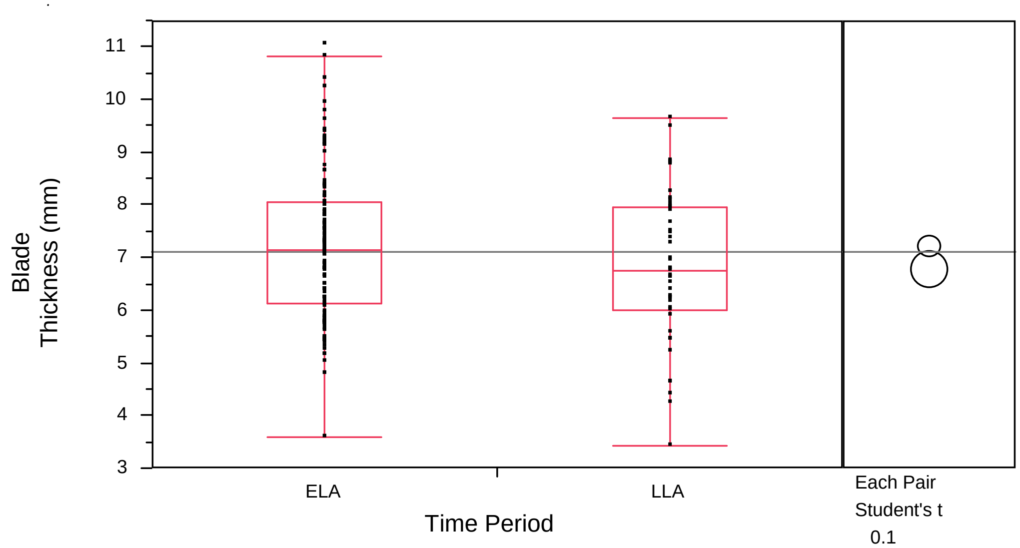

Figure VII-7. Oneway analysis of the San Pedro cluster blade thicknesses by time period.

Implications of the ELA and LLA San Pedro Cluster High Visibility Attribute Analysis. The expectations for the San Pedro cluster are twofold. The first expectation is that high visibility attributes including total length, total width, blade length, and blade width, which can be affected by curation strategies such as resharpening and thus do not indicate social continuity, should significantly increase in size during the LLA, because the need for curation was less due to a shift in subsistence strategies toward more agriculture. The second expectation for the San Pedro cluster during the ELA and LLA is that statistically there should be no change to the high visibility attributes that are not influenced by curation technologies, namely blade thickness. Therefore, this attribute may reflect social continuity. Based on the results from the statistical tests for significance, only total width and blade width of the projectile points from the San Pedro cluster conform to the stated expectations (Table VII-5). In contrast, the high visibility attributes of total length, blade length, and blade thickness do not support either expectation.

Table VII-5. Comparisons of the High Visibility Attributes for the San Pedro Cluster in the Tucson Basin.

High Visibility Attribute	ELA	LLA
Total length	No change	No change
Total width*	Smaller	Larger
Blade length	No change	No change
Blade width*	Smaller	Larger
Blade thickness	Larger	Smaller

*Conforms to the expectations

The inconsistencies in the results of the high visibility attributes that correspond to curation are perplexing. The results from the length attributes suggest that curation technologies may not be affecting the morphology of the San Pedro cluster. Therefore, it is necessary to see if there are any differences within the San Pedro cluster that may affect the overall outcome of the statistical tests. Once I take into account the projectile point types within the entire San Pedro cluster, there is a clear answer. There is a dramatic change in the number of Empire points within the ELA and LLA San Pedro clusters. During the ELA, there are 62 Empire points, but the LLA only has six in my dataset. To see if the change in number of Empire points affects the outcome, I compare the total length and the blade thickness of the Empire and San Pedro points of the ELA (there are not enough Empire points to test during the LLA). I also compare these attributes to only the San Pedro points during the ELA and LLA.

A Student's t test comparing the normally distributed means of the total length of Empire and San Pedro points during the ELA shows that Empire points (n = 47) are significantly longer ($p = 0.0552$) than the San Pedro points (n = 31) at the 90 percent confidence interval ($\alpha = 0.10$) (Table VII-6; Figure VII-8). However, a Student's t test comparing the normally distributed means of blade thickness for the Empire (n = 59) and San Pedro (n = 61) points during the LLA shows that the means are almost identical (Empire blade thickness mean = 7.29 mm and San Pedro blade thickness mean = 7.20 mm) and are not significantly different ($p = 0.7214$) at the 90 percent confidence interval ($\alpha = 0.1$) (Table VII-7; Figure VII-9).

Table VII-6. Total Length: Comparisons for Empire and San Pedro Points Using Student's t.*

Time Period	**Empire**	**San Pedro**
Empire	-3.2747	0.6221
San Pedro	0.6221	-4.0322

*Positive values show pairs of means that are significantly different

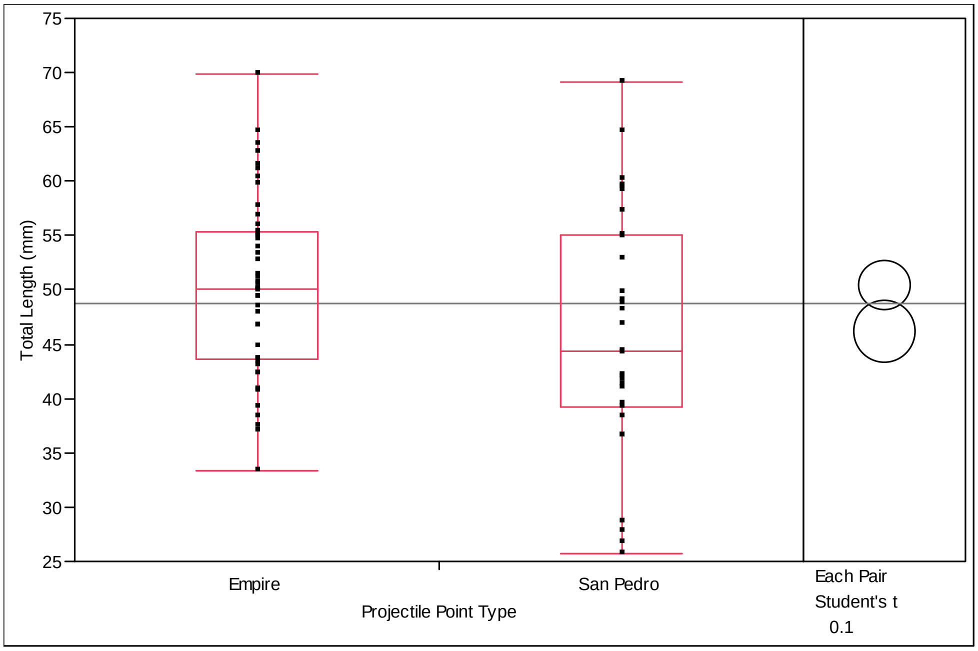

Figure VII-8. Oneway analysis of Empire and San Pedro point total lengths during the ELA.

Table VII-7. Blade Thickness: Comparisons for ELA Empire and San Pedro Points Using Student's t.*

Time Period	Empire	San Pedro
Empire	-0.44655	-0.34740
San Pedro	-0.34740	-0.43917

*Positive values show pairs of means that are significantly different

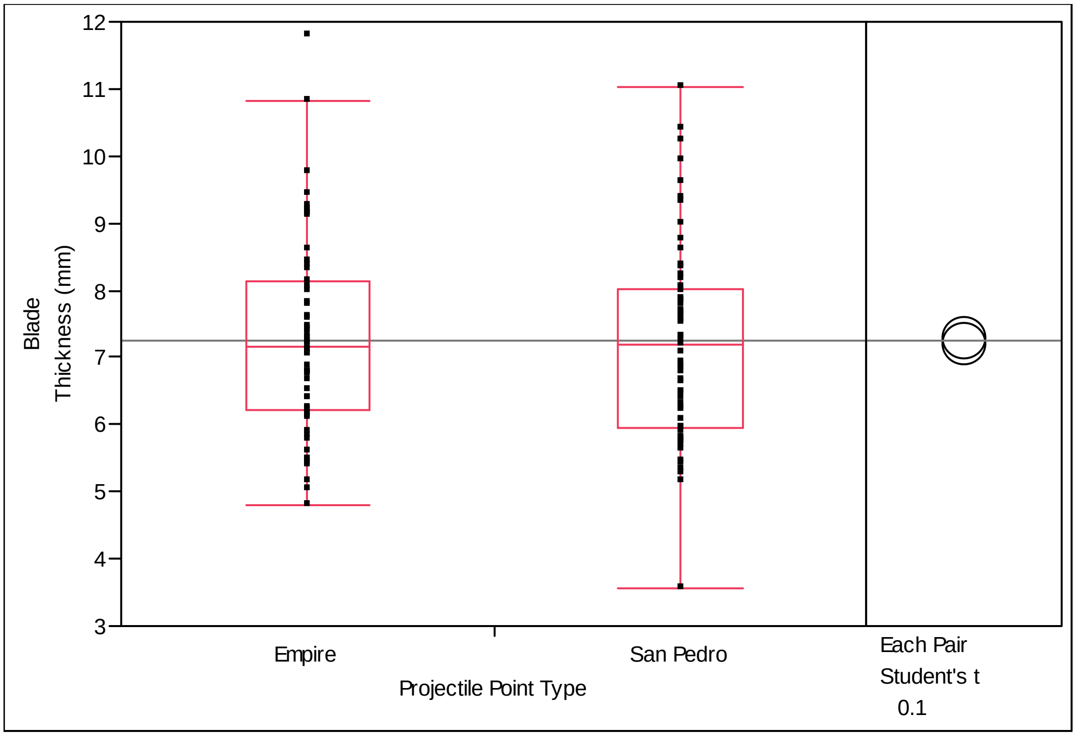

Figure VII-9. Oneway analysis of Empire and San Pedro point blade thicknesses during the ELA.

Using a non-parametric test for comparing the total length of San Pedro points between the ELA (n = 31) and LLA (n=26), the results show that total length is not significantly different between the two periods (p = .8853) at the 90 percent confidence interval (α = 0.1) (Table VII-8; Figure VII-10). Also, when comparing the normally distributed means of blade thickness for San Pedro points during the ELA (n = 61) and the LLA (n = 38) using a Student's t test, the results indicate that there is no statistical difference (p = 0.1081) between the two time periods at a 90 percent confidence interval (α = 0.1) (Figure VII-11).

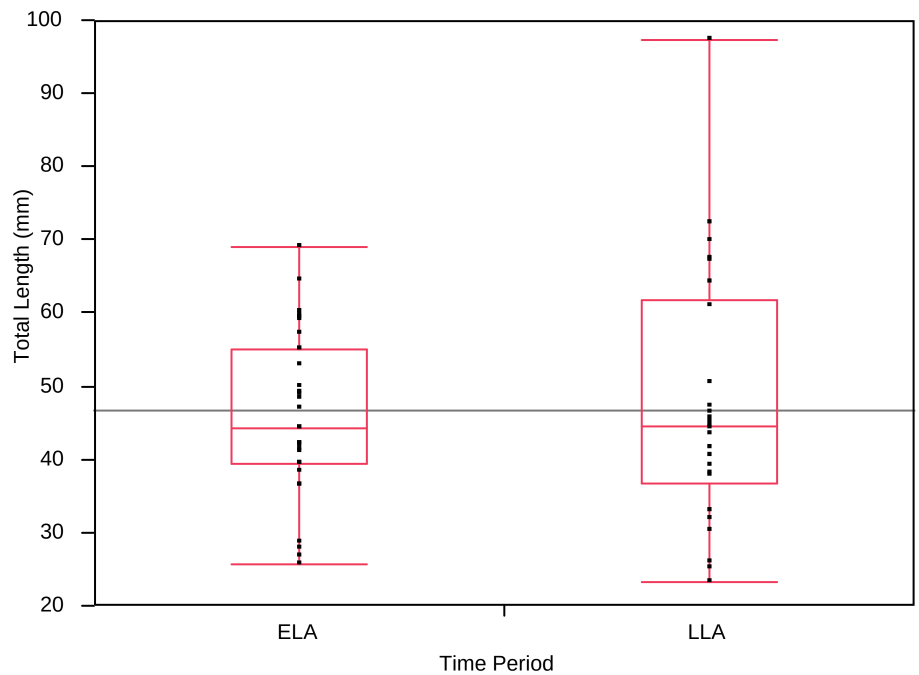

Figure VII-10. Oneway analysis of San Pedro point total lengths by time period.

Table VII-8. Blade Thickness: Comparisons for San Pedro Points during ELA and LLA Using Student's t.*

Time Period	ELA	LLA
ELA	-0.43876	-0.01174
LLA	-0.01174	-0.55590

*Positive values show pairs of means that are significantly different

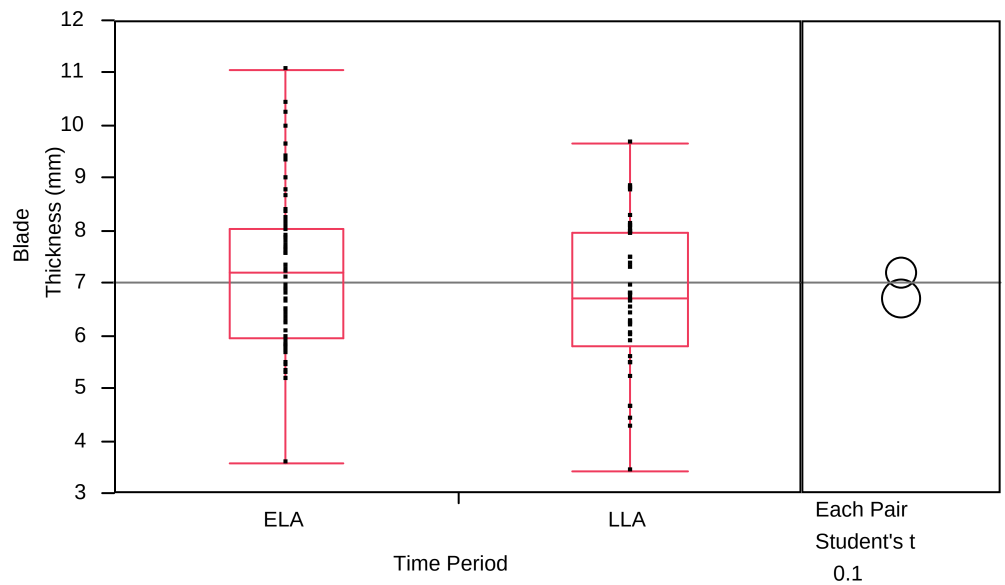

Figure VII-11. Oneway analysis of San Pedro point blade thicknesses by time period.

The results comparing the Empire points to San Pedro points and comparing San Pedro points to each other during the ELA and LLA show that projectile point types within a cluster can dramatically affect the outcome of the statistical tests. Removing the Empire points from the San Pedro cluster for blade thickness causes the results to support the expectation that blade thickness does not change through time, and so it may indeed reflect social continuity rather than changing curation strategies.

In contrast, removing the Empire points for the total length attribute still does not support the expectation that the total length decreases from the ELA to the LLA, but the total length also does not increase, which is inconsistent with the expectation for the total length and its relation to curation. Ultimately, these tests show that using projectile point clusters rather than projectile point types may obfuscate the results and may be a flaw in this study, but without using clusters in many cases, I would be unable to compare projectile point types because the sample sizes would be too small.

Tucson Basin Moderate Visibility Projectile Point Attributes

Moderate visibility attributes – attributes that are less visible at a distance but can be seen without close inspection – may reflect active or passive messaging to convey information including social affiliation within the group, rank or prestige distinctions, and enculturation (Carr 1995b; Hoffman 1997). Unlike high visibility attributes, resharpening does not affect moderate visibility attributes of serration, flake patterns, and blade tip thickness. Therefore, these attributes may provide a better indicator for social continuity between the ELA and LLA groups in the Tucson Basin.

I expect that the ELA and LLA projectile point clusters would have similar moderate visibility attributes due to social continuity. The moderate visibility attributes that I examine consist of the presence or absence of serration, flake patterns, and blade tip thickness.

Tucson Basin Moderate Visibility Attributes of the Projectile Points from the Cienega Cluster during the ELA and LLA

The expectation for the LLA Cienega cluster moderate visibility attributes is that they should not differ significantly from the earlier ELA cluster indicating social continuity. As with the high visibility attributes for the Cienega cluster, the specimens that are available for comparing moderate visibility attributes are limited (ELA = 11, LLA = 51). I am unable to evaluate the Cienega cluster blade tip thickness, because it consists of continuous data and has less than 10 specimens and therefore cannot be tested for statistical significance.

Projectile Point Serration of the Cienega Cluster between the ELA and LLA. According to the contingency table (Table VII-9), the expected value for the presence of serration during the ELA is less than five; therefore, it is necessary to use Fisher's Exact Test. The results of this test show that the presence or absence of serration is not significant between the projectile points during the ELA and the LLA ($p = 1.0000$; $\alpha = 0.1$).

Table VII-9. Contingency Table Comparing Serration on the ELA and LLA Cienega Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
ELA	8 13.11 17.39 72.73 8.29508	3 4.92 20.00 27.27 2.70492*	11 18.03
LLA	38 62.30 82.61 76.00 37.7049	12 19.67 80.00 24.00 12.2951	50 81.97
	46 75.41	15 24.59	61

*expected <5

Projectile Point Flake Patterns of the Cienega Cluster between the ELA and LLA. As with serration, the expected values for two of the contingency table cells are less than five, and therefore this attribute requires a Fisher's Exact Test (Table VII-10). The results from this test indicate that there is no significant difference for the presence or absence of flake patterns between the ELA and LLA ($p = 1.0000$; $\alpha = 0.1$). Furthermore, of 61 specimens, only two exhibit any type of flake patterning.

Table VII-10. Contingency Table Comparing Flake Patterns on the ELA and LLA Cienega Cluster Projectile Points.

Count Total % Column % Row % Expected	none	parallel	
ELA	11 18.03 18.64 100.00 10.6393	0 0.00 0.00 0.00 0.36066*	11 18.03
LLA	48 78.69 81.36 96.00 48.3607	2 3.28 100.00 4.00 1.63934*	50 81.97
	59 96.72	2 3.28	61

*expected <5

Implications of the ELA and LLA Cienega Cluster Moderate Visibility Analysis. Unfortunately, there are only two Cienega cluster moderate visibility attributes that I can compare. However, the expectation that these attributes – serration and flake pattern - should not change statistically between the ELA and LLA holds true (Table VII-11). This pattern indicates that the moderate visibility attributes represent social continuity and therefore can be used to compare social interaction between groups from different regions.

Table VII-11. Comparisons of the Moderate Visibility Attributes for the Cienega Cluster in the Tucson Basin.

Moderate Visibility Attribute	ELA	LLA
Serration*	No change	No change
Flake Pattern*	No change	No change

*Conforms to the expectations

Tucson Basin Moderate Visibility Attributes of the San Pedro Cluster during the ELA and LLA

Like the results from the moderate visibility Cienega cluster attributes, the expectation is that the moderate visibility attributes from the San Pedro cluster should not vary. The ELA San Pedro cluster has 127 specimens, and the LLA sample contains 45 specimens. Because these sample sizes are relatively large, all of the moderate attributes (serration, flake patterns, and blade tip thickness) are evaluated for the two time periods.

Projectile Point Serration of the San Pedro Cluster between the ELA and LLA. The Pearson's Chi Square indicates that there is a statistical difference for the presence of serration between the ELA (n = 118) and LLA (n = 45) ($p = 0.0014$; $\alpha = 0.1$). The results suggest that if a projectile point from the San Pedro cluster is serrated, then there is a higher likelihood it is from the ELA (Table VII-12). It must be noted that the converse of the Pearson's Chi Square – serration is absent and so the point is likely from the LLA - is not true; for both periods, non-serrated points are the dominant form.

Table VII-12. Contingency Table Comparing Serration on the ELA and LLA San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
ELA	82 50.31 66.13 69.49 89.7669	36 22.09 92.31 30.51 28.2331	118 72.39
LLA	42 25.77 33.87 93.33 34.2331	3 1.84 7.69 6.67 10.7669	45 27.61
	124 76.07	39 23.93	163

Projectile Point Flake Patterns of the San Pedro Cluster between the ELA and LLA. I used the Fisher's Exact Test to compare the flake patterns from the two San Pedro assemblages. Overall, there are only three specimens that exhibit any flake patterning. Similar to the flake pattering of the Cienega cluster, there is no statistical difference in the presence of flake patterns (p = 0.1869; α = 0.1) (Table VII-13).

Table VII-13. Contingency Table Comparing Flake Patterns on the ELA and LLA San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	None	Parallel	
ELA	116 71.60 72.96 99.15 114.833	1 0.62 33.33 0.85 2.16667*	117 72.22
LLA	43 26.54 27.04 95.56 44.1667	2 1.23 66.67 4.44 0.83333*	45 27.78
	159 98.15	3 1.85	162

*expected <5

Projectile Point Blade Tip Thickness of the San Pedro Cluster between the ELA and LLA. Of the moderate visibility attributes, blade tip thickness is the only one that consists of continuous data. Although the dataset from the ELA contains 85 specimens, the LLA has a sample size of 34, which requires using the Student's t test to compare the ELA and LLA means. The results from the parametric test indicate that the tip thickness of the ELA San Pedro cluster is significantly larger than the LLA San Pedro cluster ($p < 0.0001$; $\alpha = 0.1$) (Table VII-14 and Figure V11-12).

Table VII-14. Blade Tip Thickness: Comparisons of Each Pair Using Student's t.*

Time Period	**ELA**	**LLA**
ELA	-0.24546	0.51199
LLA	0.51199	-0.38811

*Positive values show pairs of means that are significantly different

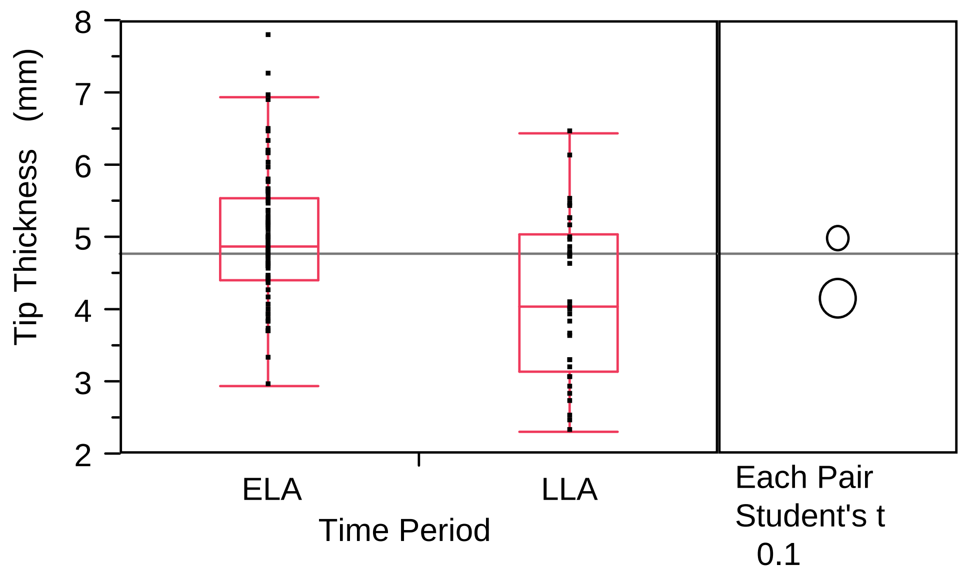

Figure VII-12. Oneway analysis of San Pedro cluster blade tip thicknesses by time period.

Implications of the ELA and LLA San Pedro Cluster Moderate Visibility Attribute Analysis. The results from the flake patterns support the expectation that there should be no difference among the moderate visibility attributes between the ELA and LLA San Pedro cluster (Table VII-15). In contrast, both the presence/absence of serration and the Student's t test of the blade tip thickness indicate that there is a difference in these attributes between the two periods.

Table VII-15. Comparisons of the Moderate Visibility Attributes for the San Pedro Cluster in the Tucson Basin.

Moderate Visibility Attribute	**ELA**	**LLA**
Serration	More likely	Less likely
Flake Pattern*	No change	No change
Blade Tip Thickness	Larger	Smaller

*Conforms to the expectations

The change in serration may be due to a change in function for the cluster. During the ELA, the projectile points from the San Pedro cluster may have been used for both sawing and as projectile points, and the former are more apt to have serration (Justice 2002b:29). During the LLA, there may have been a shift to another tool to perform as a saw, and the San Pedro cluster artifacts may have been used exclusively as points with no need for serration.

The pattern of the blade tip thickness is similar to the high visibility attribute of blade thickness in that the presence of the Empire points in the ELA San Pedro cluster may have skewed the data. To test this supposition, I eliminated the Empire points from the data and re-ran the analysis using a non-parametric test, because the sample size for the LLA was reduced to 29 specimens (ELA = 36). This time, removal of the points did not affect the outcome. Still, the ELA cluster has a significantly greater blade tip thickness than the LLA ($p = 0.0065$; $\alpha = 0.1$) (Figure VII-13), which is perplexing, but it may relate to offsetting the weight of a projectile point if there is a change of function from a dart point to an arrow point (Sliva 1999).

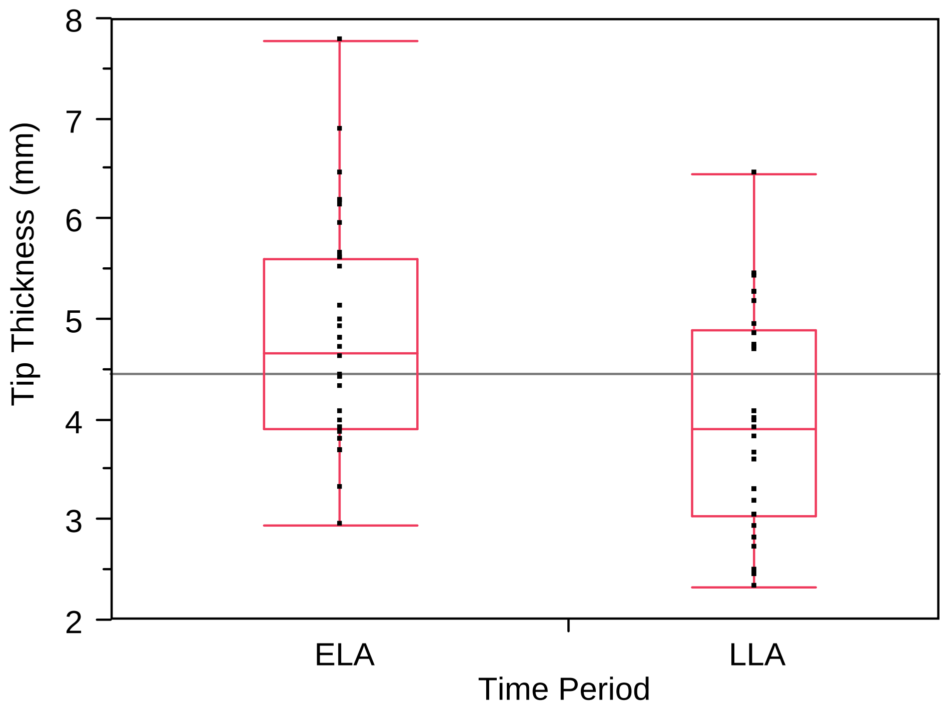

Figure VII-13. Oneway analysis of San Pedro point blade tip thicknesses by time period.

Tucson Basin Low Visibility Projectile Point Attributes

Low visibility attributes may indicate passive social interaction, the passive components of enculturation, shared histories of interaction, and passive messages pertaining to personal level social processes (Carr 1995b; Hoffman 1997). Because these variables indicate more local interactions and continuity in social relationships, the expectation is that there should be no statistical difference in the low visibility attributes of the ELA and LLA Cienega and San Pedro clusters. Low visibility attributes of projectile points used for this study are weight, stem length, neck width, base width, stem thickness, and base shape.

Projectile Point Low Visibility Attributes of the Cienega Cluster during the ELA and LLA

Of the six possible low visibility attributes that could be analyzed for the Cienega cluster projectile points, only neck width has a large enough sample size to adequately compare the attribute between the ELA and the LLA.

Projectile Point Neck Width of the Cienega Cluster between the ELA and LLA. The ELA has 11 specimens, the LLA has 50 specimens, and therefore I used a nonparametric statistical test to compare the neck width of the ELA and LLA projectile points from the Cienega cluster. The results of this test show that there is not a significant difference between the ELA and the LLA neck width ($p = 0.0201$; $\alpha = 0.1$) (Figure VII-14).

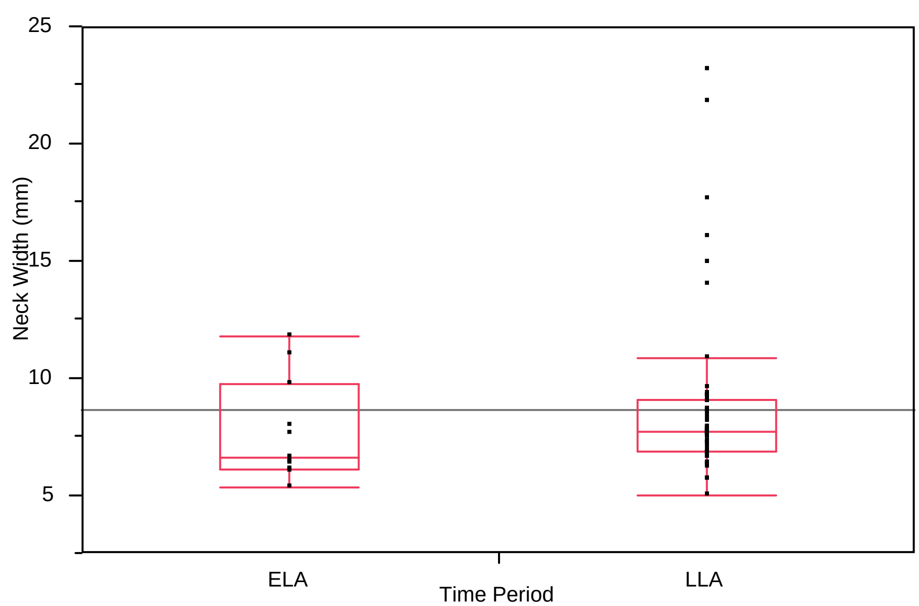

Figure VII-14. Oneway analysis of Cienega cluster neck widths by time period.

Implications of the ELA and LLA Cienega Cluster Low Visibility Attribute Analysis. Unfortunately, for the ELA and LLA Cienega cluster, I was only able to examine one of the low visibility attributes. The result does confirm the expectation that this attribute should not change between the ELA and LLA (Table VII-16), which may suggest continuity in social relationships of the Tucson Basin groups from the ELA and LLA. Furthermore, the results indicate that this low visibility attribute is a good measurement for social continuity, which can be used to evaluate my hypotheses for social interaction between regions in subsequent chapters.

Table VII-16. Comparisons of the Low Visibility Attributes for the Cienega Cluster in the Tucson Basin.

Low Visibility Attribute	**ELA**	**LLA**
Neck Width*	No Change	No change

*Conforms to the expectations

Projectile Point Low Visibility Attributes of the San Pedro Cluster during the ELA and LLA

All six of the low visibility attributes for the San Pedro cluster in the Tucson Basin have enough specimens to be evaluated. Because these are low visibility attributes, the expectation is that the statistical results should show continuity between the ELA and LLA and thus no statistically observable differences.

Projectile Point Weight of the San Pedro Cluster between the ELA and LLA. The number of samples from the ELA (n = 62) and the LLA (n = 30) are enough to use the Student's t test, but to normalize the distribution for the LLA specimens, it was necessary to eliminate one LLA outlier. This process decreased the sample size below the appropriate number for a parametric test, and so I used a nonparametric test. The results from this test indicate that there is not a significant difference between the weight of the ELA and LLA San Pedro cluster (p = 0.612; α = 0.1) (Figure VII-15).

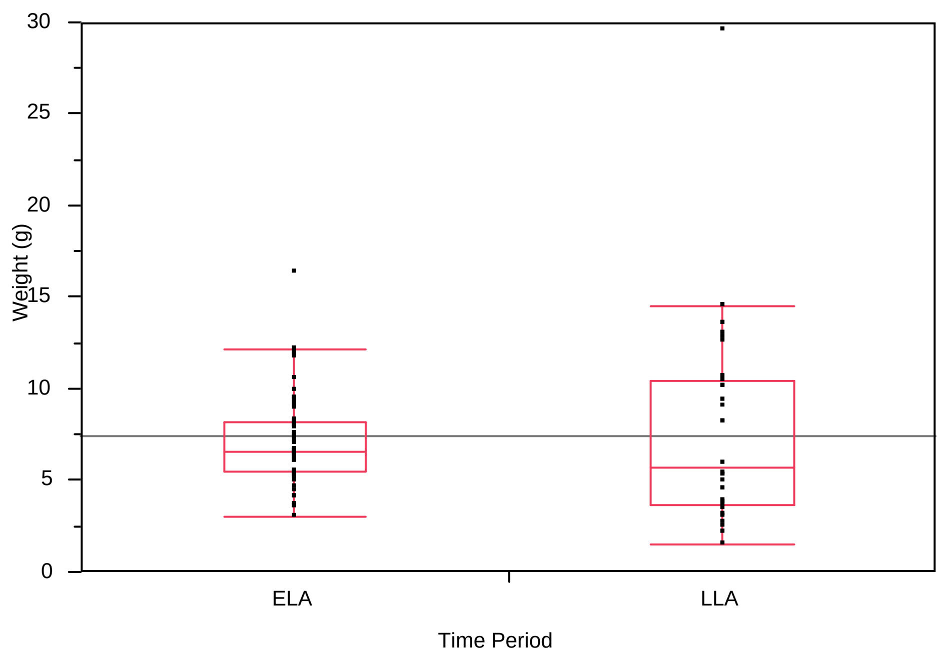

Figure VII-15. Oneway analysis of San Pedro cluster weights by time period.

Projectile Point Stem Length of the San Pedro Cluster between the ELA and LLA. After removing three outliers from the San Pedro ELA cluster, the distribution of the data was normalized. Because of the large sample sizes from the ELA (n = 120) and LLA (n = 45), I was able to use the Student's t test. The results indicate that the mean stem length does not statistically change from the ELA to the LLA with a 90 percent confidence interval (p = 0.3847) (α = 0.1) (Table VII-17; Figure VII-16).

Table VII-17. Stem Length: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.46048	-0.51285
LLA	-0.51285	-0.75195

*Positive values show pairs of means that are significantly different

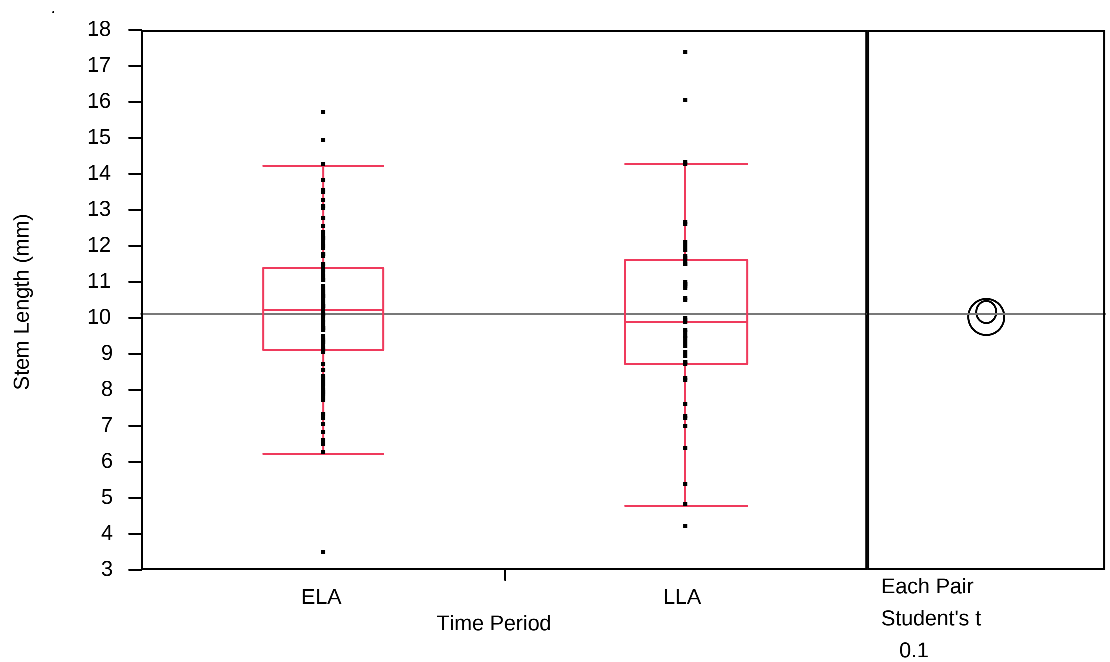

Figure VII-16. Oneway analysis of San Pedro cluster stem lengths by time period.

Projectile Point Neck Width of the San Pedro Cluster between the ELA and LLA. I was able to use the Student's t test to compare neck width, because both the ELA (n = 126) and the LLA (n = 45) have large enough samples, and their distributions are normal. The result, with a 90 percent confidence interval ($\alpha = 0.1$), is that there is not a statistical difference in the neck width between the ELA and LLA ($p = 0.1710$) (Table VII-18; Figure VII-17).

Table VII-18. Neck Width: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.5821	-0.1354
LLA	-0.1354	-0.9740

*Positive values show pairs of means that are significantly different

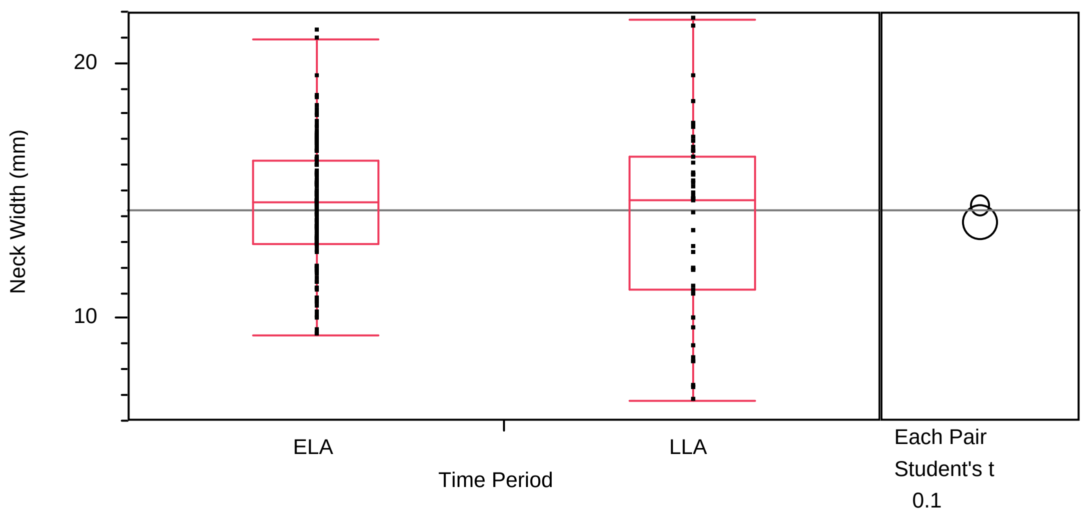

Figure VII-17. Oneway analysis of San Pedro cluster neck widths by time period.

Projectile Point Base Width of the San Pedro Cluster between the ELA and LLA. Although there are sufficient samples for this low visibility attribute (ELA = 119; LLA = 45), in order to use a parametric statistical test, I had to manipulate the data to create a normal distribution. First, I took the log+1 of the base width. Second, I had to omit five outliers from the ELA and one outlier from the LLA. The results of the Student's t test after the data management indicate that there is no significant difference between the logbase width of the ELA and the LLA San Pedro cluster points ($p = 0.2459$; $\alpha = 0.1$) (Table VII-19; Figure VII-19)

Table VII-19. Logbase Width: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.04575	-0.01815
LLA	-0.01815	-0.07365

*Positive values show pairs of means that are significantly different

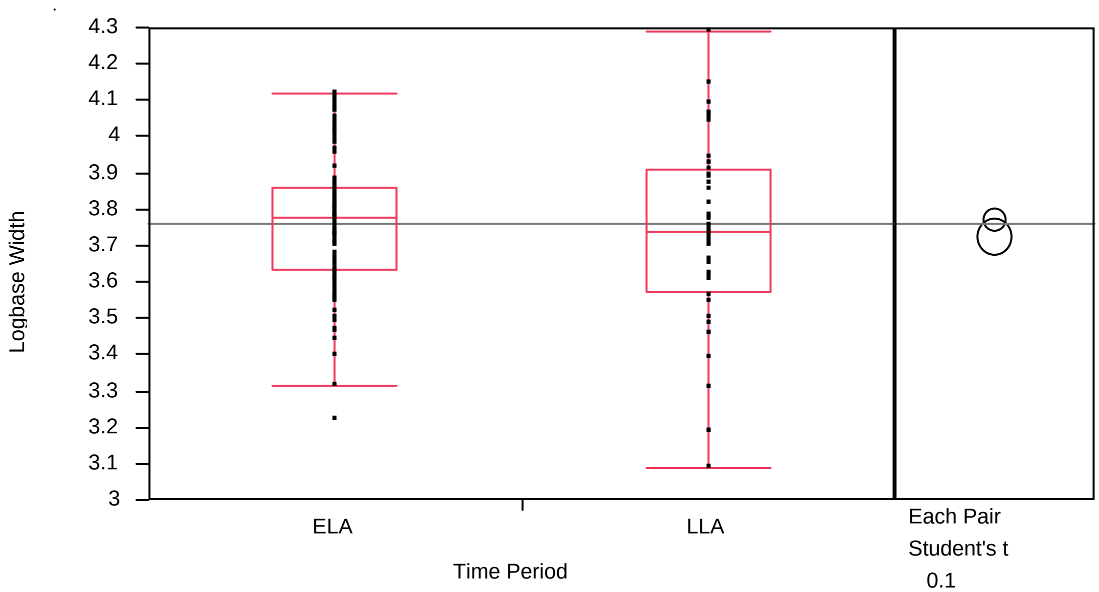

Figure VII-18. Oneway analysis of San Pedro cluster logbase widths by time period.

Projectile Point Stem Thickness of the San Pedro Cluster between the ELA and LLA. There are 126 and 43 specimens that are measurable for stem thickness from the ELA and the LLA, respectively. Three of the samples that are outliers had to be omitted to normalize the ELA distribution. Similar to the previously tested low visibility attributes, stem thickness of the San Pedro cluster is not significantly different between the ELA and the LLA ($p = 0.1653$; $\alpha = 0.1$) (Table VII-20; Figure VII-19).

Table VII-20. Stem Thickness: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.19436	-0.04251
LLA	-0.04251	-0.32872

*Positive values show pairs of means that are significantly different

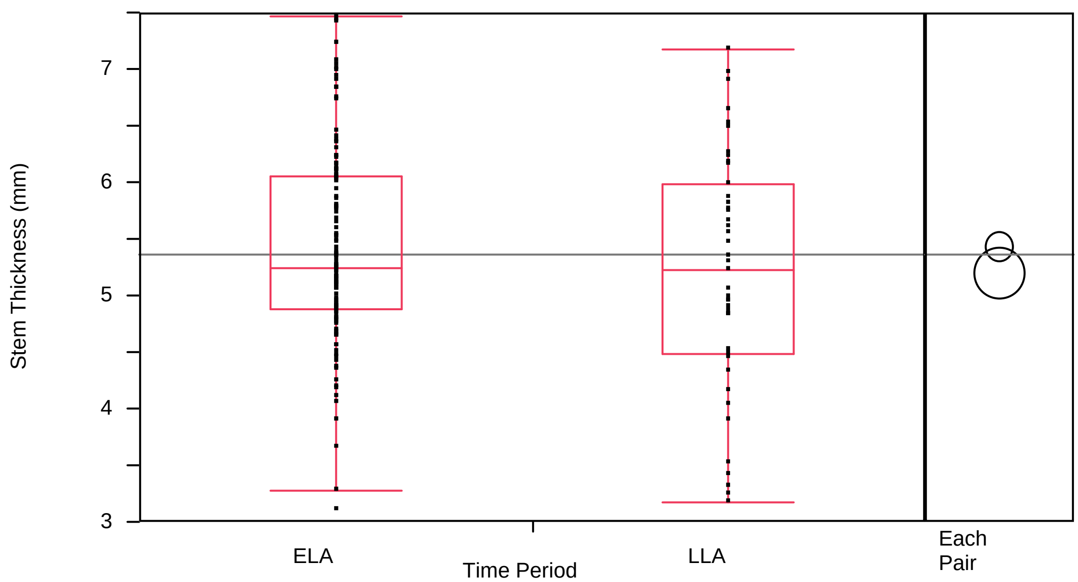

Figure VII-19. Oneway analysis of San Pedro cluster stem thicknesses by time period.

Projectile Point Base Shape of the San Pedro Cluster between the ELA and LLA. Because the base shape attribute is nominal and the expected value for each outcome is above five, I used Pearson's Chi Square (Table VII-21) to test for significance. According to the results, the probability that a convex or straight base shape is more likely to manifest in one time period over the other is not true ($p = 0.1548$; $\alpha = 0.1$). Therefore, there is no statistical difference between the base shapes of the ELA and LLA projectile points from the San Pedro cluster.

Table VII-21. Contingency Table Comparing Base Shape on the ELA and LLA San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	Convex	Straight	
ELA	32 19.28 65.31 26.45 35.7169	89 53.61 76.07 73.55 85.2831	121 72.89
LLA	17 10.24 34.69 37.78 13.2831	28 16.87 23.93 62.22 31.7169	45 27.11
	49 29.52	117 70.48	166

Implications of the ELA and LLA San Pedro Cluster Low Visibility Attribute Analysis. The expectation for the low visibility attributes is that these attributes would not be affected by any technological modifications stemming from curating ELA projectile points. Also, the low visibility attributes should be similar because people socially related to each other through time would have made similar projectile points indicating social continuity (Table VII-22). The results from the San Pedro cluster low visibility attributes are consistent with my expectations. This pattern suggests that low visibility attributes indicate social continuity and therefore may be used to compare social interaction between groups from different regions.

Table VII-22. Comparisons of the Low Visibility Attributes for the San Pedro Cluster in the Tucson Basin.

Low Visibility Attribute	ELA	LLA
Weight*	No change	No change
Stem length*	No change	No change
Neck width*	No change	No change
Base width*	No change	No change
Stem thickness*	No change	No change
Base shape*	No change	No change

*Conforms to the expectations

Patterns in Tucson Basin High, Moderate, and Low Visibility Projectile Point Attribute Analyses

This chapter as well as the following one about the Hueco Bolson ELA and LLA compares the high, moderate, and low visibility attributes within a region to show that there is social continuity between the groups during the ELA and LLA. The analyses presented in this chapter indicate that the high visibility attributes except for blade thickness are affected by differences in resharpening attributed to a change in subsistence, and not to social continuity (Table VII-23). In contrast, most of the moderate and low visibility attributes as well as the high visibility attribute of blade thickness show social continuity between the Tucson Basin ELA and LLA groups. Therefore, the blade thickness attribute, the moderate visibility attributes, and the low visibility attributes are appropriate to test my hypotheses about social interaction between different regions during the ELA and the LLA.

Table VII-23. Comparisons of the Tucson Basin Visibility Attributes for the San Pedro and Cienega Clusters between the ELA and LLA.

Visibility Level	Cluster	Attribute	ELA	LLA
High	Cienega	Blade length*	Smaller	Larger
		Blade thickness*	No change	No change
	San Pedro	Total length	No change	No change
		Total width*	Smaller	Larger
		Blade length	No change	No change
		Blade width*	Smaller	Larger
		Blade thickness	Larger	Smaller
Moderate	Cienega	Serration*	No change	No change
		Flake pattern*	No change	No change
	San Pedro	Serration	More likely	Less likely
		Flake pattern*	No Change	No change
		Blade tip thickness	Larger	Smaller
Low	Cienega	Weight*	No change	No change
		Stem length*	No change	No change
		Neck width*	No change	No change
		Base width	Larger	Smaller
		Stem thickness*	No change	No change
	San Pedro	Weight*	No change	No change
		Stem length*	No change	No change
		Neck width*	No change	No change
		Base width*	No change	No change
		Stem thickness*	No change	No change
		Base shape*	No change	No change

*Conforms to the expectations

Several patterns have emerged from the results of the statistical tests performed on the ELA and LLA Cienega and San Pedro clusters from the Tucson Basin. I have argued that that total length, total width, blade length, and blade width high visibility attributes are a product of shifting subsistence strategies toward more agriculture, and therefore decreasing projectile point curation. Overall, the results from the blade length of the Cienega cluster and total width and blade width from the San Pedro cluster confirm this expectation, because these attributes are significantly larger during the LLA. Also, the blade thickness of the Cienega cluster shows that this high visibility attribute conforms to the expectation that resharpening does not affect this attribute and may indicate social continuity. On the other hand, the San Pedro cluster blade thickness does not support this hypothesis unless I remove the Empire points from the datasets, which indicates a potential analysis flaw with using projectile point clusters instead of individual projectile point types.

The moderate visibility attributes for both the Cienega and San Pedro clusters predominantly indicate that there is no change between the ELA and LLA, suggesting social continuity. Out of the 16 moderate and low visibility attributes, only the Cienega base width and the San Pedro serration and blade tip thickness do not conform to my expectation that there should be no changes in attributes that are associated with social continuity. This pattern supports my contention that moderate visibility attributes can be used to indicate social interactions between groups from different regions.

The low visibility attributes are the most telling in terms of indicating social continuity and being applicable measures of social interaction, as discussed in future chapters. First, a change in subsistence strategies, which influences curation technologies, would not have affected low visibility attributes, because resharpening only takes place on the blade of a projectile point. Since the groups from the different time periods are assumed to have been related to each other because they lived in the same area, none of the low visibility attributes should have differed due to transgenerational social continuity. For both the Cienega and San Pedro clusters, there is no change in most of the low visibility attributes between the ELA and LLA, which indicates social continuity within the Tucson Basin. The one exception is the base width of the Cienega cluster. The results show that the base width is smaller during the

ELA than the LLA, which may indicate a change in functional use form a dart point to an arrow point that requires a smaller base width for hafting onto an arrow shaft.

Because it appears that blade thickness, moderate visibility attributes, and low visibility attributes follow Carr's (1995b:244) assertion that similarities in visibility attributes within a region through time indicate transgenerational social continuity, his suggestion that they also measure social interaction between groups of different regions is also valid. To compare with these patterns from the Tucson Basin, the next chapter presents the analyses, results, and discussion of the patterns for the ELA and LLA Hueco Bolson projectile point clusters.

Chapter VIII

Changes in the High, Moderate, and Low Visibility Projectile Point Attributes in the Hueco Bolson

In this chapter, I present the results from the parametric and nonparametric tests comparing the high, moderate, and low visibility attributes from the Hueco Bolson ELA and LLA projectile point clusters. Similar to chapter seven, the purpose of this chapter is to investigate, using the Hueco Bolson dataset, the plausibility of using visibility attributes to identify changes in subsistence strategies and social continuity between the ELA and LLA, so that I can interpret social interaction between the regions.

Based on the results from chapter six, the two Hueco Bolson projectile point clusters that have large enough samples for performing statistical tests are the Cienega and San Pedro clusters. The first section of the chapter discusses the results from comparing the ELA and LLA high visibility attributes of the projectile point clusters in the Hueco Bolson. The second section reports the patterns from the comparison of the moderate visibility attributes. The third section introduces the results from the low visibility attributes. The final section compares the patterns from both the Hueco Bolson and the previously discussed Tucson Basin.

Hueco Bolson High Visibility Projectile Point Attributes

Similar to the Tucson Basin, the expectation for the projectile point clusters from the Hueco Bolson during the ELA and the LLA is that the high visibility attributes should be similar, because of the social continuity of the people living in the Hueco Bolson during the ELA and LLA. Contrary to the Tucson Basin, according to Mbutu (1997:15), LLA groups from the Hueco Bolson did not change to a much more sedentary lifestyle because they did not rely heavily on agriculture, although some occurred. Therefore, it is uncertain whether the effects of curation and resharpening influenced any of the high visibility attributes of the projectile point clusters from the Hueco Bolson. Only the Cienega and San Pedro clusters have large enough samples for comparison.

Projectile Point High Visibility Attributes of the Cienega Cluster

The Cienega cluster sample size during the LLA is extremely small (n = 17) in contrast to the ELA (n = 50). The sample size from the ELA dictates that only non-parametric statistical tests are appropriate for testing significance. Also, some attributes are not present on enough specimens to adequately compare them between the ELA and LLA. Because of this restriction, I can only compare the total width, blade length, blade width, and blade thickness.

Projectile Point Total Width of the Cienega Cluster. Because of the small sample size, I used a non-parametric test for the high visibility attribute of total width. The results of the test show that there is statistically no change ($p = 0.8445$) in the total width of the Cienega cluster points between the ELA (n = 28) and the LLA (n = 13) at the 90 percent confidence interval ($\alpha = 0.1$) (Figure VIII-1). This pattern conforms to my expectation.

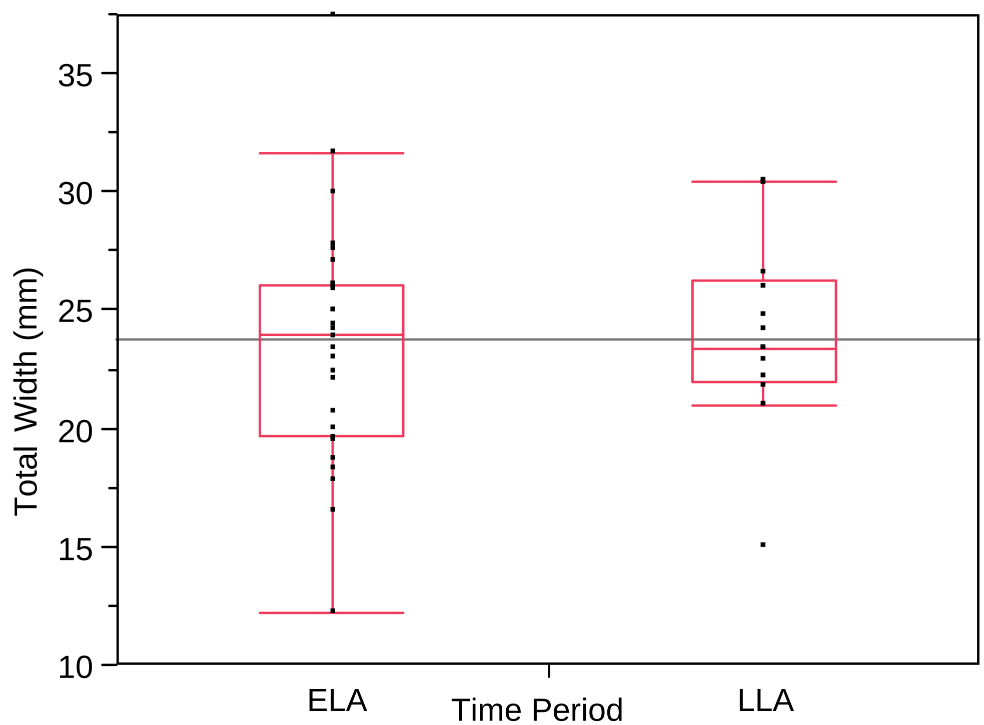

Figure VIII-1. Oneway analysis of Cienega cluster total widths from the Hueco Bolson.

Projectile Point Blade Length of the Cienega Cluster. The sample size for the blade length of the ELA Cienega cluster is 41 specimens, but for the LLA the sample size is 13, which requires the use of a non-parametric test. The comparison of the blade length from the Cienega cluster indicates that there is no statistical difference (p = 0.3899) between the blade length of the ELA and LLA specimens at the 90 percent confidence interval ($\alpha = 0.1$) (Figure VIII-2), which conforms to my expectation.

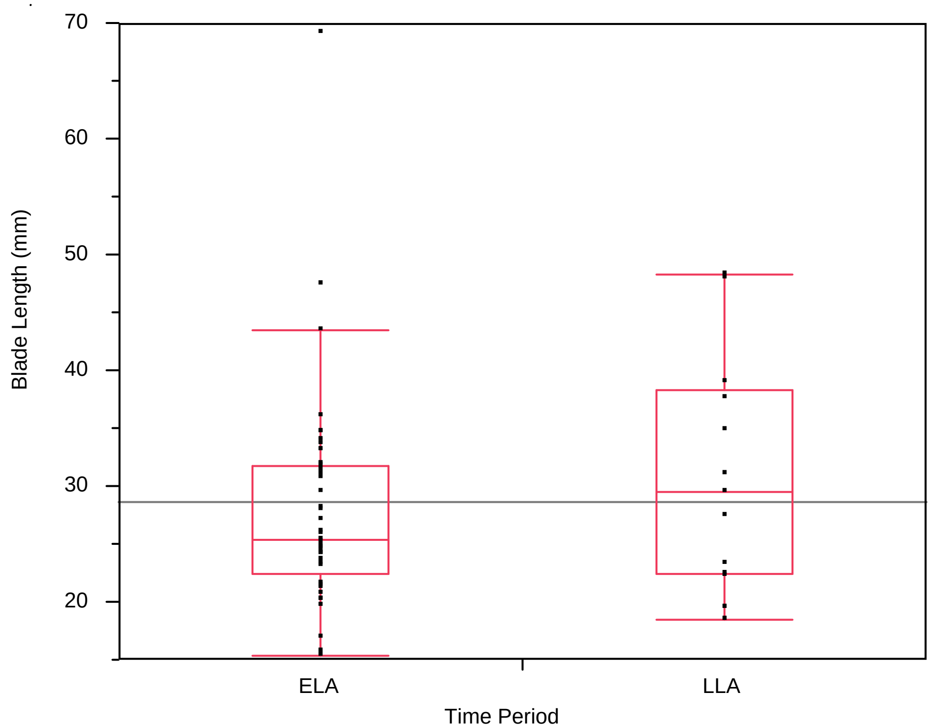

Figure VIII-2. Oneway analysis of Cienega cluster blade lengths from the Hueco Bolson.

Projectile Point Blade Width of the Cienega Cluster. Although the distribution of the blade width of the Cienega cluster is normally distributed, the low sample size from the LLA (n = 14) necessitates the use of a non-parametric test. The results from this test indicate that there is no significant difference ($p = 0.6185$) in the Cienega cluster blade width between the ELA (n = 35) and the LLA (n = 14) at the 90 percent confidence interval ($\alpha = 0.1$) (Figure VIII-3), which is consistent with my expectation.

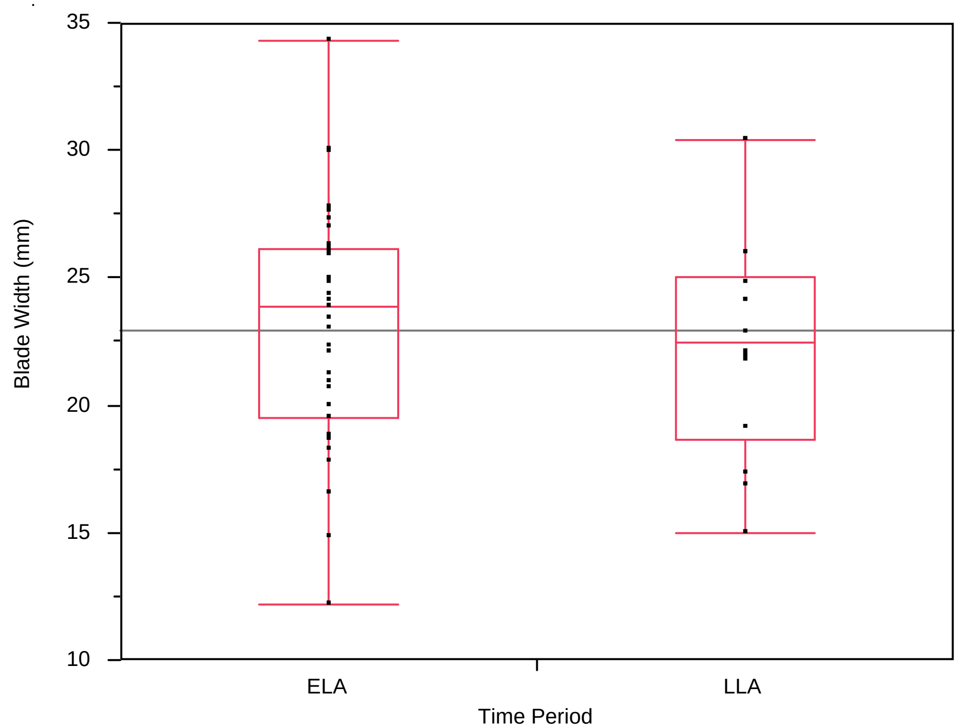

Figure VIII-3. Oneway analysis of Cienega cluster blade widths from the Hueco Bolson.

Projectile Point Blade Thickness of the Cienega Cluster. The results from the non-parametric test of the blade thickness from the Cienega cluster of the ELA (n = 49) and the LLA (n = 16) show that there is not a significant difference ($p = 0.3450$) in the blade thickness between the two time periods at the 90 percent confidence interval ($\alpha = 0.1$) (Figure VIII-4). As with the previous high visibility attributes, this pattern conforms to my expectation that there should be no change.

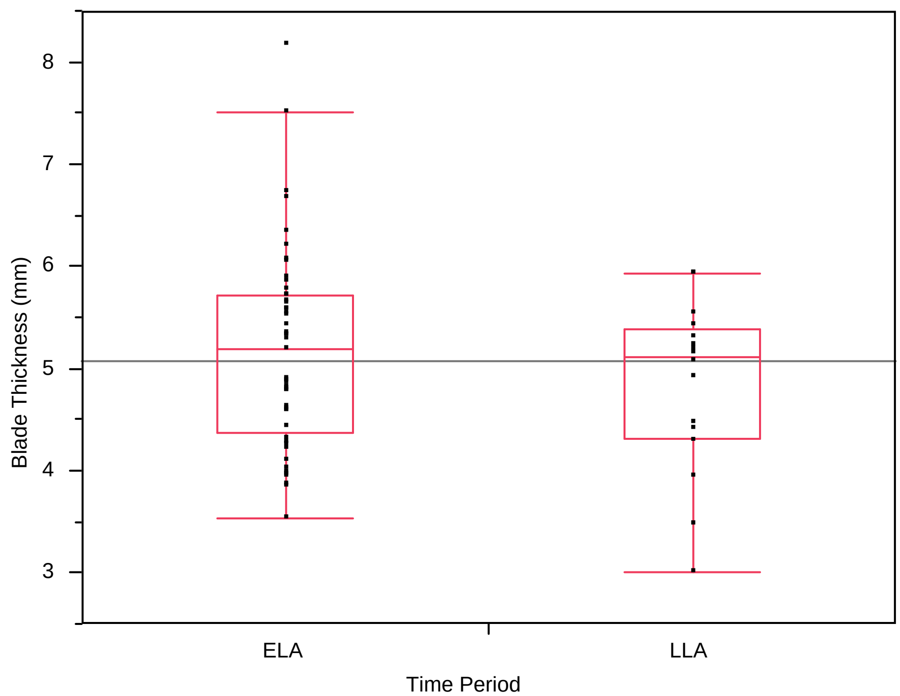

Figure VIII-4. Oneway analysis of Cienega cluster blade thicknesses from the Hueco Bolson.

Implications of the ELA and LLA Cienega Cluster High Visibility Attribute Analysis. The results from the statistical tests on the Cienega cluster high visibility attributes – total width, blade length, blade width, and blade thickness – show that none of them significantly changed between the ELA and the LLA (Table VIII-1). These results lend credence to the supposition that LLA groups from the Hueco Bolson continued their foraging and curation strategies from the ELA. Furthermore, the similarities in blade thickness, which is not affected by resharpening, suggest that there is social continuity between the Hueco Bolson ELA and LLA groups.

Table VIII-1. Comparisons of the High Visibility Attributes for the Cienega Cluster in the Hueco Bolson.

High Visibility Attribute	ELA	LLA
Total width	No change	No change
Blade length	No change	No change
Blade width	No change	No change
Blade thickness*	No change	No change

*Conforms to the expectations

Projectile Point High Visibility Attributes of the Hueco Bolson San Pedro Cluster during the ELA and LLA

Unlike the Cienega cluster, the San Pedro cluster has an ample sample size for both the ELA (n = 134) and the LLA (n = 40), although the number in this projectile point cluster decreases through time. Since the sample sizes from the San Pedro cluster are relatively large, all of the high visibility attributes – total length, total width, blade length, total width, and blade thickness – can be evaluated for the two time periods.

Projectile Point Total Length of the San Pedro Cluster. Although the sample size for the total length of the San Pedro cluster from the ELA (n = 95) is large enough for a parametric test, the sample size for the LLA (n = 27) dictates that I use a non-parametric test of significance. Based on the results from the non-parametric test, the total length of the San Pedro point cluster did significantly increase ($p = 0.0762$) at the 90 percent confidence interval ($\alpha = 0.1$) from the ELA to the LLA (Figure VIII-5).

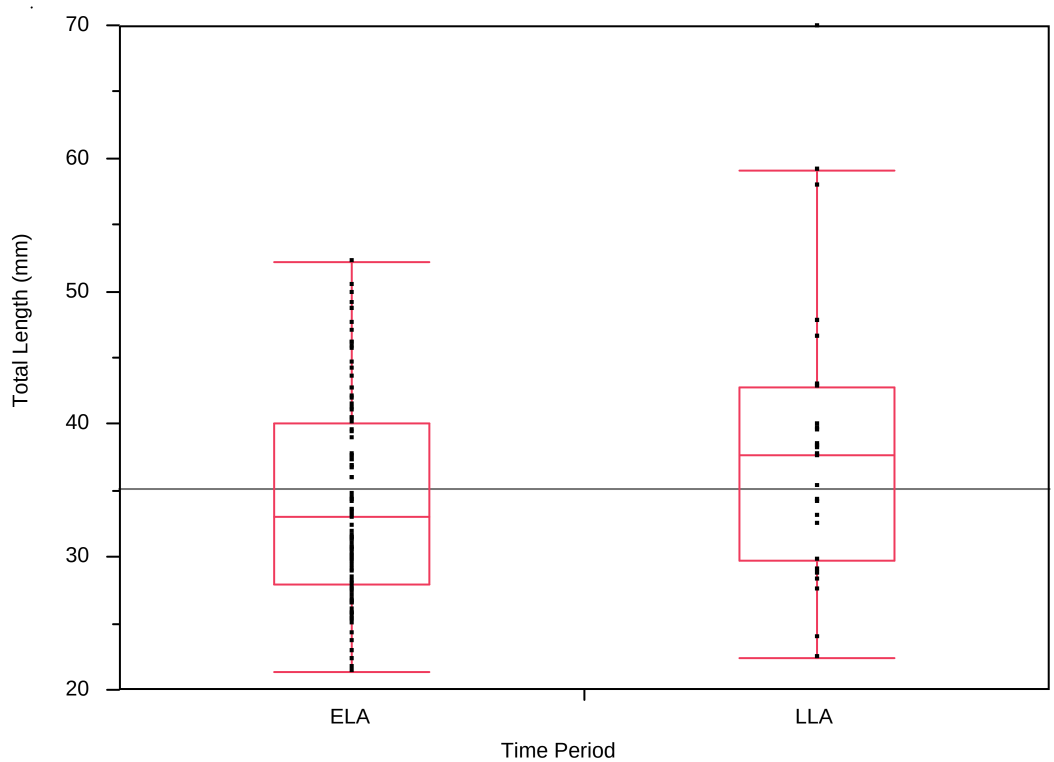

Figure VIII-5. Oneway analysis of San Pedro cluster total lengths from the Hueco Bolson.

Projectile Point Total Width of the San Pedro Cluster. The sample sizes of the total width for the San Pedro cluster during the ELA (n = 116) and the LLA (n = 35) are large enough for a Student's t test, but I had to take the log+1 to normalize the distribution. The *p* value of the Student's t test is 0.2853, which suggests that there is not a statistically significant change in the San Pedro cluster total width during the ELA and LLA at the 90 percent confidence interval ($\alpha = 0.1$) (Table VIII-2; Figure VIII-6).

Table VIII-2. Logtotal Width: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.04392	-0.02272
LLA	-0.02272	-0.07996

*Positive values show pairs of means that are significantly different

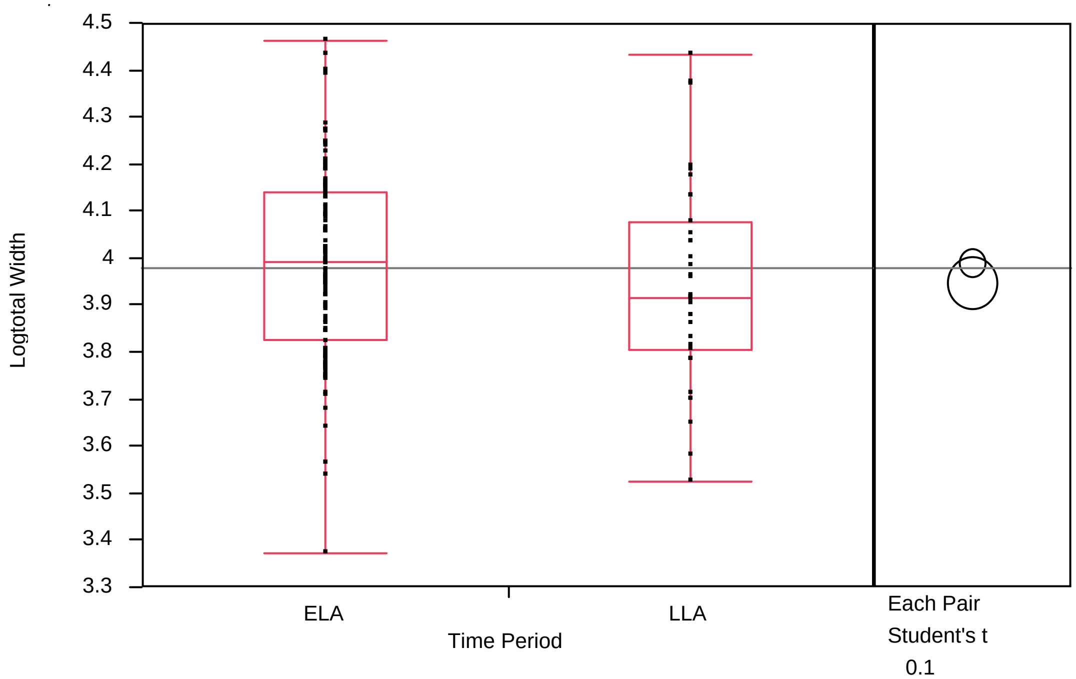

Figure VIII-6. Oneway analysis of San Pedro cluster logtotal widths from the Hueco Bolson.

Projectile Point Blade Length of the San Pedro Cluster. The results of the non-parametric test comparing the blade length of the San Pedro cluster from the ELA (n = 96) and the LLA (n = 29) indicate that there is a significant difference between the two samples (p = 0.0105) at the 90 percent confidence interval (α = 0.1). Furthermore, it appears that the blade length of the San Pedro cluster is greater during the LLA than the ELA (Figure VIII-7).

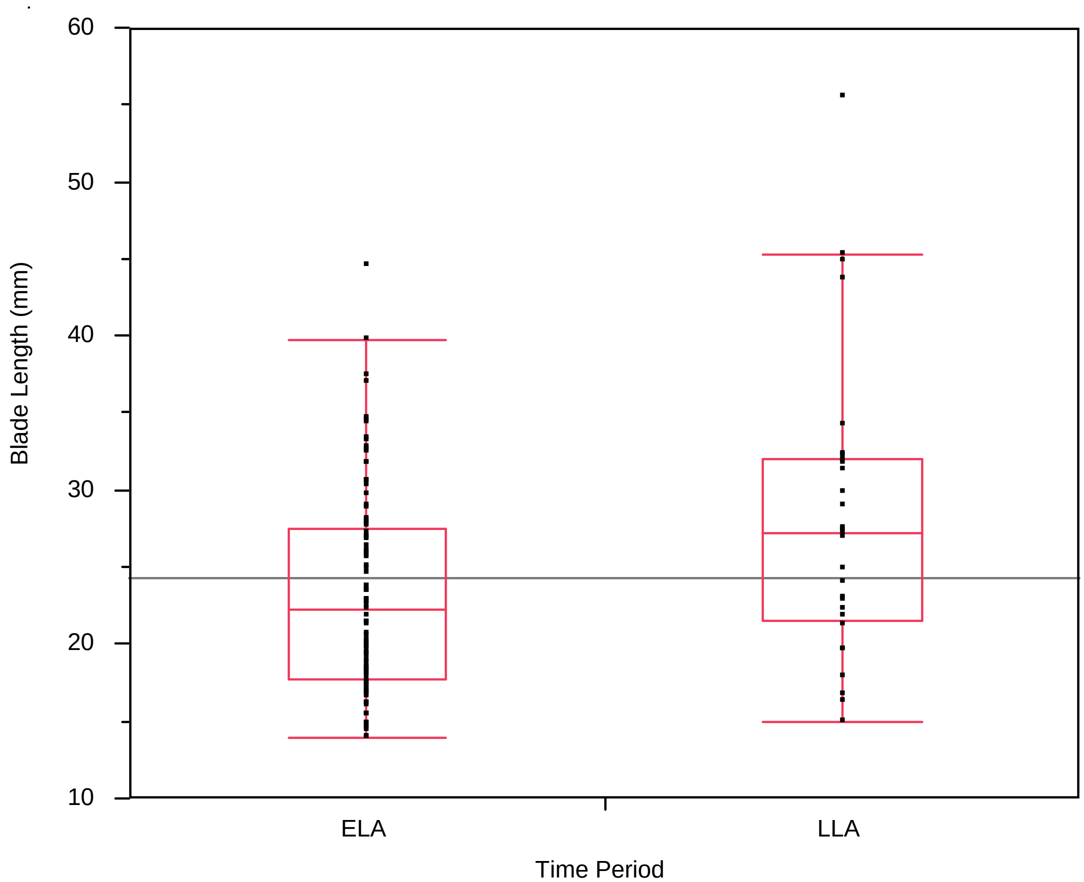

Figure VIII-7. Oneway analysis of San Pedro cluster blade lengths from the Hueco Bolson.

Projectile Point Blade Width of the San Pedro Cluster. The samples from the San Pedro cluster of the ELA and LLA are normally distributed. Also, the sample sizes for the ELA (n = 118) and the LLA (n = 35) are large enough to use the Student's t test. The results of the Student's t test for significance indicate that the blade width of the San Pedro cluster from the ELA is not significantly different than the San Pedro cluster from the LLA ($p = 0.2746$) at a 90 percent confidence interval ($\alpha = 0.1$) (Table VIII-3; Figure VIII-8).

Table VIII-3. Blade Width: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.9134	-0.4556
LLA	-0.4556	-1.6772

*Positive values show pairs of means that are significantly different

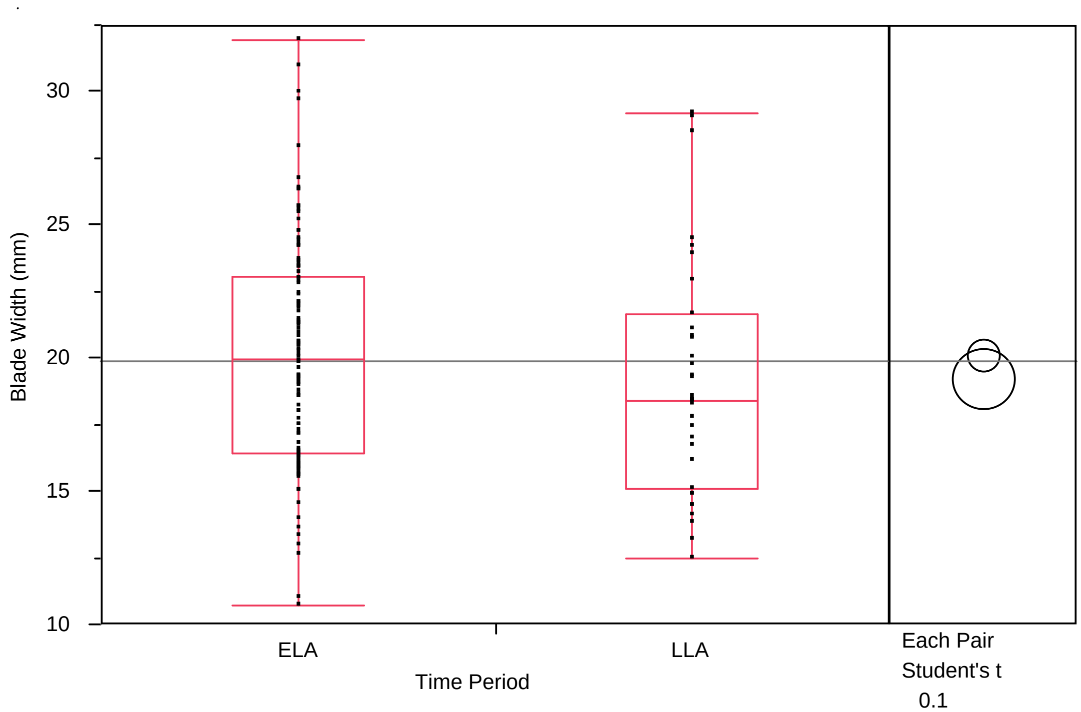

Figure VIII-8. Oneway analysis of San Pedro cluster blade widths from the Hueco Bolson.

Projectile Point Blade Thickness of the San Pedro Cluster. Both sets of samples of the blade length high visibility attribute for the San Pedro cluster from the ELA and LLA have a normal distribution. The samples sizes (ELA = 129; LLA = 39) are large enough for a parametric test. Therefore, I used a Student's t test to evaluate the significance of the means for the blade thickness of the San Pedro cluster. The results of the Student's t test for significance indicate that the ELA blade thickness is not significantly different from the LLA (p = 0.6760) at a 90 percent confidence interval (α = 0.1) (Table VIII-4; Figure VIII-9).

