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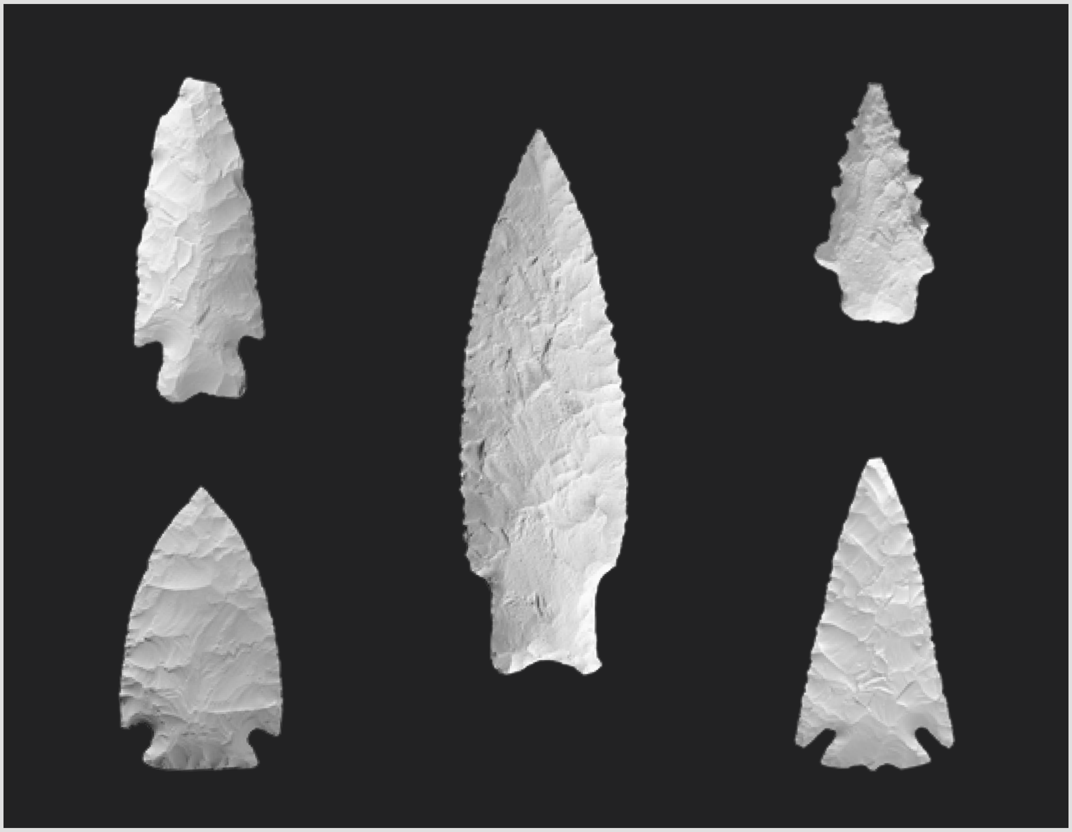
Projectile Points from the Scott Miller Site, Rio Grande County, Colorado

By Christopher M. Johnston



Research Contribution 120
Archaeological Investigations in the San Luis Valley 8

PCRG
PaleoCultural Research Group

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With Contributions By

Mark D. Mitchell

2021

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Abstract

The Scott Miller site (5RN1136) is located on the Monte Vista National Wildlife Refuge in Rio Grande County, Colorado, and was first documented in 2009. It is located within a relic wetland that is no longer active due to extensive modifications and lowering of the water table in the San Luis Valley. Over 450 artifacts have been collected from the site since 2009, along with over 100 artifacts that have been documented but left in the field.

The focus of this report are the 219 projectile points from the Scott Miller site assemblage. These points range in age from the Folsom period though the Late Prehistoric period. In addition to the one Folsom point fragment, the assemblage includes four other Paleoindian points, including two Agate Basin and two Plainview points. The assemblage also contains 27 arrow points, including 19 corner-notched arrows and 7 side-notched; one arrow is too fragmented to type.

Oshara tradition dart points, which roughly correlate to the Archaic period, comprise nearly 50 percent of the entire assemblage, and over 80 percent of the typeable assemblage. Within these, three Oshara tradition series—San Jose, Armijo, and En Medio—account for over 70 percent of the typable dart point assemblage. These three series overlap in age and span from 5000 B.P. to about 1600 B.P., with a relative frequency of just over two points per 100 years, much higher than during any other period-.

Analysis of the entire assemblage indicates the primary function of the Scott Miller relic wetland was as a hunting site. Data collected on the projectile points suggest most of the points were either lost during the hunt or broken from use and discarded; there is minimal evidence for point refurbishing or other extensive camp activities. This pattern is evident throughout the history of the site, but is most pronounced during the Oshara tradition.

Raw material data indicate a majority of the points were manufactured on materials that come from sources south of the site, including obsidian from New Mexico. There is very little evidence of source materials from north of the site being used.

A spatial analysis of the assemblage suggests use of different areas of the site likely changed over time. This likely indicates a changing landscape at the site, with some areas more heavily used than others during different periods of occupation.

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Acknowledgments

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The Scott Miller site assemblage is the result of many field sessions, including many tours when new artifacts were found. Thank you to the many people who have contributed to the research and understanding of this important site. Robert Wunderlich and the RMC team completed the initial research on the assemblage; their analysis laid the groundwork for this project to be a success.

About the Contributors

Chris Johnston is Operations Director and a Project Archaeologist for Paleocultural Research Group. Chris began his career as a PCRG undergraduate work-study employee while at the University of Colorado at Boulder. Chris earned his MA from Colorado State University in 2016 where his thesis research was on communal bison hunting at the Roberts Ranch Buffalo Jump (5LR100). He has worked for the USDA Forest Service, in cultural resource management, and as a researcher with PCRG and the Center for Mountain and Plains Archaeology at CSU. Chris served as the Assistant State Archaeologist of Colorado from 2016-2018 where he was the lead instructor for the Program for Avocational Archaeological Certification and managed the statewide archaeological and paleontological permitting system. Chris has research interests in the lithic technology of hunter-gatherers in the Plains and Rocky Mountains, landscape archaeology, and Plains Village archaeology. He has worked on a variety of contract and research projects across the Great Plains and Rocky Mountains and has authored numerous technical reports, journal articles and conference presentations. Most recently he was the co-editor of The Lithic Caches of Colorado, a special issue of the journal *Southwestern Lore*.

Dr. Mark D. Mitchell is Research Director for Paleocultural Research Group. His research explores the archaeology of two different regions: the Northern Plains in western North Dakota, and the Southern Rocky Mountains in Colorado and New Mexico. Mitchell's Southern Rockies research focuses on American Indian mobility and land use in the San Luis Valley and adjacent mountains. He is particularly interested in how technological and environmental change affected native peoples' economic decisions. Mitchell's Northern Plains research focuses on the political and economic development of post-A.D. 1200 farming villages of the Missouri River valley. He also studies historic American Indian rock art and the history of archaeology. Mitchell's research has appeared in *Plains Anthropologist*, *Antiquity*, *American Antiquity*, *Southwestern Lore*, *Colorado Archaeology*, *Quaternary International*, and in a number of book chapters. He is the author of *Crafting History in the Northern Plains: A Political Economy of the Heart River Region, 1400-1750* (University of Arizona Press, 2013) and co-editor of *Across A Great Divide: Continuity and Change in Native North American Societies, 1400-1900* (University of Arizona Press, 2010).

1 Introduction

Projectile points are one of the most informative artifact classes in all of archaeology. Their intended use is clear—mainly for hunting but also for warfare or protection—and their style and form can often be used as a relative dating method for an archaeological site. Sometimes, to the detriment of the archaeological record, they are also one of the most recognizable artifact classes that people can readily identify. For many decades, archaeologists have used projectile points when speculating about mobility and trade and exchange, based primarily on raw material types but also point styles, often obscuring the bigger picture of life in the past (Bamforth 2009). Researchers have also spilled more ink on defining projectile point types, then re-defining, and then changing those definitions, than likely any other artifact class (see Holliday and colleagues 2017 for numerous examples of this).

Owing to this extensive research, projectile points can provide a rather clear glimpse into the past compared to many other artifact classes. In addition to being used for easy and accessible dating of sites, attributes like raw material and breakage patterns can show where people may have been and can inform about how a site may have been used when little other evidence is available. At sites with repeated occupations over many hundreds or even thousands of years, projectile point assemblages can also illuminate broad patterns or differences over time. One such site is the Scott Miller relic wetland site (5RN1136) located in Rio Grande County, Colorado (figure 1.1).

The Scott Miller site contains 219 projectile points, many of which are complete enough to identify to a specific type. Those 219 points indicate occupations at the site starting during the Folsom Paleoindian period and

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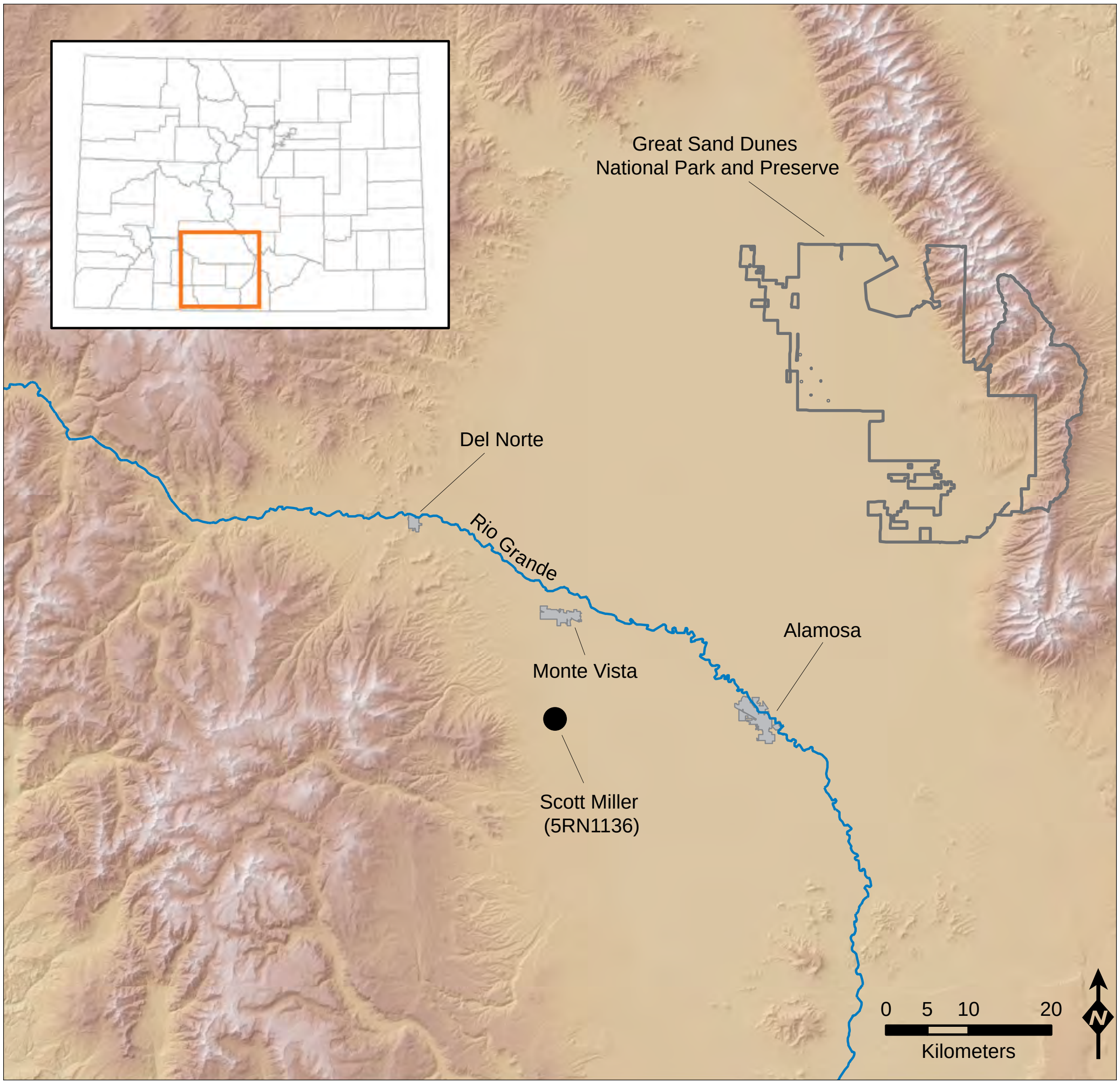

Figure 1.1. Map of the San Luis Valley showing the site location relative to major rivers and cities.

extending all the way until the last few hundred years. The site is a relic wetland or peat bog that is no longer active, likely due to modifications of the stream channels and a lowering of the water table in the San Luis Valley from extensive agriculture in modern times. In the past, however, it would have been lush with wildlife and other natural resources and an extremely attractive place for hunter-gatherer groups to procure a number of goods.

In the fall of 2020, U.S. Fish and Wildlife Service (USFWS) Regional Historic Preservation Officer Margaret Van Ness requested Paleocultural Research Group (PCRG) conduct analysis of the projectile point assemblage from the Scott Miller site. There was no new additional fieldwork component for this project. This report describes the results of this analysis. Chapter 1 outlines prior research at the site which has led to the collection analyzed in this report, followed by a context on projectile points found in the region and lithic raw material sources. Chapter 2 describes the methods and results of the analysis, offering interpretations on both the attribute and spatial data. Chapter 3 summarizes the results and offers directions for additional work in the future, both for the Scott Miller site but also more broadly for the San Luis Valley.

History of Research

The first full recording and documentation of the Scott Miller site was completed by Van Ness in 2009. The site was named after Mr. Scott Miller, a biologist at the Monte Vista National Wildlife Refuge, who alerted Van Ness about its presence. Between the initial site visit in 2009 and the first documentation, Van Ness collected about 20 projectile points from the site and initial observations indicated occupations spanning the terminal Paleoindian period to the Late Prehistoric period (Van Ness 2011).

In June of 2012, a team of archaeologists from RMC Consultants, Inc. of Wheat Ridge, Colorado, along with several volunteers, conducted a three-day recording and assessment project aided by a grant from the History Colorado State Historical Fund, project number 2012-AS-008 (Wunderlich *et al.* 2013). Dr. Jared Beeton, then at Adams State University, joined the project to conduct preliminary geomorphological studies. Three additional visits to the site occurred in 2012. In late July, Van Ness, USFWS staff, and volunteers were joined by Drs. Beeton and Steve Holen, of the Denver Museum of Nature and Science, to examine the location and site setting. Two visits were conducted in the fall of 2012, including a brief visit by Van Ness where she collected two faunal bone samples, and a brief testing project by Holen and two graduate students. After the conclusion of fieldwork in 2012, over 700 artifacts had been collected (Wunderlich *et al.* 2013:20).

Holen and Beeton returned to the site in 2016 to conduct additional geoarchaeological and geomorphology studies. Of particular focus during this investigation was the potential for human association with extinct Pleistocene fauna after the 2012 work had revealed the remains of mammoth, horse, camel, and bison (Holen and Beeton 2016:1-2). Five backhoe trenches were excavated during this session; monitoring and screening of sediments in association with faunal remains did not uncover any additional archaeological materials. The trenches—all on the north end of the site near an area dubbed the Elephant Mounds based on the discovery of numerous bones in what are believed to be twentieth century spoil piles—were vital to helping understand the geomorphological history of the site but did not reveal any association with Pleistocene fauna and humans (Holen and Beeton 2016:18).

Additional artifacts, including projectile points, were collected during subsequent visits to the site for monitoring and tours by Van Ness. Since 2009, over 450 artifacts have been collected from the site along with more than 100 others that have been inventoried but left in the field. This collection includes over 200 projectile points that are the focus of this report.

Previous Stone Tool Research

Preliminary analysis of the chipped stone tool collection upon the conclusion of the 2012 fieldwork shows 60 percent (n=128) of tools represented at the site are hafted bifaces, most of which are projectile points (Wunderlich 2013). The remaining 40 percent are flake tools, cores and tested cobbles, and various stages of unfinished bifaces, with each class occurring in relatively low frequencies. Typological analysis indicates point styles range from the Paleoindian period through the Late Prehistoric period, with over 75 percent dating to the Archaic period. The typological analysis incorporates both local type names (*e.g.* San Jose and Armijo) and type names from much more distant places like the Great Basin (Elko Corner-Notched) and northern Great Plains (McKean complex). Undoubtedly, some of these styles are similar morphologically, and Wunderlich was clear that it did not incorporate metric or technological attributes (2013:93). Using type names from distant regions like these can be misleading and insinuate groups from as far away as the Great Basin or the northern Plains visited the site. Therefore, when available, regional typologies should always be used when available, a point returned to in following chapters. Regardless of the type names, Wunderlich's analysis clearly shows repeated use of the site spanning more than 12,000 years.

Wunderlich's analysis also found a relatively diverse raw material assemblage, with materials potentially coming from as far as 200 km or more from the site (Wunderlich 2013:Table 1). Obsidian sourcing by the Northwest Research Obsidian Studies Laboratory in Corvallis, Oregon, was conducted on 20 of the artifacts, including on 13 hafted bifaces. All of the submitted samples come from three distinct sources, all in the Jemez Mountains in New Mexico (Wunderlich 2013:114). The majority of the material types identified is the 2013 analysis were classified as local or near-local, roughly within 75 km of the site. At the conclusion of his report, Wunderlich calls for additional analysis on this collection including both raw material and technological analyses, which helped form the basis of the analysis presented here.

Archaeological Context

Data on the Indigenous occupation of the San Luis Valley and vicinity have accumulated rapidly in the last twenty years. However, the archaeology of the Rio Grande basin in Colorado remains poorly understood. This is particularly true of the Archaic and Late Prehistoric stages. Accordingly, overviews of the region's history—particularly the Indigenous history—often integrate data from adjacent regions, including the Northern Colorado River basin to the northwest and the Arkansas River basin to the east. Table 1.1 summarizes the ages of the broad chronological divisions used to systematize archaeological data from these regions.

There is also a long history of anthropological and archaeological research in north-central New Mexico, the results of which are important for understanding both the Indigenous and settler history of the San Luis Valley. Research in the Taos Valley has been especially important. Early work focused primarily on the most conspicuous Pueblo sites and settlements, while mid- and late-twentieth century projects investigated a wide variety of Pueblo and earlier sites. The Archaic archaeology of the Northern Rio Grande has been an important focus of research during the last 20 years.

Table 1.1. Estimated date ranges of projectile points identified at Scott Miller, organized from oldest to most recent. Oshara tradition series are shaded in gray.

Type/Series	Estimated Age (B.P.)[a]
Folsom	12,600 – 12,150
Agate Basin	12,400 – 11,500
Hell Gap	12,300 – 10,900
Plainview	12,000 – 11,300
Jay	Late Paleoindian-Early Archaic
Bajada	6000 – 5000
San Jose	5000 – 3500
Moquino	4200 – 2000
Collier Basal Notch	4000 – 3200
Armijo	4000 – 2500
Augustin	3500 – 2000
En Medio	3000 – 1600
Corner-Notched Arrow	1600 – 850
Side-Notched Arrow	850 – 100

[a] Paleoindian and arrow point ages are reported as calendar years B.P.; dart point ages (shaded in gray) are reported as uncalibrated radiocarbon years B.P. The numerical age range of Jay points is unknown. Date ranges for Oshara tradition dart types are provided by Chapin (2017).

Owing to the focused nature of this report, the following contextual overview focuses entirely on projectile point typology and chronology in the San Luis Valley and surrounding regions. Additional background on the region's archaeology can be found in Athern (1992); Bevilacqua and others (2008); Cordell (1979); Eiselt (2009, 2012); Johnston (*ed.* 2019, 2020a, 2020b); Martorano and others (1999); Martorano and others (2005); Mitchell (2012a, 2015); Mitchell and Falk (2017); Mitchell and Krall (2020); Riley (1995); Stanford (1999); Vierra (*ed.* 2013); and Wells (2008).

Paleoindian Projectile Points

Late Pleistocene human occupation in the San Luis Valley is documented by the presence of Clovis projectile points, which is also the earliest projectile point complex documented in North America (Jodry 1999; Mitchell and Krall 2020). The number of Clovis points in the Valley is limited, however, and association with Pleistocene fauna—most notably mammoths—is limited to just one site (Jodry 1999) despite numerous recent attempts to find this association, including at the Scott Miller site and other similar sites (Beeton 2014; Holen and Beeton 2016).

Jodry (1999:86) notes Folsom is by far the most represented Paleoindian stage in terms of number of components, with 43 from both Colorado OAHP site files and private collections. Folsom occupations are often found near what are (or were) wetlands and playas (Jodry 1999:91). This pattern is not observed during later Paleoindian times which Jodry (1999:100) suggests may indicate these resources dried up post-Folsom times. While over two decades have elapsed since these data were tallied, the pattern of intense Folsom occupations in the Valley still likely holds even as more research has been conducted (Andrews *et al.* 2008:481)

One possible non-cultural reason for this pattern is the ability to identify a Folsom projectile from even just a small fragment of the point. Unlike virtually all other point styles—which generally require at minimum a portion of the proximal (haft) end if not also a portion of the shoulder—Folsom points can be readily identified with just a midsection fragment. The distinctive flute, or flake removal from the base up the longitudinal axis of the point (usually on both sides), make this identification possible. This flute is thought to be the second to last stage of Folsom point production (Bradley 2010), and it often overrides highly patterned bifacial thinning and is succeeded by fine marginal retouch. (Technologically similar points that lack the distinctive flute are called Midland [Haynes and Hill 2017].) These morphological and technical attributes make identifying a Folsom point almost unmistakable, and when coupled with the readily identifiable fluting flakes, likely create an overrepresentation of Folsom components relative to other Paleoindian and even later components.

Across the Great Plains, Intermountain West, and Great Basin, the late Pleistocene to early Holocene is represented by several projectile point types, some on a regional scale and others more widely distributed. All can be broadly defined by some general characteristics: they are mostly lanceolate in shape and lack an abrupt shoulder; the proximal margins and base are often heavily ground; they were often re-sharpened or re-tipped after breaking, perhaps multiple times; and they all lack the distinctive flute seen on Folsom and Clovis points. Among these are Goshen, Plainview, Agate Basin, and Hell Gap points. Additionally, they all, at least on the extreme ends of calibrated radiocarbon dates (Tune 2020:Table 3), partially temporally overlap Folsom.