Table VIII-4. Blade Thickness: Comparisons of Each Pair Using Student's t.*

Time Period	**ELA**	**LLA**
ELA	-0.22679	-0.24860
LLA	-0.24860	-0.41246

*Positive values show pairs of means that are significantly different

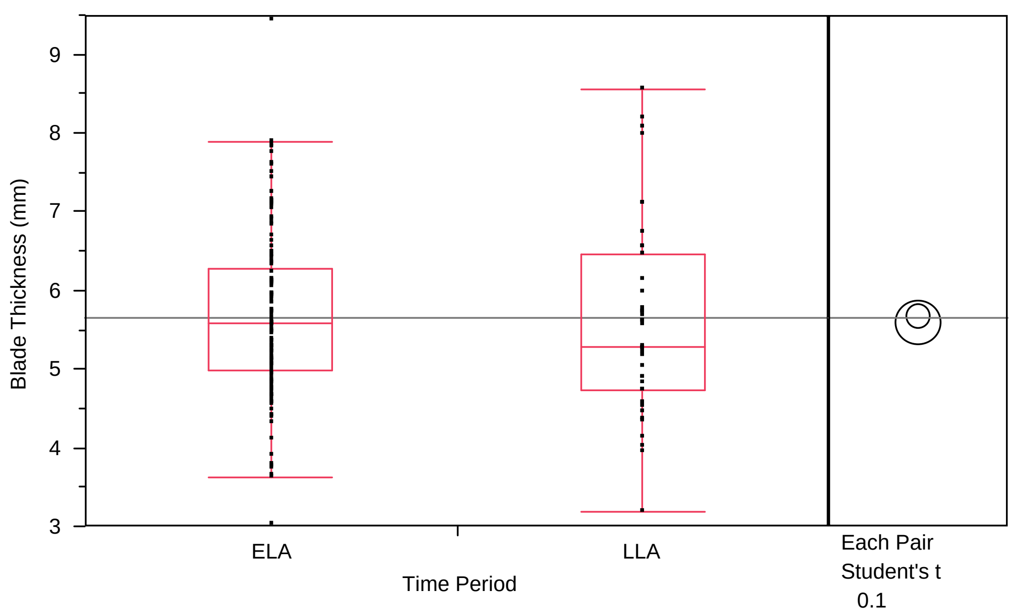

Figure VIII-9. Oneway analysis of San Pedro cluster blade thicknesses in the Hueco Bolson.

Implications of the ELA and LLA San Pedro Cluster Projectile Point High Visibility Attribute Analysis. Although the results from the analysis of the Cienega cluster support the assertion that the LLA projectile point attributes represent a continuation of the subsistence strategies and curation technologies present during the ELA, the outcome of the statistical tests of the San Pedro cluster suggests that curation technologies did change. The results of all of the San Pedro analyses except for blade width and total width support the notion that there was more resharpening in the ELA than in the LLA (Table VIII-5). Therefore, this pattern suggests that, contrary to Mbutu (1997), the introduction of agriculture may have played a larger role in the diets of the LLA groups, and it supports Whalen's (1977, 1978, 1980, 1994) argument that although the LLA groups of the Hueco Bolson mainly engaged in hunting and gathering, this subsistence strategy was supplemented by agriculture. Similar to the Tucson Basin results, these patterns from the Cienega and San Pedro clusters further indicate that, overall, other than blade thickness, high visibility attributes of projectile points are poor candidates to ascertain social continuity within a region and therefore are not suitable to use to interpret social interaction between groups from the different regions.

Table VIII-5. Comparisons of the High Visibility Attributes for the San Pedro Cluster in the Hueco Bolson.

High Visibility Attribute	ELA	LLA
Total length	Smaller	Larger
Total width	No change	No change
Blade length	Smaller	Larger
Blade width	No change	No change
Blade thickness*	No change	No change

*Conforms to the expectations

Blade thickness is the only high visibility attribute that is not affected by a change in curation technologies such as resharpening. If there is social continuity between the ELA and LLA groups from the Hueco Bolson, then the results from the statistical test would show no difference of the blade thickness through time. The results from comparing the blade thickness between the ELA and LLA support the expectation of no change through time, and they further suggest that there was social continuity between the ELA and LLA groups in the Hueco Bolson.

Hueco Bolson Moderate Visibility Projectile Point Attributes

The expectation for the Cienega and San Pedro cluster moderate visibility attributes from the Hueco Bolson during the ELA and LLA is that they should not have any statistically significant differences, because these attributes are not affected by a change in subsistence, and they should therefore reflect social continuity. Moderate visibility attributes used in this study are the presence/absence of serration, flake patterns, and blade tip thickness.

Moderate Visibility Attributes of the Projectile Points from the Cienega Cluster during the ELA and LLA from the Hueco Bolson

The Cienega cluster sample size during the LLA is extremely small (n = 17) in contrast to the ELA sample (n = 50). The sample size from the ELA dictates that only non-parametric statistical tests are appropriate for testing significance. However, there are enough specimens to compare the presence/absence of serration, flake patterns, and blade tip thickness. Because these attributes have moderate visibility, and possibly indicate social continuity between the ELA and LLA groups, I expect these attributes to be similar through time in the Hueco Bolson.

Projectile Point Serration of the Cienega Cluster. Because the expected value for the presence of serration on projectile points from the Cienega cluster is less than five during the LLA, I used the Fisher’s Exact test (Table VIII-6). According to the results from the test, there is no difference in the presence or absence of serration between the ELA and the LLA (p = 0.3014; α = 0.1).

Table VIII-6. Contingency Table Comparing Serration on the ELA and LLA Cienega Cluster Projectile Points.

Count Total % Column % Row % Expected	0	1	
ELA	47 70.15 73.44 94.00 47.7612	3 4.48 100.00 6.00 2.23881*	50 74.63
LLA	17 25.37 26.56 100.00 16.2388	0 0.00 0.00 0.00 0.76119*	17 25.37
	64 95.52	3 4.48	67

*expected <5

Projectile Point Flake Patterns of the Cienega Cluster. As with the previous moderate visibility attribute, the expected value for the presence of flake patterns on projectile points from the Cienega cluster is less than five during the ELA and LLA (Table VIII-7). This requires that I use the Fisher's Exact test. According to the results from the test, there is no difference for the presence or absence of flake patterns between the ELA and the LLA (p = 0.5964; α = 0.1).

Table VIII-7. Contingency Table Comparing Serration on the ELA and LLA Cienega Cluster Projectile Points.

Count Total % Column % Row % Expected	none	overlapping	
ELA	43 69.35 75.44 93.48 42.2903	3 4.84 60.00 6.52 3.70968*	46 74.19
LLA	14 22.58 24.56 87.50 14.7097	2 3.23 40.00 12.50 1.29032*	16 25.81
	57 91.94	5 8.06	62

*expected <5

Projectile Point Blade Tip Thickness of the Cienega Cluster. The number of specimens for the Cienega cluster during the LLA is extremely small (n = 12). On the other hand, there are 41 cases during the ELA. Because of the small sample size from the LLA dataset, only a non-parametric test is appropriate. The p value for the tip thickness is 0.8566, which is not statistically significant at the 90 percent confidence interval level ($\alpha = 0.10$) (Figure VIII-10).

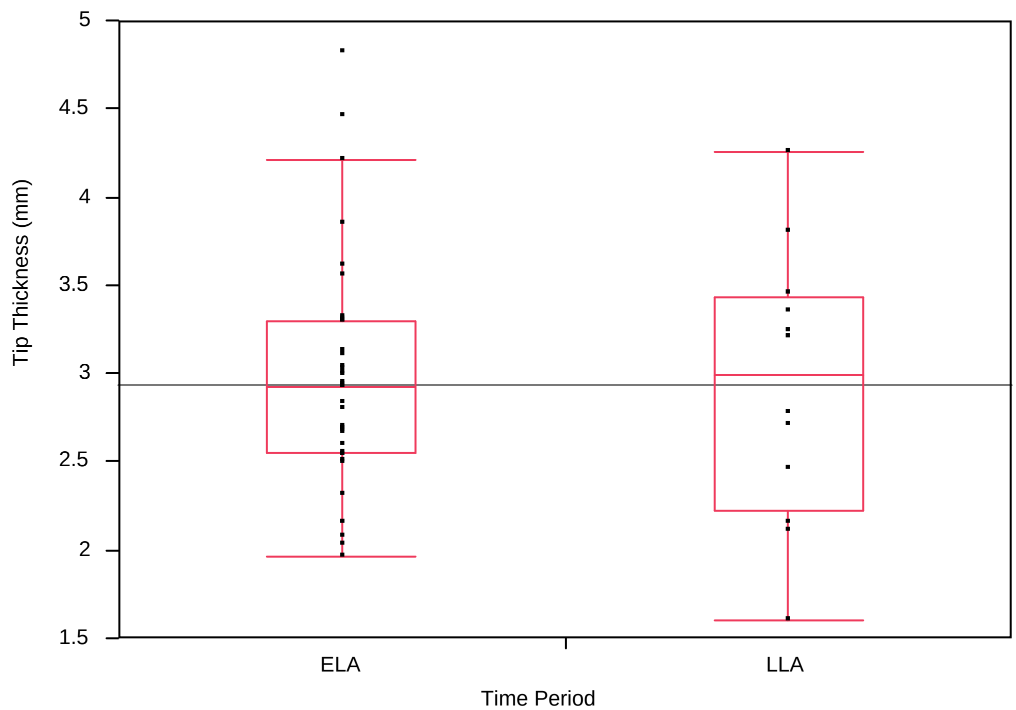

Figure VIII-10. Oneway analysis of Cienega cluster blade tip thicknesses from the Hueco Bolson.

Implications of the ELA and LLA Cienega Cluster Moderate Visibility Attribute Analysis. I was able to evaluate all three moderate visibility attributes for the ELA and LLA Cienega cluster from the Hueco Bolson. The comparisons of these attributes indicate that none of them is statistically different between the ELA and the LLA (Table VIII-8). Because the moderate visibility attributes are not affected by changing subsistence and curation strategies, the pattern suggests social continuity between the ELA and LLA groups from the Hueco Bolson, which in turn indicates that it is appropriate to assume that moderate visibility attributes will also indicate social interaction between groups from different regions, as Carr (1995b) suggests.

Table VIII-8. Comparisons of the Moderate Visibility Attributes for the Cienega Cluster in the Tucson Basin.

Moderate Visibility Attribute	ELA	LLA
Serration*	No change	No change
Flake pattern*	No change	No change
Blade tip thickness*	No change	No change

*Conforms to the expectations

Hueco Bolson Moderate Visibility Projectile Point Attributes of the San Pedro Cluster during the ELA and LLA

The San Pedro cluster has a large enough sample size for both the ELA (n = 134) and the LLA (n = 40), and so all three moderate visibility attributes can be compared between the two periods. These moderate visibility attributes are presences/absence of serration, flake patterns, and blade tip thickness. Because these attributes have moderate visibility and indicate social continuity, I expected the attributes to be similar through time within the Hueco Bolson.

Projectile Point Serration of the San Pedro Cluster. Similar to this attribute for the Cienega cluster, the expected value for the presence of serration on projectile points from the San Pedro cluster is less than five during the LLA; therefore I used the Fisher's Exact test (Table VIII-9). However, unlike the Cienega cluster, the results from the test indicate there is a statistical difference for the presence or absence of serration between the ELA and the LLA. The Fisher's Exact test shows that not only is there a statistical difference between the ELA and LLA ($p = 0.0929$; $\alpha = 0.1$), but the results indicate that if a projectile point from the Cienega cluster is serrated, then it is most likely from the LLA ($p = 0.0710$; $\alpha = 0.1$).

Table VIII-9. Contingency Table Comparing Serration on the ELA and LLA San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	0	1	
ELA	126 72.41 78.75 94.03 123.218	8 4.60 57.14 5.97 10.7816	134 77.01
LLA	34 19.54 21.25 85.00 36.7816	6 3.45 42.86 15.00 3.21839*	40 22.99
	160 91.95	14 8.05	174

*expected <5

Projectile Point Flake Patterns of the San Pedro Cluster. The expected value for the presence of flake patterns on projectile points from the San Pedro cluster is less than five during the LLA (Table VIII-10). This requires that I use the Fisher's Exact test, the results of which suggest that there is no difference for the presence or absence of flake patterns between the ELA and the LLA (p = 0.6806; α = 0.1).

Table VIII-10. Contingency Table Comparing Flake Patterns on the ELA and LLA San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	none	overlapping	
ELA	112 71.34 75.17 94.12 112.936	7 4.46 87.50 5.88 6.06369	119 75.80
LLA	37 23.57 24.83 97.37 36.0637	1 0.64 12.50 2.63 1.93631*	38 24.20
	149 94.90	8 5.10	157

*expected <5

Projectile Point Blade Tip Thickness of the San Pedro Cluster. This moderate visibility attribute is normally distributed when the formula log + 1 is applied to its values. The normal distribution in conjunction with the sample sizes from the ELA (n = 96) and the LLA (n = 30) allow for the use of the Student's t test. The results of this test indicate that there is no significant difference of the blade tip thickness of the San Pedro cluster from the ELA and LLA ($p = 0.3035$; $\alpha = 0.1$) (Table VII-11; Figure VIII-11).

Table VIII-11. Logblade Tip Thickness: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.05117	-0.05131
LLA	-0.05131	-0.09154

*Positive values show pairs of means that are significantly different

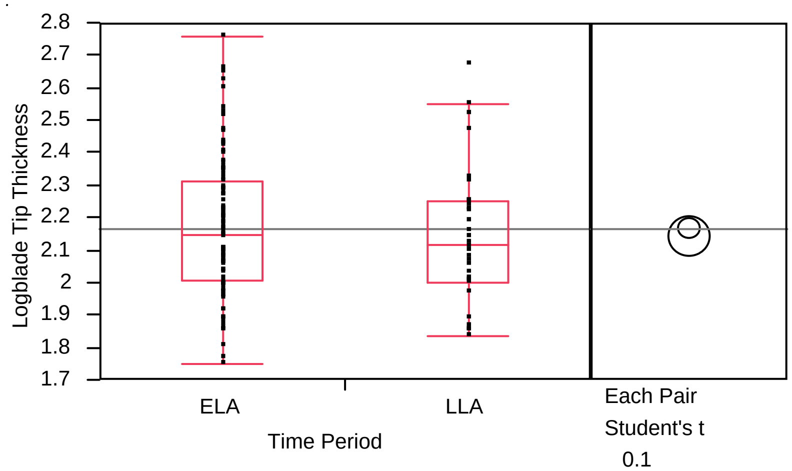

Figure VIII-11. Oneway analysis of San Pedro cluster logblade tip thicknesses from the Hueco Bolson.

Implications of the ELA and LLA San Pedro Cluster Moderate Visibility Projectile Point Attribute Analysis. The results from the flake patterns and the blade tip thickness support the expectation that there should be no difference among the moderate visibility attributes between the ELA and LLA San Pedro cluster (Table VIII-12), which suggests social continuity between the ELA and LLA groups living in the Hueco Bolson. In contrast, the presence/absence of serration indicates that there is a difference in these attributes from the two periods.

Table VIII-12. Comparisons of the Moderate Visibility Attributes for the San Pedro Cluster in the Hueco Bolson.

Moderate Visibility Attribute	ELA	LLA
Serration	More likely	Less likely
Flake pattern*	No change	No change
Blade tip thickness*	No change	No change

*Conforms to the expectations

As with the results of presence/absence for San Pedro cluster serration from the Tucson Basin, the change may be due to a modification in function. During the ELA, projectile points from the San Pedro cluster may have been used as saws as well as projectile points. During the LLA, there may have been a shift to another tool to perform as a saw, and the San Pedro points may have been used exclusively as points. However, because both the flake pattern and the blade tip thickness moderate visibility attributes are similar between the ELA and LLA, thus indicating social continuity, these attributes still appear to be good candidates to compare social interaction between the groups from the different regions.

Hueco Bolson Low Visibility Projectile Point Attributes

Low visibility attributes may indicate passive social interaction, the passive components of enculturation, shared histories of interaction, and passive messages pertaining to personal level social processes (Carr 1995b; Hoffman 1997). Low visibility attributes of projectile points used for this study are weight, stem length, neck width, base width, and stem thickness.

Hueco Bolson Low Visibility Projectile Point Attributes of the Cienega Cluster during the ELA and LLA

The expectation for the Cienega cluster is that there should be no statistically significant difference for any of the low visibility attributes between the ELA and LLA, because the groups from these periods should have had close transgenerational social ties. Only the low visibility attribute of weight (ELA = 29; LLA = 6) does not have a large enough sample size to be evaluated.

Projectile Point Stem Length of the Cienega Cluster. The LLA sample size for the stem length attribute is 41 from the ELA and 12 from the LLA. Since the LLA sample is small, a nonparametric test is appropriate. The results from the test show that there is a significant difference in stem length for the Cienega cluster between the ELA and LLA ($p = 0.0072$; $\alpha = 0.1$). Furthermore, it appears that the stem lengths from the ELA are longer than those from the LLA (Figure VIII- 12). This result does not conform to the expectation that there should be no change.

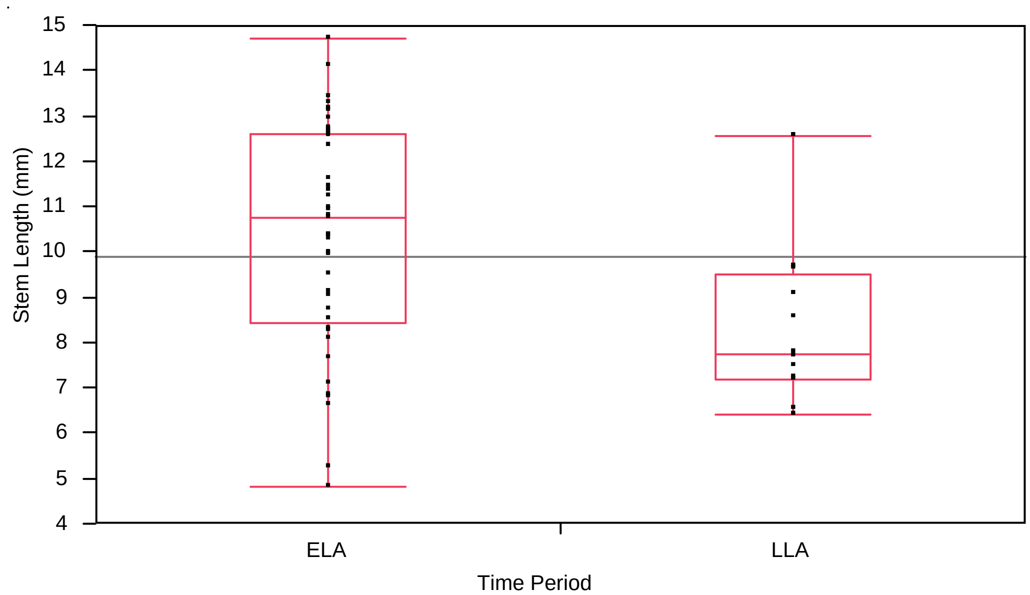

Figure VIII-12. Oneway analysis of Cienega cluster stem lengths from the Hueco Bolson.

Projectile Point Neck Width of the Cienega Cluster. It is necessary to use a nonparametric test to compare the neck widths of the Cienega cluster from the ELA and LLA, because the LLA only has 16 specimens (ELA = 45). The nonparametric test shows that there is no statistical difference ($p = 0.1081$; $\alpha = 0.1$) between the ELA and the LLA for neck width (Figure VIII-13), which is consistent with the expectation that low visibility attributes should be the same between the ELA and the LLA.

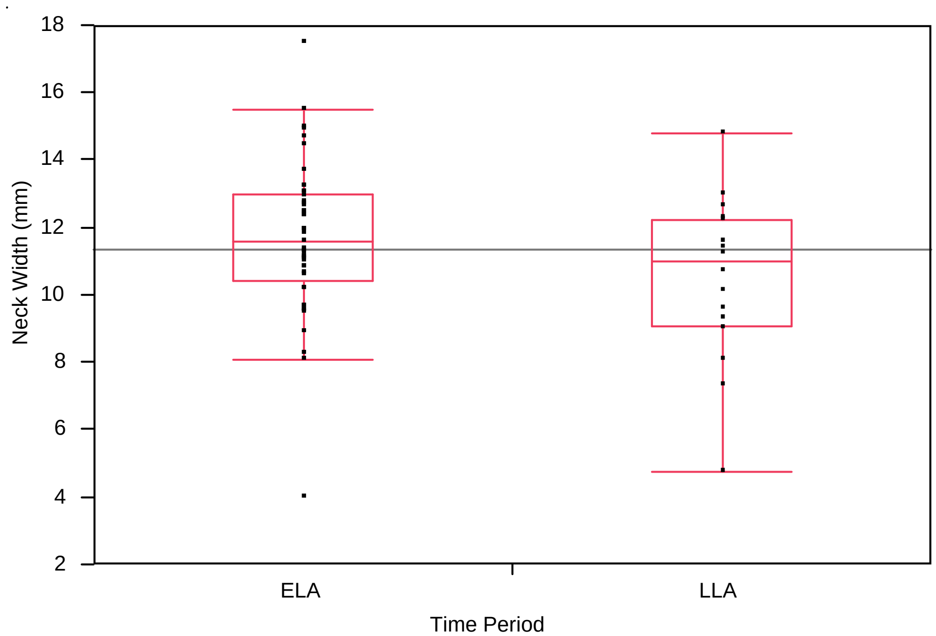

Figure VIII-13. Oneway analysis of Cienega cluster neck widths from the Hueco Bolson.

Projectile Point Base Width of the Cienega Cluster. I used a nonparametric test for this variable because of its low sample size from the LLA (n = 12; ELA = 36). The results from this test do not support my expectation that there should be no statistical difference of the base widths of the Cienega cluster from the ELA and LLA (p = 0.0116; $\alpha = 0.1$) (Figure VIII-14).

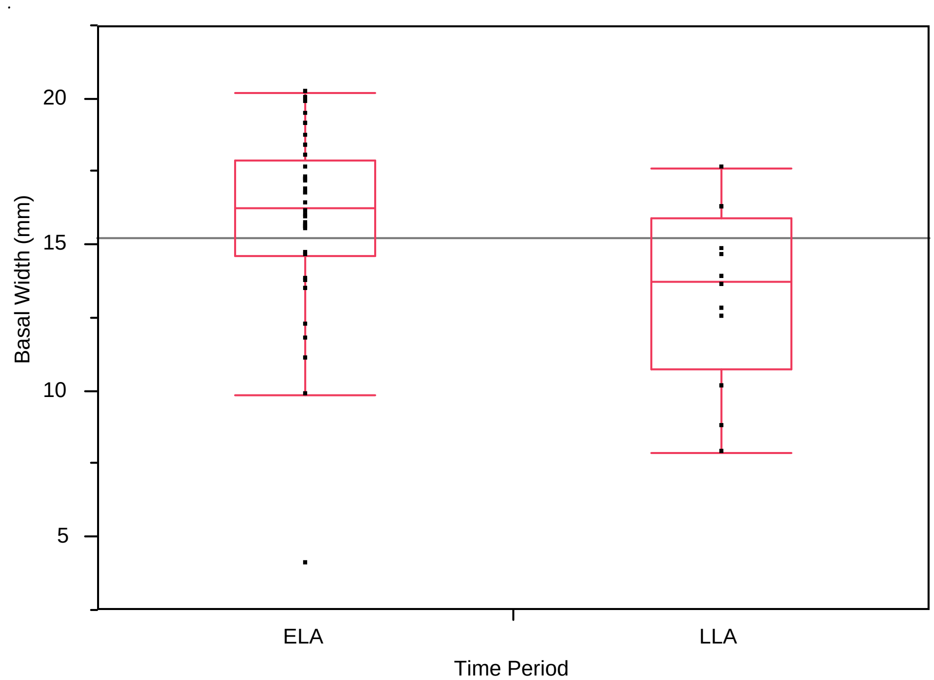

Figure VIII-14. Oneway analysis of Cienega cluster base widths from the Hueco Bolson.

Projectile Point Stem Thickness of the Cienega Cluster. A nonparametric test is appropriate for comparing the stem thicknesses of the Cienega cluster from the ELA (n = 44) and LLA (n= 14). The outcome of this comparison shows that, similar to my expectation, there is no significant difference between the stem thicknesses between the ELA and LLA ($p = 0.7436$) (Figure VIII-15).

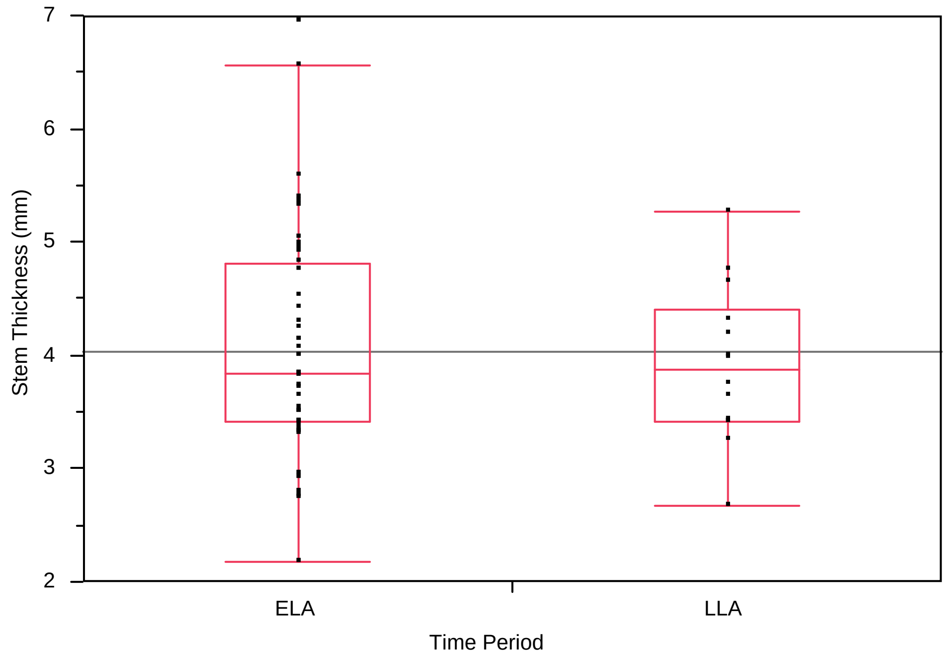

Figure VIII-15. Oneway analysis of Cienega cluster stem thicknesses from the Hueco Bolson.

Implications of the ELA and LLA Cienega Cluster Low Visibility Attribute Analysis. Based on the statistical tests, only two of the four low visibility attributes support my expectation that there should be no statistical difference of the attributes between the ELA and LLA (Table VIII-13), which would indicate social continuity. These results may suggest that the low visibility attributes may not be ideal for identifying social interaction between groups in different regions.

Because the LLA marks a transition from dart points to arrow points, this transition may have affected the Cienega cluster more, since this cluster appears predominantly during the changeover to arrow points. It is possible the change in stem length and base width are due to a change in the foreshaft onto which the point was hafted. Sliva's (1999) study suggests that projectile points that fall within the Cienega cluster show a greater preponderance of arrow points, but some of the points still have characteristics of dart points, such as a larger size. Because arrow shafts are smaller in diameter that dart shafts, for functional purposes the base width and possibly the stem length would need to be smaller as the results indicate. Following this logic, however, the neck width should also be smaller during the LLA, which it is not, based on a 90 confidence interval. Although it is inappropriate to change the statistical threshold, it should be noted that the neck width is barely not statistically significant ($p = 0.1081$; $\alpha = 0.1$), and one of the drawbacks for using nonparametric tests over parametric test is that the nonparametric methods are more conservative in identifying statistical differences.

Table VIII-13. Comparisons of the Low Visibility Attributes for the Cienega Cluster in the Hueco Bolson.

Low Visibility Attribute	**ELA**	**LLA**
Stem length	Larger	Smaller
Neck width*	No change	No change
Base width	Larger	Smaller
Stem thickness*	No change	No change

*Conforms to the expectations

Projectile Point Low Visibility Attributes of the Hueco Bolson San Pedro Cluster during the ELA and LLA

The expectation for the San Pedro cluster is that there should be no statistically significant difference for any of the low visibility attributes between the ELA and LLA, because there should be social continuity. Furthermore, unlike the Cienega cluster, it appears that the San Pedro cluster was not as affected by the transition to the bow and arrow (Sliva 1999; Stevens and Sliva 2002), because the projectile points do not get smaller between the ELA and LLA. Because of the large sample sizes, all low visibility attributes can be evaluated between the ELA and LLA.

Projectile Point Weight of the San Pedro Cluster. The LLA sample size for weight is 24, and so I used a nonparametric test to evaluate this attribute (ELA = 91). The results from the test show that there is no significant difference in weight for the San Pedro cluster between the ELA and LLA ($p = 0.1817$; $\alpha = 0.1$), which conforms to the expectation of no change (Figure VIII-16).

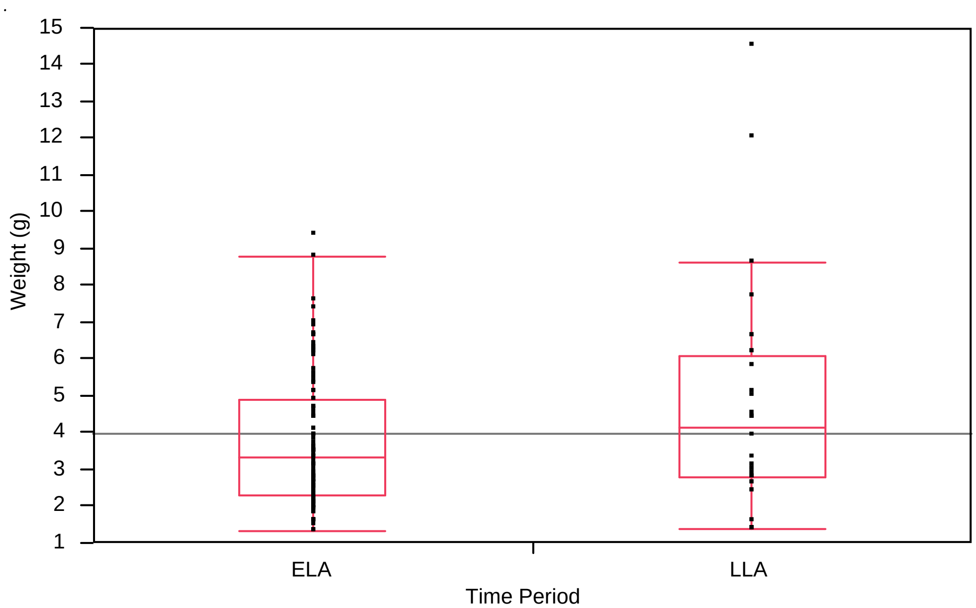

Figure VIII-16. Oneway analysis of San Pedro cluster weights from the Hueco Bolson.

Projectile Point Stem Length of the San Pedro Cluster. Because the sample sizes from both periods are greater than 30 (ELA = 131; LLA = 37), and both are normally distributed after removing one outlier from the ELA sample, it is possible to use a Student's t test to compare the stem lengths. The results from this test show that there is no statistical difference ($p = 0.4406$; $\alpha = 0.1$) between the stem lengths from the ELA and the LLA in the Hueco Bolson region (Table VIII-14; Figure VIII-17).

Table VIII-14. Stem Length: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.4887	-0.6697
LLA	-0.6697	-0.9196

*Positive values show pairs of means that are significantly different

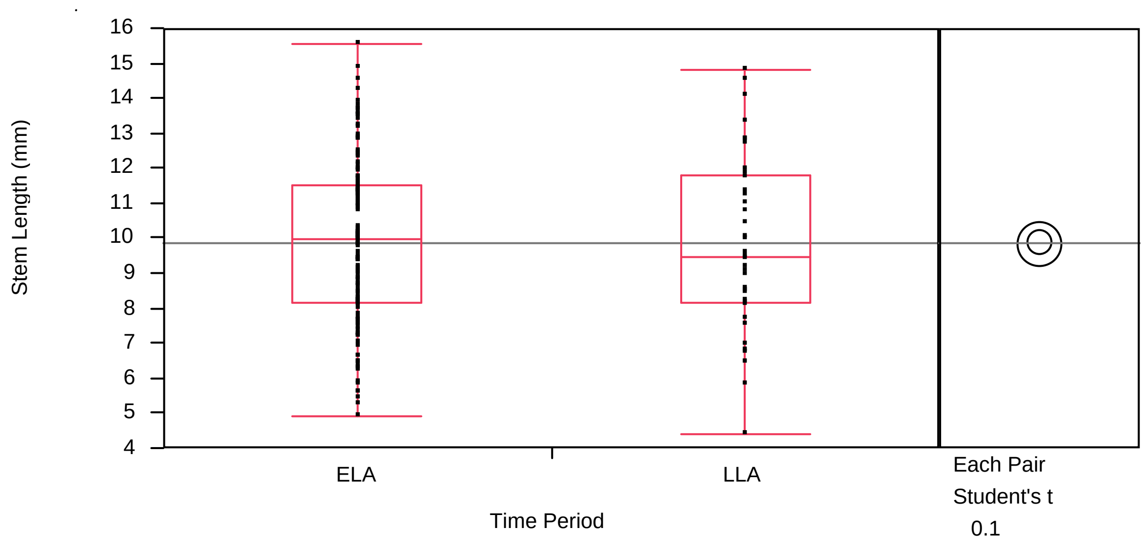

Figure VIII-17. Oneway analysis of San Pedro cluster stem lengths from the Hueco Bolson.

Projectile Point Neck Width of the San Pedro Cluster. The distribution of the samples from the ELA (n = 133) and the LLA (n = 38) are normal, and so a Student's t test is appropriate to compare this attribute from the two periods. As expected, the results of the Student's t test show that there is no significant difference ($p = 0.1632$; $\alpha = 0.1$) for the neck width of the San Pedro cluster from the ELA and LLA (Table VIII-15; Figure VIII-18).

Table VIII-15. Neck Width: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.4843	-0.2942
LLA	-0.2942	-0.9061

*Positive values show pairs of means that are significantly different

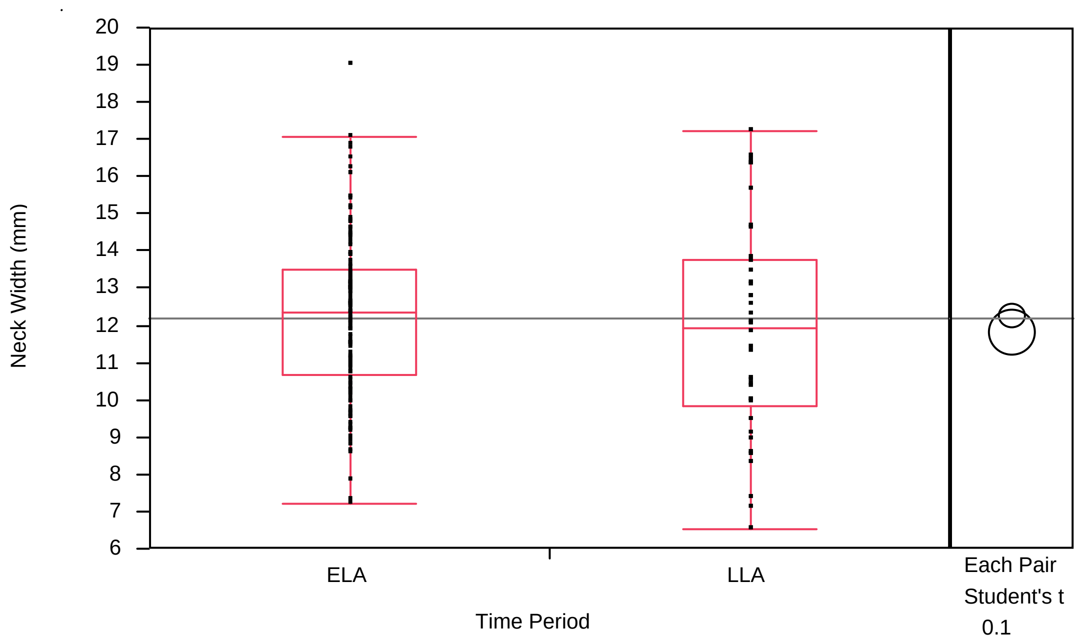

Figure VIII-18. Oneway analysis of San Pedro cluster neck widths from the Hueco Bolson.

Projectile Point Base Width of the San Pedro Cluster. The distributions for the base width from the ELA (n = 128) and LLA (n = 33) are normal, and so I used a Student's t test to compare the means for the neck width from the San Pedro cluster. The results of the t test shows that there is a statistically significant difference between of the base widths from the San Pedro cluster during the ELA and LLA ($p = 0.0146$; $\alpha = 0.1$) (Table VIII-16) The data suggest the base width for the ELA are greater than during the LLA (Figure VIII-19).

Table VIII-16. Base Width: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.5880	0.3024
LLA	0.3024	-1.1580

*Positive values show pairs of means that are significantly different

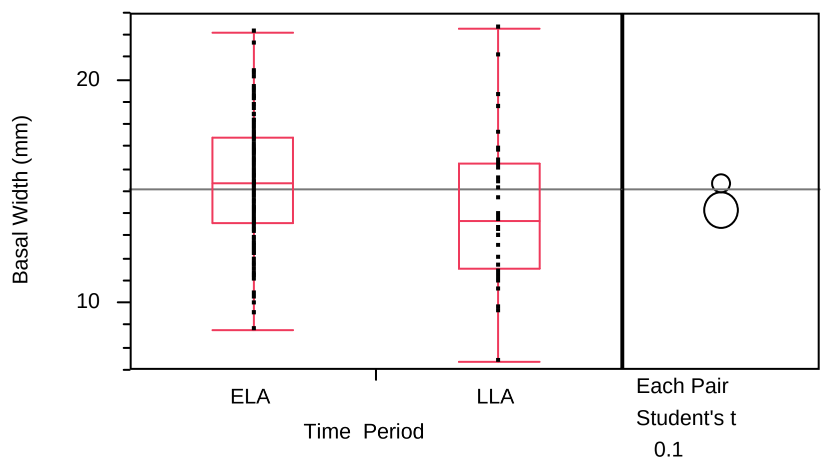

Figure VIII-19. Oneway analysis of San Pedro cluster base widths from the Hueco Bolson.

Projectile Point Stem Thickness of the San Pedro Cluster during the ELA and LLA. The distributions for the stem thicknesses of the San Pedro cluster from the ELA (n = 131) and LLA (n = 38) are normal, and so I used a Student's t test to compare the means. The Student's t test shows that there is no significant difference ($p = 0.3278$) (Table VIII-17) between the stem thicknesses of the San Pedro cluster of the ELA and LLA (Figure VIII-20).

Table VIII-17. Stem Thickness: Comparisons of Each Pair Using Student's t.*

Time Period	ELA	LLA
ELA	-0.16525	-0.17986
LLA	-0.17986	-0.30683

*Positive values show pairs of means that are significantly different

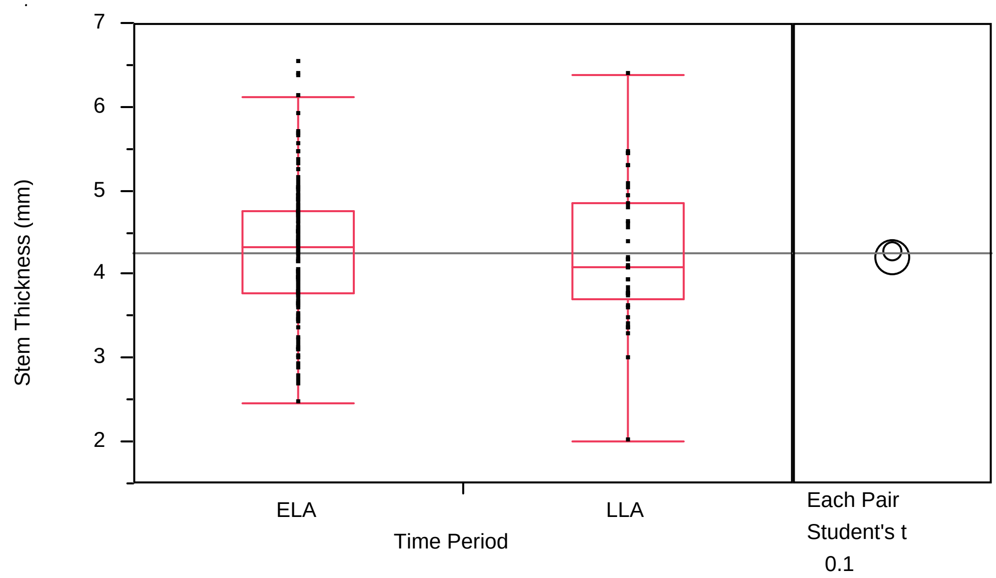

Figure VIII-20. Oneway analysis of San Pedro cluster stem thicknesses from the Hueco Bolson.

Implications of the ELA and LLA San Pedro Cluster Low Visibility Attribute Analysis. Only the base width attribute of the San Pedro cluster does not support my expectation that that there should be no difference among the moderate visibility attributes between the ELA and LLA (Table VIII-18). Therefore, at least for the San Pedro cluster, five of the six low visibility attributes do indicate social continuity between the ELA and LLA groups from the Hueco Bolson, and therefore they should make good candidates for identifying social interaction between groups from different regions. The results show that the base width is smaller during the ELA than the LLA, which may indicate a change in functional use form a dart point to an arrow point.

Table VIII-18. Comparisons of the Low Visibility Attributes for the San Pedro Cluster in the Hueco Bolson.

Low Visibility Attribute	**ELA**	**LLA**
Weight*	No change	No change
Stem length*	No change	No change
Neck width*	No change	No change
Base width	Larger	Smaller
Stem thickness*	No change	No change

*Conforms to the expectations

Patterns in the Hueco Bolson High, Moderate, and Low Visibility Projectile Point Attribute Analyses

In general, the moderate and low visibility attributes of the projectile points from the Cienega and San Pedro clusters between the ELA and LLA show that there are not any significant changes in the attributes, which indicates social continuity between ELA and LLA groups from the Hueco Bolson (Table VIII-19). These results are quite promising in that the moderate and low visibility attributes can be used to identify social interaction between regions.

Table VIII-19. Comparisons of the Hueco Bolson Visibility Attributes for the San Pedro and Cienega Clusters between the ELA and LLA.

Visibility Level	Cluster	Attribute	ELA	LLA
High	Cienega	Total width*	No change	No change
		Blade length*	No change	No change
		Blade width*	No change	No change
		Blade thickness*	No change	No change
	San Pedro	Total length	Smaller	Larger
		Total width*	No change	No change
		Blade length	Smaller	Larger
		Blade width*	No change	No change
		Blade thickness*	No change	No change
Moderate	Cienega	Serration*	No change	No change
		Flake pattern*	No change	No change
		Blade tip thickness*	No change	No change
	San Pedro	Serration	More likely	Less likely
		Flake pattern*	No Change	No change
		Blade tip thickness*	No Change	No change
Low	Cienega	Stem length	Larger	Smaller
		Neck width*	No change	No change
		Base width	Larger	Smaller
		Stem thickness*	No change	No change
	San Pedro	Weight*	No change	No change
		Stem length*	No change	No change
		Neck width*	No change	No change
		Base width	Larger	Smaller
		Stem thickness*	No change	No change

*Conforms to the expectations

The one major contradiction to this assertion is the result from the stem length and base width low visibility attributes of the Cienega cluster. The changes in this dataset may represent the shift from dart point to bow and arrow as indicated by Sliva (1999), which requires a smaller stem length and base width in order to be fastened to arrow shafts.

The most telling pattern of the high visibility attributes from the Hueco Bolson is that blade thickness does not change for both the Cienega and San Pedro clusters.

This result further supports my idea that blade thickness is the only high visibility attribute that is an indicator of social continuity. Therefore, blade thickness can be used to identify the social interaction of groups between regions, as Carr (1995b) has suggested.

Although the total width and blade width high visibility attributes from Cienega and San Pedro clusters do not support my expectation that they changed significantly between the ELA and LLA due to a change in curation technologies, they are consistent between the two clusters. This pattern supports Mbutu's (1997) contention that groups in the Hueco Basin used the same subsistence strategies during the ELA and LLA.

In contrast, the results of the blade length from the Cienega and San Pedro clusters differ between the two clusters. The result from this high visibility attribute from the Cienega cluster is consistent with the total width and blade width attributes in that it does not change through time. On the other hand, the blade length from the San Pedro cluster is significantly larger, which supports Whalen's (1977, 1978, 1980, 1994) suggestion that agriculture began to supplant hunting and gathering during the LLA.

Overarching Patterns in the ELA and LLA High, Moderate, and Low Visibility Projectile Point Attributes in the Tucson Basin and Hueco Bolson

One of the main purposes for comparing the high, moderate, and low visibility attributes within each region is to identify those attributes that show social continuity between the groups form the ELA and LLA within a region, and therefore that may indicate social interaction between groups in different regions. Carr (1995), however, states that the functional need for a tool will constrain and possibly trump social indicators. The analytic results in both this and the previous chapter show that the high visibility attributes may indeed be a reflection of the change in subsistence strategies and curation technologies, such as a shift from hunting and gathering to a greater dependence on agriculture rather than of social interaction. Therefore, I use all of the high visibility attributes except for blade thickness to compare the amount of resharpening and curation that took place between groups from the Tucson Basin, Black Mesa, and the Hueco Bolson. I also use blade thickness in the subsequent chapters as a measure of social interaction of groups between regions, since I have shown that this attribute measures social continuity within a region.

In contrast, the moderate and low visibility attributes with a few exceptions tend to support the assertion that they should not be affected by a change in subsistence and curation technologies and therefore do not change between the ELA and LLA. Instead, they indicate social continuity between ELA and LLA groups in the same region, which is consistent with Carr's (1995b) premise for the visibility hierarchy. A total of 13 out of 16 moderate and low visibility attributes from the Tucson Basin Cienega and San Pedro clusters, and 11 out of 15 of moderate and low visibility attributes from the Hueco Bolson Cienega and San Pedro clusters do not change between the ELA and LLA, and support the notion of social continuity within each of these regions (Table VII-23; Table VIII-19). Therefore, following this logic, the moderate and low visibility attributes should also follow Carr's assertion that they are good indicators of social interaction between groups from different regions. The one exception for of the low visibility attributes is base width. As previously mentioned, the shift to a smaller base width during the LLA may indicate a change in function of the projectile points from a dart point to an arrow point.

Chapter IX

Results of Comparing High Visibility Projectile Point Attributes among the Tucson Basin, Black Mesa, and Hueco Bolson Projectile Points

In this chapter, I introduce the results from the parametric and nonparametric tests for the high visibility attributes of the projectile point clusters that I compare between the Tucson Basin, Black Mesa, and the Hueco Bolson. The Black Mesa dataset does not have a sufficient number of projectile points to compare to the other two regions during the ELA, but there are enough to compare the projectile point clusters from all three regions to each other during the LLA. Based on the literature (Gregory 2001a, 2001c; Gregory and Diehl 2002), I expect that the Tucson Basin high visibility attributes will indicate that the groups from this region relied more on agriculture than did the Hueco Bolson and Black Mesa groups during both the ELA and LLA. Therefore, the high visibility attributes of total length, total width, blade length, and blade width should be statistically larger from the Tucson Basin, because groups from this region relied more on agriculture. Furthermore, the literature suggests that the groups from the Hueco Bolson did not depend on agriculture until after the LLA (Mbutu 1997). Therefore, those higher visibility attributes should be statistically smaller than the attributes from the Tucson Basin and Black Mesa.

According to Carr (1995b), high visibility attributes have the potential for communicating information about the individual, the group, the society, and acculturation unless they are constrained by the functional need for the tool. The analyses in the two previous chapters suggest that the latter is true for most of the high visibility attributes, total length, blade length, total width, and blade width because of projectile point curation. However, knowing which groups relied more on agriculture at any given time is important, because it helps address my hypotheses and expectations that I presented in chapter 1. Namely, the type of subsistence strategy could have caused groups from the different regions to be in competition with one another.

On the other hand, the high visibility attribute of blade thickness, which resharpening does not affect, shows that there is transgenerational social continuity between ELA and LLA groups within a region. Carr (1995b) suggests that high visibility attributes that signify social continuity within a region also indicate the social interaction of groups between regions. Therefore, looking at similarities in blade thickness in the different regions may identify cooperation between the groups in those regions.

Tucson Basin and the Hueco Bolson High Visibility Projectile Point Attributes during the ELA

The clusters that I identified in a previous chapter that are associated with both regions and have large enough sample sizes during the ELA are the Cienega and San Pedro clusters from the Tucson Basin and Hueco Bolson. Ideally, the high visibility attributes will identify the relationship that groups from the Tucson Basin had with those from the Hueco Bolson, but the previous chapters suggest that some of the high visibility attributes represent a change in subsistence strategies and curation practices through time rather than group social relationships. Differences in the high visibility attributes of total length, total width, blade length, and blade width indicate how reliant a group is on agriculture compared to a group from another region. If a group from an area relies more on agriculture, then less projectile point curation and resharpening would have taken place. Therefore, projectile point clusters that are statistically larger would indicate a group from that region relied more on agriculture than a group from the other regions. I analyze these attributes although they do not indicate social interaction because part of my expectations introduced in chapter 1 for testing my hypotheses are predicated on differences in dependence on agriculture.

Of the high visibility attributes, only blade thickness has shown not to be affected by resharpening, and so it may illuminate social relationships between the regions. Regions that have no significant difference between blade thickness may indicate social affiliation between regions, because the similarity suggests contact between the groups.

Tucson Basin and the Hueco Bolson High Visibility Projectile Point Attributes from the ELA

The Cienega cluster has a marginal sample size for statistical analysis during the ELA in the Tucson Basin ($n = 11$). The Hueco Bolson includes 50 samples. Therefore, the high visibility attributes that I compare are dictated by the number of specimens from the Tucson Basin. The high visibility attributes that have large enough sample sizes ($n \geq 10$) are blade width and blade thickness.

Projectile Point Blade Width of the Cienega Cluster. The number of specimens for the Cienega cluster from the Tucson Basin is small ($n = 10$). On the other hand, there are 35 specimens from the Hueco Bolson. Because of the small sample size, only a non-parametric test is appropriate. The *p* value for the blade width is 0.0019, which is significant at the 90 percent confidence interval level ($\alpha = 0.10$). Thus, there is a statistically significant difference between the total length of the Cienega cluster between the Tucson Basin and the Hueco Bolson. According to the results, the Cienega cluster has a greater blade width in the Hueco Bolson than in the Tucson Basin, which suggests that Tucson Basin groups resharpened their projectile points more than the groups from the Hueco Bolson during the ELA (Figure IX-1).

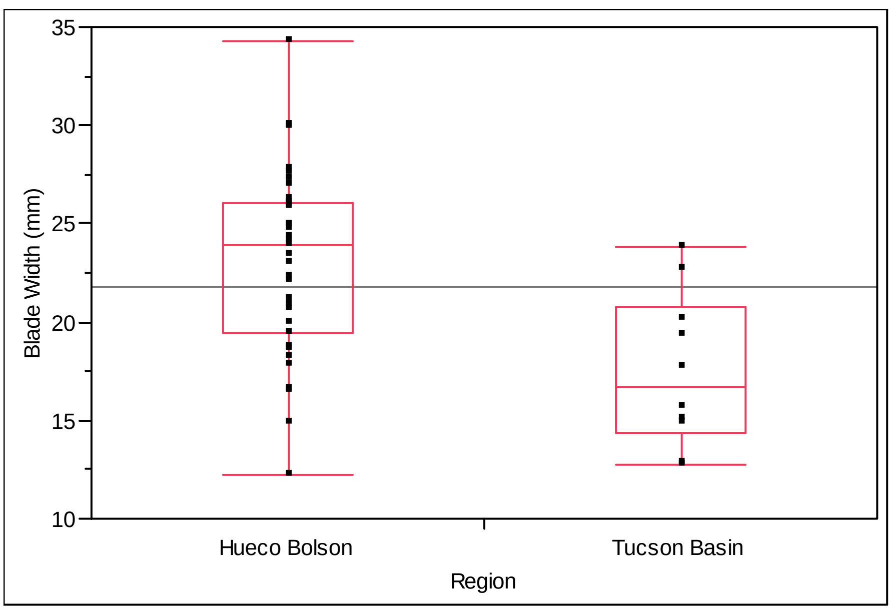

Figure IX-1. Oneway analysis of the Cienega cluster blade widths by region.

Projectile Point Blade Thickness of the Cienega Cluster. To identify whether there is a significant difference in blade thickness between the Tucson Basin and the Hueco Bolson Cienega clusters, I used a non-parametric test because of the small sample sizes (Hueco Bolson = 49, Tucson Basin = 11). The results ($p = 0.3492$)

indicate that the blade thickness of the Cienega cluster from the Hueco Bolson is not significantly different than the blade thickness from the Tucson Basin at the 90 percent confidence interval level ($\alpha = 0.10$) (Figure IX-2). This similarity may represent social affiliation between the groups from the Tucson Basin and the Hueco Bolson who made and used Cienega cluster projectile points.

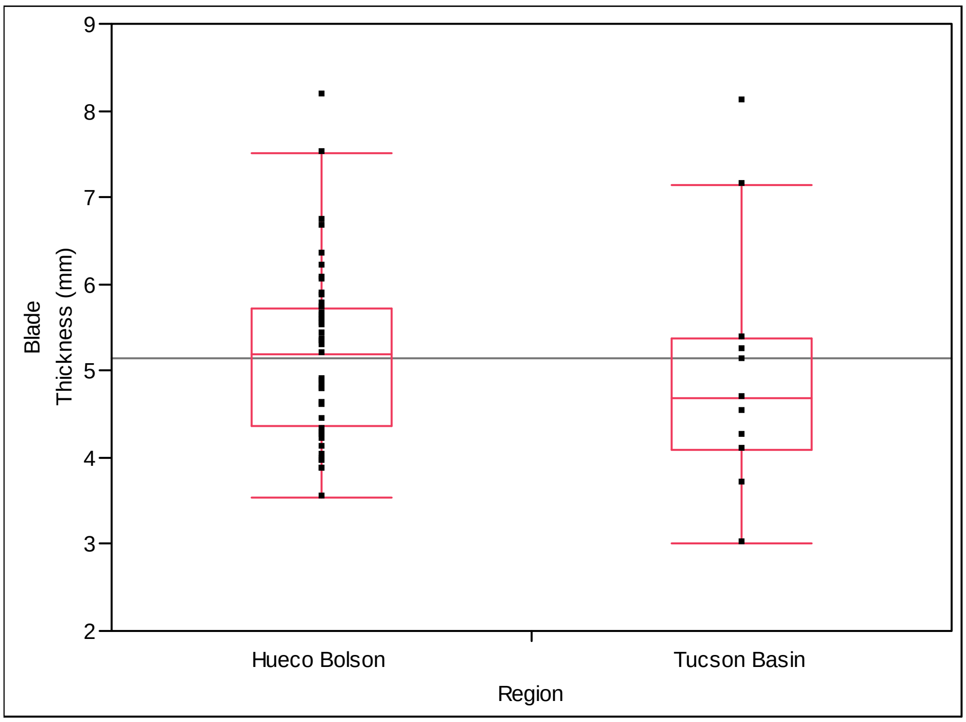

Figure IX-2. Oneway analysis of the Cienega cluster blade thicknesses by region.

Implications of the Tucson Basin and Hueco Bolson Cienega Cluster High Visibility Attribute Analysis. The small sample size for the Tucson Basin Cienega cluster limits identifying many meaningful patterns. After controlling for sample size, only two high visibility attributes – blade width and blade thickness – have an adequate dataset. In the case of the blade width attribute, the Hueco Bolson samples are significantly larger than the Tucson Basin specimens, but the results from the statistical test for the blade thickness show that there is not a statistical difference for the Cienega cluster between the regions.

Table IX-1. Comparisons of the High Visibility Attributes for the Cienega Cluster in the Tucson Basin and Hueco Bolson.

High Visibility Attribute	Tucson Basin	Hueco Bolson
Blade width	Smaller	Larger
Blade thickness	No difference	No difference

Following the patterns from the previous chapters, the larger blade width for the Cienega cluster from the Hueco Bolson suggests that these groups did not use curation technology as extensively as the Tucson Basin groups during the ELA. This pattern indicates that the Hueco Bolson groups relied more upon agriculture than the groups from the Tucson Basin, which is contrary to current thinking and archaeological evidence, which may indicate that these attributes do not measure a groups reliance on agriculture. If this is true, then the results from the high visibility attributes of the San Pedro cluster should follow this same pattern for those attributes that are affected by resharpening during the ELA. Another possibility for the difference in the blade width is that the size of the raw material from the Tucson Basin is smaller that of the Hueco Bolson, which would constrain the size of the projectile point.

In the previous chapters, blade thickness is the only high visibility attribute that is not affected by resharpening. Therefore, this attribute may provide a clue to the type of relationship the Tucson Basin groups had with the Hueco Bolson groups during the ELA. As previously mentioned, if the groups from these two areas were trying to differentiate themselves or did not have any contact with each other, then the high visibility attributes not contingent upon curation would be significantly different between the two regions. The results for blade thickness suggest that the groups who used Cienega cluster points may not have been actively competing with each other and had positive social interaction and thus social affiliation. The following sections will provide further insight into these patterns.

Tucson Basin and Hueco Bolson High Visibility Projectile Point Attributes from the ELA

The ELA San Pedro cluster has a more robust sample size compared to the Cienega cluster. Overall, there are 126 specimens from the Tucson Basin ELA and 134 from the Hueco Bolson ELA. Therefore, I am able to compare all of the high visibility attributes of the San Pedro cluster. Furthermore, in several instances, the datasets are large enough to use an ANOVA statistical test.

Projectile Point Total Length of the San Pedro Cluster. In order to normalize the distribution for the high visibility attribute of total length, I had to use log+1 and exclude two specimens from the Tucson Basin, which then allows the use of the Student's t test. The sample size for the total length of the San Pedro cluster during the ELA from the Tucson Basin is 77, and the sample size for the Hueco Bolson is 95.

The results of the Student's t test for significance indicate that total length of the San Pedro cluster from the ELA is significantly different from the San Pedro cluster from Hueco Bolson ($p = 0.0001$) at a 90 percent confidence interval ($\alpha = 0.1$) (Table IX-2; Figure IX-3). Furthermore, the Hueco Bolson San Pedro cluster has a smaller total length indicating that these points may have been resharpened more.

Table IX-2. Logtotal Length: Comparisons of Each Pair Using Student's t.*

Region	Tucson Basin	Hueco Bolson
Tucson Basin	-0.05527	0.32253
Hueco Bolson	0.32253	-0.04975

*Positive values show pairs of means that are significantly different

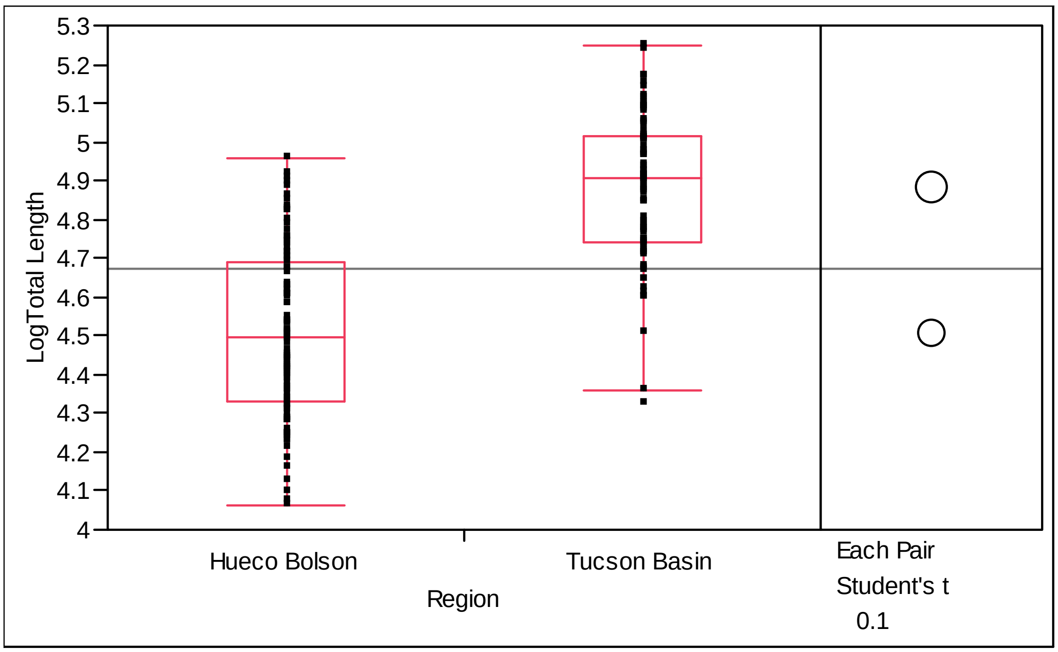

Figure IX-3. Oneway analysis of the San Pedro cluster logtotal lengths by region.

Projectile Point Total Width of the San Pedro Cluster. In order to normalize the distributions of the San Pedro cluster for total width, I had to use log+1 and exclude three outliers from the Tucson Basin sample. Even with the exclusion of those specimens, both sample sizes from the Tucson Basin and the Hueco Bolson contained 116 points, which allows the use of an ANOVA test for significance in conjunction with the Tukey-Kramer (HSD) test.

The ANOVA results show that the total width of the San Pedro cluster from the ELA is not significantly different from the San Pedro cluster from Hueco Bolson (p = 0.7507) at a 90 percent confidence interval ($\alpha = 0.1$) (Figure IX-4). The Tukey-Kramer

HSD confirms the ANOVA results (Table IX-3). Furthermore, the means from the logtotal width are within several thousandths of a millimeter (Tucson Basin = 3.98123; Hueco Bolson = 3.98841), suggesting that the groups from these two regions resharpened their projectile points similarly.

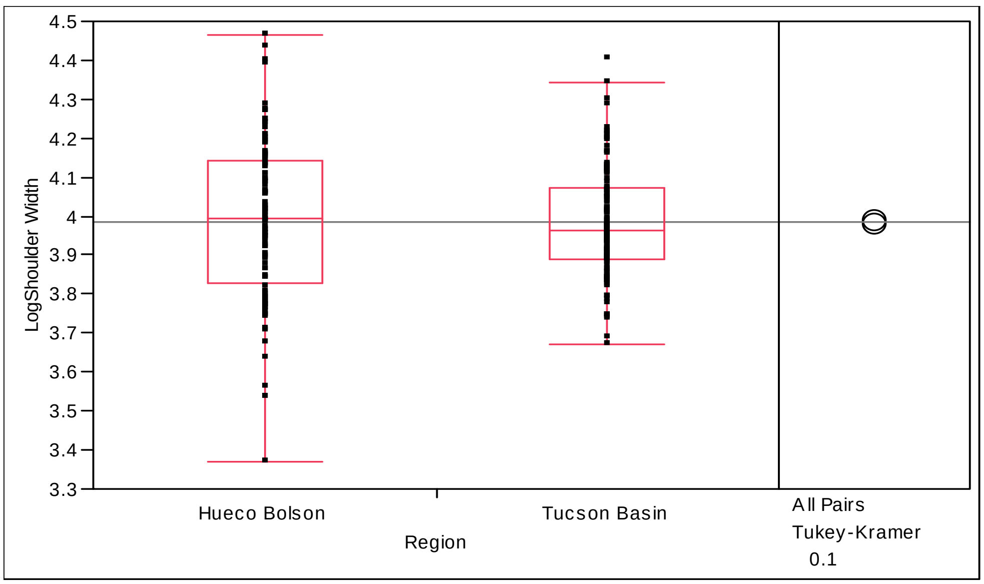

Figure IX-4. Oneway analysis of the San Pedro cluster logtotal widths by region.

Table IX-3. Logtotal Width: Comparisons of All Pairs Using Tukey-Kramer HSD.*

Region	**Hueco Bolson**	**Tucson Basin**
Hueco Bolson	-0.03724	-0.03006
Tucson Basin	-0.03006	-0.03724

*Positive values show pairs of means that are significantly different

Projectile Point Blade Length of the San Pedro Cluster. In order to normalize the distribution for a Student's t test for significance, I had to use log+1 and exclude two outliers from the Tucson Basin dataset. After the exclusions, the sample size for the Hueco Bolson is 96 and 78 for the Tucson Basin San Pedro cluster.

Similar to the results of the total length, the Student's t test for significance indicates that blade length of the San Pedro cluster from the ELA is significantly different from the Hueco Bolson San Pedro cluster ($p = 0.0001$) at a 90 percent confidence interval ($\alpha = 0.1$) (Table IX-4). Furthermore, the results show that the Tucson Basin specimens have a larger blade length than the Hueco Bolson San Pedro cluster during the ELA (Figure IX-5), indicating that the groups from the Tucson Basin did less resharpening than their Hueco Bolson counterparts.

Table IX-4. Logblade Length: Comparisons of Each Pair Using Student's t.*

Region	**Tucson Basin**	**Hueco Bolson**
Tucson Basin	-0.06902	0.45764
Hueco Bolson	0.45764	-0.06222

*Positive values show pairs of means that are significantly different

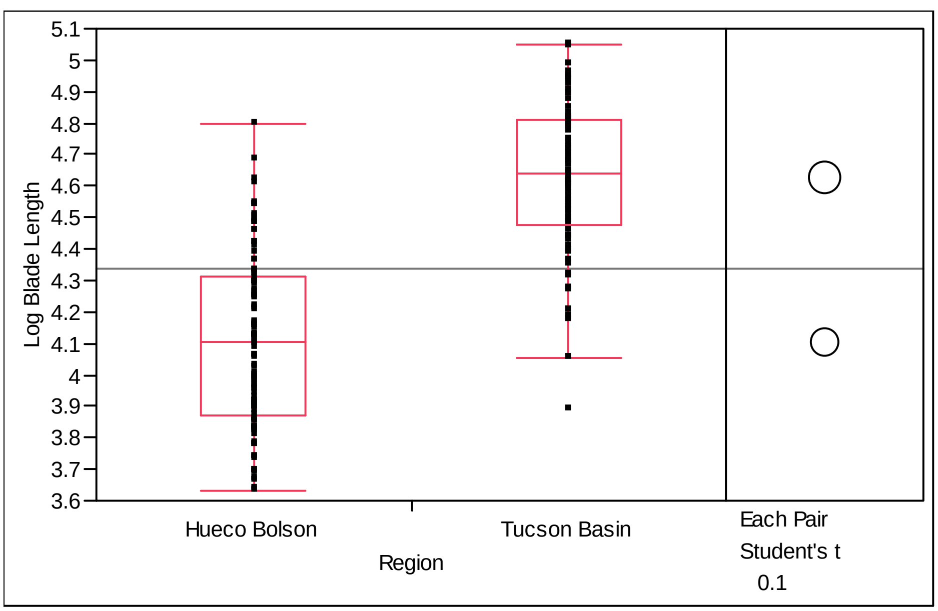

Figure IX-5. Oneway analysis of the San Pedro cluster logblade lengths by region.

Projectile Point Blade Width of the San Pedro Cluster. The distribution for the Hueco Bolson sample is normal, but to normalize the Tucson Basin dataset, I excluded four outliers. With the exclusion of the four specimens from the Tucson Basin, the sample size is 115. The sample size for the Hueco Bolson is 118. Therefore, it is appropriate to use the ANOVA test for significance in conjunction with the Tukey-Kramer (HSD) test.

The results from the ANOVA show that the blade width of the San Pedro cluster from the Tucson Basin during the ELA is not significantly different from the Hueco Bolson San Pedro cluster (p = 0.3004) at a 90 percent confidence interval (α = 0.1) (Figure IX-6). The Tukey-Kramer HSD confirms the results from the ANOVA (Table IX-5), suggesting that groups from neither region resharpened their projectile points more.

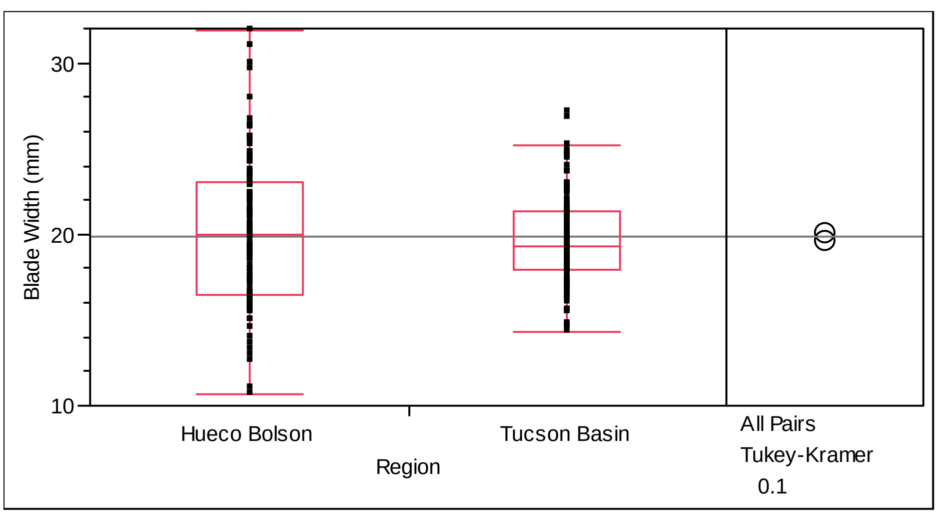

Figure IX-6. Oneway analysis of the San Pedro cluster blade widths by region.

Table IX-5. Blade Width: Comparisons for All Pairs Using Tukey-Kramer HSD.*

Region	**Hueco Bolson**	**Tucson Basin**
Hueco Bolson	-0.75688	-0.28306
Tucson Basin	-0.28306	-0.76669

*Positive values show pairs of means that are significantly different

Projectile Point Blade Thickness of the San Pedro Cluster. The distribution for the Hueco Bolson samples is normal, but to normalize the Tucson Basin dataset, I excluded one outlier. The sample size for blade thickness from the Hueco Bolson is 129, and from the Tucson Basin the sample size is 118. Hence, I used the ANOVA test for significance in conjunction with the Tukey-Kramer (HSD) test.

The results from the ANOVA test for significance show that the blade thickness of the ELA San Pedro cluster from the Tucson Basin is significantly different from the San Pedro cluster from Hueco Bolson (p = 0.0001) at a 90 percent confidence interval ($\alpha = 0.1$). The Tukey-Kramer HSD confirms the results from the ANOVA (Table IX-6). Overall, the blade thickness of the Tucson Basin San Pedro cluster projectile points is larger than their Hueco Bolson counterparts (Figure IX-7), indicating that those groups from each of the regions who used projectile points from the San Pedro cluster did not have any social affiliation.

Table IX-6. Blade Thickness: Comparisons for All Pairs Using Tukey-Kramer HSD.*

Region	**Hueco Bolson**	**Tucson Basin**
Tucson Basin	1.2527	-0.2620
Hueco Bolson	-0.2506	1.2527

*Positive values show pairs of means that are significantly different

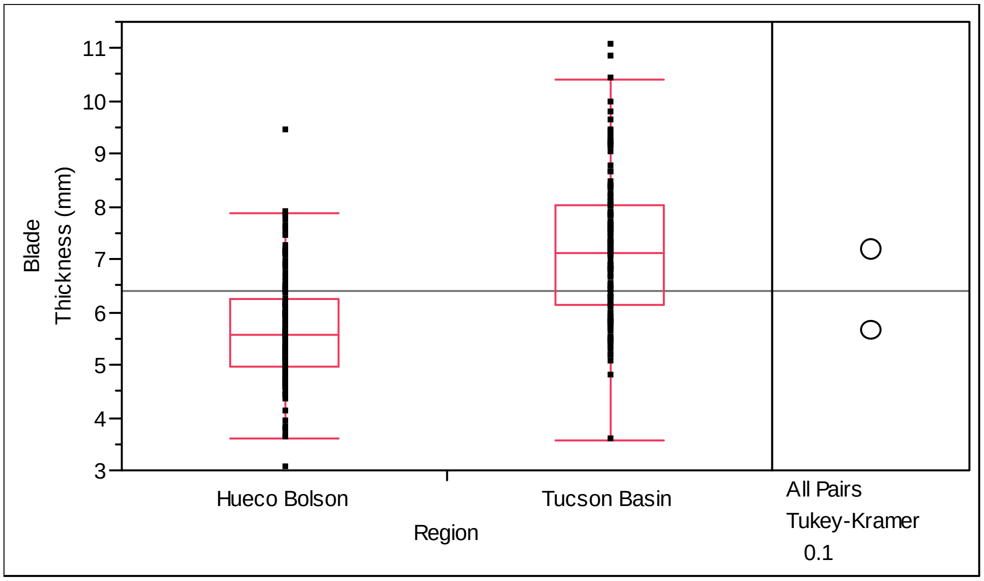

Figure IX-7. Oneway analysis of the San Pedro cluster blade thickness by region.

Implications of the Tucson Basin and Hueco Bolson San Pedro Cluster High Visibility Attribute Analysis. If the high visibility attributes – total length, total width, blade length, and blade width – are influenced by curation due to different subsistence strategies, as I have suggested, then the results of total length and blade length high visibility attributes indicate that the Hueco Bolson groups resharpened their projectile points more than the Tucson Basin groups during the ELA (Table IX-7). This pattern suggests that the Hueco Bolson groups curated their tools more and may have been more mobile and relied less on agriculture.

Table IX-7. Comparisons of the High Visibility Attributes for the San Pedro Cluster in the Tucson Basin and Hueco Bolson.

High Visibility Attribute	Tucson Basin	Hueco Bolson
Total length	Larger	Smaller
Total width	No change	No change
Blade length	Larger	Smaller
Blade width	No change	No change
Blade thickness	Larger	Smaller

However, this pattern does not hold true with the total width or blade width. Based on the results from the statistical tests, these high visibility attributes are similar in both regions during the ELA, and resharpening did not occur on the lateral margins of the projectile points. Therefore, there may be other lurking variables that account for the discrepancy. For instance, the size of the raw material may be smaller in the Hueco Bolson than in the Tucson Basin, and therefore the points cannot be as long.

Another possibility is that the differences in some of the high visibility attributes are a way for the groups from the Tucson Basin and Hueco Bolson to differentiate themselves from each other. This possibility is further supported by the difference in the blade thickness, which I have earlier established as a good indicator of social interaction.

The results from the ELA San Pedro cluster analyses are at odds with the results from the Cienega cluster analyses. First, the blade width of the Cienega cluster is larger from the Hueco Bolson, but the blade width is the same as the Tucson Basin for the San Pedro cluster. For blade thickness, the opposite is true. The blade thickness from the Cienega cluster is similar, but for the San Pedro cluster, the blade thickness is significantly larger in the Tucson Basin. One reason for the inconsistencies is that the small sample size for the Cienega cluster has skewed the results, but the statistical tests I used should adjust for the shortcomings of the dataset. The size of the raw material may affect the projectile points, especially the length, but it should not drastically change the thickness or width. Therefore, I am uncertain what these patterns mean.

Tucson Basin, Black Mesa, and the Hueco Bolson High Visibility Projectile Point Attributes during the LLA

This section discusses the results of comparing the LLA high visibility attributes from clusters common to the Tucson Basin, Black Mesa, and the Hueco Bolson. Both the Cienega and San Pedro clusters have large enough sample sizes from all three regions to compare the high visibility attributes. The Livermore cluster has a satisfactory sample size only for the Tucson Basin and the Hueco Bolson.

As with the previous section, comparing the high visibility attributes may indicate a difference in curation strategies, except for the blade thickness attribute, which may identify the relationship that groups from the Tucson Basin, Hueco Bolson, and Black Mesa had with each other. Also, the results from the statistical tests from the ELA can be compared to those from the LLA to discover any changes in the relationships between the groups of the three regions through time. If there is no change, the statistical results for the Cienega and San Pedro clusters from the Tucson Basin and the Hueco Bolson during the LLA should be the same as for the ELA.

Tucson Basin, Black Mesa, and the Hueco Bolson High Visibility Projectile Point Attributes of the Cienega Cluster from the LLA

The sample sizes for the Cienega cluster are of an adequate size to compare most of the high visibility attributes from all three regions. The high visibility attribute of total length does not have enough specimens from Black Mesa and the Hueco Bolson to allow any comparisons. Also, the Black Mesa Cienega cluster has too few specimens for blade length to be compared to the Tucson Basin and the Hueco Bolson Cienega clusters.

Projectile Point Total Width of the LLA Cienega Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. Because of the small sample sizes, a non-parametric significance test is appropriate to compare the total widths of the Cienega cluster projectile points from the three regions. The results from the test show that the total width from the Hueco Bolson (n = 13) is significantly greater than the Cienega cluster from the Tucson Basin (n = 48, $p = 0.0107$, $\alpha = 0.1$) and from Black Mesa (n = 11, $p = 0.0221$, $\alpha = 0.1$) (Figure IX-8). Also, the results from the significance test show that there is no statistical difference between the total width of the Cienega clusters from the Tucson Basin and Black Mesa ($p = 0.6335$, $\alpha = 0.1$). This pattern suggests that the Tucson Basin groups resharpened their Cienega cluster projectile points more than the groups from the Hueco Bolson, but similar to those from Black Mesa.

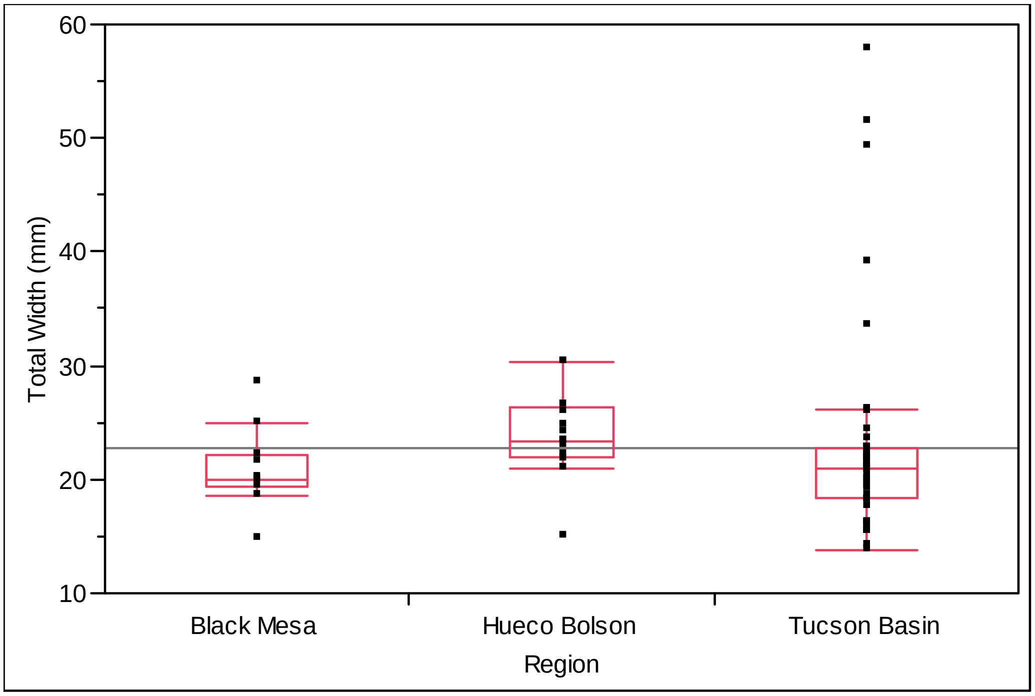

Figure IX-8. Oneway analysis of the Cienega cluster total widths by region.