In their recent monograph on Plainview archaeology, Holiday and colleagues (2017) and the many authors therein, show the vast and varied history of Plainview points. Knudson (2017:46) notes that Plainview points are a "horizon style" on the Great Plains during the Pleistocene-Holocene transition, meaning they show up nearly everywhere. At the broadest scale, Knudson (2017:77) defines Plainview as unshouldered lanceolate points with parallel to convex margins, and usually a concave base. Knudson also notes that regional variants may exist with minor variations of the broad style but have commonalities.

Haynes and Hill (2017) argue that many points once called Goshen are better called Plainview. Further, they argue that the Goshen type name should be reserved for points with a deep basal concavity, which, based on their analysis, is only one which is the Goshen type point from the Hell Gap site (Haynes and Hill 2017:272-273). In their view, based on extensive metric and morphological data, the Goshen type is merely a Plainview variant.

Another regional Plainview variant are Belen points identified from central New Mexico (Baker 2017; Judge 1973). In general, Belen points are nearly identical to the Plainview definition, but with minor variations in metric measurements, some morphological differences, and the geographical location of where they are found. Belen points should merely be considered a regional Plainview variant (Baker 2017),

Jodry (1999) documents seven Plainview points (which she combines with Goshen) in the San Luis Valley. However, given the recent literature regarding Plainview (Holiday *et al.* 2017), and the expanded definition of what Plainview points are, this number may have grown. Additionally, Jodry's summary is now over 20 years old but is the latest compilation of all Paleoindian point types in the San Luis Valley and undoubtedly archaeological investigations in the intervening years have uncovered additional specimens of these and other Paleoindian point styles.

Agate Basin points are technologically distinct from Plainview and other Paleoindian points (Mitchell 2012c). These lanceolate, unstemmed points have parallel to convex blade margins, straight to convex bases, and thick lenticular cross-sections. Lateral edge grinding is present along one- to two-thirds of the points length and were manufactured by initial percussion reduction on a biface which was followed by extensive comedial to transmedial pressure flaking (Bradley 2009; Mitchell 2012c). Rejuvination and re-use is a common feature of Agate Basin points, with Bradley (2009:265) arguing that they were manufactured with a "built-in capacity to sustain significant damage and breakage" and still be useful for re-working and re-use.

Agate Basin points are relatively rare in the San Luis Valley (Jodry 1999:96-97), with only two specimens being documented in private collections. Another Agate Basin point was, interestingly, reported from a peat bog site south of Saguache, and Jodry (1999:97) suggests that hunting along and near wetlands may be a key component for the spatial distribution in the San Luis Valley.

Bradley (2010:485) argues Hell Gap point manufacture was a continuation of Agate Basin technology. The reduction sequence is the same noted for Agate Basin points, with two distinct finishing techniques that may reflect "regional, chronological, or idiosyncratic variations" (Bradley 2010:485). Hell Gap points have a contracting stem that is heavily ground, a slight shoulder, and a flat to slightly convex base. Morphologically, Hell Gap points are quite similar to Jay points from the Oshara tradition (described in the next section), and two fragments in the Scott Miller site assemblage could not be differentiated between the two types. According to Jodry (1999:97), Hell Gap points are, like Agate Basin, relatively rare in the San

Luis Valley, with only three examples noted, including one from a wetland area west of the Great Sand Dunes National Park and Preserve.

Later Paleoindian point styles, such as Cody complex, Angostura, and James Allen points, are also found in the San Luis Valley. In fact, Cody complex components are the second-most represented Paleoindian components in the basin (Jodry 1999). Pitblado (2007) argues that Angostura points only occur in the mountains, whereas James Allen points occur in both the mountains and Plains, although Tune (2020) suggests that Angostura may not be restricted to just the mountains and appear in the central Colorado Plateu. Both styles have been documented in and around the San Luis Valley (Mitchell and Mandel 2019:Figure 1.10). Interestingly, none of these point styles are present in the Scott Miller assemblage. Jodry (1999:100) notes that Cody complex points are "infrequent near the playas hunted by Folsom people", which she argues indicates those areas may have dried up, or at least been less perennial systems, during these times. Scott Miller, while not a playa, may have been less attractive to game during these times and thus not as frequently used by late Paleoindian groups.

Oshara Tradition Projectile Points

With some exceptions, Paleoindian projectile point types are ubiquitous across rather broad regions. For example, a Folsom point found in North Dakota and one found in New Mexico are both called Folsom points. In the Archaic stage, projectile point typologies become much more varied regionally. At the same time, however, some seminal typological analyses become standard pan-regional types used across much broader regions, akin to Paleoindian typologies. For instance, David Hurst Thomas' (1981) report on the Monitor Valley named types such as Desert side-notched, Elko corner-notched, and Rosegate, that many archaeologists outside of the Great Basin continue to use to this day. The validity of this is certainly debatable, but the implications of this—particularly without proper framing—can often be misleading and suggest peoples from the Great Basin travelled out across other regions in large numbers, and frequently. Thus, when available, local or regional typologies and projectile point styles should always be used if they are available. In northern New Mexico and the San Luis Valley in Colorado, the regional typology for the period spanning the Archaic stage is the Oshara tradition.

Cynthia Irwin-Williams described the Oshara tradition and the associated projectile point typology in 1973. The Oshara tradition was the first attempt at establishing a projectile point sequence for Archaic-aged projectile points in north-central New Mexico (the data are from Irwin-Williams work on the Anasazi Origins Project near Albuquerque). Researchers had named individual types for the region prior to Irwin-Williams, such as Renaud's loosely defined Rio Grande point (1942), a tapering to parallel-sided stemmed point believed to date to the terminal Paleoindian or early Archaic periods. Another common type was the San Jose type—a name that Irwin-Williams incorporated into the Oshara tradition—established by Bryan and Toulouse (1943; see Chapin 2017:77-78 for a discussion on other types identified prior to the Oshara tradition).

The Oshara tradition Irwin-Williams (1973) defined is in fact not necessarily a typology as most archaeologists think of the term (Chapin 2017:78-79). Chapin (20147:78) notes Irwin-Williams took care to avoid the word "type" in her discussions and that it is "very clear that she did not consider that a single point type was identified with each of the five phases of the Oshara Tradition". Instead, the intent of the Oshara tradition defined by Irwin-Williams was to discuss "general trends and shifts in technology" (Chapin 2017:78) across the northern Southwest. Over time, however, this distinction was lost and the original five Oshara phase names became synonymous with point types, which likely was not Irwin-Williams intent.

For over three decades, including in the original analysis of the Scott Miller site assemblage (Wunderlich 2013), researchers have used Oshara tradition phase names as point types, partly because of the lack of descriptive and attribute analyses of the associated Oshara tradition points. this is mostly because the points of the Oshara tradition were loosely defined by Irwin-Williams. Nicholas Chapin (2005) made one of the first attempts to provide detailed descriptions of Oshara tradition points which, effectively, represented the first true typology for the Oshara tradition. Chapin expanded his work in 2017, providing a detailed description of Oshara tradition phases and points associated with each phase. Chapin's 2017 work includes extensive metric and morphological analyses, a flow-chart or key to use as a guide for identifying Oshara point types, and illustrations of each type for comparative purposes. Chapin's (2017) methods were used extensively in the Scott Miller analysis.

Chapin largely retains the original Oshara phase names Iwrin-Williams first established; however, rather than considering them phases, Chapin approaches the highest level of the typology as a "series" (2017:86-88). For instance, Armijo points do not necessarily refer to a specific temporal range but rather a group of points with broad similarities (such as basal morphology or shoulder angle measurements). Within most of these series, specific types that conform to fairly rigid attributes are identified. For example, within the Armijo series Chapin identifies three main types—Side-Notched (with two varieites, A and B), Stemmed, and Corner-Notched—that share broad similarities such as flat to slightly convex base, serration overall similar morphology.

One critical piece lacking from the Oshara tradition typology is good chronology. This, to be clear, is not the fault of Chapin but rather the nature of assemblages and associated dates. Some of the specific types within the series are very well dated which results in moderately well-dated series ranges. Others, however, are very poorly understood temporally and can only be loosely assigned temporal ranges. There are enough data to roughly place the series in chronological order, as displayed in table 1.1.

A review of Chapin's (2017) typology in the Oshara Tradition is provided here for contextual purposes in chapter 2. In his analysis, Chapin uses uncalibrated radiocarbon dates, which for clarity and comparison, have been retained in the presentation of chronological information for Oshara tradition points in the Scott Miller site collection presented here. The following provides brief overviews of the various Oshara point series and types within the series, but the reader should reference Chapin's analysis directly for specific data on each point type as it is both comprehensive and nuanced.

Jay

The earliest points seen in the Oshara tradition are Jay, which are the most poorly understood and defined points in the Oshara typological sequence. In general, Jay points are large, contracting-stemmed points with a convex to flat base and a weak shoulder. Morphologically, Jay points are similar to Paleoindian types such as Hell Gap and, according to Chapin (2017:88), Great Basin Stemmed points. These shared morphologies, along with the lack of much additional data to help refine Jay points compared to these other types, make identifying fragments difficult. In the Scott Miller collection, multiple basal fragments were identified that could very easily be Jay points or other types, such as Hell Gap or Bajada. Thus, the points of this type in the Scott Miller site assemblage were identified as *either* Jay or another style to provide the most parsimonious analysis of the data.

A primary problem with refining the discussion around Jay points is the lack of examples with associated dates (Chapin [2017:89] identifies several dated examples but explains problems with each one). Chapin suggests a range of 7,500 to 6,800 B.P. being possible, but perhaps more likely they date to similarly styled points in the west, most notably the Great Basin Stemmed point, and suggests a range of 10,700 to 7550 B.P. is likely.

Bajada Series

Bajada series includes three types that Chapin (2017:89) notes are all quite similar. In general, Bajada series are large, stemmed points with a concave base, the stems are often heavily ground, but the base is unground. The three types within the series, labeled Stemmed A, B, and C, are mainly differentiated by the degree of proximal stem expansion (2017:90). Stemmed C points also show an increase in blade serration, which Chapin (2017:90-91) notes is characteristic of later San Jose series points (Stemmed C points were not identified in the Scott Miller assemblage). Largely, however, the differences between the three seem minor and until more collections are available it is unknown how much the variability between the three means (2017:90). Bajada series points are well dated to between 6000 – 5000 B.P., with a possible range between 7000 and 4000 B.P.

San Jose Series

Chapin (2017:92-96) identifies five types within the San Jose series: Stemmed A, Stemmed B, Grants, Side-notched, and Square-stemmed. In general, San Jose series points have a moderate-sized expanding stem, concave base, and frequent blade serration. The two stemmed types are quite similar, with the main difference being the proximal shoulder angle measurement with Stemmed B type being more flared. These are also quite similar to Bajada series points; however the shorter stem length is a defining difference between the two.

Grants San Jose points are like the Stemmed B type but have "a more sharply flared base" (Chapin

2017:93). They also have higher frequencies of blade serration, but in general over 50 percent of all San Jose series points have blade serration. Grants, like the Stemmed types, have abrupt shoulders and, while smaller overall than Bajada series points, are relatively large. In contrast, the San Jose Side-notched type is rather small with a much shorter stem, the main difference between this and other San Jose types. Chapin (2017:95) notes it is also quite like Armijo types, but shares more morphological similarities with San Jose types, particularly the Grants type and the basal morphology with a pronounced flare.

The final San Jose series type is the poorly understood Square-Stemmed type. The primary difference with this type is the flat base, which contrasts with the mostly deeply concaved base for the other San Jose types. In general, San Jose series types are dated between 5000 and 3500 B.P.