Projectile Point Blade Length of the LLA Cienega Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The sample size for the blade length from the Black Mesa is too small (n = 8) for a statistical test, so I omitted it from the analysis. The low sample size from the Hueco Bolson (n = 13) requires that I perform a non-parametric test. According to the results, there is no statistical difference between the blade length of the Cienega cluster from the Tucson Basin (n = 47) and the Hueco Bolson ($p = 0.9928$, $\alpha = 0.1$) (Figure IX-9), suggesting that groups from these two regions resharpened their projectile points similarly.

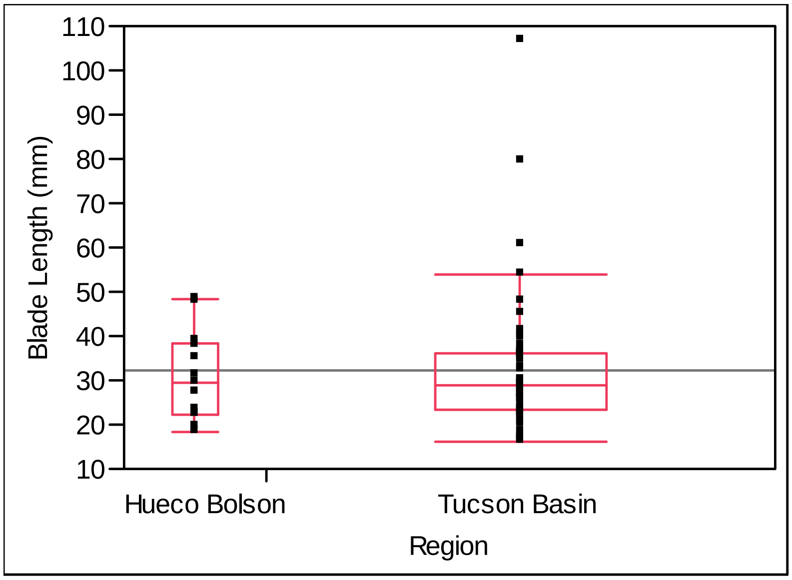

Figure IX-9. Oneway analysis of the Cienega cluster blade lengths by region.

Projectile Point Blade Width of the LLA Cienega Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The sample sizes for the high visibility attribute of blade width from the Cienega cluster projectile points are large enough to compare all three regions using a non-parametric test (Tucson Basin = 49, Black Mesa = 11, Hueco Bolson = 14). The results from the Kruskal-Wallace test indicate that there is no significant difference between Cienega cluster from the Black Mesa compared to the Tucson Basin ($p = 0.5796$, $\alpha = 0.1$) and the Hueco Bolson ($p = 0.2503$, $\alpha = 0.1$) (Figure IX-10). On the other hand, the blade width of the Cienega cluster from the Hueco Bolson is significantly larger than that from the Tucson Basin ($p = 0.0412$, $\alpha = 0.1$). This pattern indicates that the Hueco Bolson groups resharpened their projectile points the least, and the Tucson Basin groups resharpened theirs the most during the LLA.

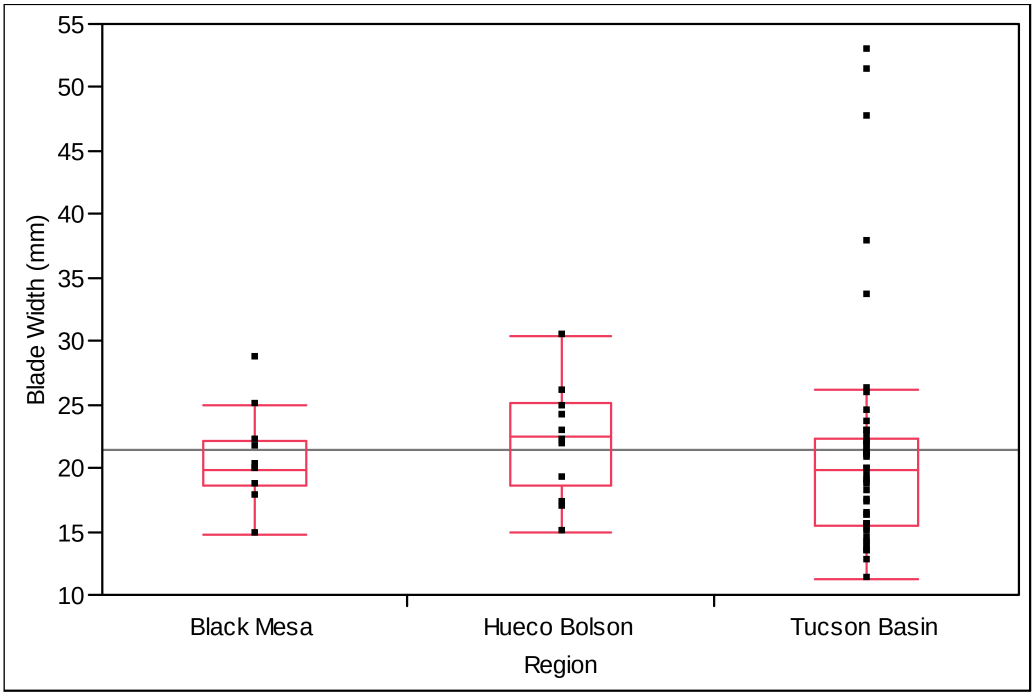

Figure IX-10. Oneway analysis of the Cienega cluster blade widths by region.

Projectile Point Blade Thickness of the LLA Cienega Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The sample sizes for blade thickness of the Cienega clusters from each region are of a sufficient size to use a non-parametric test (Tucson Basin = 51, Black Mesa = 12, Hueco Bolson = 16). The results from the Kruskal-Wallace test indicate that there is not a significant difference in the Cienega cluster blade thickness from any of the three regions (Tucson Basin and Black Mesa p = 0.1256, α = 0.1; Tucson Basin and Hueco Bolson p = 0.5223, α = 0.1; Black Mesa and Hueco Bolson p = 0.1091, α = 0.1) (Figure IX-11). This pattern indicates that groups from all three regions may have had some social affiliation.

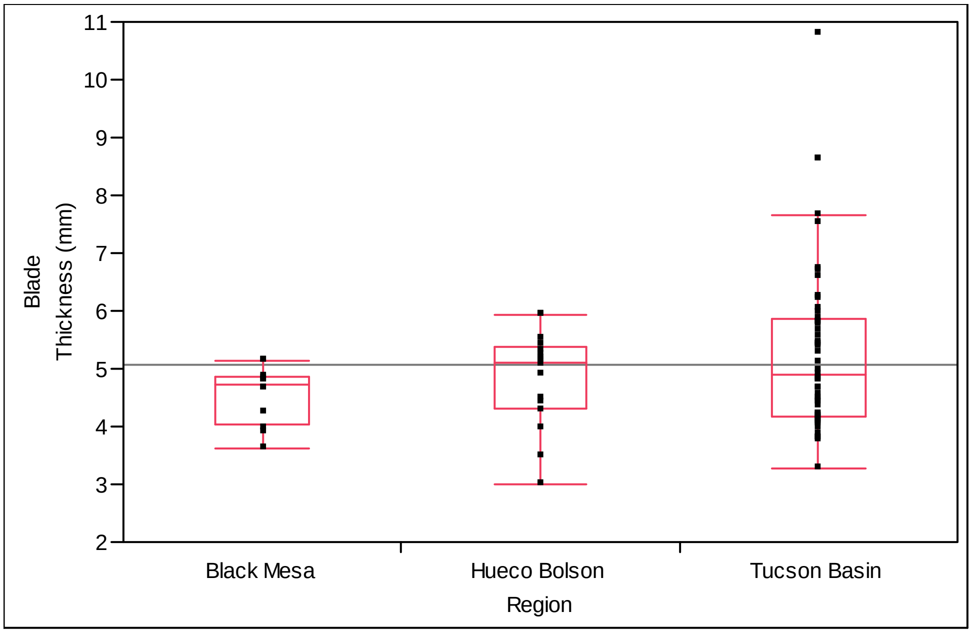

Figure IX-11. Oneway analysis of the Cienega cluster blade thicknesses by region.

Implications of the Tucson Basin, Hueco Bolson, and Black Mesa Cienega Cluster High Visibility Attribute Analysis. The patterns from comparing the LLA Cienega cluster between regions are twofold. The projectile points from the Hueco Bolson are larger in total width and blade width, indicating that groups from the Hueco Bolson sharpened their projectile points less than the groups from the Tucson Basin and Black Mesa. This pattern suggests that these latter groups may have relied less on agriculture than the groups from the Hueco Bolson (Table IX-8), which is contrary to the literature and the archaeological evidence.

Table IX-8. Comparisons of the High Visibility Attributes for the Cienega Cluster LLA Projectile Points from the Tucson Basin, Black Mesa, and Hueco Bolson.

High Visibility Attribute	Tucson Basin	Black Mesa	Hueco Bolson
Total width	= BM	=TB	> TB
	< HB	< HB	> BM
Blade length	= HB	n/a	= TB
Blade width	= BM	= TB	> TB
	< HB	= HB	= BM
Blade thickness	=	=	=

* TB = Tucson Basin, BM = Black Mesa, HB = Hueco Bolson, (=) = not significant

The second pattern is the consistency of the blade thickness attribute. Across all three regions, there is not a statistically significant difference in the Cienega cluster blade thicknesses. Since this high visibility attribute tends not be affected by resharpening, this result may indicate a positive social relationship resulting in acculturation among the groups from the three regions. Because similarities in high visibility attributes indicate social interaction, this pattern suggests that there is social affiliation between groups from the Tucson Basin, Hueco Bolson, and Black Mesa during the LLA.

Tucson Basin, Black Mesa, and the Hueco Bolson High Visibility Projectile Point Attributes in the LLA San Pedro Cluster

The San Pedro cluster from each of the three regions has a large sample size. Therefore, all of the high visibility attributes can be compared across all three regions.

Projectile Point Total Length of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The sample sizes for the total length from the Tucson Basin, Black Mesa, and the Hueco Bolson San Pedro cluster are n = 34, n =

29, and n = 27, respectively. Because both the Black Mesa and the Hueco Bolson datasets have fewer than 30, I used a non-parametric test.

The results of the non-parametric test show that the total length of the San Pedro cluster from the Tucson Basin is significantly greater than the projectile point lengths from the other two regions (Black Mesa, $p = 0.0386$, $\alpha = 0.1$; Hueco Bolson, $p = 0.0385$, $\alpha = 0.1$) (Figure IX-12). Furthermore, the non-parametric results show that there is no significant difference in the total length between the Black Mesa and the Hueco Bolson San Pedro clusters ($p = 0.7122$, $\alpha = 0.1$).

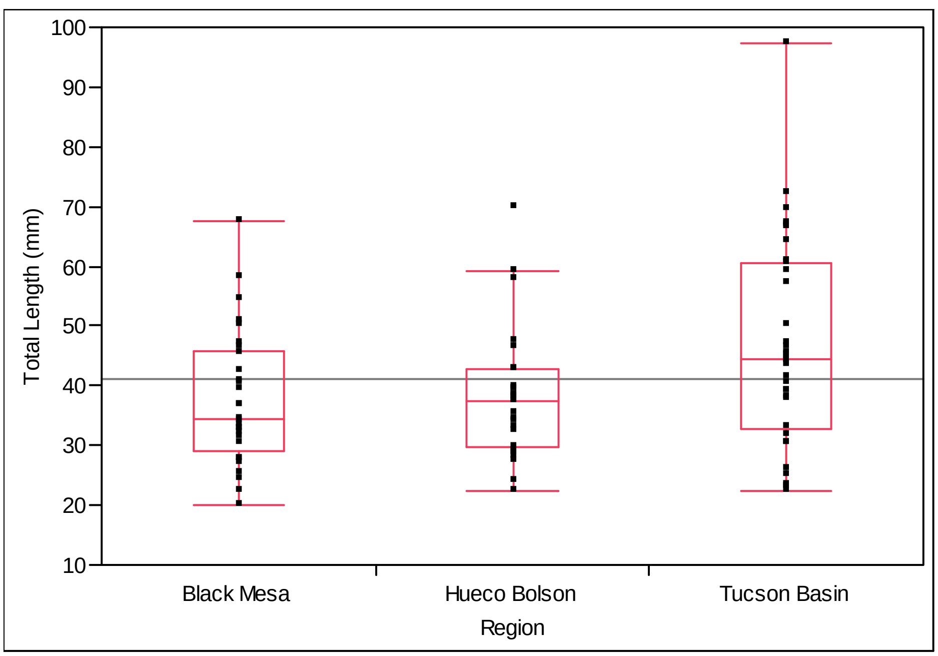

Figure IX-12. Oneway analysis of the San Pedro cluster total lengths by region.

Projectile Point Total Width of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. In order to normalize the distribution of the high visibility attribute, total width, I used logtotal width + 1. Since I was able to normalize the distribution and the sample sizes are large enough from the Tucson Basin (n = 45), Black Mesa (n = 33), and Hueco Bolson (n = 35), I used the Student's t significance test.

The results of the Student's t test indicate that the specimens from the Tucson Basin are statistically larger in total width than the Black Mesa and Hueco Bolson widths (Black Mesa, $p = 0.0030$, $\alpha = 0.1$; Hueco Bolson, $p = 0.0017$, $\alpha = 0.1$) (Table IX-9; Figure IX-13). In contrast, the total widths from the Black Mesa and Hueco Bolson San Pedro clusters are not statistically different ($p = 0.0017$, $\alpha = 0.1$). This result suggests that the Tucson Basin groups resharpened the lateral margins of their projectile points less than groups from the other two regions during the LLA.

Table IX-9. Logtotal Width: Comparisons of Each Pair Using Student's t.*

Region	Tucson Basin	Black Mesa	Hueco Bolson
Tucson Basin	-0.08114	0.07323	0.08154
Black Mesa	0.07323	-0.09475	-0.08655
Hueco Bolson	0.08154	-0.08655	-0.09201

*Positive values show pairs of means that are significantly different

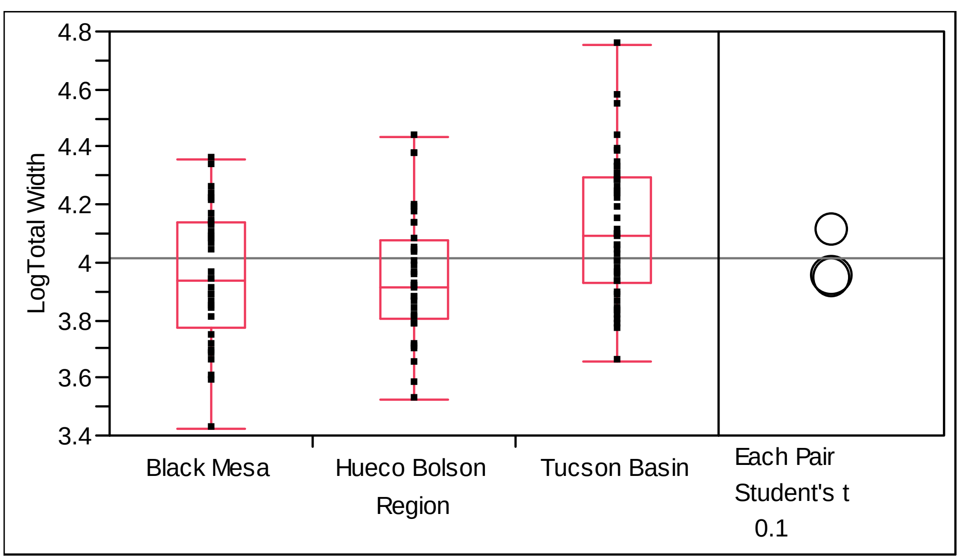

Figure IX-13. Oneway analysis of the San Pedro cluster logtotal widths by region.

Projectile Point Blade Length of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. Although the sample sizes for the Tucson Basin (n = 32) and the Black Mesa (n = 31) are large enough for a parametric test for significance, the Hueco Bolson only has 29 specimens, which requires a non-parametric test. The results of this test show that the blade length for the San Pedro cluster from the Tucson Basin is statistically larger than the Black Mesa ($p = 0.0072$, $\alpha = 0.1$) and Hueco Bolson ($p = 0.0041$, $\alpha = 0.1$) counterparts (Figure IX-14). Similar to the previously tested high visibility attributes, there is no statistical difference between the blade lengths of the San Pedro clusters from the Black Mesa and the Hueco Bolson ($p = 0.7617$, $\alpha = 0.1$). This result suggests that the Tucson Basin groups resharpened their projectile points less than groups from the other two regions during the LLA.

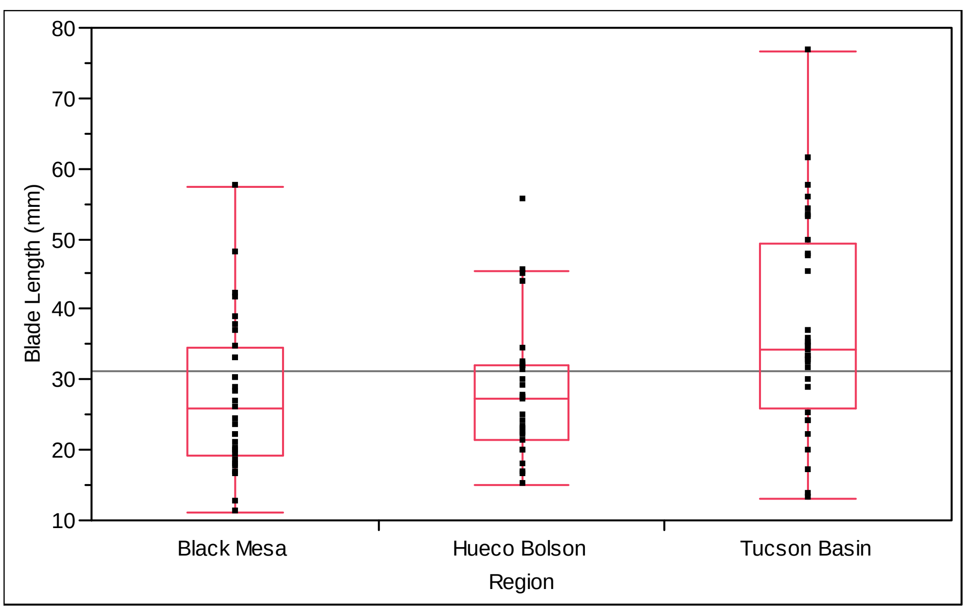

Figure IX-14. Oneway analysis of the San Pedro cluster blade lengths by region.

Projectile Point Blade Width of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. Similar to the total width, the distribution of the high visibility attribute, blade width, is not normal. In order to normalize the distribution, I used logblade width +1. Because the sample sizes for the Tucson Basin (n = 44), Black Mesa (n = 33), and the Hueco Boson (n = 36) are greater than 30 and I normalized the distribution, I used the Student's t test to compared the blade widths of the San Pedro clusters from the three regions.

Again, the results from the Student's t test indicate that the blade width of the San Pedro cluster from the Tucson Basin is significantly larger than the blade widths of the San Pedro clusters from Black Mesa ($p = 0.0186$, $\alpha = 0.1$) and the Hueco Bolson ($p = 0.0187$, $\alpha = 0.1$) (Table IX-10; Figure IX-15). The Black Mesa and Hueco Bolson blade widths are not statistically different ($p = 0.9550$, $\alpha = 0.1$). This result suggests that the Tucson Basin groups resharpened the lateral margins of their projectile points less than groups from the other two regions during the LLA.

Table IX-10. Logblade Width: Comparisons of Each Pair Using Student's t.*

Region	**Tucson Basin**	**Hueco Bolson**	**Black Mesa**
Tucson Basin	-0.08645	0.04002	0.04110
Hueco Bolson	0.04002	-0.09558	-0.09440
Black Mesa	0.04110	-0.09440	-0.09983

*Positive values show pairs of means that are significantly different

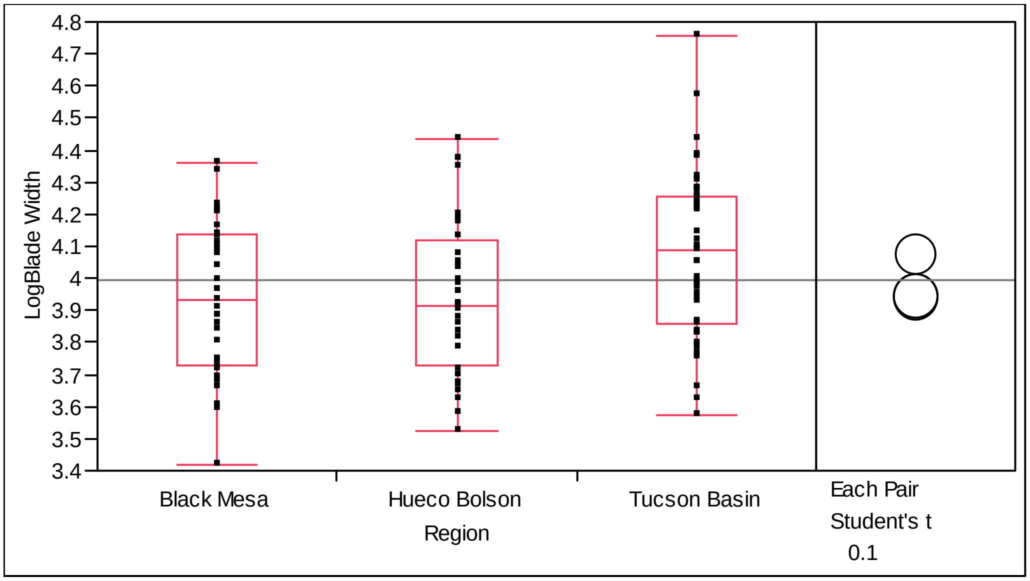

Figure IX-15. Oneway analysis of the San Pedro cluster logblade widths by region.

Projectile Point Blade Thickness of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The blade thicknesses for the San Pedro cluster from all three regions are normally distributed without any data manipulation. The sample size from the Tucson Basin (n = 43), Black Mesa (n = 35), and the Hueco Bolson (n = 39) are of sufficient quantity to use a Student's t test to compare the blade thicknesses of the San Pedro cluster from each region.

The parametric test for blade thickness shows that the results from all of the regions are statistically different (Table IX-11). First, the Student's t test indicates that the blade thickness of the San Pedro cluster from the Tucson Basin is significantly larger than the thicknesses from both Black Mesa ($p < 0.0001$, $\alpha = 0.1$) and the Hueco Bolson ($p < 0.0001$, $\alpha = 0.1$) (Figure IX-16**)**. Second, the results show that the blade thickness of the Hueco Bolson San Pedro cluster is statistically larger than the Black Mesa specimens ($p = 0.0043$, $\alpha = 0.1$). Because blade thickness indicates social interaction, these results suggest that the groups from the three regions using projectile points from the San Pedro cluster did not have social affiliations.

Table IX-11. Blade Thickness: Comparisons of Each Pair Using Student's t.*

Region	Tucson Basin	Hueco Bolson	Black Mesa
Tucson Basin	-0.4373	0.7529	1.5684
Hueco Bolson	0.7529	-0.4592	0.3566
Black Mesa	1.5684	0.3566	-0.4848

*Positive values show pairs of means that are significantly different

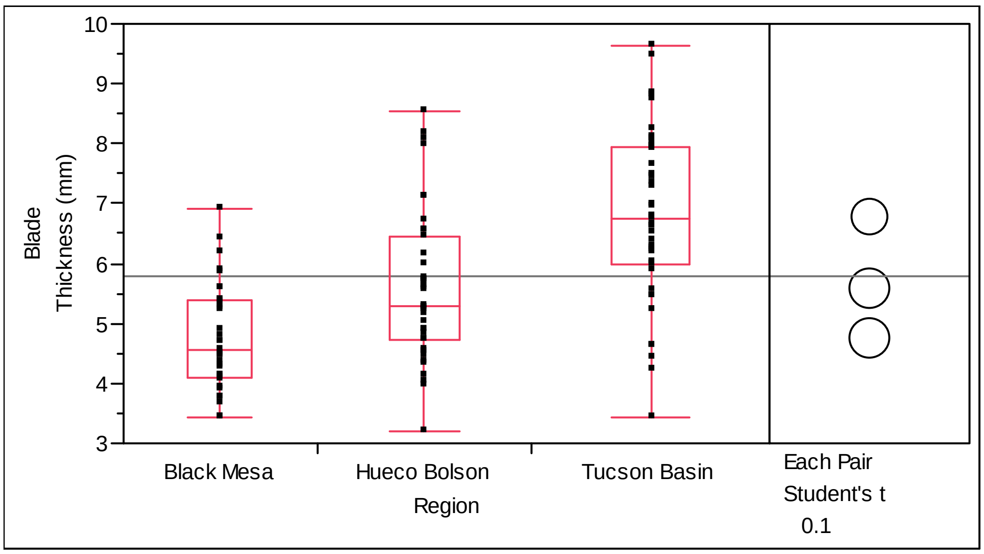

Figure IX-16. Oneway analysis of the San Pedro cluster blade thicknesses by region.

Implications of the Tucson Basin, Hueco Bolson, and Black Mesa San Pedro Cluster High Visibility Attribute Analysis. In contrast with the results from the Cienega cluster, the statistical tests show that all of the San Pedro cluster high visibility attributes from the Tucson Basin specimens are statistically larger than those from the other two regions (Table IX-12). As previously stated, the fact that the Tucson Basin has overall larger San Pedro cluster projectile points may indicate that the Tucson Basin groups relied more on agriculture than the Black Mesa and Hueco Bolson groups during the LLA. Furthermore, the total length, total width, blade length, and blade width, which are affected by resharpening are not different between the Black Mesa and Hueco Bolson. This pattern suggest that the groups from these two regions curated their points similarly.

Table IX-12. Comparisons of the High Visibility Attributes for the San Pedro Cluster from the Tucson Basin, Black Mesa, and Hueco Bolson during the LLA.

High Visibility Attribute	**Tucson Basin**	**Black Mesa**	**Hueco Bolson**
Total Length	> BM	< TB	< TB
	> HB	= HB	= BM
Total width	> BM	< TB	< TB
	> HB	= HB	= BM
Blade length	> BM	<TB	< TB
	> HB	= HB	= BM
Blade width	> BM	< TB	< TB
	> HB	= HB	= BM
Blade thickness	> BM	< TB	< TB
	> HB	< HB	> BM

TB = Tucson Basin, BM = Black Mesa, HB = Hueco Bolson, (=) = not significant

Blade thickness, which may indicate social interaction, is statistically different among all three regions for the San Pedro cluster during the LLA. This pattern suggests that either the groups using the projectile points from this cluster did not have social affiliations, or they were actively trying to differentiate themselves.

Tucson Basin and the Hueco Bolson High Visibility Projectile Point Attributes of the LLA Livermore Cluster

Only the Tucson Basin and the Hueco Bolson have specimens that are a part of the Livermore cluster during the LLA. The Tucson Basin has 43 projectile points from the Livermore cluster, but the Hueco Bolson only has 16. Because of such a low sample size from the Hueco Bolson, the only high visibility attributes that were present on a large enough sample are blade length, blade width, and blade thickness. Furthermore, the small sample size from the Hueco Bolson dataset dictates the use of a non-parametric test.

Projectile Point Blade Length of the LLA Livermore Cluster from the Tucson Basin and the Hueco Bolson. The sample sizes for the Livermore cluster from the Tucson Basin and Hueco Bolson are n = 41 and n = 10 respectively. The results of the non-parametric test indicate that the blade lengths for the Livermore cluster from the two regions are not significantly different (p = 0.5452, α = 0.1) (Figure IX-17). This pattern suggests that neither group from the Tucson Basin or Hueco Bolson was resharpening their projectile points more than the other.

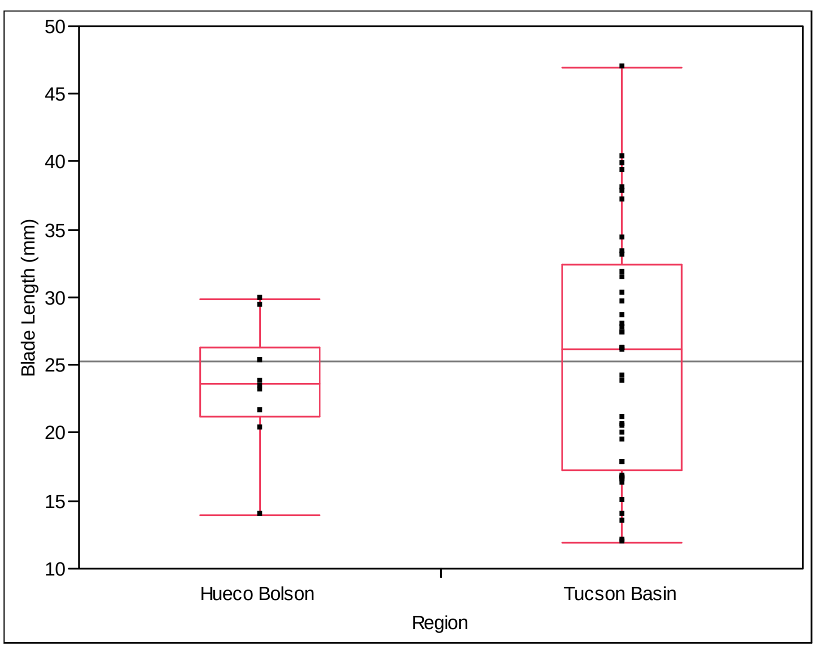

Figure IX-17. Oneway analysis of the Livermore cluster blade lengths by region.

Projectile Point Blade Width of the LLA Livermore Cluster from the Tucson Basin and the Hueco Bolson. The Tucson Basin has 42 specimens, and the Hueco Bolson has 14 specimens for the blade width high visibility attribute of the LLA Livermore cluster. According to the non-parametric test results, the blade width from the Tucson Basin Livermore cluster is significantly larger than the blade width from the Hueco Bolson Livermore cluster (p = 0.0044, α = 0.1) (Figure IX-18). This result suggests that the Tucson Basin groups resharpened the lateral margins of their projectile points less than groups from the Hueco Bolson during the LLA.

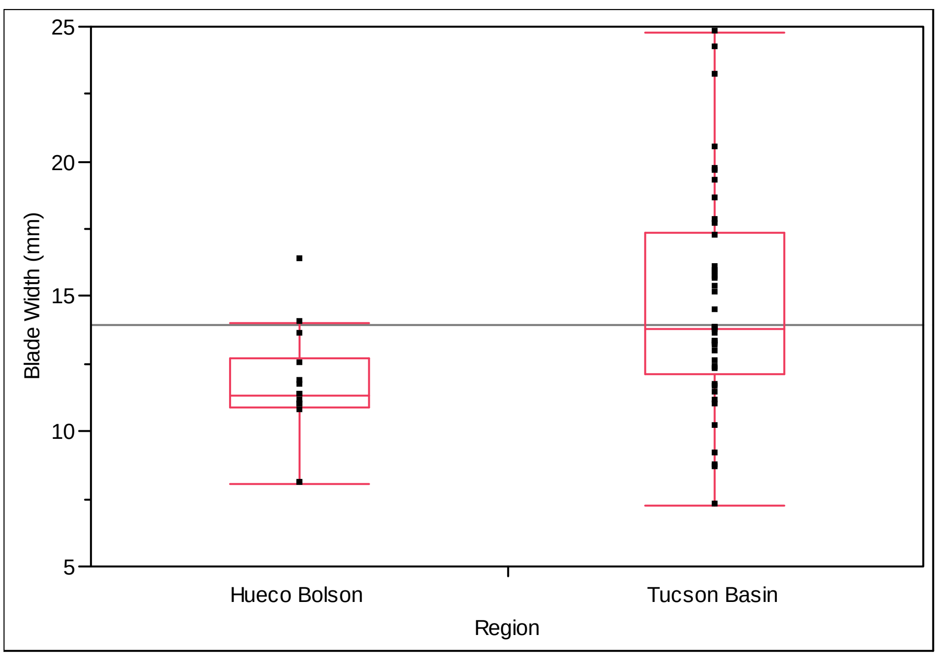

Figure IX-18. Oneway analysis of the Livermore cluster blade widths by region.

Projectile Point Blade Thickness of the LLA Livermore Cluster from the Tucson Basin and the Hueco Bolson. The high visibility attribute, blade thickness, has a sample size of 40 from the Tucson Basin and 16 from the Hueco Bolson. Similar to blade width, the blade thickness from the Tucson Basin's Livermore cluster is significantly larger than the blade thickness of the Hueco Bolson's cluster (p = 0.0007, α = 0.1) (Figure IX-19). This pattern suggests that the groups from the Tucson Basin and Hueco Bolson who used projectile points from the Livermore cluster did not have social affiliation or were actively trying to differentiate themselves.

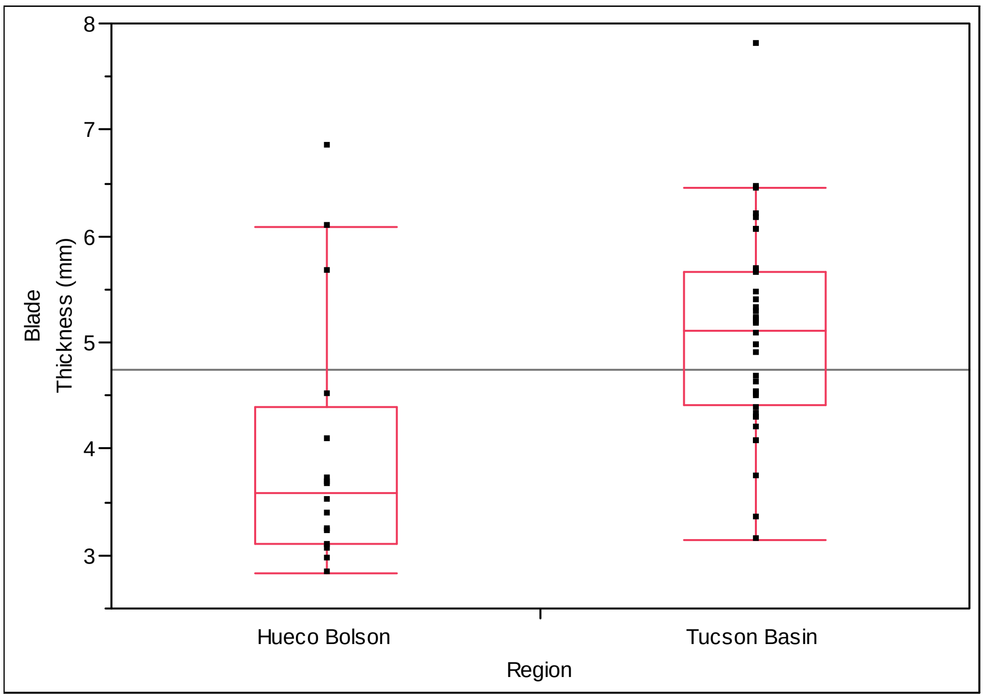

Figure IX-19. Oneway analysis of the Livermore cluster blade thicknesses by region.

Implications of the Tucson Basin and the Hueco Bolson Livermore Cluster High Visibility Attribute Analysis. In contrast with the results from the Cienega cluster and similar to the San Pedro cluster, parametric and non-parametric tests show that the Tucson Basin specimens have statistically larger width than the Hueco Bolson (Table IX-13). As previously stated, the fact that the Tucson Basin Livermore points have overall larger width than the Hueco Bolson Livermore cluster may indicate that the

Tucson Basin groups relied more on agriculture than the Hueco Bolson groups during the LLA. On the other hand, the results from comparing the blade lengths, which are similar from the two regions indicate that groups from the Tucson Basin and the Hueco Bolson resharpened their projectile points from this cluster similarly, suggesting that one group did not rely more on agriculture than the other.

Table IX-13. Comparisons of the High Visibility Attributes for the Livermore Cluster from the Tucson Basin and the Hueco Bolson during the LLA.

High Visibility Attribute	Tucson Basin	Hueco Bolson
Blade length	Not significant	Not significant
Blade width	Larger	Smaller
Blade thickness	Larger	Smaller

Furthermore, like the San Pedro cluster results, blade thickness is significantly different between the Livermore cluster projectile points from the Tucson Basin and the Hueco Bolson. Because this high visibility attribute should indicate social interaction, the difference in blade thicknesses suggests that there was no social affiliation or the groups from the two regions were trying to differentiate themselves.

Comparing the High Visibility ELA and LLA Projectile Point Attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson

The purpose for comparing the high visibility attributes of the projectile point clusters between the three regions is twofold. The main reason is to identify the possible social relationships between the ELA and LLA groups from the Tucson Basin, Black Mesa, and the Hueco Bolson. Due to the analysis results discussed in the previous chapters, which have provided a foundation for the rest of this study, it has become apparent that most of the identified high visibility attributes may not be factors in interpreting group interaction. Only blade thickness appears to be a high visibility attribute that may reflect group interaction. The other high visibility attributes seem to reflect the amount of dependence on agriculture based on resharpening and curating projectile points. In the following section I discuss the results from comparing the high visibility attributes and how they pertain to my hypotheses.

Comparing the High Visibility ELA Attributes from the Tucson Basin and the Hueco Bolson

I was able to compare two ELA projectile point clusters – Cienega and San Pedro – between the Tucson Basin and the Hueco Bolson. Some people from these two regions had some sort of social interaction, because there are at least these two projectile point clusters found in large quantities in both areas. As mentioned in chapter one, to evaluate this interaction, the expectations for these two regions are that the analysis results should:

1. indicate that people in the Tucson Basin relied more on agriculture than those in the Hueco Bolson, and this would be manifested by less evidence of resharpening on the Tucson Basin specimens than on the Hueco Bolson samples, and;
2. the blade thickness, which is not affected by resharpening, should not be statistically different between the two regions resulting from

acculturation because they were not competing for resources due to different subsistence strategies.

The results from the statistical tests of the ELA Cienega cluster suggest that the Tucson Basin groups may have resharpened their points more and thus curated their points more, because the blade width is significantly smaller than that from the Hueco Bolson (Table IX-14). Therefore, this result does not meet my expectation. There are several possibilities for the inconsistency. One is that the raw material of the unmodified stone is smaller in the Tucson Basin, which would dictate a smaller point. Also, the available wood onto which the projectile point was hafted may have been larger in the Hueco Bolson than the wood that Tucson Basin groups used. Furthermore, this high visibility attribute may be an anomaly, but the sample sizes are too small for comparison of any of the other attributes that may indicate resharpening. Finally, it is possible that the blade width is not an indicator of subsistence strategy changes.

Table IX-14. Comparisons of the High Visibility Attributes for the Cienega and San Pedro Clusters.

Cluster	High Visibility Attribute	Tucson Basin	Hueco Bolson
Cienega	Blade width	Smaller	Larger
	Blade thickness*	No change	No change
San Pedro	Total length*	Larger	Smaller
	Total width	No change	No change
	Blade length*	Larger	Smaller
	Blade width	No change	No change
	Blade thickness	Larger	Smaller

*Conforms to the expectations

On the other hand, there is not a statistically significant difference between the ELA Cienega cluster blade thicknesses in the Tucson Basin and the Hueco Bolson.

This pattern supports my expectation that the groups from the two regions were not in competition and were socially affiliated.

Ideally, the results comparing the ELA San Pedro cluster between the Tucson Basin and the Hueco Bolson either meet the aforementioned expectations or at least conform to the same patterns as those from the Cienega cluster. It appears that in all cases where the high visibility attribute could have been affected by resharpening, the Tucson Basin specimens are either the same as or statistically larger than their Hueco Bolson counterparts. This pattern supports my assertion that the Hueco Bolson groups did not rely as much on agriculture in comparison to Tucson Basin groups, because the results indicate that resharpening which is a hallmark of a highly mobile group who relied more on hunting and gathering (Beale 2007), took place largely within the Hueco Bolson.

In contrast, the high visibility attribute of blade thickness for the ELA San Pedro cluster does not support my expectation that they were not in competition with each other and would have social contact resulting in acculturation, because the blade thickness is significantly different from each region. This result suggests that my expectation is incorrect, and that groups who used projectile points from the San Pedro cluster were actively differentiating from each other or were not socially affiliated. Another possibility is that blade thickness is not an indicator for types of social interaction.

The Cienega and San Pedro clusters from the Tucson Basin and the Hueco Bolson during the ELA thus do not have the same patterns (Tables IX-1 and IX-7). If the groups within each region used all of the projectile clusters available to them and operated under the same constraints, the patterns from each cluster should be similar. Because the two types of clusters show dissimilar patterns, it may suggest that different groups within the each region were using different points or that each point cluster may have served alternative purposes.

Comparing the High Visibility LLA Attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson

I am able to compare the Cienega cluster and the San Pedro cluster among all three regions, but only the Tucson Basin and the Hueco Bolson have a sufficient sample from the LLA Livermore cluster. Again, some people from these three regions interacted, because there are at least two projectile point clusters that are found in large quantities in all three areas.

My expectations for the projectile point clusters from these regions are:

1. that people from the Tucson Basin relied more on agriculture than those from the Black Mesa and Hueco Bolson, which is supported by less evidence of resharpening on the Tucson Basin specimens than on the Black Mesa and Hueco Bolson samples. The Black Mesa sample should have less resharpening than the Hueco Bolson, and;
2. the blade thickness, which is not affected by resharpening, should not be statistically different between the three regions because the groups were not competing for resources due to different subsistence strategies, or in the case of the Black Mesa and Tucson Basin, the

groups would have been less mobile because of an increased dependence on agriculture.

The results of the comparisons of the high visibility attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson better conform to my expectations than the ELA high visibility attributes (Table IX-15). The majority of the high visibility attributes that are affected by resharpening are larger from the Tucson Basin San Pedro and Livermore clusters except for the Livermore blade length. The only cluster that does not consistently follow the expectations is the Cienega cluster. Similar to the results from the ELA Cienega cluster, the high visibility attributes from the Hueco Bolson specimens indicate that the projectile points are either equal to or larger than those from the Tucson Basin or Black Mesa. This pattern is not consistent with my expectation that a group that relied more on hunting and gathering would have had high visibility attributes affected by resharpening and would be smaller in size. As previously stated, this may be due to the difference of sizes of local raw material.

Table IX-15. Cienega, San Pedro, and Livermore Clusters High Visibility Attributes for the Tucson Basin, Black Mesa, and Hueco Bolson.

Cluster	High Visibility Attribute	Tucson Basin	Black Mesa	Hueco Bolson
Cienega	Total width	= BM	= TB	> TB
		< HB	< HB	> BM
	Blade length	= HB		= TB
	Blade width	= BM	= TB	> TB
		< HB	= HB	= BM
	Blade thickness	= BM*	= TB*	= TB*
		= HB*	= HB*	= BM*
San Pedro	Total length	> BM*	< TB*	< TB*
		> HB*	= HB	= BM
	Total width	> BM*	< TB*	< TB*
		> HB*	= HB	= BM
	Blade length	> BM*	<TB*	< TB*
		> HB*	= HB	= BM
	Blade width	> BM*	< TB	< TB
		> HB*	= HB	= BM
	Blade thickness	> BM	< TB	< TB
		> HB	< HB	> BM
Livermore	Blade length	= HB		= TB
	Blade width	> HB*		< TB*
	Blade thickness	> HB		< TB

TB = Tucson Basin, BM = Black Mesa, HB = Hueco Bolson, (=) = not significant; * conforms to expectation

Furthermore, the data suggest that there in no significant difference between the high visibility attributes affected by resharpening between the Tucson Basin and the Black Mesa. I have speculated that both regions relied more on agriculture than the Hueco Bolson groups, but it is not known whether the Tucson Basin groups relied more on agriculture than those living on Black Mesa. If these high visibility attributes which are affected by resharpening are any indication, then the results from the Cienega cluster suggest that they may have been similarly dependent on agriculture.

Supporting my expectation, there is not a statistically significant difference between the Cienega cluster blade thicknesses from the Tucson Basin, Black Mesa, and the Hueco Bolson, which may suggest positive social interaction and social affiliation resulting in acculturation. Interestingly, the pattern that there is a lack of significant difference of the blade thickness seen between the Cienega clusters in the different regions during the ELA mirrors the results from the LLA. Because the Cienega cluster blade thickness shows no significant differences between the regions, but the San Pedro cluster does show significant differences in this attribute supports of my contention that either the different projectile point clusters may represent different groups using the points, or they were used for different purposes.

The pattern from the LLA San Pedro cluster also resembles the ELA results. Again, the high visibility attributes affected by resharpening are larger in the Tucson Basin, which is expected. The San Pedro cluster from Black Mesa suggests that the groups from this region may have relied more on agriculture than Hueco Bolson groups.

In contrast, the blade thickness, which should be the same among each of the regions, is actually different in all three places. Tucson Basin specimens are the largest, followed by the Hueco Bolson, and then by the Black Mesa samples. The differences in the blade thicknesses in the San Pedro cluster suggest that, during the LLA, groups using these projectile points did not have social affiliations.

Although the Livermore cluster can only be compared between the Tucson Basin and the Hueco Bolson, the results are similar to the San Pedro cluster in that the Tucson Basin high visibility attributes are larger (Table IX-13). The Tucson Basin high visibility attributes that can be affected by resharpening are either equal to or larger than the Hueco Bolson Livermore samples. Also, the statistical difference in the blade thickness from this projectile point cluster suggests that there was no social affiliation between the groups using this projectile point cluster, or they were actively differentiating themselves.

High Visibility Projectile Point Attribute Patterns through Time in the Tucson Basin and the Hueco Bolson

Because Black Mesa does not have enough ELA projectile points, I can only compare the Tucson Basin and the Hueco Bolson regions through time. Furthermore, the only projectile point clusters that are found during both the ELA and LLA are the Cienega and San Pedro clusters.

Both time periods show that the Hueco Bolson groups used projectile points from the Cienega cluster that are larger than those from the Tucson Basin. This pattern indicates that the Tucson Basin groups resharpened their projectile points more and were less dependent on agriculture, which is unlikely according to the literature, and is contrary to archaeological evidence.

Interestingly, the one high visibility attribute from the Cienega cluster, blade thickness, indicates that social interaction changes between the ELA and LLA. During the ELA, the blade thicknesses from the Tucson Basin and the Hueco Bolson are similar, but during the LLA, the blade thicknesses become statistically different. This could indicate that the groups from the two regions were socially affiliated during the ELA and not during the LLA. It is possible that this change in social interaction could be due to a shift in subsistence. During the ELA, groups were more mobile and had a better chance of being in situations were they came in contact with each other. On the other hand, with a greater dependence on agriculture, the groups would have been tethered to their fields in their regions and thus would have had less opportunity to encounter each other.

In contrast to the Cienega cluster, the comparison of the San Pedro cluster from the Tucson Basin and the Hueco Bolson between the ELA and LLA indicates that the high visibility attributes that resharpening effects are larger in the Tucson Basin. This suggests that the Tucson Basin groups during both the ELA and LLA resharpened their projectile points less than the groups in the Hueco Bolson, and the Tucson Basin groups thus relied more on agriculture.

The results from the San Pedro blade thickness comparisons between the two regions during the ELA and LLA indicate that both time periods are statistically different with this high visibility attribute. This pattern would indicate that the groups from the Tucson Basin and the Hueco Bolson did not have any social affiliation with each other or were actively trying to differentiate themselves during both time periods.

There are a couple of reasons why there is a possible disconnect between the results from Cienega and San Pedro clusters from the Tucson Basin and the Hueco Bolson during the ELA and LLA. First, my assumptions that total length, total width, blade length, and blade width measure resharpening, and correlates with the dependence on agriculture may be false. Also, it is possible that Carr (1995b) is incorrect that high visibility attributes that are not affected by tool function indicate social affiliation. Another possibility is that groups in each region used their projectile points differently or preferred different projectile point types, and that variability within the region affects the comparisons between the regions. It is also possible that people who preferred to use points from the San Pedro cluster had different social interactions with people from other regions than those who preferred to use the Cienega cluster. I will explore these possibilities further in the following chapters comparing moderate and low visibility projectile point attributes in the Tucson Basin, Hueco Bolson, and Black Mesa.

Chapter X

Results of Comparing Moderate Visibility Projectile Point Attributes among the Tucson Basin, Black Mesa, and the Hueco Bolson

This chapter presents the results from comparing the moderate visibility attributes during the ELA and LLA among the Tucson Basin, Black Mesa, and the Hueco Bolson. The moderate visibility attributes of projectile points are by nature less visible than the high visibility attributes, but they may be seen without close inspection, and they are not obscured by the hafting element. According to Carr's (1995b) unified middle-range theory of artifact design, the moderate visibility attributes may indicate active or passive messaging such as social affiliation within a group or acculturation (Carr 1995a, 1995b). These attributes are not affected by resharpening, and so they may better reflect social relationships than the high visibility attributes other than blade thickness. The moderate visibility attributes of the projectile point clusters that I consider are the presence or absence of serration, flake patterns, and blade tip thickness. For the ELA, I compare the Cienega and San Pedro clusters from the Tucson Basin and the Hueco Bolson. I am also able to compare these two clusters during the LLA with the addition of the Black Mesa region. Furthermore, the Livermore cluster from the Tucson Basin and the Hueco Bolson has a large enough sample to compare during the LLA.

Tucson Basin and Hueco Bolson Moderate Visibility Projectile Point Attributes during the ELA

According to Carr (1995b), moderate visibility attributes should reflect social acculturation. This social acculturation may crosscut regions especially if the groups from the different regions are not in competition with one another. Therefore, there should be a dominance of similarities in the moderate visibility attributes from the Cienega and San Pedro clusters during the ELA from the Tucson Basin and the Hueco Bolson if these groups had social interaction including acculturation.

Tucson Basin and Hueco Bolson Moderate Visibility Projectile Point Attributes of the ELA Cienega Cluster

Ascertaining any patterns from the moderate visibility attributes for the Cienega cluster from the Tucson Basin and the Hueco Bolson during the ELA is difficult because so few of the attributes had enough samples to adequately test them. It appears, however, that the results show that the groups from each region using projectile points from the Cienega cluster had social affiliation. If these groups shared social acculturation, I expect to see these patterns suggesting close social ties with the groups from the two regions to continue. Therefore, there should be no statistical differences between the moderate visibility attributes of serration, flake patterning, and blade tip thickness in the Tucson Basin and the Hueco Bolson.

Projectile Point Serration of the ELA Cienega Cluster from the Tucson Basin and Hueco Bolson. Because the expected value for the presence of serration on projectile points from the Cienega cluster is less than five, I used the Fisher's Exact test

(Table X-1). According to the results from the test, if a Cienega point has serration, it is likely it came from the Tucson Basin ($p = 0.0320$; $\alpha = 0.1$). This pattern suggests that the groups from the Tucson Basin and the Hueco Bolson who used projectile points from the Cienega cluster did not have close social ties resulting from acculturation

Table X-1. Contingency Table Comparing Serration on the Tucson Basin and the Hueco Bolson Cienega Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
Hueco Bolson	47 77.05 85.45 94.00 45.082	3 4.92 50.00 6.00 4.91803*	50 81.97
Tucson Basin	8 13.11 14.55 72.73 9.91803	3 4.92 50.00 27.27 1.08197*	11 18.03
	55 90.16	6 9.84	61

*expected <5

Projectile Point Flake Patterns of the ELA Cienega Cluster from the Tucson Basin and Hueco Bolson. Again, this moderate visibility attribute has an expected value that is less than five for the presence of any type of flake patterns on projectile points from the Cienega cluster (Table X-2). This requires that I use the Fisher's Exact test. According to the results from the test, there is no difference in the presence or absence of flake patterns between the ELA and the LLA ($p = 0.3998$; $\alpha = 0.1$). This pattern indicates that the groups from the two regions had social interaction based on acculturation.

Table X-2. Contingency Table Comparing Flake Patterns on the Tucson Basin and the Hueco Bolson Cienega Cluster Projectile Points.

Count Total % Column % Row % Expected	None	Parallel	
Hueco Bolson	46 76.67 80.70 93.88 46.55	3 5.00 100.00 6.12 2.45*	49 81.67
Tucson Basin	11 18.33 19.30 100.00 10.45	0 0.00 0.00 0.00 0.55*	11 18.33
	57 95.00	3 5.00	60

*expected < 5

Projectile Point Blade Tip Thickness of the ELA Cienega Cluster from the Tucson Basin and Hueco Bolson. The sample sizes for the Cienega cluster from the Tucson Basin (n = 10) and the Hueco Bolson (n = 41) are too small for a parametric test. The results from the non-parametric test show that there is no statistical difference of the tip thicknesses from the Cienega cluster between the Tucson Basin and the Hueco Bolson ($p = 0.1891$; $\alpha = 0.01$) (Figure X-1). This pattern indicates that the groups from the Tucson Basin and Hueco Bolson had social interaction based on acculturation.

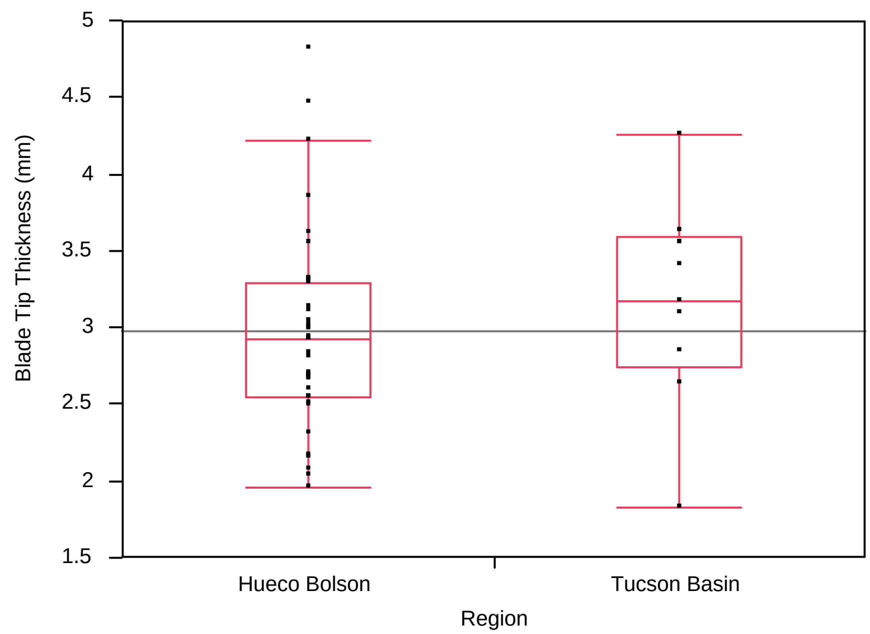

Figure X-1. Oneway analysis of ELA Cienega cluster blade tip thicknesses by region.

Implications from the Cienega Cluster Analysis from the Hueco Bolson and Tucson Basin. Two of the three moderate visibility attributes conform to my expectation that the groups from the Tucson Basin and the Hueco Bolson who used projectile points from the Cienega cluster would have similar moderate visibility attributes (Table X-3). According to Carr (1995b), the similarities are due to acculturation.

Table X-3. Comparisons of the Moderate Visibility Attributes for the Cienega Cluster in the Tucson Basin and Hueco Bolson.

Moderate Visibility Attribute	Tucson Basin	Hueco Bolson
Serration	More likely	Less likely
Flake patterns	No difference	No difference
Blade tip thickness	No difference	No difference

Although the moderate visibility attribute, serration, does not follow the pattern of acculturation, it could be due to a change in utilitarian function, such as the potential for being used in a sawing motion. If this is true that there was a greater likelihood to use some of the projectile points as saws in the Tucson Basin, then this should also hold true for San Pedro cluster in the following section.

Tucson Basin and Hueco Bolson Moderate Visibility Projectile Point Attributes of the ELA San Pedro Cluster

Similar to the Cienega cluster from the two regions during the ELA, I expect that results from comparing the San Pedro cluster will indicate that the groups from the Tucson Basin and the Hueco Bolson had positive social contact due to acculturation. Therefore, all three of the San Pedro cluster moderate visibility attributes should be statistically similar.

Projectile Point Serration of the ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. In the case of this moderate visibility attribute, the expected values are greater than five, so that a Chi Square test is appropriate (Table X-4). The results show that if a San Pedro point has serration, then it is greater than chance that the specimen came from the Tucson Basin ($\chi^2 = 23.292$, df = 1, $p < 0.0001$; $\alpha = 0.1$). This pattern suggests that the groups from the Tucson Basin and the Hueco Bolson who used projectile points from the San Pedro cluster were not acculturated.

Table X-4. Contingency Table Comparing Serration on the Tucson Basin and the Hueco Bolson San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
Hueco Bolson	126 48.28 58.06 94.03 111.41	8 3.07 18.18 5.97 22.59	134 51.34
Tucson Basin	91 34.87 41.94 71.65 105.59	36 13.79 81.82 28.35 21.41	127 48.66
	217 83.14	44 16.86	261

The Projectile Point Flake Patterns of ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. Because the expected values for the presence of flake patterns for both the Tucson Basin and the Hueco Bolson are less than five, I used a Fisher's Exact test (Table X-5). The results from this test show that although neither region during the ELA had a greater likelihood of projectile points with any discernable flake patterning, if a specimen did have a pattern, then it is statistically reasonable to assert that the projectile point came from the Hueco Bolson ($p = 0.0268$; $\alpha = 0.1$). This pattern suggests that the groups from the Tucson Basin and the Hueco Bolson who used projectile points from the San Pedro cluster were not in regular contact.

Table X-5. Contingency Table Comparing Flake Patterns on the Tucson Basin and the Hueco Bolson San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	None	Parallel	
Hueco Bolson	115 46.18 47.72 94.26 118.08	7 2.81 87.50 5.74 3.91968*	122 49.00
Tucson Basin	126 50.60 52.28 99.21 122.92	1 0.40 12.50 0.79 4.08032*	127 51.00
	241 96.79	8 3.21	249

*expected < 5

Projectile Point Blade Tip Thickness of the ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. The sample sizes for the San Pedro cluster from the Tucson Basin (n = 85) and the Hueco Bolson (n = 96) are large enough to use a Student's t test. In order to normalize the distribution, I used the formula log (tip thickness) + 1. The results from the Student's t test show that there is a significant difference between the tip thicknesses from the two regions during the ELA ($p < 0.0001$; $\alpha = 0.01$) (Table X-6). Furthermore, the results indicate that the tip thicknesses for the San Pedro cluster are larger in the Tucson Basin (Figure X-2). This pattern suggests that the groups from the Tucson Basin and the Hueco Bolson who used projectile points from the San Pedro cluster were not acculturated.

Table X-6. Logblade Tip Thickness: Comparisons for Each Pair Using Student's t.*

Region	Tucson Basin	Hueco Bolson
Tucson Basin	-0.05031	0.37521
Hueco Bolson	0.37521	-0.04734

*Positive values show pairs of means that are significantly different

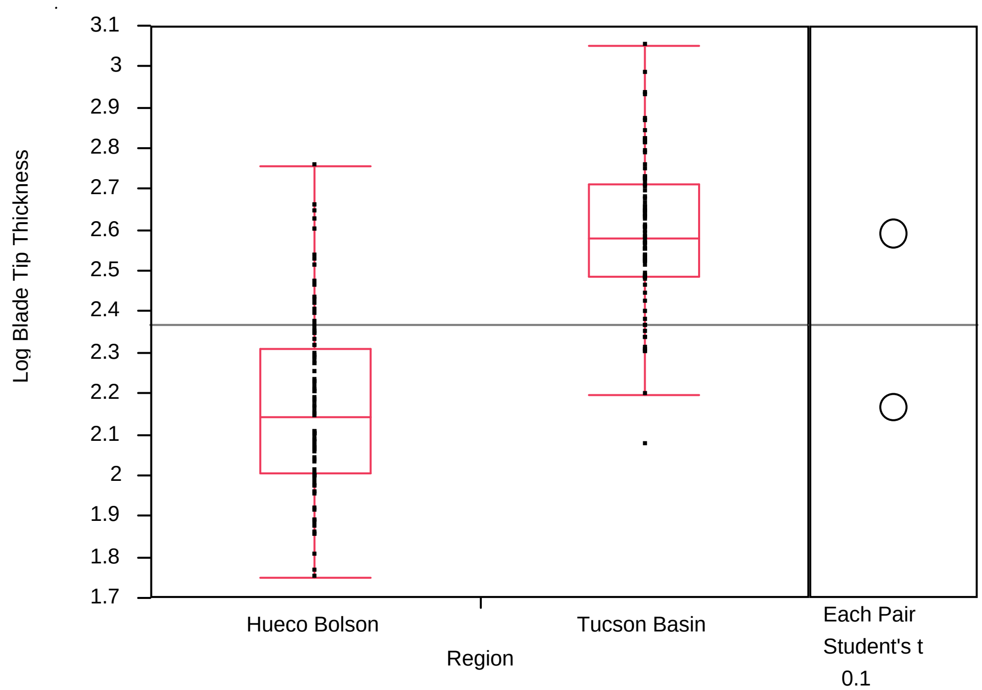

Figure X-2. Oneway analysis of ELA San Pedro cluster blade tip thicknesses by region.

Implications of the Tucson Basin and Hueco Bolson San Pedro Cluster Moderate Visibility Attribute Analysis. Carr states similarities of moderate visibility attributes between regions are a result of acculturation of the groups from the different regions. None of the moderate visibility attributes are statistically similar between the Tucson Basin and Hueco Bolson (Table X-7). Therefore, the results from the moderate visibility attribute analysis of the projectile points from the San Pedro cluster indicate that the groups from the two regions did not have social interaction based on acculturation.

Table X-7. Comparisons of the Moderate Visibility Attributes for the San Pedro Cluster in the Tucson Basin and Hueco Bolson.

Moderate Visibility Attribute	Tucson Basin	Hueco Bolson
Serration	More likely	Less likely
Flake patterns	Less likely	More likely
Blade tip thickness	Larger	Smaller

If moderate visibility attributes reflect active or passive messaging such as social affiliation and acculturation as suggested by Carr (1995b), then the Tucson Basin and Hueco Bolson groups that used different ecological niches, but did have contact with each other, would have similar moderate visibility attributes because of the acculturation. Due to the lack of competition, the groups from the Tucson Basin and the Hueco Bolson would have shared the knowledge of projectile point manufacturing.

None of the moderate visibility attributes support my contention that the moderate visibility attributes would not be significantly different. The results from the three moderate visibility attributes measured from the San Pedro cluster suggest that the Tucson Basin and the Hueco Bolson groups during the ELA did not have contact that would have facilitated social acculturation.

There are at least three possible reasons for the discrepancies between the patterns of the Cienega and San Pedro clusters. First, it is possible that social context does not affect moderate visibility attributes. Second, lurking variables that I have not recognized are influencing the results. Third, different social groups within each region may have preferred a different projectile point types. This last reason can easily explain the different patterns between the two projectile point clusters, but it runs the risk of suggesting that artifacts define a culture.

Another interesting pattern is the continuity of serration of some of the projectile points within the Cienega and San Pedro clusters from the Tucson Basin. Because the pattern persists between clusters, this result may suggest that on a whole, Tucson Basin groups preferred serrated projectile points.

Tucson Basin, Black Mesa, and the Hueco Bolson Moderate Visibility Projectile Point Attributes during the LLA

This section compares the moderate visibility attributes from the Tucson Basin, Black Mesa, and Hueco Bolson projectile points during the LLA. The clusters that I compare from all three regions are the Cienega and San Pedro clusters. Also, I investigate the commonalties and differences of the moderate visibility attributes of the Livermore cluster between the Tucson Basin and the Hueco Bolson, because there are not any specimens from Black Mesa.

Tucson Basin, Black Mesa, and Hueco Bolson Moderate Visibility Projectile Point Attributes of the LLA Cienega Cluster

Since the Cienega cluster is diagnostic for the LLA, but begins to appear in the archaeological record near the end of the ELA, the LLA patterns should be similar to the ELA for the Cienega cluster, because they may not have had enough time for differences to appear between the time periods. Unfortunately, I can only compare serration and flake patterns from all three regions, because the Black Mesa sample does not have enough specimens for blade tip thickness.

Projectile Point Serration of the LLA Cienega Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The contingency table indicates that the expected value for the presence of serration is less than five from Black Mesa and the Hueco Bolson, which indicates that a Fisher's exact test is appropriate (Table X-8). The results show that if a Cienega point has serration, it is greater than chance that the specimen came from the Tucson Basin ($p = 0.0206$; $\alpha = 0.1$). This pattern suggests that the Tucson Basin groups during the ELA did not have social interaction with Black Mesa or Hueco Bolson groups. Furthermore, the similarity of no serration on the projectile points from the Cienega cluster between Black Mesa and the Hueco Bolson indicate that these groups had socially close ties.

Table X-8. Contingency Table Comparing Serration on the Tucson Basin, Black Mesa, and the Hueco Bolson Cienega Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
Black Mesa	11 13.92 16.42 100.00 9.32911	0 0.00 0.00 0.00 1.67089*	11 13.92
Hueco Bolson	17 21.52 25.37 100.00 14.4177	0 0.00 0.00 0.00 2.58228*	17 21.52
Tucson Basin	39 49.37 58.21 76.47 43.2532	12 15.19 100.00 23.53 7.74684	51 64.56
	67 84.81	12 15.19	79

*expected < 5

Projectile Point Flake Patterns of the LLA Cienega Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The contingency table indicates that the expected value for the presence of flake patterns is less than five for all three regions, and so I used a Fisher's Exact test (Table X-9). The results show there is no propensity for one region having a projectile point with any discernable flake patterns over another ($p = 0.4067$; $\alpha = 0.1$). This pattern may indicate that the groups from all three regions had social interaction resulting in acculturation.

Table X-9. Contingency Table Comparing Flake Patterns on the Tucson Basin, Black Mesa, and the Hueco Bolson Cienega Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
Black Mesa	8 10.53 11.27 88.89 8.40789	1 1.32 20.00 11.11 0.59211*	9 11.84
Hueco Bolson	14 18.42 19.72 87.50 14.9474	2 2.63 40.00 12.50 1.05263*	16 21.05
Tucson Basin	49 64.47 69.01 96.08 47.6447	2 2.63 40.00 3.92 3.35526*	51 67.11
	71 93.42	5 6.58	76

*expected < 5

Projectile Point Blade Tip Thickness of the LLA Cienega Cluster from the Tucson Basin and the Hueco Bolson. The sample size is too small from the Black Mesa (n = 7) to compare, but the sample sizes from the Tucson Basin (n = 46) and the Hueco Bolson (n = 12) are large enough to use a non-parametric test. This test shows that there is no statistical difference in the projectile point tip thicknesses between the Tucson Basin and the Hueco Bolson specimens ($p = 0.1611$; $\alpha = 0.1$) (Figure X-3), suggesting close social ties.

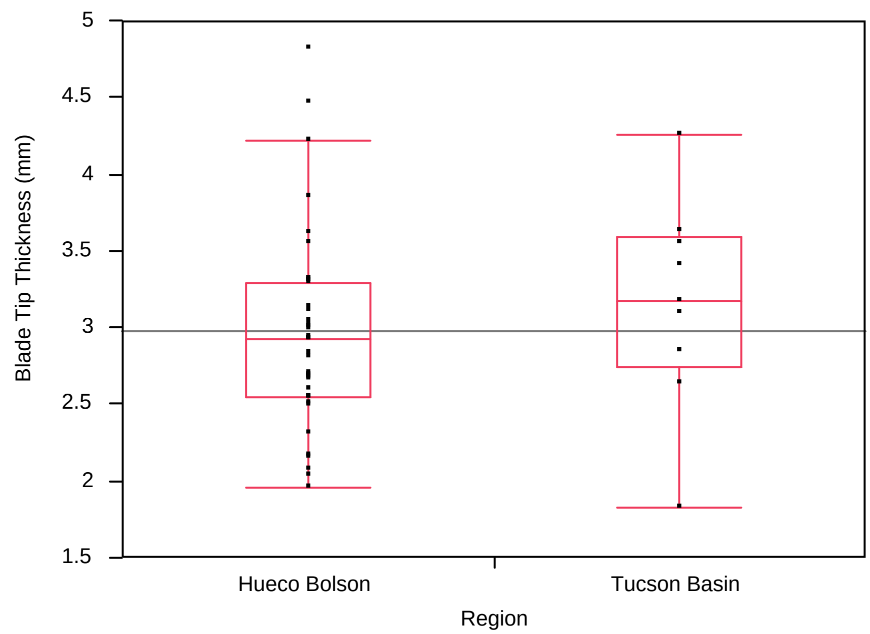

Figure X-3. Oneway analysis of LLA Cienega cluster blade tip thicknesses by region.

Implications of the Tucson Basin, Black Mesa, and Hueco Bolson Cienega Cluster Moderate Visibility Analysis. Because more of the moderate visibility attributes are similar between the Cienega cluster projectile points from the Tucson Basin and the Hueco Bolson, this pattern suggests that the groups from these regions had close interaction resulting from acculturation (Table X-10). In contrast, of the two moderate visibility attributes that are present on the Cienega cluster Black Mesa specimens, there is no difference between the Hueco Bolson and Black Mesa projectile points. This pattern also implies these groups had close social interaction. In contrast, the results comparing the Tucson Basin and the Black Mesa Cienega clusters exhibit no patterns, but with a sample size of 11, it is difficult to speculate too much on the relationship of the Cienega cluster from the Black Mesa compared to those from the other two regions.

Table X-10. Comparisons of the Moderate Visibility Attributes for the Cienega Cluster in the Tucson Basin, Black Mesa, and Hueco Bolson.

Moderate Visibility Attribute	Tucson Basin	Hueco Bolson	Black Mesa
Serration	More likely	Less likely	Less likely
Flake patterns	No difference	No difference	No difference
Blade tip thickness	No difference	No difference	

Tucson Basin, Black Mesa, and the Hueco Bolson Moderate Visibility Projectile Point Attributes of the LLA San Pedro Cluster

Unlike the Cienega cluster, the projectile points that compose the San Pedro cluster were first introduced at the beginning of the ELA. Therefore, the attributes of these projectile points have a considerable amount of time to change. Hence, the San Pedro cluster should show evidence of this change in their moderate visibility attributes. Because the groups during the LLA would have been tied to their regions more than during the previous ELA due to a shift from foraging to more agriculture, the groups within each region would have had less opportunity to interact. Thus, attributes that could show social acculturation should show that the moderate visibility attributes are statistically different between the regions.

Projectile Point Serration of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and Hueco Bolson. The contingency table indicates that the expected values for the presence of serration are less than five from all three regions, which indicates that a Fisher's exact test is appropriate (Table X-11). The results show if a San Pedro point has serration, it more likely came from the Hueco Bolson region during the LLA ($p = 0.0498$; $\alpha = 0.1$).

Table X-11. Contingency Table Comparing Serration on the Tucson Basin, Black Mesa, and the Hueco Bolson San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
Black Mesa	34 28.57 30.91 100.00 31.4286	0 0.00 0.00 0.00 2.57143*	34 28.57
Hueco Bolson	34 28.57 30.91 85.00 36.9748	6 5.04 66.67 15.00 3.02521*	40 33.61
Tucson Basin	42 35.29 38.18 93.33 41.5966	3 2.52 33.33 6.67 3.40336*	45 37.82
	110 92.44	9 7.56	119

*expected <5

Projectile Point Flake Patterns of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and Hueco Bolson. The contingency table indicates that the expected values for the presence of flake patterns on projectile points from the San Pedro cluster are less than five for all three regions, and so I used a Fisher's Exact test (Table X-12). The results show that projectile points from within the San Pedro cluster that do have a flake pattern are more likely to be from the Black Mesa region (p = 0.0397; $\alpha = 0.1$).

Table X-12. Contingency Table Comparing Flake Patterns on the Tucson Basin, Black Mesa, and the Hueco Bolson San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
Black Mesa	23 20.72 22.33 82.14 25.982	5 4.50 62.50 17.86 2.01802*	28 25.23
Hueco Bolson	37 33.33 35.92 97.37 35.2613	1 0.90 12.50 2.63 2.73874*	38 34.23
Tucson Basin	43 38.74 41.75 95.56 41.7568	2 1.80 25.00 4.44 3.24324*	45 40.54
	103 92.79	8 7.21	111

*expected <5

Projectile Point Blade Tip Thickness of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. Although the sample sizes from the Tucson Basin (n = 34) and the Hueco Bolson (n = 30) are large enough for a Student's t test, the smaller sample for the Black Mesa (n = 28) dictates the use of a non-parametric test. The blade tip thickness of the San Pedro cluster from the Tucson Basin is significantly larger than those from Black Mesa and the Hueco Bolson ($p = 0.0012$; $\alpha = 0.1$), and the Black Mesa thicknesses are significantly larger than those from the Hueco Bolson (Figure X-4).

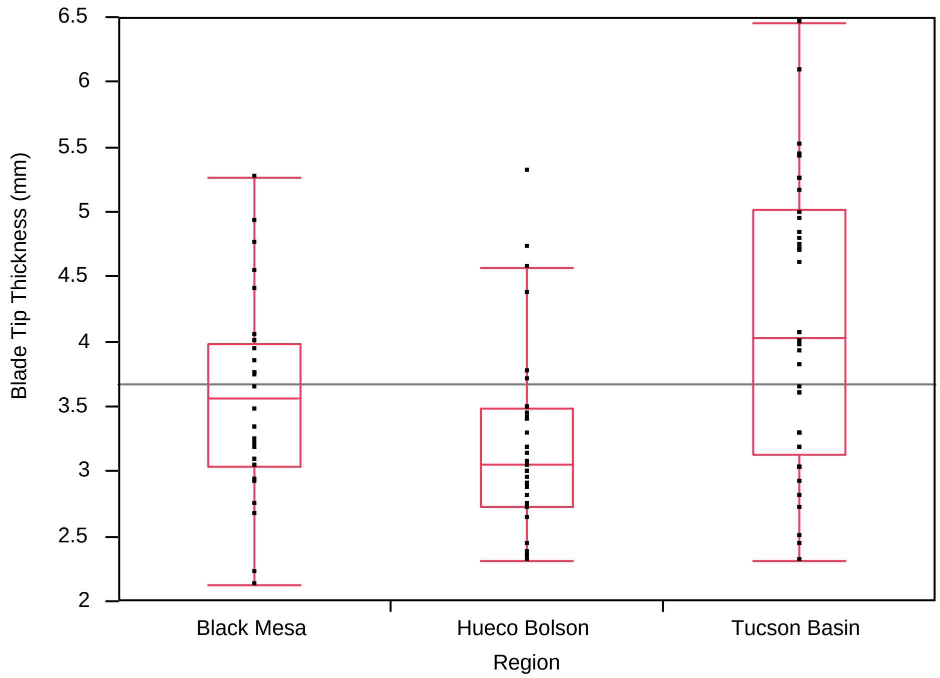

Figure X-4. Oneway analysis of LLA San Pedro cluster blade tip thicknesses by region.

Implications of the Tucson Basin, Black Mesa, and the Hueco Bolson San Pedro Cluster Moderate Visibility Analysis. As expected, the results show that there are significant differences between the regions. The San Pedro cluster from the Tucson Basin has a significantly larger blade tip thickness. Unlike the Cienega cluster, the Hueco Bolson shows more serration, and the results suggest that the Black Mesa specimens are more likely to show flake patterning. These results of the moderate visibility attributes indicate that the groups from the three regions using San Pedro cluster projectile points did not have enough social interaction to facilitate acculturation.

Table X-13. Comparisons of the Moderate Visibility Attributes for the San Pedro Cluster in the Tucson Basin, Black Mesa, and Hueco Bolson.

Moderate Visibility Attribute	**Tucson Basin**	**Hueco Bolson**	**Black Mesa**
Serration	Less likely	More likely	Less likely
Flake patterns	Less likely	Less likely	More likely
Blade tip thickness	Larger than all	Smaller than all	Larger than Hueco Bolson

Tucson Basin and Hueco Bolson Moderate Visibility Projectile Point Attributes of the LLA Livermore Cluster

Unfortunately, the Livermore cluster is only present during the LLA, and so I cannot address its possible change through time. Only the Tucson Basin and the Hueco Bolson have specimens from this cluster for comparison. The Guadalupe point that is part of the Livermore cluster by definition is serrated. Therefore, this moderate visibility attribute may not prove insightful.

Projectile Point Serration of the LLA Livermore Cluster from the Tucson Basin and the Hueco Bolson. The contingency table indicates that the expected value for the presence of serration is greater than five from the Tucson Basin, which suggests that a Chi Square test is appropriate (Table X-14). The results show there is no likelihood for one region's group to have serration on their projectile points over the other ($\chi^2 = 0.313$, df = 1, $p = 0.5756$; $\alpha = 0.1$). Furthermore, this indicates that over 50 percent of the samples from each region have serration, which is expected, because one of the defining attributes of a Guadalupe point that falls within the Livermore cluster is the presence of serration.

Table X-14. Contingency Table Comparing Serration on the Tucson Basin and the Hueco Bolson Livermore Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
Hueco Bolson	8 13.56 30.77 50.00 7.05085	8 13.56 24.24 50.00 8.94915	16 27.12
Tucson Basin	18 30.51 69.23 41.86 18.9492	25 42.37 75.76 58.14 24.0508	43 72.88
	26 44.07	33 55.93	59

Projectile Point Flake Patterns of the LLA Livermore Cluster from the Tucson Basin and the Hueco Bolson. Due to the low expected values, I used a Fisher's Exact test, which indicates that there is no tendency that the Tucson Basin or the Hueco Bolson regions are more likely to have had flake patterns on the Livermore cluster projectile points (p = 0.4067; α = 0.1) (Table X-15).

Table X-15. Contingency Table Comparing Flake Patterns on the Tucson Basin and the Hueco Bolson Livermore Cluster Projectile Points.