Moquino Series

Moquino series are large, side-notched dart points that were not discussed in the original Oshara tradition typology. Instead, type names such as San Pedro from southeastern Arizona or from the Great Basin like Sudden-Side-notched have been frequently used to describe large side-notched dart points in northern New Mexico and the San Luis basin (Chapin 2017:96-97). Chapin, using an assemblage from the Moquino site, establishes the Moquino series, stating it is "a name that is both culturally neutral and geographically relevant" (2017:97). Moquino series points are also morphologically similar to Mallory points from the McKean complex of the northern Great Plains (Miller 2017).

Chapin identifies three types in the Moquino series: the Moquino Square-based, Moquino Small Side-notched, and Moquino Concave. Square-based points have pronounced side-notches located high up on the lateral margins, creating a large, rectangular stem with a flat base that sometimes is slightly concave. The Moquino Small Side-notched type is quite similar except it is much smaller, with the notches generally much closer to the base. Like the square-based type, the widest part of the point is at the base. Chapin (2017:98) also notes that the Small Side-notched type is similar to Armijo Side-notched A points and could be included with that type.

Morphologically, Moquino Concave are the same, with broad side-notches and a large, rectangular stem. As the name implies, however, these have more deeply concave bases than the Square-based type. Subtypes within this type are also noted, but the sample size is too small to differentiate the overall variation (Chapin 2017:99). Dating on Moquino series points is quite variable, with a range spanning from 4200-2000 B.P.

Collier Basal Notch

Collier basal-notched points are large and triangular in overall shape (Chapin 2017:108-109). The notches are at steep angles, almost perpendicular to the base, creating pronounced tangs that sometimes extend to or even below the base. They have a narrow stem which expands slightly, with a flat to convex base. Chapin (2017:108) notes these points are sometimes classified as Shumla-like, after a point type from the Lower Pecos area in Texas. They are also like Calf Creek points, a Middle Archaic type on the southern Great Plains (Wyckoff 1995). They have also often been included with En Medio points, but their unique morphology and the suggested age range (4000-3200 B.P.) indicate they are likely a distinct type.

Armijo Series

With the possible exception of San Jose, no point "type" from Irwin-Williams' (1973) original discussion of the Oshara tradition has been more confusing than the Armijo point (Chapin 2017:99). Chapin (2017:99-103) refines the definition for Armijo series points and identifies three main types: Armijo Side-notched, Stemmed, and Corner-notched. The side-notched type has two varieties, identified as A and B, but the differences are quite minor. As defined by Chapin (2017:100), the B variety has a "less consistently shaped stem" and "a blade that is significantly wider than the base" along with lower notches and a shallower notch orientation. Both have flat to slightly convex bases, serration is present on the blade margins (although more frequent in the A variety), and have relatively short stems.

Armijo-stemmed points have a slightly expanding stem, abrupt shoulders, and a straight to slightly convex base. In many ways these are also quite like the side-notched B variety although have a longer stem and a shallower proximal shoulder angle. The Corner-notched type is a new type defined by Chapin (2017:102-103). They have narrow necks and expanding stems with a flat base, and high incidences of blade serration (like most Armijo points). Neck, or hafting, widths, range from 5.9 to 9.4 mm, and often are less than the 8.0 mm width often used to distinguish darts and arrow points. However, the points occur in dated contexts between 3500 and 3000 B.P. indicating they are likely dart points, but Chapin (2017:103) does note more work is needed to better define this type. Armijo series points in general range from about 4000 to 2500 B.P.

Augustin Series

Augustin series points include three types: the Contracting Stem, the Concave, and the Pelona. Both the Augustin Contracting Stem and Concave types are quite similar, sharing a short, contracting stem and an abrupt shoulder. The blade is triangular and blade serration is often present. The only difference between the two are the Contracting Stem type has a pointed to rounded base while the Concave has, as the name implies, a slightly concave base. Pelona points have a leaf or teardrop shape and are bi-pointed. They lack a shoulder, and in some ways almost appear as unfinished preforms but edge finishing and impact fractures indicate they likely were used as points. The series dates roughly to 3500 and 2000 B.P.

En Medio Series

En Medio series points include a diverse array of large, medium, and small corner- and side-notched points. Chapin (2017:104-106) describes the many type names from more distant regions like the Great Basin and southern Arizona that have become—in many cases erroneously—nearly synonymous with En Medio points such as Elko and San Pedro. Instead, he defines four different En Medio series types: Corner-notched, Side-notched, and Eared, that share some relative similarities. In general, they have convex bases (although Eared are flat to even convex or basally notched), with a roughly triangular blade shape, little to no blade serration, and no grinding on the base or stem.

En Medio Corner-notched points are the most common of the series in Chapin's analysis, and thus also shows a great deal of variation, particularly in the overall size. Notch size and shape are also quite variable. En Medio Eared are nearly identical to Corner-notched points except for having the flat to convex base, and Chapin (2017:108) even indicates the Eared type is more likely a variant of the Corner-notched points rather than a distinct type. The Side-notched type has an expanding, convex base (similar to Corner-notched and Eared) and is also similar to Armijo Side-notched point except it has broader and deeper side-notches than the Armijo. En Medio series points have an age range of about 3000-1600 B.P.

Oshara Tradition Summary

The definitions and descriptions provided by Chapin (2017) for the Oshara tradition and the projectile point typology within have come a long way since it was first defined in 1973 by Irwin-Williams. Not only has Chapin refined the definitions and clarified ambiguity that has crept in over the years, but he has defined new types to account for the variation seen within the point assemblages of northern New Mexico.

In some ways, however, the distinctions he draws between types identified within series are often minor and may just be accounting for small variations that could be expected when manufacturing stone implements. For instance, are En Medio Eared and Corner-notched two distinct types or just variations on the same thing? Even though he identifies it as a type, Chapin (2017:108) appears to lean toward two variants of the same thing. Other instances of this include the two Armijo Side-notched variants, and the various San Jose types, particularly the Stemmed types and Grants.

It is mainly just a case of lumping versus splitting but considering the intent of Chapin's work is to define an Oshara tradition typology, initially splitting and identifying minor variations that may or may not be meaningful is a valid approach. Two limiting factors for many of the types Chapin identifies are sample size and points from well-dated contexts. The true value of identifying different types, and even variants within, will be more fully known once more analyses follow these methods and refine them even more, particularly with good dating controls.

Arrow Points

Unlike Paleoindian points and the extensive recent work on the Oshara tradition, variation in arrow point technology and morphology is not well defined in the San Luis basin and adjoining regions. In general, arrow points were defined in this analysis as relatively small, with hafting widths less than 8.0 mm. However, although as noted earlier, Armijo Corner-notched points often have hafting widths less than 8.0 mm so other attributes were used to parse these points from corner-notched arrows.

Corner-notched arrow points tend to have broad notches initiating from the base, an expanding stem, and a flat to convex base. In this region, these points generally date to about 1600 to 800 B.P., perhaps showing up slightly earlier. In addition to being similar to Armijo Corner-notched, many are also quite similar to En Medio Corner-notched, but the hafting width differentiates the two.

Side-notched arrow points generally have narrow notches that are closer to the base, which is usually flat. The widest point tends to be at the blade base margins, and the points in general have a triangular blade shape. Side-notched arrow points roughly date between about 850 and 100 B.P.

After conducting this analysis, it has become clear that much more variation is present in arrow points than just these basic descriptions. The extent of regional variations, perhaps even cultural variations such as points made by Puebloan groups compared to other groups like the Utes, are not well documented. Additional work could be done with the Scott Miller arrow point assemblage, and more broadly arrow points from the San Luis basin and northern New Mexico, to better define and identify this variation like Chapin has been doing with the Oshara tradition.

Lithic Raw Material Sources

Sources of raw materials suitable for the production of chipped stone tools are widely distributed in the Rio Grande basin. However, the quality and abundance of those materials vary widely, and their distribution is uneven. This section summarizes data on documented sources within and immediately adjacent to the Rio Grande basin in southern Colorado and northern New Mexico. Additional data on Rio Grande basin lithic raw material sources are provide by Baugh and Nelson (1987); Black (2000); Black and Thies (2015); Boyer and others (2001); Mitchell (2017); Newman (1994); Shackley (2005, 2011, 2013); Spero and Hoefer (1999); Stiger (2001); and Wunderlich (2011).

Unlike the La Garita and eastern San Juan mountains on the western side of the San Luis basin, the Sangre de Cristo Range on the east does not contain significant sources of stone tool raw materials. The range's core rocks consist of Precambrian granites, gneisses, and quartz monzonite, as well as Paleozoic conglomerate, arkose, sandstone, and shale (Cappa and Wallace 2007), none of which are suitable for chipped stone tool production. Isolated outcrops of undivided Lower Mississippian to Upper Cambrian rocks (potentially including exposures of the Leadville Limestone, Fremont Dolomite, Manitou Formation, and Sawatch Quartzite) occur in the Sangre de Cristo Range and some of these may contain usable toolstone; however, the presence of exploitable raw materials has so far not been reported (Hendrickson *et al*. 2011; Spero and Hoefer 1999:186).

By contrast, numerous toolstone sources—several of which are extensive and yield high-quality stone—are present on the west side of the valley. The most important sources of cryptocrystalline stone are secondary deposits of chert and chalcedony that formed within Oligocene tuff flows (Mitchell 2012b). Few specific sources of this material, which varies widely in color and quality, have been documented. However, the distribution of those that have suggests that it is widely available throughout the eastern San Juans, from central Hinsdale County into the western portions of Saguache, Rio Grande, and Conejos counties. Wunderlich (2011) identifies two varieties of this material, which he designates "San Juan Volcanic Field Chert A" and "San Juan Volcanic Field Chert B," that he distinguishes primarily by color. However, well-documented sources of the San Juan Mountains tuff-flow cherts exhibit significant within-source variability, suggesting that such designations are not meaningful. Some of the chert sources discussed by Black (2000), Spero and Hofer (1999), and Stiger (2001) likely represent outcrops or alluvial deposits of this tuff-flow material.

Other sources of moderate- to high-quality chert in the region include Cumbres Pass chert (5CN35), which outcrops some 55 km south-southwest of the Scott Miller site and Mosca Creek chert (5HN392), which occurs about 70 km to the west-southwest. The geologic context of Cumbres Pass chert is not known. The Mosca Creek chert source consists of a bed of alluvial cobbles that originally formed in Mississippian limestone (Jodry 1999; Spero and Hoefer 1999). Another important chert source located just outside the San Luis basin and about 150 km north of the Scott Miller site is the Paleozoic (Ordovician) Trout Creek quarry (5CF84) (Chambellan *et al.* 1984). Black and Thies (2015) tally an additional 28 sources of jasper in Chaffee, Fremont, and Park counties, many of which produce stone that is visually similar to that available at the Trout Creek quarry. Pedernal chert outcrops at several locations in the Chama River Valley, 150 km south of the Scott Miller site (Boyer *et al*. 2001:50).

Few orthoquartzite (quartz arenite) sources have been documented in the Rio Grande basin; however, stone from the best-known quartzite source is highly distinctive. The Alkali Spring or Trickle Mountain quartzite source site in western Saguache County occurs within an isolated, 80-hectare (200-acre) block of Cretaceous (Dakota Formation) rock surrounded and nearly overridden by middle Tertiary volcanic deposits. The documented portion of the quarry covers roughly 1.4 ha (3.5 acres), but reconnaissance surveys indicate that workable stone occurs over an area several times that size. The quality of the quartzite is moderate; much of the material is coarse and poorly sorted, although finer-grained, better cemented stone also is available. Dominant colors are white to light grey, although brown, light yellow, and pink to lavender stone also occurs at the quarry. Sparse dark mineral fragments occur in most samples and vugs and other irregularities are common. Other quartzite sources occur in the Chama River valley (Newman 1994) and in the Gunnison River basin (Pitblado *et al.* 2008).

The raw materials common on many archaeological sites in the southern San Juan basin are dark toolstones derived from sources located in the Taos Plateau volcanic field (Black 2000; Boyer *et al.* 2001; Shackley 2011, 2013). The late Pliocene to early Pleistocene Taos Plateau volcanic field formed from at least 35 shield volcanos and volcanic cones. Among the most important raw materials from the Taos Plateau volcanic field is dacite (termed "rhyodacite" by Newman [1994]), an aphanitic igneous rock of moderate to high quality for flintknapping. At least two identifiable sources, including San Antonio Mountain and Newman Dome, are known (Shackley 2011). The larger of the two, San Antonio Mountain, is located 70 km south of Scott Miller. Other silicious volcanics available from sources in the Taos Plateau volcanic field include andesite, basalt, and rhyolite.

Rhyolite is also available in the La Garita and eastern San Juan mountains (Wunderlich 2011). The quality of the rhyolite varies, although highly siliceous material with relatively small phenocrysts is available if not abundant. Colors vary from white and light gray through salmon and tan to brown to black. One possibly distinctive source occurs in English Valley, 35 km northwest of the Scott Miller site. Numerous rhyolite outcrops occur in the Saguache Creek valley (Mitchell 2017). Rhyolite quarries have also been documented in the Biedell Creek area (Bevilacqua *et al.* 2007) and in central Hinsdale County (Spero and Hoefer 1999).

Obsidian also appears in archaeological contexts in the San Luis basin. Virtually all of the archaeological obsidian comes from a series of sources located in the Valles Caldera region of the Jemez Mountains, roughly 180 km south-southwest of the Scott Miller site (Baugh and Nelson 1987; Shackley 2005, 2013). Among those four sources, stone from the Polvadera Peak (El Rechuelos) source appears most commonly on archaeological sites in the San Juan Mountains and San Luis basin (Mitchell 2012b). Artifacts made from stone from a second Valles Caldera source, Cerro del Medio, also occur on sites in the region. Small obsidian nodules also occur on Cochetopa Dome in western Saguache County, although material from that source seldom was used to produce stone tools (Mitchell 2017; Stiger 2001). Obsidian from No Agua Peaks, located in northern Taos County, New Mexico, also was seldom used (Stiger 2001).

2

Projectile Point Analysis

Archaeologists typically utilize the full suite of an assemblage to make interpretations about how places were used in the past. In this analysis, interpretations about site use and function are based solely on the projectile point assemblage. The previous analysis of the modified stone assemblage (Wunderlich 2013:Figure 8) shows that nearly 60 percent of the tool assemblage is projectile points (called hafted bifaces in Wunderlich's figure). Given the nature of the assemblage at the Scott Miller site, conclusions drawn in this analysis inform a great deal about how the relic wetland was used over thousands of years.

This chapter begins by describing the methods used during each phase of the analysis, followed by an overview of the entire assemblage and the typology. Following this are discussions on some of the attributes coded during this analysis which help describe how the site was used over thousands of years. The chapter concludes with an analysis of the spatial distribution of various point styles which reveals important spatial patterns and could also help in planning future work at the site. Chapter 3 provides a summary of these data and the Scott Miller site, and discusses some directions for future work both at the site and with this assemblage.

Analysis Methods

A three-phased approach was used in the analysis of the Scott Miller projectile point assemblage. PCRG Project Archaeologist Chris Johnston oversaw the entire process and was assisted by Reagan Herdt, a University of Colorado

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at Denver work-study lab student. PCRG Research Director Mark Mitchell provided guidance on each phase.

The modified stone assemblage was received in cover bags representing a contiguous series of FS numbers. These bags included flaking debris, chipped stone tools, limited ground stone, and a few pottery sherds which were not slated for analysis. In Phase 1, Johnston began by cross-checking the original database supplied by the USFWS, ensuring PCRG had possession of all previously identified projectile points. Johnston removed these from their cover bag for further analysis. In addition to previously identified points, Johnston also removed fragments that had been identified as bifaces or another chipped stone tool category for potential analysis. Herdt assisted with the re-bagging and boxing of the non-projectile point assemblage.

Herdt, under Johnston's supervision and analysis design, then proceeded to collect attributes in Phase 2 of the analysis. Variables coded in Phase 2 included basic raw material, burning, heat treatment, cortex, and completeness. Points were also labeled using the sandwich method of black ink between two layers of Paraloid B72. Any point that had discernable and measurable attributes that could aid in assigning a type were coded as needing additional analysis. Those that could not, such as distal or marginal fragments, were separated from the assemblage at this stage so that the remaining assemblage only included points that could at minimum be reasonably be typed either a dart or arrow point.

Johnston coded variables in the third and final phase of analysis, including form and style, a more detailed completeness category designed specifically for projectile points, use phase, reason for rejection, and the type (see Appendix A for a complete listing of all variables). Much of the analysis follows methods developed by Ahler (1971), with subsequent modifications and additions made over many years, including by Ahler and others (1994). Many of the variables coded for this analysis, such as distal and proximal shoulder angle, were purely for aiding the typological assignment. The full dataset has been supplied to the USFWS, Lakewood office, and is also stored in the PCRG digital archive.

The typology used for analysis is largely based on the Oshara tradition as described by Chapin (2005, 2017), and the methods used therein to determine type. Chapin's work modifies the original Oshara sequence developed by Cynthia Irwin-Williams (1973) and is the most complete guide yet for determining type within the Oshara tradition. As discussed in chapter 1, the Oshara tradition is a sequence that mainly covers the Archaic period, or roughly from about 8000 B.P. to about 1500 B.P. Paleoindian typological sequences draw on a number of regional sources, all of which are discussed in chapter 1. Arrow point typologies generally follow the regional pattern of corner-notched arrows preceding side-notched.

Collection Summary

The assemblage from the Scott Miller site contains a total of 219 projectile points. This includes one point that is two different FS numbers that refit and is treated as one. Additionally, at least five of the points were refurbished as bifacial knives but the original point form was still identifiable even after this modification.

Table 2.1 provides a summary of the basic raw material types, organized by point type from oldest to most recent. Nearly 45 percent of the assemblage is made from cryptocrystalline silicate rocks (chert and chalcedony). Obsidian makes up about 13 percent of the point assemblage. Previous analysis of the raw materials from the Scott Miller site (Wunderlich 2013:114) included obsidian sourcing data on 20 artifacts, including both tools and debitage. All of these come from three distinct obsidian sources in the Jemez Mountains in New Mexico (Baugh and Nelson 1987; Glascock *et al.* 1999; Shackly 2005). Eleven are from El Rechuelos (Polvadera Peak), 7 from Cerro del Medio (Valles Rhyolite), and 2 from Obsidian Ridge (Cerro Toledo Rhyolite) (Wunderlich 2013:114). While not all of the points examined in the analysis presented here were subject to sourcing, all are most likely from Jemez Mountain sources because, as alluded to in the previous analysis, they are the nearest sources of high-quality obsidian.

Basalt and dacite (or rhyodacite) can often be confused with one another but using Shackley's (2011) descriptions it is possible to differentiate between the two types of stone. Both occur in the Taos Plateau Volcanic Fields about 70 km south of the site. Points made from basalt are 21 percent of the assemblage, while dacite points constitute about 9 percent. Quartzite points are only 7 percent of the assemblage, more than only rhyolite, from which 10 points (or about 5 percent) are made. Rhyolite is ubiquitous across much of the west side of the San Luis Valley but no sources are present on the east.

The raw material distribution indicates travel

Table 2.1. Raw material classification by projectile point style.

	Raw Material								
Point Style	Chert	Chalcedony	Quartzite	Rhyolite	Basalt	Obsidian	Dacite	Total	Percent
Folsom	1							1	*0.5*
Agate Basin					2			2	*0.9*
Plainview	1						1	2	*0.9*
Jay or Hell Gap	1						1	2	*0.9*
Jay or Bajada					1			1	*0.5*
Bajada					2	1	1	4	*1.8*
San Jose	1	2	2	2	8	7	3	25	*11.4*
Collier Basal Notch	3	1	1			3		8	*3.7*
Moquino	5	3					1	9	*4.1*
Armijo	6	2	2	2	6	3	4	25	*11.4*
Augustin					4		2	6	*2.7*
Pelona					2			2	*0.9*
En Medio	11	4	3	1	3	4	1	27	*12.3*
Dart-Unspecified	19	7	6	4	14	10	4	64	*29.2*
Corner-Notched Arrow	8	6	1		2	1	1	19	*8.7*
Side-Notched Arrow	2	4	1					7	*3.2*
Arrow-Unspecified	1							1	*0.5*
Unknown	8	2		1	2		1	14	*6.4*
Total	67	31	16	10	46	29	20	219	*100.0*
Percent	*30.6*	*14.2*	*7.3*	*4.6*	*21.0*	*13.2*	*9.1*	*100.0*	

patterns mainly from the south (obsidian, some cherts, dacite, and basalt) and west (cherts, rhyolite). Trout Creek chert and other visually similar materials, which are about 150 km north of the Scott Miller site, is notably rare in the assemblage. Only one point—a Paleoindian Plainview point—is possibly made from this material (figure 2.1[C]).This further indicates travel patterns more focused to the south and west of the site.

Table 2.2 shows thermal alteration of points, including burning and heat treatment. Identifying burning and heat treatment on coarse-grained materials (quartzite, basalt, dacite, and rhyolite) is difficult to impossible. These materials make up 56 percent (n=123) of the collection and thermal alterations were coded as not applicable. These materials were removed from the analysis when considering relative percentages and thus the coded assemblage for thermal alterations comprises a total of 96 points.

Only about 8 percent of the coded assemblage shows any evidence of burning. Burning is often associated with camp or site maintenance, and if people were spending extended time at the site more burning would be expected. Nearly 42 percent of the coded assemblage is either possibly or definitely heat treated. This activity, however, likely occurred prior to people visiting and using the Scott Miller site.

Point Typology

Table 2.3 shows the frequency of points, organized from oldest to most recent. Oshara tradition points are further parsed by their series type, as discussed in chapter 1. Nearly 94 percent of the assemblage are classified at minimum as a dart or arrow point. Sixty-four percent of the point assemblage (n=140) could be classified to a specific type. There are 64 unspecified dart points and one unspecified arrow point, which all have enough metric or morphological attributes to be classed as such but are too fragmented to be typed. There are 14 points that were too fragmented to identify beyond being a projectile point.

The assemblage is quite diverse and spans over 12,000 years. Figures 2.1, 2.2, and 2.3 display selected points from the assemblage to highlight this diversity and range of point styles, with an emphasis on displaying overall point style and flaking patterns. Selected points are also shown in color to show the raw material diversity.

The earliest is a Folsom point midsection, only typeable because of the distinctive channel flake scar

Table 2.2. Thermal alteration of the projectile point assemblage, organized by point style. Additionally, 123 of the 219 points are raw material types that preclude recordation of thermal alteration.