Count Total % Column % Row % Expected	Absent	Present	
Hueco Bolson	13 22.81 23.64 92.86 13.5088	1 1.75 50.00 7.14 0.49123*	14 24.56
Tucson Basin	42 73.68 76.36 97.67 41.4912	1 1.75 50.00 2.33 1.50877*	43 75.44
	55 96.49	2 3.51	57

*expected < 5

Projectile Point Blade Tip Thickness of the LLA Livermore Cluster from the Tucson Basin and the Hueco Bolson. Because of the small sample size from the Hueco Bolson (n = 10), only a non-parametric test is appropriate to compare the tip thicknesses of the Livermore cluster from the Tucson Basin (n = 38) and the Hueco Bolson during the LLA. Based on the results from the test, the blade tip thickness of the Livermore cluster from the Tucson Basin is significantly larger than those from the Hueco Bolson during the LLA ($p < 0.0001$, $\alpha = 0.1$) (Figure X-5).

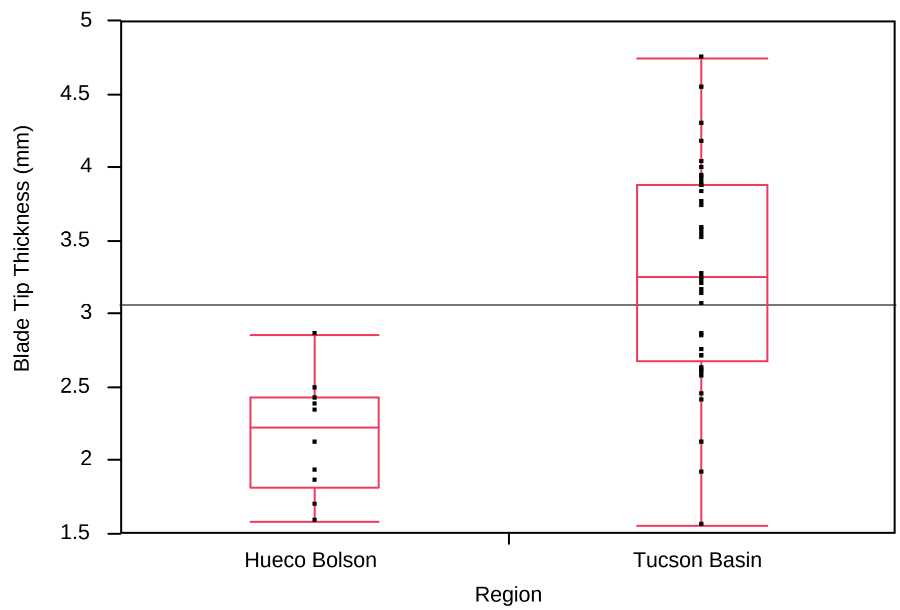

Figure X-5. Oneway analysis of LLA Livermore cluster blade tip thicknesses by region.

Implications of the Tucson Basin and the Hueco Bolson LLA Livermore Cluster Analysis. There are no discernable patterns from the Livermore cluster except that the blade tip thickness from the Tucson Basin specimens is significantly larger. As expected, the fact that one of the projectile points types from the Livermore cluster has serration as a defining characteristic suggests that serration is not a meaningful attribute for this cluster. More patterns may emerge when the moderate visibility attributes are explored in conjunction with the high and low visibility attributes, which will be discussed in the final chapter.

Comparing the Moderate Visibility ELA and LLA Projectile Point Attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson

The moderate visibility attributes introduced in this chapter are not affected by subsistence strategies. Instead, differences and similarities between the projectile point clusters and their moderate visibility attributes can be used to identify patterns of social interaction resulting from acculturation. Three moderate visibility attributes are viable for this study and only one of them, blade tip thickness, is a continuous variable that can truly be measured in terms of significance. The other two variables are measured based on the likelihood that the attribute will be found within one region versus another region. Even still, interesting patterns have emerged from statistically analyzing the moderate visibility attributes from the Cienega, San Pedro, and Livermore clusters during the ELA and LLA in the Tucson Basin, Black Mesa, and the Hueco Bolson.

Tucson Basin and Hueco Bolson Moderate Visibility Attributes during the ELA

The clusters from the Tucson Basin and the Hueco Bolson that have an adequate sample size from both regions during the ELA and LLA are the Cienega and San Pedro clusters. As previously discussed, there was some sort of interaction between the groups from these regions because of the overlap in projectile point clusters. Based on the results from of the San Pedro high visibility attribute analyses, I have suggested that although it appears that the groups from the Tucson Basin relied more on agriculture than the groups from the Hueco Bolson during the ELA, they still participated in social interaction with the groups from the Hueco Bolson. Because the Tucson Basin groups would not have been in competition with the Hueco Bolson groups, the groups from the two regions may have shared knowledge about projectile point manufacturing. Based on this assumption and Carr's (1995b) proposal that moderate visibility attributes measure social interaction, the moderate visibility attributes from the Cienega and San Pedro clusters during the ELA should be similar between the Tucson Basin and the Hueco Bolson.

The results from the Cienega cluster analyses show that two of the three moderate visibility attributes, flake patterns and blade tip thickness, are similar between the two regions (Table X-16). Thus, the groups from the two regions had close social contact with each other.

Table X-16. Cienega and San Pedro Clusters Moderate Visibility Attributes in the Tucson Basin and Hueco Bolson.

Cluster	**Moderate Visibility Attribute**	**Tucson Basin**	**Hueco Bolson**
Cienega	Serration	More likely	Less likely
	Flake patterns*	No change	No change
	Blade tip thickness*	No change	No change
San Pedro	Serration	More likely	Less likely
	Flake patterns	Less likely	More likely
	Blade tip thickness	Larger	Smaller

* Conforms to expectation

In contrast, the San Pedro cluster analyses indicate that all of the moderate visibility attributes are different suggesting that the groups from the different regions did not have intimate contact. The fact that the Cienega and the San Pedro clusters show different trends indicates that the interaction between the groups from the Tucson Basin and the Hueco Bolson was more nuanced than I had expected. A scenario that takes into account the discrepancy between the two clusters is that different social groups within each region may be using different projectile points to differentiate themselves from each other, but they had close ties with groups outside of their region. In order to further explore this idea, these results need to be examined in conjunction with the low visibility attributes, which are discussed in the next chapter.

Trends of the Tucson Basin, Black Mesa, and Hueco Bolson Moderate Visibility Attributes during the LLA

In contrast with the ELA, the LLA groups from the different regions would have been more tied to their respective areas due to maintaining their agricultural fields. Therefore, the moderate visibility attributes from the Cienega, San Pedro, and Livermore clusters should be different among the regions. Unfortunately, analyzing the Livermore cluster appears to be fruitless at this stage because it cannot be compared in the Black Mesa, nor does the cluster appear in the ELA so I cannot identify if the attributes from this cluster changed between the ELA and LLA.

The analysis of the San Pedro cluster, however, conforms to my expectation that the moderate visibility attributes should vary between the regions (Table X-17). On the other hand, the Cienega cluster paints another picture. The results from this cluster show the same patterns as the ELA in that there is no statistically difference of the flake patterns and blade tip thickness moderate visibility attributes, although serration is more likely present on the Tucson Basin Cienega cluster projectile points. One possibility for this pattern is that the invention of the projectile points from the Cienega cluster was so late during the ELA that social relationships as well as the changes in subsistence had already taken place and therefore had no bearing on the attributes of the cluster.

Another possibility for the difference in patterns between the Cienega and San Pedro clusters is that different social groups were using each point cluster.

Table X-17. Tucson Basin, Black Mesa, and Hueco Bolson Projectile Point Moderate Visibility Attributes for the Cienega, San Pedro, and Livermore Clusters.

Cluster	**Moderate Visibility Attribute**	**Tucson Basin**	**Hueco Bolson**	**Black Mesa**
Cienega	Serration(*)	More likely	Less likely	Less likely
	Flake patterns	No difference	No difference	No difference
	Blade tip thickness	No difference	No difference	
San Pedro	Serration(*)	Less likely	More likely	Less likely
	Flake patterns(*)	Less likely	Less likely	More likely
	Blade tip thickness*	Largest	Smallest	Larger than Hueco Bolson
Livermore	Serration	No difference	No difference	
	Flake patterns	No difference	No difference	
	Blade tip thickness*	Larger*	Smaller*	

* Conforms to expectation; (*) one region conforms to expectation

Final Thoughts on the Moderate Visibility Attributes

Unlike the high visibility attributes, addressing the moderate visibility attributes has led to an exploration of the possible social relationships among the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson, and how those relationships may have changed from the ELA to the LLA. The comparison of the Cienega cluster between the Tucson Basin and Hueco Bolson show no changes between the ELA and the LLA. Furthermore, only serration from the Tucson Basin and Hueco Bolson San Pedro cluster changes between the ELA and the LLA, while flake patterns and blade tip thickness do not. Because all of the Cienega cluster moderate visibility attributes and two of the three San Pedro moderate visibility attributes do not change between the

ELA and LLA, there may have been no changes in the Tucson Basin and Hueco Bolson groups' social relations between the time periods. Furthermore, both the Cienega and San Pedro clusters from the Tucson Basin and the Hueco Bolson are more similar than those from the Hueco Bolson during the LLA. This pattern may suggest that there was more social contact between the Tucson Basin and Hueco Bolson groups than with the Black Mesa groups. The next step is to further this exploration by analyzing the low visibility attributes to see if the patterns from each of the clusters continue to hold.

Chapter XI

Results of Comparing of Low Visibility Projectile Point Attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson

This chapter presents the results of the statistical tests comparing the low visibility attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA and the LLA. Low visibility attributes may indicate enculturation (Carr 1995a, 1995b; Hoffman 1997). Unlike the previous high and moderate visibility attributes, the low visibility attributes cannot be viewed unless the projectile point has been removed from its hafting element. Also, because these variables indicate more local interactions and should not have been influenced by a change in subsistence strategy that led to curation and resharpening, the expectation is that there should be a statistical difference in the Cienega, San Pedro, and Livermore clusters among the projectile point from the Tucson Basin, Black Mesa, and the Hueco Bolson. Low visibility attributes of projectile points that I used for this study are weight, stem length, neck width, base width, stem thickness, and base shape.

Tucson Basin and the Hueco Bolson Low Visibility Projectile Point Attributes during the ELA

Because these are low visibility variables that cannot be seen without close inspection of an unhafted projectile point, the attributes should represent enculturation (Carr 1995b). Therefore, most, if not all, of the low visibility attributes from the

Cienega and San Pedro clusters should be statistically different between the Tucson Basin and the Hueco Bolson during the ELA.

Tucson Basin and Hueco Bolson Low Visibility Projectile Point Attributes of the ELA Cienega Cluster

In order to have a robust sample size for my study, I used some projectile points that are broken. The neck of a point is an area of weakness that is prone to breaking. In many cases, I am able to identify the projectile point type and its cluster with part of the stem missing. Unfortunately, the Tucson Basin has a small sample size, and thus I cannot compare many of the low visibility attributes for the ELA Cienega cluster. Of the six low visibility attributes, only neck width has barely enough specimens to analyze.

Projectile Point Neck Width of the ELA Cienega Cluster from the Tucson Basin and the Hueco Bolson. The sample size for this low visibility attribute dictate that I use a non-parametric test, because the sample from the Tucson Basin has 11 specimens (Hueco Bolson = 45). The results show that the Tucson Basin Cienega cluster has a statistically smaller neck width than that from the Hueco Bolson ($p < 0.0001$; $\alpha = 0.1$) (Figure XI-1).

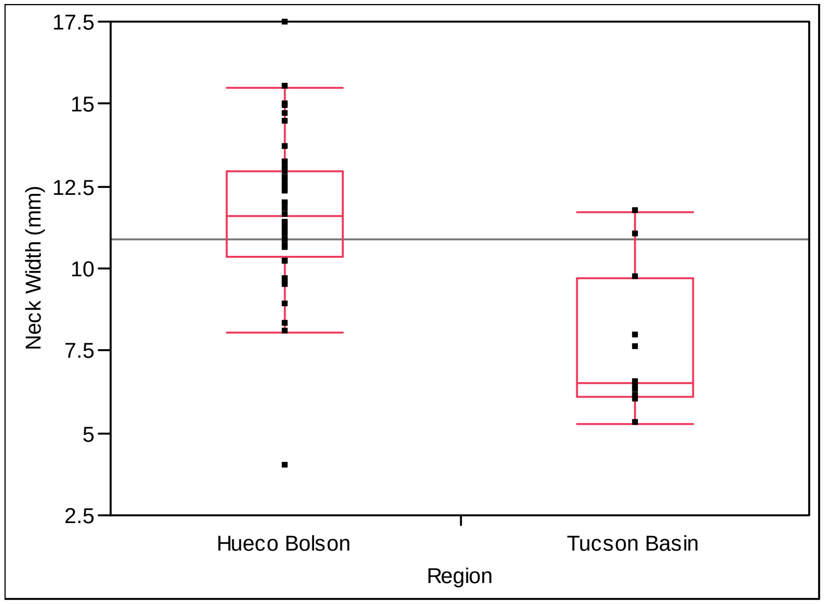

Figure XI-1. Oneway analysis of Cienega cluster neck width by region.

Implications of the Tucson Basin and Hueco Bolson ELA Cienega Cluster Low Visibility Attribute Analysis. The expectation for the low visibility attributes from the Tucson Basin and the Hueco Bolson Cienega clusters during the ELA is that most of the low visibility attributes should be statistically different, because these attributes reflect enculturation within each region. Although neck width is the only low visibility attribute that has a suitable sample size, the pattern of this attribute conforms to my expectation.

Tucson Basin and Hueco Bolson Low Visibility Projectile Point Attributes of the ELA San Pedro Cluster

Similar to the Cienega cluster, I expect that the Tucson Basin and the Hueco Bolson San Pedro clusters during the ELA should be statistically different due to enculturation. The sample sizes from both of the regions allow for the testing of all of the low visibility attributes, which are weight, stem length, neck width, base width, stem thickness, and base shape.

Projectile Point Weight of the ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. After taking the log of weight, the distributions are normal. Because of the sample size from the Tucson Basin dataset (n = 78) and the Hueco Bolson (n = 91), I am able to use the Student's t test to evaluate the San Pedro cluster from the two regions during the ELA. The results of this test show that the San Pedro cluster from the Tucson Basin weighs statistically more than those from the Hueco Bolson ($p < 0.0001$; $\alpha = 0.1$) (Table XI-1; Figure XI-2). This pattern is consistent with my expectation.

Table XI-1. Logweight: Comparisons of Each Pair Using Student's t.*

Region	**Tucson Basin**	**Hueco Bolson**
Tucson Basin	-0.11142	0.56218
Hueco Bolson	0.56218	-0.10316

*Positive values show pairs of means that are significantly different

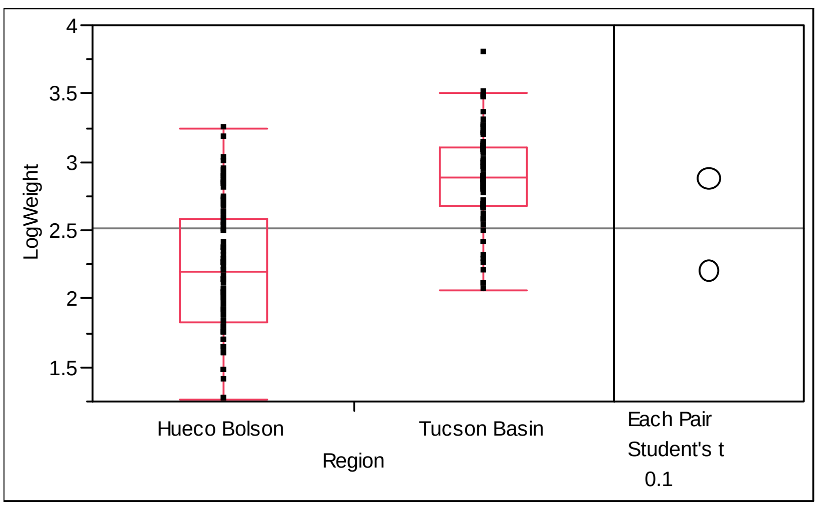

Figure XI-2. Oneway analysis of San Pedro cluster logweights by region.

Projectile Point Stem Length of the ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. To normalize the two datasets, I had to exclude two specimens from the Tucson Basin (n = 121) and one specimen from the Hueco Bolson (n = 131). The sample sizes from each region are large enough to conduct an ANOVA statistical test. The results from this test show that there is not a statistically significant difference of the San Pedro cluster stem lengths between the Tucson Basin and the Hueco Bolson during the ELA ($p = 0.2236$; $\alpha = 0.1$) (Table X1-2; Figure XI-3). This pattern is contrary to my expectation and may suggest close social ties between the groups from the Tucson Basin and the Hueco Bolson during the ELA.

Table XI-2. Stem Length: Comparisons of Each Pair Using Tukey-Kramer HSD.*

Region	Tucson Basin	Hueco Bolson
Tucson Basin	-0.46929	-0.12737
Hueco Bolson	-0.12737	-0.45103

*Positive values show pairs of means that are significantly different

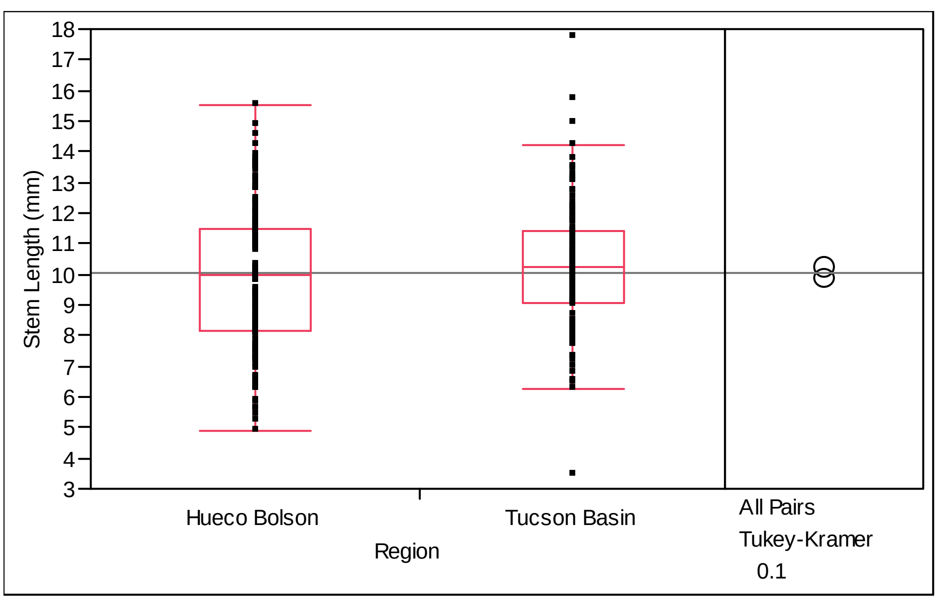

Figure XI-3. Oneway analysis of San Pedro cluster stem lengths by region.

Projectile Point Neck Width of the ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. The distribution of the low visibility attribute, neck width, is normal. Furthermore, the sample sizes are large enough (Tucson Basin = 126; Hueco Bolson = 133) to use an ANOVA statistical test. The results indicate that there is a statistical difference in the neck width attribute between the Tucson Basin and Hueco Bolson San Pedro cluster during the ELA ($p < 0.0001$; $\alpha = 0.1$) (Table XI-3). This pattern is consistent with my expectation that the low visibility attributes should be statistically different between the regions.

Table XI-3. Neck Width: Comparisons of Each Pair Using Tukey-Kramer HSD.*

Region	**Tucson Basin**	**Hueco Bolson**
Tucson Basin	-0.4825	1.6986
Hueco Bolson	1.6986	-0.4696

*Positive values show pairs of means that are significantly different

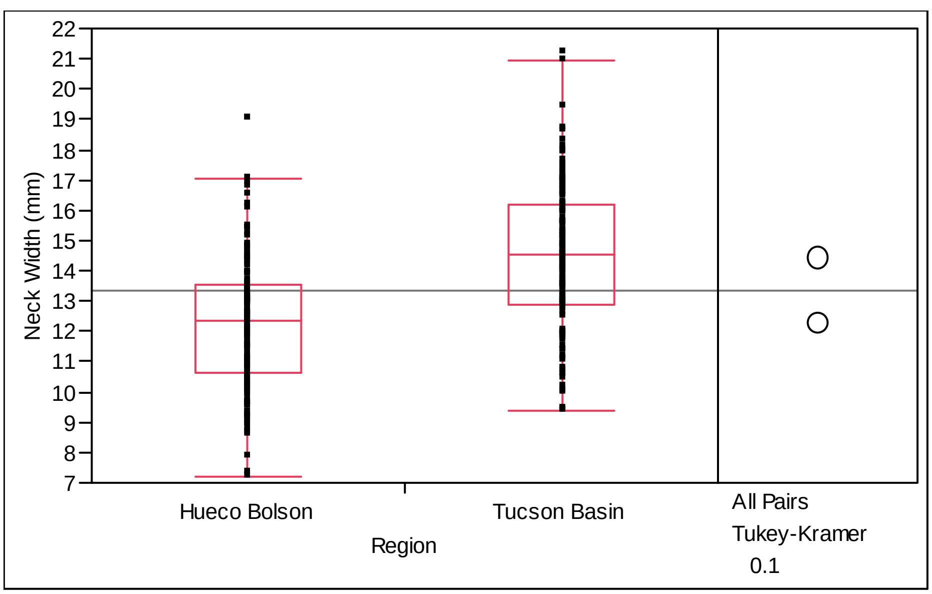

Figure XI-4. Oneway analysis of San Pedro cluster neck widths by region.

Projectile Point Base Width of the ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. In order to normalize the distribution of both the Tucson Basin (n = 116) and the Hueco Bolson (n = 128) datasets, I took the log of the attribute and excluded three outliers form the Tucson Basin sample. Because the sample sizes for both regions are over one hundred specimens, I am able to use the ANOVA statistical test. The results from this test show that there is a statistical difference between the two regions ($p = 0.0083$; $\alpha = 0.1$) (Table XI-4), and that the base width of the San Pedro cluster from the Tucson Basin is larger (Figure XI-5). Again, the statistical difference of this low visibility attribute agrees with my expectation.

Table XI-4. Base Width: Comparisons of Each Pair Using Tukey-Kramer HSD.*

Region	Tucson Basin	Hueco Bolson
Tucson Basin	-0.62698	0.37433
Hueco Bolson	0.37433	-0.59687

*Positive values show pairs of means that are significantly different

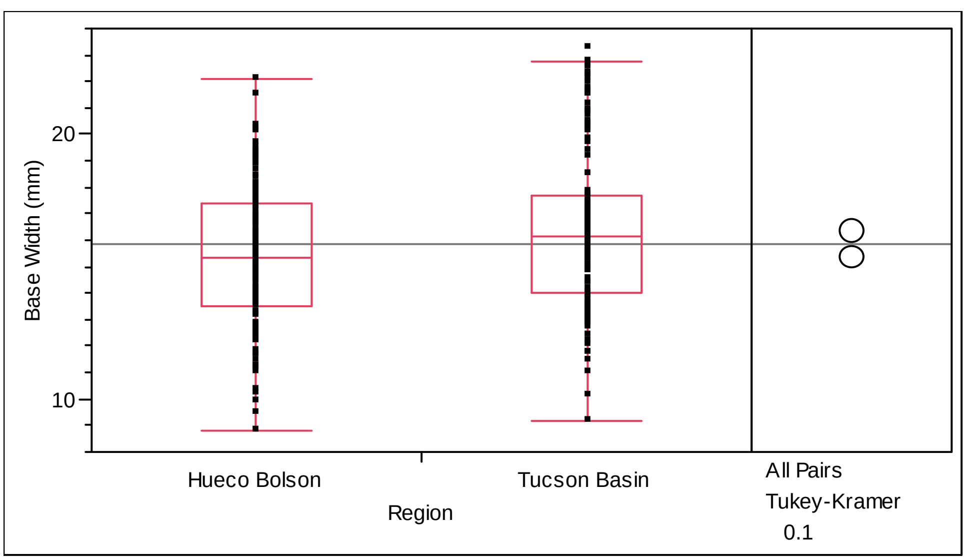

Figure XI-5. Oneway analysis of San Pedro cluster base widths by region.

Projectile Point Stem Thickness of the ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. For this low visibility attribute, I only needed to exclude two outliers form the Tucson Basin dataset to normalize the distribution. The sample sizes for the Tucson Basin (n = 124) and the Hueco Bolson (n = 131) are large enough to use the ANOVA statistical test. The results of this test show that there is a statistically significant difference in the San Pedro cluster stem thicknesses from the two regions ($p < 0.0001$; $\alpha = 0.1$) (Table XI-5), and the Tucson Basin specimens are larger (Figure XI-6). The results for this low visibility attribute also are consistent with my expectation.

Table XI-5. Stem Thickness: Comparisons of Each Pair Using Tukey-Kramer HSD.*

Region	Tucson Basin	Hueco Bolson
Tucson Basin	-0.17674	0.99028
Hueco Bolson	0.99028	-0.17195

*Positive values show pairs of means that are significantly different

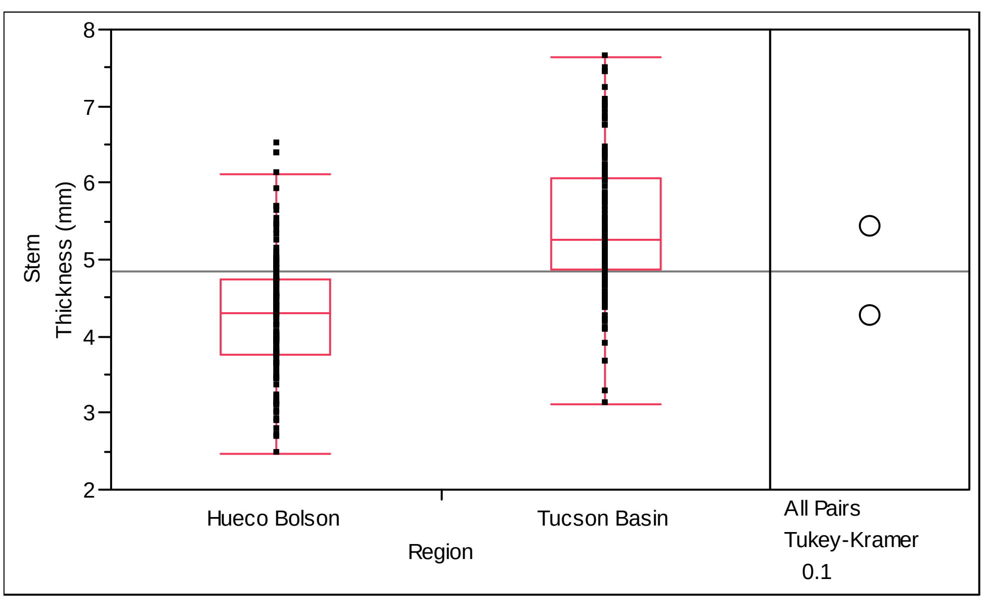

Figure XI-6. Oneway analysis of San Pedro cluster stem thicknesses by region.

Projectile Point Base Shape of the ELA San Pedro Cluster from the Tucson Basin and the Hueco Bolson. Because base shape is a nominal attribute, I used a Chi Square test. The results of the Chi Square test ($\chi^2 = 6.312$, df = 1, $p = 0.0154$; $\alpha = 0.1$) for the base shape of the San Pedro cluster from the Tucson Basin (n = 119) and the Hueco Bolson (n = 132) show that the Tucson Basin specimens are more likely to have a straight base (Table XI-6). This difference in base shapes between regions further supports my expectation that the low visibility attributes should be different between the Tucson Basin and the Hueco Bolson.

Table XI-6. Contingency Table Comparing Base Shape on the Tucson Basin and the Hueco Bolson San Pedro Cluster Projectile Points.

Count Total % Column % Row % Expected	convex	straight	
Hueco Bolson	53 21.12 63.86 40.15 43.6494	79 31.47 47.02 59.85 88.3506	132 52.59
Tucson Basin	30 11.95 36.14 25.21 39.3506	89 35.46 52.98 74.79 79.6494	119 47.41
	83 33.07	168 66.93	251

Implications of the Tucson Basin and Hueco Bolson ELA San Pedro Cluster Low Visibility Attribute Analysis. Like the Cienega cluster, the expectation for the low visibility attributes of the San Pedro cluster from the Tucson Basin and the Hueco

Bolson during the ELA is that all of the low visibility attributes should be statistically different, because these attributes reflect enculturation. Of the six low visibility attributes that I have used for this study, all of them except stem length conform to my expectation (Table XI-7). Therefore, the overall pattern for the comparison of the low visibility attributes between the Tucson Basin and the Hueco Bolson suggests that the low visibility attributes are statistically different between the regions during the ELA. This indicates that the groups using the projectile points from the San Pedro cluster in the two regions did not have close enough social contact to influence the low visibility attributes.

Table XI-7. Comparisons of the Low Visibility Attributes for the San Pedro Cluster during the ELA.

Low Visibility Attribute	**Tucson Basin**	**Hueco Bolson**
Weight*	Larger	Smaller
Stem length	No difference	No difference
Neck width*	Larger	Smaller
Base width*	Larger	Smaller
Stem thickness*	Larger	Smaller
Base shape*	Straight	Convex

*Conforms to the expectations

Tucson Basin, Black Mesa, and the Hueco Bolson Low Visibility Projectile Point Attributes during the LLA

This section compares the low visibility projectile point LLA attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson. I compare the Cienega and San Pedro clusters from all three regions. Also, I investigate the commonalties and differences of the low visibility attributes of the Livermore cluster from the Tucson Basin and the Hueco Bolson.

Tucson Basin, Black Mesa, and Hueco Bolson Low Visibility Projectile Point Attributes of the LLA Cienega Cluster

The patterns identified from the comparison of the Cienega clusters between the Tucson Basin and the Hueco Bolson during the ELA should persist during the LLA, namely that the low visibility attributes between the regions should be statistically different. Although I was unable to compare the Black Mesa projectile points during the ELA because there too few from this region, I expect that the results comparing the Cienega cluster between all three regions should show statistical differences in the low visibility attributes. These attributes should be different because the groups from their respective regions would have had less opportunity to interact, for the reason that they would have been tied to their agricultural fields.

The low visibility attributes that have a large enough sample size are stem length, neck width, base width, and stem thickness. Some low visibility attributes that have only enough specimens from the Tucson Basin and Hueco Bolson are stem length and base width. Weight and base shape do not have a large enough sample size from two of the regions, and therefore I did not evaluate them.

Projectile Point Stem Length of the LLA Cienega Cluster from the Tucson Basin and the Hueco Bolson. Only the Tucson Basin (n = 31) and the Hueco Bolson (n = 11) have large enough sample sizes to use the Kruskall-Wallace test. This test indicates that the Tucson Basin points have a statistically larger stem length than the projectile points in the Cienega cluster from the Hueco Bolson ($p = 0.0738$; $\alpha = 0.01$) (Figure XI-7).

The results from the comparison of the stem length are consistent with my expectation that the low visibility attributes should be statistically different between the regions, because similarities in low visibility attributes indicate close social ties resulting from enculturation.

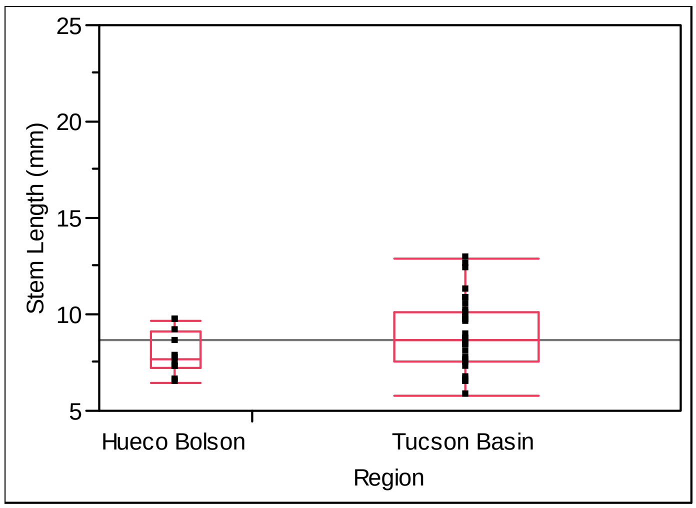

Figure XI-7. Oneway analysis of Cienega cluster stem lengths by region.

Projectile Point Neck Width of the LLA Cienega Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. All three regions have a large enough sample size to use the Kruskall-Wallace test (Tucson Basin = 50; Hueco Bolson = 16; Black Mesa = 10) to compare the neck widths from the Cienega cluster. The results from this test indicate that the Tucson Basin specimens have a statistically smaller neck width than the projectile points from the other two regions ($p = 0.0003$; $\alpha = 0.1$) (Figure XI-8). In contrast, there is not a statistically significant difference between the Hueco Bolson and Black Mesa specimens ($p = 0.8952$; $\alpha = 0.1$). Since the Tucson Basin specimens are statistically different than those from the other two regions, those results support my expectation. In contrast, the results from comparing the Black Mesa and Hueco Bolson Cienega cluster contradict my expectation.

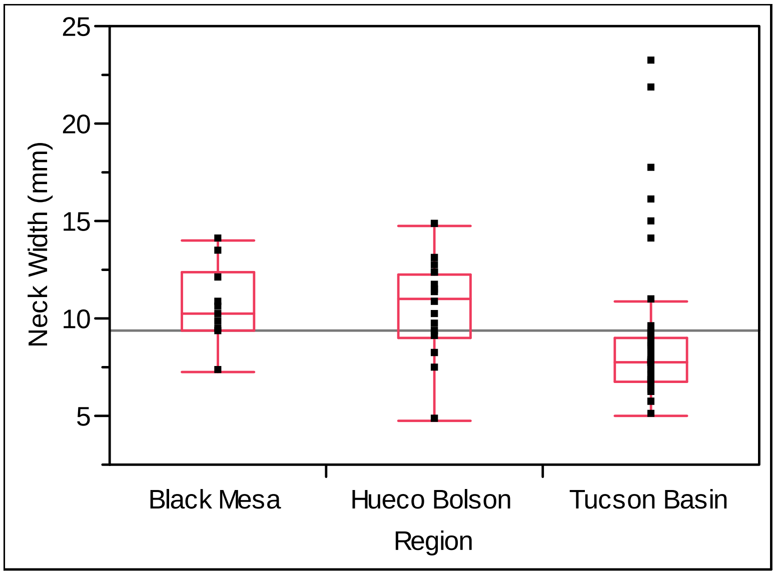

Figure XI-8. Oneway analysis of Cienega cluster neck widths by region.

Projectile Point Base Width of the LLA Cienega Cluster from the Tucson Basin and the Hueco Bolson. This low visibility attribute only has enough specimens to effectively use a non-parametric test to compare the Tucson Basin (n = 24) and the Hueco Bolson (n = 10). The results from the Wilcoxon test show that the base width of the Cienega cluster projectile points from the Tucson Basin are significantly smaller (p = 0.0821; $\alpha = 0.1$) than those from the Hueco Bolson during the LLA (Figure XI-9). This pattern agrees with my expectation.

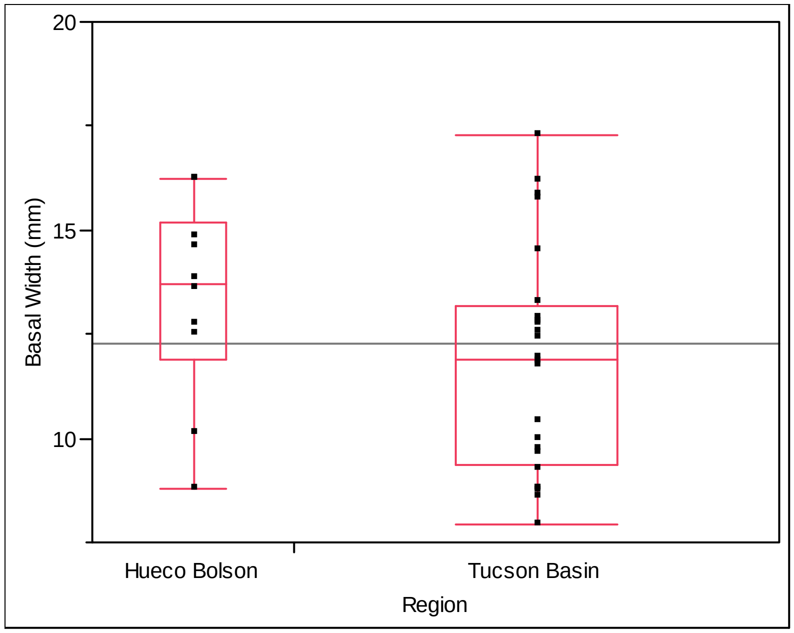

Figure XI-9. Oneway analysis of Cienega cluster base widths by region.

Projectile Point Stem Thickness of the LLA Cienega Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The stem thickness attribute for the Cienega cluster from the Tucson Basin (n = 48), Black Mesa (n = 10), and the Hueco Bolson (n = 14) has a sample size appropriate for a Kruskal-Wallace non-parametric test. The results show that there are no statistically significant differences among the three regions during the LLA ($p = 0.7693$; $\alpha = 0.1$) (Figure XI-10). These results do not correspond with my expectation that the projectile points from the Cienega cluster should be statistically different among all three regions.

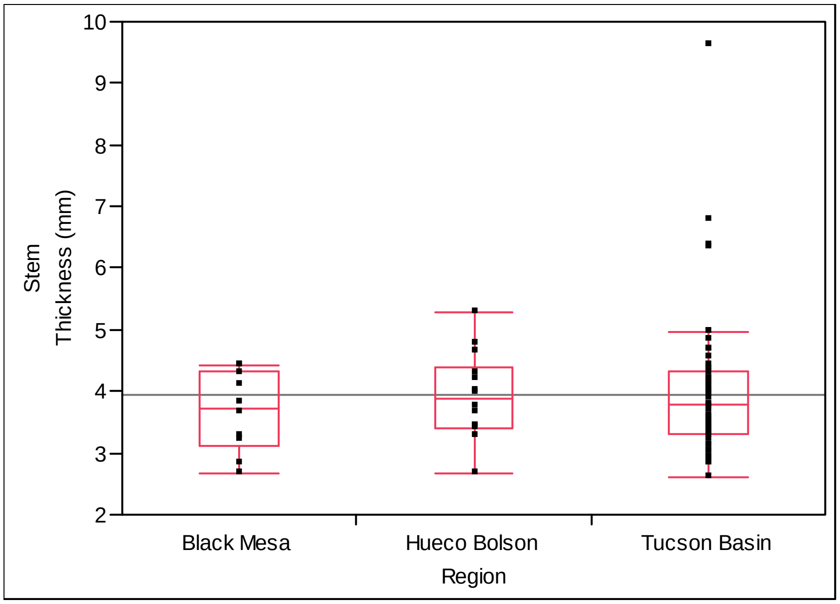

Figure XI-10. Oneway analysis of Cienega cluster stem thicknesses by region.

Implications of the Tucson Basin, Black Mesa, and Hueco Bolson LLA Cienega Cluster Low Visibility Attribute Analysis. The expectation for the Cienega cluster low visibility attributes from the three regions during the LLA is that all of the low visibility attributes should be statistically different, because these attributes reflect enculturation within each region. In all cases, except for stem thickness, the low visibility attributes of the Tucson Basin Cienega cluster are statistically different compared to those attributes from Black Mesa and the Hueco Bolson during the LLA. This pattern conforms to my expectation because enculturation should not have been taking place between the groups from different regions.

Table XI-8. Comparisons of the Low Visibility Attributes for the Cienega Cluster during the LLA.

Low Visibility Attribute	Tucson Basin	Black Mesa	Hueco Bolson
Stem length*	Larger		Smaller
Neck width(*)	Smaller	No difference	No difference
Base width*	Smaller		Larger
Stem thickness	Same	Same	Same

*Conforms to the expectations; (*) one region conforms to expectations.

In contrast, for the two cases in which the Black Mesa specimens are put into the mix, neck width and stem thickness, the Cienega cluster low visibility attributes from Black Mesa and the Hueco Bolson are not significantly different. One possibility for this outcome is that the groups from these two regions had very positive close-knit relationships that they were similarly enculturated. This possibility is highly suspect for several reasons. First, the regions for these two groups are distant from each other, which would not have been conducive for enculturation. Second, the results from the high visibility and moderate visibility attributes suggest that these groups were not close socially. A more reasonable explanation is the small sample sizes from the two regions. The strength of a non-parametric test is that it can be used in situations with a small sample size because it will not over represent statistical significance, so that having a false positive (type 1 error) is less likely. On the other hand, non-parametric tests tend to under represent significance, so the non-parametric tests are more conservative and more likely to give a false negative (type 2 error).

Tucson Basin, Black Mesa and the Hueco Bolson Low Visibility Projectile Point Attributes of the LLA San Pedro Cluster Projectile

I expect that the San Pedro clusters from the Tucson Basin, Black Mesa, and the Hueco Bolson during the LLA should be statistically different due to regional enculturation. The sample sizes from the three regions are of a suitable size to allow the testing of all of the low visibility attributes.

Projectile Point Weight of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and Hueco Bolson. Because I am comparing three regions, and two of the three regions have less than 30 specimens (Tucson Basin = 32; Black Mesa = 24; Hueco Bolson = 24), I used a Kruskal-Wallace non-parametric test to compare the weights of the San Pedro cluster points. The results show that the Tucson Basin sample has a statistically larger weight than those from the other two regions ($p = 0.0006$: $\alpha = 0.1$) (Figure XI-11). Furthermore, the Hueco Basin sample for the weight of the San Pedro cluster points has significantly greater weight than the cluster from Black Mesa ($p = 0.0633$: $\alpha = 0.1$). These results support my expectation that there should be no similarity among the low visibility attributes from the three regions.

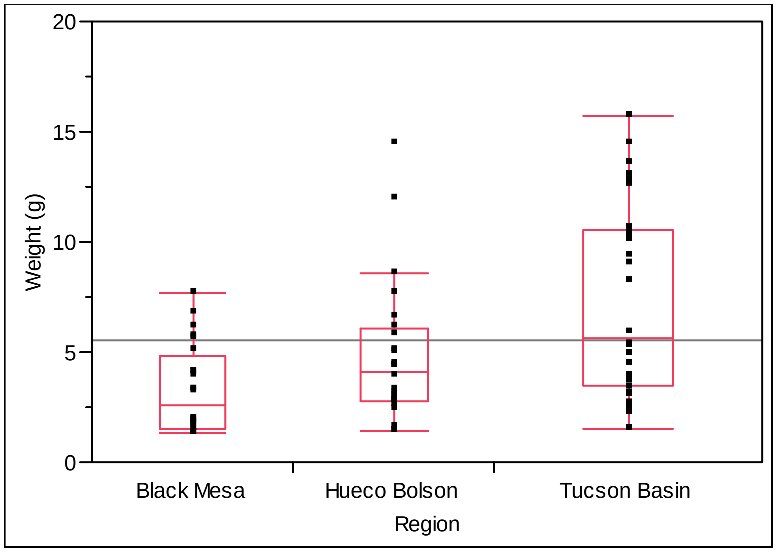

Figure XI-11. Oneway analysis of San Pedro cluster weights by region.

Projectile Point Stem Length of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. I am able to use the Student's t test for significance because the samples sizes from the Tucson Basin (n = 45), Black Mesa (n = 32), and the Hueco Bolson (n = 37) are of an appropriate size. Also, I had to exclude one outlier from the Black Mesa dataset to normalize the distribution. First, the results of this test show that the Black Mesa sample is significantly different than the other two regions (Table XI-9). Furthermore, the Black Mesa specimens have the smallest stem length during the LLA (Figure XI-12). This pattern supports my expectation.

Table XI- 9. Stem Length: Comparisons of Each Pair Using Student's t.*

Region	**Tucson Basin**	**Hueco Bolson**	**Black Mesa**
Tucson Basin	-0.8311	-0.6486	1.5927
Hueco Bolson	-0.6486	-0.9166	1.3264
Black Mesa	1.5927	1.3264	-0.9856

*Positive values show pairs of means that are significantly different

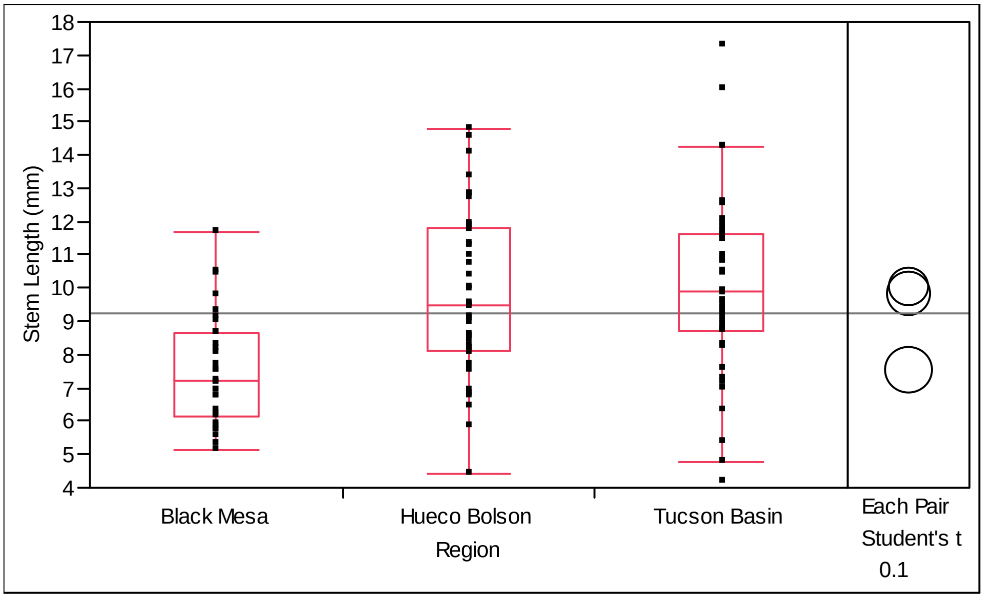

Figure XI-12. Oneway analysis of San Pedro cluster stem lengths by region.

In contrast, the comparison of the stem length of the San Pedro cluster between the Tucson Basin and the Hueco Bolson suggest that the stem lengths are similar between the regions. This pattern does not support my expectation and may suggest that the groups from the Tucson Basin and the Hueco Bolson had close social ties.

Projectile Point Neck Width of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and Hueco Bolson. As with the previous low visibility attribute, there are enough specimens from each of the regions (Tucson Basin = 45; Black Mesa = 32; Hueco Bolson = 38), and normal distributions to use a Student's t test. The results from this test show that only the Tucson Basin San Pedro cluster is statistically significant ($p = 0.0030$; $\alpha = 0.1$) (Table XI-10), which supports my expectation. The Tucson Basin's San Pedro cluster is larger than those from the Black Mesa or the Hueco Bolson (Figure XI-13). In contrast, the results for neck width between the Black Mesa and Hueco Bolson San Pedro clusters do not support my expectation that the neck width should be statistically different.

Table XI- 10. Neck Width: Comparisons of Each Pair Using Student's t.*

Region	Tucson Basin	Hueco Bolson	Black Mesa
Tucson Basin	-1.0919	0.7991	1.0322
Hueco Bolson	0.7991	-1.1882	-0.9534
Black Mesa	1.0322	-0.9534	-1.2750

*Positive values show pairs of means that are significantly different

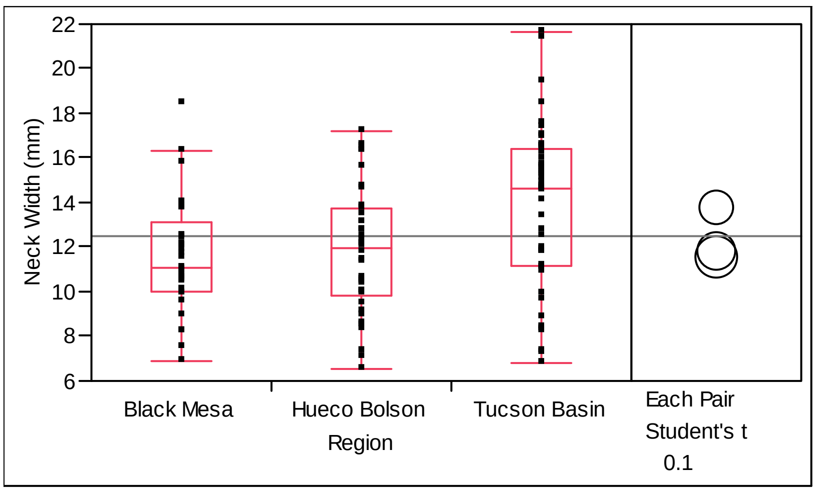

Figure XI-13. Oneway analysis of San Pedro cluster neck widths by region.

Projectile Point Base Width of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The sample sizes for this attribute are 45 from the Tucson Basin, 30 from Black Mesa, and 32 from the Hueco Bolson during the LLA. Also, the distributions are normal, and so I used a Student's t test. The results show that there is no statistically significant difference (p = 0.2827; α = 0.1) among the San Pedro cluster base width measurements from the Tucson Basin, Black Mesa, and the Hueco Bolson (Table XI-11; Figure XI-14). This pattern does not support my expectation and could suggest that the groups from the three regions had close social ties.

Table XI- 11. Base Width: Comparisons of Each Pair Using Student's t.*

Region	Tucson Basin	Black Mesa	Hueco Bolson
Tucson Basin	-1.3504	-0.7901	-0.0596
Black Mesa	-0.7901	-1.6539	-0.9272
Hueco Bolson	-0.0596	-0.9272	-1.5770

*Positive values show pairs of means that are significantly different

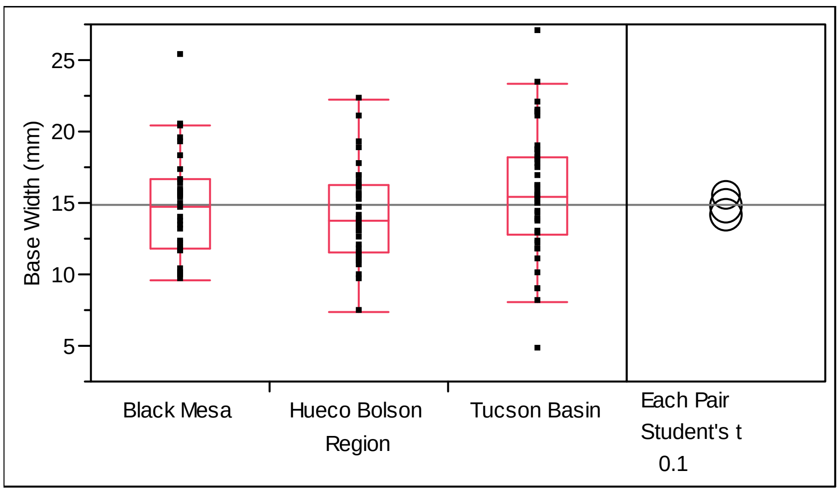

Figure XI-14. Oneway analysis of San Pedro cluster base widths by region.

Projectile Point Stem Thickness of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The stem thickness of the San Pedro cluster from the Tucson Basin (n = 43), Black Mesa (n = 32), and the Hueco Bolson (n = 38) are normally distributed. The Student's t test shows that stem thicknesses in all of the regions are statistically different ($p < 0.0001$; $\alpha = 0.1$) (Table XI-12). The Tucson Basin specimens are the largest, and the Black Mesa ones have the smallest stem thickness (Figure XI-15). These results are consistent with my expectation that there should be statistical differences in the low visibility attributes between the Tucson Basin, Black Mesa, and the Hueco Bolson.

Table XI- 12. Stem Thickness: Comparisons of Each Pair Using Student's t.*

Region	Tucson Basin	Black Mesa	Hueco Bolson
Tucson Basin	-0.31092	0.66482	0.99610
Black Mesa	0.66482	-0.33075	0.00089
Hueco Bolson	0.99610	0.00089	-0.35492

*Positive values show pairs of means that are significantly different

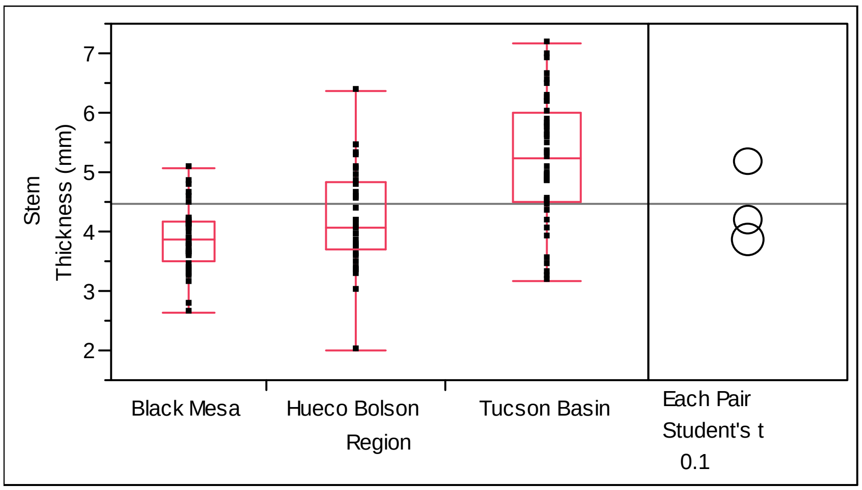

Figure XI-15. Oneway analysis of San Pedro cluster stem thicknesses by region.

Projectile Point Base Shape of the LLA San Pedro Cluster from the Tucson Basin, Black Mesa, and the Hueco Bolson. The results from the Chi Square test show that the projectile point cluster from the regions have a greater likelihood of having projectile points with a convex or straight base ($\chi^2 = 0.385$, df = 2, $p = 0.8249$; $\alpha = 0.1$) (Table XI-13). This pattern does not support my expectation and may suggest that the groups from the three regions using San Pedro cluster projectile points had close social ties.

Table XI-13. Contingency Table Comparing Base Type on the Tucson Basin, Black Mesa, and the Hueco Bolson San Pedro Cluster Projectile Points.

Count Total % Col % Row % Expected	convex	straight	
Black Mesa	15 13.27 30.61 46.88 13.8761	17 15.04 26.56 53.13 18.1239	32 28.32
Hueco Bolson	16 14.16 32.65 44.44 15.6106	20 17.70 31.25 55.56 20.3894	36 31.86
Tucson Basin	18 15.93 36.73 40.00 19.5133	27 23.89 42.19 60.00 25.4867	45 39.82
	49 43.36	64 56.64	113

Implications of the Tucson Basin, Black Mesa, and Hueco Bolson LLA San Pedro Cluster Low Visibility Analysis. Like the Cienega cluster, the expectation for the low visibility attributes of the San Pedro cluster from the Tucson Basin and the Hueco Bolson during the LLA is that all of the low visibility attributes should be statistically different, because these attributes reflect enculturation within each region. Only the low visibility attributes of base width and base shape do not follow my assertion (Table XI-14). The remaining four low visibility attributes have at least one region that is significantly different. In general, the patterns indicate that the Tucson Basin low visibility attributes are the largest, and the Black Mesa low visibility attributes are the smallest. Therefore, the patterns suggest that the low visibility attributes from the San

Pedro cluster are different among the regions during the LLA, indicating that the relationship of the groups using the projectile points from the San Pedro cluster was not close enough social contact to influence the low visibility attributes.

Table XI-14. Comparisons of the Low Visibility Attributes for the San Pedro Cluster during the LLA.

Low Visibility Attribute	Tucson Basin	Black Mesa	Hueco Bolson
Weight*	Largest	Smallest	Medium
Stem length(*)	No difference	Smaller	No difference
Neck width(*)	Larger	No difference	No difference
Base width	No difference	No difference	No difference
Stem thickness*	Largest	Smallest	Medium
Base shape	No difference	No difference	No difference

*Conforms to the expectations; (*) one region conforms to expectations.

Tucson Basin and Hueco Bolson Low Visibility Projectile Point Attributes of the LLA Livermore Cluster

The Tucson Basin and the Hueco Bolson have enough specimens that constitute the Livermore cluster for statistical comparison. Of the possible low visibility attributes that I am testing, only neck width and stem thickness have an adequate sample size for non-parametric statistical tests. Similar to the Cienega and San Pedro clusters and their results, I expect these two low visibility attributes to be statistically different between the Tucson Basin and the Hueco Bolson due to regional enculturation.

Projectile Point Neck Width of the LLA Livermore Cluster from the Tucson Basin and the Hueco Bolson. The sample sizes for the Tucson Basin and the Hueco Bolson for neck width are 43 and 16, respectively. Therefore, I used the Wilcoxon non-parametric statistical test. The results of this test show that the neck widths of the

Livermore cluster from the Tucson Basin is statistically larger than from the Hueco Bolson sample ($p = 0.0155$; $\alpha = 0.1$) (Figure XI-16). This pattern supports my expectation.

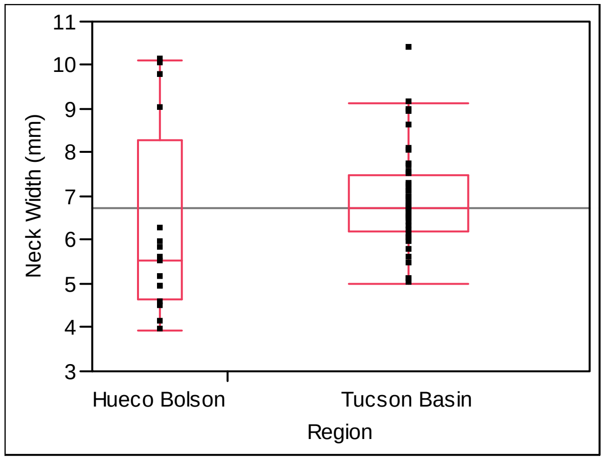

Figure XI-16. Oneway analysis of Livermore cluster neck width by region.

Projectile Point Stem Thickness of the LLA Livermore Cluster from the Tucson Basin and the Hueco Bolson. Again, I used the Wilcoxon non-parametric test because of having only 15 samples from the Hueco Bolson (Tucson Basin = 39). Similar to the previous results for neck width, the outcomes from the statistical test show that the Tucson Basin specimens have a statistically larger stem thickness than the Livermore cluster from the Hueco Bolson during the LLA ($p = 0.0018$; $\alpha = 0.1$) (Figure XI-17). This pattern supports my expectation.

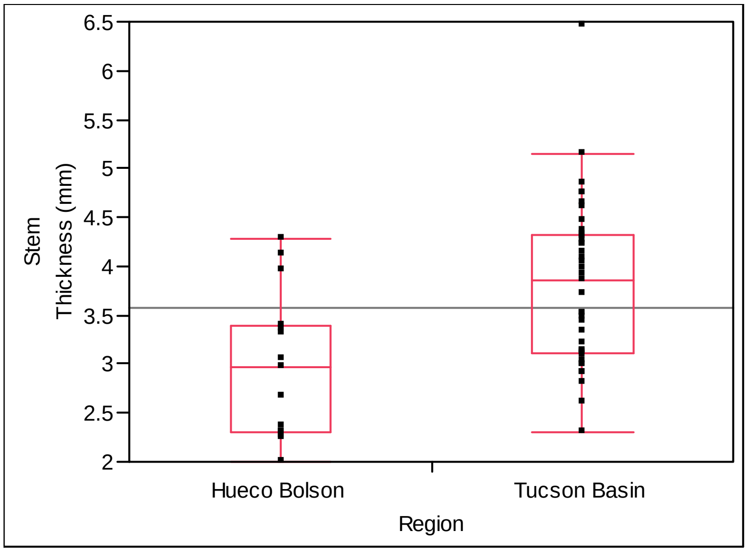

Figure XI-17. Oneway analysis of Livermore cluster stem thicknesses by region.

Implications of the Tucson Basin and Hueco Bolson LLA Livermore Cluster Low Visibility Analysis. Unfortunately, only two low visibility attributes from the Livermore cluster have large enough LLA sample sizes to adequately compare them between the Tucson Basin and the Hueco Bolson. With that being said, the results from the statistical tests reflect the same general pattern as the Cienega and San Pedro clusters, namely that the low visibility attributes are statistically different between the regions during the LLA, and the Tucson Basin specimens tend to be larger. These patterns indicate that the groups from the Tucson Basin and the Hueco Bolson did not have close social interaction resulting in enculturation.

Patterns in the ELA and LLA Low Visibility Projectile Point Attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson

Carr (1995b) states that similarities in low visibility attributes are a product of enculturation. Because enculturation is the process of an individual learning the social norms within a group, it should not affect the low visibility attributes between groups. Therefore, the low visibility attributes from the Cienega, San Pedro, and Livermore clusters during the ELA and LLA should be statistically different.

Overall, the results of the low visibility attribute analyses from the Cienega, San Pedro, and Livermore clusters during both the ELA and the LLA are straightforward. During the ELA, both Cienega and San Pedro cluster analyses indicate that all of the low visibility attributes are statistically different except for stem length from the San Pedro cluster (Table XI-7). This ELA pattern suggests that the groups from the Tucson Basin and the Hueco Bolson did not have close social ties resulting in enculturation.

Table XI-15. Tucson Basin and Hueco Bolson Projectile Point Low Visibility Attributes for the Cienega and San Pedro.

Cluster	**Moderate Visibility Attribute**	**Tucson Basin**	**Hueco Bolson**
Cienega	Neck width*	Smaller	Larger
San Pedro	Weight*	Larger	Smaller
	Stem length	No difference	No difference
	Neck width*	Larger	Smaller
	Base width*	Larger	Smaller
	Stem thickness*	Larger	Smaller
	Base shape*	Straight	Convex

* Conforms to expectation

During the LLA, the pattern of statistical differences for the projectile point cluster attributes continues, although there are a few more exceptions (Tables XI-16). Interestingly, those low visibility attributes that are not significantly different are not consistent between the projectile point clusters. For instance, the stem thickness for the Cienega cluster is not significant among all three regions, but it is from the San Pedro cluster. On the other hand, there is no statistical difference of the base width from the

San Pedro cluster, but this attribute is statistically significant from the Cienega cluster. Although some low visibility attributes do not support my expectation that they should be statistically different, the overall pattern during the LLA is that the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson did not have close social ties resulting in enculturation, which does support my expectation.

Table XI-16. Tucson Basin, Black Mesa, and Hueco Bolson Projectile Point Low Visibility Attributes for the Cienega, San Pedro, and Livermore Clusters.

Cluster	Moderate Visibility Attribute	Tucson Basin	Black Mesa	Hueco Bolson
Cienega	Stem length*	Larger		Smaller
	Neck width(*)	Smaller	No difference	No difference
	Base width*	Smaller		Larger
	Stem thickness	Same	Same	Same
San Pedro	Weight*	Largest	Smallest	Medium
	Stem length(*)	No difference	Smaller	No difference
	Neck width(*)	Larger	No difference	No difference
	Base width	No difference	No difference	No difference
	Stem thickness*	Largest	Smallest	Medium
	Base shape	No difference	No difference	No difference
Livermore	Neck width*	Larger		Smaller
	Stem thickness*	Larger		Smaller

* Conforms to expectation; (*) one region conforms to expectation

The overarching results during both the ELA and LLA from the low visibility attribute analysis conform to the expectation that the groups from the three different regions did not have close social ties that would have facilitated enculturation among them. Furthermore, the results of the analysis indicating no social enculturation among the groups from the different regions suggest that their relationships with one another did not change through time.

This chapter concludes the statistical analysis of the projectile point clusters from the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA and the

LLA. The next chapter discusses how the patterns from the raw material study, the identification of the projectile point clusters, and the high, moderate, and low visibility attributes analyses directly correspond to my hypotheses and expectations presented in the first chapter.

Chapter XII

Discussion of the Analysis Results from this Projectile Point Study

Using Barth's (1969), Tostevin's (2007), and Carr's (1995b) ideas of social interaction, I have proposed the following hypotheses. First, groups during the ELA might have cooperated with each other because their varied subsistence strategies and resource scheduling would dictate that they not occupy the same ecological niches simultaneously. Evidence of this positive interaction can be identified by the similarities of projectile point design style including possible commonalities in the high, moderate, and low visibility attributes. Second, groups during the LLA who relied more on agriculture would have occupied smaller territories and would have been less mobile than ELA groups because they would have been tied to their fields. Therefore, projectile point design between each region should show statistically significant differences in their attributes.

In order to test these hypotheses, I developed six expectations. These expectations were modeled after Barth's (1969) concept of social boundaries and Tostevin's (2007) notion of social interaction in terms of Carr's (1995b) unified middle-range theory of artifact design based on high, moderate, and low visibility attributes.

The first expectation is that groups from the same region, but different time periods would have projectile points with similar high, moderate, and low visibility attributes, because Carr (1995b) suggests that similarities in these attributes reflect transgenerational social continuity. Carr (1995b) states, and I also expect, that attributes associated with utilitarian purposes, will be statistically different between the ELA and LLA, because of the shift from a foraging subsistence strategy during the ELA to one more dependent on agriculture during the LLA (Table XII-1). Specifically, the attributes of total length, total width, blade length, and blade width would be smaller during the ELA because of tool curation and resharpening (Beale 2007). This expectation applies to the Cienega and San Pedro clusters that I compared from the Tucson Basin and Hueco Bolson during the ELA and LLA, because I compared the projectile point clusters within each region between the ELA and LLA. In terms of my analyses, I discuss these patterns further below.

The second expectation is that people during the ELA and LLA who were part of the same social group would have cooperated, and their projectile points would have similar high, moderate, and low visibility attributes. Projectile points that have similarities for all three levels of visibility attributes would have been a result of enculturation. Because this expectation relates to groups within a region during the same time period, none of the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA or the LLA falls into this category.

The third expectation is that social groups who used the same territory but engaged in different subsistence strategies would likely form alliances to share environmental resources and social resources and would have high social interaction. These groups with high social interaction would have similar high, moderate, and low visibility projectile point attributes, except for those that may reflect utilitarian purposes (Carr 1995:219), which include total length, total width, blade length, and blade width. The only non-utilitarian high visibility attribute is blade thickness, but one high visibility attribute may not be enough to adequately measure social interaction resulting from enculturation. The results from my analyses indicate that none of the social relationships fit this third expectation, because the regions are geographically distant, and the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson would have not used the same territories.

The fourth expectation is that groups who used the same territory and relied on the same subsistence strategy would compete for resources. The groups would actively differentiate themselves by producing projectile points with similar overall morphologies, such as their shape, but with differences in high visibility attributes and variables to denote group differences (Carr 1995b:189). On the other hand, because these competing groups were in the same territory and had the same subsistence strategy, high visibility attributes of raw material use and blade attributes would be the same, indicating their comparable reliance on hunting and more mobility or agriculture and less mobility. Therefore, the projectile point attributes would be statistically different for all three visibility levels except for those attributes that likely corresponded to function. As with the previous expectation, my analysis suggests that none of the groups from the Tucson Basin, Black Mesa, and Hueco Bolson during the ELA or LLA fall into this category, because the regions are geographically distant, and people did not need to use the same territories.

The fifth expectation is that groups who predominantly used different territories but had the same subsistence strategy may have exchanged technical innovations. These groups would have similar overall point morphology and moderate and high visibility attributes, but the stem attributes, which are low visibility, would be different, because the groups in contact would not be socially close enough for enculturation. The similarities in the high and moderate visibility attributes would be a result of acculturation. In addition, the groups would use different raw materials from different locales, but they would have similar high visibility attributes pertaining to the projectile point blade indicating the same reliance on hunting and mobility or dependence on agriculture and less mobility. Tostevin (2007) has suggested that this pattern would indicate moderate social interaction when the morphology of the projectile points is similar between the different groups, but low visibility attributes such as the haft and the technological style are different. Results from my analysis indicate that this scenario is most prevalent based on the high, moderate, and low visibility attributes of the Cienega, San Pedro, and Livermore clusters from the Tucson Basin, Black Mesa, and Hueco Bolson during the ELA and LLA. I discuss this is further detail below.

The sixth expectation is that groups who inhabited different territories and had different subsistence strategies would have produced significantly different projectile points. These groups would have different overall projectile point morphology, stem styles, blade attributes, and raw materials. The differences in these attributes indicate that the groups had low social interaction, and there should be statistically different attributes for all three visibility levels. These groups would not be competing or in alliance with each other and therefore would have had little contact or influence on each other's cultural practices, including the production of projectile points. Because there are projectile point clusters that are present in all three regions, it appears that none of the cases follows this expectation, based on the results I present below.

In rest of this chapter, I discuss my conclusions about social interaction drawn from analyzing the raw material of the projectile points and the similar projectile point clusters found in the Tucson Basin, Black Mesa, and the Hueco Bolson during the ELA and LLA. I also present my findings from comparing the ELA and LLA high, moderate, and low visibility attributes within the Tucson Basin and the Hueco Bolson.

Raw Material

The first characteristic that I examined for each of the regions is the raw materials out of which the projectile points were made. I identified frequencies of any non-local raw materials within the samples. A higher frequency of non-local raw materials would indicate a greater amount of mobility or trade and possible contact with other regions. Within each region, the expectation is that during the ELA, when agriculture was just beginning, these groups would have still been relatively mobile compared to people in the LLA. Therefore, ELA groups would have a higher percentage of non-local raw materials. Also, I was looking for any raw material local to one region but found in another to indicate possible social interaction.

The results of the raw material frequencies from the Tucson Basin, Black Mesa, and the Hueco Bolson from both the ELA and LLA do not match my expectations. Unsurprisingly, the local raw material frequencies greatly outnumbered non-local lithic materials, and there is no difference between the ELA and LLA. The low percentage of non-local raw material suggests that either the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson did not travel far beyond their regions, or more likely if they did venture away from their geographical area, they used the local raw materials of other regions. Therefore, analyzing the raw material of the projectile points did not yield any evidence of social interaction among the groups from the three regions during the ELA or the LLA.

Similar ELA and LLA Projectile Point Clusters among the Regions

One of my first steps for this study was to identify the projectile points from each region and assign them to a projectile point cluster based on Justice's (2002b) typology. The results from the projectile point cluster analyses indicate that there was contact between the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson regions during both the ELA and LLA, because projectile points from the Cienega and San Pedro clusters are found in all three regions (Table XII-1). Also, the Livermore cluster is present in the Tucson Basin and the Hueco Bolson datasets.

Table XII-1. Projectile Point Clusters Common to the Three Regions Used in this Study.

Region	Time Period	Cienega Cluster	San Pedro Cluster	Livermore Cluster
Tucson Basin	ELA	X	X	
	LLA	X	X	X
Black Mesa	LLA	X	X	
Hueco Bolson	ELA	X	X	
	LLA	X	X	X

My expectation for these clusters is that projectile point style overlap would decrease from the ELA to the LLA because groups during the latter period would have been less mobile and more tethered to their crops. The Cienega and San Pedro clusters are present in both the Tucson Basin and the Hueco Bolson, and there is a high percentage of projectile point types found from both regions. The Tucson Basin has 88.1 percent of its projectile points in common with the Hueco Bolson, and the Hueco Bolson has 75 percent projectile points in common with the Tucson Basin (Tucson Basin = 88.1 percent; Hueco Bolson = 75.0 percent). This suggests that the groups from the Tucson Basin and the Hueco Bolson during the ELA had some form of contact with each other. Contact continued during the LLA, but based on the percentages of projectile points found in both regions (Tucson Basin = 82.2 percent; Hueco Bolson = 65.6 percent), it seems that social contact decreased some, which may be due to a shift to a more sedentary lifestyle. The pattern of a decrease in overlap of similar projectile point types between the ELA and LLA supports my expectation.

The paucity of ELA data from the Black Mesa region may suggest that groups did not heavily occupy the region during that time. In contrast, during the LLA, the frequencies of projectile point types and clusters in the region suggest that Black Mesa groups had some form of contact with groups from both the Tucson Basin and the Hueco Bolson (Table XII-1). Furthermore, the frequencies of the similar clusters and projectile point types suggest that the Tucson Basin groups during the LLA had more contact to those groups from the Hueco Bolson (82.2 percent projectile points in common) than to Black Mesa 63.2 percent projectile points in common). However, the Black Mesa projectile point clusters seem to have more in common with those in the Tucson Basin (67.6 percent) than those in the Hueco Bolson (66.2 percent). This pattern seems logical since spatially the Tucson Basin is closer to the Hueco Bolson than to Black Mesa, and Black Mesa is closer to the Tucson Basin than the Hueco Bolson.

Changes in the ELA and LLA High, Moderate, and Low Visibility Attributes from the Tucson Basin and the Hueco Bolson

In this section, I discuss that patterns from the statistical tests comparing the high, moderate, and low visibility attributes of the Tucson Basin and Hueco Bolson projectile point clusters during the ELA and LLA. I evaluate the ELA and LLA Cienega and San Pedro clusters within each region to provide the data for comparing the visibility attributes between the different regions. The Black Mesa dataset does not have enough specimens to compare similarities and differences of the Cienega and San Pedro clusters during the ELA, and so I do not discuss Black Mesa in this section.

Similarities in visibility attributes within a region through time indicate transgenerational social continuity (Carr 1995b:244). The analyses indicate that there is indeed transgenerational social continuity between ELA and LLA groups within the Tucson Basin and within the Hueco Bolson, and the ELA groups would have passed their technology to their descendants continuously through time into the LLA. Therefore, high, moderate, and low visibility attributes should not be statistically different between the time periods because of this social continuity.

However, Carr (1995a:162) also states that the utilitarian need to have a functioning projectile point to perform a necessary task takes precedence over social messaging. In chapters seven and eight, I have suggested that a change in subsistence strategy impacts the projectile point attributes affected by curation and resharpening. The high visibility attributes that resharpening influences are total length, total width, blade length, and blade width. Resharpening does not influence the high visibility attribute of blade thickness or moderate and low visibility attributes, and so these attribute should be similar between the projectile points of the ELA and LLA groups within the Tucson Basin and within the Hueco Bolson.

The first part of this section discusses the results of comparing the Tucson Basin and the Hueco Bolson high visibility attributes of the projectile point clusters during the ELA and LLA. The second part reports the patterns from the comparison of the ELA and LLA moderate visibility attributes from the two regions. In the third part, I discuss the results of the low visibility attribute analyses.

High Visibility Attributes within the Tucson Basin and within the Hueco Bolson during the ELA and LLA

According to Carr’s (1995a, 1995b) model, differences and similarities high visibility attributes may represent the social relationship between groups from different regions, but they may also indicate transgenerational social continuity, except for the high visibility attributes that are affected by utilitarian purposes. I expected that because of social continuity, the high visibility attribute that is not affected by utilitarian needs, blade thickness, would be similar between the ELA and LLA Cienega and San Pedro clusters (Table XII-2).

Table XII-2. Expected Changes in High Visibility Attributes.

Region	**High Visibility Attribute**	**ELA**	**LLA**
Tucson Basin	Total length	Smaller	Larger
	Total width	Smaller	Larger
	Blade length	Smaller	Larger
	Blade width	Smaller	Larger
	Blade thickness	No difference	No difference
Hueco Bolson	Total length	No difference	No difference
	Total width	No difference	No difference
	Blade length	No difference	No difference
	Blade width	No difference	No difference
	Blade thickness	No difference	No difference

Second, I have suggested that because groups from the Tucson Basin became less mobile due to a greater reliance on agriculture in the LLA, they would not have needed to curate their tools, unlike the during the ELA. Therefore, I expected that the high visibility attributes associated with resharpening, total length, total width, blade length, and blade width, would be larger during the LLA (Table XII-2). In contrast, there is a debate about whether or not agriculture played a role during the LLA in the Hueco Bolson. Mbutu (1997) suggests that the LLA groups did not depend on agriculture and were just as mobile as their ELA counterparts. If this is correct, total length, total width, blade length, and blade width should not change between the ELA and LLA (Table XII-2).

The first step in evaluating my hypotheses and expectations was comparing the high visibility attributes within a region and their potential changes between the ELA and LLA (Table XII-3). Blade thickness does not change through time except in the Tucson Basin San Pedro cluster. This pattern supports my expectation that groups within a region would have had transgenerational social continuity, and it would be reflected in the high visibility attributes not affected by resharpening.

Table XII-3. Changes in the Tucson Basin and Hueco Bolson High Visibility of the Selected Projectile Point Clusters between the ELA and LLA.

Region	**Cluster**	**High Visibility Attribute**	**ELA**	**LLA**
Tucson Basin	Cienega	Blade length*	Smaller	Larger
		Blade thickness*	No change	No change
	San Pedro	Total length	No change	No change
		Total width*	Smaller	Larger
		Blade length	No change	No change
		Blade width*	Smaller	Larger
		Blade thickness	Larger	Smaller
Hueco Bolson	Cienega	Total width*	No change	No change
		Blade length*	No change	No change
		Blade width*	No change	No change
		Blade thickness*	No change	No change
	San Pedro	Total length	Smaller	Larger
		Total width*	No change	No change
		Blade length	Smaller	Larger
		Blade width*	No change	No change
		Blade thickness*	No change	No change

*Conforms to the expectations

Within the Tucson Basin, blade length, the one attribute from the Cienega cluster that I could measure that could relate to subsistence, increased through time, supporting my expectation that curation and resharpening were not as prevalent during the LLA. In contrast, only total width and blade width from the Tucson Basin San Pedro cluster conform to this same expectation. Both total length and blade length show no change through time. I discussed in chapter seven that this may be due to the large number of Empire points that are a part of the ELA San Pedro cluster, but that are not as prevalent during the LLA, which may explain the discrepancy.

As previously mentioned, Mbutu (1997) argues that mobility and lack of dependence on agriculture did not change between the ELA and LLA in the Hueco Bolson. All of the Cienega cluster high visibility attributes that are affected by utilitarian purposes support Mbutu's argument that there was not much change in subsistence strategies between the ELA and LLA. Furthermore, the total width and blade width from the San Pedro cluster also indicate that Mbutu is correct. On the other hand, total length and blade length do not change between the ELA and LLA, and thus does not support my expectation these attributes should not change.

The patterns seen in the Tucson Basin Cienega and San Pedro clusters mirror those from the Hueco Bolson during the ELA and LLA. One explanation is that there was social contact between the groups from the different regions, which will be addressed further later in this chapter. There is continuity of the high, moderate, and low visibility attributes between the Cienega cluster from the two regions between the ELA and LLA. This may be because the Cienega cluster is diagnostic for the LLA but begins to appear in the archaeological record near the end of the ELA. The LLA patterns should be similar to the ELA for the Cienega cluster, since they may not have had enough time for differences to appear between the time periods.

Moderate Visibility Attributes within the Tucson Basin and the Hueco Bolson during the ELA and LLA

Moderate visibility attributes – those that are less visible at a distance but can be seen without close inspection - reflect social continuity between generations within a region through time (Carr 1995b; Hoffman 1997). Unlike high visibility attributes, moderate visibility attributes are not affected by resharpening and curation. These attributes as well as the low visibility attributes may thus provide a better indicator for social continuity. Therefore, I expected no differences in any of the ELA and LLA moderate visibility attributes from the Cienega and San Pedro clusters from the Tucson Basin and the Hueco Bolson.