Point Style	Burned	Possibly Heat Treated	Heat Treated
San Jose		2	
Collier Basal Notch			1
Moquino	1	3	3
Armijo	1		2
En Medio		3	3
Dart-Unspecified	3	4	3
Corner-Notched Arrow	1	3	6
Side-Notched Arrow		1	3
Arrow-Unspecified	1		
Unknown	1	2	1
Total	8	18	22

(figure 2.3[F]). Other Paleoindian points include two Plainview points (figure 2.1[C] and the Agate Basin points, including one displayed in figure 2.2[F] that shows the unmistakable re-working from a once larger broken point often seen with Agate Basin points. Two points are either Jay or Hell Gap. In addition to Jay points not being well understood (see chapter 1), both are lacking specific attributes to determine the specific type. An additional point is either a Jay or Bajada but is also missing key attributes to differentiate the type.

As discussed more in the next section, Oshara tradition points—shaded in gray in table 2.3—comprise most of the assemblage. The specific types for Oshara points reflect distinctive attributes Chapin (2017) uses to help explain or discern variability within his broader series categories. While some have definite (or likely) utility, the sample size and chronological information for many are limited. Further, the sample size of each type seen in the Scott Miller analysis is too small to allow for any definitive statements to be made about their distribution. To better illustrate broader patterns, particularly chronological ones (even at a gross scale), the specific Oshara series types are not used for the remainder of the analysis. Further work could be done to parse these types out, particularly once more assemblages from the region have used the typological methods described here and by Chapin (2017) and more samples with good chronological control are available.

The assemblage also includes 27 arrow points, including 19 corner-notched and 7 side-notched, along with the one unidentifiable arrow point. The arrow points, particularly the corner-notched, also show a great deal of stylistic diversity, highlighted in figures 2.1[B] and 2.3[C]. Additional work could possibly parse out some regional or temporal differences within the corner-notched arrow points. Points like the one displayed in figure 2.1[B] also are quite similar to Oshara tradition En Medio Corner-Notched points—which immediately precede arrow points. Chapin (2017:106-107) notes the "arbitrary" hafting width of 8 mm is what separates En Medio Corner-Notched from arrow points.

Temporal Distribution

The assemblage can be combined into four main categories: Paleoindian points, Oshara tradition dart points (generally correlated to the Archaic period), and Late Prehistoric corner- and side-notched arrow points. Metal arrow points have not been identified in the assemblage.

Table 2.4 summarizes these four broad technologies. The Jay or Hell Gap points and Jay or Bajada point are included with the Paleoindian points while unspecified dart points are included with the Oshara tradition; the unspecified arrow point is excluded from the data. Oshara tradition (or dart) points comprise 83 percent of the typable assemblage (excluding the unknown), while arrow points constitute about 13 percent, and Paleoindian points the remaining 4 percent.

While dart points seemingly dominate the Scott Miller site assemblage, this is also the longest period amongst the four broad groups. To better understand the true chronological differences between the different groups, a general (and conservative) estimate of the length of time for each period was used to normalize the collection to points per 100 years. As table 2.4 shows, dart points still are the predominate

Table 2.3. Summary of the Scott Miller projectile point assemblage, organized by from oldest to most recent. Oshara tradition points are shaded in gray.

Point Style	Oshara Type	Frequency	Estimated Age (B.P.)[a]	Figure Reference
Folsom	-	1	12,600 – 12,150	2.3[F]
Agate Basin	-	2	12,400 – 11,500	2.2[F]
Plainview	-	2	12,000 – 11,300	2.1[C]
Jay or Hell Gap	-	2	Paleoindian – Early Archaic	
Jay or Bajada	-	1	Paleoindian – Early Archaic	
Bajada		4	6000 – 5000	
	Stemmed A	1	6000 – 5000	
	Stemmed B	3	6000 – 5000	2.2[E]
San Jose		25	5000 – 3500	
	Stemmed A	6	5000 – 3500	2.2[D]
	Stemmed B	10	5000 – 3500	2.2[A]
	Grants	1	4900 – 4100	
	Side-Notched	5	4500+ – 3500	
	Square-Stemmed	1	4000 – 3500	
	San Jose Unspecified	2	5000 – 3500	
Moquino		9	4200 – 2000	
	Square-Based	5	4000 – 2000	2.1[E]
	Concave	4	4200 – 3500	2.3[A]
Collier Basal Notch	Collier Basal Notch	8	4000 – 3200	2.2[B]
Armijo		25	4000 – 2500	
	Side-Notched A	2	4000 – 2500	
	Side-Notched B	2	4000 – 2500	
	Stemmed	13	3500 – 2500	2.3[E]
	Corner-Notched	8	4000 – 3500	2.1[A and D]
Augustin		6	3500 – 2000	
	Augustin	4	3500 – 2000	2.3[G]
	Pelona	2	3000 – 2200	2.2[C]
En Medio		27	3000 – 1600	
	Corner-Notched	17	2800 – 1600	2.1[F]
	Eared	4	3000 – 1600	2.1[G]
	Side-Notched	6	2800 – 1600	2.3[D]
Dart-Unspecified	-	64	6000 – 1600	
Corner-Notched Arrow	-	19	1600 – 850	2.1[B]; 2.3[C]
Side-Notched Arrow	-	7	850 – 150	2.3[B]
Arrow-Unspecified	-	1	–	
Unknown	-	14	–	
Total		219		

[a] Paleoindian and arrow point ages are reported as calendar years B.P.; dart point ages are reported as uncalibrated radiocarbon years B.P. The numerical age range of Jay points is unknown. Date ranges for Oshara tradition dart types are provided by Chapin (2017).

style represented at the Scott Miller site, although with slightly less frequency than the raw count would suggest. Paleoindian points are quite infrequent in the assemblage, even when the possible Jay or Bajada points are included. This could be reflective of several factors, including limited occupation or use during this period. It is also possible that collectors, prior to discovery and documentation (and protection) of the site, may have removed the larger, more stylistic, and easier to identify Paleoindian points relative to later styles.

The relative frequency of corner-notched arrow

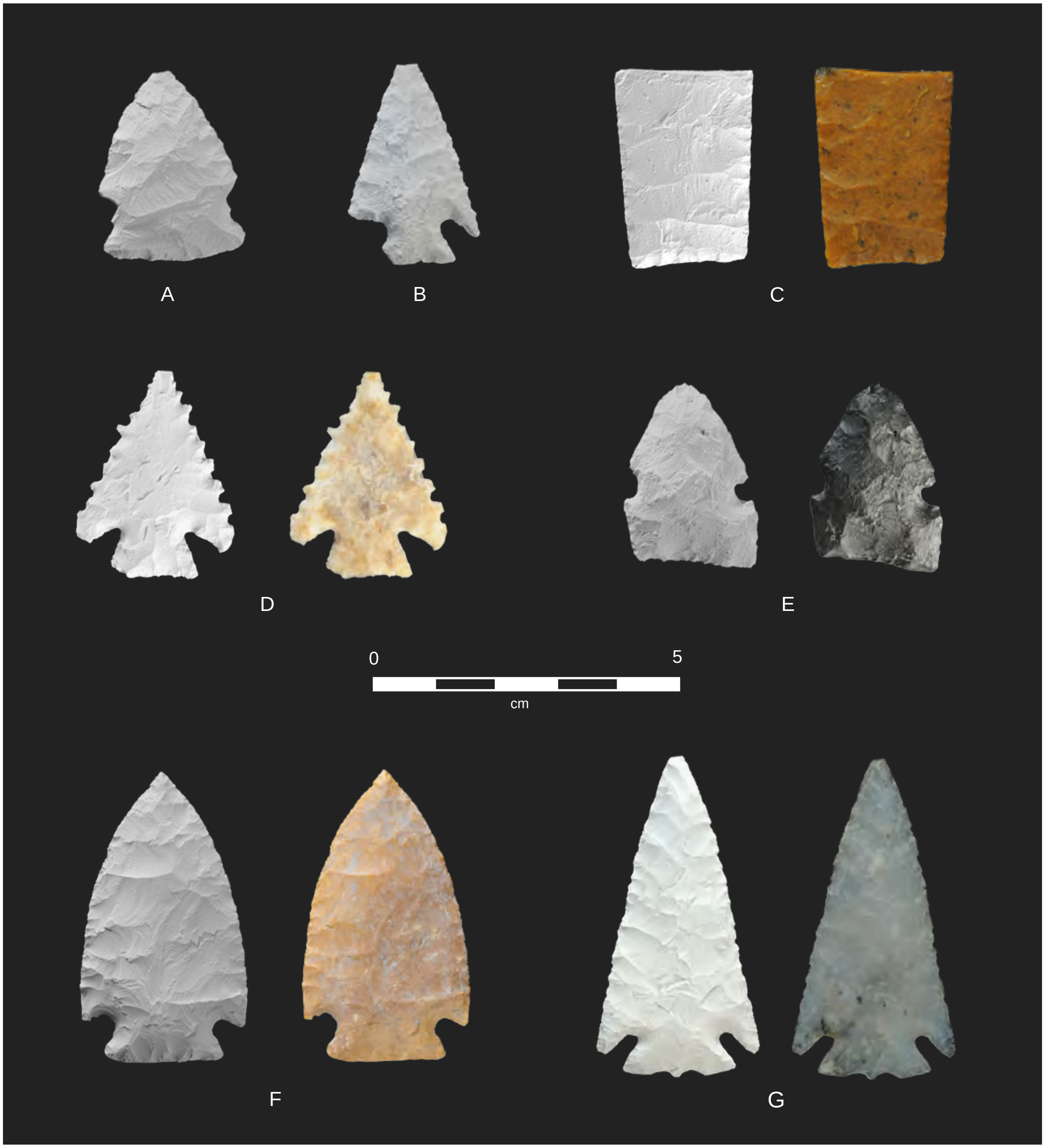

Figure 2.1. Selected projectile points from the Scott Miller assemblage. Point styles are listed in table 2.3. Field Specimen numbers are: A) FS19; B)FS402; C)FS90; D)FS89; E)FS126; F)FS481; G)FS294.

points indicates continued use and occupation at the Scott Miller site after the more intensive occupation during the Oshara tradition. This is followed by decreased use in the later part of the Late Prehistoric period, represented by the low frequency of side-notched arrow points. However, more work can be done with the arrow point assemblage, particularly attempting to refine the variable styles of corner- and side-notching to other regional typologies from southwestern Colorado and northern New Mexico.