Table XII-4. Expected Changes in Moderate Visibility Attributes Indicating Social Continuity.

Moderate Visibility Attribute	**ELA**	**LLA**
Serration	No change	No change
Flake pattern	No change	No change
Blade tip thickness	No change	No change

I argue that within each of the regions the moderate visibility attributes should not change between the ELA and the LLA because groups using a specific projectile point during the ELA would pass their knowledge to their descendants in the LLA. Overall, this pattern holds true for the Tucson Basin and the Hueco Bolson (Table XII-5). The Cienega cluster from both the Tucson Basin and the Hueco Bolson shows no differences of the moderate visibility attributes between the ELA and LLA. This pattern suggests that there is social continuity of the ELA and LLA groups in each of the regions.

Table XII-5. Changes in the Tucson Basin and Hueco Bolson Moderate Visibility of the Selected Projectile Point Clusters between the ELA and LLA.

Region	**Cluster**	**Moderate Visibility Attribute**	**ELA**	**LLA**
Tucson Basin	Cienega	Serration*	No change	No change
		Flake pattern*	No change	No change
	San Pedro	Serration	More likely	Less likely
		Flake pattern*	No Change	No change
		Blade tip thickness	Larger	Smaller
Hueco Bolson	Cienega	Serration*	No change	No change
		Flake pattern*	No change	No change
		Blade tip thickness*	No change	No change
	San Pedro	Serration	More likely	Less likely
		Flake pattern*	No Change	No change
		Blade tip thickness*	No Change	No change

*Conforms to the expectations

The San Pedro cluster from each of the regions does not support my expectation as effectively. The Tucson Basin San Pedro cluster has differences in serration and blade tip thickness between the ELA and the LLA, which would indicate that there is not any social continuity. In contrast, the San Pedro cluster from the Hueco Bolson better supports my expectation. The Hueco Bolson San Pedro cluster has similar flake patterns and blade tip thickness, but differences in serration.

Both the San Pedro clusters from the Tucson Basin and the Hueco Bolson have a change in serration between the ELA and LLA. Earlier in this study, I argued that the change in serration maybe due to a change in the utilitarian function of the projectile point. One possibility is that during the ELA the projectile points from the San Pedro cluster may have been used as saws, but not during the LLA, which would explain the great likelihood of serration during the ELA.

Low Visibility Attributes within the Tucson Basin and the Hueco Bolson during the ELA and LLA

Low visibility attributes may indicate passive social interaction, the passive components of enculturation, shared histories of interaction, and passive messages pertaining to personal level processes (Carr 1995b; Hoffman 1997). Changes in subsistence strategies and curation technologies do not affect these attributes. I assumed that the groups from the different time periods were related to each other because they lived in the same area, and therefore none of the low visibility attributes should have differed (Table XII-6).

Table XII-6. Expected Changes in Low Visibility Attributes Indicating Social Continuity.

Visibility Level Attribute	**ELA**	**LLA**
Neck width	No change	No change
Weight	No change	No change
Stem length	No change	No change
Base width	No change	No change
Stem thickness	No change	No change
Base shape	No change	No change

For both the Cienega and San Pedro clusters from the Tucson Basin, there is no change in any of the low visibility attributes between the ELA and LLA, except for the base width from the Cienega cluster (Table XII-7). The Cienega and the San Pedro clusters from the Hueco Bolson also show that most of the low visibility attributes do not change between the ELA and the LLA. The three exceptions are stem length and base width from the Cienega cluster and base width from the San Pedro cluster. Because, overwhelmingly, the low visibility attributes from the two regions between the

ELA and LLA show no change, this indicates that there is social continuity with the groups from within their respective regions.

Table XII-7. Comparisons of the Tucson Basin and Hueco Bolson Low Visibility Attributes for the Cienega and San Pedro Clusters.

Region	**Cluster**	**Low Visibility Attribute**	**ELA**	**LLA**
Tucson Basin	Cienega	Weight*	No change	No change
		Stem length*	No change	No change
		Neck width*	No change	No change
		Base width	Larger	Smaller
		Stem thickness*	No change	No change
	San Pedro	Weight*	No change	No change
		Stem length*	No change	No change
		Neck width*	No change	No change
		Base width*	No change	No change
		Stem thickness*	No change	No change
		Base shape*	No change	No change
Hueco Bolson	Cienega	Stem length	Larger	Smaller
		Neck width*	No change	No change
		Base width	Larger	Smaller
		Stem thickness*	No change	No change
	San Pedro	Weight*	No change	No change
		Stem length*	No change	No change
		Neck width*	No change	No change
		Base width	Larger	Smaller
		Stem thickness*	No change	No change

*Conforms to expectations

In three of four cases (Table XII-7), the low visibility attribute that does not fit my expectation is base width. This discrepancy may be due to a change from groups using dart points during the ELA to arrow points during the LLA. Because the foreshaft for a spear is wider than the shaft of an arrow, the base width would have to be smaller on the arrow.

High Visibility Projectile Point Attribute Analysis for the Tucson Basin, Black Mesa, and Hueco Bolson Projectile Point Clusters

The purpose for comparing the high visibility attributes of the projectile point clusters among the three regions is twofold. The main reason is to identify the possible social relationships such as acculturation between the ELA and LLA groups from the Tucson Basin, Black Mesa, and the Hueco Bolson. It has become apparent with my analyses, however, that the high visibility attributes of total length, total width, blade length, and blade width may not be factors in measuring group interaction. Resharpening a projectile point affects its size. Because resharpening in indicative of tool curation, which is a characteristic of highly mobile groups who were not tethered to their agricultural fields, differences in the aforementioned high visibility attributes may indicate how mobile a group was compared to another group from a different region.

Carr suggests that similarities in high visibility attributes that are not affected by utilitarian needs indicate acculturation. Only blade thickness appears to be the high visibility attribute that may reflect group interaction.

Tucson Basin and the Hueco Bolson High Visibility Projectile Point Attributes between Clusters during the ELA

Groups from the Tucson Basin and the Hueco Bolson had some sort of interaction, because there are at least two projectile point clusters that are found in large quantities in both areas during the ELA. The clusters that have large enough sample sizes to compare from each region are the Cienega and San Pedro clusters.

To evaluate group interaction between the Tucson Basin and the Hueco Bolson during the ELA, I formulated two expectations. First, the high visibility attributes should indicate that people in the Tucson Basin relied more on agriculture than did people in the Hueco Bolson since agriculture was already present in the Tucson Basin during the ELA. This would be manifested by less curation and so less evidence of resharpening on the Tucson Basin specimens than on the Hueco Bolson samples (Table XII-8). Second, I expected that the blade thickness, which is not affected by resharpening, should not be statistically different between the two regions because they were not competing for resources due to different subsistence strategies.

Table XII-8. Expected Differences in Projectile Point High Visibility Attributes during the ELA.

High Visibility Attribute	Tucson Basin	Hueco Bolson
Total length	Larger	Smaller
Total width	Larger	Smaller
Blade length	Larger	Smaller
Blade width	Larger	Smaller
Blade thickness	No change	No change

Both the Cienega and San Pedro clusters should follow these expectations, but the results of the statistical tests from the Cienega cluster show that the Tucson Basin groups may have resharpened these points more (Table XII-9), although this is only based on the blade width attribute, the only one with enough samples to statistically evaluate. Thus, this pattern suggests that the Tucson Basin groups curated their points, because the blade width is significantly smaller than those from the Hueco Bolson, indicating that the Hueco Bolson groups during the ELA were less mobile and relied more on agriculture. This result does not meet my expectation. On the other hand, because there is not a statistically significant difference between the blade thicknesses of the Tucson Basin and Hueco Bolson Cienega clusters, this supports my expectation that the groups from the two regions were not in competition.

Table XII-9. Comparisons of the High Visibility Attributes for the Cienega and San Pedro Clusters.

Cluster	High Visibility Attribute	Tucson Basin	Hueco Bolson
Cienega	Blade width	Smaller	Larger
	Blade thickness*	No change	No change
San Pedro	Total length*	Larger	Smaller
	Total width	No change	No change
	Blade length*	Larger	Smaller
	Blade width	No change	No change
	Blade thickness	Larger	Smaller

*Conforms to the expectations

There are several possibilities for the discrepancy of the blade width attribute. One possibility is that the raw material of the unmodified stone is smaller in the Tucson Basin, which would lead to a smaller point. Also, the available wood to which the projectile points were hafted may have been larger in the Hueco Bolson than the wood that Tucson Basin groups used. Also, this high visibility attribute may be an anomaly, but the sample sizes are too small to analyze any of the other attributes that may indicate resharpening. Finally, it is possible that the blade width is not an indicator of subsistence strategies.

Ideally, the results of comparing the San Pedro cluster in the Tucson Basin and the Hueco Bolson would conform either to my expectations or to the same patterns as those from the Cienega cluster. It appears that total length and blade length that are affected by resharpening indicate that the Tucson Basin specimens are statistically larger than their Hueco Bolson counterparts. This pattern supports my assertion that the Hueco Bolson groups did not rely as much on agriculture in comparison to Tucson Basin groups. However, total width and blade width do not support my expectation, and suggest that the groups from the Tucson Basin and the Hueco Bolson resharpened their projectile points similarly.

The blade thickness for the San Pedro cluster does not support my expectation, because there is a statistical difference between the two regions. This result suggests that my expectation that there was social contact between the groups of the two regions was not correct, and that social contact was not present, or it did not result in acculturation. It is possible that the groups who used projectile points from the San Pedro cluster were actively differentiating themselves from each other. Another possibility is that blade thickness is not an indicator for types of social interaction.

The Cienega and San Pedro clusters from the Tucson Basin and the Hueco Bolson during the ELA do not have the same patterns. If the same groups within each region used all of the projectile clusters available to them, the patterns from each cluster should be similar. Because the two clusters show different patterns, it may suggest that different groups within each of the regions were using different points or that each of the point clusters may have served different functions.

Tucson Basin, Black Mesa, and the Hueco Bolson High Visibility Projectile Point Attributes between Clusters during the LLA

Unlike the ELA, the LLA has clusters that are found in all three regions and that have enough specimens to evaluate statistically. I was able to compare the Cienega clusters and the San Pedro clusters among all three regions, but only the Tucson Basin and the Hueco Bolson has sufficient Livermore cluster sample sizes to compare.

My first expectation for the LLA projectile point clusters is that people from the Tucson Basin relied more on agriculture than those from Black Mesa and the Hueco Bolson, and therefore the projectile points would have larger total lengths, total widths, blade lengths, and blade widths (Table XII-10). Although Black Mesa has less evidence of agriculture compared to the Tucson Basin, Black Mesa does have more agriculture than the Hueco Bolson. Therefore, the aforementioned high visibility attributes should be larger for the Black Mesa Cienega and San Pedro clusters than for the Hueco Bolson counterparts. My other expectation is that the blade thickness, which resharpening does not affect, should not be statistically different among the three regions because people were not competing for resources.

Table XII-10. Expected Differences in Projectile Point High Visibility Attributes during the LLA.

High Visibility Attribute	Tucson Basin	Black Mesa	Hueco Bolson
Total length	> BM	< TB	< TB
	> HB	> HB	< BM
Total width	> BM	< TB	< TB
	> HB	> HB	< BM
Blade length	> BM	< TB	< TB
	> HB	> HB	< BM
Blade width	> BM	< TB	< TB
	> HB	> HB	< BM
Blade thickness	= BM	= TB	= TB
	= HB	= HB	= BM

TB = Tucson Basin, BM = Black Mesa, HB = Hueco Bolson, (=) = no difference

The results from the comparisons of the Cienega cluster high visibility attributes from the three regions do not support my expectation that Tucson Basin groups who were less mobile and more dependent on agriculture should have projectile points with larger total length, total width, blade length, and blade width (Table XII-11). Similar to the results from the ELA Cienega cluster, the high visibility attributes from the Hueco Bolson Cienega cluster are either equal to or larger than those from the Tucson Basin or Black Mesa. As previously stated, this may be due to the difference of sizes in local raw material.

Table XII-11. Cienega, San Pedro, and Livermore Clusters High Visibility Attributes for the Tucson Basin, Black Mesa, and Hueco Bolson.

Cluster	**High Visibility Attribute**	**Tucson Basin**	**Black Mesa**	**Hueco Bolson**
Cienega	Total width	= BM	= TB	> TB
		< HB	< HB	> BM
	Blade length	= HB		= TB
	Blade width	= BM	= TB	> TB
		< HB	= HB	= BM
	Blade thickness	= BM*	= TB*	= TB*
		= HB*	= HB*	= BM*
San Pedro	Total length	> BM*	< TB*	< TB*
		> HB*	= HB	= BM
	Total width	> BM*	< TB*	< TB*
		> HB*	= HB	= BM
	Blade length	> BM*	<TB*	< TB*
		> HB*	= HB	= BM
	Blade width	> BM*	< TB	< TB
		> HB*	= HB	= BM
	Blade thickness	> BM	< TB	< TB
		> HB	< HB	> BM
Livermore	Blade length	= HB		= TB
	Blade width	> HB*		< TB*
	Blade thickness	> HB		< TB

TB = Tucson Basin, BM = Black Mesa, HB = Hueco Bolson, (=) = not significant;
* conforms to expectation

Furthermore, the data suggest that there is no significant difference between the high visibility attributes affected by resharpening between the Tucson Basin and the Black Mesa. I suggested that groups from both regions relied more on agriculture than the Hueco Bolson groups, but it is not known whether the Tucson Basin groups relied more on agriculture than those living on Black Mesa. If the high visibility attributes of total length, total width, blade length, and blade width, which are affected by resharpening, are any indication of mobility and dependence on agriculture, then the results from the Cienega cluster suggests that the groups from the Tucson Basin and Black Mesa may have been similarly dependent on agriculture.

Similar to my expectation that there should be no difference of the blade thickness, the results show there is not a statistically significant difference between the blade thicknesses of the Cienega clusters from the Tucson Basin, Black Mesa, and the Hueco Bolson. This pattern may suggest positive social interaction and acculturation. Interestingly, the pattern seen between the Cienega clusters from the different regions during the LLA mirrors the results from the ELA. The similarities of the Cienega cluster blade thickness may indicate that the Tucson Basin and Hueco Bolson groups using these projectile points continued having social contact between the ELA and LLA.

The pattern from the LLA San Pedro cluster indicates that Tucson Basin groups resharpened their projectile points less than the Black Mesa and Hueco Bolson groups based on the Tucson Basin San Pedro cluster having larger total length, total width, blade length, and blade width. This pattern is expected because the Tucson Basin groups were less mobile and depended more on agriculture. Furthermore, the similarities of the high visibility attributes associated with resharpening suggest that the Black Mesa and Hueco Bolson groups were equally as mobile and dependent on agriculture.

In contrast, I expected that the blade thickness of the San Pedro cluster among the three regions would be similar because the groups were not in competition for resources. Based on the results from the statistical test comparing the San Pedro cluster blade thickness, none of the regions is similar. This pattern suggests that the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson did not have close enough social contact to result in acculturation.

The Livermore cluster can only be compared between the Tucson Basin and the Hueco Bolson. The results from the attributes indicating resharpening from this cluster are inconclusive. The projectile points from the Tucson Basin Livermore cluster have a larger blade width than those from the Hueco Bolson, but the results of the blade length are similar. Therefore, the blade width supports my expectation that the Tucson Basin groups relied less on resharpening than Hueco Bolson groups, but the blade length does not. Also, the blade thickness from each region is statistically different, indicating that groups from the Tucson Basin and the Hueco Bolson who used projectile points from the Livermore cluster did not have social contact resulting in acculturation.

Overall, the results from comparing the LLA high visibility attributes of the Cienega, San Pedro, and Livermore clusters from the Tucson Basin, Black Mesa, and the Hueco Bolson show conflicting patterns of resharpening and social contact resulting in acculturation. The Cienega cluster indicates that the Hueco Bolson groups were less mobile than the groups from the other regions, but the San Pedro cluster suggests that the Tucson Basin groups were less mobile and relied more on agriculture. Furthermore, blade thickness, which may indicate social interaction and acculturation, are different among the clusters. The Cienega cluster shows that the groups from the three regions had social contact resulting in acculturation, but the San Pedro and Livermore clusters indicate that there was no social interaction. These inconsistencies among the clusters can be explained by different groups within each of the regions using different points or that each of the point clusters may have served different functions.

Moderate Visibility Attribute Analysis for the Tucson Basin, Black Mesa, and Hueco Bolson Projectile Point Clusters

The moderate visibility attributes of projectile points are by nature less visible than the high visibility attributes, they may be seen without close inspection, and they are not obscured by the hafting element. According to the unified middle-range theory of artifact design, the moderate visibility attributes may indicate active or passive messaging such as social affiliation within a group or acculturation between groups (Carr 1995b). These attributes, serration, flake patterns, and blade tip thickness, are not affected by resharpening, and so they may better reflect social relationships than high visibility attributes.

Tucson Basin and Hueco Bolson Moderate Visibility Projectile Point Attributes between the ELA Clusters

By looking at the moderate visibility attributes, it is possible to begin to tease apart the type of interaction the groups from the different regions may have had with each other. I have suggested that although it appears that the groups from the Tucson Basin relied more on agriculture than those from the Hueco Bolson during the ELA, they still participated in seasonal rounds, which would have facilitated any interaction with groups from the Hueco Bolson. Because the Tucson Basin groups would not have been in competition with the Hueco Bolson groups since they could have fallen back on the crops within their home region, the groups from the two regions may have shared knowledge about projectile point manufacturing. Therefore, acculturation may have been taking place on this level. If this is true, then the moderate visibility attributes from the Cienega and San Pedro clusters during the ELA should be similar between the Tucson Basin and the Hueco Bolson (Table XII-12).

Table XII-12. Expected Patterns in Projectile Point Moderate Visibility Attributes during the ELA.

Moderate Visibility Attribute	**Tucson Basin**	**Hueco Bolson**
Serration	No change	No change
Flake patterns	No change	No change
Blade tip thickness	No change	No change

The results from the Cienega cluster analysis show that both flake patterns and blade tip thickness moderate visibility attributes are similar between the two regions (Table XII-13). Although serration significantly differs, because more of the moderate visibility attributes are similar, overall the pattern from the Cienega cluster supports my expectation that the groups from the Tucson Basin and Hueco Bolson regions had contact with each other resulting in acculturation.

Table XII-13. Cienega and San Pedro Clusters Moderate Visibility Attributes in the Tucson Basin and Hueco Bolson.

Cluster	**Moderate Visibility Attribute**	**Tucson Basin**	**Hueco Bolson**
Cienega	Serration	More likely	Less likely
	Flake patterns*	No change	No change
	Blade tip thickness*	No change	No change
San Pedro	Serration	More likely	Less likely
	Flake patterns	Less likely	More likely
	Blade tip thickness	Larger	Smaller

* Conforms to expectation

In contrast, the San Pedro cluster indicates none of the moderate visibility attributes is similar, suggesting that the groups from the different regions did not have intimate contact. The fact that the Cienega and the San Pedro clusters show different trends indicates that the interaction between the groups from the Tucson Basin and the Hueco Bolson is more nuanced and less straightforward. As earlier proposed, this discrepancy between the two clusters may suggest that different social groups within each region may be using different projectile point clusters to differentiate themselves, but they have had contact with groups outside of their region, with whom they have close ties resulting in acculturation.

Tucson Basin, Black Mesa, and Hueco Bolson Moderate Visibility Projectile Point Attributes between the LLA Clusters

In contrast with the ELA, the LLA groups from the different regions would have been more tied to their respective areas due to maintaining their agricultural fields. Therefore, the moderate visibility attributes from the Cienega, San Pedro, and Livermore clusters should be different between each of the regions, indicating that the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson did not have social interaction resulting in acculturation (Table XII-14).

Table XII-14. Expected Patterns in Projectile Point Moderate Visibility Attributes during the LLA.

Moderate Visibility Attribute	Tucson Basin	Black Mesa	Hueco Bolson
Serration	Different	Different	Different
Flake patterns	Different	Different	Different
Blade tip thickness	Different	Different	Different

The results from the LLA Cienega cluster analysis do not support my expectation that the moderate visibility attributes should be different between the regions (Table XII-15). Both flake patterns and blade tip thickness are similar suggesting that the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson had social interaction resulting in acculturation. Only serration from the Tucson Basin conforms to my expectation.

Table XII-15. Tucson Basin, Black Mesa, and Hueco Bolson Projectile Point Moderate Visibility Attributes for the Cienega, San Pedro, and Livermore Clusters.

Cluster	Moderate Visibility Attribute	Tucson Basin	Hueco Bolson	Black Mesa
Cienega	Serration(*)	More likely	Less likely	Less likely
	Flake patterns	No difference	No difference	No difference
	Blade tip thickness	No difference	No difference	
San Pedro	Serration(*)	Less likely	More likely	Less likely
	Flake patterns(*)	Less likely	Less likely	More likely
	Blade tip thickness*	Largest	Smallest	Larger than Hueco Bolson
Livermore	Serration	No difference	No difference	
	Flake patterns	No difference	No difference	
	Blade tip thickness*	Larger*	Smaller*	

* Conforms to expectation; (*) one region conforms to expectation

It appears that my expectation that the moderate visibility attributes during the LLA should be significantly different holds up better based on the analysis of the San Pedro cluster from the Tucson Basin, Black Mesa and the Hueco Bolson. The attribute of blade tip thickness is statistically different across all three regions. Furthermore, the Hueco Bolson San Pedro cluster is more likely to have serration, and the Black Mesa San Pedro cluster is more likely to have parallel flake patterns. Therefore, the groups may be actively differentiating themselves from each other, or they did not have close social interaction to have similarities in moderate visibility attributes resulting from acculturation.

As with the high visibility attributes of the projectile points from the Livermore cluster, the results from the comparison of the moderate visibility attributes between the Tucson Basin and the Hueco Bolson are inconclusive for ascertaining social interaction. Only blade tip thickness conforms to my expectation that the moderate visibility attributes should be significantly different. In contrast, there is no difference in either serration or flake patterns. It is not surprising that there is no difference in serration, because one of the defining elements of the Guadalupe point in the Livermore cluster is the presence of serration, which may affect the overall distribution.

Low Visibility Projectile Point Attribute Analysis for the Tucson Basin, Black Mesa, and Hueco Bolson Projectile Point Clusters

Low visibility attributes may indicate passive social interaction, the passive components of enculturation, shared histories of interaction, and passive messages pertaining to personal level processes (Carr 1995b; Hoffman 1997). The low visibility attributes should differ regionally because these attributes cannot be viewed unless the projectile point has been removed from its hafting element, and because similarities in low visibility attributes are a product of enculturation (Carr 1995b). Low visibility attributes that I compared between the projectile point clusters from the Tucson Basin, Black Mesa, and the Hueco Bolson are weight, stem length, neck width, base width, stem thickness, and base shape.

Tucson Basin and the Hueco Bolson Low Visibility Projectile Point Attributes between the ELA Clusters

Similarities among low visibility attributes indicate more local interactions and not relationships between groups from different geographical regions. Therefore, I expect that all of the ELA Cienega and San Pedro cluster low visibility attributes from each of the three regions should be statistically different (Table XII-16).

Table XII-16. Expected Patterns in Projectile Point Low Visibility Attributes during the ELA.

Low Visibility Attribute	**Tucson Basin**	**Hueco Bolson**
Weight	Different	Different
Stem length	Different	Different
Neck width	Different	Different
Base width	Different	Different
Stem thickness	Different	Different
Base shape	Different	Different

I was only able to compare the neck width of the projectile points from the ELA Cienega cluster between the Tucson Basin and the Hueco Bolson. The results show that the neck width is significantly different between the two regions (Table XII-17). This pattern supports my expectation that there should be a difference in the low visibility attributes between the Tucson Basin and Hueco Bolson, because they did not have close social interaction that would have permitted enculturation.

Table XII-17. Tucson Basin and Hueco Bolson Projectile Point Low Visibility Attributes for the Cienega and San Pedro.

Cluster	Moderate Visibility Attribute	Tucson Basin	Hueco Bolson
Cienega	Neck width*	Smaller	Larger
San Pedro	Weight*	Larger	Smaller
	Stem length	No difference	No difference
	Neck width*	Larger	Smaller
	Base width*	Larger	Smaller
	Stem thickness*	Larger	Smaller
	Base shape*	Straight	Convex

* Conforms to expectation

The results from comparing the San Pedro cluster low visibility attributes strongly support my expectation that these attributes should be statistically different between the regions (Table XII-17). Only stem length is not statistically different between the Tucson Basin and the Hueco Bolson. Therefore, the patterns from the San Pedro cluster overwhelmingly indicate that the ELA groups from the Tucson Basin and the Hueco Bolson did not have close social interaction that would have resulted in enculturation.

Tucson Basin, Black Mesa, and the Hueco Bolson Low Visibility Projectile Point Attributes between the LLA Clusters

Similar to the ELA, the LLA groups should not have had social interaction that would result in enculturation. Therefore, I expect that weight, stem length, neck width, base width, stem thickness, and base shape from the Cienega, San Pedro, and Livermore clusters should be statistically different among the three regions (Table XII-18).

Table XII-18. Expected Patterns in Projectile Point Low Visibility Attributes during the LLA.

Low Visibility Attribute	**Tucson Basin**	**Black Mesa**	**Hueco Bolson**
Weight	Different	Different	Different
Stem length	Different	Different	Different
Neck width	Different	Different	Different
Base width	Different	Different	Different
Stem thickness	Different	Different	Different
Base shape	Different	Different	Different

Stem length and base width from the Cienega cluster of the Tucson Basin and Hueco Bolson support my expectation that the low visibility attributes are statistically different between the regions (Table XII-19). The neck width attribute only supports my expectation for the Tucson Basin, but this attribute is similar between the Black Mesa and Hueco Bolson Cienega cluster. Finally, the stem thickness for the Cienega cluster is not significantly different between all three regions and therefore does not support my expectation. Overall, the results from the Cienega cluster low visibility attribute analyses show that the Tucson Basin has significantly different attributes. This pattern indicates that the Tucson Basin groups did not have social interaction with the groups from the other two regions that would have resulted in enculturation.

Table XII-19. Tucson Basin, Black Mesa, and Hueco Bolson Projectile Point Low Visibility Attributes for the Cienega, San Pedro, and Livermore Clusters.

Cluster	**Moderate Visibility Attribute**	**Tucson Basin**	**Black Mesa**	**Hueco Bolson**
Cienega	Stem length*	Larger		Smaller
	Neck width(*)	Smaller	No difference	No difference
	Base width*	Smaller		Larger
	Stem thickness	Same	Same	Same
San Pedro	Weight*	Largest	Smallest	Medium
	Stem length(*)	No difference	Smaller	No difference
	Neck width(*)	Larger	No difference	No difference
	Base width	No difference	No difference	No difference
	Stem thickness*	Largest	Smallest	Medium
	Base shape	No difference	No difference	No difference
Livermore	Neck width*	Larger		Smaller
	Stem thickness*	Larger		Smaller

* Conforms to expectation; (*) one region conforms to expectation

In contrast, of the attributes that can be compared from the Black Mesa dataset (neck width and stem thickness), these attributes are similar to those from the Hueco Bolson region. The pattern suggests that groups from these two regions had very close social interaction that led to acculturation. Ultimately, I think that this is not the case, because of how far apart the regions are geographically, and at least the Black Mesa groups would have been tethered to their agricultural fields, which would have limited their mobility. Therefore, this unexpected pattern of similarities of the low visibility attributes between the Black Mesa and the Hueco Bolson is surprising, and I expect that there are lurking variables at play of which I am unaware.

For the San Pedro cluster during the LLA, both weight and stem thickness are significantly different among the Tucson Basin, Black Mesa, and the Hueco Bolson. These results support my expectation that the low visibility attributes should be significantly different between all three regions, because similarities of these attributes are likely a result of enculturation. The neck width attribute is also consistent with my expectation in the Tucson Basin, but the attribute is similar between the Black Mesa and the Hueco Bolson. Also, the stem length from Black Mesa fits my expectation, but the stem lengths from the Tucson Basin and the Hueco Bolson do not. Furthermore, the low visibility attributes of base width and base shape do not support my expectation. Looking at all of the low visibility attributes as a suite, although some do not support my expectation, most of them do to a point, suggesting that the groups from the Tucson Basin, Black Mesa, and the Hueco Bolson did not have social interaction resulting in acculturation.

The results from the Livermore cluster are more straightforward than those from the Cienega and San Pedro clusters during the LLA. The only two low visibility attributes that I was able to compare, neck width and stem thickness, are significantly different between the Tucson Basin and the Hueco Bolson. This pattern further indicates that my expectation that groups from the Tucson Basin and Hueco Bolson did not have close enough social ties to facilitate acculturation is correct.

Change in Social Interaction as It Relates to My Hypotheses between the ELA and LLA

At the beginning of this research, I hypothesized that social interaction among the groups from the Tucson Basin, Black Mesa, and Hueco Bolson changed between the ELA and LLA. Specifically, I have stated that the ELA groups would have had greater social contact because they were more mobile and had a better opportunity to interact with each other. In contrast, the LLA groups would have been less mobile, because they would have been tied to their agricultural fields, especially the groups from the Tucson Basin and Black Mesa. Therefore, these groups would not have had the opportunity to interact as much as the previous ELA groups.

In order to illuminate any changes in social interaction, I compare the moderate visibility attributes from two clusters, the Cienega and San Pedro. I do not compare the high visibility attributes because all of them except for blade thickness are affected by resharpening. Furthermore, I do not compare the low visibility attributes because they represent enculturation, and it did not take place between groups from different regions. Also, I am unable to compare the Black Mesa region or the Livermore cluster between the ELA and LLA, because there are not enough specimens for evaluation from either phase.

During both the ELA and the LLA, the moderate visibility attributes of the Cienega cluster from the Tucson Basin and the Hueco Bolson do not change. Serration is significantly different between the two regions, but flake patterns and blade tip thickness are the same. This pattern suggests that there was no change in social interaction of the groups from the Tucson Basin and the Hueco Bolson between the ELA and LLA.

The comparisons of the moderate visibility attributes from the projectile points of the San Pedro cluster between the Tucson Basin and Hueco Bolson show that serration, flake patterns, and blade tip thickness are all significantly different between the regions during the ELA. During the LLA, both serration and blade tip thickness are significantly different, but the San Pedro cluster flake patterns are similar between the

Tucson Basin and the Hueco Bolson. Therefore, this pattern also does not support my hypothesis, because there is not much difference between the two time periods, and the results indicate little social interaction between the groups from the Tucson Basin and the Hueco Bolson.

This section concludes the analysis of my study. The final chapter provides a concluding summary pulling all of the analyses together as well as directions for the future.

Chapter XIII

Concluding Remarks and Opportunities for Future Research

As archaeologists, sometimes we identify discrete groups based on their geographical location, subsistence strategy, and time. This notion is evident when comparing projectile point types across the Southwest. An ideal example is the San Pedro point. Most commonly, the San Pedro point is defined as a Late Archaic side notched point with an expanding stem whose distribution is centered around the later Hohokam cultural area. According to Justice (2002b:195), projectile points with the same morphological style and time frame as the San Pedro point can also be found across other regions of the Southwest, such as the Anasazi and Mogollon cultural areas but identified according to different names like Hueco, Basketmaker II, and En Medio points. The fact that these are morphologically the same projectile point type suggests that groups from areas across the Southwest did not live in a cultural vacuum, and that groups from different regions interacted.

The rationale of this study was to identify patterns of social interaction between three spatially distant geographical groups in the Southwest during the early Late Archaic (ELA) and the late Late Archaic (LLA), and how these relationships may have changed through time as subsistence strategies also changed. The basic premise of this study follows Barth's (1969) concept of social boundaries in conjunction with Tostevin's (2007) ideas about social interaction. Barth proposed that social groups compete or cooperate depending on their economic and ecological niches. Following Barth's reasoning, Tostevin (2007:4) proposed that, as individuals have more positive contact, they may become more willing to interact with one another and share their ideas of artifact design. Carr (1995b) provides a model of artifact design that uses visibility attributes to further parse out types of social interaction.

I developed two hypotheses for this study. First, groups from the Tucson Basin, Black Mesa, and the Hueco Bolson during ELA would have greater social interaction with each other because through varied subsistence strategies and resource scheduling they would not have occupied the same ecological niches simultaneously. This would alleviate any competition, and seasonal rounds would have facilitated social interaction among groups from the different regions. Second, groups from the Tucson Basin, Black Mesa, and the Hueco Bolson during the LLA who relied more on agriculture would have occupied smaller territories and been tethered to their agricultural lands, constraining mobility and limiting the opportunity for such large scale social interaction. The complexities of the results from this study hardly support either of these hypotheses.

Upon testing these hypotheses, several obstacles became apparent. First, the lack of a sufficient dataset from the Black Mesa during the ELA prevented comparing the three regions between the ELA and LLA. Second, only two projectile point clusters, the Cienega and San Pedro clusters, are present during both time periods. Although the Black Mesa data and the Livermore cluster are unusable for the ELA, I still employed them to ascertain any possible patterns during the LLA. Even though I encountered the aforementioned obstacles, I am confident that the results from the comparisons of all the regions and their projectile point clusters during both the ELA and LLA most closely support my first and fifth original expectations.

The first expectation is that groups from the same region but different time periods would have projectile points with similar high, moderate, and low visibility attributes, because Carr (1995b) suggests that similarities with these attributes reflect social continuity transgenerationally. I expected, though, that high visibility attributes associated with utilitarian needs, total length, total width, blade length, and blade width, would be statistically different because of the shift from a foraging subsistence strategy during the ELA to one more dependent on agriculture during the LLA.

The results from comparing the Cienega and San Pedro clusters from the Tucson Basin between the ELA and LLA overwhelmingly support my supposition that the high visibility attributes not associated with resharpening, the moderate visibility attributes, and the low visibility attributes did not change and therefore do reflect social continuity transgenerationally. This pattern is further supported by the results from the high visibility attributes not associated with resharpening, the moderate visibility attributes, and the low visibility attributes of the Cienega and San Pedro clusters from the Hueco Bolson.

The high visibility attributes that are affected by resharpening, total length, total width, blade length, and blade width, which may indicate a decrease in mobility and an increase of dependence on agriculture, are statistically different in the Tucson Basin from the ELA to the LLA. This pattern suggests that the groups from the Tucson Basin relied more on agriculture during the LLA than the ELA. In contrast, the results of the aforementioned attributes of the Cienega and San Pedro clusters from the Hueco Bolson indicate that there was not a drastic shift in mobility or dependence on agriculture between the ELA and LLA.

The fifth expectation that I had is that groups who predominantly used different territories but had the same subsistence strategy may have exchanged technical innovations. These groups would have similar overall point morphology and moderate and high visibility attributes resulting from acculturation. In addition, low visibility attributes affecting stem styles would differ between the regions because the people would not have had close enough social interaction resulting in enculturation.

Evidence supporting this expectation includes the presence of projectile points from the Cienega and San Pedro clusters found in the Tucson Basin, Black Mesa, and Hueco Bolson. Also, at least in reference to the Cienega cluster, the one high visibility attribute that may indicate social interaction, blade thickness, is similar among all three regions suggesting social interaction resulting from acculturation. The moderate visibility attributes from the Cienega cluster also indicate some social interaction among groups from the Tucson Basin, Black Mesa, and the Hueco Bolson. The low visibility attributes from the Cienega, San Pedro, and Livermore clusters, overall, are significantly different between the regions providing evidence that the groups did not have close enough social contact to facilitate enculturation.

Some unexpected outcomes were illuminated by studying the visibility attributes of the projectile point clusters. First, the results suggest that the utilitarian requirements for a projectile point play a larger role than I was willing to concede. All but one of the high visibility attributes seem to be tied directly to changes in curation strategies, especially resharpening. Alternatively, it is possible that the attributes that I measured as high visibility were not used socially as I have suggested, but attributes such as markings on the foreshaft or arrow shaft performed this function.

Also, I expected that if there was a change in one cluster, then the other clusters would follow suit within and between the regions. This is not the case. In several instances, the Cienega cluster attributes varied between regions, but the San Pedro cluster did not or vice versa. This is perplexing, if the same groups of people were using the projectile points from the Cienega and San Pedro clusters. Possibly the discrepancies between clusters are because different groups used the different projectile point types. Another explanation is the projectile points from each cluster performed a different function.

Future Research

To address some of the unexpected differences in the analytic results between the projectile point clusters, I could explore several paths. First, I could conduct this study again in a similar way but use clusters defined by a cluster analysis rather than those identified by Justice (2002b). Defining clusters statistically may provide better projectile point groups to compare. The drawback of this is that it could lead to creating new projectile point types, which may further confuse the projectile point typology. Another possibility is to do a cluster analysis within the clusters identified by Justice, and then compare the visibility attributes between regions. This trajectory would not create new typologies, and clusters found between regions could then indicate greater social interaction.

Another avenue for research is comparing projectile point clusters within regions. I would begin by conducting a similar study but compare the projectile points within sites and between sites. With such comparisons, the attributes should not be influenced by any external factors such as subsistence strategy, because those groups within a site would practice the same type of subsistence. The drawback of this approach is that many sites do not yield enough specimens to adequately compare them statistically, but sites like Las Capas and Los Pozos in the Tucson Basin that I used in this research may have large enough samples to address these questions.

Although I failed to provide support for my original hypotheses, this study shows that comparing projectile point clusters between regions can identify some patterns of social interaction and point to paths for future research. This type of study could be used in all geographical regions where prehistoric, protohistoric, and historic peoples produce projectile points. In light of the identification of social interaction by using differences and similarities in projectile point clusters, ultimately this study has been a success.

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Appendix A

Provenience of the Projectile Points from the Tucson Basin, Black Mesa, and the Hueco Bolson

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Black Mesa	D:07:0151		6413-xx	321	Gypsum	Gypsum	100	LLA
Black Mesa	D:07:0151		6413-487	3536	Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:07:0151		6413-487	3540	San Pedro	San Pedro	25	LLA
Black Mesa	D:07:0151		6413-328	328	Tularosa Corner Notched	Cienega	50	LLA
Black Mesa	D:07:0151		3130-357	4023	Elko Corner Notch	Elko	50	LLA
Black Mesa	D:07:0151		3130-474		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0152		1131-187	30	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:0152		1131-xx	273	Cottonwood Leaf	Western Triangular	95	LLA
Black Mesa	D:07:0152		1131-xx	160	unknown	unknown	75	LLA
Black Mesa	D:07:0152		1131-xx	44	unknown	unknown	75	LLA
Black Mesa	D:07:0152		1131-xx	150	unknown	unknown	3	LLA
Black Mesa	D:07:0152		1131-xx	42	unknown	unknown	50	LLA
Black Mesa	D:07:0152		1131-41	158	San Jose	San Jose	75	LLA
Black Mesa	D:07:0152		1131-41	846	Gypsum	Gypsum	50	LLA
Black Mesa	D:07:0152		1131-xx	211	Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:07:0152		1131-xx	54	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:0152		1131-xx	201	Gypsum	Gypsum	100	LLA
Black Mesa	D:07:0152		1131-xx	55	Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:07:0152		1131-xx	4	San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0152		1131-xx	92	Elko Corner Notch	Elko	75	LLA
Black Mesa	D:07:0152		1131-xx	144	Gypsum	Gypsum	100	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Black Mesa	D:07:0152		1131-xx	130	Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:07:0152		1131-xx	115	Chaco Corner Notched	Chaco	75	LLA
Black Mesa	D:07:0152		1131-xx	264	Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:07:0152		1131-xx	53	San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0152		1131-212	5?	Black Mesa Narrow Neck	Black Mesa	50	LLA
Black Mesa	D:07:0152		1131-312	5	San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0152		1131-172		unknown	unknown	25	LLA
Black Mesa	D:07:0152		1131-211	28	unknown	unknown	75	LLA
Black Mesa	D:07:0152		1131-31	11	unknown	unknown	75	LLA
Black Mesa	D:07:0152		1131-91	73	unknown	unknown	100	LLA
Black Mesa	D:07:0152		1131-118	64	San Jose	San Jose	25	LLA
Black Mesa	D:07:0152		1131-193	152	Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:07:0152		1131-87	149	San Pedro	San Pedro	50	LLA
Black Mesa	D:07:0152		1131-xx	40	Elko Corner Notch	Elko	25	LLA
Black Mesa	D:07:0152		1131-127	18	San Jose	San Jose	100	LLA
Black Mesa	D:07:0152		1131-137	72	Bonito Notched	Chaco	100	LLA
Black Mesa	D:07:0152		1131-231	27	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:0152		1131-107,97	x	Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:07:0152		1131-107,97	xx	Tularosa Corner Notched	Cienega	75	LLA
Black Mesa	D:07:0152		1131-107,97	xxx	San Jose	San Jose	100	LLA
Black Mesa	D:07:0152		1131-107,97	xxxx	knife	unknown	100	LLA
Black Mesa	D:07:0236		2792-323		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:0236		2792-274		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0236		2792-233	2189	Black Mesa Narrow Neck	Black Mesa	95	LLA
Black Mesa	D:07:0236		2792-421		Black Mesa Narrow Neck	Black Mesa	50	LLA
Black Mesa	D:07:0236		2792-593		Black Mesa Narrow Neck	Black Mesa	25	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Black Mesa	D:07:0236		2792-627B		Black Mesa Narrow Neck	Black Mesa	50	LLA
Black Mesa	D:07:0236		2792-756		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:0236		2792-464		unknown	unknown	75	LLA
Black Mesa	D:07:0236		6805	x	unknown	unknown	75	LLA
Black Mesa	D:07:0236		6805	xx	Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:07:0236		6805	xxx	Gypsum	Gypsum	25	LLA
Black Mesa	D:07:0236		2290-88		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0239		3140-273		San Pedro	San Pedro	50	LLA
Black Mesa	D:07:0239		3140-248		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0239		3140-301		San Jose	San Jose	100	LLA
Black Mesa	D:07:0239		3140-224		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:0239		3140-238		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0239		3140-287		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:0239		3140-336		Tularosa Basal Notched	Cienega	50	LLA
Black Mesa	D:07:0239		3140-255		San Pedro	San Pedro	95	LLA
Black Mesa	D:07:0239		3141-63		black mesa narrow neck	Black Mesa	95	LLA
Black Mesa	D:07:0239		3141-46		Tularosa Corner Notched	Cienega	75	LLA
Black Mesa	D:07:0239		3141-97		Datil	Datil	100	LLA
Black Mesa	D:07:0239		3141-80		black mesa narrow neck	Black Mesa	50	LLA
Black Mesa	D:07:0239		3141-60		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:0239		3141-92		San Pedro	San Pedro	50	LLA
Black Mesa	D:07:0239		3141-31		Black Mesa Narrow Neck	Black Mesa	50	LLA
Black Mesa	D:07:0239		3141-64		unknown	unknown	75	LLA
Black Mesa	D:07:0254		3551-2		Tularosa Corner Notched	Cienega	50	LLA
Black Mesa	D:07:0254		3551-185		Tularosa Corner Notched	Cienega	100	LLA
Black Mesa	D:07:0254		3551-103		San Pedro	San Pedro	100	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Black Mesa	D:07:0254		3551-280		Datil	Datil	50	LLA
Black Mesa	D:07:0254		3551-209		black mesa narrow neck	Black Mesa	25	LLA
Black Mesa	D:07:0254		3551-121		Black Mesa Narrow Neck	Black Mesa	50	LLA
Black Mesa	D:07:1108		2464-261		unknown	unknown	75	LLA
Black Mesa	D:07:1108		2462-265		black mesa narrow neck	Black Mesa	100	LLA
Black Mesa	D:07:3003		3314-1038		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:3003		3315-1714		San Rafael	Northern Side Notched	50	LLA
Black Mesa	D:07:3003		3316-1508		Gypsum	Gypsum	95	LLA
Black Mesa	D:07:3003		3316-1803		Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:07:3003		3317-2234		Black Mesa Narrow Neck	Black Mesa	50	LLA
Black Mesa	D:07:3003		3318-115		unknown	unknown	50	LLA
Black Mesa	D:07:3003		3318-3076		unknown	unknown	25	LLA
Black Mesa	D:07:3013		3330-334		San Pedro	San Pedro	95	LLA
Black Mesa	D:07:3013		3330-246		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:3013		3330-xxx		Gypsum	Gypsum	100	LLA
Black Mesa	D:07:3013		3330-305		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:3013		3330-332		San Pedro	San Pedro	50	LLA
Black Mesa	D:07:3013		3330-289		San Pedro	San Pedro	75	LLA
Black Mesa	D:07:3017		3340-458		San Pedro	San Pedro	100	LLA
Black Mesa	D:07:3017		3340-211		Elko Corner Notch	Elko	50	LLA
Black Mesa	D:07:3017		3340-48		Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:07:3017		3340-357		unknown	unknown	50	LLA
Black Mesa	D:07:3107		3635-79		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:3107		3535-9		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:07:3107		3635-10		Black Mesa Narrow Neck	Black Mesa	95	LLA
Black Mesa	D:07:3141		3990-28-1	28.1	Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:07:3141		3990-29-1	29.1	Elko Corner Notch	Elko	50	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Black Mesa	D:07:3141		3990-11-1	11	San Pedro	San Pedro	100	
Black Mesa	D:07:3141		3990-15-15	15.15	San Pedro	San Pedro	95	LLA
Black Mesa	D:07:3141		3990-1	1	San Pedro	San Pedro	75	LLA
Black Mesa	D:07:3144		6890-1	cell 249	San Pedro	San Pedro	100	LLA
Black Mesa	D:07:3144		6890-2	cell 240	unknown	unknown	25	LLA
Black Mesa	D:07:3144		4000-50-1	50.1	Tularosa Corner Notched	Cienega	95	LLA
Black Mesa	D:07:2100		3630		unknown	unknown	25	LLA
Black Mesa	D:11:0244		3650-1184		Tularosa Corner Notched	Cienega	100	LLA
Black Mesa	D:11:0244		3650-301		Pinto	Pinto	100	LLA
Black Mesa	D:11:0244		3651-1316		Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:11:0244		3651-1322		black mesa narrow neck	Black Mesa	75	LLA
Black Mesa	D:11:0244		3651-1259		Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:11:0244		3652-1014		unknown	unknown	50	LLA
Black Mesa	D:11:0244		3652-388		Tularosa Basal Notched	Cienega	75	LLA
Black Mesa	D:11:0244		3652-285		Bajada	Bajada	25	LLA
Black Mesa	D:11:449		4597-489.3	cell 236	Gypsum	Gypsum	50	LLA
Black Mesa	D:11:1281		4771-21	cell 222	San Rafael	Northern Side Notched	75	LLA
Black Mesa	D:11:1281		4771-77	cell 247	unknown	unknown	50	LLA
Black Mesa	D:11:1281		4771-52	cell 218	Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:11:1281		4771-13	cell 247	Tularosa Corner Notched	Cienega	100	LLA
Black Mesa	D:11:1281		2475-19	cell 234	Empire	San Pedro	100	LLA
Black Mesa	D:11:1281		2475-41	cell 176	unknown	unknown	25	LLA
Black Mesa	D:11:449		4621-1735	cell 237	San Jose	San Jose	25	LLA
Black Mesa	D:11:449		Diagnostic-1846	cell 280	San Jose	San Jose	75	LLA
Black Mesa	D:11:449		diagnostic-2027		Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:11:449		Diagnostic-788		Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:11:449		diagnostic-2010	cell 237	Black Mesa Narrow Neck	Black Mesa	95	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Black Mesa	D:11:449		diagnostic- 999	cell 249	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:449		diagnostic-687		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:449		diagnostic-000		Gypsum	Gypsum	50	LLA
Black Mesa	D:11:449		diagnostic-1162	cell 247	unknown	unknown	75	LLA
Black Mesa	D:11:449		diagnostic-1255	cell 217	Tularosa Basal Notched	Cienega	75	LLA
Black Mesa	D:11:449		diagnostic-001		Elko Corner Notch	Elko	25	LLA
Black Mesa	D:11:449		diagnostic-1284	cell 242	San Jose	San Jose	95	LLA
Black Mesa	D:11:449		diagnostic-1634	cell 249	San Jose	San Jose	100	LLA
Black Mesa	D:11:449		diagnostic-1592	cell 240	Gypsum	Gypsum	100	LLA
Black Mesa	D:11:449		diagnostic-1731	cell 218	San Jose	San Jose	50	LLA
Black Mesa	D:11:1161		2241-278,283		San Pedro	San Pedro	100	LLA
Black Mesa	D:11:1162		2251-29		Datil	Datil	25	LLA
Black Mesa	D:11:1410		2475-7	cell 237	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:1410		2475-55	cell 248	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:1410		4818-643	cell 242	Black Mesa Narrow Neck	Black Mesa	95	LLA
Black Mesa	D:11:1410		4818-645	cell 237	Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:11:1410		4818-660	cell 234	unknown	unknown	25	LLA
Black Mesa	D:11:1410		4817-613	cell 250	Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:11:2063		4190-466		San Jose	San Jose	25	LLA
Black Mesa	D:11:2063		4190-594		San Pedro	San Pedro	95	LLA
Black Mesa	D:11:2063		4190-826		Durango Notched	Durango	25	LLA
Black Mesa	D:11:2063		4190-398		unknown	unknown	25	LLA
Black Mesa	D:11:2063		4190-349		unknown	unknown	25	LLA
Black Mesa	D:11:2175		6918-53	cell 249	San Pedro	San Pedro	100	LLA
Black Mesa	D:11:2190		6921-90	cell 239	Desert Side Notch	Desert Side Notch	100	LLA
Black Mesa	D:11:2190		6921-86	cell 240	unknown	unknown	25	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Black Mesa	D:11:3133		4374-2006	cell 241	Elko Corner Notch	Elko	25	LLA
Black Mesa	D:11:3133		4374-2305	cell 248	unknown	unknown	25	LLA
Black Mesa	D:11:3133		4374-2378		unknown	unknown	25	LLA
Black Mesa	D:11:3133		4374-1154-1	cell 248	unknown	unknown	25	LLA
Black Mesa	D:11:3133		4374-2030-2	cell 248	Datil	Datil	25	LLA
Black Mesa	D:11:3133		4374-829	cell 249	unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-799	cell 237	Durango Notched	Durango	75	LLA
Black Mesa	D:11:3133		4374-2377		unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-2319		unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-491	cell 248	unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-2350	cell 248	San Pedro	San Pedro	100	LLA
Black Mesa	D:11:3133		4374-1137-1	cell 248	Datil	Datil	100	LLA
Black Mesa	D:11:3133		4374-286-1	cell 248	unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-225	cell 236	Black Mesa Narrow Neck	Black Mesa	50	LLA
Black Mesa	D:11:3133		4374-1438-2		unknown	unknown	25	LLA
Black Mesa	D:11:3133		4374-1991	cell 218	unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-236-4		Temporal	Chaco	25	LLA
Black Mesa	D:11:3133		4374-2424	cell 248	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:3133		4374-2193		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:3133		4374-1483	cell 248	San Pedro	San Pedro	100	LLA
Black Mesa	D:11:3133		4374-1105	cell 248	Black Mesa Narrow Neck	Black Mesa	100	LLA
Black Mesa	D:11:3133		4374-2119	cell 246	San Pedro	San Pedro	75	LLA
Black Mesa	D:11:3133		4374-1416	cell 248	Black Mesa Narrow Neck	Black Mesa	50	LLA
Black Mesa	D:11:3133		4374-1641-4	cell 248	Sudden Side Notched	Northern Side Notched	25	LLA
Black Mesa	D:11:3133		4374-1927	cell 240	unknown	unknown	25	LLA
Black Mesa	D:11:3133		4374-572	cell 248	unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-2137	cell 234	Black Mesa Narrow	Black Mesa	75	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
					Neck			
Black Mesa	D:11:3133		4374-718	cell 248	unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-620	cell 248	Black Mesa Narrow Neck	Black Mesa	95	LLA
Black Mesa	D:11:3133		4374-1469-16	cell 248	Sudden Side Notched	Northern Side Notched	25	LLA
Black Mesa	D:11:3133		4374-999	cell 248	unknown	unknown	25	LLA
Black Mesa	D:11:3133		4374-2099	cell 237	San Pedro	San Pedro	100	LLA
Black Mesa	D:11:3133		4374-2340	cell 240	San Pedro	San Pedro	100	LLA
Black Mesa	D:11:3133		4374-1773		Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:3133		4374-240	cell 237	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:3133		4374-1894-5		unknown	unknown	50	LLA
Black Mesa	D:11:3133		4374-2381	cell 240	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:3133		4374-1870	cell 218	San Pedro	San Pedro	75	LLA
Black Mesa	D:11:3133		4374-2420	cell 240	Tularosa Corner Notched	Cienega	50	LLA
Black Mesa	D:11:3133		4374-335	cell 247	Tularosa Corner Notched	Cienega	25	LLA
Black Mesa	D:11:3133		4374-1972	cell 248	Durango Notched	Durango	75	LLA
Black Mesa	D:11:3133		4374-2321-19		Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:11:3133		4374-2321-26		unknown	unknown	25	LLA
Black Mesa	D:11:3133		4374-850	cell 208?	Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:11:3133		4374-2146	cell 248	Black Mesa Narrow Neck	Black Mesa	25	LLA
Black Mesa	D:11:3131		4337-514		unknown	unknown	50	LLA
Black Mesa	D:11:3131		4337-2436	cell 248	Black Mesa Narrow Neck	Black Mesa	75	LLA
Black Mesa	D:11:3131		4337-936	cell 248	Black Mesa Narrow Neck	Black Mesa	95	LLA
Black Mesa	D:11:3131		4337-1390	cell 217	San Pedro	San Pedro	100	LLA
Black Mesa	D:11:3131		4337-1006	cell 249	black mesa narrow neck	Black Mesa	25	LLA
Black Mesa	D:11:3131		4337-1347	cell 248	unknown	unknown	25	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Black Mesa	D:11:3131		4337-601	cell 250	unknown	unknown	50	LLA
Black Mesa	D:11:3131		4337-2338	cell 248	unknown	unknown	25	LLA
Black Mesa	D:11:3131		4337-475		unknown	unknown	50	LLA
Black Mesa	D:11:3131		4337-1121	cell 248	black mesa narrow neck	Black Mesa	25	LLA
Black Mesa	D:11:3131		4337-2516	cell 240	Black Mesa Narrow Neck	Black Mesa	75	LLA
Hueco Bolson	FB 5000		1996.536.275	5000-G134-259	Guadalupe	Livermore	75	LLA
Hueco Bolson	FB 9366	Pendejo Cave	1996.564.1873	1326	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9366	Pendejo Cave	1996.564.2008	804	Tularosa Corner Notched	Cienega	100	LLA
Hueco Bolson	FB 9366	Pendejo Cave	1996.564.1860	1168	unknown	unknown	75	LLA
Hueco Bolson	FB 10018		2002.14.8464	1085	Gypsum	Gypsum	100	ELA
Hueco Bolson	FB 7483		1996.724.447	7483-G106-259	Bajada	Bajada	50	ELA
Hueco Bolson	FB 7483		1996.724.448	7483-G2-259	Pueblo Side Notched	Pueblo Side Notched	100	LLA
Hueco Bolson	FB 7484		1996.725.314	7484-G20-259	Gypsum	Gypsum	100	LLA
Hueco Bolson	FB 7484		1996.725.313	7484-G98-259	Maljamar	Maljmar	95	LLA
Hueco Bolson	FB 6281	Meyer Pithouse Village	1996.914.2924	1093	San Pedro	San Pedro	50	LLA
Hueco Bolson	FB 6281	Meyer Pithouse Village	1996.914.2923	1097	Scallorn	Scallorn	95	LLA
Hueco Bolson	FB 6281	Meyer Pithouse Village	1996.914.2925	1098	Guadalupe	Livermore	95	LLA
Hueco Bolson	FB 6281	Meyer Pithouse Village	1996.914.2926	1092	Dolores	Dolores	75	LLA
Hueco Bolson	FB 6281	Meyer Pithouse Village	1996.914.2927	212	Black Mesa Narrow Neck	Black Mesa	100	LLA
Hueco Bolson	FB 6281	Meyer Pithouse Village	1996.914.2928	287	Tularosa Corner Notched	Cienega	75	LLA
Hueco Bolson	FB 6281	Meyer Pithouse Village	1996.914.2929	934	San Pedro	San Pedro	95	LLA
Hueco Bolson	FB 16698		2000.5.274e		Tularosa Basal Notched	Cienega	100	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 12648		12648-G1885-259-00	1930	Bajada	Bajada	100	ELA
Hueco Bolson	FB 12648		12648-G2228-259-00	2286	unknown	unknown	100	LLA
Hueco Bolson	FB 10916			FB 10916 cn 1 G 1 259	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 5834			1	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 16698		2000.5.231b	2000.5.2.3a-aaa	unknown	unknown	50	LLA
Hueco Bolson	FB 16698		2000.5.285d	2000.5.19.5a-s	unknown	unknown	50	LLA
Hueco Bolson	FB 5000		5000-n1-259-1	1996.917.104	Empire	San Pedro	100	LLA
Hueco Bolson	FB 5000		5000-G186-259-1	1996.917.976	Gypsum	Gypsum	100	LLA
Hueco Bolson	FB 5000		5000-G217-259-1	1996.917.103	unknown	unknown	50	LLA
Hueco Bolson	FB 5000		5000-G237-259	1996.917.317	Guadalupe	Livermore	100	LLA
Hueco Bolson	FB 5000		5000-G237-259-2	1996.917.500	Scallorn	Scallorn	100	LLA
Hueco Bolson	FB 5004		5004-N7-259-1	1996.917.943	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 5004		5004-N10-259-1	1996.917.760	unknown	unknown	50	LLA
Hueco Bolson	FB 5016		5016-N2-259-1	1996.917.321	Tularosa Basal Notched	Cienega	100	ELA
Hueco Bolson	FB 5016		5016-N1-259-1	1996.917.515	Tularosa Corner Notched	Cienega	95	ELA
Hueco Bolson	FB 12710		1996.917.1304	12710-270-9-259	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 12710		1996.919.42669	FB12710-G388-259	Scallorn	Scallorn	95	LLA
Hueco Bolson	FB 10018		2002.14.8481	136	San Jose	San Jose	75	ELA
Hueco Bolson	FB 10018		2002.14.8465	1492	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 12648		1996.919.25448	FB12648-G2126-600	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 12648		1996.919.26982	FB12648-N0-600	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 12648		1996.919.26981	FB12648-N0-259	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 7634		2000.30.593	FB7634-599-251	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 7634		2000.30.594	FB7634-G326-259	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9099		2002.11.340		San Pedro	San Pedro	75	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 10018		2002.14.8466	1692	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 10018		2002.14.8473	1803	unknown	unknown	25	ELA
Hueco Bolson	FB 9697		1996.991.1333	14B-33-1	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 10018		2002.14.8474	2398	San Pedro	San Pedro	25	ELA
Hueco Bolson	FB 10018		2002.14.8483	2403	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 10018		2002.14.8467	2516	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9697		1996.991.1537	9697-6195-259-1	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 10018		2002.14.8475	2798	unknown	unknown	25	ELA
Hueco Bolson	FB 9697		1996.991.1332		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 16816		2002.3.62	369/3557-1	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 6726			3	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 6432		2001.5.2118	5	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 6432		2001.5.2120	2	Tularosa Corner Notched	Cienega	75	LLA
Hueco Bolson	FB 6432		2001.5.2121	3	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 6432		2001.5.2123	6	Maljamar	Maljmar	100	LLA
Hueco Bolson	FB 6432		2001.5.2050	1601	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 6432		2001.5.2051	719	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 6432		2001.5.2052	2850	San Pedro	San Pedro	95	LLA
Hueco Bolson	FB 429		2002.11.172		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 429		2002.11.173		Pueblo Side Notched	Pueblo Side Notched	50	LLA
Hueco Bolson	FB 7462		2003.2.31	41EP1070-01-259	San Jose	San Jose	100	LLA
Hueco Bolson	FB 13597		2003.2.53		Guadalupe	Livermore	50	LLA
Hueco Bolson	FB 12744		2003.7.1431		Tularosa Corner Notched	Cienega	75	ELA
Hueco Bolson	FB 13271		2004.10.0422		Gypsum	Gypsum	100	ELA
Hueco Bolson	FB 10018		2002.14.8250	287	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 6610		2004.10.0625		Tularosa Corner Notched	Cienega	50	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 273		2004.11.808		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 12650		2003.7.1432		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 10018		2002.14.8476	2904	Cottonwood	Western Triangular	25	ELA
Hueco Bolson	FB 12650		2003.7.1434		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 10018		2002.14.8468	3061	Gypsum	Gypsum	95	ELA
Hueco Bolson	FB 470		2004.11.318		San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 470		2004.11.338		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 235		2004.11.029		unknown	unknown	75	LLA
Hueco Bolson	FB 273		2994.11.815		San Jose	San Jose	100	ELA
Hueco Bolson	FB 273		2004.11.981		Lake Mojave	Great Basin Stemmed	100	ELA
Hueco Bolson	FB 10018		2002.14.8477	3092	San Pedro	San Pedro	25	ELA
Hueco Bolson	FB 273		2004.11.813		Pinto	Pinto	95	ELA
Hueco Bolson	FB 273		2004.11.810		San Jose	San Jose	100	ELA
Hueco Bolson	FB 273		2004.11.811		San Pedro	San Pedro	25	ELA
Hueco Bolson	FB 273		2004.11.809		San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 12648		1996.917.1308	12648-2754-G2517-251	tularosa corner Notched	Cienega	100	ELA
Hueco Bolson	FB 12648		1996.919.24403	FB12648-769-G762-259-0	Plano	unknown	100	ELA
Hueco Bolson	FB 447		2004.11.669		Tularosa Corner Notched	Cienega	95	ELA
Hueco Bolson	FB 447		2004.11.670		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 447		2004.11.671		Palmillas	San Pedro	50	LLA
Hueco Bolson	FB 12650		2003.7.1433		unknown	unknown	25	ELA
Hueco Bolson	FB 447		2004.11.673		Tularosa Corner Notched	Cienega	50	ELA
Hueco Bolson	FB 470		2004.11.336		Tularosa Corner Notched	Cienega	50	ELA
Hueco Bolson	FB 4487		2005.11.733		San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 4487		2005.11.535		Gypsum	Gypsum	50	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 5846		2005.11.943		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 5846		2005.11.942		Pinto	Pinto	100	ELA
Hueco Bolson	FB 4488		2005.11.891	144	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 6360		2005.11.1156	31	Datil	Datil	100	ELA
Hueco Bolson	FB 13975		2005.11.1432		Gypsum	Gypsum	75	ELA
Hueco Bolson	FB 272		2010.3.46	1-1	San Pedro	San Pedro	75	LLA
Hueco Bolson	FB 272		2010.3.47	2-1	Tularosa Corner Notched	Cienega	50	LLA
Hueco Bolson	FB 9697		1996.991.1188	9697-G395-259-1	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 12705		2005.16.178	1	San Jose	San Jose	75	ELA
Hueco Bolson	FB 10043		2005.14.244	1-1	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 10043		2005.14.259	10-1	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 10043		2005.14.484	93-1	San Pedro	San Pedro	25	ELA
Hueco Bolson	FB 10043		2005.14.485	94-1	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 10042		2005.14.141	2-1	Tularosa Corner Notched	Cienega	75	LLA
Hueco Bolson	FB 7477		2005.15.102	4-1	Pueblo Side Notched	Pueblo Side Notched	100	LLA
Hueco Bolson	FB 12705		2005.16.27	1	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 12705		2005.16.30	2	San Pedro	San Pedro	25	LLA
Hueco Bolson	FB 12705		2005.16.165	1	San Jose	San Jose	95	ELA
Hueco Bolson	FB 12708		1996.919.38301	FB12708-G755-259	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 12705		2005.16.379	1	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 12705		2005.16.606	1	Pinto	Pinto	50	ELA
Hueco Bolson	FB 12705		2005.16.729	1	unknown	unknown	95	LLA
Hueco Bolson	FB 17442		2006.02.003		Tularosa Basal Notched	Cienega	75	LLA
Hueco Bolson	FB 17450		2006.02.0001	1	San Pedro	San Pedro	25	ELA
Hueco Bolson	FB 17450		2006.02.0002	2	San Jose	San Jose	75	ELA
Hueco Bolson	FB 1581		2007.4.1	1	Maljamar	Maljmar	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 4339		2007.4.3	1	San Jose	San Jose	95	ELA
Hueco Bolson	FB 1579		2007.5.1	1	Tularosa Corner Notched	Cienega	75	LLA
Hueco Bolson	FB 1579		2007.5.2	2	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 1579		2007.5.3	3	Tularosa Basal Notched	Cienega	75	LLA
Hueco Bolson	FB 1579		2007.5.24	1	Tularosa Corner Notched	Cienega	95	LLA
Hueco Bolson	FB 6190		2007.18.0562		San Jose	San Jose	75	ELA
Hueco Bolson	FB 6190		2007.18.0563		San Jose	San Jose	95	ELA
Hueco Bolson	FB 7593		2007.6.18	2	Bajada	Bajada	100	ELA
Hueco Bolson	FB 7593		2007.6.19	3	San Jose	San Jose	100	ELA
Hueco Bolson	FB 6773		2007.6.13	4	Bajada	Bajada	100	ELA
Hueco Bolson	FB 6720		2007.6.2	2	Tularosa Basal Notched	Cienega	100	LLA
Hueco Bolson	FB 6720		2007.6.3	3	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 6720		2007.6.4	4	Gypsum	Gypsum	100	ELA
Hueco Bolson	FB 6720		2006.6.5	5	San Jose	San Jose	100	ELA
Hueco Bolson	FB 273		2004.11.814		unknown	unknown	75	ELA
Hueco Bolson	FB 6720		2007.6.9	9	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 12366		2007.22.303	91-1	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 10117		2007.22.77	3-1	Pinto	Pinto	95	ELA
Hueco Bolson	FB 5073		2008.1.9		San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 5073		2008.1.8		Bajada	Bajada	25	LLA
Hueco Bolson	FB 2790		2007.30.28	2	unknown	unknown	100	LLA
Hueco Bolson	FB 2790		2007.30.27	1	San Jose	San Jose	75	LLA
Hueco Bolson	FB 9390		2008.4.37		Guadalupe	Livermore	75	LLA
Hueco Bolson	FB 9339		2008.4.18		Temporal	Chaco	100	LLA
Hueco Bolson	FB 6001		2008.6.01		Carlsbad	Cienega	95	ELA
Hueco Bolson	FB 9620		2008.08.12	12	San Pedro	San Pedro	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 9620		2008.08.13	13	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9620		2008.08.15	15	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9620		2008.08.01	1	Guadalupe	Livermore	75	ELA
Hueco Bolson	FB 9620		2008.08.02	2	Maljamar	Maljmar	100	ELA
Hueco Bolson	FB 9620		2008.08.03	3	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9620		2008.08.05	5	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 3238		2002.12.22		Scallorn	Scallorn	95	ELA
Hueco Bolson	FB 9620		2008.08.07	7	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9620		2008.08.08	8	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 6741		2008.16.159	3087	San Jose	San Jose	100	ELA
Hueco Bolson	FB 6741		2008.16.126	3059	San Jose	San Jose	100	ELA
Hueco Bolson	FB 17157		2008.9.752	3000-0A000007C	Livermore	Livermore	100	LLA
Hueco Bolson	FB 17157		2008.9.750	3000-0A0000B1C	San Pedro	San Pedro	50	LLA
Hueco Bolson	FB 6741		2008.16.125	3058	Bajada	Bajada	100	ELA
Hueco Bolson	FB 6741		2008.16.187	3105	Pinto	Pinto	75	ELA
Hueco Bolson	FB 6741		2008.16.123	3056	Gypsum	Gypsum	100	ELA
Hueco Bolson	FB 447		2004.11.666		Maljamar	Maljmar	100	ELA
Hueco Bolson	FB 7484		2008.16.0252	276	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 7484		2008.16.0253	277	Bajada	Bajada	100	ELA
Hueco Bolson	FB 7491		2008.16.100	2	San Jose	San Jose	75	ELA
Hueco Bolson	FB 447		2004.11.668		unknown	unknown	25	ELA
Hueco Bolson	FB 7506		2008.16.120	138	Livermore	Livermore	95	ELA
Hueco Bolson	FB 18618		2008.25.78	1	Bajada	Bajada	75	LLA
Hueco Bolson	FB 9426		2008.25.09	6	San Pedro	San Pedro	50	LLA
Hueco Bolson	FB 9426		2008.25.26	3	Guadalupe	Livermore	25	LLA
Hueco Bolson	FB 9426		2008.25.76	5	San Pedro	San Pedro	25	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 12519		2008.31.626	239-1	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 17278		2008.36.1927	70-6	San Pedro	San Pedro	75	LLA
Hueco Bolson	FB 17278		2008.36.2074	92-1	Tularosa Basal Notched	Cienega	100	LLA
Hueco Bolson	FB 17278		2008.36.2170	110-1	Livermore	Livermore	50	LLA
Hueco Bolson	FB 12527		2008.31.1708	382-1	Tularosa Basal Notched	Cienega	75	ELA
Hueco Bolson	FB 12527		2008.31.1799	446-7	Tularosa Basal Notched	Cienega	100	ELA
Hueco Bolson	FB 12527		2008.31.1974	474-1	San Jose	San Jose	100	ELA
Hueco Bolson	FB 17278		2008.36.2169	109-1	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 17278		2008.36.2127	98-1	Tularosa Corner Notched	Cienega	75	LLA
Hueco Bolson	FB 6773		2009.2.2	11021	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 6773		2009.2.34	23018	San Pedro	San Pedro	25	ELA
Hueco Bolson	FB 6773		2009.2.6	1077	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 447		2004.11.672		unknown	unknown	25	ELA
Hueco Bolson	FB 6873		2007-28-0002	2	unknown	unknown	100	LLA
Hueco Bolson	FB 6873		2007-28-0007	1	San Pedro	San Pedro	75	LLA
Hueco Bolson	FB 6873		2007-28-0008	3	Pueblo Side Notched	Pueblo Side Notched	100	LLA
Hueco Bolson	FB 7520		2009.26.0001	544	Guadalupe	Livermore	50	LLA
Hueco Bolson	FB 7520		2009.26.0019	560	unknown	unknown	95	LLA
Hueco Bolson	FB 7520		2009.26.0022	561	San Jose	San Jose	100	LLA
Hueco Bolson	FB 7520		2009.26.0378	794	unknown	unknown	100	LLA
Hueco Bolson	FB 9554		2008.4.48		Dolores	Dolores	95	LLA
Hueco Bolson	FB 9554		2008.4.49		Cottonwood	Western Triangular	95	LLA
Hueco Bolson	FB 16158		2008.26.0023		Gypsum	Gypsum	100	LLA
Hueco Bolson	FB 6271		2007.11.0014		Guadalupe	Livermore	75	LLA
Hueco Bolson	FB 6271		2007.11.0023		Guadalupe	Livermore	75	LLA
Hueco Bolson	FB 6271		2007.11.0028		Datil	Datil	100	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 6271		2007.11.0029		San Jose	San Jose	50	LLA
Hueco Bolson	FB 6271		2007.11.0030		San Pedro	San Pedro	75	LLA
Hueco Bolson	FB 6271		2007.11.0031		Tularosa Basal Notched	Cienega	50	LLA
Hueco Bolson	FB 10035		2002.14.8889	420	Toyah	Pueblo Side Notched	75	LLA
Hueco Bolson	FB 10035		2002.14.8890	474	Datil	Datil	100	LLA
Hueco Bolson	FB 10017		2002.14.2789	1311	San Pedro	San Pedro	75	LLA
Hueco Bolson	FB 10017		2002.14.2790	1832	Tularosa Corner Notched	Cienega	100	LLA
Hueco Bolson	FB 10017		2002.14.2791	1936	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 10017		2002.14.2792	2251	San Pedro	San Pedro	25	LLA
Hueco Bolson	FB 10017		2002.14.9116	692	unknown	unknown	25	LLA
Hueco Bolson	FB 10017		2002.14.9117	919	San Pedro	San Pedro	75	LLA
Hueco Bolson	FB 10017		2002.14.9120	1017	unknown	unknown	50	LLA
Hueco Bolson	FB 10017		2002.14.9121	1034	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 10017		2002.14.9163	4163	San Pedro	San Pedro	50	LLA
Hueco Bolson	FB 10017		2002.14.9115	334	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 10017		2002.14.1932	1490	San Jose	San Jose	75	LLA
Hueco Bolson	FB 10035		2002.14.9124	131	unknown	unknown	50	LLA
Hueco Bolson	FB 10035		2002.14.9122	127	San Pedro	San Pedro	75	LLA
Hueco Bolson	FB 10018		2002.14.8478	3178	unknown	unknown	25	ELA
Hueco Bolson	FB 10018		2002.14.8472	359	San Pedro	San Pedro	25	ELA
Hueco Bolson	FB 470		2004.11.324		San Jose	San Jose	50	ELA
Hueco Bolson	FB 49		2002.3.133	363/3552-1	Bajada	Bajada	25	ELA
Hueco Bolson	FB 49		2002.3.134	363/3552-2	unknown	unknown	95	ELA
Hueco Bolson	FB 6610		2004.10.0624		San Jose	San Jose	25	ELA
Hueco Bolson	FB 10018		2002.14.8479	3770	Tularosa Corner Notched	Cienega	50	ELA
Hueco Bolson	FB 10018		2002.14.8469	3900	Gypsum	Gypsum	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 10018		2002.14.8470	4445	Abasolo	Abasolo	100	ELA
Hueco Bolson	FB 10018		2002.14.8471	4477	unknown	unknown	25	ELA
Hueco Bolson	FB 6720		2007.6.8	8	unknown	unknown	25	ELA
Hueco Bolson	FB 10018		2002.14.7553	5036	Tularosa Corner Notched	Cienega	50	ELA
Hueco Bolson	FB 10018		2002.24.7562	5056	Tularosa Corner Notched	Cienega	25	ELA
Hueco Bolson	FB 6741		1996.716.1936	2292	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 7183		2008.16.0101	4	unknown	unknown	25	ELA
Hueco Bolson	FB 10018		2002.14.7593	5138	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 7352		7352.obs.6.259		Bajada	Bajada	75	ELA
Hueco Bolson	FB 7506		2008.16.108	126	Pinto	Pinto	50	ELA
Hueco Bolson	FB 8612		2009-10-2	2-1	unknown	unknown	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2453-259-01	ocn 332	unknown	unknown	25	ELA
Hueco Bolson	FB 10018		2002.14.7595a	5141	unknown	unknown	25	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2605-259-01		unknown	unknown	25	ELA
Hueco Bolson	FB 10018		2002.14.8462	641	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9620		2008.08.06	6	Datil	Datil	75	ELA
Hueco Bolson	FB 10018		2002.14.8463	737	Guadalupe	Livermore	100	ELA
Hueco Bolson	FB 10018		2002.14.8482	907	San Jose	San Jose	100	ELA
Hueco Bolson	FB 1680		2001.7.294		Guadalupe	Livermore	75	LLA
Hueco Bolson	FB 1680		2001.7.295		Guadalupe	Livermore	75	LLA
Hueco Bolson	FB 1680		2001.7.297		Guadalupe	Livermore	50	LLA
Hueco Bolson	FB 1680		2001.7.304		Guadalupe	Livermore	25	LLA
Hueco Bolson	FB 1680		2001.7.305		Tularosa Basal Notched	Cienega	75	LLA
Hueco Bolson	FB 6747		2005.21.291	1-1	Tularosa Basal Notched	Cienega	75	ELA
Hueco Bolson	FB 9697		1996.991.593	FB9697-G509-259-1	San Pedro	San Pedro	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 9697		1996.991.594	FB9697-G439-259-1	unknown	unknown	50	ELA
Hueco Bolson	FB 9697		1996.991.599	FB9697-G438-259-1	unknown	unknown	50	ELA
Hueco Bolson	FB 49		2002.3.135	364/3552-1	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 49		2002.3.136	364/3552-2	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 12708		1996.919.36147	FB12-g553-259	Datil	Datil	100	LLA
Hueco Bolson	FB 12708		1996.919.37379	FB12708-G621-259	San Pedro	San Pedro	95	LLA
Hueco Bolson	FB 12708		1996.919.37380	FB12708-G658-259	unknown	unknown	100	LLA
Hueco Bolson	FB 12650		1996.919.39595	FB 12650-G1566-259	Tularosa Basal Notched	Cienega	75	ELA
Hueco Bolson	FB 12699		1996.919.32514	FB12699-G864-259	unknown	unknown	50	LLA
Hueco Bolson	FB 1587		2008.20.209	3000-0A000047D	Tularosa Corner Notched	Cienega	75	LLA
Hueco Bolson	FB 8149		2008.18.2	3000-0A000AA2E	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 8149		2008.18.3	3000-0A000AA2F	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 8149		2008.18.4	3000-0A000AA30	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 8149		2008.18.7	3000-0A000AA33	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 8149		2008.18.9	3000-0A00AA35	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 9302		2008.36.595	485-1	Tularosa Basal Notched	Cienega	95	ELA
Hueco Bolson	FB 9302		2008.36.594	484-1	Gypsum	Gypsum	95	ELA
Hueco Bolson	FB 17339		2008.36.1509	13-1	San Pedro	San Pedro	75	LLA
Hueco Bolson	FB 17339		2008.36.1619	112-1	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 13985		2005.9.3	1	Tularosa Corner Notched	Cienega	95	ELA
Hueco Bolson	FB 13985		2005.9.8	9	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 13985		2005.9.9	12	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 13985		2005.9.10	7	Tularosa Corner Notched	Cienega	75	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 17282		2008.36.986	2-1	Guadalupe	Livermore	75	ELA
Hueco Bolson	FB 12699		1996.919.33645	FB12699-G1104-259	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 9697		1996.991.597	9697-G472-259-1	unknown	unknown	25	ELA
Hueco Bolson	FB 6801		2009.29.8	23	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 5000		2009.19.001	1	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 5000		2009.19.004	4	Guadalupe	Livermore	75	LLA
Hueco Bolson	FB 6188		2004.22.7		Gypsum	Gypsum	100	ELA
Hueco Bolson	FB 12527		2008.31.1431	228-1	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 8395		2006.17.21	3	San Jose	San Jose	25	ELA
Hueco Bolson	FB 10039		2005.17.918	118-1	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 10039		2005.17.920	301-1	San Pedro	San Pedro	95	LLA
Hueco Bolson	FB 10039		2005.17.921	302-1	Scallorn	Scallorn	95	LLA
Hueco Bolson	FB 10039		2005.17.922	303-1	Scallorn	Scallorn	100	LLA
Hueco Bolson	FB 10039		2005.17.924	443-1	Gypsum	Gypsum	100	LLA
Hueco Bolson	FB 10039		2005.17.925	715-3	San Pedro	San Pedro	95	LLA
Hueco Bolson	FB 10039		2005.17.926	722-3	unknown	unknown	50	LLA
Hueco Bolson	FB 10039		2005.17.927	724-3	San Pedro	San Pedro	100	LLA
Hueco Bolson	FB 10039		2005.17.928	812-3	unknown	unknown	25	LLA
Hueco Bolson	FB 10041		2005.17.1800	118-1	unknown	unknown	50	LLA
Hueco Bolson	FB 10041		2005.17.1802	281-1	San Pedro	San Pedro	95	LLA
Hueco Bolson	FB 10041		2005.17.1803	292-9	San Pedro	San Pedro	95	LLA
Hueco Bolson	FB 10041		2005.17.1804	338-10	San Jose	San Jose	100	LLA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G292-259-01	ocn 115	Tularosa Basal Notched	Cienega	95	ELA
Hueco Bolson	FB 9697		1996.991.1462		unknown	unknown	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G657-259-01	ocn 160	Tularosa Basal Notched	Cienega	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G3-259-01	ocn 3	Tularosa Basal Notched	Cienega	50	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G660-259-01	ocn 160	Tularosa Basal Notched	Cienega	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G15-259-03	ocn 11	Carlsbad	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G43-259-04	ocn 28	Tularosa Basal Notched	Cienega	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G32-259-02	ocn 20	Carlsbad	Cienega	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G706-259-01	ocn 165	Tularosa Basal Notched	Cienega	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G18-259-01	ocn 14	Carlsbad	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G457-259-01	ocn 139	Tularosa Basal Notched	Cienega	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G43-259-01	ocn 28	Tularosa Corner Notched	Cienega	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G278-259-01	ocn 103	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G3-259-04		Tularosa Corner Notched	Cienega	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G894-259-01	ocn 172	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1008-259-01	ocn 188	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G5-259-02	ocn 5	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G208-259-04	ocn 79	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1-259-05	ocn 1	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G8-259-01	ocn 8	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1-259-02		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G292-259-03	ocn 115	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G44-259-02	ocn 29	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G536-259-01	ocn 146	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G324-259-01	ocn 122	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G285-259-01	ocn 110	Tularosa Corner Notched	Cienega	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1633-259-01	ocn 263	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G15-259-02	ocn 11	San Pedro	San Pedro	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1261-259-01	ocn 222	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1863-259-01	ocn 285	Tularosa Basal Notched	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2912-259-01	ocn 159	Tularosa Corner Notched	Cienega	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2012-259-01	ocn 311	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G6-259-01	ocn 6	Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G32-259-01	ocn 20	Hueco	San Pedro	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G70-259-01	ocn 39	Tularosa Corner Notched	Cienega	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G653-259-03	ocn 159	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2553-259-01	ocn 368	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G30-259-03	ocn 18	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G3-259-05	ocn 3	Hueco	San Pedro	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2040-259-01	ocn 315	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G208-259-03	ocn 79	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2608-259-01		San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1647-259-01		San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G40-259-01	ocn 25	Tularosa Basal Notched	Cienega	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1735-259-01	ocn 267	San Pedro	San Pedro	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G4-259-01		Tularosa Corner Notched	Cienega	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G292-259-02	ocn 115	Tularosa Basal Notched	Cienega	75	ELA
Hueco Bolson	FB 9697		1996.991.1010	9697-G278-259-1	unknown	unknown	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-N0-259-01		San Pedro	San Pedro	25	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G721-259-01	ocn 165	San Pedro	San Pedro	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G832-259-01	ocn 167	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1-259-01		Hatch	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G454-259-01	ocn 139	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G15-259-04	ocn 11	Tularosa Corner Notched	Cienega	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G15-259-01		San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1708-259-01	ocn 246	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G904-259-01	ocn 172	En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G12-259-01	ocn 9	En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G925-259-01	ocn 174	En Medio	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G916-259-01	ocn 174	En Medio	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2544-259-01	ocn 362	En Medio	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G653-259-02	ocn 159	En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G608-259-01	ocn 151	En Medio	San Pedro	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G652-259-01	ocn 157	En Medio	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G16-259-01	ocn 12	En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2362-259-01	ocn 336	En Medio	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2822-259-01	ocn 405	En Medio	San Pedro	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1881-259-01	ocn 288	En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G663-259-01	ocn 160	En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G3-259-07		En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G3-259-03		En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G208-259-02	ocn79	En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G43-259-03	ocn 28	En Medio	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G6-259-02	ocn 6	San Pedro	San Pedro	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G422-259-01	ocn 137	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G896-259-01	ocn 172	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2927-259-01	ocn 174	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2907-259-01	ocn 159	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G452-259-01		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G314-259-01	ocn 120	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G30-259-01	ocn 18	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2373-259-01	ocn 336	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1862-259-01	ocn 285	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1877-259-01	ocn 287	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G230-259-01	ocn 87	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G212-259-01	ocn 83	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G707-259-01	ocn 165	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G711-259-01	ocn 165	San Pedro	San Pedro	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2523-259-01		San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1919-259-01	ocn 280	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1620-259-01	ocn 261	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G870-259-01	ocn 170	San Pedro	San Pedro	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G935-259-01	ocn 174	San Pedro	San Pedro	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2524-259-01	ocn 355	San Jose	San Jose	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2487-259-01	ocn 348	San Jose	San Jose	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2360-259-01	ocn 333	San Jose	San Jose	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G201-259-01		Armijo	San Jose	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2452-259-01	ocn 332	Armijo	San Jose	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1495-259-01	ocn 243	Armijo	San Jose	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1898-259-01		Armijo	San Jose	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G200-259-01	ocn 75?	Armijo	San Jose	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2918-259-01		Armijo	San Jose	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G43-259-05	ocn 28	Fresnal	Datil	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G246-259-02	ocn 94	Fresnal	Datil	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1921-259-01	ocn 294	Fresnal	Datil	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G863-259-01	ocn 169	Fresnal	Datil	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1968-259-01	ocn 307	Fresnal	Datil	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G282-259-01	ocn 107	Fresnal	Datil	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G617-259-01	ocn 153	Fresnal	Datil	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2822-259-01	ocn 405	Fresnal	Datil	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2-259-03		Fresnal	Datil	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1-259-09		Fresnal	Datil	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G520-259-01	ocn 143	Fresnal	Datil	100	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1958-259-01	ocn 306	Fresnal	Datil	50	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G332-259-01	ocn 126	Augustin	Gypsum	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G651-259-02	ocn 155	Augustin	Gypsum	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G938-259-01	ocn 173	Augustin	Gypsum	95	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G1091-259-01	ocn 203	Augustin	Gypsum	75	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2142-259-01	ocn 316	Augustin	Gypsum	75	ELA
Hueco Bolson	FB 9369	Pintada Rockshelter	9369-G2517-259-01	ocn358	Augustin	Gypsum	50	ELA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-22	3791	Guadalupe	Livermore	95	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-23	380	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-24	2519	Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	AA:12:746	santa Cruz Bend	98-136-25	2094	Empire	San Pedro	100	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-26	1636	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-27	2349	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-28	1226	San Pedro	San Pedro	75	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-29	5564	Cortaro	Cortaro	75	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-30	3787	Pinto	Pinto	100	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-17	3788	Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-18	1816	Guadalupe	Livermore	100	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-19	6532	Guadalupe	Livermore	100	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-20	2849	Guadalupe	Livermore	95	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-21	2744	Guadalupe	Livermore	75	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-229	5154	Guadalupe	Livermore	95	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-230	4903	Guadalupe	Livermore	100	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-231	4377	Guadalupe	Livermore	75	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-225	4925	Pinto	Pinto	100	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-226	4902	San Pedro	San Pedro	75	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-227	5509	Guadalupe	Livermore	100	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-228	4837	Guadalupe	Livermore	95	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-221	4965	Livermore	Livermore	95	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-222	5651	Dolores Straight Stem	Dolores	100	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	BB:13:425	Stone Pipe	98-136-223	4571	San Pedro	San Pedro	95	LLA
Tucson Basin	BB:13:425	Stone Pipe	98-136-224	6492	San Pedro	San Pedro	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-37	460	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-32	1508	unknown	unknown	25	LLA
Tucson Basin	AA:12:746	Santa Cruz Bend	98-136-33	2293	unknown	unknown	50	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-38	593	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-39	280	San Pedro	San Pedro	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-40	209	San Pedro	San Pedro	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-41	230	Guadalupe	Livermore	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-42	329	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-43	529	Guadalupe	Livermore	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-44	114	Elko Corner Notch	Elko	50	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-45	513	San Pedro	San Pedro	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-46	438	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-47		Guadalupe	Livermore	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-52	525	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-53	525	San Pedro	San Pedro	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-54	525	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-55	525	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-56	525	Tularosa Basal Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-57	525	Tularosa Basal Notched	Cienega	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-58	525	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-61	525	San Jose	San Jose	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-68	525	Tularosa Corner Notched	Cienega	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-73	525	Guadalupe	Livermore	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87-74	525	Tularosa Basal Notched	Cienega	75	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:91	Los Pozos	2001-87-80	525	Livermore	Livermore	100	LLA
Tucson Basin	BB:10:46	Milagro	95-33-1		San Pedro	San Pedro	75	ELA
Tucson Basin	BB:10:46	Milagro	95-33-7		Empire	San Pedro	100	ELA
Tucson Basin	BB:10:46	Milagro	95-33-4		Empire	San Pedro	100	ELA
Tucson Basin	BB:10:46	Milagro	95-33-3		San Pedro	San Pedro	25	ELA
Tucson Basin	BB:10:46	Milagro	95-33-2		San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-1		Tularosa Basal Notched	Cienega	75	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-2		unknown	unknown	50	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-3		Tularosa Corner Notched	Cienega	50	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-4		Tularosa Basal Notched	Cienega	75	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-5		Tularosa Corner Notched	Cienega	75	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-6		Livermore	Livermore	75	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-7		Tularosa Corner Notched	Cienega	75	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-8		Tularosa Corner Notched	Cienega	100	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-9		Dolores Straight Stem	Dolores	100	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-10		Empire	San Pedro	100	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-11		Empire	San Pedro	75	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-12		San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:90	Wetlands	98-21-13		unknown	unknown	75	ELA
Tucson Basin	BB:13:15	Valencia	85-35-49	10	San Pedro	San Pedro	100	LLA
Tucson Basin	BB:13:15	Valencia	85-35-48	22	Guadalupe	Livermore	95	LLA
Tucson Basin	AA:12:486	Cortaro Fan	94-85-1	13	Guadalupe	Livermore	100	LLA
Tucson Basin	AA:12:486	Cortaro Fan	94-85-2	10	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:486	Cortaro Fan	94-85-3		Cortaro	Cortaro	100	LLA
Tucson Basin	AA:12:486	Cortaro Fan	94-85-4	79	Cortaro	Cortaro	100	LLA
Tucson Basin	AA:12:486	Cortaro Fan	94-85-5	22	Cortaro	Cortaro	100	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:486	Cortaro Fan	94-85-6	440	Cortaro	Cortaro	100	LLA
Tucson Basin	AA:12:486	Cortaro Fan	94-85-7	336	Cortaro	Cortaro	100	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-9		Cortaro	Cortaro	100	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-10		San Pedro	San Pedro	100	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-11		San Pedro	San Pedro	75	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-12		Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-13		Tularosa Basal Notched	Cienega	95	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-14		Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-15		Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-16		Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-17		Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-18		Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-19		Livermore	Livermore	95	LLA
Tucson Basin	BB:13:6	Clearwater	97-26-20		Guadalupe	Livermore	100	LLA
Tucson Basin	AA:12:111	Las Capas	2008-459-190	1875	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-79	842	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-187	1855	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-186	1850	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-145	1241	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-25	240	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-65	816	Empire	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-58	809	Empire	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-161	1580	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-134	1000	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-106	887	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-104	884	Empire	San Pedro	95	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:111	Las Capas	2008-459-103	883	Empire	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-100	880	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-99	879	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-89	860	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-83	848	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-59	810	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-80	843	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-36	606	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-22	198	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-159	1554	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-44	646	Empire	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-21	194	Empire	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-14	40	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-180	1813	Cortaro	Cortaro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-32	420	unknown	unknown	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-19	181	Cortaro	Cortaro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-183	1834	unknown	unknown	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-167	1677	Cortaro	Cortaro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-191	1881	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-193	1895	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-210	2173	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-211	2174	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-137	1081	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-198	1968	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-175	1754	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-55	784	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-54	782	San Pedro	San Pedro	75	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:111	Las Capas	2008-459-46	668	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-12	2	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-47	669	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-122	935	Empire	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-29	294	Empire	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-56	789	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-202	2060	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-128	985	Empire	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-148	1315	Empire	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-150	1429	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-160	1556	Empire	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-136	1077	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-179	1810	Empire	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-182	1827	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-184	1837	Empire	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-185	1839	Empire	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-192	1884	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-189	1874	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-197	1946	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-199	2004	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-205	2107	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-459-216	2236	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008	4776	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008	914	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008	4814	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008	4853	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3095	Guadalupe	Livermore	75	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:111	Las Capas	2008	542	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:91	Los Pozos	2008-769	39	Livermore	Livermore	100	LLA
Tucson Basin	AA:12:111	Las Capas	2008	5593	Empire	San Pedro	95	ELA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4304	Guadalupe	Livermore	100	LLA
Tucson Basin	AA:12:111	Las Capas	2008	666	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008	2236	San Pedro	San Pedro	95	ELA
Tucson Basin	BB:13:6	Clearwater	2006-491-33	5850	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	BB:13:6	Clearwater	2006-491-34	8953	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	BB:13:6	Clearwater	2006-491-35	6247	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	BB:13:6	Clearwater	2006-491-36	6005	Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	BB:13:6	Clearwater	2006-491-37	5928	Tularosa Basal Notched	Cienega	95	LLA
Tucson Basin	EE:2:30	Donaldson	30-n100en6-25		Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	EE:2:30	Donaldson	30-n116e56-19		Tularosa Corner Notched	Cienega	75	LLA
Tucson Basin	EE:2:30	Donaldson	30-11-34		Guadalupe	Livermore	75	LLA
Tucson Basin	EE:2:30	Donaldson	30-6-11		Livermore	Livermore	95	LLA
Tucson Basin	EE:2:30	Donaldson	30-11-62		San Pedro	San Pedro	100	LLA
Tucson Basin	EE:2:30	Donaldson	30-2-23		Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	EE:2:30	Donaldson	xxxxxxxx		Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	EE:2:30	Donaldson	30-17-24		San Pedro	San Pedro	75	LLA
Tucson Basin	EE:2:30	Donaldson	30-1-9		San Pedro	San Pedro	50	LLA
Tucson Basin	EE:2:137	Los Ojitos	137-e5-22		San Pedro	San Pedro	75	LLA
Tucson Basin	EE:2:137	Los Ojitos	137-b2-1		San Pedro	San Pedro	100	LLA
Tucson Basin	EE:2:137	Los Ojitos	137-3to4n-5		San Pedro	San Pedro	100	LLA
Tucson Basin	EE:2:137	Los Ojitos	137-e5-16		Guadalupe	Livermore	100	LLA
Tucson Basin	EE:2:137	Los Ojitos	137-w2-19		Guadalupe	Livermore	100	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	EE:2:62	Wasp Canyon	80-86-99		Empire	San Pedro	100	LLA
Tucson Basin	EE:2:62	Wasp Canyon	93-7-25		San Pedro	San Pedro	100	LLA
Tucson Basin	EE:2:62	wasp canyon	93-7-24	10	Elko Corner Notch	Elko	100	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-137	41	Guadalupe	Livermore	95	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-141	45	Elko Corner Notch	Elko	100	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-143		Empire	San Pedro	100	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-136		Pinto	Pinto	75	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-140		Elko Split Stem	Elko	95	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-142	46	Elko Corner Notch	Elko	75	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-139		Guadalupe	Livermore	75	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-145		San Pedro	San Pedro	75	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-138		Guadalupe	Livermore	100	LLA
Tucson Basin	EE:2:103	Split Ridge	93-7-144	48	Cortaro	Cortaro	100	LLA
Tucson Basin	V:13:201	Kearney	2001-21-1	135	Tularosa Basal Notched	Cienega	100	LLA
Tucson Basin	V:13:201	Kearney	2001-21-2	1402a	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	V:13:201	Kearney	2001-21-3	1402b	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	V:13:201	Kearney	2001-21-4	1401	unknown	unknown	50	LLA
Tucson Basin	V:13:201	Kearney	2001-21-5	1677	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	V:13:201	Kearney	2001-21-6	713	Ventana Side Notch	Northern Side Notched	100	LLA
Tucson Basin	V:13:201	Kearney	2001-21-7	60	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	V:13:201	Kearney	2001-21-9	119	unknown	unknown	25	LLA
Tucson Basin	V:13:201	Kearney	2001-21-11	1012	unknown	unknown	25	LLA
Tucson Basin	V:13:201	Kearney	2001-21-12	950	unknown	unknown	25	LLA
Tucson Basin	V:13:201	Kearney	2001-21-13	218	Black Mesa Narrow Neck	Black Mesa	25	LLA
Tucson Basin	AA:12:111	Las Capas	2008-796	4851	Cortaro	Cortaro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	3243	San Pedro	San Pedro	100	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:111	Las Capas	2008-796	6274	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1644	San Pedro	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1847	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1849	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	2829	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	2830	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5545	Empire	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5513	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5616	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5617	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5767	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	3013	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	2967	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	2910	unknown	unknown	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	3136	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	2997	San Pedro	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1211	unknown	unknown	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1355	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1347	San Pedro	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	3095	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	805	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	850	San Pedro	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	795	Tularosa Corner Notched	Cienega	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	795	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	727	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	790	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	716	San Pedro	San Pedro	95	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:111	Las Capas	2008-796	697	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	619	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	641	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	622	Empire	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	313	Guadalupe	Livermore	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	367	Empire	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	452	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	103	Tularosa Corner Notched	Cienega	100	ELA
Tucson Basin	AA:12:91	Los Pozos	2008-796	923a	Black Mesa Narrow Neck	Black Mesa	25	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	923b	Tularosa Corner Notched	Cienega	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1355	Tularosa Corner Notched	Cienega	75	LLA
Tucson Basin	AA:12:91	Los Pozos	20080796	1066	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3382	San Pedro	San Pedro	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3542	San Pedro	San Pedro	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3724	unknown	unknown	25	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4272	Guadalupe	Livermore	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3669	Tularosa Corner Notched	Cienega	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3729	Guadalupe	Livermore	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3526	Cortaro	Cortaro	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3747	Livermore	Livermore	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3119	Guadalupe	Livermore	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3448	Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4260	unknown	unknown	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4257	San Pedro	San Pedro	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3582	Tularosa Corner Notched	Cienega	100	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:91	Los Pozos	2008-796	3457	Durango Notched	Durango	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3778	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	81	Cortaro	Cortaro	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3925	San Pedro	San Pedro	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3960	Livermore	Livermore	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3981	Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3642	Livermore	Livermore	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3643	San Pedro	San Pedro	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3644	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3939	Livermore	Livermore	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	300	Livermore	Livermore	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	934	Guadalupe	Livermore	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	448	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	425	Tularosa Corner Notched	Cienega	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1383	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1290	San Pedro	San Pedro	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	655	Durango Notched	Durango	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1406	Tularosa Corner Notched	Cienega	50	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1294	Tularosa Basal Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1200	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3346	Guadalupe	Livermore	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3259	Guadalupe	Livermore	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	3094	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4572	Tularosa Corner Notched	Cienega	50	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4144	unknown	unknown	95	LLA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:91	Los Pozos	2008-796	4139	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4051	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1440	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4536	Tularosa Corner Notched	Cienega	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4176	unknown	unknown	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1451	Tularosa Corner Notched	Cienega	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4175	Guadalupe	Livermore	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	4177	Guadalupe	Livermore	75	LLA
Tucson Basin	AA:12:91	Los Pozos	2008-796	1448	Tularosa Basal Notched	Cienega	75	LLA
Tucson Basin	AA:12:111	Las Capas	2008-796	521	San Pedro	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	507	San Jose	San Jose	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	577	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	528	Tularosa Corner Notched	Cienega	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	947	unknown	unknown	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	963	San Pedro	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	933	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	913	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1015	unknown	unknown	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1129	Tularosa Corner Notched	Cienega	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1014	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1138	unknown	unknown	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1789	unknown	unknown	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1820	Empire	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1727	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1625	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1619	San Pedro	San Pedro	75	ELA

Region	Site Number*	Site Name	Museum Number	Specimen Number	Projectile Point Type	Cluster	Percent Present	Time Period
Tucson Basin	AA:12:111	Las Capas	2008-796	2740	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	2649	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	4520a	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	4520b	unknown	unknown	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	3319	unknown	unknown	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5484	Empire	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5137	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5428	San Pedro	San Pedro	25	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5978	San Pedro	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	6122	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5701	unknown	unknown	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	4692	San Pedro	San Pedro	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	1439	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	3442	unknown	unknown	95	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5744	San Pedro	San Pedro	100	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	4513	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5468	Empire	San Pedro	75	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5331	San Pedro	San Pedro	50	ELA
Tucson Basin	AA:12:111	Las Capas	2008-796	5395	Tularosa Corner Notched	Cienega	100	ELA
Tucson Basin	AA:12:91	Los Pozos	2001-87	249	Empire	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87	398	Empire	San Pedro	50	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87	283	San Pedro	San Pedro	95	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87	1163	Empire	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87	7	San Pedro	San Pedro	100	LLA
Tucson Basin	AA:12:91	Los Pozos	2001-87	175	Tularosa Corner Notched	Cienega	100	LLA

*All Tucson Basin site numbers are Arizona State Museum (ASM); Hueco Bolson site numbers are Fort Bliss (FB).

Appendix B

High Visibility Attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
D:07:3141	3990-11-1	11	Chert	20.00	11.13	18.29	18.29	4.57
D:11:0244	3652-285		Owl Rock Chert			21.63	21.63	5.65
D:07:0151	6413-487	3536	Quartzite					
D:07:0152	1131-187	30	Siltstone		30.79	15.64	15.64	3.54
D:07:0152	1131-xx	211	Siltstone				13.82	
D:07:0152	1131-xx	54	Siltstone	29.75		15.97	17.33	4.16
D:07:0152	1131-xx	55	Siltstone	42.61	33.24	13.74	13.74	4.25
D:07:0152	1131-xx	130	Navajo Chert	29.57	21.71	13.34	13.34	4.16
D:07:0152	1131-xx	264	Quartzite	43.63	34.13	17.72	17.72	3.53
D:07:0152	1131-212	5?	Navajo Chert	21.70				
D:07:0152	1131-193	152	Chinle Chert	34.61	24.87	16.51	16.51	4.86
D:07:0152	1131-231	27	Chert		22.30	14.08	14.08	4.47
D:07:0152	1131-107,97	x	Navajo Chert	37.37	28.47	15.06	15.06	3.11
D:07:0236	2792-323		Navajo Chert			17.73	17.73	3.73
D:07:0236	2792-233	2189	Chalcedony	25.77	15.43	16.51	16.51	3.87
D:07:0236	2792-421		Chert			18.29	18.29	4.35
D:07:0236	2792-593		Siltstone					
D:07:0236	2792-627B		Siltstone			19.33	19.33	3.94
D:07:0236	2792-756		Siltstone		33.67	15.24	15.24	3.20
D:07:0236	6805	xx	Chert					
D:07:0239	3140-224		Navajo Chert			16.73	16.73	
D:07:0239	3141-63		Chalcedony	30.85	21.84	16.93	16.93	3.82
D:07:0239	3141-80		Chert			17.35	17.35	4.13
D:07:0239	3141-60		Owl Rock Chert			15.73	15.73	4.87
D:07:0239	3141-31		Chert			13.22	13.22	3.75
D:07:0254	3551-209		Navajo Chert					
D:07:0254	3551-121		Fine Grained Basalt			19.97	19.97	3.69
D:07:1108	2462-265		Siltstone	52.75	41.51	18.96	18.96	4.89
D:07:3003	3316-1803		Chinle Chert					
D:07:3003	3317-2234		Non-Local Chert		35.42	15.98	15.98	5.19
D:07:3017	3340-48		Quartzite	27.04	20.24	23.38	23.38	
D:07:3107	3635-79		Chinle Chert		40.97	21.20	21.20	4.50
D:07:3107	3535-9		Unk Chert			13.44	13.44	3.91
D:07:3107	3635-10		Siltstone	33.24	25.75	16.21	16.21	4.40
D:07:3141	3990-28-1	28.1	Siltstone	27.75	20.07	12.92	12.92	4.49
D:11:0244	3651-1316		Unk Chert					
D:11:0244	3651-1322		Siltstone		26.55	18.91	18.91	4.56
D:11:0244	3651-1259		Owl Rock Chert					
D:11:1281	4771-52	cell 218	Unk Chert					
D:11:449	diagnostic-2027		Siltstone	40.29	31.61	14.50	14.50	4.28

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
D:11:449	Diagnostic-788		Owl Rock Chert	39.25	29.86	16.64	15.99	2.67
D:11:449	diagnostic-2010	cell 237	Owl Rock Chert	42.89	32.47	17.17	17.17	3.48
D:11:449	diagnostic-999	cell 249	Siltstone			18.02	18.02	3.66
D:11:449	diagnostic-687		Navajo Chert			18.07	18.07	4.03
D:11:1410	2475-7	cell 237	Siltstone			15.54	15.54	3.64
D:11:1410	2475-55	cell 248	Siltstone		36.02	17.64	17.64	4.49
D:11:1410	4818-643	cell 242	Owl Rock Chert	32.09	23.72	13.83	13.83	3.61
D:11:1410	4818-645	cell 237	Owl Rock Chert					
D:11:1410	4817-613	cell 250	Owl Rock Chert	30.73	24.10	10.88	10.88	4.78
D:11:3133	4374-225	cell 236	Navajo Chert			22.86	22.86	4.82
D:11:3133	4374-2424	cell 248	Siltstone			21.95	19.75	4.17
D:11:3133	4374-2193		Siltstone			21.56	19.73	3.64
D:11:3133	4374-1105	cell 248	Siltstone	32.63	24.82	15.68	14.99	3.64
D:11:3133	4374-1416	cell 248	Siltstone			19.43	19.43	3.66
D:11:3133	4374-2137	cell 234	Navajo Chert			13.55	12.04	3.38
D:11:3133	4374-620	cell 248	Siltstone	40.60	31.86	18.78	18.78	4.83
D:11:3133	4374-1773		Gravel Chert			21.65	21.65	4.09
D:11:3133	4374-240	cell 237	Owl Rock Chert		28.57	17.16	17.16	2.92
D:11:3133	4374-2381	cell 240	Chalcedonic Chert		32.55	17.25	17.25	3.54
D:11:3133	4374-2321-19		Siltstone					
D:11:3133	4374-850	cell 208?	Siltstone					
D:11:3133	4374-2146	cell 248	Siltstone					
D:11:3131	4337-2436	cell 248	Siltstone			16.44	16.44	3.40
D:11:3131	4337-936	cell 248	Siltstone	51.23	45.05	18.33	18.33	4.12
D:11:3131	4337-1006	cell 249	Siltstone					
D:11:3131	4337-1121	cell 248	Siltstone					
D:11:3131	4337-2516	cell 240	Gravel Chert	52.64	42.40			5.47
D:07:0152	1131-xx	115	Washington Pass Chert			22.03	22.03	4.89
D:07:0152	1131-137	72	Chert	21.37	11.74	13.11	18.10	5.26
D:11:3133	4374-236-4		Siltstone			11.56	11.56	3.14
D:07:0151	6413-328	328	Siltstone			17.80	19.43	5.13
D:07:0152	1131-107,97	xx	Chert		22.98	18.59	18.59	3.61
D:07:0239	3140-336		Chalcedony	21.05	12.10			4.84
D:07:0239	3141-46		Vitreous Petrified Wood			19.88	19.88	4.64
D:07:0254	3551-2		Chert			19.79	19.79	4.64
D:07:0254	3551-185		Chalcedony	26.42	19.19	20.22	20.22	4.23
D:07:3144	4000-50-1	50.1	Unk Chert	36.41	27.94	28.56	28.56	5.14
D:11:0244	3650-1184		Vitreous Petrified Wood	37.75	29.60	14.74	14.74	3.95
D:11:0244	3652-388		Siltstone		23.53	21.55	21.55	3.88
D:11:1281	4771-13	cell 247	Navajo Chert	28.12	23.07	19.90	19.90	4.87
D:11:449	diagnostic-1255	cell 217	Chalcedony		41.85	24.91	24.91	4.81
D:11:3133	4374-2420	cell 240	Gravel Chert			22.19	22.19	4.80
D:11:3133	4374-335	cell 247	Chinle Chert					
D:07:0239	3141-97		Chert	38.65	28.87	10.65	12.45	3.71
D:07:0254	3551-280		Navajo Chert			17.54	17.54	
D:11:1162	2251-29		Navajo Chert			22.30	22.30	4.72

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
D:11:3133	4374-2030-2	cell 248	Siltstone					
D:11:3133	4374-1137-1	cell 248	Siltstone	43.85	36.59	15.89	15.89	4.02
D:11:2190	6921-90	cell 239	Chalcedony	29.64	21.96	14.53	14.53	4.27
D:11:2063	4190-826		Navajo Chert					
D:11:3133	4374-799	cell 237	Gravels Chert			26.13	31.16	7.09
D:11:3133	4374-1972	cell 248	Oolitic Chert		31.86	17.98	17.98	3.89
D:07:0151	3130-357	4023	Pearlite					4.00
D:07:0152	1131-xx	92	Georgetown Chert	35.18		25.59	25.95	5.22
D:07:0152	1131-xx	40	Chert					
D:07:3017	3340-211		Navajo Chert			12.82	14.55	4.37
D:07:3141	3990-29-1	29.1	Chert					6.17
D:11:449	diagnostic-001					21.75	21.75	3.72
D:11:3133	4374-2006	cell 241	Chalcedony					
D:07:0151	6413-xx	321	Siltstone	27.65	19.43	14.76	14.76	3.88
D:07:0152	1131-41	846	Siltstone	23.31			20.94	
D:07:0152	1131-xx	201	Siltstone	37.51	28.18	16.03	16.03	5.49
D:07:0152	1131-xx	144	Siltstone	27.90	17.42	12.24	12.24	4.59
D:07:0236	6805	xxx	Navajo Chert			15.75	15.75	5.85
D:07:3003	3316-1508		Siltstone	36.70	26.03	14.41	14.41	3.53
D:07:3013	3330-xxx		Obsidian	20.92	13.64	10.96	10.96	4.19
D:11:449	4597-489.3	cell 236	Milky Quartz	32.15	20.99			7.67
D:11:449	diagnostic-000		Owl Rock Chert			11.93	16.91	4.94
D:11:449	diagnostic-1592	cell 240	Navajo Chert	33.97	21.96	23.29	23.29	5.59
D:07:3003	3315-1714		Chert			20.19	20.19	4.24
D:11:1281	4771-21	cell 222	Obsidian	42.70	27.38	23.54	23.54	4.83
D:11:3133	4374-1641-4	cell 248	Siltstone					
D:11:3133	4374-1469-16	cell 248	Siltstone					
D:11:0244	3650-301		Unk Chert	27.92	12.68	13.12	16.89	5.95
D:07:0152	1131-41	158	Obsidian	19.83		13.13	16.84	3.56
D:07:0152	1131-118	64	Siltstone					
D:07:0152	1131-127	18	Chalcedony	35.64	27.19	16.92	19.93	3.62
D:07:0152	1131-107,97	xxx	Navajo Chert	25.38	17.05	16.19	16.19	4.68
D:07:0239	3140-301		Quartzitic Chert	27.86	19.01	9.16	17.46	4.53
D:11:449	4621-1735	cell 237	Navajo Chert					4.59
D:11:449	Diagnostic-1846	cell 280	Quartzite			13.12	13.12	4.28
D:11:449	diagnostic-1284	cell 242	Navajo Chert	23.74	16.28	16.64	16.64	4.99
D:11:449	diagnostic-1634	cell 249	Siltstone	31.76	23.82	17.61	17.61	5.82
D:11:449	diagnostic-1731	cell 218	Unk Chert			19.64	19.64	5.29
D:11:2063	4190-466		Siltstone					4.51
D:07:0151	6413-487	3540	Jasper					
D:07:0151	3130-474		Chert	46.41	34.56	22.43	22.69	
D:07:0152	1131-xx	4	Siltstone	32.05	20.12	13.53	13.53	4.26
D:07:0152	1131-xx	53	Chert	39.36	30.17	23.67	23.67	4.46
D:07:0152	1131-312	5	Siltstone	34.41	25.76	15.09	15.09	3.67

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
D:07:0152	1131-87	149	Chert			22.95	22.95	4.68
D:07:0236	2792-274		Navajo Chert	50.79	38.65	20.82	20.82	5.59
D:07:0236	2290-88		Navajo Chert	30.30	18.50	13.32	13.32	4.49
D:07:0239	3140-273		Chert			19.95	21.35	4.88
D:07:0239	3140-248		Owl Rock Chert	40.53	28.61	15.55	17.04	3.44
D:07:0239	3140-238		Chert	45.30	36.91	24.92	24.92	5.58
D:07:0239	3140-287		Chert	26.99	17.89	17.88	17.88	4.30
D:07:0239	3140-255		Chalcedony	32.85	21.93	21.90	21.90	5.23
D:07:0239	3141-92		Quartzite			28.07	28.07	4.78
D:07:0254	3551-103		Navajo Chert	22.25	12.55	17.14	17.14	4.45
D:07:3003	3314-1038		Quartzite	36.63	26.67	14.73	14.73	5.38
D:07:3013	3330-334		Fine Grained Basalt	67.70	57.37	25.32	25.32	6.42
D:07:3013	3330-246		Jasper		16.42	14.28	14.28	5.28
D:07:3013	3330-305		Siltstone	40.67	32.96	22.19	22.19	3.94
D:07:3013	3330-332		Navajo Chert					5.34
D:07:3013	3330-289		Siltstone	32.59	21.01			4.05
D:07:3017	3340-458			24.45	16.69	18.79	18.79	4.70
D:07:3141	3990-15-15	15.15	Navajo Chert	36.61	30.12	14.60	14.60	3.42
D:07:3141	3990-1	1	Chalcedony	27.79	19.10			4.13
D:07:3144	6890-1	cell 249	Fine Grained Basalt	54.55	41.48	21.69	21.69	5.85
D:11:1281	2475-19	cell 234	Navajo Chert	47.04	37.68	16.50	16.50	5.88
D:11:1161	2241-278,283		Navajo Chert	58.03	47.82	28.77	28.77	5.38
D:11:2063	4190-594		Navajo Chert	42.37	32.73	24.82	25.90	5.24
D:11:2175	6918-53	cell 249	Siltstone	33.94	24.17	23.09	23.09	6.93
D:11:3133	4374-2350	cell 248	Siltstone	33.45	21.97	11.24	11.24	3.76
D:11:3133	4374-1483	cell 248	Siltstone	27.88	19.69	17.84	17.84	4.13
D:11:3133	4374-2119	cell 246	Navajo Chert			19.34	19.34	4.35
D:11:3133	4374-2099	cell 237	Owl Rock Chert	31.53	23.31	15.19	18.85	6.19
D:11:3133	4374-2340	cell 240	Gravels Chert	50.06	42.00	24.69	24.69	3.88
D:11:3133	4374-1870	cell 218	Navajo Chert		28.08	15.51	15.51	4.11
D:11:3131	4337-1390	cell 217	Chalcedony	25.29	17.64	17.47	17.47	3.77
D:07:0152	1131-xx	160	Chalcedony		28.84	17.13	18.49	5.83
D:07:0152	1131-xx	44	Quartzite		35.16	15.00	15.00	3.76
D:07:0152	1131-xx	150	Siltstone					5.53
D:07:0152	1131-xx	42	Siltstone			20.11		4.69
D:07:0152	1131-172		Obsidian	10.20				
D:07:0152	1131-211	28	Siltstone	31.77	31.77	17.38	17.38	4.12
D:07:0152	1131-31	11	Siltstone	25.99	25.99	14.09	14.09	3.80
D:07:0152	1131-91	73	Siltstone	37.10	26.30	14.79	14.79	
D:07:0152	1131-107,97	xxxx	Siltstone	21.69	17.97	13.40	13.40	2.57
D:07:0236	2792-464		Fine Grained Basalt			22.70	22.70	
D:07:0236	6805	x	Jasper		20.31	11.20	11.20	3.20
D:07:0239	3141-64		Owl Rock Chert		18.47	10.22	10.22	3.40
D:07:1108	2464-261		Chert		30.48	13.02	13.02	4.33
D:07:3003	3318-115		Chalcedony					5.01
D:07:3003	3318-3076		Fine Grained Basalt					
D:07:3017	3340-357		Chinle Chert			20.33	20.33	4.10
D:07:3144	6890-2	cell 240	Siltstone					
D:07:2100	3630		Unk Chert					3.52
D:11:0244	3652-1014		Siltstone					3.09

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
D:11:1281	4771-77	cell 247	Vitreous Petrified Wooe			22.90		6.00
D:11:1281	2475-41	cell 176	Siltstone					
D:11:449	diagnostic-1162	cell 247	Chinle Chert			18.04	18.04	4.42
D:11:1410	4818-660	cell 234	Navajo Chert					
D:11:2063	4190-398		Navajo Chert					3.59
D:11:2063	4190-349		Siltstone					3.97
D:11:2190	6921-86	cell 240	Unk Chert					3.68
D:11:3133	4374-2305	cell 248	Siltstone					5.88
D:11:3133	4374-2378		Siltstone					4.29
D:11:3133	4374-1154-1	cell 248	Siltstone					
D:11:3133	4374-829	cell 249	Siltstone					3.98
D:11:3133	4374-2377		Siltstone					3.12
D:11:3133	4374-2319		Siltstone					3.48
D:11:3133	4374-491	cell 248	Siltstone					4.14
D:11:3133	4374-286-1	cell 248	Siltstone			18.40	18.40	3.63
D:11:3133	4374-1438-2		Siltstone					2.15
D:11:3133	4374-1991	cell 218	Chalcedony			22.25	22.25	5.56
D:11:3133	4374-1927	cell 240	Owl Rock Chert					4.90
D:11:3133	4374-572	cell 248	Siltstone					3.70
D:11:3133	4374-718	cell 248	Siltstone					3.65
D:11:3133	4374-999	cell 248	Siltstone					2.89
D:11:3133	4374-1894-5		Gravel Chert					5.59
D:11:3133	4374-2321-26		Siltstone					
D:11:3131	4337-514		Owl Rock Chert		23.77			3.90
D:11:3131	4337-1347	cell 248	Siltstone					3.95
D:11:3131	4337-601	cell 250	Navajo Chert					3.70
D:11:3131	4337-2338	cell 248	Siltstone					3.26
D:11:3131	4337-475		Owl Rock Chert					4.48
D:07:0152	1131-xx	273	Fine Grained Basalt	51.50	34.59	22.64	25.20	4.01
FB 10018	2002.14.8470	4445	Rhyolite	53.40	32.49	19.01	19.01	5.53
FB 7483	1996.724.447	7483-G106-259	Obsidian			17.23	17.23	6.24
FB 12648	12648-G1885-259-00	1930	Fine Grained Basalt	48.99	31.28	19.86	19.86	8.46
FB 7593	2007.6.18	2	Obsidian	25.20	15.79	12.86	12.86	3.94
FB 6773	2007.6.13	4	Chert	40.85	24.92	18.79	18.79	5.14
FB 6741	2008.16.125	3058	Chert	53.93	25.02	12.49	12.49	7.67
FB 7484	2008.16.0253	277	Cerro Toledo Rhyolite	24.83	14.83	13.45	13.45	3.94
FB 49	2002.3.133	363/3552-1	Rancheria Chert					
FB 7352	7352.obs.6.259		Chert			27.36	27.36	6.85
FB 5016	5016-N2-259-1	1996.917.321	Chert	29.71	24.14	12.21	12.21	3.54
FB 5016	5016-N1-259-1	1996.917.515	Chert	36.28	25.92	19.97	19.97	4.82

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 12648	1996.919.26981	FB12648-N0-259	Rhyolite	43.96	34.65	18.66	18.66	6.66
FB 12744	2003.7.1431		Sandstone?	36.30	26.10			5.65
FB 6610	2004.10.0625		Rhyolite			20.87		5.42
FB 12648	1996.917.1308	12648-2754-G2517-251	Obsidian	21.96	15.66	16.51	16.51	4.21
FB 447	2004.11.669		Chalcedonic Chert	31.12	21.23	21.21		4.26
FB 447	2004.11.673		Chert					4.10
FB 470	2004.11.336		Chert					4.59
FB 4488	2005.11.891	144	Chert	38.02	29.54	25.93	25.93	4.89
FB 12366	2007.22.303	91-1	Chert	37.52	28.13	14.85	19.53	6.72
FB 6001	2008.6.01		Chert	29.61	15.34	20.68	20.68	6.06
FB 7484	2008.16.0252	276	Rancheria Chert	58.81	43.41	26.25	27.07	5.77
FB 12527	2008.31.1708	382-1	Chert			30.02		5.86
FB 12527	2008.31.1799	446-7	Chert	27.15	20.14	22.06	22.06	4.32
FB 10018	2002.14.8479	3770	Chert			19.50	19.50	5.88
FB 10018	2002.14.7553	5036	Rancheria Chert?					5.57
FB 10018	2002.24.7562	5056	Rhyolite					
FB 6747	2005.21.291	1-1	Chert			27.26	31.62	5.53
FB 49	2002.3.135	364/3552-1	Chalcedony	35.24	27.91	18.24	18.24	3.86
FB 12650	1996.919.39595	FB 12650-G1566-259	Chert		24.88	27.01		4.61
FB 8149	2008.18.3	3000-0A000AA2F	Chert	42.42	30.77	23.88	23.88	5.33
FB 9302	2008.36.595	485-1	Chalcedony	82.75	69.19	24.78	37.44	7.50
FB 13985	2005.9.3	1	Chert	34.61	20.69	24.34	24.34	5.35
FB 13985	2005.9.10	7	Chert		34.67			3.96
FB 9369	9369-G292-259-01	ocn 115	Chert	49.35	33.58	34.27		6.04
FB 9369	9369-G657-259-01	ocn 160	Volcaninc?	35.99	25.20			6.21
FB 9369	9369-G3-259-01	ocn 3	Chert		33.05	27.75		4.62
FB 9369	9369-G660-259-01	ocn 160	Chert		23.27	22.34	22.34	4.88
FB 9369	9369-G15-259-03	ocn 11	Chert	33.51	20.17	16.58	27.75	5.71
FB 9369	9369-G43-259-04	ocn 28	Quartz		31.38			4.77
FB 9369	9369-G32-259-02	ocn 20	Chert	45.27	31.88			8.17
FB 9369	9369-G706-259-01	ocn 165	Jasper					4.02

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 9369	9369-G18-259-01	ocn 14	Chert/Agate?	38.88	25.34	29.94	29.94	5.28
FB 9369	9369-G457-259-01	ocn 139	Quartzite		24.46	24.97	24.97	4.28
FB 9369	9369-G43-259-01	ocn 28	Chert	62.83	47.33			5.18
FB 9369	9369-G3-259-04		Quartzite	53.81	36.02			6.34
FB 9369	9369-G1008-259-01	ocn 188	Chert	34.57	23.13	25.86	25.86	4.77
FB 9369	9369-G208-259-04	ocn 79	Chert	35.83	24.09	24.92	24.92	3.85
FB 9369	9369-G292-259-03	ocn 115	Chert	41.04	27.10	23.38	23.38	4.43
FB 9369	9369-G285-259-01	ocn 110	Chert	45.79	31.68			4.79
FB 9369	9369-G1633-259-01	ocn 263	Chert	30.13	16.82	22.97	22.96	4.86
FB 9369	9369-G1863-259-01	ocn 285	Chert	37.82	24.15	27.57	27.57	5.33
FB 9369	9369-G2912-259-01	ocn 159	Chert	35.60	21.53			4.59
FB 9369	9369-G6-259-01	ocn 6	Chert	44.12	30.97	24.10	24.10	5.57
FB 9369	9369-G70-259-01	ocn 39	Chert	33.23	21.41	18.77		3.98
FB 9369	9369-G40-259-01	ocn 25	Chert		33.95	26.09	26.09	5.51
FB 9369	9369-G4-259-01		Chert	37.13	23.61	26.08	26.08	5.71
FB 9369	9369-G292-259-02	ocn 115	Rhyolite	38.04	24.58			5.63
FB 9369	9369-G15-259-04	ocn 11	Chert	30.50	19.65	17.78	17.78	3.95
FB 6360	2005.11.1156	31	Chert	39.63	29.63	13.54	13.54	5.71
FB 9620	2008.08.06	6	Rhyolite			15.30	15.30	6.20
FB 9369	9369-G43-259-05	ocn 28	Chert	42.01	31.36	22.63	22.63	6.77
FB 9369	9369-G246-259-02	ocn 94	Chert	37.30	26.16			5.16
FB 9369	9369-G1921-259-01	ocn 294	Rhyolite	51.33	34.34	21.32	21.32	6.52
FB 9369	9369-G863-259-01	ocn 169	Chert	30.85	17.45	20.34	20.34	5.04
FB 9369	9369-G1968-259-01	ocn 307	Chert	39.42	29.62	18.26	18.26	5.62
FB 9369	9369-G282-259-01	ocn 107	Chert	30.43	19.53	25.88	25.88	5.00
FB 9369	9369-G617-259-01	ocn 153	Chert			23.60	23.60	5.52

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 9369	9369-G2822-259-01	ocn 405	Chert			25.79	25.79	5.24
FB 9369	9369-G2-259-03		Chert	34.83	25.04	23.85	23.85	5.98
FB 9369	9369-G1-259-09		Chert	41.00	27.20	20.94	20.94	6.60
FB 9369	9369-G520-259-01	ocn 143	Chert	33.69	22.65	24.76	24.76	5.85
FB 9369	9369-G1958-259-01	ocn 306	Rancheria Chert			24.15	24.15	5.41
FB 273	2004.11.981		Chert	31.87	13.93	20.02	20.02	6.83
FB 10018	2002.14.8464	1085	Chert/ Chalcedony	24.67	14.15	12.22	12.22	4.05
FB 13271	2004.10.0422		Rhyolite?	41.92	36.90	20.75	22.03	10.09
FB 10018	2002.14.8468	3061	Chert	34.39	26.58	19.48	19.48	3.96
FB 4487	2005.11.535		Chert			20.01	20.01	7.32
FB 13975	2005.11.1432		Chert			18.16	21.74	4.61
FB 6720	2007.6.4	4	Chert	35.31	24.92	23.37	23.37	5.56
FB 6741	2008.16.123	3056	Chert	28.07	22.77	18.38	18.38	4.12
FB 10018	2002.14.8469	3900	Quartzite	37.96	25.81	14.81	14.81	5.62
FB 9302	2008.36.594	484-1	Chalcedony	75.97	55.25	32.21		5.86
FB 6188	2004.22.7		Chert	41.06	32.46	26.96	26.96	
FB 9369	9369-G332-259-01	ocn 126	Chert			23.05	23.05	6.65
FB 9369	9369-G651-259-02	ocn 155	Chert	30.98	23.18			5.73
FB 9369	9369-G938-259-01	ocn 173	Chert	41.94	29.14			6.20
FB 9369	9369-G1091-259-01	ocn 203	Fine Grained Basalt?		50.08	23.54	23.54	7.15
FB 9369	9369-G2142-259-01	ocn 316	Chert			16.28	16.28	7.64
FB 9369	9369-G2517-259-01	ocn358	Rhyolite			19.77	19.77	5.90
FB 9620	2008.08.01	1	Chert			17.43	21.76	5.98
FB 7506	2008.16.120	138	Chert	41.18	30.91	19.20	27.97	5.97
FB 10018	2002.14.8463	737	Chert	25.69	17.76	19.78	19.78	4.03
FB 17282	2008.36.986	2-1	Chert			12.49	17.68	7.04
FB 1581	2007.4.1	1	Chert	38.00	31.11	17.73	17.73	3.70
FB 9620	2008.08.02	2	Chert	34.94	27.23	17.50	13.78	6.21
FB 447	2004.11.666		Chert	38.67	33.36	17.20	17.20	6.30
FB 273	2004.11.813		Chert	45.17	33.41	18.14	18.14	6.59
FB 5846	2005.11.942		Obsidian	23.82	13.40	17.27	17.27	4.68
FB 12705	2005.16.606	1	Chalcedony			18.41	24.50	6.97
FB 10117	2007.22.77	3-1	Chert	30.41	20.99	18.27	18.27	4.88
FB 6741	2008.16.187	3105	Chert			17.03	17.03	5.25
FB 7506	2008.16.108	126	Chert			24.47	24.47	3.93
FB 10018	2002.14.8481	136	Chert	17.90	9.21	14.92	14.92	5.42

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 273	2994.11.815		Chalcedonic Chert	38.74	26.34	15.54	18.41	8.55
FB 273	2004.11.810		Chert	30.90	19.17	15.24	15.24	4.46
FB 12705	2005.16.178	1	Chert			16.40	16.40	5.01
FB 12705	2005.16.165	1	Rancheria Chert	37.04	26.23	15.01	21.70	7.40
FB 17450	2006.02.000 2	2	Chert	25.82	17.79	16.69	16.69	4.11
FB 4339	2007.4.3	1	Siltstone	27.29	17.38	15.23	15.23	4.58
FB 6190	2007.18.056 2		Chert		19.08	16.21	22.02	3.73
FB 6190	2007.18.056 3		Chert	44.62	33.86	12.88	16.65	6.19
FB 7593	2007.6.19	3	Chert	24.36	17.48	17.44	15.93	4.28
FB 6720	2006.6.5	5	Obsidian	21.40	14.44	16.75	16.75	5.27
FB 6741	2008.16.159	3087	Cerro Toledo Rhyolite	23.03	14.58	16.74	16.74	3.94
FB 6741	2008.16.126	3059	Cerro Toledo Rhyolite	24.62	17.20	16.32	16.32	4.59
FB 7491	2008.16.100	2	Rhyolite	40.50	32.24	19.83	19.83	4.66
FB 12527	2008.31.197 4	474-1	Obsidian	29.83	18.42	22.27	22.27	5.45
FB 470	2004.11.324		Rancheria Chert			17.90	20.17	6.98
FB 6610	2004.10.062 4		Chert					5.81
FB 10018	2002.14.848 2	907	Obsidian	23.90	16.45	12.13	12.13	4.91
FB 8395	2006.17.21	3	Chalcedony					
FB 9369	9369-G2524-259-01	ocn 355	Quartzite	29.44	17.84	21.04	21.04	4.33
FB 9369	9369-G2487-259-01	ocn 348	Chert			22.78	22.78	4.00
FB 9369	9369-G2360-259-01	ocn 333	Chert	23.96	11.66	16.71	16.71	4.39
FB 9369	9369-G201-259-01		Chert	39.52	27.93	19.23	19.23	3.94
FB 9369	9369-G2452-259-01	ocn 332	Chert	30.60	20.20	13.98	13.98	4.43
FB 9369	9369-G1495-259-01	ocn 243	Chert	39.16	30.46	16.82	16.82	5.71
FB 9369	9369-G1898-259-01		Rancheria Chert	41.87	29.27	19.57	19.57	6.17
FB 9369	9369-G200-259-01	ocn 75?	Chert	31.17	19.63	17.46	17.46	5.28
FB 9369	9369-G2918-259-01		Chert	30.35	18.88	16.64	16.64	5.54
FB 9366	1996.564.18 73	1326	Chert	37.51	26.89	16.25	16.25	7.59
FB 10916		FB 10916 cn 1 G 1 259	Chert	43.43	34.37	21.26	21.26	5.06
FB 5834		1	Obsidian	25.53	18.41	17.51	17.51	4.38
FB 5004	5004-N7-259-1	1996.917.94 3	Chert	26.54	19.82	18.18	18.18	5.72

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 12710	1996.917.1304	12710-270-9-259	Obsidian	23.55	15.38	20.79	20.79	4.60
FB 10018	2002.14.8465	1492	Chert	27.61	16.88	15.03	15.03	5.59
FB 12648	1996.919.25448	FB12648-G2126-600	Siltstone	31.32	20.16	20.07	20.07	5.53
FB 12648	1996.919.26982	FB12648-N0-600	Oolitic Chert			26.29	26.29	5.83
FB 7634	2000.30.593	FB7634-599-251	Chert	31.21	21.37			4.56
FB 7634	2000.30.594	FB7634-G326-259	Chert	25.98	17.88	15.98	15.98	6.09
FB 9099	2002.11.340		Rhyolite?			26.27	26.27	7.12
FB 10018	2002.14.8466	1692	Chert	37.54	26.31	24.27	24.27	6.06
FB 9697	1996.991.1333	14B-33-1	Siltstone		25.80	20.55	20.55	7.12
FB 10018	2002.14.8474	2398	Rhyolite					
FB 10018	2002.14.8483	2403	Obsidian	24.12	16.11	12.96	12.96	5.11
FB 10018	2002.14.8467	2516	Chert					5.96
FB 9697	1996.991.1537	9697-6195-259-1	Chert			13.98	13.98	5.30
FB 9697	1996.991.1332		Rhyolite	31.20	21.88	18.75	18.75	6.11
FB 16816	2002.3.62	369/3557-1	Chert			22.99	22.99	5.09
FB 429	2002.11.172		Chert	28.07	16.90	13.33	15.99	4.71
FB 10018	2002.14.8250	287	Chert			14.99	14.99	5.16
FB 273	2004.11.808		Silicified Sediment?	41.06	30.54	21.33	21.33	5.28
FB 12650	2003.7.1432		Chert	25.69	14.33	19.19	19.19	3.78
FB 12650	2003.7.1434		Chert	21.59	14.79	17.97	17.97	4.56
FB 470	2004.11.318		Chert			22.80	22.80	5.56
FB 470	2004.11.338		Chert	36.67	25.82	15.56	15.56	4.64
FB 10018	2002.14.8477	3092	Chert					4.66
FB 273	2004.11.811		Chert			10.71	10.71	3.62
FB 273	2004.11.809		Shale	35.92	26.78	20.55	20.55	4.75
FB 447	2004.11.670		Chert	37.18	28.04	15.75	18.07	5.29
FB 4487	2005.11.733		Chert			19.33	19.33	6.40
FB 5846	2005.11.943		Chert	34.68	22.64	20.95	23.18	6.04
FB 9697	1996.991.1188	9697-G395-259-1	Chert	45.78	32.44	29.94	29.94	5.38
FB 10043	2005.14.244	1-1	Chalcedony	42.04	29.63	30.95	30.95	7.10
FB 10043	2005.14.259	10-1	Chert	32.81	22.69	16.54	16.54	4.94
FB 10043	2005.14.484	93-1	Chert					
FB 10043	2005.14.485	94-1	Chert	34.18	21.39	23.53	23.53	5.90
FB 12705	2005.16.27	1	Chert	52.25	44.58	25.52	25.52	7.50
FB 12708	1996.919.38301	FB12708-G755-259	Unk			25.46	25.46	7.74
FB 12705	2005.16.379	1	Rhyolite	33.46	26.98	17.71	17.71	3.89

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 17450	2006.02.0001	1	Chert			22.09	22.09	3.02
FB 6720	2007.6.3	3	Chert			19.01	19.01	5.11
FB 6720	2007.6.9	9	Rhyolite			23.60	23.60	7.85
FB 9620	2008.08.12	12	Chert	30.21	24.98	15.80	18.99	6.31
FB 9620	2008.08.13	13	Chert	44.06	33.22	21.42	21.42	7.07
FB 9620	2008.08.15	15	Chert	22.79	16.61	15.62	15.62	5.48
FB 9620	2008.08.03	3	Rhyolite			17.99	20.24	4.82
FB 9620	2008.08.05	5	Chert	29.27	21.22	16.43	19.47	5.28
FB 9620	2008.08.07	7	Chert	29.90	23.46	18.61	18.61	5.10
FB 9620	2008.08.08	8	Chert	26.97	19.61	17.24	17.24	5.60
FB 12519	2008.31.626	239-1	Chert?	50.40	39.70	19.88	19.88	6.92
FB 6773	2009.2.2	11021	Chert	40.42	32.71	18.56	18.56	5.92
FB 6773	2009.2.34	23018	Chalcedony			19.00	19.00	7.15
FB 6773	2009.2.6	1077	Chert	30.59	16.03	15.50	15.50	4.87
FB 10018	2002.14.8472	359	Chert					
FB 6741	1996.716.1936	2292	Obsidian	25.73	19.15	13.58	18.13	5.35
FB 10018	2002.14.7593	5138	Rhyolite?			31.92	31.92	7.61
FB 10018	2002.14.8462	641	Chert	41.43	30.26	22.81	22.81	5.73
FB 9697	1996.991.593	FB9697-G509-259-1	Chert	33.21	24.64	11.00	15.85	
FB 49	2002.3.136	364/3552-2	Fine Grained Basalt			23.67	23.67	5.59
FB 8149	2008.18.2	3000-0A000AA2E	Chert	30.92	19.38	20.26	20.26	5.92
FB 8149	2008.18.4	3000-0A000AA30	Chert			24.21	24.21	5.05
FB 8149	2008.18.7	3000-0A000AA33	Chert	33.51	23.40	17.49	17.49	4.55
FB 8149	2008.18.9	3000-0A00AA35	Chert	33.28	22.79	23.38	23.38	
FB 13985	2005.9.8	9	Chert	26.73	20.06	12.64	12.64	4.84
FB 13985	2005.9.9	12	Chert					5.00
FB 6801	2009.29.8	23	Chert			22.96	22.96	5.83
FB 12527	2008.31.1431	228-1	Chert	34.08	23.34	15.87	15.87	5.50
FB 9369	9369-G278-259-01	ocn 103	Silicified Sediment	45.99	33.35	20.48	20.48	6.10
FB 9369	9369-G894-259-01	ocn 172	Unk	42.63	28.83			5.93
FB 9369	9369-G5-259-02	ocn 5	Chert			25.68	25.68	6.44
FB 9369	9369-G1-259-05	ocn 1	Chert	40.97	27.85	18.50	18.50	5.15
FB 9369	9369-G8-259-01	ocn 8	Chalcedonic Chert	46.10	32.60	22.39	22.39	7.81
FB 9369	9369-G1-259-02		Chert	40.37	22.75	29.66	29.66	6.84

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 9369	9369-G44-259-02	ocn 29	Chert	49.86	37.46	26.70	26.70	6.83
FB 9369	9369-G536-259-01	ocn 146	Chert	37.72	23.69	21.04	24.52	7.43
FB 9369	9369-G324-259-01	ocn 122	Chert	37.23	20.54	24.38	24.38	7.07
FB 9369	9369-G15-259-02	ocn 11	Chert	45.56	28.90	24.17	24.17	5.96
FB 9369	9369-G1261-259-01	ocn 222	Fine Grained Basalt	35.94	22.33	21.31	21.31	5.46
FB 9369	9369-G2012-259-01	ocn 311	Siltstone			25.67	25.67	6.43
FB 9369	9369-G32-259-01	ocn 20	Chert			21.31	21.31	5.59
FB 9369	9369-G653-259-03	ocn 159	Chert			21.19	21.19	5.23
FB 9369	9369-G2553-259-01	ocn 368	Chert					6.12
FB 9369	9369-G30-259-03	ocn 18	Chert			24.49	24.49	5.75
FB 9369	9369-G3-259-05	ocn 3	Chalcedony	31.85	17.01			4.11
FB 9369	9369-G2040-259-01	ocn 315	Rhyolite?			21.91	21.91	5.69
FB 9369	9369-G208-259-03	ocn 79	Chert			20.43	20.43	5.44
FB 9369	9369-G2608-259-01		Chert	36.56	23.65			6.47
FB 9369	9369-G1647-259-01		Chert	36.82	25.67			4.41
FB 9369	9369-G1735-259-01	ocn 267	Chert			23.42	23.42	5.87
FB 9369	9369-N0-259-01		Chert			19.32	19.32	6.09
FB 9369	9369-G721-259-01	ocn 165	Chert	27.98	17.60	15.82	15.82	5.55
FB 9369	9369-G832-259-01	ocn 167	Chert	26.51	13.89	20.30	20.30	5.05
FB 9369	9369-G1-259-01		Chert	30.44	19.29			4.73
FB 9369	9369-G454-259-01	ocn 139	Chert	32.34	19.89	16.03	16.03	6.90
FB 9369	9369-G15-259-01		Chert			15.96	15.96	4.67
FB 9369	9369-G1708-259-01	ocn 246	Fine Grained Basalt?	28.84	15.44	19.83	19.83	6.22
FB 9369	9369-G904-259-01	ocn 172	Chert	25.67	17.03	19.89	19.89	4.32
FB 9369	9369-G12-259-01	ocn 9	Chert	27.53	16.17	16.04	16.04	5.46

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 9369	9369-G925-259-01	ocn 174	Chert	38.89	31.75	24.73	24.73	7.23
FB 9369	9369-G916-259-01	ocn 174	Chert	33.03	22.78	20.41	20.41	5.95
FB 9369	9369-G2544-259-01	ocn 362	Rhyolite	22.19	14.82	21.70	21.70	3.75
FB 9369	9369-G653-259-02	ocn 159	Chert	21.37	13.94	21.87	21.87	4.78
FB 9369	9369-G608-259-01	ocn 151	Chalcedony			27.92		6.11
FB 9369	9369-G652-259-01	ocn 157	Chert	29.73	18.11	23.39		4.47
FB 9369	9369-G16-259-01	ocn 12	Chert	29.61	18.27	26.36	26.36	5.21
FB 9369	9369-G2362-259-01	ocn 336	Chert	36.82	27.90			5.21
FB 9369	9369-G2822-259-01	ocn 405	Rhyolite?			18.93	18.93	5.56
FB 9369	9369-G1881-259-01	ocn 288	Chalcedony	31.33	18.74	19.57	19.57	4.41
FB 9369	9369-G663-259-01	ocn 160	Chert	26.64	15.43	25.17	25.17	5.66
FB 9369	9369-G3-259-07		Rhyolite	26.51	17.41	19.99	19.99	6.13
FB 9369	9369-G3-259-03		Fine Grained Basalt	40.04	27.24	24.72	24.72	5.58
FB 9369	9369-G208-259-02	ocn79	Chert	25.27	18.46	16.49	16.49	3.65
FB 9369	9369-G43-259-03	ocn 28	Chert	34.42	22.70	23.22	23.22	4.91
FB 9369	9369-G6-259-02	ocn 6	Chert	34.28	20.71	22.05	22.05	7.88
FB 9369	9369-G422-259-01	ocn 137	Rhyolite	30.44	18.08	19.19	19.19	4.96
FB 9369	9369-G896-259-01	ocn 172	Chert	25.25	14.45	19.21	19.21	5.34
FB 9369	9369-G2927-259-01	ocn 174	Chert	28.40	16.74			3.74
FB 9369	9369-G2907-259-01	ocn 159	Chert	30.59	17.41	16.39	16.39	4.82
FB 9369	9369-G452-259-01		Chert	27.34	17.29	14.53	14.53	5.74
FB 9369	9369-G314-259-01	ocn 120	Chert	24.87	14.70	17.13	17.13	4.67
FB 9369	9369-G30-259-01	ocn 18	Chert	39.31	22.22	22.35	22.35	6.54
FB 9369	9369-G2373-259-01	ocn 336	Chert	30.05	18.33			6.69
FB 9369	9369-G1862-259-01	ocn 285	Chert	31.58	18.90	15.54	15.54	5.22

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 9369	9369-G1877-259-01	ocn 287	Chert	28.94	17.27	16.21	16.21	5.35
FB 9369	9369-G230-259-01	ocn 87	Chert	39.47	26.10	16.26	16.26	5.25
FB 9369	9369-G212-259-01	ocn 83	Chert	47.53	34.58	21.99	21.99	6.13
FB 9369	9369-G707-259-01	ocn 165	Chert	49.05	24.83	16.36	16.36	7.04
FB 9369	9369-G711-259-01	ocn 165	Chert	46.90	31.76	16.80	16.80	6.35
FB 9369	9369-G2523-259-01		Chert	42.53	30.54	23.43	23.43	6.37
FB 9369	9369-G1919-259-01	ocn 280	Rancheria Chert	41.81	27.62	15.67	15.67	6.62
FB 9369	9369-G1620-259-01	ocn 261	Chert	48.59	36.93	17.15	17.15	9.43
FB 9369	9369-G870-259-01	ocn 170	Chert			16.15	16.15	6.48
FB 9369	9369-G935-259-01	ocn 174	Silicified Sediment	44.57	34.47	19.83	19.83	5.94
FB 3238	2002.12.22		Chert	28.04	16.48	17.45	17.45	4.17
FB 10018	2002.14.8473	1803	Rhyolite					
FB 10018	2002.14.8475	2798	Chert					
FB 12648	1996.919.24403	FB12648-769-G762-259-0	Siltstone?	50.60	40.47	14.42	14.42	5.56
FB 12650	2003.7.1433		Chert					
FB 273	2004.11.814		Siltstone			13.28	13.28	6.90
FB 447	2004.11.668		Chalcedony					
FB 447	2004.11.672		Chert					
FB 10018	2002.14.8478	3178	Chert					
FB 49	2002.3.134	363/3552-2	Chert	32.24	15.23	14.41	14.43	4.79
FB 10018	2002.14.8471	4477	Chert					
FB 6720	2007.6.8	8	Chert					
FB 7183	2008.16.0101	4	Chert			20.76	20.76	5.31
FB 8612	2009-10-2	2-1	Unk	31.39	20.91	13.03	14.75	5.55
FB 9369	9369-G2453-259-01	ocn 332	Chert					4.33
FB 10018	2002.14.7595a	5141	Chert/Chalcedony			13.60	13.60	3.79
FB 9369	9369-G2605-259-01		Chert			18.68	18.68	5.58
FB 9697	1996.991.594	FB9697-G439-259-1	Rhyolite			20.43	20.43	6.58

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 9697	1996.991.599	FB9697-G438-259-1	Chert			20.53	25.56	5.80
FB 9697	1996.991.597	9697-G472-259-1	Chert					
FB 9697	1996.991.1462		Chert?			12.83	20.21	5.04
FB 9697	1996.991.1010	9697-G278-259-1	Chert			21.51	21.51	5.46
FB 10018	2002.14.8476	2904	Chert					
FB 5073	2008.1.8		Chert					
FB 18618	2008.25.78	1	Chert			20.59	20.59	6.26
FB 6281	1996.914.2927	212	Chert	36.34	27.22	14.98	14.98	4.16
FB 9339	2008.4.18		Chert	22.22	15.17	10.08	10.08	3.69
FB 9366	1996.564.2008	804	Chert	29.11	22.44	14.98	14.98	3.47
FB 6281	1996.914.2928	287	Rhyolite?			24.10	24.10	5.53
FB 16698	2000.5.274e		Chert	47.96	38.95	21.94	23.34	4.29
FB 6432	2001.5.2120	2	Rhyolite		22.25			5.30
FB 272	2010.3.47	2-1	Chert			16.87		5.15
FB 10042	2005.14.141	2-1	Chert		31.04	19.14	21.00	3.01
FB 17442	2006.02.003		Chert		48.22	24.76	24.76	5.18
FB 1579	2007.5.1	1	Chert	27.20	18.42	22.88	22.88	
FB 1579	2007.5.3	3	Chert	40.22	29.42			4.47
FB 1579	2007.5.24	1	Chert/Chalcedony	30.68	23.23	17.29	23.38	4.41
FB 6720	2007.6.2	2	Chert	44.86	34.82	24.09	26.57	5.07
FB 17278	2008.36.2074	92-1	Chert	37.60	27.42	21.78	21.78	4.91
FB 17278	2008.36.2127	98-1	Chert		37.57	25.99	25.99	5.42
FB 6271	2007.11.0031		Chert					3.95
FB 10017	2002.14.2790	1832	Chert	28.02	19.45	22.11	22.11	5.23
FB 1680	2001.7.305		Chert		47.90	30.38	30.38	5.92
FB 1587	2008.20.209	3000-0A000047D	Chert			30.37	30.37	5.93
FB 6271	2007.11.0028		Chert	31.59	22.43	17.97	17.97	5.12
FB 10035	2002.14.8890	474	Rhyolite	46.87	34.32	20.17	20.17	7.54
FB 12708	1996.919.36147	FB12-g553-259	Rhyolite	38.10	31.29	12.57	19.54	5.92
FB 6281	1996.914.2926	1092	Chert		16.19	15.97	15.97	3.02
FB 9554	2008.4.48		Chert	29.17	23.43	9.43		4.19
FB 7484	1996.725.314	7484-G20-259	Obsidian	23.49	13.59	12.61	12.61	4.70
FB 5000	5000-G186-259-1	1996.917.976	Chert	41.20	30.00	15.93	15.93	4.60
FB 16158	2008.26.0023		Chert	42.12	31.73	21.48	21.48	5.07

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 10039	2005.17.924	443-1	Agate?	33.40	22.58	11.14	13.41	7.27
FB 5000	1996.536.275	5000-G134-259	Chert		23.08	11.72	14.24	2.84
FB 6281	1996.914.2925	1098	Rhyolite	37.82	29.84	14.00		3.66
FB 5000	5000-G237-259	1996.917.317	Chert	20.29	13.89	16.34	16.34	4.50
FB 13597	2003.2.53		Chert			11.84	15.92	6.09
FB 9390	2008.4.37		Chert	39.42	29.35	12.46		6.84
FB 17157	2008.9.752	3000-0A000007C	Chert	28.90	21.61	8.09	13.10	3.68
FB 9426	2008.25.26	3	Chert			10.96		3.38
FB 17278	2008.36.2170	110-1	Chert					5.67
FB 7520	2009.26.0001	544	Chert			11.36	18.59	3.71
FB 6271	2007.11.0014		Chert		23.80	10.93	17.39	3.08
FB 6271	2007.11.0023		Chert	31.03	23.36	8.05		3.22
FB 1680	2001.7.294		Chert		25.24	11.13	16.50	2.96
FB 1680	2001.7.295		Chert		20.26	11.30	18.28	3.51
FB 1680	2001.7.297		Chert			10.71	17.49	4.08
FB 1680	2001.7.304		Chert			13.57		3.05
FB 5000	2009.19.004	4	Chert		25.24			3.23
FB 7484	1996.725.313	7484-G98-259	Chert	30.40	19.82	19.20	19.20	4.15
FB 6432	2001.5.2123	6	Chert	47.88	36.61	17.81	17.81	6.40
FB 7483	1996.724.448	7483-G2-259	Chert	29.11	21.18	9.59	9.59	3.46
FB 429	2002.11.173		Jasper			12.46	12.46	3.35
FB 7477	2005.15.102	4-1	Jasper	25.41	16.46	12.92	12.92	3.08
FB 6873	2007-28-0008	3	Chert	35.16	25.57	10.77	10.77	3.90
FB 10035	2002.14.8889	420	Chert		19.90	12.92	12.92	3.03
FB 7462	2003.2.31	41EP1070-01-259	Chert	32.91	20.44	20.84	20.84	5.24
FB 2790	2007.30.27	1	Jasper			17.41	17.41	3.48
FB 7520	2009.26.0022	561	Chert	24.06	12.71	12.02	12.02	4.87
FB 6271	2007.11.0029		Chert		21.28	17.17	17.17	5.00
FB 10017	2002.14.1932	1490	Chert		35.40	16.96	16.96	5.17
FB 10041	2005.17.1804	338-10	Obsidian	32.06	22.72	14.68	14.68	4.30
FB 6281	1996.914.2924	1093	Chert			18.41	18.41	4.34
FB 6281	1996.914.2929	934	Chert	27.52	16.71	17.73	17.73	4.89
FB 5000	5000-n1-259-1	1996.917.104	Siltstone	38.04	31.30	16.98	16.98	8.08
FB 6726			Chert	28.22	16.34	20.81	20.81	5.68
FB 6432	2001.5.2118	5	Chert	39.42	27.37	14.41	16.15	5.28
FB 6432	2001.5.2121	3	Obsidian	29.72	22.19	13.18	13.18	5.27
FB 6432	2001.5.2050	1601	Chert	37.57	28.88	13.80	16.55	5.21
FB 6432	2001.5.2051	719	Chert	29.04	21.86	20.73	20.73	5.16

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 6432	2001.5.2052	2850	Rhyolite	38.35	26.96	19.21	19.21	6.73
FB 447	2004.11.671		Chert			16.14	16.14	5.73
FB 272	2010.3.46	1-1	Quartz	23.95	19.68			4.37
FB 12705	2005.16.30	2	Obsidian			15.08	15.08	3.95
FB 1579	2007.5.2	2	Quartzite	46.49	31.78	22.89	22.89	7.10
FB 5073	2008.1.9		Chert	37.60	27.24	21.65	21.65	5.72
FB 17157	2008.9.750	3000-0A0000B1C	Chert			12.48	12.48	3.19
FB 9426	2008.25.09	6	Chert			24.17	24.17	5.61
FB 9426	2008.25.76	5	Chert					5.55
FB 17278	2008.36.1927	70-6	Chert			17.43	17.43	4.74
FB 17278	2008.36.2169	109-1	Obsidian	22.41	14.91	16.68	16.68	4.13
FB 6873	2007-28-0007	1	Chert			14.88	14.88	4.46
FB 6271	2007.11.0030		Chert	32.45	19.65	29.07	29.07	4.53
FB 10017	2002.14.2789	1311	Chert			14.44	17.78	4.88
FB 10017	2002.14.2791	1936	Chert	42.74	32.15	18.25	18.25	7.10
FB 10017	2002.14.2792	2251	Obsidian					
FB 10017	2002.14.9117	919	Silicified Sandstone		45.34	18.54	18.54	8.19
FB 10017	2002.14.9121	1034	Chert	39.59	27.50	19.29	19.29	6.46
FB 10017	2002.14.9163	4163	Unk	34.26	21.21			4.57
FB 10017	2002.14.9115	334	Cerro Toledo Rhyolite	39.88	31.82	18.38	18.38	5.02
FB 10035	2002.14.9122	127	Rancheria Chert?			24.45	24.45	7.98
FB 12708	1996.919.37379	FB12708-G621-259	Chert (Pedernal?)	47.62	32.34	28.45		6.54
FB 17339	2008.36.1509	13-1	Chert		34.17	18.41	18.41	5.25
FB 17339	2008.36.1619	112-1	Chert?	33.01	22.79	14.87	14.87	4.83
FB 12699	1996.919.33645	FB12699-G1104-259	Jasper	28.63	17.81	14.12	14.12	4.72
FB 5000	2009.19.001	1	Chert	35.30	23.94	20.04	20.04	4.02
FB 10039	2005.17.918	118-1	Rhyolite?	34.10	23.00	21.10	21.10	6.14
FB 10039	2005.17.920	301-1	Silicified Sediment	42.92	29.85	23.86	23.86	5.60
FB 10039	2005.17.925	715-3	Rhyolite?	59.12	44.87	30.98	30.98	8.55
FB 10039	2005.17.927	724-3	Fine Grained Basalt	69.83	55.44	29.18	29.18	6.54
FB 10041	2005.17.1802	281-1	Chert	38.32	24.80	22.93	22.93	5.98
FB 10041	2005.17.1803	292-9	Slate	57.85	43.74	19.73	19.73	5.77
FB 6281	1996.914.2923	1097	Chert	30.90	24.60	17.43	17.43	5.54
FB 5000	5000-G237-259-2	1996.917.500	Chert	33.20	23.99	19.84	19.84	5.81

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
FB 12710	1996.919.42669	FB12710-G388-259	Jasper?	27.73	12.67	12.85	12.85	6.60
FB 10039	2005.17.921	302-1	Quartzite	33.99	21.85			6.25
FB 10039	2005.17.922	303-1	Milky Quartz?	26.65	17.51	12.38	12.38	5.05
FB 9366	1996.564.1860	1168	Chert		20.28	13.50	13.50	3.58
FB 12648	12648-G2228-259-00	2286	Chert	50.26	40.40	16.19	14.30	7.24
FB 16698	2000.5.231b	2000.5.2.3a-aaa	Unk			18.38		6.49
FB 16698	2000.5.285d	2000.5.19.5a-s	Chert		26.46	16.46	21.29	5.30
FB 5000	5000-G217-259-1	1996.917.103	Chert			12.08	12.08	3.98
FB 5004	5004-N10-259-1	1996.917.760	Chert?			23.64	23.64	5.23
FB 235	2004.11.029		Rancheria Chert			12.11	14.64	4.05
FB 12705	2005.16.729	1	Obsidian	21.63	14.86	17.58	17.58	5.20
FB 2790	2007.30.28	2	Chert	26.71	16.01	15.54	15.54	6.06
FB 6873	2007-28-0002	2	Cerro Toledo Rhyolite	22.69	14.51	16.14	16.14	6.41
FB 7520	2009.26.0019	560	Chert	30.61	20.87	17.00	17.00	4.73
FB 7520	2009.26.0378	794	Cerro Toledo Rhyolite	19.83	23.60	12.83	12.83	4.41
FB 10017	2002.14.9116	692	Chert			14.98	20.98	5.60
FB 10017	2002.14.9120	1017	Chert					5.37
FB 10035	2002.14.9124	131	Rancheria Chert?			23.91	23.91	9.63
FB 12708	1996.919.37380	FB12708-G658-259	Chert (Jasper?)	49.45	42.32	10.81	10.81	6.20
FB 12699	1996.919.32514	FB12699-G864-259	Rhyolite		25.87			7.09
FB 10039	2005.17.926	722-3	Chert		29.75	15.60	15.60	5.34
FB 10039	2005.17.928	812-3	Chert					
FB 10041	2005.17.1800	118-1	Chert		21.61			4.39
FB 9554	2008.4.49		Chalcedony	18.80	9.56	6.93		2.41
AA:12:90	98-21-1		Chert	18.22	18.22	15.09		3.00
AA:12:90	98-21-3		Chert	8.75		17.76	17.76	4.68
AA:12:90	98-21-4		Limestone	28.83	26.83	19.36	19.36	5.38
AA:12:90	98-21-5		Rhyolite	28.06	25.76			3.69
AA:12:90	98-21-7		Rhyolite	23.32		15.68	20.53	4.09
AA:12:90	98-21-8		Rhyolite	27.21	18.35	14.83	18.22	5.23
AA:12:111	2008-796	795	Rhyolite	29.26		20.12	20.12	7.14
AA:12:111	2008-796	103	Rhyolite	56.60	45.13	22.72	22.72	8.11
AA:12:111	2008-796	528	Chalcedony	41.95	28.49	23.80	23.80	5.11
AA:12:111	2008-796	1129	Chalcedony	24.85	17.33	12.75	12.75	4.52
AA:12:111	2008-796	5395	Jasper	30.19	20.56	12.85	12.85	4.26
AA:12:111	2008-459-180	1813	Rhyolite	56.31	50.65	20.96	20.17	7.91