The point frequency data clearly shows that the Scott Miller site was most intensively occupied during the Oshara tradition, or roughly during the Archaic period. The data can be further parsed to show

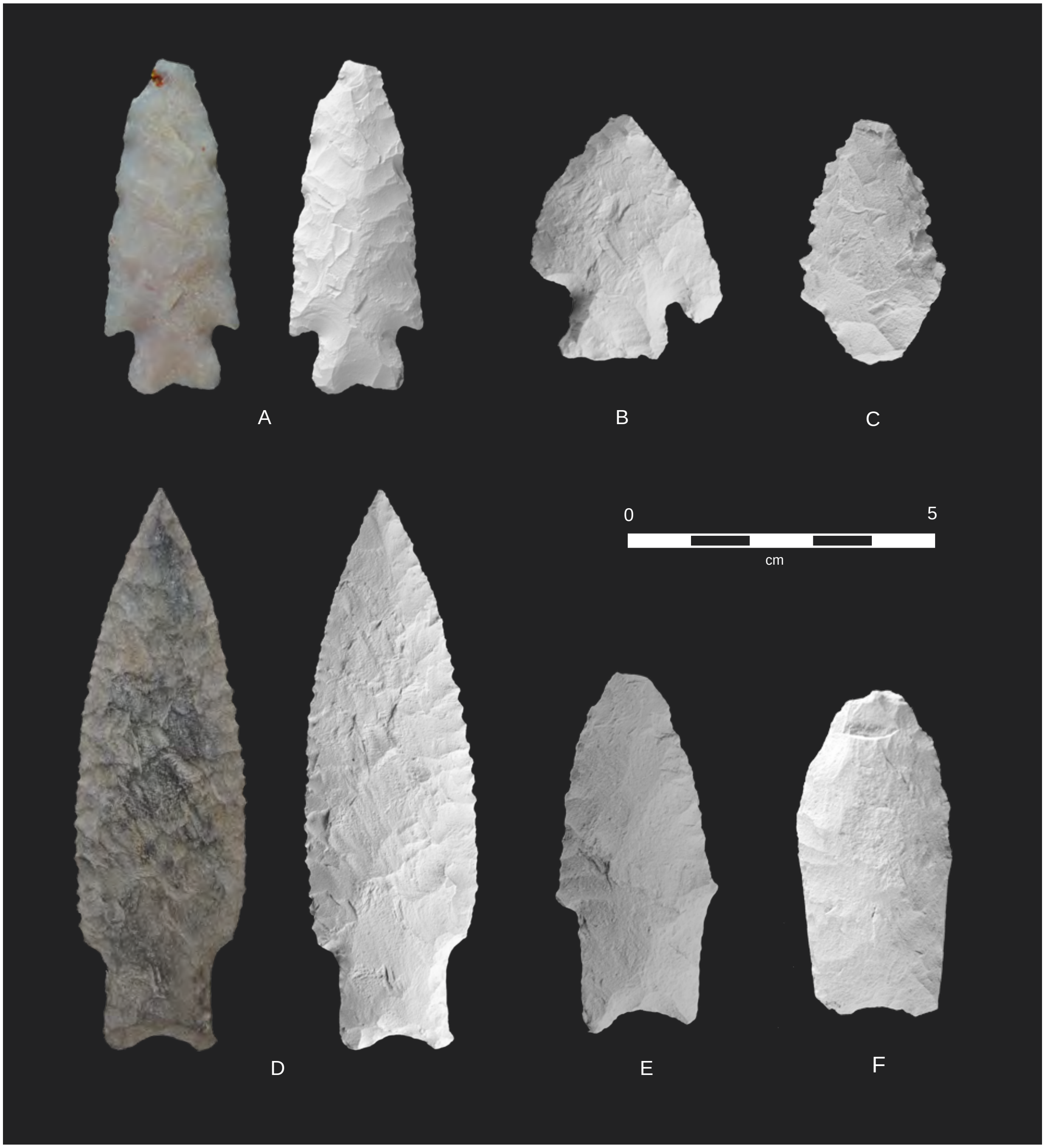

Figure 2.2. Selected projectile points from the Scott Miller assemblage. Point styles are listed in table 2.3. Field Specimen numbers are: A) FS62; B)FS195; C)FS517; D)FS507; E)FS535; F)FS540.

three major pulses for the San Jose, Armijo, and En Medio series points. These series overlap—San Jose with Armijo, and Armijo with En Medio—roughly spanning from about 5000 B.P. to about 1600 B.P. While other Oshara point types also occur during this span, these three types comprise about 73 percent of the typeable dart points in the assemblage and have a relative frequency during this span of about 2.3 points per 100 years.

More regional data are needed on the distribution of Oshara point types to better understand the frequency distribution of these three series and what patterns may be represented at the site. What is clear, however, is these three dominate the Oshara point

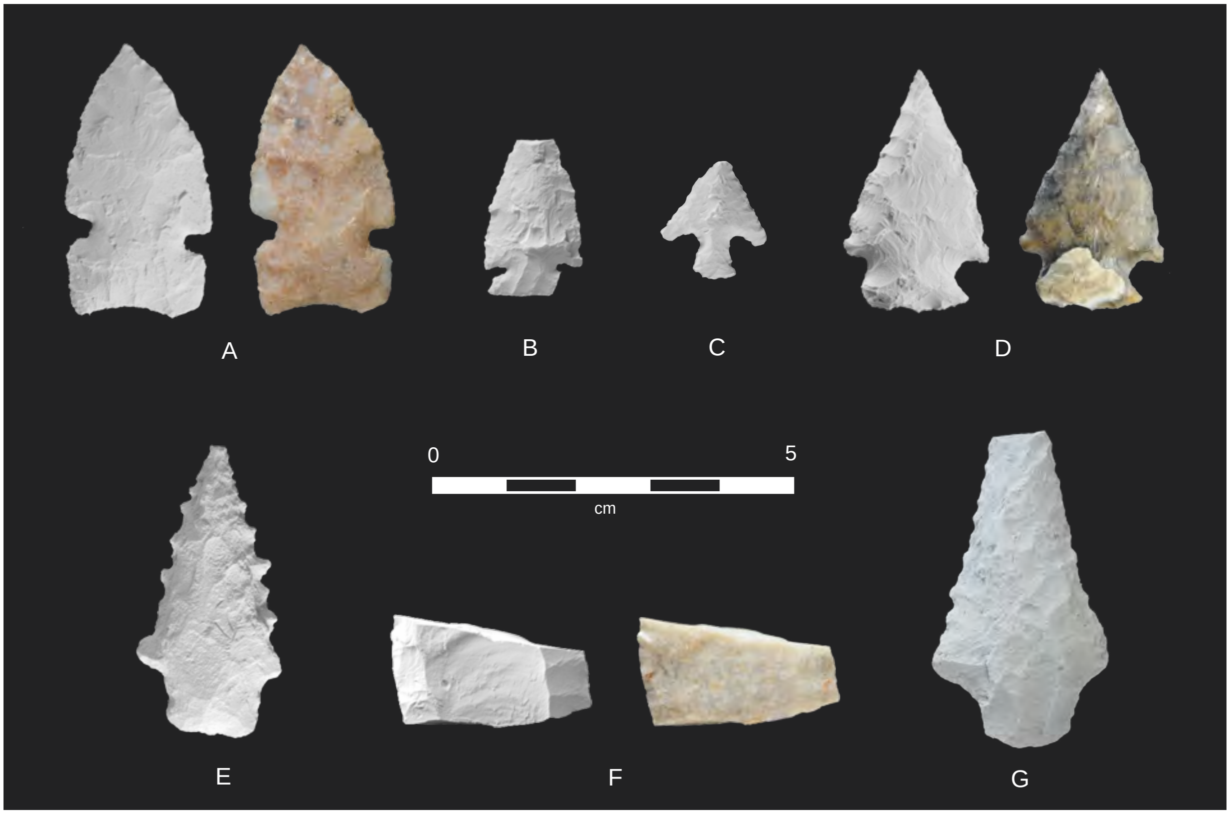

Figure 2.3. Selected projectile points from the Scott Miller assemblage. Point styles are listed in table 2.3. Field Specimen numbers are: A) FS146; B)FS298; C)FS271; D)FS187; E)FS544; F)FS92; G)FS470.

assemblage from the site. This could simply reflect a limited number of occupations at the site during each of these periods where several points were deposited. Conversely, it could indicate many uses of the site and only a few points were left each time. It could also be that these three series—which are three of the five Oshara series with multiple point types—are more inclusive of a wider range of variation than others the distribution is perhaps inflated to a degree. The spatial distribution of each of these types is explored later in this chapter and offers insights of what may be represented by the high frequency of San Jose, Armijo, and En Medio series points.

Point Completeness and Breakage

Table 2.5 provides data on completeness of the point assemblage, again organized from oldest to most recent (and includes unknown types). The data show a relatively fragmented collection, with only 28 (or about 13 percent) complete, unbroken points. One of these, classified as an unknown type, is a complete point with edge finishing and notching, but the type is not discernable. The flaking pattern is particularly haphazard, the notches are placed unevenly relative to each other, but the lateral margins show no sign of use as a cutting or other tool. A plausible explanation

Table 2.4. Site use intensity by broad point style, normalized by point frequency per 100 years.

Point Style	Count	Approximate Span (Years)	Points per 100 years
Paleoindian	8	3500	0.2
Oshara Tradition (Dart)	170	5500	3.1
Corner-Notched Arrow	19	1000	1.9
Side-Notched Arrow	7	800	0.9
Total (excludes unknown)	204		

for this point is that it is a practice piece or perhaps even a toy.

Only one arrow point (a side-notched) is complete. The other 26 complete points are darts points from the Oshara tradition. Tip resharpening was also coded, so points that had previously broken and been refurbished (n=2) were classified as such. Thus, most of the complete points in the assemblage are likely hunting losses.

Over 34 percent of the point assemblage is a distal segment lacking a base. Most of these are either unspecified dart points—based on the overall size and morphology of the distal fragment—or typed as unknown. One of these is clearly either a Jay or Bajada point based on the size and morphology, but the stem and base are missing which is the determining factor to differentiate the two. Five are classified as corner-notched arrows but missing a base. While the base was missing, portions of the notching are still present, which combined with the size and morphology, left little doubt they are corner-notched arrows.

Twenty-five (11 percent) are distal segments with at least a portion of the base and haft element preserved. Many of these are complete enough to assign a specific type; however, three are too incomplete and classified as unspecified dart points and one as an unspecified arrow point. Another 18 (about 8 percent) have enough of a base preserved to be assigned a specific type. Three more are basal fragments but were not complete enough to assign more than some style of dart point.

Aside from distal segments lacking a base, points that are mostly complete but only missing the distal end (tip) are the most represented in terms of completeness. All of these (n=68, or 31 percent) could be assigned to a specific type. One exception is a point that could be classified as either Hell Gap or Jay.

Fracture Patterns

Projectile point completeness offers some insights into overall site use. To better understand overall site use at Scott Miller, however, the fracture type of broken points was recorded (table 2.6). As noted earlier in this chapter, five points were recycled into different tool forms (knives). The refurbishing made identifying original fracture type difficult and thus these were recorded as recycled tools.

Forty-two (or about 19 percent of the assemblage) have perverse fractures. This fracture type is often

Table 2.5. Completeness classification organized by point style.

	Completeness Class							
Point Style	Complete	Resharpened Tip	Missing Tip	Basal Fragment	Distal Segment	Distal Segment Lacking Base	Total	Percent
Folsom					1		1	*0.5*
Agate Basin			1	1			2	*0.9*
Plainview				2			2	*0.9*
Jay or Hell Gap			2				2	*0.9*
Jay or Bajada						1	1	*0.5*
Bajada			3	1			4	*1.8*
San Jose	9	1	11	2	2		25	*11.4*
Collier Basal Notch	1		2	3	2		8	*3.7*
Moquino	2		6	1			9	*4.1*
Armijo	6		15	1	3		25	*11.4*
Augustin	1		4		1		6	*2.7*
Pelona			2				2	*0.9*
En Medio	7	1	10	4	5		27	*12.3*
Dart-Unspecified				3	3	58	64	*29.2*
Corner-Notched Arrow			7	1	6	5	19	*8.7*
Side-Notched Arrow	1		5		1		7	*3.2*
Arrow-Unspecified					1		1	*0.5*
Unknown	1			2		11	14	*6.4*
Total	28	2	68	21	25	75	219	*100.0*
Percent	*12.8*	*0.9*	*31.1*	*9.6*	*11.4*	*34.2*	*100.0*	

Table 2.6. Reason for projectile point discard, organized by point style.