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
AA:12:111	2008-459-19	181	Rhyolite?	46.66	37.97	18.12	18.89	8.04
AA:12:111	2008-459-167	1677	Rhyolite	37.64	27.41	21.19	21.19	6.68
AA:12:111	2008-796	4851	Basalt	33.13		29.43	29.43	9.19
AA:12:90	98-21-9		Chert	26.88	20.82	13.73	14.67	3.42
AA:12:90	98-21-6		Rhyolite	15.67				5.40
AA:12:111	2008-796	313	Chert	31.58	21.75	15.64	15.64	4.37
AA:12:111	2008-796	507	Chert	35.75	23.51	15.75	15.75	4.35
BB:10:46	95-33-1		Rhyolite	42.39		24.88	24.88	7.84
BB:10:46	95-33-7		Rhyolite	61.58	53.94	23.61	23.61	9.43
BB:10:46	95-33-4		Chert	59.82	48.87	14.70	14.70	
BB:10:46	95-33-3		Rhyolite	19.11		27.08	27.08	7.87
BB:10:46	95-33-2		Rhyolite	40.96	29.80	22.47	24.98	9.30
AA:12:90	98-21-10		Dacite	57.74	46.12	21.06	22.45	6.65
AA:12:90	98-21-11		Andesite	37.81		19.81	19.81	5.39
AA:12:90	98-21-12		Fine Grained Basalt	31.55		20.45	20.45	6.39
AA:12:111	2008-459-190	1875	Rhyolite	69.90	57.40	21.24	21.24	9.20
AA:12:111	2008-459-79	842	Fine Grained Basalt	50.52	38.21	15.41	15.41	6.86
AA:12:111	2008-459-187	1855	Dacite	51.13	40.55	18.96	18.96	7.29
AA:12:111	2008-459-186	1850	Chert	47.81	36.84	17.13	17.13	7.34
AA:12:111	2008-459-145	1241	Meta-Sediment	50.00	42.33	16.30	16.30	9.26
AA:12:111	2008-459-25	240	Rhyolite	50.06	39.68	19.00	19.00	7.41
AA:12:111	2008-459-65	816	Chert	18.15		19.89	19.89	6.15
AA:12:111	2008-459-58	809	Dacite	43.63	33.69	18.16	18.16	6.79
AA:12:111	2008-459-161	1580	Rhyolite	40.89	32.68	19.50	19.50	5.48
AA:12:111	2008-459-134	1000	Rhyolite	51.33	41.34	19.43	19.43	6.76
AA:12:111	2008-459-106	887	Rhyolite	61.13	51.81	19.54	19.54	11.80
AA:12:111	2008-459-104	884	Dacite	64.57	52.62	20.75	20.75	6.23
AA:12:111	2008-459-103	883	Dacite	60.80	56.92	17.97	17.97	9.14
AA:12:111	2008-459-100	880	Dacite	54.92	47.01	18.04	18.04	10.83
AA:12:111	2008-459-99	879	Rhyolite	56.87	44.55	18.74	18.74	8.06
AA:12:111	2008-459-89	860	Dacite	55.40	43.98	19.65	19.65	8.32
AA:12:111	2008-459-83	848	Basalt	43.03	34.02	18.08	18.08	5.15
AA:12:111	2008-459-59	810	Dacite	55.90	43.37	17.40	17.40	7.19
AA:12:111	2008-459-80	843	Dacite	55.15	45.56	20.89	18.29	7.10
AA:12:111	2008-459-36	606	Dacite	49.94	39.11	19.27	19.27	7.61
AA:12:111	2008-459-22	198	Basalt	55.09	39.41	19.06	19.06	9.11

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
AA:12:111	2008-459-159	1554	Dacite	50.71	40.20	18.16	18.16	8.62
AA:12:111	2008-459-44	646	Basalt	12.74				
AA:12:111	2008-459-21	194	Rhyolite	36.98	27.59	17.01	17.01	6.78
AA:12:111	2008-459-14	40	Rhyolite	39.17	28.82	16.22	16.22	5.03
AA:12:111	2008-459-191	1881	Rhyolite	42.31	35.68	19.99	19.99	5.59
AA:12:111	2008-459-193	1895	Basalt	38.29	30.19	17.91	18.35	7.57
AA:12:111	2008-459-210	2173	Chert	69.08	51.54	30.43	30.43	10.40
AA:12:111	2008-459-211	2174	Andesite	64.56	50.53	24.51	24.51	11.04
AA:12:111	2008-459-137	1081	Dacite	27.81	17.94	22.48	22.48	5.32
AA:12:111	2008-459-198	1968	Rhyolite	35.97		20.20	20.20	5.73
AA:12:111	2008-459-175	1754	Rhyolite	26.77	21.26	21.86	21.86	5.45
AA:12:111	2008-459-55	784	Metasediment	44.34	38.36	19.38	20.34	7.32
AA:12:111	2008-459-54	782	Chert	52.69	37.12	31.05	31.05	8.62
AA:12:111	2008-459-46	668	Chalcedony	38.36	27.40	19.22	19.22	5.26
AA:12:111	2008-459-12	2	Dacite	33.90		23.97	23.97	6.65
AA:12:111	2008-459-47	669	Rhyolite	59.14	48.97	24.48	24.48	7.65
AA:12:111	2008-459-122	935	Rhyolite	33.64		16.85	16.85	6.79
AA:12:111	2008-459-29	294	Chert	39.56		18.37	18.37	7.78
AA:12:111	2008-459-56	789	Dacite	48.42	38.01	16.02	16.02	9.13
AA:12:111	2008-459-202	2060	Basalt	42.29	32.46	17.84	17.84	6.14
AA:12:111	2008-459-128	985	Dacite	34.73		18.38	18.38	7.44
AA:12:111	2008-459-148	1315	Rhyolite	34.74		17.86	17.86	6.50
AA:12:111	2008-459-150	1429	Basalt	49.37	37.12	19.57	19.57	7.47
AA:12:111	2008-459-160	1556	Chert	13.18				
AA:12:111	2008-459-136	1077	Dacite	43.32	32.89	17.18	17.18	5.83
AA:12:111	2008-459-179	1810	Basalt	21.88		19.29	19.29	5.42
AA:12:111	2008-459-182	1827	Basalt	40.75	26.34	17.96	17.96	6.09
AA:12:111	2008-459-184	1837	Dacite	31.51		18.71	18.71	7.10
AA:12:111	2008-459-185	1839	Dacite	46.75	35.42	19.56	19.56	8.14
AA:12:111	2008-459-192	1884	Rhyolite	63.41	53.85	18.20	17.53	9.76
AA:12:111	2008-459-189	1874	Andesite	53.83	41.05	16.31	16.31	6.39
AA:12:111	2008-459-197	1946	Dacite	52.68	45.12	21.03	21.03	6.24
AA:12:111	2008-459-199	2004	Quartz	43.60	37.71	16.96	16.96	7.05

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
AA:12:111	2008-459-205	2107	Quartzite	49.97	39.82	18.03	18.03	7.15
AA:12:111	2008-459-216	2236	Dacite	62.71	45.07	18.42	18.42	8.38
AA:12:111	2008	4776	Rhyolite	46.73	36.52	18.44	18.44	7.80
AA:12:111	2008	914	Rhyolite	37.84		18.21	18.21	8.37
AA:12:111	2008	4814	Basalt	34.38		21.63	21.63	9.60
AA:12:111	2008	4853	Rhyolite	49.78		22.53	22.53	6.23
AA:12:111	2008	542	Rhyolite	39.50	30.77	25.20	25.20	7.84
AA:12:111	2008	5593	Dacite	44.76	34.55	17.10	17.10	5.76
AA:12:111	2008	666	Rhyolite	60.27	49.64	17.06	17.06	6.40
AA:12:111	2008	2236	Rhyolite	60.17	51.68	23.63	23.63	6.86
AA:12:111	2008-796	3243	Basalt	59.61	51.22	21.54	21.54	5.63
AA:12:111	2008-796	6274	Basalt	32.60		18.53	18.53	7.25
AA:12:111	2008-796	1644	Agate	14.62				
AA:12:111	2008-796	1847	Basalt	41.69	31.05	21.16	21.16	9.94
AA:12:111	2008-796	1849	Dacite	23.83		22.05	22.05	5.78
AA:12:111	2008-796	2829	Dacite	44.15	34.26	20.40	20.40	8.16
AA:12:111	2008-796	2830	Basalt	37.67		18.89	18.89	8.34
AA:12:111	2008-796	5545	Rhyolite	33.41	26.49	15.51	15.51	4.79
AA:12:111	2008-796	5513	Rhyolite	41.25	33.28	17.12	17.12	6.06
AA:12:111	2008-796	5616	Dacite	53.27	34.84	19.26	19.26	7.28
AA:12:111	2008-796	5617	Sugar Quartz	49.32	31.19	18.85	18.85	7.22
AA:12:111	2008-796	5767	Rhyolite	37.46	24.59	16.78	16.78	5.88
AA:12:111	2008-796	3013	Dacite	22.29		22.32	22.32	5.95
AA:12:111	2008-796	2967	Rhyolite	23.56		22.88	22.88	5.42
AA:12:111	2008-796	3136	Basalt	48.72	39.53	20.86	20.86	5.94
AA:12:111	2008-796	2997	Rhyolite	11.02				
AA:12:111	2008-796	1355	Rhyolite	27.34		22.65	22.65	5.78
AA:12:111	2008-796	1347	Basalt	15.24		18.79	18.79	6.48
AA:12:111	2008-796	3095	Basalt	42.05		17.02	17.02	7.99
AA:12:111	2008-796	805	Quartzite	42.17	31.13	24.76	24.76	7.52
AA:12:111	2008-796	850	Basalt	9.08				3.57
AA:12:111	2008-796	795	Basalt	48.18	36.74	20.21	20.21	9.38
AA:12:111	2008-796	727	Basalt	26.44		19.71	19.71	5.14

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
AA:12:111	2008-796	790	Unk	33.82		19.57	19.57	6.92
AA:12:111	2008-796	716	Rhyolite	55.03	44.37	20.53	20.53	7.07
AA:12:111	2008-796	697	Rhyolite	54.98	45.16	22.63	22.63	7.70
AA:12:111	2008-796	619	Basalt	37.58		22.90	22.90	6.49
AA:12:111	2008-796	641	Rhyolite	24.10		16.62	19.07	8.99
AA:12:111	2008-796	622	Basalt	44.85		17.65	17.65	5.49
AA:12:111	2008-796	367	Rhyolite	54.67	41.04	18.75	18.75	9.21
AA:12:111	2008-796	452	Rhyolite	36.53	24.24	16.73	20.29	7.18
AA:12:111	2008-796	521	Metasediment	13.07				
AA:12:111	2008-796	577	Basalt	52.93	41.82	19.47	19.47	7.61
AA:12:111	2008-796	963	Dacite	13.25				
AA:12:111	2008-796	933	Metasediment	46.84	36.95	21.40	21.40	7.54
AA:12:111	2008-796	913	Basalt	49.07	36.26	24.41	24.41	6.31
AA:12:111	2008-796	1014	Quartz	25.76	16.86	14.71	22.92	7.53
AA:12:111	2008-796	1820	Dacite	32.66		17.95	17.95	8.44
AA:12:111	2008-796	1727	Rhyolite	22.87		22.64	22.64	7.63
AA:12:111	2008-796	1625	Rhyolite	30.07		22.79	22.79	8.06
AA:12:111	2008-796	1619	Dacite	37.20		26.73	26.73	8.74
AA:12:111	2008-796	2740	Rhyolite	38.31		26.25	26.25	10.22
AA:12:111	2008-796	2649	Basalt	57.25	45.44	21.03	21.03	7.31
AA:12:111	2008-796	4520a	Rhyolite	59.43	48.24	21.29	28.30	8.21
AA:12:111	2008-796	5484	Sugar Quartz	23.64		15.57	15.57	7.98
AA:12:111	2008-796	5137	Metasediment	42.02	28.44	19.11	19.11	5.80
AA:12:111	2008-796	5428	Dacite	16.47		19.56	19.56	5.69
AA:12:111	2008-796	5978	Dacite	36.17	31.81	21.44	21.44	6.24
AA:12:111	2008-796	6122	Metasediment	36.56	23.96	18.34	18.34	6.79
AA:12:111	2008-796	4692	Chert	28.71	15.83	14.48	14.48	6.63
AA:12:111	2008-796	1439	Dacite	28.57		23.64	23.64	5.88
AA:12:111	2008-796	5744	Chert	39.26	29.67	14.28	15.60	5.75
AA:12:111	2008-796	4513	Dacite	29.79		30.05	30.05	7.78
AA:12:111	2008-796	5468	Unk	36.50		17.38	17.38	7.03
AA:12:111	2008-796	5331	Dacite	25.61		31.55	31.55	6.84
AA:12:90	98-21-2		Rhyolite	24.83	24.83			3.85

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
AA:12:90	98-21-13		Fine Grained Basalt	38.06	31.94	19.44		6.32
AA:12:111	2008-459-32	420	Chert	30.11	21.00			8.38
AA:12:111	2008-459-183	1834	Jasper			21.52	21.52	4.48
AA:12:111	2008-796	2910	Rhyolite	41.54	39.54	18.92	18.92	7.22
AA:12:111	2008-796	1211	Rhyolite	32.67	24.52	16.66	16.66	5.75
AA:12:111	2008-796	947	Basalt	31.00	20.68	20.26	20.26	4.98
AA:12:111	2008-796	1015	Rhyolite	31.29	29.89	17.93	17.93	9.72
AA:12:111	2008-796	1138	Rhyolite	66.99	62.75	20.15	20.15	5.05
AA:12:111	2008-796	1789	Dacite	45.07		18.58	18.58	8.37
AA:12:111	2008-796	4520b	Rhyolite	31.16		23.36	23.36	9.34
AA:12:111	2008-796	3319	Basalt	46.24	46.24	22.70	22.70	6.69
AA:12:111	2008-796	5701	Dacite	34.61		30.72	30.72	7.00
AA:12:111	2008-796	3442	Quartzite	31.48	20.41	16.54	16.54	5.61
V:13:201	2001-21-13	218	Chert	8.18				
AA:12:91	2008-796	923a	Chert	10.73				
AA:12:746	98-136-23	380	Obsidian	29.41	24.13	13.99	15.68	3.96
AA:12:746	98-136-24	2519	Obsidian	19.99	19.79	11.17	14.10	3.85
AA:12:746	98-136-17	3788	Jasper	25.57	22.20	13.34	17.60	4.12
AA:12:91	2001-87-42	329	Rhyolite	39.17	29.00	18.72	22.59	4.84
AA:12:91	2001-87-52	525	Chet	129.20	106.58	52.90	57.74	10.78
AA:12:91	2001-87-56	525	Chert	68.61	54.08	37.75	39.15	8.61
AA:12:91	2001-87-57	525	Chert	72.78	60.46	47.57	49.22	6.69
AA:12:91	2001-87-68	525	Chert	31.91	28.92	22.00	22.00	4.65
AA:12:91	2001-87-74	525	Fine Grained Basalt	34.83	32.12	18.17	18.17	3.77
BB:13:6	97-26-12		Chalcedony	39.12	36.44	21.25	21.25	4.54
BB:13:6	97-26-13		Dacite	28.61	20.52	19.24	19.24	3.81
BB:13:6	97-26-14		Rhyolite	25.56		25.85	25.85	7.53
BB:13:6	97-26-15		Chert	36.95	26.39	13.33	15.36	5.44
BB:13:6	97-26-16		Chert	27.01	17.18	13.87	13.87	4.80
BB:13:6	97-26-17		Rhyolite	28.00	18.10	13.57	15.99	3.80
BB:13:6	97-26-18		Rhyolite	25.33	16.78	15.40	15.40	4.17
BB:13:6	2006-491-33	5850	Rhyolite	35.98	28.59	12.59	19.33	5.10
BB:13:6	2006-491-34	8953	Rhyolite	33.22	22.93			4.50
BB:13:6	2006-491-35	6247	Chert	36.18	25.41	14.85		4.08
BB:13:6	2006-491-36	6005	Basalt	36.14	32.96	22.47	22.47	4.89
BB:13:6	2006-491-37	5928	Rhyolite	31.14	26.70	15.08	18.21	4.18
EE:2:30	30-n100en6-25		Rhyolite	52.06	40.91	15.53	22.77	6.25
EE:2:30	30-n116e56-19		Chert	25.28		17.31	22.10	5.79

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
EE:2:30	30-2-23		Chert	36.24	34.64	16.41	21.01	4.02
EE:2:30	xxxxxxxx		Basalt	32.20	30.18	14.37	20.37	5.28
V:13:201	2001-21-1	135	Chert	95.18	79.48	51.36	51.36	5.95
V:13:201	2001-21-2	1402a	Chert	47.83	37.79	21.78	21.78	5.40
V:13:201	2001-21-3	1402b	Chalcedony	44.47	35.86	21.13	21.13	5.38
V:13:201	2001-21-5	1677	Chert	37.77	28.05	19.88	19.88	5.78
V:13:201	2001-21-7	60	Chert	24.23	16.33			4.80
AA:12:91	2008-796	923b	Dacite	43.55	40.04	24.38	24.38	4.19
AA:12:91	2008-796	1355	Chert	44.47	39.29	23.51	23.51	6.21
AA:12:91	20080796	1066	Chert	26.71	16.72	20.86	20.86	4.06
AA:12:91	2008-796	3669	Obsidian	31.21	25.50	18.61	18.61	4.44
AA:12:91	2008-796	3448	Rhyolite	39.41	36.29	20.94	20.94	5.65
AA:12:91	2008-796	3582	Chert	32.19	23.29	21.09	21.09	4.65
AA:12:91	2008-796	3778	Rhyolite	37.55	29.38	16.21	16.21	4.41
AA:12:91	2008-796	3981	Obsidian	23.16	23.16	22.80	22.80	3.27
AA:12:91	2008-796	3644	Rhyolite	37.01	26.98	17.14	21.74	6.71
AA:12:91	2008-796	448	Chert	46.51	34.97	21.66	21.66	6.04
AA:12:91	2008-796	425	Chalcedony	35.79	29.96	21.00	21.00	5.40
AA:12:91	2008-796	1406	Chert	27.63		21.01	21.01	4.19
AA:12:91	2008-796	1294	Andesite	30.68	21.82	19.83	19.83	5.85
AA:12:91	2008-796	1200	Rhyolite	46.48	36.11	19.02	21.66	5.76
AA:12:91	2008-796	4572	Dacite	38.34		33.55	33.55	7.65
AA:12:91	2008-796	4139	Chert	46.25	35.53	22.82	22.82	4.96
AA:12:91	2008-796	1440	Rhyolite	44.80	35.44	20.81	20.81	6.60
AA:12:91	2008-796	4536	Chert	59.57	45.20	26.11	26.11	8.62
AA:12:91	2008-796	1451	Rhyolite	31.17	25.30	15.45	15.45	4.35
AA:12:91	2008-796	1448	Chert	22.08	22.08	16.16	16.16	4.14
AA:12:91	2001-87	175	Andesite	59.95	47.59	21.87	21.87	5.54
AA:12:74 6	98-136-29	5564	Jasper Banded With Chalcedony	38.20		22.41		6.05
AA:12:48 6	94-85-3		Igneous	30.01	22.05	17.24	17.24	6.24
AA:12:48 6	94-85-4	79	Rhyolite	30.02	13.55	14.27	21.07	6.29
AA:12:48 6	94-85-5	22	Chert	55.28	37.90	17.94	19.30	6.80
AA:12:48 6	94-85-6	440	Quartzite	43.20	24.67	17.92	20.52	8.21
AA:12:48 6	94-85-7	336	Chert	37.57	24.24	15.67	19.14	8.08
BB:13:6	97-26-9		Chalcedony	48.94	32.30	21.20	24.22	7.63
EE:2:103	93-7-144	48	Rhyolite	41.09	31.76	17.43	17.43	7.08
AA:12:91	2008-796	3526	Rhyolite	37.83	28.44	15.76	16.33	6.50
AA:12:91	2008-796	81	Rhyolite	47.71	36.32	18.68	18.69	7.20
BB:13:425	98-136-222	5651	Rhyolite	31.80	22.21	15.15	18.59	4.97
AA:12:91	2008-796	3457	Jasper	29.76	22.56	15.26	15.26	5.14
AA:12:91	2008-796	655	Chert	28.91	21.75	18.14	18.14	5.61
AA:12:91	2001-87-44	114	Fine Grained Basalt	27.90		26.56	26.36	6.03
EE:2:62	93-7-24	10	Rhyolite	28.43	19.50	20.99	20.99	4.40
EE:2:103	93-7-141	45	Unk	42.94	30.79	29.60	29.60	7.16
EE:2:103	93-7-140		Chert	21.87	15.54	17.75	17.75	5.59
EE:2:103	93-7-142	46	Metasediment	37.82		30.10	30.10	6.66
AA:12:74 6	98-136-22	3791	Obsidian	40.55		13.78	16.48	5.32
AA:12:74	98-136-18	1816	Rhyolite	28.62	19.38	11.63	14.83	4.53

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
6								
AA:12:746	98-136-19	6532	Rhyolite	38.76	26.19	17.79	19.11	6.05
AA:12:746	98-136-20	2849	Rhyolite	63.38	40.28	17.23	22.34	6.43
AA:12:746	98-136-21	2744	Rhyolite	58.31	46.90	23.20	25.03	6.05
BB:13:425	98-136-229	5154	Fine Grained Basalt	50.77	30.24	13.11	15.31	4.29
BB:13:425	98-136-230	4903	Fine Grained Basalt	47.28	33.00	16.07	17.31	5.69
BB:13:425	98-136-231	4377	Crystal Quartz	20.88	17.76	10.95	15.94	
BB:13:425	98-136-227	5509	Fine Grained Basalt	45.40	34.34	13.77	16.91	5.07
BB:13:425	98-136-228	4837	Rhyolite	51.00	37.80	18.57	26.12	4.96
BB:13:425	98-136-221	4965	Rhyolite	34.92		15.84	19.31	4.67
AA:12:91	2001-87-41	230	Rhyolite	28.57	20.48	11.40	16.68	5.46
AA:12:91	2001-87-43	529	Chert	29.62	24.20	12.59	18.00	5.38
AA:12:91	2001-87-47		Rhyolite	49.65	39.82	20.49	22.13	7.80
AA:12:91	2001-87-73	525	Chert	32.39	26.09	15.93	15.93	4.89
AA:12:91	2001-87-80	525	Chert	23.70	14.95	13.57	13.57	3.15
BB:13:15	85-35-48	22	Jasper	30.99	27.31	17.63		6.05
AA:12:486	94-85-1	13	Rhyolite	39.38	28.63	15.11	20.49	5.16
BB:13:6	97-26-19		Dacite	27.10	16.60	8.68	14.98	
BB:13:6	97-26-20		Chalcedony	19.69	12.01	8.62	13.41	4.61
AA:12:91	2008-796	3095	Rhyolite	43.33	37.17	24.80	24.80	5.23
AA:12:91	2008-769	39	Obsidian	22.30	16.63	15.65	15.65	4.33
AA:12:91	2008-796	4304	Rhyolite	37.78	26.12	12.38	21.47	6.20
EE:2:30	30-11-34		Rhyolite	20.96		13.70	19.44	4.51
EE:2:30	30-6-11		Andesite	40.65	31.81	15.67		6.45
EE:2:137	137-e5-16		Chert	30.38	21.10	15.36	15.36	4.07
EE:2:137	137-w2-19		Chert	25.42	16.56	10.14	14.61	4.29
EE:2:103	93-7-137	41	Chalcedony	22.22	13.50	11.68	18.12	4.19
EE:2:103	93-7-139		Chert	22.26	13.89			4.38
EE:2:103	93-7-138		Chert	25.10	17.73	12.30	16.27	5.21
AA:12:91	2008-796	4272	Chalcedony	22.32	20.00	9.11	13.77	3.35
AA:12:91	2008-796	3729	Chert	24.32	16.25	14.45	14.45	4.53
AA:12:91	2008-796	3747	Rhyolite	26.06	16.76	19.29	19.29	
AA:12:91	2008-796	3119	Chert	39.96	38.04	13.28	18.42	5.20
AA:12:91	2008-796	3960	Rhyolite	18.43		13.29	13.29	3.73
AA:12:91	2008-796	3642	Dacite	35.21	23.77	11.08	19.24	6.16
AA:12:91	2008-796	3939	Jasper	23.11	11.86	13.24	13.24	4.97
AA:12:91	2008-796	300	Rhyolite	29.18	20.55	12.91	12.91	5.67
AA:12:91	2008-796	934	Dacite	32.83	27.28	19.72	19.72	5.19
AA:12:91	2008-796	3346	Rhyolite	34.34	29.64	7.26	18.86	5.64
AA:12:91	2008-796	3259	Jasper	44.07	31.46	19.59	19.59	4.48
AA:12:91	2008-796	4175	Basalt	39.73	27.70	24.21	24.21	5.27
AA:12:91	2008-796	4177	Daciite	41.80	39.36	13.81	22.25	4.06
V:13:201	2001-21-6	713	Chert	28.95	23.01	13.98	13.98	6.38
AA:12:746	98-136-30	3787	Andesite	56.22	39.75	29.67	31.11	8.81
BB:13:425	98-136-225	4925	Rhyolite	33.96	23.98	18.22	18.22	6.82
EE:2:103	93-7-136		Chert	20.84		14.17	16.74	3.43
AA:12:91	2001-87-61	525	Obsidian	40.53	27.23	26.85	28.98	5.78
AA:12:74	98-136-25	2094	Rhyolite	60.56	49.70	19.63	21.90	6.97

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
6								
AA:12:746	98-136-26	1636	Chert	64.07	53.29	22.22	22.38	5.89
AA:12:746	98-136-27	2349	Rhyolite	72.39	61.32	27.51	28.33	7.48
AA:12:746	98-136-28	1226	Andesite	43.33		29.33	30.92	8.02
BB:13:425	98-136-226	4902	Rhyolite	39.84		21.11	21.11	6.95
BB:13:425	98-136-223	4571	Fine Grained Basalt	25.93	16.99	15.88	15.88	4.24
BB:13:425	98-136-224	6492	Andesite	40.36	25.15	31.05	34.66	9.64
AA:12:91	2001-87-37	460	Chert	31.85	21.86	18.84	20.56	4.63
AA:12:91	2001-87-38	593	Chert	37.83	28.66	16.91	18.02	4.41
AA:12:91	2001-87-39	280	Chert	41.50	32.69	19.86	20.81	5.21
AA:12:91	2001-87-40	209	Igneous	66.39	52.92	27.24	27.24	6.63
AA:12:91	2001-87-45	513	Quartzite	46.45	33.26	22.59	27.79	8.75
AA:12:91	2001-87-46	438	Rhyolite	33.01	23.94	21.97	24.20	6.03
AA:12:91	2001-87-53	525	Rhyolite	69.71	54.12	25.98	25.98	6.22
AA:12:91	2001-87-54	525	Igneous	67.33	55.87	26.62	26.62	6.66
AA:12:91	2001-87-55	525	Chert	97.25	76.56	42.69	42.69	8.24
AA:12:91	2001-87-58	525	Fine Grained Basalt	50.31	36.91	25.65	29.39	8.08
BB:13:15	85-35-49	10	Quartz	24.99	19.72	16.36	16.36	5.45
AA:12:486	94-85-2	10	Rhyolite	44.98	33.22	25.86	27.84	7.94
BB:13:6	97-26-10		Meta-Sediment	45.56	35.10	24.88	27.12	6.51
BB:13:6	97-26-11		Fine Grained Basalt	26.57		15.68	19.34	6.00
EE:2:30	30-11-62		Rhyolite	44.26	34.68	21.98	21.98	
EE:2:30	30-17-24		Rhyolite	33.43		25.28	25.28	7.28
EE:2:30	30-1-9		Quartzite	22.32		25.48	25.48	6.39
EE:2:137	137-e5-22		Rhyolite	35.70		22.10	22.10	6.24
EE:2:137	137-b2-1		Chert	43.30	35.65	16.88	16.88	5.45
EE:2:137	137-3to4n-5		Rhyolite	30.27	23.81	13.12	20.10	5.57
EE:2:62	80-86-99		Quartz	30.36	13.14	13.81	17.81	6.61
EE:2:62	93-7-25		Rhyolite	47.13	34.75	19.17	19.17	6.76
EE:2:103	93-7-143		Dacite	57.13	45.14	19.54	19.54	6.27
EE:2:103	93-7-145		Chert	35.02		17.56	16.65	7.90
AA:12:91	2008-796	3382	Dacite	50.73		35.62	35.62	7.36
AA:12:91	2008-796	3542	Rhyolite	44.94		26.53	26.53	6.79
AA:12:91	2008-796	4257	Rhyolite	39.68		26.46	26.46	8.79
AA:12:91	2008-796	3925	Rhyolite	67.01	57.46	23.24	23.24	8.83
AA:12:91	2008-796	3643	Chert	29.22		20.14	20.14	6.17
AA:12:91	2008-796	1383	Rhyolite	44.59	33.99	18.67	18.67	6.78
AA:12:91	2008-796	1290	Basalt	48.28		24.90	24.90	7.46
AA:12:91	2008-796	3094	Chert	38.01	29.82	21.18	21.18	8.12
AA:12:91	2008-796	4051	Rhyolite	39.13	31.56	17.39	17.39	4.64
AA:12:91	2001-87	249	Rhyolite	59.07	47.66	17.03	17.03	9.47
AA:12:91	2001-87	398	Rhyolite	23.00			18.72	
AA:12:91	2001-87	283	Obsidian	23.27	13.60	16.16	16.16	3.42
AA:12:91	2001-87	1163	Quartz	39.00	32.38	14.26	14.26	7.66
AA:12:91	2001-87	7	Rhyolite	60.90	47.41	29.59	29.59	7.95
AA:12:746	98-136-32	1508	Jasper					7.43
AA:12:746	98-136-33	2293	Fine Grained Basalt					3.66

Site Number	Museum Number	Specimen Number	Raw Material	Total Length (mm)	Blade Length (mm)	Blade Width (mm)	Total Width (mm)	Blade Thickness (mm)
V:13:201	2001-21-4	1401	Sugar Quartz	26.46		21.79	21.79	5.35
V:13:201	2001-21-9	119	Chert	9.61				
V:13:201	2001-21-11	1012	Chalcedony	10.25				
V:13:201	2001-21-12	950	Chert	14.09				
AA:12:91	2008-796	3724	Rhyolite	15.22				
AA:12:91	2008-796	4260	Chert	22.32	15.76	7.79	7.79	5.12
AA:12:91	2008-796	4144	Rhyolite	40.34	26.70	19.86	20.39	9.64
AA:12:91	2008-796	4176	Jasper	52.45	48.30	24.71	24.71	6.21

Appendix C

Moderate Visibility Attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
AA:12:746	98-136-22	3791	2.61	none	no
AA:12:746	98-136-23	380	1.94	none	no
AA:12:746	98-136-24	2519	1.70	none	no
AA:12:746	98-136-25	2094	4.78	none	no
AA:12:746	98-136-26	1636	4.94	none	no
AA:12:746	98-136-27	2349	3.81	parallel	no
AA:12:746	98-136-28	1226		none	no
AA:12:746	98-136-29	5564		none	no
AA:12:746	98-136-30	3787	4.75	none	no
AA:12:746	98-136-17	3788	2.06	parallel	no
AA:12:746	98-136-18	1816	3.16	none	no
AA:12:746	98-136-19	6532	3.87	none	yes
AA:12:746	98-136-20	2849	3.76	none	yes
AA:12:746	98-136-21	2744	4.74	none	yes
BB:13:425	98-136-229	5154	4.03		no
BB:13:425	98-136-230	4903	3.57		yes
BB:13:425	98-136-231	4377	2.11	parallel	yes
BB:13:425	98-136-225	4925	5.08	none	no
BB:13:425	98-136-226	4902			no
BB:13:425	98-136-227	5509	3.82	none	no
BB:13:425	98-136-228	4837	3.24		yes
BB:13:425	98-136-221	4965		none	no
BB:13:425	98-136-222	5651	2.61		no
BB:13:425	98-136-223	4571	2.81	none	no
BB:13:425	98-136-224	6492	4.69	none	no
AA:12:91	2001-87-37	460	3.28	none	no
AA:12:746	98-136-32	1508	3.57		no
AA:12:746	98-136-33	2293	2.52	none	yes
AA:12:91	2001-87-38	593	3.17	none	no
AA:12:91	2001-87-39	280	3.02	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
AA:12:91	2001-87-40	209	4.06	none	no
AA:12:91	2001-87-41	230	3.54	none	no
AA:12:91	2001-87-42	329	1.97	none	yes
AA:12:91	2001-87-43	529	1.91	none	yes
AA:12:91	2001-87-44	114		none	no
AA:12:91	2001-87-45	513	4.73	none	no
AA:12:91	2001-87-46	438	3.28	none	no
AA:12:91	2001-87-47		4.17	none	yes
AA:12:91	2001-87-52	525	4.41	none	no
AA:12:91	2001-87-53	525	3.64	none	yes
AA:12:91	2001-87-54	525	3.59	none	no
AA:12:91	2001-87-55	525	4.00	none	no
AA:12:91	2001-87-56	525	5.88	none	yes
AA:12:91	2001-87-57	525	4.47	none	no
AA:12:91	2001-87-58	525	5.43	none	no
AA:12:91	2001-87-61	525	3.11	none	no
AA:12:91	2001-87-68	525	2.48	none	no
AA:12:91	2001-87-73	525	2.40	none	no
AA:12:91	2001-87-74	525	2.34	parallel	yes
AA:12:91	2001-87-80	525	1.55	none	yes
BB:10:46	95-33-1			none	no
BB:10:46	95-33-7		5.17	parallel	no
BB:10:46	95-33-4				no
BB:10:46	95-33-3				no
BB:10:46	95-33-2		6.17	none	no
AA:12:90	98-21-1		1.82	none	yes
AA:12:90	98-21-2		2.91		no
AA:12:90	98-21-3				yes
AA:12:90	98-21-4		3.63	none	no
AA:12:90	98-21-5		3.09	none	no
AA:12:90	98-21-6				no
AA:12:90	98-21-7		2.64	none	no
AA:12:90	98-21-8		2.85	none	no
AA:12:90	98-21-9		3.24		yes
AA:12:90	98-21-10		4.61	none	no
AA:12:90	98-21-11		4.40		no
AA:12:90	98-21-12			none	no
AA:12:90	98-21-13		4.54	none	no
BB:13:15	85-35-49	10	3.02	parellel	no
BB:13:15	85-35-48	22	3.92		yes

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
AA:12:486	94-85-1	13	2.70		yes
AA:12:486	94-85-2	10	3.91		no
AA:12:486	94-85-3		2.58		no
AA:12:486	94-85-4	79	4.10	none	no
AA:12:486	94-85-5	22	4.08		no
AA:12:486	94-85-6	440	4.28		no
AA:12:486	94-85-7	336	4.51	none	yes
BB:13:6	97-26-9		3.76	none	no
BB:13:6	97-26-10		2.91		no
BB:13:6	97-26-11		5.25	none	no
BB:13:6	97-26-12		3.32	none	no
BB:13:6	97-26-13		2.96	none	no
BB:13:6	97-26-14			none	no
BB:13:6	97-26-15		2.98	none	no
BB:13:6	97-26-16		3.42	none	no
BB:13:6	97-26-17		2.74	none	no
BB:13:6	97-26-18		3.40	none	no
BB:13:6	97-26-19			none	no
BB:13:6	97-26-20		3.51	none	yes
AA:12:111	2008-459-190	1875	4.23	none	yes
AA:12:111	2008-459-79	842	4.97		no
AA:12:111	2008-459-187	1855	5.21		yes
AA:12:111	2008-459-186	1850	5.58		yes
AA:12:111	2008-459-145	1241	5.78	none	yes
AA:12:111	2008-459-25	240	6.15		yes
AA:12:111	2008-459-65	816			no
AA:12:111	2008-459-58	809	5.07	none	yes
AA:12:111	2008-459-161	1580	4.73		yes
AA:12:111	2008-459-134	1000	4.77		no
AA:12:111	2008-459-106	887	5.48		no
AA:12:111	2008-459-104	884	4.99		yes
AA:12:111	2008-459-103	883	4.61		yes
AA:12:111	2008-459-100	880	4.57		no
AA:12:111	2008-459-99	879	5.28		no
AA:12:111	2008-459-89	860	5.18		yes
AA:12:111	2008-459-83	848	5.72		no
AA:12:111	2008-459-59	810	4.70		no
AA:12:111	2008-459-80	843	6.30		yes
AA:12:111	2008-459-36	606	7.25		yes
AA:12:111	2008-459-22	198	6.12		yes

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
AA:12:111	2008-459-159	1554	6.92		no
AA:12:111	2008-459-44	646			no
AA:12:111	2008-459-21	194	5.32		no
AA:12:111	2008-459-14	40	4.86		no
AA:12:111	2008-459-180	1813	4.21		no
AA:12:111	2008-459-32	420	4.19		no
AA:12:111	2008-459-19	181	5.10		no
AA:12:111	2008-459-183	1834			no
AA:12:111	2008-459-167	1677	5.03		no
AA:12:111	2008-459-191	1881	4.92		no
AA:12:111	2008-459-193	1895	6.00		no
AA:12:111	2008-459-210	2173	6.17		no
AA:12:111	2008-459-211	2174	5.59		no
AA:12:111	2008-459-137	1081	3.67		no
AA:12:111	2008-459-198	1968			yes
AA:12:111	2008-459-175	1754	4.91		no
AA:12:111	2008-459-55	784	4.05		yes
AA:12:111	2008-459-54	782	3.96		no
AA:12:111	2008-459-46	668	4.40		no
AA:12:111	2008-459-12	2	5.12		no
AA:12:111	2008-459-47	669	5.51		yes
AA:12:111	2008-459-122	935			yes
AA:12:111	2008-459-29	294			no
AA:12:111	2008-459-56	789	6.48		yes
AA:12:111	2008-459-202	2060	5.63		no
AA:12:111	2008-459-128	985			no
AA:12:111	2008-459-148	1315			no
AA:12:111	2008-459-150	1429	5.18		no
AA:12:111	2008-459-160	1556			no
AA:12:111	2008-459-136	1077	4.58		no
AA:12:111	2008-459-179	1810			no
AA:12:111	2008-459-182	1827	4.77		no
AA:12:111	2008-459-184	1837			yes
AA:12:111	2008-459-185	1839	5.44		yes
AA:12:111	2008-459-192	1884	4.58		yes
AA:12:111	2008-459-189	1874	5.09		yes
AA:12:111	2008-459-197	1946	4.84		no
AA:12:111	2008-459-199	2004	5.23		yes
AA:12:111	2008-459-205	2107	4.14		no
AA:12:111	2008-459-216	2236	4.70		yes

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
AA:12:111	2008	4776	5.34		yes
AA:12:111	2008	914			no
AA:12:111	2008	4814			no
AA:12:111	2008	4853	6.12		no
AA:12:91	2008-796	3095	3.89		yes
AA:12:111	2008	542	4.71		yes
AA:12:91	2008-769	39	2.44		no
AA:12:111	2008	5593	4.59		yes
AA:12:91	2008-796	4304	4.29		yes
AA:12:111	2008	666	4.52		yes
AA:12:111	2008	2236	4.43		yes
BB:13:6	2006-491-33	5850	3.02		no
BB:13:6	2006-491-34	8953	3.04		no
BB:13:6	2006-491-35	6247	2.53		no
BB:13:6	2006-491-36	6005	3.11		no
BB:13:6	2006-491-37	5928	3.29		no
EE:2:30	30-n100en6-25		2.68		no
EE:2:30	30-n116e56-19				yes
EE:2:30	30-11-34				no
EE:2:30	30-6-11		3.99		no
EE:2:30	30-11-62				no
EE:2:30	30-2-23		3.61		no
EE:2:30	xxxxxxxx		4.32		no
EE:2:30	30-17-24				no
EE:2:30	30-1-9				no
EE:2:137	137-e5-22				no
EE:2:137	137-b2-1		2.31		no
EE:2:137	137-3to4n-5		2.44		no
EE:2:137	137-e5-16		2.74		yes
EE:2:137	137-w2-19		3.06		yes
EE:2:62	80-86-99		5.51		no
EE:2:62	93-7-25		3.96		no
EE:2:62	93-7-24	10	2.63		yes
EE:2:103	93-7-137	41	3.86		no
EE:2:103	93-7-141	45	5.84		yes
EE:2:103	93-7-143		4.98		no
EE:2:103	93-7-136		2.70		no
EE:2:103	93-7-140		4.37		no
EE:2:103	93-7-142	46			no
EE:2:103	93-7-139		3.20		no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
EE:2:103	93-7-145				yes
EE:2:103	93-7-138		3.58		yes
EE:2:103	93-7-144	48	3.42		no
V:13:201	2001-21-1	135	4.81		no
V:13:201	2001-21-2	1402a	4.16		no
V:13:201	2001-21-3	1402b	2.80		no
V:13:201	2001-21-4	1401			no
V:13:201	2001-21-5	1677	2.96		no
V:13:201	2001-21-6	713	3.69		no
V:13:201	2001-21-7	60	4.42		no
V:13:201	2001-21-9	119			no
V:13:201	2001-21-11	1012			no
V:13:201	2001-21-12	950			no
V:13:201	2001-21-13	218			no
AA:12:111	2008-796	4851			no
AA:12:111	2008-796	3243	3.90		yes
AA:12:111	2008-796	6274			no
AA:12:111	2008-796	1644			no
AA:12:111	2008-796	1847	6.45		no
AA:12:111	2008-796	1849			no
AA:12:111	2008-796	2829	6.87		no
AA:12:111	2008-796	2830			no
AA:12:111	2008-796	5545	3.71		no
AA:12:111	2008-796	5513	4.40		no
AA:12:111	2008-796	5616	4.65		no
AA:12:111	2008-796	5617	4.37		yes
AA:12:111	2008-796	5767	4.98		no
AA:12:111	2008-796	3013			no
AA:12:111	2008-796	2967			no
AA:12:111	2008-796	2910	3.41		no
AA:12:111	2008-796	3136	4.79		no
AA:12:111	2008-796	2997			no
AA:12:111	2008-796	1211	3.60		no
AA:12:111	2008-796	1355			no
AA:12:111	2008-796	1347			no
AA:12:111	2008-796	3095	5.63		no
AA:12:111	2008-796	805	4.98		no
AA:12:111	2008-796	850			no
AA:12:111	2008-796	795			no
AA:12:111	2008-796	795	3.68		yes

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
AA:12:111	2008-796	727			no
AA:12:111	2008-796	790	7.78		no
AA:12:111	2008-796	716	4.40		yes
AA:12:111	2008-796	697	3.85		no
AA:12:111	2008-796	619			yes
AA:12:111	2008-796	641			no
AA:12:111	2008-796	622	4.45		no
AA:12:111	2008-796	313	2.71		yes
AA:12:111	2008-796	367	4.65		no
AA:12:111	2008-796	452	3.67		no
AA:12:111	2008-796	103	4.25		yes
AA:12:91	2008-796	923a			no
AA:12:91	2008-796	923b	4.34		yes
AA:12:91	2008-796	1355	4.25		no
AA:12:91	20080796	1066			no
AA:12:91	2008-796	3382			no
AA:12:91	2008-796	3542	4.70		no
AA:12:91	2008-796	3724			no
AA:12:91	2008-796	4272	2.62		no
AA:12:91	2008-796	3669	3.34		no
AA:12:91	2008-796	3729	3.22		yes
AA:12:91	2008-796	3526	3.94		no
AA:12:91	2008-796	3747			yes
AA:12:91	2008-796	3119	3.73		yes
AA:12:91	2008-796	3448	3.78		yes
AA:12:91	2008-796	4260	3.45		no
AA:12:91	2008-796	4257			no
AA:12:91	2008-796	3582	3.09		no
AA:12:91	2008-796	3457	3.79		no
AA:12:91	2008-796	3778	4.04		no
AA:12:91	2008-796	81	5.02		no
AA:12:91	2008-796	3925	4.83		yes
AA:12:91	2008-796	3960			yes
AA:12:91	2008-796	3981	2.28		no
AA:12:91	2008-796	3642	4.53		no
AA:12:91	2008-796	3643			no
AA:12:91	2008-796	3644	3.57		yes
AA:12:91	2008-796	3939	3.27		no
AA:12:91	2008-796	300	2.56		yes
AA:12:91	2008-796	934	3.94		yes

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
AA:12:91	2008-796	448	2.88		no
AA:12:91	2008-796	425	3.64		yes
AA:12:91	2008-796	1383	5.15		no
AA:12:91	2008-796	1290	5.41		no
AA:12:91	2008-796	655	4.17		no
AA:12:91	2008-796	1406			no
AA:12:91	2008-796	1294	3.42		no
AA:12:91	2008-796	1200	4.83		no
AA:12:91	2008-796	3346	2.84		no
AA:12:91	2008-796	3259	2.86		yes
AA:12:91	2008-796	3094	6.45		no
AA:12:91	2008-796	4572			no
AA:12:91	2008-796	4144	3.59		no
AA:12:91	2008-796	4139	3.68		no
AA:12:91	2008-796	4051	2.71		no
AA:12:91	2008-796	1440	4.30		yes
AA:12:91	2008-796	4536	4.21		yes
AA:12:91	2008-796	4176	4.36		no
AA:12:91	2008-796	1451	3.10		yes
AA:12:91	2008-796	4175	3.13		no
AA:12:91	2008-796	4177	2.60		yes
AA:12:91	2008-796	1448	1.96		yes
AA:12:111	2008-796	521			no
AA:12:111	2008-796	507	3.70		yes
AA:12:111	2008-796	577	3.79		no
AA:12:111	2008-796	528	3.55		no
AA:12:111	2008-796	947	4.01		no
AA:12:111	2008-796	963			no
AA:12:111	2008-796	933	2.93		no
AA:12:111	2008-796	913	3.31		no
AA:12:111	2008-796	1015	5.29		no
AA:12:111	2008-796	1129	3.41		no
AA:12:111	2008-796	1014	5.59		no
AA:12:111	2008-796	1138	4.28		yes
AA:12:111	2008-796	1789			no
AA:12:111	2008-796	1820			no
AA:12:111	2008-796	1727			no
AA:12:111	2008-796	1625			no
AA:12:111	2008-796	1619			no
AA:12:111	2008-796	2740			no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
AA:12:111	2008-796	2649	5.12		no
AA:12:111	2008-796	4520a	4.60		yes
AA:12:111	2008-796	4520b			no
AA:12:111	2008-796	3319	3.29		yes
AA:12:111	2008-796	5484			no
AA:12:111	2008-796	5137	3.90		no
AA:12:111	2008-796	5428			no
AA:12:111	2008-796	5978	4.32		no
AA:12:111	2008-796	6122	4.80		no
AA:12:111	2008-796	5701			no
AA:12:111	2008-796	4692	5.95		no
AA:12:111	2008-796	1439			no
AA:12:111	2008-796	3442	3.71		no
AA:12:111	2008-796	5744	3.79		no
AA:12:111	2008-796	4513			yes
AA:12:111	2008-796	5468			no
AA:12:111	2008-796	5331			no
AA:12:111	2008-796	5395	3.17		no
AA:12:91	2001-87	249	6.09		no
AA:12:91	2001-87	398			no
AA:12:91	2001-87	283	2.49		no
AA:12:91	2001-87	1163	4.60		no
AA:12:91	2001-87	7	5.25		no
AA:12:91	2001-87	175	3.24		no
D:07:0151	6413-xx	321	3.09		no
D:07:0151	6413-487	3536			no
D:07:0151	6413-487	3540			no
D:07:0151	6413-328	328			no
D:07:0151	3130-357	4023			no
D:07:0151	3130-474				no
D:07:0152	1131-187	30	3.57		no
D:07:0152	1131-xx	273	2.60		no
D:07:0152	1131-xx	160	3.45	parellel	no
D:07:0152	1131-xx	44	2.89		no
D:07:0152	1131-xx	150	2.64		no
D:07:0152	1131-xx	42	2.36		no
D:07:0152	1131-41	158			no
D:07:0152	1131-41	846			no
D:07:0152	1131-xx	211			no
D:07:0152	1131-xx	54	3.00	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
D:07:0152	1131-xx	201	3.53		no
D:07:0152	1131-xx	55	2.79		no
D:07:0152	1131-xx	4	4.04		no
D:07:0152	1131-xx	92	2.90		no
D:07:0152	1131-xx	144	3.49		no
D:07:0152	1131-xx	130	3.38		no
D:07:0152	1131-xx	115		parallel	no
D:07:0152	1131-xx	264	2.93		no
D:07:0152	1131-xx	53	3.04		no
D:07:0152	1131-212	5?			no
D:07:0152	1131-312	5	2.22		no
D:07:0152	1131-172				no
D:07:0152	1131-211	28	2.76		no
D:07:0152	1131-31	11	3.27		no
D:07:0152	1131-91	73			no
D:07:0152	1131-118	64			no
D:07:0152	1131-193	152	3.60		no
D:07:0152	1131-87	149			no
D:07:0152	1131-xx	40			no
D:07:0152	1131-127	18	3.62		no
D:07:0152	1131-137	72	4.79	parallel	no
D:07:0152	1131-231	27	3.44	none	no
D:07:0152	1131-107,97	x	2.86	none	no
D:07:0152	1131-107,97	xx	2.78	parallel	no
D:07:0152	1131-107,97	xxx	3.51	none	no
D:07:0152	1131-107,97	xxxx	2.95	parallel	no
D:07:0236	2792-323			parallel	no
D:07:0236	2792-274		5.26	none	no
D:07:0236	2792-233	2189	3.74	none	no
D:07:0236	2792-421			none	no
D:07:0236	2792-593				no
D:07:0236	2792-627B			none	no
D:07:0236	2792-756		2.86	none	no
D:07:0236	2792-464			parallel	no
D:07:0236	6805	x	2.43	parallel	no
D:07:0236	6805	xx			no
D:07:0236	6805	xxx			no
D:07:0236	2290-88		3.24	none	no
D:07:0239	3140-273			none	no
D:07:0239	3140-248		3.47	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
D:07:0239	3140-301		3.48	none	no
D:07:0239	3140-224			none	no
D:07:0239	3140-238		3.75	none	no
D:07:0239	3140-287		3.03	none	no
D:07:0239	3140-336		3.98	none	no
D:07:0239	3140-255		4.76	none	no
D:07:0239	3141-63		3.44		no
D:07:0239	3141-46		3.55	none	no
D:07:0239	3141-97		4.27	none	no
D:07:0239	3141-80			parallel	no
D:07:0239	3141-60		4.22		no
D:07:0239	3141-92				no
D:07:0239	3141-31			parallel	no
D:07:0239	3141-64		3.09	none	no
D:07:0254	3551-2			none	no
D:07:0254	3551-185		3.32	none	no
D:07:0254	3551-103		3.18	none	no
D:07:0254	3551-280			none	yes
D:07:0254	3551-209				no
D:07:0254	3551-121			parallel	no
D:07:1108	2464-261		3.48	none	no
D:07:1108	2462-265		3.42	none	no
D:07:3003	3314-1038		3.73		no
D:07:3003	3315-1714			none	no
D:07:3003	3316-1508		2.23		no
D:07:3003	3316-1803				no
D:07:3003	3317-2234		4.03	parallel	yes
D:07:3003	3318-115		3.29	none	no
D:07:3003	3318-3076				no
D:07:3013	3330-334		4.40		no
D:07:3013	3330-246		3.94	none	no
D:07:3013	3330-xxx		3.58	none	no
D:07:3013	3330-305		3.64	parallel	no
D:07:3013	3330-332				no
D:07:3013	3330-289		3.20	none	no
D:07:3017	3340-458		4.00	none	no
D:07:3017	3340-211				no
D:07:3017	3340-48				no
D:07:3017	3340-357				no
D:07:3107	3635-79		4.14	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
D:07:3107	3535-9		2.81		no
D:07:3107	3635-10		3.12		no
D:07:3141	3990-28-1	28.1	3.64	none	no
D:07:3141	3990-29-1	29.1		none	no
D:07:3141	3990-11-1	11	3.09	parallel	no
D:07:3141	3990-15-15	15.15	2.93	parallel	no
D:07:3141	3990-1	1	3.75		no
D:07:3144	6890-1	cell 249	4.18	parallel	no
D:07:3144	6890-2	cell 240	2.99	parallel	no
D:07:3144	4000-50-1	50.1	3.07	none	no
D:07:2100	3630			none	no
D:11:0244	3650-1184		3.03	none	no
D:11:0244	3650-301		3.04	none	no
D:11:0244	3651-1316				no
D:11:0244	3651-1322		3.74	none	no
D:11:0244	3651-1259				no
D:11:0244	3652-1014		2.31		no
D:11:0244	3652-388		2.92	none	no
D:11:0244	3652-285			parallel	no
D:11:449	4597-489.3	cell 236	4.92		no
D:11:1281	4771-21	cell 222	2.23	parallel	yes
D:11:1281	4771-77	cell 247		parallel	no
D:11:1281	4771-52	cell 218			no
D:11:1281	4771-13	cell 247	3.30	parallel	no
D:11:1281	2475-19	cell 234	3.66	none	no
D:11:1281	2475-41	cell 176	2.47		no
D:11:449	4621-1735	cell 237	3.12	parallel	yes
D:11:449	Diagnostic-1846	cell 280		none	yes
D:11:449	diagnostic-2027		2.45		no
D:11:449	Diagnostic-788		2.33	none	no
D:11:449	diagnostic-2010	cell 237	2.15	none	no
D:11:449	diagnostic- 999	cell 249		parallel	no
D:11:449	diagnostic-687		3.06	none	no
D:11:449	diagnostic-000		4.65	none	no
D:11:449	diagnostic-1162	cell 247		down	no
D:11:449	diagnostic-1255	cell 217	2.63	none	no
D:11:449	diagnostic-001				no
D:11:449	diagnostic-1284	cell 242	3.14	none	yes
D:11:449	diagnostic-1634	cell 249	3.86	none	yes
D:11:449	diagnostic-1592	cell 240	4.02	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
D:11:449	diagnostic-1731	cell 218		none	no
D:11:1161	2241-278,283		4.53	none	no
D:11:1162	2251-29				no
D:11:1410	2475-7	cell 237	2.87	parallel	no
D:11:1410	2475-55	cell 248	3.42	none	no
D:11:1410	4818-643	cell 242	2.30	none	no
D:11:1410	4818-645	cell 237			no
D:11:1410	4818-660	cell 234			no
D:11:1410	4817-613	cell 250	3.44	none	no
D:11:2063	4190-466				no
D:11:2063	4190-594		2.75	none	no
D:11:2063	4190-826				no
D:11:2063	4190-398		2.86	none	no
D:11:2063	4190-349		2.86	parallel	no
D:11:2175	6918-53	cell 249	4.06	none	no
D:11:2190	6921-90	cell 239	2.74	none	yes
D:11:2190	6921-86	cell 240	2.15	parallel	no
D:11:3133	4374-2006	cell 241			no
D:11:3133	4374-2305	cell 248	2.88	none	no
D:11:3133	4374-2378		2.90	none	no
D:11:3133	4374-1154-1	cell 248		none	no
D:11:3133	4374-2030-2	cell 248		none	no
D:11:3133	4374-829	cell 249	2.98	none	no
D:11:3133	4374-799	cell 237	4.82	none	no
D:11:3133	4374-2377		3.15	none	no
D:11:3133	4374-2319		3.04	none	no
D:11:3133	4374-491	cell 248	2.03	none	no
D:11:3133	4374-2350	cell 248	2.91	none	no
D:11:3133	4374-1137-1	cell 248	2.98	none	no
D:11:3133	4374-286-1	cell 248	2.34	parallel	no
D:11:3133	4374-225	cell 236			no
D:11:3133	4374-1438-2		1.69		no
D:11:3133	4374-1991	cell 218		none	no
D:11:3133	4374-236-4				no
D:11:3133	4374-2424	cell 248		none	no
D:11:3133	4374-2193			none	no
D:11:3133	4374-1483	cell 248	2.66	parallel	no
D:11:3133	4374-1105	cell 248	2.61		no
D:11:3133	4374-2119	cell 246	3.75	parallel	no
D:11:3133	4374-1416	cell 248		none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
D:11:3133	4374-1641-4	cell 248			no
D:11:3133	4374-1927	cell 240	3.48		no
D:11:3133	4374-572	cell 248	2.90	none	no
D:11:3133	4374-2137	cell 234	2.68	none	no
D:11:3133	4374-718	cell 248	2.78	none	no
D:11:3133	4374-620	cell 248	3.45	parallel	no
D:11:3133	4374-1469-16	cell 248			no
D:11:3133	4374-999	cell 248	2.28	none	no
D:11:3133	4374-2099	cell 237	4.92		no
D:11:3133	4374-2340	cell 240	3.84	none	no
D:11:3133	4374-1773			none	no
D:11:3133	4374-240	cell 237	2.61	none	no
D:11:3133	4374-1894-5		2.74	none	no
D:11:3133	4374-2381	cell 240	2.37	parallel	no
D:11:3133	4374-1870	cell 218	3.33		no
D:11:3133	4374-2420	cell 240			no
D:11:3133	4374-335	cell 247			no
D:11:3133	4374-1972	cell 248	3.20	none	no
D:11:3133	4374-2321-19				no
D:11:3133	4374-2321-26				no
D:11:3133	4374-850	cell 208?			no
D:11:3133	4374-2146	cell 248			no
D:11:3131	4337-514		2.80	none	no
D:11:3131	4337-2436	cell 248	3.16	none	no
D:11:3131	4337-936	cell 248	2.17	none	no
D:11:3131	4337-1390	cell 217	2.12	none	no
D:11:3131	4337-1006	cell 249			no
D:11:3131	4337-1347	cell 248	4.04	none	no
D:11:3131	4337-601	cell 250	2.68	parallel	no
D:11:3131	4337-2338	cell 248	2.63	none	no
D:11:3131	4337-475		2.56	none	no
D:11:3131	4337-1121	cell 248			no
D:11:3131	4337-2516	cell 240	2.76	none	no
FB 5000	1996.536.275	5000-G134-259	1.86		yes
FB 9366	1996.564.1873	1326	3.32	parallel	yes
FB 9366	1996.564.2008	804	2.11	none	no
FB 9366	1996.564.1860	1168	3.29	none	no
FB 10018	2002.14.8464	1085	2.34	none	no
FB 7483	1996.724.447	7483-G106-259		none	no
FB 7483	1996.724.448	7483-G2-259	2.06	parallel	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 7484	1996.725.314	7484-G20-259	2.52	none	no
FB 7484	1996.725.313	7484-G98-259	3.87	none	yes
FB 6281	1996.914.2924	1093		none	no
FB 6281	1996.914.2923	1097	3.68	none	no
FB 6281	1996.914.2925	1098	2.41	none	yes
FB 6281	1996.914.2926	1092	1.93	none	no
FB 6281	1996.914.2927	212	3.90	none	no
FB 6281	1996.914.2928	287		none	no
FB 6281	1996.914.2929	934	2.80	none	no
FB 16698	2000.5.274e		3.80	parallel	no
FB 12648	12648-G1885-259-00	1930	4.45	none	no
FB 12648	12648-G2228-259-00	2286	4.55	none	no
FB 10916		FB 10916 cn 1 G 1 259	2.75	none	no
FB 5834		1	3.39	none	no
FB 16698	2000.5.231b	2000.5.2.3a-aaa	3.68		no
FB 16698	2000.5.285d	2000.5.19.5a-s	5.22	none	no
FB 5000	5000-n1-259-1	1996.917.104	2.34	none	no
FB 5000	5000-G186-259-1	1996.917.976	2.11	none	yes
FB 5000	5000-G217-259-1	1996.917.103	3.28	none	no
FB 5000	5000-G237-259	1996.917.317	2.85	none	no
FB 5000	5000-G237-259-2	1996.917.500	2.29	none	no
FB 5004	5004-N7-259-1	1996.917.943	3.24		no
FB 5004	5004-N10-259-1	1996.917.760			no
FB 5016	5016-N2-259-1	1996.917.321	2.68	none	no
FB 5016	5016-N1-259-1	1996.917.515	2.67	parallel	no
FB 12710	1996.917.1304	12710-270-9-259	2.65	none	no
FB 12710	1996.919.42669	FB12710-G388-259	3.12		no
FB 10018	2002.14.8481	136	4.12	none	no
FB 10018	2002.14.8465	1492	4.03	none	no
FB 12648	1996.919.25448	FB12648-G2126-600	3.56	none	yes
FB 12648	1996.919.26982	FB12648-N0-600		none	no
FB 12648	1996.919.26981	FB12648-N0-259	2.50		yes
FB 7634	2000.30.593	FB7634-599-251	4.07	none	no
FB 7634	2000.30.594	FB7634-G326-259	5.08	none	no
FB 9099	2002.11.340			none	no
FB 10018	2002.14.8466	1692	3.72	none	no
FB 10018	2002.14.8473	1803			no
FB 9697	1996.991.1333	14B-33-1	3.57	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 10018	2002.14.8474	2398			no
FB 10018	2002.14.8483	2403	2.94	none	no
FB 10018	2002.14.8467	2516	4.18	none	no
FB 9697	1996.991.1537	9697-6195-259-1	4.60	none	no
FB 10018	2002.14.8475	2798			no
FB 9697	1996.991.1332		3.49	none	no
FB 16816	2002.3.62	369/3557-1		parallel	no
FB 6726			2.94	none	no
FB 6432	2001.5.2118	5	2.37	none	yes
FB 6432	2001.5.2120	2	1.60	none	no
FB 6432	2001.5.2121	3	2.44	none	no
FB 6432	2001.5.2123	6	3.08	parallel	yes
FB 6432	2001.5.2050	1601	3.44	none	no
FB 6432	2001.5.2051	719	3.13	none	no
FB 6432	2001.5.2052	2850	3.04	none	no
FB 429	2002.11.172		2.91		no
FB 429	2002.11.173		2.16	none	no
FB 7462	2003.2.31	41EP1070-01-259	3.84	none	no
FB 13597	2003.2.53			none	no
FB 12744	2003.7.1431		2.49		no
FB 13271	2004.10.0422		4.05	none	no
FB 10018	2002.14.8250	287		none	no
FB 6610	2004.10.0625			none	no
FB 273	2004.11.808		2.35	parallel	no
FB 12650	2003.7.1432		3.01	none	no
FB 10018	2002.14.8476	2904			no
FB 12650	2003.7.1434		3.73	none	no
FB 10018	2002.14.8468	3061	2.07	none	no
FB 470	2004.11.318			none	no
FB 470	2004.11.338		2.80	none	no
FB 235	2004.11.029		3.54	none	no
FB 273	2994.11.815		4.58	none	no
FB 273	2004.11.981		3.21	none	no
FB 10018	2002.14.8477	3092			no
FB 273	2004.11.813		4.15	none	no
FB 273	2004.11.810		3.24	none	no
FB 273	2004.11.811				no
FB 273	2004.11.809		2.87	none	yes
FB 12648	1996.917.1308	12648-2754-G2517-251	2.31	none	no
FB 12648	1996.919.24403	FB12648-769-	4.61	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
		G762-259-0			
FB 447	2004.11.669		3.61	none	no
FB 447	2004.11.670		3.41	none	no
FB 447	2004.11.671			none	no
FB 12650	2003.7.1433				no
FB 447	2004.11.673			none	no
FB 470	2004.11.336			none	no
FB 4487	2005.11.733			none	no
FB 4487	2005.11.535			none	no
FB 5846	2005.11.943		3.84	none	no
FB 5846	2005.11.942		3.33	none	yes
FB 4488	2005.11.891	144	2.60	none	no
FB 6360	2005.11.1156	31	4.11	none	no
FB 13975	2005.11.1432			none	yes
FB 272	2010.3.46	1-1	4.56	none	no
FB 272	2010.3.47	2-1			no
FB 9697	1996.991.1188	9697-G395-259-1	3.78	none	no
FB 12705	2005.16.178	1		none	no
FB 10043	2005.14.244	1-1	3.95	none	no
FB 10043	2005.14.259	10-1	3.43	none	no
FB 10043	2005.14.484	93-1			no
FB 10043	2005.14.485	94-1	2.91	none	no
FB 10042	2005.14.141	2-1	2.46	none	no
FB 7477	2005.15.102	4-1	1.67		no
FB 12705	2005.16.27	1	3.21	none	no
FB 12705	2005.16.30	2			no
FB 12705	2005.16.165	1	3.52	parallel	yes
FB 12708	1996.919.38301	FB12708-G755-259		none	no
FB 12705	2005.16.379	1	2.81	none	no
FB 12705	2005.16.606	1		none	yes
FB 12705	2005.16.729	1	2.26	none	yes
FB 17442	2006.02.003		3.35	none	no
FB 17450	2006.02.0001	1			no
FB 17450	2006.02.0002	2	3.08	none	no
FB 1581	2007.4.1	1	2.02	none	yes
FB 4339	2007.4.3	1	2.96	none	no
FB 1579	2007.5.1	1		none	no
FB 1579	2007.5.2	2	4.72	none	yes
FB 1579	2007.5.3	3	2.15	none	no
FB 1579	2007.5.24	1	2.71	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 6190	2007.18.0562		2.88		yes
FB 6190	2007.18.0563		2.78		no
FB 7593	2007.6.18	2	1.64	none	no
FB 7593	2007.6.19	3	3.21	none	yes
FB 6773	2007.6.13	4	3.49	none	no
FB 6720	2007.6.2	2	4.25	parallel	no
FB 6720	2007.6.3	3			no
FB 6720	2007.6.4	4	2.74	none	no
FB 6720	2006.6.5	5	3.69	none	no
FB 273	2004.11.814				no
FB 6720	2007.6.9	9			no
FB 12366	2007.22.303	91-1	2.92	none	no
FB 10117	2007.22.77	3-1	2.40	none	no
FB 5073	2008.1.9		5.31	none	no
FB 5073	2008.1.8				no
FB 2790	2007.30.28	2		none	no
FB 2790	2007.30.27	1		none	no
FB 9390	2008.4.37		2.34	none	no
FB 9339	2008.4.18		2.42		no
FB 6001	2008.6.01		3.02	none	no
FB 9620	2008.08.12	12	4.31	none	no
FB 9620	2008.08.13	13	3.02	none	no
FB 9620	2008.08.15	15	3.32	none	no
FB 9620	2008.08.01	1		none	no
FB 9620	2008.08.02	2	4.25	none	no
FB 9620	2008.08.03	3		none	no
FB 9620	2008.08.05	5	3.61	none	no
FB 3238	2002.12.22		2.64	none	yes
FB 9620	2008.08.07	7	2.43	none	no
FB 9620	2008.08.08	8	3.00	none	no
FB 6741	2008.16.159	3087	2.98	none	no
FB 6741	2008.16.126	3059	2.32	none	yes
FB 17157	2008.9.752	3000-0A000007C	2.49	none	no
FB 17157	2008.9.750	3000-0A0000B1C			no
FB 6741	2008.16.125	3058	2.61	parallel	no
FB 6741	2008.16.187	3105		none	yes
FB 6741	2008.16.123	3056	3.12	none	no
FB 447	2004.11.666		3.45	none	no
FB 7484	2008.16.0252	276	2.93	parallel	no
FB 7484	2008.16.0253	277	2.48	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 7491	2008.16.100	2	2.95	none	yes
FB 447	2004.11.668		4.84		no
FB 7506	2008.16.120	138	3.13	none	no
FB 18618	2008.25.78	1		none	no
FB 9426	2008.25.09	6		none	no
FB 9426	2008.25.26	3		none	yes
FB 9426	2008.25.76	5		none	no
FB 12519	2008.31.626	239-1	3.83		no
FB 17278	2008.36.1927	70-6		none	no
FB 17278	2008.36.2074	92-1	3.45	none	no
FB 17278	2008.36.2170	110-1		none	no
FB 12527	2008.31.1708	382-1		none	no
FB 12527	2008.31.1799	446-7	2.83	none	no
FB 12527	2008.31.1974	474-1	3.58	none	no
FB 17278	2008.36.2169	109-1	2.73	none	no
FB 17278	2008.36.2127	98-1	2.78	none	no
FB 6773	2009.2.2	11021	2.70	none	no
FB 6773	2009.2.34	23018			no
FB 6773	2009.2.6	1077	4.13	none	no
FB 447	2004.11.672		3.03		no
FB 6873	2007-28-0002	2	5.12	none	no
FB 6873	2007-28-0007	1		none	no
FB 6873	2007-28-0008	3	1.38	parallel	no
FB 7520	2009.26.0001	544			yes
FB 7520	2009.26.0019	560	3.69	none	no
FB 7520	2009.26.0022	561	3.04	none	yes
FB 7520	2009.26.0378	794	2.18	parallel	yes
FB 9554	2008.4.48		2.55	none	no
FB 9554	2008.4.49		1.25	none	no
FB 16158	2008.26.0023		2.92	none	no
FB 6271	2007.11.0014		1.58	none	yes
FB 6271	2007.11.0023		2.37	parallel	no
FB 6271	2007.11.0028		2.94	none	no
FB 6271	2007.11.0029		2.72	none	yes
FB 6271	2007.11.0030		2.71	none	no
FB 6271	2007.11.0031			none	no
FB 10035	2002.14.8889	420	1.39	none	yes
FB 10035	2002.14.8890	474	4.54	none	no
FB 10017	2002.14.2789	1311		none	no
FB 10017	2002.14.2790	1832	3.21	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 10017	2002.14.2791	1936	4.36	none	no
FB 10017	2002.14.2792	2251	3.76	none	no
FB 10017	2002.14.9116	692		none	no
FB 10017	2002.14.9117	919	2.87	none	yes
FB 10017	2002.14.9120	1017	3.41	none	no
FB 10017	2002.14.9121	1034	2.90	none	no
FB 10017	2002.14.9163	4163	3.07	none	no
FB 10017	2002.14.9115	334	2.75	none	no
FB 10017	2002.14.1932	1490	2.52	parallel	yes
FB 10035	2002.14.9124	131		none	no
FB 10035	2002.14.9122	127		none	no
FB 10018	2002.14.8478	3178			no
FB 10018	2002.14.8472	359			no
FB 470	2004.11.324		3.77		yes
FB 49	2002.3.133	363/3552-1			no
FB 49	2002.3.134	363/3552-2	3.16	none	no
FB 6610	2004.10.0624				no
FB 10018	2002.14.8479	3770		none	no
FB 10018	2002.14.8469	3900	2.51	none	yes
FB 10018	2002.14.8470	4445	3.69	none	no
FB 10018	2002.14.8471	4477			no
FB 6720	2007.6.8	8			no
FB 10018	2002.14.7553	5036		none	no
FB 10018	2002.24.7562	5056			no
FB 6741	1996.716.1936	2292	3.32	none	no
FB 7183	2008.16.0101	4			no
FB 10018	2002.14.7593	5138		none	no
FB 7352	7352.obs.6.259			none	no
FB 7506	2008.16.108	126		none	no
FB 8612	2009-10-2	2-1	3.81	none	no
FB 9369	9369-G2453-259-01	ocn 332			no
FB 10018	2002.14.7595a	5141			no
FB 9369	9369-G2605-259-01				no
FB 10018	2002.14.8462	641	3.86	none	no
FB 9620	2008.08.06	6		parallel	no
FB 10018	2002.14.8463	737	2.36	none	yes
FB 10018	2002.14.8482	907	3.13	none	no
FB 1680	2001.7.294		1.69	none	yes
FB 1680	2001.7.295		1.92	none	yes
FB 1680	2001.7.297			none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 1680	2001.7.304			none	no
FB 1680	2001.7.305		3.24	none	no
FB 6747	2005.21.291	1-1		none	yes
FB 9697	1996.991.593	FB9697-G509-259-1		none	no
FB 9697	1996.991.594	FB9697-G439-259-1		none	no
FB 9697	1996.991.599	FB9697-G438-259-1		none	no
FB 49	2002.3.135	364/3552-1	2.54	none	no
FB 49	2002.3.136	364/3552-2		none	no
FB 12708	1996.919.36147	FB12-g553-259	3.11	none	yes
FB 12708	1996.919.37379	FB12708-G621-259	2.64	none	no
FB 12708	1996.919.37380	FB12708-G658-259	3.33	none	no
FB 12650	1996.919.39595	FB 12650-G1566-259	3.04	none	no
FB 12699	1996.919.32514	FB12699-G864-259	4.38	none	no
FB 1587	2008.20.209	3000-0A000047D		none	no
FB 8149	2008.18.2	3000-0A000AA2E	3.91	none	no
FB 8149	2008.18.3	3000-0A000AA2F	2.66	none	no
FB 8149	2008.18.4	3000-0A000AA30		none	no
FB 8149	2008.18.7	3000-0A000AA33	2.60	none	yes
FB 8149	2008.18.9	3000-0A00AA35		none	no
FB 9302	2008.36.595	485-1	4.82	none	no
FB 9302	2008.36.594	484-1	3.19	parallel	no
FB 17339	2008.36.1509	13-1	3.28	parallel	yes
FB 17339	2008.36.1619	112-1	3.40	none	no
FB 13985	2005.9.3	1	3.29	none	no
FB 13985	2005.9.8	9	3.15	none	yes
FB 13985	2005.9.9	12		none	no
FB 13985	2005.9.10	7	2.15		no
FB 17282	2008.36.986	2-1		parallel	no
FB 12699	1996.919.33645	FB12699-G1104-259	2.31	none	yes
FB 9697	1996.991.597	9697-G472-259-1		none	no
FB 6801	2009.29.8	23		none	no
FB 5000	2009.19.001	1	2.35	none	no
FB 5000	2009.19.004	4	2.11	none	yes
FB 6188	2004.22.7			none	yes
FB 12527	2008.31.1431	228-1	2.89	none	no
FB 8395	2006.17.21	3			no
FB 10039	2005.17.918	118-1	3.70	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 10039	2005.17.920	301-1	3.18	none	yes
FB 10039	2005.17.921	302-1	4.43	none	no
FB 10039	2005.17.922	303-1	3.41	none	yes
FB 10039	2005.17.924	443-1	2.11	none	no
FB 10039	2005.17.925	715-3	3.48	none	no
FB 10039	2005.17.926	722-3	2.31	none	no
FB 10039	2005.17.927	724-3	3.39	none	no
FB 10039	2005.17.928	812-3			no
FB 10041	2005.17.1800	118-1	1.81	parallel	no
FB 10041	2005.17.1802	281-1	3.48	none	no
FB 10041	2005.17.1803	292-9	2.99	none	no
FB 10041	2005.17.1804	338-10	2.29	none	yes
FB 9369	9369-G292-259-01	ocn 115	3.55	none	no
FB 9697	1996.991.1462			none	no
FB 9369	9369-G657-259-01	ocn 160	4.21	none	no
FB 9369	9369-G3-259-01	ocn 3	2.54	none	no
FB 9369	9369-G660-259-01	ocn 160	2.80	none	no
FB 9369	9369-G15-259-03	ocn 11	3.10	none	no
FB 9369	9369-G43-259-04	ocn 28	3.30	none	no
FB 9369	9369-G32-259-02	ocn 20	2.92	none	no
FB 9369	9369-G706-259-01	ocn 165		none	no
FB 9369	9369-G18-259-01	ocn 14	2.16	none	no
FB 9369	9369-G457-259-01	ocn 139	2.69	none	no
FB 9369	9369-G43-259-01	ocn 28	2.03	parallel	yes
FB 9369	9369-G278-259-01	ocn 103	2.49	none	no
FB 9369	9369-G3-259-04		3.00	none	no
FB 9369	9369-G894-259-01	ocn 172	2.88	none	no
FB 9369	9369-G1008-259-01	ocn 188	3.32	none	no
FB 9369	9369-G5-259-02	ocn 5		none	no
FB 9369	9369-G208-259-04	ocn 79	2.55	none	no
FB 9369	9369-G1-259-05	ocn 1	2.59	none	no
FB 9369	9369-G8-259-01	ocn 8	2.23	none	no
FB 9369	9369-G1-259-02		2.50	none	no
FB 9369	9369-G292-259-03	ocn 115	1.96	none	no
FB 9369	9369-G44-259-02	ocn 29	2.96	none	no
FB 9369	9369-G536-259-01	ocn 146	4.35	none	yes
FB 9369	9369-G324-259-01	ocn 122	3.56	none	no
FB 9369	9369-G285-259-01	ocn 110	2.94	none	no
FB 9369	9369-G1633-259-01	ocn 263	3.85	none	no
FB 9369	9369-G15-259-02	ocn 11	2.68	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 9369	9369-G1261-259-01	ocn 222	3.26	none	no
FB 9369	9369-G1863-259-01	ocn 285	4.46	none	no
FB 9369	9369-G2912-259-01	ocn 159	2.70	none	no
FB 9369	9369-G2012-259-01	ocn 311		none	no
FB 9369	9369-G6-259-01	ocn 6	2.69	none	no
FB 9369	9369-G32-259-01	ocn 20		none	no
FB 9369	9369-G70-259-01	ocn 39	2.08	none	no
FB 9369	9369-G653-259-03	ocn 159		none	no
FB 9369	9369-G2553-259-01	ocn 368		none	no
FB 9369	9369-G30-259-03	ocn 18		none	no
FB 9369	9369-G3-259-05	ocn 3	2.34	none	no
FB 9369	9369-G2040-259-01	ocn 315			no
FB 9369	9369-G208-259-03	ocn 79		none	no
FB 9369	9369-G2608-259-01		5.78	none	no
FB 9369	9369-G1647-259-01		3.00	none	no
FB 9369	9369-G40-259-01	ocn 25	3.31	none	no
FB 9369	9369-G1735-259-01	ocn 267		none	no
FB 9369	9369-G4-259-01		2.99	none	no
FB 9369	9369-G292-259-02	ocn 115	3.30	none	no
FB 9697	1996.991.1010	9697-G278-259-1			no
FB 9369	9369-N0-259-01				no
FB 9369	9369-G721-259-01	ocn 165	3.01	none	no
FB 9369	9369-G832-259-01	ocn 167	2.42	none	no
FB 9369	9369-G1-259-01		2.82	none	no
FB 9369	9369-G454-259-01	ocn 139	5.26	none	no
FB 9369	9369-G15-259-04	ocn 11	3.13	none	no
FB 9369	9369-G15-259-01			parallel	no
FB 9369	9369-G1708-259-01	ocn 246	5.18	none	no
FB 9369	9369-G904-259-01	ocn 172	3.87	none	no
FB 9369	9369-G12-259-01	ocn 9	3.00	none	no
FB 9369	9369-G925-259-01	ocn 174	3.13	none	no
FB 9369	9369-G916-259-01	ocn 174	4.53	none	no
FB 9369	9369-G2544-259-01	ocn 362	3.65	none	no
FB 9369	9369-G653-259-02	ocn 159	3.17	none	no
FB 9369	9369-G608-259-01	ocn 151		none	no
FB 9369	9369-G652-259-01	ocn 157	2.70	none	no
FB 9369	9369-G16-259-01	ocn 12	4.17	none	no
FB 9369	9369-G2362-259-01	ocn 336	2.88	none	no
FB 9369	9369-G2822-259-01	ocn 405			no
FB 9369	9369-G1881-259-01	ocn 288	2.39	overlapping	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 9369	9369-G663-259-01	ocn 160	2.98	none	no
FB 9369	9369-G3-259-07		3.20	none	no
FB 9369	9369-G3-259-03		2.94	none	no
FB 9369	9369-G208-259-02	ocn79	2.15	none	yes
FB 9369	9369-G43-259-03	ocn 28	2.60	none	no
FB 9369	9369-G6-259-02	ocn 6	4.95	none	no
FB 9369	9369-G422-259-01	ocn 137	2.70	none	no
FB 9369	9369-G896-259-01	ocn 172	3.34	none	no
FB 9369	9369-G2927-259-01	ocn 174	2.36	none	no
FB 9369	9369-G2907-259-01	ocn 159	2.72	none	no
FB 9369	9369-G452-259-01		2.95	parrallel	no
FB 9369	9369-G314-259-01	ocn 120	2.11	none	no
FB 9369	9369-G30-259-01	ocn 18	2.70	none	no
FB 9369	9369-G2373-259-01	ocn 336	3.41	none	no
FB 9369	9369-G1862-259-01	ocn 285	2.43	none	no
FB 9369	9369-G1877-259-01	ocn 287	2.64	none	no
FB 9369	9369-G230-259-01	ocn 87	4.65	none	yes
FB 9369	9369-G212-259-01	ocn 83	2.64	none	no
FB 9369	9369-G707-259-01	ocn 165	3.00	parallel	no
FB 9369	9369-G711-259-01	ocn 165	3.36	none	no
FB 9369	9369-G2523-259-01		3.62	none	no
FB 9369	9369-G1919-259-01	ocn 280	3.63	none	no
FB 9369	9369-G1620-259-01	ocn 261	3.00	none	no
FB 9369	9369-G870-259-01	ocn 170		none	no
FB 9369	9369-G935-259-01	ocn 174	3.28	none	no
FB 9369	9369-G2524-259-01	ocn 355	3.66	none	no
FB 9369	9369-G2487-259-01	ocn 348		none	no
FB 9369	9369-G2360-259-01	ocn 333	2.15	none	no
FB 9369	9369-G201-259-01		2.86	none	yes
FB 9369	9369-G2452-259-01	ocn 332	2.20	none	no
FB 9369	9369-G1495-259-01	ocn 243	2.23	none	yes
FB 9369	9369-G1898-259-01		3.17	none	no
FB 9369	9369-G200-259-01	ocn 75?	3.66	none	yes
FB 9369	9369-G2918-259-01		2.06	none	yes
FB 9369	9369-G43-259-05	ocn 28	4.46	none	no
FB 9369	9369-G246-259-02	ocn 94	2.88	none	no
FB 9369	9369-G1921-259-01	ocn 294	3.78	none	no
FB 9369	9369-G863-259-01	ocn 169	1.99	none	no
FB 9369	9369-G1968-259-01	ocn 307	3.19	none	no
FB 9369	9369-G282-259-01	ocn 107	2.63	none	no

Site Number	Museum Number	Specimen Number	Blade Tip Thickness (mm)	Flake Pattern	Serration
FB 9369	9369-G617-259-01	ocn 153		none	no
FB 9369	9369-G2822-259-01	ocn 405		none	no
FB 9369	9369-G2-259-03		2.04	none	yes
FB 9369	9369-G1-259-09		3.16	none	no
FB 9369	9369-G520-259-01	ocn 143	4.20	none	no
FB 9369	9369-G1958-259-01	ocn 306			no
FB 9369	9369-G332-259-01	ocn 126		none	no
FB 9369	9369-G651-259-02	ocn 155	2.88	parallel	no
FB 9369	9369-G938-259-01	ocn 173	3.19	none	no
FB 9369	9369-G1091-259-01	ocn 203	2.72	parallel	no
FB 9369	9369-G2142-259-01	ocn 316		parallel	no
FB 9369	9369-G2517-259-01	ocn358		none	no

Appendix D

Low Visibility Attributes from the Tucson Basin, Black Mesa, and the Hueco Bolson

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
AA:12:746	98-136-22		7.24	5.94	8.33	4.65	straight
AA:12:746	98-136-23			6.98	7.70	2.82	
AA:12:746	98-136-24			6.60			
AA:12:746	98-136-25	9.40	11.44	15.65	13.55	5.99	straight
AA:12:746	98-136-26	10.40	10.82	14.05	18.67	4.33	straight
AA:12:746	98-136-27	14.50	11.95	18.42	20.92	5.81	straight
AA:12:746	98-136-28		11.68	17.54	21.42	5.46	straight
AA:12:746	98-136-29		9.6		22.35	5.20	concave
AA:12:746	98-136-30	13.00	12.2	28.08	27.31	7.30	concave
AA:12:746	98-136-17			6.74			
AA:12:746	98-136-18	1.20	8.29	5.60	6.84	3.10	straight
AA:12:746	98-136-19	3.20	10.52	7.49	11.86	4.84	convex
AA:12:746	98-136-20	3.90	11.63	7.53	9.36	6.45	convex
AA:12:746	98-136-21			8.96			
BB:13:425	98-136-229	2.90	12.72	7.69	13.11	3.85	convex
BB:13:425	98-136-230	3.10	11.06	6.18	11.75	4.22	convex
BB:13:425	98-136-231			5.11		3.47	
BB:13:425	98-136-225	4.30	12.34	16.14	19.07	6.46	concave
BB:13:425	98-136-226		9.81	11.80	13.75	5.65	convex
BB:13:425	98-136-227	2.50	8.56	6.74	9.88	4.36	convex
BB:13:425	98-136-228	4.40	11.27	8.91	14.47	4.32	convex
BB:13:425	98-136-221		6.97	6.68		4.31	
BB:13:425	98-136-222	2.00	9.51	5.48	6.21	3.67	straight
BB:13:425	98-136-223	1.50	8.89	7.22	11.69	3.31	convex
BB:13:425	98-136-224	10.10	15.98	17.00	21.26	6.96	straight
AA:12:91	2001-87-37	3.10	7.25	8.29	16.09	4.03	straight
AA:12:746	98-136-32	4.60					
AA:12:746	98-136-33						
AA:12:91	2001-87-38	3.00	9.19	7.33	12.03	4.49	convex
AA:12:91	2001-87-39	3.90	8.68	6.81	10.93	4.83	straight
AA:12:91	2001-87-40	13.00	12.59	14.56	8.90	6.22	convex

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
AA:12:91	2001-87-41		6.86	5.46	8.69	2.91	straight
AA:12:91	2001-87-42	2.30	10.08	7.68	11.73	3.48	convex
AA:12:91	2001-87-43			6.10		4.04	
AA:12:91	2001-87-44		7.61	16.92	21.73	5.50	concave
AA:12:91	2001-87-45	9.00	12.54	16.48	18.38	6.90	straight
AA:12:91	2001-87-46	5.30	8.71	16.89	17.38	4.98	straight
AA:12:91	2001-87-47			10.38		4.61	
AA:12:91	2001-87-52	64.50	22.71	23.09		9.61	straight
AA:12:91	2001-87-53	12.80	10.89	16.26	13.71	5.30	straight
AA:12:91	2001-87-54	10.60	9.58	14.60	16.74	4.82	straight
AA:12:91	2001-87-55	29.60	17.31	17.38	21.95	7.17	convex
AA:12:91	2001-87-56	18.90	12.3	17.60	22.07	6.32	straight
AA:12:91	2001-87-57		12.53	14.89	16.17	6.38	straight
AA:12:91	2001-87-58	12.60	11.57	21.40	23.28	6.52	straight
AA:12:91	2001-87-61	5.60	11.89	18.20	19.17	4.57	convex
AA:12:91	2001-87-68			7.74		3.94	
AA:12:91	2001-87-73	1.90	5	6.51	6.40	3.52	straight
AA:12:91	2001-87-74			6.12			
AA:12:91	2001-87-80	0.70	6.22	6.04	7.85	2.60	convex
BB:10:46	95-33-1		10.83	17.95	21.70	5.25	straight
BB:10:46	95-33-7	11.90	3.45	21.24	17.81	7.07	straight
BB:10:46	95-33-4	6.10	7.28	10.72	11.45		straight
BB:10:46	95-33-3		10.29	16.24	23.27	7.03	straight
BB:10:46	95-33-2	8.10	10.17	18.13	22.06	6.05	convex
AA:12:90	98-21-1			5.30			
AA:12:90	98-21-2			5.89			
AA:12:90	98-21-3			6.54		3.72	
AA:12:90	98-21-4			5.99			
AA:12:90	98-21-5			6.41		3.29	
AA:12:90	98-21-6		5.71			3.50	straight
AA:12:90	98-21-7			6.10		3.78	
AA:12:90	98-21-8	1.50	7.7	6.29	8.44	3.70	straight
AA:12:90	98-21-9	1.20	7.08	5.32	4.06	2.53	straight
AA:12:90	98-21-10	9.00	7.96	15.05	10.99	5.34	convex
AA:12:90	98-21-11		7.89	15.61	12.22	3.28	convex
AA:12:90	98-21-12		10.37	11.05	14.05	5.19	straight
AA:12:90	98-21-13		6.12			4.70	straight
BB:13:15	85-35-49	2.20	4.15	8.25	8.93	3.24	straight
BB:13:15	85-35-48			6.40			
AA:12:486	94-85-1	2.70	10.96	7.07	9.32	2.99	convex
AA:12:486	94-85-2	8.20	11.45	15.34	16.00	5.74	concave

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
AA:12:486	94-85-3	2.90			16.81	5.57	concave
AA:12:486	94-85-4	3.20	17.35		18.82	4.28	concave
AA:12:486	94-85-5	6.40	13.9		12.72	4.91	concave
AA:12:486	94-85-6	6.00	16.18		20.21	5.96	concave
AA:12:486	94-85-7	4.30	12.97		18.21	6.20	concave
BB:13:6	97-26-9	6.50	12.44		24.27	5.10	concave
BB:13:6	97-26-10	5.90	9.37	16.61	18.03	4.86	convex
BB:13:6	97-26-11		10.77	8.84	14.88	4.44	convex
BB:13:6	97-26-12			7.15		3.70	
BB:13:6	97-26-13		7.71	6.81	9.96	3.56	straight
BB:13:6	97-26-14		10.78	9.26	11.82	4.97	straight
BB:13:6	97-26-15	2.70	7.46			3.89	straight
BB:13:6	97-26-16	1.50	9.68	7.17	8.80	3.74	convex
BB:13:6	97-26-17	1.40	8.41	5.63	8.81	3.13	straight
BB:13:6	97-26-18	1.10	9.62	6.61	9.64	3.21	convex
BB:13:6	97-26-19		10.15	6.70	8.37		straight
BB:13:6	97-26-20	0.70	6.88	6.30	9.42	3.14	straight
AA:12:111	2008-459-190	9.50	9.29	17.30	14.97	6.07	straight
AA:12:111	2008-459-79	5.50	7.85	12.49	14.35	4.06	straight
AA:12:111	2008-459-187	7.10	8.68	14.52	14.13	5.08	straight
AA:12:111	2008-459-186	5.30	10.99	14.97	15.03	5.31	straight
AA:12:111	2008-459-145	6.60	9.64	13.04	16.06	5.14	straight
AA:12:111	2008-459-25	6.30	10.74	15.27	17.43	6.12	straight
AA:12:111	2008-459-65		9.62	14.71	16.37	4.55	straight
AA:12:111	2008-459-58		10.3	15.57	13.04	5.27	straight
AA:12:111	2008-459-161	4.60	7.7	14.80	14.52	3.89	straight
AA:12:111	2008-459-134	6.50	11.27	16.48	16.09	4.69	straight
AA:12:111	2008-459-106	11.80	7.18	17.62	12.81	7.64	convex
AA:12:111	2008-459-104		12.14			5.00	convex
AA:12:111	2008-459-103			15.27		7.95	
AA:12:111	2008-459-100	7.40	7.8	14.39	13.84	4.89	convex
AA:12:111	2008-459-99	8.20	11.11	16.93	16.13	5.26	straight
AA:12:111	2008-459-89	7.30	9.99	17.52	16.13	4.87	convex
AA:12:111	2008-459-83	4.40	10.53	16.63	15.71	4.75	convex
AA:12:111	2008-459-59	7.00	10.21	14.89	11.71	5.75	straight
AA:12:111	2008-459-80	9.50	9.65	15.55	13.16	5.12	straight
AA:12:111	2008-459-36	8.10	13.08	17.92	15.55	5.53	convex
AA:12:111	2008-459-22	9.40	14.21	17.13	15.04	5.06	straight
AA:12:111	2008-459-159	8.20	9	15.35	13.46	6.15	straight
AA:12:111	2008-459-44		12.74	14.43	16.67	6.00	straight
AA:12:111	2008-459-21		10.07	14.05	9.19	5.76	convex

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
AA:12:111	2008-459-14	3.70	9.35	13.76	13.72	4.19	straight
AA:12:111	2008-459-180	9.70	6.23	18.28	16.75	5.78	concave
AA:12:111	2008-459-32		6.61			5.26	straight
AA:12:111	2008-459-19	5.90	12.28	17.74	11.74	4.52	straight
AA:12:111	2008-459-183			12.57		3.82	
AA:12:111	2008-459-167		8.24	19.30	14.23	5.03	convex
AA:12:111	2008-459-191	5.20	9.88	18.68	15.30	4.10	convex
AA:12:111	2008-459-193	6.20	11.89	17.06	11.77	6.83	concave
AA:12:111	2008-459-210	16.30	17.74	16.50	19.68	7.50	convex
AA:12:111	2008-459-211	12.20	11.44	14.93	14.96	5.10	straight
AA:12:111	2008-459-137	3.00	9.75	11.86	21.65	4.50	straight
AA:12:111	2008-459-198		8.23	10.56	13.27	4.80	straight
AA:12:111	2008-459-175		6.25	14.53	16.91	4.24	straight
AA:12:111	2008-459-55	5.40	8.49	13.61	13.61	4.37	convex
AA:12:111	2008-459-54		13.45	20.92		6.73	
AA:12:111	2008-459-46	4.10	10.27	13.80	15.94	4.80	convex
AA:12:111	2008-459-12		10.28	16.19	16.49	5.12	convex
AA:12:111	2008-459-47	9.90	9.27	14.02	15.29	6.04	straight
AA:12:111	2008-459-122		6.98	12.61	13.06	5.15	straight
AA:12:111	2008-459-29		9.05	16.98	16.47	5.15	convex
AA:12:111	2008-459-56	6.40	13.02	15.14	13.44	5.06	straight
AA:12:111	2008-459-202	5.20	7.85	14.20	14.86	4.55	straight
AA:12:111	2008-459-128		12.51	14.52	12.07	6.11	convex
AA:12:111	2008-459-148		6.55	16.07	16.89	4.35	straight
AA:12:111	2008-459-150	6.60	10.57	16.56	14.84	5.78	straight
AA:12:111	2008-459-160		12.33	16.78	12.88	5.48	straight
AA:12:111	2008-459-136	5.00	12.16	16.70	16.21	5.36	straight
AA:12:111	2008-459-179		10.06	16.91	16.18	4.85	convex
AA:12:111	2008-459-182	5.50	13.5	17.22	15.92	5.08	straight
AA:12:111	2008-459-184		9.37	15.91	15.57	5.38	convex
AA:12:111	2008-459-185		11.72	16.21	12.95	5.22	straight
AA:12:111	2008-459-192	9.10	11.72	15.73	16.48	6.93	convex
AA:12:111	2008-459-189	6.40	14.91	15.91	15.27	5.78	straight
AA:12:111	2008-459-197	7.80	12.72	19.41	16.99	5.93	straight
AA:12:111	2008-459-199	6.20	6.78	14.30	13.85	5.20	straight
AA:12:111	2008-459-205	5.30	8.28	14.54	13.88	5.25	convex
AA:12:111	2008-459-216	8.90	19.9	17.45	17.18	6.82	straight
AA:12:111	2008	6.30	9.61	15.98	16.13	6.22	concave
AA:12:111	2008		11.92	10.19	17.20	6.15	straight
AA:12:111	2008		11.71	12.92	22.64	7.43	straight
AA:12:111	2008		10.98	13.16	20.08	6.03	concave

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
AA:12:91	2008-796			6.55		4.47	
AA:12:111	2008	6.00	10.28	14.57	23.39	5.42	straight
AA:12:91	2008-769	0.90	6.34	6.46	5.70	3.03	straight
AA:12:111	2008		10.46	14.13	15.35	4.88	straight
AA:12:91	2008-796	2.90	10.69	6.65	11.77	5.14	straight
AA:12:111	2008	6.00	10.29	13.22	13.53	5.15	straight
AA:12:111	2008		9.29	15.32		4.42	straight
BB:13:6	2006-491-33	2.30	8.58	6.31	8.59	3.98	straight
BB:13:6	2006-491-34		8.36	7.53	12.43	2.90	straight
BB:13:6	2006-491-35		9.68	8.48	12.87	3.54	straight
BB:13:6	2006-491-36			6.36		4.21	
BB:13:6	2006-491-37			5.65		3.60	
EE:2:30	30-n100en6-25	6.00	10.47	8.61	14.53	4.41	convex
EE:2:30	30-n116e56-19		10.8	7.49	12.73	4.02	convex
EE:2:30	30-11-34		10.52	8.05	10.27	4.26	convex
EE:2:30	30-6-11		8.6	8.58	7.65	3.72	straight
EE:2:30	30-11-62	5.40	9.29	11.91	15.61		convex
EE:2:30	30-2-23			6.71		3.03	
EE:2:30	xxxxxxxx			7.66		4.20	
EE:2:30	30-17-24		9.46	15.05	15.28	5.35	straight
EE:2:30	30-1-9		10.96	15.26	15.10	5.06	convex
EE:2:137	137-e5-22		7.58	15.52	17.89	5.22	straight
EE:2:137	137-b2-1	3.70	6.31	9.61	10.05	3.42	straight
EE:2:137	137-3to4n-5	2.50	8.27	11.82	14.18	3.89	convex
EE:2:137	137-e5-16	1.50	8.77	6.71	11.94	2.80	convex
EE:2:137	137-w2-19	1.20	6.68	7.67	7.80	3.14	straight
EE:2:62	80-86-99	3.40	14.27	14.65	12.17	4.94	straight
EE:2:62	93-7-25	4.50	12.05	11.08	12.73	4.89	convex
EE:2:62	93-7-24	1.90	6.76	8.21	11.10	4.06	concave
EE:2:103	93-7-137		7.38	6.50	8.35	3.34	straight
EE:2:103	93-7-141	8.30	10.03	17.15	19.16	5.56	concave
EE:2:103	93-7-143	8.20	9.92	15.99	17.63	5.56	straight
EE:2:103	93-7-136		10.56	15.70	19.64	3.56	concave
EE:2:103	93-7-140		7.78	6.92	8.43	3.57	concave
EE:2:103	93-7-142		10.09	14.89	20.33	5.37	concave
EE:2:103	93-7-139		7.81	7.09	7.58	3.51	straight
EE:2:103	93-7-145		7.14	11.17	14.31	4.52	straight
EE:2:103	93-7-138	1.40	7.03	6.77	8.01	3.22	straight
EE:2:103	93-7-144	4.60	9.93	15.25	15.61	5.25	straight
V:13:201	2001-21-1	30.40	12.84	21.76	26.14	4.68	straight
V:13:201	2001-21-2		6.48	9.18		3.03	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
V:13:201	2001-21-3		8.63	7.23	11.92	4.01	straight
V:13:201	2001-21-4			11.25		3.83	
V:13:201	2001-21-5	2.70	7.58	8.65	12.80	3.38	straight
V:13:201	2001-21-6	2.80	8.07	13.91	18.31	5.58	concave
V:13:201	2001-21-7		7.24	7.46	10.42	3.80	convex
V:13:201	2001-21-9		9.61	9.32	14.51	4.96	convex
V:13:201	2001-21-11		10.25	7.99	14.96	3.69	straight
V:13:201	2001-21-12		14.09	8.93	15.50	3.55	straight
V:13:201	2001-21-13		8.18	8.56	16.65	4.21	straight
AA:12:111	2008-796		15.41	28.58	29.73	6.55	concave
AA:12:111	2008-796	7.50	8.13	12.97	13.60	4.64	straight
AA:12:111	2008-796		11.66	11.35	20.93	6.20	straight
AA:12:111	2008-796		10.62	13.57	23.39	6.10	straight
AA:12:111	2008-796	8.00	9.67	13.54	19.37	6.74	straight
AA:12:111	2008-796		10.69	12.85	15.34	6.90	straight
AA:12:111	2008-796	8.00	10.56	14.84	23.77	7.47	straight
AA:12:111	2008-796			10.05		5.67	
AA:12:111	2008-796		7.97	13.19	10.10	4.76	straight
AA:12:111	2008-796		7.67	13.04	15.35	5.25	straight
AA:12:111	2008-796	8.00	17.84	17.07	16.82	6.22	convex
AA:12:111	2008-796	6.40	15.69	14.42	16.73	4.91	convex
AA:12:111	2008-796	4.10	13.77	16.21	15.23	5.35	convex
AA:12:111	2008-796		10.05	14.03	21.50	5.10	straight
AA:12:111	2008-796		11.29	10.58	22.23	5.08	straight
AA:12:111	2008-796			10.01		5.67	
AA:12:111	2008-796	5.40	8.5	11.91	13.30	3.66	convex
AA:12:111	2008-796		11.02	12.88	15.76	4.64	straight
AA:12:111	2008-796			14.57			
AA:12:111	2008-796		11.08	12.01	22.54	6.10	straight
AA:12:111	2008-796		10.77	13.55	20.47	6.11	convex
AA:12:111	2008-796		11.4	10.00	15.40	5.80	straight
AA:12:111	2008-796	6.60	11.01	16.52	20.21	6.39	convex
AA:12:111	2008-796		9.08	11.11	16.58	3.11	straight
AA:12:111	2008-796			9.68		9.68	
AA:12:111	2008-796	7.30	10.54	13.40	19.13	5.63	straight
AA:12:111	2008-796		9.7	11.76	17.44	5.52	straight
AA:12:111	2008-796		7.29	14.67	16.30	5.10	straight
AA:12:111	2008-796		9.69	13.40	17.09	5.26	straight
AA:12:111	2008-796	10.50	8.05	13.67	15.46	4.93	straight
AA:12:111	2008-796		10.02	15.14		5.16	straight
AA:12:111	2008-796		11.99	11.96	20.81	5.58	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
AA:12:111	2008-796		6.43	11.51	12.41	4.97	straight
AA:12:111	2008-796	1.70	9.8	7.07	10.25	3.78	convex
AA:12:111	2008-796	9.20	12.19	16.78	16.23	7.42	straight
AA:12:111	2008-796		9.13	15.96	21.17	4.89	convex
AA:12:111	2008-796	8.20	12.1	11.72	24.71	6.63	convex
AA:12:91	2008-796		10.73	5.74	16.38	3.69	straight
AA:12:91	2008-796			10.85		4.29	
AA:12:91	2008-796			8.54		4.37	
AA:12:91	20080796		8.3	6.78	12.56	3.42	straight
AA:12:91	2008-796		14.25	21.68	26.88	5.86	convex
AA:12:91	2008-796		11.82	14.73	15.68	5.76	straight
AA:12:91	2008-796		15.22	15.89	21.72	7.31	concave
AA:12:91	2008-796			5.09		2.99	
AA:12:91	2008-796			7.81		3.11	
AA:12:91	2008-796	1.30	7.41	7.26	7.80	3.43	convex
AA:12:91	2008-796		7.77	16.33	13.47	4.54	concave
AA:12:91	2008-796	1.70	8.61	7.24	7.68		straight
AA:12:91	2008-796			7.17		3.98	
AA:12:91	2008-796			7.58		4.35	
AA:12:91	2008-796	0.90	5.79	5.97	6.78	3.53	straight
AA:12:91	2008-796	9.80	9.91	16.46	18.94	6.25	straight
AA:12:91	2008-796	2.40	6.71	8.93	9.74	2.83	concave
AA:12:91	2008-796	2.60	6.78	13.39	14.87	3.24	straight
AA:12:91	2008-796	2.70	6.57	8.99	9.27	3.35	straight
AA:12:91	2008-796		12.33	18.35	16.65	6.38	straight
AA:12:91	2008-796		10.42	12.51	15.40	6.63	straight
AA:12:91	2008-796		7.41	5.74	4.09	3.09	straight
AA:12:91	2008-796			8.07		2.60	
AA:12:91	2008-796	2.60	8.48	9.15	10.15	4.13	convex
AA:12:91	2008-796		8.75	13.34	18.64	4.94	straight
AA:12:91	2008-796	4.00	7.98	13.97	18.22	4.15	straight
AA:12:91	2008-796		8.41	6.83	5.14	4.08	straight
AA:12:91	2008-796	1.30	7.29	6.04	6.19	4.22	convex
AA:12:91	2008-796			6.91		4.75	
AA:12:91	2008-796	4.30	9.51	9.12	17.27	4.54	convex
AA:12:91	2008-796			7.72		6.78	
AA:12:91	2008-796	4.90	10.49	10.87	11.67	4.16	convex
AA:12:91	2008-796		9.6	14.64	15.35	6.15	straight
AA:12:91	2008-796	3.30	7.76	15.04	17.41	5.03	concave
AA:12:91	2008-796			6.20		3.31	
AA:12:91	2008-796	3.00	5.73	7.58	7.94	3.47	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
AA:12:91	2008-796	5.40	9.97	9.52	18.96	4.10	straight
AA:12:91	2008-796			5.01		4.74	
AA:12:91	2008-796	2.90	10.88	6.94	11.15	2.91	convex
AA:12:91	2008-796	5.30	6.95	12.78	15.46	4.82	straight
AA:12:91	2008-796			15.96		4.05	
AA:12:91	2008-796	7.70	12.04	18.92	19.36	6.73	straight
AA:12:91	2008-796	4.70	8.93	7.59	15.85	4.67	convex
AA:12:91	2008-796	2.70	5.36	11.93	12.96	3.52	straight
AA:12:91	2008-796		8.64	7.82		3.29	straight
AA:12:91	2008-796	10.90	11.19	9.18	15.77	4.83	straight
AA:12:91	2008-796			14.01			
AA:12:91	2008-796		6.5	7.75	8.74	2.93	straight
AA:12:91	2008-796		9.48	6.94	10.16	2.31	straight
AA:12:91	2008-796			8.03		3.92	
AA:12:91	2008-796			4.94		2.92	
AA:12:111	2008-796		13.07	11.68	20.38	6.37	straight
AA:12:111	2008-796	2.80	11.05	10.13	13.52	4.28	straight
AA:12:111	2008-796	6.70	10.36	10.46	12.82	5.51	straight
AA:12:111	2008-796	4.40	10.03	11.00	24.46	3.71	convex
AA:12:111	2008-796	3.60	11.8	17.74	18.46	4.30	straight
AA:12:111	2008-796		13.25	12.74	17.27	6.30	
AA:12:111	2008-796		9.83	9.36	16.52	4.66	straight
AA:12:111	2008-796	6.60	9.22	14.20	22.77	5.06	straight
AA:12:111	2008-796			8.81		7.75	
AA:12:111	2008-796	1.40	7.94	7.57	9.01	3.99	straight
AA:12:111	2008-796	3.60	9.11	14.78	16.10	4.68	straight
AA:12:111	2008-796			12.00		4.47	
AA:12:111	2008-796		19.52	20.74	23.93	5.86	straight
AA:12:111	2008-796			10.75		6.44	
AA:12:111	2008-796		9.44	13.98	19.79	4.90	straight
AA:12:111	2008-796		10.56	13.07	20.68	5.86	straight
AA:12:111	2008-796		9.66	15.61	16.43	6.02	concave
AA:12:111	2008-796		9.84	15.51	21.48	6.99	straight
AA:12:111	2008-796	8.30	10.48	12.82	16.93	5.84	convex
AA:12:111	2008-796	11.70	7.87	15.15	16.61	6.34	straight
AA:12:111	2008-796		9.28	19.00	12.67	9.21	convex
AA:12:111	2008-796			14.67		4.56	
AA:12:111	2008-796		12.21	13.86	14.39	7.23	straight
AA:12:111	2008-796		11.73	9.37	18.48	5.73	straight
AA:12:111	2008-796		8.35	13.47	17.70	4.47	straight
AA:12:111	2008-796			11.98		4.88	

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
AA:12:111	2008-796		11.46	11.35	17.67	5.47	straight
AA:12:111	2008-796		7.75	15.16		5.47	
AA:12:111	2008-796		12.11	11.83	17.69	4.94	convex
AA:12:111	2008-796		10.69	11.16	22.34	4.18	convex
AA:12:111	2008-796		8.97	12.05		4.00	straight
AA:12:111	2008-796	3.50	8.15	9.47	12.72	4.45	convex
AA:12:111	2008-796		11.19	18.28	20.35	7.00	straight
AA:12:111	2008-796		9.32	14.36	13.96	4.78	straight
AA:12:111	2008-796		9.61	18.61	21.93	4.83	straight
AA:12:111	2008-796	1.60	9.14	7.91	10.13	3.72	convex
AA:12:91	2001-87	10.10	11.63	14.86	14.93	6.48	convex
AA:12:91	2001-87		8.99	15.56	16.16		convex
AA:12:91	2001-87		8.22	8.38	4.76	3.17	convex
AA:12:91	2001-87	3.80	4.77	9.94	8.08	5.61	straight
AA:12:91	2001-87	13.60	10.88	19.41	21.21	6.17	convex
AA:12:91	2001-87	6.40	9.83	8.24	13.27	3.40	convex
D:07:0151	6413-xx	1.50	6.03	7.66	5.80	3.06	straight
D:07:0151	6413-487		9.37	13.70	23.64	4.20	straight
D:07:0151	6413-487		8.98	12.46	16.22	4.09	straight
D:07:0151	6413-328		7.89	9.77	16.88	2.82	straight
D:07:0151	3130-357			14.03	13.54	4.58	concave
D:07:0151	3130-474	5.10	8.66	14.02	14.93		convex
D:07:0152	1131-187			6.30			
D:07:0152	1131-xx		15.1	25.74	23.56	3.18	straight
D:07:0152	1131-xx			13.32		4.63	
D:07:0152	1131-xx	0.00					
D:07:0152	1131-xx						
D:07:0152	1131-xx	2.30					
D:07:0152	1131-41		10.29	15.00	19.82	4.82	concave
D:07:0152	1131-41		7.32	9.19	8.19		convex
D:07:0152	1131-xx			7.96		3.67	
D:07:0152	1131-xx		6.86	5.92		3.54	concave
D:07:0152	1131-xx	2.40	6.47	6.73	8.16	3.42	convex
D:07:0152	1131-xx	2.10	7.62	6.17	11.86	3.84	straight
D:07:0152	1131-xx	1.80	8.64	8.24	10.21	3.34	convex
D:07:0152	1131-xx		7.53	10.78	11.71	3.88	concave
D:07:0152	1131-xx	1.60	8.97	8.78	6.20	3.74	straight
D:07:0152	1131-xx	1.80	6.19	9.06	14.17	3.80	straight
D:07:0152	1131-xx			10.68		4.96	
D:07:0152	1131-xx	3.10	6.16	9.94	16.70	3.23	straight
D:07:0152	1131-xx	3.90	7.18	10.49	13.68	4.21	concave

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
D:07:0152	1131-212		10.04	11.66	19.71	4.26	convex
D:07:0152	1131-312	1.50	5.87	10.61	11.50	3.77	straight
D:07:0152	1131-172		10.2	16.22	13.34	5.24	straight
D:07:0152	1131-211	2.00		9.03		4.05	
D:07:0152	1131-31	1.30		5.79		3.06	
D:07:0152	1131-91	2.90	11.36	12.65	12.13		convex
D:07:0152	1131-118		11.58	16.51	23.93	4.30	concave
D:07:0152	1131-193	3.00	8.33	7.02	16.39	3.90	straight
D:07:0152	1131-87		6.32	13.75		3.85	straight
D:07:0152	1131-xx		7.1	11.99	17.43	4.34	concave
D:07:0152	1131-127	2.50	7	11.96	14.63	3.67	concave
D:07:0152	1131-137	2.00	9.44	13.43	17.28	4.56	convex
D:07:0152	1131-231	1.50		5.92		3.82	
D:07:0152	1131-107,97	1.70	7.41	5.53	12.87	2.34	straight
D:07:0152	1131-107,97	1.90		9.28		3.28	
D:07:0152	1131-107,97	1.70	9.01	9.22	13.99	4.82	concave
D:07:0152	1131-107,97	0.80	3.54	5.95	5.64	2.15	straight
D:07:0236	2792-323		7.47	5.20	10.15	3.17	straight
D:07:0236	2792-274	6.80	6.92	11.72	13.37	5.06	straight
D:07:0236	2792-233	1.90	6.18	9.07	12.48	3.73	straight
D:07:0236	2792-421		6.74	9.03	14.19	3.90	straight
D:07:0236	2792-593		9.18	9.08	16.30	4.38	straight
D:07:0236	2792-627B			8.41		4.22	
D:07:0236	2792-756	2.10		5.63		2.44	
D:07:0236	2792-464		7.72				straight
D:07:0236	6805	0.70		4.75		3.08	
D:07:0236	6805		10.12	8.35	13.91	2.99	straight
D:07:0236	6805		7.09	12.54	6.60	3.16	straight
D:07:0236	2290-88	1.90	8.04	9.93	11.70	3.36	straight
D:07:0239	3140-273		20.09	12.50	16.55	3.68	straight
D:07:0239	3140-248	3.20	9.14	9.95	15.32	3.87	convex
D:07:0239	3140-301	1.70	7.69	11.69	17.76	4.30	straight
D:07:0239	3140-224		7.37	9.60	15.38		straight
D:07:0239	3140-238	5.70	6.77	12.39	20.37	3.63	straight
D:07:0239	3140-287	2.00	6.94	11.90	17.29	3.22	concave
D:07:0239	3140-336		7.16			4.09	convex
D:07:0239	3140-255		8.19	14.03	20.29	4.19	straight
D:07:0239	3141-63		7.39	8.88	16.75	3.55	straight
D:07:0239	3141-46		6.66	10.12	12.64	3.81	straight
D:07:0239	3141-97	2.50	5.52	10.27	10.45	4.02	convex
D:07:0239	3141-80		8.12	6.82	16.41	3.60	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
D:07:0239	3141-60		7.98	7.68	13.59	3.75	straight
D:07:0239	3141-92		10.43	18.45	25.24	4.03	straight
D:07:0239	3141-31		6.31	6.56		3.16	
D:07:0239	3141-64	1.20		8.35		3.30	
D:07:0254	3551-2		7.14	10.49	14.11	4.43	straight
D:07:0254	3551-185	2.00	6.87	10.72	13.60	3.20	straight
D:07:0254	3551-103	1.30	6.23	9.53	13.08	4.85	convex
D:07:0254	3551-280			15.51		5.19	
D:07:0254	3551-209		7.3	7.71	16.37	3.08	straight
D:07:0254	3551-121		7.9	12.34	16.23	2.95	straight
D:07:1108	2464-261	2.40					
D:07:1108	2462-265	4.40	9.07	7.29	15.36	3.70	straight
D:07:3003	3314-1038	3.30	7.7	10.88	15.40	4.62	convex
D:07:3003	3315-1714		16.05			3.18	concave
D:07:3003	3316-1508		9.42	8.81	7.13	3.44	convex
D:07:3003	3316-1803		8.1	6.24	18.27	2.95	straight
D:07:3003	3317-2234						
D:07:3003	3318-115						
D:07:3003	3318-3076		8.18	16.29	16.20		straight
D:07:3013	3330-334	7.70	8.28	16.29	19.50	4.08	straight
D:07:3013	3330-246	1.30	5.34	8.89	10.02	3.76	convex
D:07:3013	3330-xxx	0.80	4.53	5.75	5.54	2.48	convex
D:07:3013	3330-305	4.10	5.72	10.67	12.19	4.17	straight
D:07:3013	3330-332		11.68	6.87	9.93	4.78	convex
D:07:3013	3330-289		9.75	11.03	18.21	3.59	convex
D:07:3017	3340-458	1.80	5.74	10.60	13.94	3.57	straight
D:07:3017	3340-211		8.33	8.31	12.14	3.67	convex
D:07:3017	3340-48	3.70	5.83	13.49	13.35		concave
D:07:3017	3340-357		6.86	9.82	8.41	3.69	straight
D:07:3107	3635-79	5.70		10.01			
D:07:3107	3535-9		7.75	6.76	10.44	2.70	straight
D:07:3107	3635-10		6.39	9.27	13.97	3.19	straight
D:07:3141	3990-28-1	1.50	6.9	7.96	11.13	2.30	convex
D:07:3141	3990-29-1		6.67			3.94	straight
D:07:3141	3990-11-1	1.30	5.92	12.12	14.58	3.44	convex
D:07:3141	3990-15-15		6.12			2.77	
D:07:3141	3990-1		7.17	11.49		2.64	convex
D:07:3144	6890-1	7.50	9.1	16.40	21.50	5.18	straight
D:07:3144	6890-2						
D:07:3144	4000-50-1		8.37	15.23		4.19	
D:07:2100	3630		7.71	12.77	17.86	2.83	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
D:11:0244	3650-1184	2.10	6.86	7.26	8.38	2.66	straight
D:11:0244	3650-301	0.00	11.96	14.21	14.93	5.10	concave
D:11:0244	3651-1316		7.74	6.98		3.81	straight
D:11:0244	3651-1322	2.50		8.38			
D:11:0244	3651-1259		24.18	8.16	27.48	4.63	straight
D:11:0244	3652-1014						
D:11:0244	3652-388	1.90		9.38			
D:11:0244	3652-285		19.08	15.91	13.70	5.35	concave
D:11:449	4597-489.3		9.1			4.40	straight
D:11:1281	4771-21		13.37	15.54		4.17	concave
D:11:1281	4771-77						
D:11:1281	4771-52		6.91	6.79	17.90	4.27	straight
D:11:1281	4771-13	2.30	5.27	13.52	15.65	3.37	
D:11:1281	2475-19	5.00	8.18	14.72	10.59	4.45	straight
D:11:1281	2475-41						
D:11:449	4621-1735						
D:11:449	Diagnostic-1846		11.75	10.26	11.73	4.90	concave
D:11:449	diagnostic-2027	2.00	6.91	6.01	12.82	2.87	straight
D:11:449	Diagnostic-788	1.90	7.76	5.30	15.57	2.47	straight
D:11:449	diagnostic-2010		9.94	5.41		3.43	straight
D:11:449	diagnostic- 999		8.58	5.42	12.55	3.79	straight
D:11:449	diagnostic-687		7.33	10.05		4.58	straight
D:11:449	diagnostic-000			5.74		3.45	
D:11:449	diagnostic-1162		5.87	8.46		3.15	
D:11:449	diagnostic-1255			13.39		4.41	
D:11:449	diagnostic-001		7.31	13.00	17.91	3.32	concave
D:11:449	diagnostic-1284		6.5	11.17	13.88	3.86	straight
D:11:449	diagnostic-1634	3.00	7.76	14.36	10.64	3.36	concave
D:11:449	diagnostic-1592	4.00	9.68	11.62	8.98	3.36	straight
D:11:449	diagnostic-1731		11.34	14.54	17.32	5.10	concave
D:11:1161	2241-278,283	8.90	9.33	15.79	19.19	4.58	straight
D:11:1162	2251-29		10.6	18.55	19.44	4.67	straight
D:11:1410	2475-7		6.5	8.31	13.08	3.84	straight
D:11:1410	2475-55			7.05		4.40	
D:11:1410	4818-643		7.56	4.96	12.59	2.85	straight
D:11:1410	4818-645		6.84	4.52	11.66	2.84	straight
D:11:1410	4818-660			9.77		4.56	
D:11:1410	4817-613	1.40	5.56	4.83	9.73	2.65	straight
D:11:2063	4190-466		13.01	14.95	20.55	4.24	concave
D:11:2063	4190-594	5.60	7.49	13.70	15.66	4.11	straight
D:11:2063	4190-826		9.53	12.29	16.97	4.31	concave

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
D:11:2063	4190-398						
D:11:2063	4190-349						
D:11:2175	6918-53	0.00	8.54	7.75	10.18	3.99	straight
D:11:2190	6921-90	2.10	7.38	12.08	18.07	4.17	concave
D:11:2190	6921-86						
D:11:3133	4374-2006			15.57	22.50	4.40	concave
D:11:3133	4374-2305	1.40					
D:11:3133	4374-2378	1.10					
D:11:3133	4374-1154-1		14.98	13.57	17.12	3.30	straight
D:11:3133	4374-2030-2		17.74	16.82	14.66	3.84	straight
D:11:3133	4374-829						
D:11:3133	4374-799		6.77	29.05	33.44	5.57	straight
D:11:3133	4374-2377	1.10					
D:11:3133	4374-2319	0.80					
D:11:3133	4374-491	1.90					
D:11:3133	4374-2350	1.30	10.51	7.54	11.86	3.26	convex
D:11:3133	4374-1137-1	3.10	6.34	13.80	13.35	3.16	straight
D:11:3133	4374-286-1						
D:11:3133	4374-225		9.39	8.23	14.00	4.02	straight
D:11:3133	4374-1438-2						
D:11:3133	4374-1991						
D:11:3133	4374-236-4			6.07		2.96	
D:11:3133	4374-2424		7.34	9.00	17.30	3.54	straight
D:11:3133	4374-2193		6.85	8.00	14.43	3.34	straight
D:11:3133	4374-1483	1.70	7.22	11.01	11.52	3.12	convex
D:11:3133	4374-1105	1.80	6.98	8.99	11.61	3.59	straight
D:11:3133	4374-2119		5.11	10.05	9.55	3.98	straight
D:11:3133	4374-1416		10.92	7.35	13.29	3.97	straight
D:11:3133	4374-1641-4		13.16	8.47	13.65	3.18	convex
D:11:3133	4374-1927						
D:11:3133	4374-572						
D:11:3133	4374-2137		6.37	6.71	12.57	3.32	straight
D:11:3133	4374-718	0.80					
D:11:3133	4374-620		7.93	10.39		3.82	straight
D:11:3133	4374-1469-16		13.74	5.21	17.56	3.00	convex
D:11:3133	4374-999	0.60					
D:11:3133	4374-2099	3.30	7.52	13.82	15.82	3.64	straight
D:11:3133	4374-2340	6.20	6.77	12.02	15.62	4.13	straight
D:11:3133	4374-1773		8.12	9.48	14.72	3.12	straight
D:11:3133	4374-240	1.90		5.15		2.64	
D:11:3133	4374-1894-5	1.50					

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
D:11:3133	4374-2381	2.60		6.00		3.80	
D:11:3133	4374-1870	2.50		8.18		4.45	
D:11:3133	4374-2420		7.29	14.06	20.75	3.65	straight
D:11:3133	4374-335		8.51	11.96	18.05	4.29	convex
D:11:3133	4374-1972	2.20					
D:11:3133	4374-2321-19			7.79	14.38	2.97	convex
D:11:3133	4374-2321-26	0.30		6.66	11.32	2.75	convex
D:11:3133	4374-850			7.38	14.71	3.45	straight
D:11:3133	4374-2146			5.86	16.03	3.38	straight
D:11:3131	4337-514			6.66		3.77	
D:11:3131	4337-2436		7.04	7.33		2.49	
D:11:3131	4337-936		6.37	7.77	15.67	2.68	straight
D:11:3131	4337-1390	1.50	5.54	10.42	12.04	3.74	convex
D:11:3131	4337-1006		7.96	7.31	14.27	2.89	concave
D:11:3131	4337-1347						
D:11:3131	4337-601	1.20					
D:11:3131	4337-2338	0.60					
D:11:3131	4337-475	1.70					
D:11:3131	4337-1121		8.73	6.33	16.62	4.53	straight
D:11:3131	4337-2516		6.78			5.07	
FB 5000	1996.536.275	0.50		3.92		2.24	
FB 9366	1996.564.1873	3.30	8.26	12.99	15.30	4.42	straight
FB 9366	1996.564.2008	1.00	6.52	4.74	7.87	2.67	straight
FB 9366	1996.564.1860			4.30		2.77	
FB 10018	2002.14.8464	1.10	8.46	7.64	4.78	2.42	straight
FB 7483	1996.724.447		13.57	13.16	9.14	4.39	concave
FB 7483	1996.724.448	1.10	7.53	7.48	14.29	2.76	concave
FB 7484	1996.725.314	0.90	8.81	8.52	5.24	2.86	straight
FB 7484	1996.725.313	3.20	9.16	15.02	10.72	4.17	straight
FB 6281	1996.914.2924		6.72	11.41	13.69	2.99	straight
FB 6281	1996.914.2923		5.93	9.11		5.17	
FB 6281	1996.914.2925		8.1	5.78	5.19	2.01	convex
FB 6281	1996.914.2926	0.80		5.40		2.64	
FB 6281	1996.914.2927	2.80	7.68	8.51	14.44	4.22	straight
FB 6281	1996.914.2928		7.49	9.61	12.75	4.19	straight
FB 6281	1996.914.2929		8.18	12.10	13.22	4.09	straight
FB 16698	2000.5.274e	5.40	7.76	10.14	13.84	3.98	straight
FB 12648	12648-G1885-259-00	7.80	15.35	17.33	16.10	5.83	concave
FB 12648	12648-G2228-259-00	6.40	8.41	13.62	16.87	4.78	straight
FB 10916		3.80	7.51	10.80	14.77	3.78	straight
FB 5834		1.80	7.21	9.55	11.17	3.75	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 16698	2000.5.231b	2.50					
FB 16698	2000.5.285d			13.14			
FB 5000	5000-n1-259-1	5.00	8.07	12.05	9.54	4.15	straight
FB 5000	5000-G186-259-1	2.30	9.89	10.55	7.26	3.29	convex
FB 5000	5000-G217-259-1			5.33		3.29	
FB 5000	5000-G237-259	1.10	6.07	6.23	8.04	3.05	straight
FB 5000	5000-G237-259-2	2.90	10.32	12.15	13.60	4.88	straight
FB 5004	5004-N7-259-1	2.50	6.23	11.85	13.55	4.88	straight
FB 5004	5004-N10-259-1		9.26	11.75	14.98	4.13	straight
FB 5016	5016-N2-259-1	0.90	5.23	3.96	4.04	2.18	straight
FB 5016	5016-N1-259-1		8.26	12.48	15.58	3.40	convex
FB 12710	1996.917.1304	2.10	7.83	12.09	13.97	4.17	straight
FB 12710	1996.919.42669		14.86	9.41	11.62	4.31	straight
FB 10018	2002.14.8481		7.36	13.28		4.32	straight
FB 10018	2002.14.8465	2.20	9.06	9.60	12.59	4.38	straight
FB 12648	1996.919.25448		9.39	10.23	11.14	4.54	convex
FB 12648	1996.919.26982		7.26	12.03	15.32	4.66	convex
FB 12648	1996.919.26981	3.90	7.66	10.65	16.09	4.95	convex
FB 7634	2000.30.593		8.5	12.95	15.73	3.22	convex
FB 7634	2000.30.594	2.20	7.62	8.89	9.45	5.13	straight
FB 9099	2002.11.340		11.34	11.96	13.28	4.92	straight
FB 10018	2002.14.8466	5.30	9.39	14.13	15.59	3.68	straight
FB 10018	2002.14.8473			18.23	21.81	5.94	straight
FB 9697	1996.991.1333			11.85			
FB 10018	2002.14.8474		11.66	14.47	18.64	5.67	straight
FB 10018	2002.14.8483	1.30	7.41	7.30	8.82	3.43	convex
FB 10018	2002.14.8467		12.34	14.78	18.34	4.80	convex
FB 9697	1996.991.1537		11.61	11.08	14.20	4.04	convex
FB 10018	2002.14.8475		11.26	13.51	17.99	4.68	straight
FB 9697	1996.991.1332	3.00	7.18	11.87	12.45	4.32	convex
FB 16816	2002.3.62		9.79	12.08	13.51	4.73	straight
FB 6726		3.00	10.4	13.12	16.84	3.75	straight
FB 6432	2001.5.2118	2.90	10.75	10.42	15.96	3.73	convex
FB 6432	2001.5.2120			12.63		3.65	concave
FB 6432	2001.5.2121	1.40	6.79	7.10	7.34	3.74	straight
FB 6432	2001.5.2123	4.00	12.23	11.09	11.05	4.46	straight
FB 6432	2001.5.2050	2.60	8.41	8.52	11.32	4.15	straight
FB 6432	2001.5.2051	3.10	7.53	12.79	14.63	3.38	convex
FB 6432	2001.5.2052		8.52	9.96		5.07	
FB 429	2002.11.172	2.10	9.17	13.14	17.44	3.61	convex
FB 429	2002.11.173		8.67			3.67	concave

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 7462	2003.2.31	4.20	10.86	15.00	17.02	3.43	concave
FB 13597	2003.2.53		6.82	10.09	10.22	4.29	convex
FB 12744	2003.7.1431		9.91	10.83	14.60	3.99	straight
FB 13271	2004.10.0422	6.70	2.98	9.76	7.01	2.90	straight
FB 10018	2002.14.8250		11.15	13.06	15.47	4.72	convex
FB 6610	2004.10.0625		13.42	11.09	15.58	3.99	straight
FB 273	2004.11.808	4.40	10.01	10.72	15.34	4.49	convex
FB 12650	2003.7.1432	1.60	9.84	9.13	12.17	2.87	straight
FB 10018	2002.14.8476		19.64	12.08	17.61	5.52	straight
FB 12650	2003.7.1434	1.60	6.61	12.51	14.51	3.63	straight
FB 10018	2002.14.8468		8.17			3.59	straight
FB 470	2004.11.318		11.36	13.93	18.84	4.86	straight
FB 470	2004.11.338	2.80	9.11	9.33	15.28	5.08	straight
FB 235	2004.11.029		6.47	8.05	9.62	4.09	straight
FB 273	2994.11.815	5.40	11.22	13.92	15.01	6.50	concave
FB 273	2004.11.981	4.10	14.21	17.98	17.52	5.97	straight
FB 10018	2002.14.8477		9.95	14.41	20.34	4.50	convex
FB 273	2004.11.813		10.27	15.16		4.27	concave
FB 273	2004.11.810	2.60	12.65	13.31	15.89	4.14	concave
FB 273	2004.11.811		6.32	7.86	12.60	3.34	straight
FB 273	2004.11.809		8.28	12.36	13.85	4.15	straight
FB 12648	1996.917.1308	1.30	6.81	11.11	11.73	3.30	convex
FB 12648	1996.919.24403	4.60	10.02	12.06	12.45	4.79	concave
FB 447	2004.11.669		9.48	12.45	16.74	3.64	convex
FB 447	2004.11.670	3.10	8.08	8.59	11.48	3.76	straight
FB 447	2004.11.671		11.72	8.30	9.80	4.38	convex
FB 12650	2003.7.1433		9.49	12.04	14.04	3.49	straight
FB 447	2004.11.673		4.81			2.91	straight
FB 470	2004.11.336			9.63		3.33	convex
FB 4487	2005.11.733		6.91	12.60	14.48	4.82	straight
FB 4487	2005.11.535		5.7	13.18	11.71	5.73	convex
FB 5846	2005.11.943	3.90	9.98	12.17	15.62	5.22	straight
FB 5846	2005.11.942	1.80	7.52	14.96	15.53	4.78	concave
FB 4488	2005.11.891	3.90	7.09	14.97	19.95	4.25	convex
FB 6360	2005.11.1156	3.20	8.73	9.54	10.09	3.47	straight
FB 13975	2005.11.1432		5.67	10.44	7.34	3.15	straight
FB 272	2010.3.46		4.4	9.93	11.02	3.92	straight
FB 272	2010.3.47		7.22	8.98	8.78	3.43	straight
FB 9697	1996.991.1188	7.60	11.54	16.20	18.08	4.50	convex
FB 12705	2005.16.178		10.56	14.45	18.40	4.11	concave
FB 10043	2005.14.244		10.87	19.00	21.54	6.38	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 10043	2005.14.259	2.90	10.08	12.58	16.69	4.28	convex
FB 10043	2005.14.484		13.76	11.48	19.31	4.40	straight
FB 10043	2005.14.485		12.88	13.89	15.85	4.49	straight
FB 10042	2005.14.141	2.70		7.32			
FB 7477	2005.15.102	1.10	6.93	9.21	13.75	2.73	concave
FB 12705	2005.16.27		5.58	14.29	13.99	5.36	straight
FB 12705	2005.16.30		6.42	9.08	11.21	3.92	straight
FB 12705	2005.16.165		9.21	12.28	16.59	5.38	concave
FB 12708	1996.919.38301		12.79	16.06	17.08	5.68	convex
FB 12705	2005.16.379		5.8	8.78	10.37	3.09	straight
FB 12705	2005.16.606			13.10		6.38	
FB 12705	2005.16.729		4.67	8.23	9.43	4.09	straight
FB 17442	2006.02.003	7.30		12.25			
FB 17450	2006.02.0001			11.94		2.66	
FB 17450	2006.02.0002		7.95			3.47	concave
FB 1581	2007.4.1	2.40	6.5	13.18	13.21	4.28	straight
FB 4339	2007.4.3		7.46	13.03	15.85	3.85	concave
FB 1579	2007.5.1		7.18	9.30	10.14		straight
FB 1579	2007.5.2	7.70	13.35	13.72	16.78	6.38	convex
FB 1579	2007.5.3		9.69	11.59	14.84	3.41	straight
FB 1579	2007.5.24		6.41	14.80	16.25	4.00	convex
FB 6190	2007.18.0562	1.50		10.72		3.11	
FB 6190	2007.18.0563		7.8	15.74		5.14	concave
FB 7593	2007.6.18	0.90	9.36	9.16	7.19	2.94	concave
FB 7593	2007.6.19	1.60	5.71	11.33	13.70	3.05	concave
FB 6773	2007.6.13	4.70	13.17	15.96	14.03	4.58	concave
FB 6720	2007.6.2	5.30	7.68	11.23	14.61	3.26	convex
FB 6720	2007.6.3		8.17	12.36	16.67	3.66	straight
FB 6720	2007.6.4	3.50	8.67	12.50	6.17	3.55	straight
FB 6720	2006.6.5	1.50	6.16	8.93	10.19	3.72	concave
FB 273	2004.11.814		14.3	13.26	12.99	6.09	straight
FB 6720	2007.6.9		10.81	14.61	15.58	5.31	convex
FB 12366	2007.22.303	3.70	8.51	10.16	11.10	5.39	straight
FB 10117	2007.22.77		8.9	12.16	14.74	3.81	convex
FB 5073	2008.1.9	4.50	9.04	14.67	15.10	4.92	straight
FB 5073	2008.1.8		15.66	13.48	18.77	5.56	concave
FB 2790	2007.30.28	2.50	10.32	13.43	16.32	4.58	convex
FB 2790	2007.30.27		9.34	16.05	21.38	3.25	concave
FB 9390	2008.4.37		7.88	10.04	11.86	4.12	straight
FB 9339	2008.4.18	0.80	5.87	7.51	12.22	2.70	convex
FB 6001	2008.6.01	4.00	12.74	14.90	18.01	4.29	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 9620	2008.08.12	3.60	4.92	9.92	10.23	5.45	straight
FB 9620	2008.08.13	6.30	10.13	12.99	17.73	6.11	straight
FB 9620	2008.08.15	1.60	5.4	10.92	12.51	4.13	straight
FB 9620	2008.08.01		8.91	9.55	8.96	4.54	straight
FB 9620	2008.08.02	3.90	8.07	9.16	0.37	4.57	convex
FB 9620	2008.08.03		10.19	12.85	12.15	4.28	convex
FB 9620	2008.08.05	2.70	7.53	12.43	16.76	4.31	convex
FB 3238	2002.12.22	1.60	9.36	8.91	12.83	3.97	straight
FB 9620	2008.08.07	2.50	5.24	11.50	11.21	4.38	straight
FB 9620	2008.08.08	2.00	5.62	8.64	12.25	4.23	straight
FB 6741	2008.16.159	1.40	7.16	12.08	12.22	3.49	concave
FB 6741	2008.16.126	1.50	7.05	11.62	13.62	4.04	concave
FB 17157	2008.9.752	0.90	6.56	5.49	4.98	2.30	convex
FB 17157	2008.9.750		5.83	6.53		2.00	straight
FB 6741	2008.16.125	4.70	25.1	11.49	9.37	3.78	concave
FB 6741	2008.16.187		10.99	14.69	18.79	3.82	concave
FB 6741	2008.16.123	2.10	5.79	10.16	7.58	4.12	convex
FB 447	2004.11.666	4.20	5.09	14.60	8.69	3.41	convex
FB 7484	2008.16.0252	7.90	14.1	11.25	17.57	4.92	straight
FB 7484	2008.16.0253	1.20	10.82	9.64	7.82	2.98	straight
FB 7491	2008.16.100		6.91	12.77		3.47	concave
FB 447	2004.11.668						
FB 7506	2008.16.120		9.43	12.76	12.92	4.64	straight
FB 18618	2008.25.78		10.49	13.30	14.67	4.96	concave
FB 9426	2008.25.09		11.94	12.53	13.33	4.54	convex
FB 9426	2008.25.26			5.95		3.39	
FB 9426	2008.25.76		8.56	11.82	15.35	5.43	convex
FB 12519	2008.31.626	5.70	11.39	10.58	9.90	5.53	straight
FB 17278	2008.36.1927		8.23	10.58	12.97	3.46	convex
FB 17278	2008.36.2074	4.30	8.54	8.10	12.50	3.75	straight
FB 17278	2008.36.2170		8.26	9.74	9.14	3.96	convex
FB 12527	2008.31.1708		9.1	11.60	15.71	3.36	straight
FB 12527	2008.31.1799	2.20	6.85	11.04	13.45	2.96	straight
FB 12527	2008.31.1974	3.20	10.66	12.85	14.55	4.85	
FB 17278	2008.36.2169	1.40	6.94	10.37	11.66	3.75	straight
FB 17278	2008.36.2127	5.30		10.72		4.31	
FB 6773	2009.2.2	3.50	6.64	12.87	14.72	3.63	straight
FB 6773	2009.2.34		9.32	12.53	16.44	3.95	straight
FB 6773	2009.2.6	2.80	13.64	12.50	19.22	3.57	convex
FB 447	2004.11.672						
FB 6873	2007-28-0002	2.20	6.85	10.85	10.27	4.63	convex

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 6873	2007-28-0007		10.01	9.97	12.98	3.58	convex
FB 6873	2007-28-0008	1.30	8.4	6.58	13.83	2.94	concave
FB 7520	2009.26.0001		5.8	8.98	9.72	3.36	straight
FB 7520	2009.26.0019		9.29	9.40		3.67	concave
FB 7520	2009.26.0022	1.30	10.38	11.42	12.97	3.17	concave
FB 7520	2009.26.0378	1.40	5.86	8.95	14.99	4.33	straight
FB 9554	2008.4.48		5.14	4.82	4.80	1.90	straight
FB 9554	2008.4.49		8.05	7.75	10.82	2.02	concave
FB 16158	2008.26.0023	5.20	9.06	14.13	7.83	4.30	convex
FB 6271	2007.11.0014	0.80		4.89		2.37	
FB 6271	2007.11.0023		7.02	4.12	4.55	2.31	straight
FB 6271	2007.11.0028	2.70	9.12	14.36	14.31	4.14	convex
FB 6271	2007.11.0029	2.30		12.92		4.70	
FB 6271	2007.11.0030		10.97	16.35	22.26	4.06	straight
FB 6271	2007.11.0031		9.09		17.59	3.42	convex
FB 10035	2002.14.8889	0.60		5.87		2.90	
FB 10035	2002.14.8890	7.50	10.94	14.75	15.81	5.77	straight
FB 10017	2002.14.2789		11.33	8.58	13.96	3.76	convex
FB 10017	2002.14.2790	3.20	9.63	12.19	16.24	4.65	straight
FB 10017	2002.14.2791	6.20	9.15	12.27	12.00	4.17	convex
FB 10017	2002.14.2792						
FB 10017	2002.14.9116						
FB 10017	2002.14.9117						
FB 10017	2002.14.9120	4.30					
FB 10017	2002.14.9121	3.90	11.25	11.30	12.53	5.29	convex
FB 10017	2002.14.9163		14.79	10.53	16.33	3.28	convex
FB 10017	2002.14.9115	3.30	7.67	9.47	10.87	3.33	straight
FB 10017	2002.14.1932	2.60					
FB 10035	2002.14.9124		16.94	22.53	23.91	6.64	straight
FB 10035	2002.14.9122		12.84	16.54	19.23	4.82	straight
FB 10018	2002.14.8478		12.25	17.42	21.86	5.15	convex
FB 10018	2002.14.8472		10.76	10.31	15.76	3.97	convex
FB 470	2004.11.324			11.09		5.86	
FB 49	2002.3.133		15.54	14.90	16.97	5.47	concave
FB 49	2002.3.134		16.16	12.97	9.20	3.36	straight
FB 6610	2004.10.0624		14.37	15.12	19.32	3.20	concave
FB 10018	2002.14.8479		10.29	10.83	17.18	5.33	straight
FB 10018	2002.14.8469	2.60	9.79	11.39	6.65	3.58	straight
FB 10018	2002.14.8470	7.50	19.16	19.81	22.54	5.07	convex
FB 10018	2002.14.8471				16.89	5.88	straight
FB 6720	2007.6.8		7.69	16.03	20.23	4.69	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 10018	2002.14.7553		8.07	13.02	20.20	4.99	concave
FB 10018	2002.24.7562		10.76	14.41		5.58	straight
FB 6741	1996.716.1936	1.90	6.27	11.12	12.20	4.44	straight
FB 7183	2008.16.0101			10.43			
FB 10018	2002.14.7593		7.7	19.01	18.83	6.36	straight
FB 7352	7352.obs.6.259		13.45	15.44	16.34	5.18	concave
FB 7506	2008.16.108		8.55	17.71	14.24	4.26	concave
FB 8612	2009-10-2	2.30	6.02	9.61		4.29	
FB 9369	9369-G2453-259-01		8.76			3.22	
FB 10018	2002.14.7595a		6.91	9.58	10.31	3.00	straight
FB 9369	9369-G2605-259-01		12.53	10.14		3.89	convex
FB 10018	2002.14.8462	6.20	10.23	14.18	13.53	4.93	convex
FB 9620	2008.08.06		9.48	11.95	13.58	4.18	straight
FB 10018	2002.14.8463	1.70	6.35	10.29	12.07	5.00	straight
FB 10018	2002.14.8482	1.40	6.47	10.05	11.82	3.55	straight
FB 1680	2001.7.294	1.00		4.90		2.66	
FB 1680	2001.7.295			5.15		2.96	
FB 1680	2001.7.297			4.56		3.32	
FB 1680	2001.7.304			5.57		2.27	
FB 1680	2001.7.305	11.40		11.40		5.27	
FB 6747	2005.21.291			13.04			
FB 9697	1996.991.593	2.70	8.6	12.28	12.31		straight
FB 9697	1996.991.594		13.97	13.98	21.31	5.61	straight
FB 9697	1996.991.599		9.31	12.58	11.70	3.67	straight
FB 49	2002.3.135	2.40	6.6	11.36	13.79	3.84	straight
FB 49	2002.3.136		10.09	13.57	15.37	4.35	straight
FB 12708	1996.919.36147	2.90	7.25	10.79	10.75	5.62	straight
FB 12708	1996.919.37379		14.53	16.45	17.60	4.62	concave
FB 12708	1996.919.37380	3.60	7.21	9.09	10.65	3.19	convex
FB 12650	1996.919.39595			9.51			
FB 12699	1996.919.32514	3.90					
FB 1587	2008.20.209		12.57	12.96	13.60	4.76	convex
FB 8149	2008.18.2	3.50	11.74	14.83	15.35	4.50	straight
FB 8149	2008.18.3	4.30	10.34	10.99	12.22	3.51	straight
FB 8149	2008.18.4		11.08	15.42	14.08	4.43	straight
FB 8149	2008.18.7	2.20	8.22	9.78	11.85	3.80	convex
FB 8149	2008.18.9		8.84	14.75	14.17		convex
FB 9302	2008.36.595		10.92	17.46		6.55	straight
FB 9302	2008.36.594		15.33	13.23	8.06	4.06	convex
FB 17339	2008.36.1509	3.90		13.44		4.58	
FB 17339	2008.36.1619	2.40	9.56	8.96	13.27	4.05	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 13985	2005.9.3		11.35	13.20	19.42	3.82	straight
FB 13985	2005.9.8		6.44	7.21	11.03	3.10	straight
FB 13985	2005.9.9		6.43	10.12	15.01	4.61	straight
FB 13985	2005.9.10	4.00					
FB 17282	2008.36.986		8.73	9.33	8.51	4.92	convex
FB 12699	1996.919.33645	1.60	8.97	7.34	10.57	3.82	straight
FB 9697	1996.991.597		16.35	9.46	12.87	5.25	concave
FB 6801	2009.29.8		8.79	10.23		3.10	straight
FB 5000	2009.19.001	2.80	9.47	12.79	15.49	3.34	straight
FB 5000	2009.19.004	0.90		4.45			
FB 6188	2004.22.7	3.60	7.76	10.83	5.88		convex
FB 12527	2008.31.1431	3.10	8.84	10.42	14.31	4.26	straight
FB 8395	2006.17.21		14.95	13.54	20.72	4.42	concave
FB 10039	2005.17.918	4.40	9.96	13.81	16.13	5.43	straight
FB 10039	2005.17.920		12.68	15.64	18.72	5.27	convex
FB 10039	2005.17.921		12.18	11.20	13.95	5.65	straight
FB 10039	2005.17.922	1.70	8.57	9.73	11.10	3.81	straight
FB 10039	2005.17.924	2.10	8.77	5.17	5.32	3.93	straight
FB 10039	2005.17.925		11.87	17.24		5.44	convex
FB 10039	2005.17.926			13.95			
FB 10039	2005.17.927	14.50	12.83	14.62	21.02	5.02	convex
FB 10039	2005.17.928		13.37	11.34	16.34	5.47	straight
FB 10041	2005.17.1800					3.04	
FB 10041	2005.17.1802		14.09	16.33		4.77	straight
FB 10041	2005.17.1803		9.43	13.09	13.81	3.60	straight
FB 10041	2005.17.1804	1.80	8.7	12.50	12.79	3.37	concave
FB 9369	9369-G292-259-01		12.57	13.20	16.35	4.52	straight
FB 9697	1996.991.1462		14.79	14.53	19.75	5.39	convex
FB 9369	9369-G657-259-01		9.99	14.66	15.66	5.04	convex
FB 9369	9369-G3-259-01	4.80					
FB 9369	9369-G660-259-01	2.70		8.87			
FB 9369	9369-G15-259-03	4.00	13.13	12.70	17.16	4.42	convex
FB 9369	9369-G43-259-04	3.50		9.55		3.42	
FB 9369	9369-G32-259-02		11.24	15.50	19.88	6.94	straight
FB 9369	9369-G706-259-01		8.74			3.42	convex
FB 9369	9369-G18-259-01	4.00	12.68	12.73	19.11	3.32	straight
FB 9369	9369-G457-259-01	3.00		8.07		2.74	
FB 9369	9369-G43-259-01		12.64		19.07	4.13	convex
FB 9369	9369-G278-259-01	4.90	11.41	13.36	16.14	5.44	straight
FB 9369	9369-G3-259-04		14.71	11.79	16.85	3.84	straight
FB 9369	9369-G894-259-01		12.48	13.89	18.12	4.61	convex

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 9369	9369-G1008-259-01	4.60	10.35	12.31	14.68	3.73	convex
FB 9369	9369-G5-259-02		11.72	13.69	17.56	4.69	straight
FB 9369	9369-G208-259-04	3.40	10.77	10.18	17.13	3.51	convex
FB 9369	9369-G1-259-05	3.60	13.39	11.02	16.04	4.00	straight
FB 9369	9369-G8-259-01	6.40	11.3	14.37	17.56	5.01	convex
FB 9369	9369-G1-259-02	4.90	14.54	13.01	16.91	4.65	straight
FB 9369	9369-G292-259-03	3.90	11.61	11.27	15.51	3.54	straight
FB 9369	9369-G44-259-02	7.00	13.52	16.77	19.64	3.96	straight
FB 9369	9369-G536-259-01	5.40	13.67	11.73	17.62	5.91	convex
FB 9369	9369-G324-259-01	6.10	13.54	12.21	16.32	4.78	convex
FB 9369	9369-G285-259-01		12.94	12.36	15.99	4.75	straight
FB 9369	9369-G1633-259-01	3.50	10.94	9.65	13.75	3.51	straight
FB 9369	9369-G15-259-02	6.60	14.23	15.12	19.07	4.94	straight
FB 9369	9369-G1261-259-01		12.29	12.37	13.99	4.75	straight
FB 9369	9369-G1863-259-01	5.10	12.58	13.65	17.23	4.82	straight
FB 9369	9369-G2912-259-01		13.28	11.92	18.34	3.72	straight
FB 9369	9369-G2012-259-01		9.34	13.41	16.78	4.01	convex
FB 9369	9369-G6-259-01	5.50	13.14	12.92	18.68	4.07	straight
FB 9369	9369-G32-259-01		13.19	12.97	18.12	5.01	convex
FB 9369	9369-G70-259-01		9.01	10.58		2.80	convex
FB 9369	9369-G653-259-03		10.3	13.14	17.28	3.78	straight
FB 9369	9369-G2553-259-01		10.06	16.49	17.32	4.13	straight
FB 9369	9369-G30-259-03		12.95	13.27	16.56	3.15	straight
FB 9369	9369-G3-259-05		13.91	13.22	16.29	3.99	convex
FB 9369	9369-G2040-259-01		7.22	13.92	16.64	5.04	straight
FB 9369	9369-G208-259-03		11.46	13.19	15.22	4.12	straight
FB 9369	9369-G2608-259-01		11.22			4.72	straight
FB 9369	9369-G1647-259-01		9.81	10.53	14.81	2.98	convex
FB 9369	9369-G40-259-01	6.10		9.48			
FB 9369	9369-G1735-259-01		13.13	14.42	19.14	4.86	convex
FB 9369	9369-G4-259-01	4.50	12.33	11.92	15.91	5.36	straight
FB 9369	9369-G292-259-02		11.44	12.60	16.74	4.13	convex
FB 9697	1996.991.1010		11.21	13.33	15.28	5.28	straight
FB 9369	9369-N0-259-01		9.82	11.48		3.95	straight
FB 9369	9369-G721-259-01	1.90	8.64	9.31	11.70	3.63	straight
FB 9369	9369-G832-259-01	2.40	9.99	9.66	11.24	3.86	convex
FB 9369	9369-G1-259-01		8.07	10.86	12.87	2.91	straight
FB 9369	9369-G454-259-01	3.50	9.41	11.23	15.24	4.70	straight
FB 9369	9369-G15-259-04	2.00	8.3	8.26	9.84	2.76	straight
FB 9369	9369-G15-259-01		9.77	9.21	11.66	3.81	straight
FB 9369	9369-G1708-259-01	3.50	10.93	13.60	13.65	4.33	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 9369	9369-G904-259-01	2.10	8.44	8.97	14.11	3.19	convex
FB 9369	9369-G12-259-01	2.30	11.89	11.68	17.85	4.71	convex
FB 9369	9369-G925-259-01		7.98	17.05	22.12	3.73	straight
FB 9369	9369-G916-259-01		9.36	10.43		4.87	convex
FB 9369	9369-G2544-259-01		7.64	11.38	15.03	3.49	straight
FB 9369	9369-G653-259-02	2.00	7.04	13.11	15.91	3.42	straight
FB 9369	9369-G608-259-01		10.93	12.96	20.22	5.00	straight
FB 9369	9369-G652-259-01		12.05	12.70	15.61	3.01	convex
FB 9369	9369-G16-259-01	4.50	9.83	15.46	20.08	3.85	convex
FB 9369	9369-G2362-259-01		8.21	12.84	15.75	4.22	straight
FB 9369	9369-G2822-259-01		11.49	1261.00	14.59	4.39	convex
FB 9369	9369-G1881-259-01	2.70	8.65	10.96	15.38	3.95	convex
FB 9369	9369-G663-259-01	2.90	8.95	12.95	16.96	3.46	convex
FB 9369	9369-G3-259-07	2.80	7.38	11.45	12.35	4.01	straight
FB 9369	9369-G3-259-03	5.10	9.55	13.07	16.76	3.52	convex
FB 9369	9369-G208-259-02	1.30	5.9	9.51	12.80	2.46	straight
FB 9369	9369-G43-259-03	3.30	11.07	13.15	17.90	3.88	convex
FB 9369	9369-G6-259-02	5.60	12.79	15.37	19.10	6.51	convex
FB 9369	9369-G422-259-01	3.10	9.48	14.60	19.49	4.04	convex
FB 9369	9369-G896-259-01	2.60	9	14.88	17.26	4.36	convex
FB 9369	9369-G2927-259-01		12.16	10.15	17.45	3.91	convex
FB 9369	9369-G2907-259-01	2.50	11.27	11.56	18.01	4.98	convex
FB 9369	9369-G452-259-01	2.10	8.4	9.65	14.16	3.72	straight
FB 9369	9369-G314-259-01	1.80	9.98	12.63	15.36	3.44	straight
FB 9369	9369-G30-259-01	4.40	14.87	15.20	19.19	4.53	convex
FB 9369	9369-G2373-259-01		10.01	13.10	15.20	4.53	straight
FB 9369	9369-G1862-259-01	2.40	11.33	11.53	17.44	3.08	straight
FB 9369	9369-G1877-259-01	2.60	10.16	12.53	14.95	2.77	straight
FB 9369	9369-G230-259-01	3.90	11.19	9.95	13.62	2.71	convex
FB 9369	9369-G212-259-01	6.20	11.96	13.46	18.39	4.48	straight
FB 9369	9369-G707-259-01	5.10	21.18	9.21	13.78	5.63	convex
FB 9369	9369-G711-259-01		15.54	10.05	16.21	3.93	straight
FB 9369	9369-G2523-259-01	6.90	10.15	16.88	19.41	3.92	straight
FB 9369	9369-G1919-259-01	4.70	13.48	10.74	13.17	4.59	convex
FB 9369	9369-G1620-259-01	6.70	12.4	11.14	13.69	4.92	convex
FB 9369	9369-G870-259-01		11.98	9.18	13.24	4.00	convex
FB 9369	9369-G935-259-01	7.40	8.15	9.52	12.48	4.50	straight
FB 9369	9369-G2524-259-01	2.90	9.57	13.93	15.60	4.18	concave
FB 9369	9369-G2487-259-01		8.4	13.10	14.50	3.01	concave
FB 9369	9369-G2360-259-01	1.40	9.33	12.59	13.60	3.55	concave
FB 9369	9369-G201-259-01	3.60	8.58	11.71	14.04	3.27	straight

Site Number	Museum Number	Weight (g)	Stem Length (mm)	Neck Width (mm)	Base Width (mm)	Stem Thickness (mm)	Base Type
FB 9369	9369-G2452-259-01	2.30	9.65	10.59	12.58	3.36	convex
FB 9369	9369-G1495-259-01	3.90	8.12	11.21	15.71	3.50	straight
FB 9369	9369-G1898-259-01	4.80	11.15	12.08	15.30	4.69	convex
FB 9369	9369-G200-259-01		11.95	13.50		3.83	convex
FB 9369	9369-G2918-259-01	1.80	9.86	9.91	11.84	3.65	convex
FB 9369	9369-G43-259-05		10	14.35		3.82	straight
FB 9369	9369-G246-259-02		8.24	12.51		3.64	
FB 9369	9369-G1921-259-01	7.90	14.09	13.96	15.66	4.72	straight
FB 9369	9369-G863-259-01	2.70	10.05	13.60		3.24	straight
FB 9369	9369-G1968-259-01		8.86	11.74		5.02	
FB 9369	9369-G282-259-01	3.80	9.48	15.29	14.62	4.18	straight
FB 9369	9369-G617-259-01		9.68	13.87	14.68	4.04	straight
FB 9369	9369-G2822-259-01		9.57	14.83	15.66	3.75	straight
FB 9369	9369-G2-259-03	4.10	8.72	11.87	12.68	4.98	straight
FB 9369	9369-G1-259-09	4.30	12.42	12.76	12.66	3.34	convex
FB 9369	9369-G520-259-01	4.60	8.37	14.36	14.78	5.15	straight
FB 9369	9369-G1958-259-01		9.01	14.95	14.97	3.93	concave
FB 9369	9369-G332-259-01		5.21	12.76	11.26	3.52	convex
FB 9369	9369-G651-259-02		7.03	9.71	7.88	4.33	straight
FB 9369	9369-G938-259-01		11.47	12.36	10.18	3.83	straight
FB 9369	9369-G1091-259-01	10.20		13.35			
FB 9369	9369-G2142-259-01		13.2	12.02	6.02	4.98	straight
FB 9369	9369-G2517-259-01		14.61	15.79	10.29	5.14	convex