Point Style	Reason for Discard						Total
	Complete	Bending Fracture	Perverse Fracture	Impact Fracture	Burination Spall	Recycled	
Folsom		1					1
Agate Basin		1		1			2
Plainview		1	1				2
Jay or Hell Gap				2			2
Jay or Bajada				1			1
Bajada		1		3			4
San Jose	10	1	3	9	1	1	25
Collier Basal Notch		3	2	2		1	8
Moquino	2	1	1	5			9
Armijo	6	5	2	12			25
Augustin	1	1	2	2			6
Pelona			1	1			2
En Medio	7	5	5	8	1	1	27
Dart-Unspecified		23	12	27		2	64
Corner-Notched Arrow		4	6	9			19
Side-Notched Arrow	1	1	1	4			7
Arrow-Unspecified			1				1
Unknown	1	6	5		2		14
Total	28	54	42	86	4	5	219
Percent	*12.8*	*24.7*	*19.2*	*39.3*	*1.8*	*2.3*	*100.0*

associated with manufacturing or maintenance failure. The most frequent type with perverse fractures are unspecified dart points. This suggests that there was at least some point manufacture or maintenance occurring at the site, but in general this activity appears quite limited in the assemblage.

Nearly 40 percent of points have impact fractures. These indicate use as a hunting weapon that fractured upon impact with something hard such as bone. Another 25 percent have bending or end shock fractures; this fracture type also often occurs from sudden force like impact, or from back-force within the haft. Four points have burination spalls, which also generally indicate fracture upon impact where one entire margin has been removed via the force of impact. Thus, nearly two-thirds of the point assemblage appears to have been discarded (or not re-used) due to fractures associated with use, most likely hunting.

Table 2.7 combines the fracture types associated with use (complete, bending, impact, and burination fractures), and fractures associated with manufacture (perverse fractures) to show the relevant percentage compared to the average of the entire assemblage. For clarity, types with fewer than five have been excluded from the table but are included in the total percentage of each discard mode. As these data show, 78.5 percent of the point assemblage appear most likely to have been discarded due to use, either due to hunting loss (complete points) or via a fracture most likely caused by use (impact, bending, and burination). Only 19.2 percent were discarded due to manufacturing or maintenance failures.

Table 2.7. Percentage of the likely cause of discard for each point style with a total count of more than five. Remaining percentages are recycled points.

Point Style	Impact or Use	Manufacture
San Jose	*84.0*	*12.0*
Collier Basal Notch	*62.5*	*25.0*
Moquino	*88.9*	*11.1*
Armijo	*92.0*	*8.0*
Augustin	*66.7*	*33.3*
En Medio	*77.8*	*18.5*
Dart-Unspecified	*78.1*	*18.8*
Corner-Notched Arrow	*68.4*	*31.6*
Side-Notched Arrow	*85.7*	*14.3*
Unknown	*64.3*	*35.7*
Percent of Assemblage	*78.5*	*19.2*

Point styles discarded due to use are relatively close to the mean for the entire assemblage, indicating that the site was mostly used in a similar way over many thousands of years. Armijo series points are an exception, where 92 percent were discarded either due to breakage from use or were complete and likely lost. Thus, during the Armijo series phase the overwhelming use of the site was purely for hunting. Other types showing a similar pattern are: San Jose series points, which precede Armijo but also overlap temporally; Moquino, which is roughly equivalent in age with Armijo points; and side-notched arrows.

Conversely, more manufacturing or point maintenance may have been occurring during the period of Augustin points, which largely post-dates Armijo but does overlap some, and corner-notched arrow points. Overall sample size for each point type can certainly be considered when examining this distribution, but these data clearly show hunting—and not maintenance or manufacture—was the dominant activity at the Scott Miller site over thousands of years.

Spatial Analysis

Figure 2.4 displays all of the projectile points identified at the site, along with the five re-worked points. (One point, an unspecified dart point, was collected after the site boundary was established based on the 2011 fieldwork and thus lies outside the boundary as displayed here.) There is one main cluster at the north end of the site in an area known as the "Elephant Mounds", shown in figure 2.4 (Holen and Beeton 2016; Wunderlich *et al.* 2013). This area has clear evidence of ground disturbance, likely from heavy equipment, at some point in the past, has little vegetation and is heavily eroded. It is also close to where crew and visitors often park when going to the site (Margaret Van Ness, personal communication 2021). This area was the focus of work by Holen and Beeton in 2016, which involved excavation of multiple deep trenches.

Conversely, on the south-central end of the site near the two braided channels seen in the lidar imagery in figure 2.4 there are very few points. Van Ness (personal communication, 2021) notes this area is heavily vegetated, has little disturbance, and is less frequently visited, thus few points have been collected in this area. Clearly, disturbance processes are a factor in the spatial distribution of points at the site. However, even with these factors there do appear to be some interesting patterns that may help focus future work at the site.

Figure 2.5 displays the three most frequent Oshara tradition point series found at the site. The general distribution mirrors that of the entire assemblage. However, San Jose series points (blue triangles) are nearly all concentrated within the Elephant Mounds area on the north end and even within that area they are tightly confined. Armijo series points are also more concentrated in the Elephant Mounds area, although much less concentrated and five are found in the southwestern half of the site compared to just one San Jose series point. En Medio series point distribution more closely resembles the Armijo series, but is even less confined within the Elephant Mounds and 11 points are found in the southwestern half, illustrating a much broader distribution across the site.

This expanding distribution, which spans roughly three thousand years, could indicate changes in site use over time which, at minimum, likely reflect a changing landscape during this period. It could also indicate unique episodes of occupation during each of the periods represented by the three Oshara series. For example, the San Jose series occupations may have been fewer in number and thus more tightly concentrated. Occupations during the En Medio series could have been more frequent and thus more scattered around the relic wetland, reflecting both a changing landscape where some areas were better suited to hunting than others at different periods.

Arrow point distribution also shows a concentration in the Elephant Mounds area with a limited distribution of points on the southern end of the site boundary (figure 2.6). The distribution, particularly the corner-notched arrow points, mirrors the En Medio series distribution. However, the limited frequency of arrow points makes drawing many conclusions difficult aside from use of the site continued across a large area into the Late Prehistoric period.

Figure 2.7 displays the projectile point distribution by cause of fracture (use, manufacture or maintenance, and complete), as defined earlier in this chapter. Complete points, which are presumably hunting losses, are nearly all confined on the north end of the site. Points discarded (or lost) due to breakage from use are distributed across the site in a relatively even pattern relative to their overall frequency in the assemblage.

The Elephant Mounds area, contains about 57 percent (n=16) of the complete points. Over 50 percent (n=73) of the points broken due to use are also in this area; however, nearly 55 percent of the points

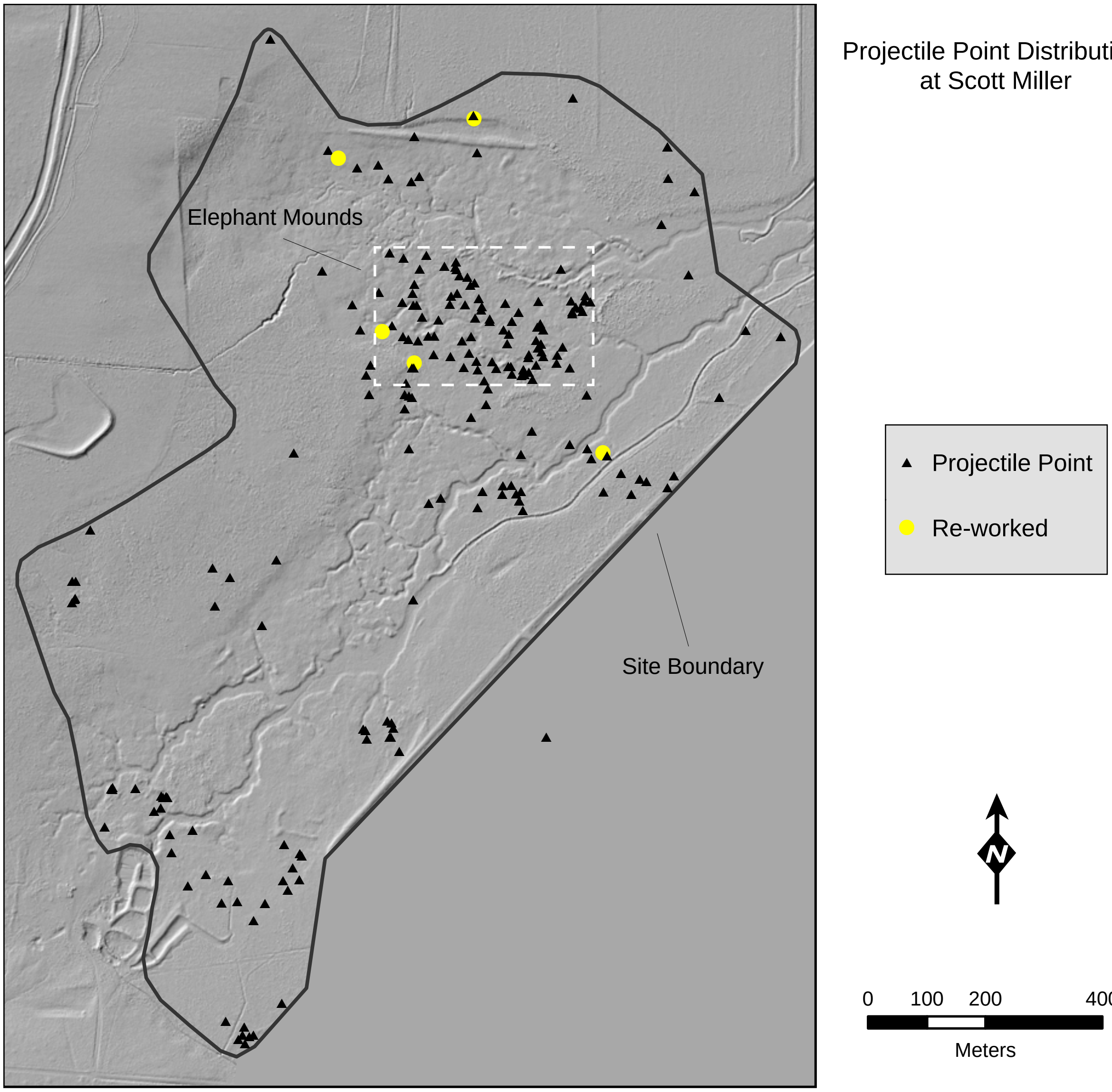

Figure 2.4. Distribution of projectile points at the Scott Miller site.

broken during manufacture or maintenance are also in the Elephant Mounds area. This could simply be a representation of the disturbances here and more collection in this area noted earlier in this section. It may also suggest, particularly for the complete points, that this area may have been a major hunting focus during much of the site's history.

This distribution, coupled with the distributions of various point styles, clearly shows areas of the site may have been used differently, perhaps with site use expanding from a more centralized zone to a broader area through time. One possibility is the Elephant Mounds area was one of, or perhaps the main, hunting zone and the perimeter of the site may represent more of the camp or processing areas. The concentration of complete points supports this. Points broken during use could just as likely be found in hunting areas as they could in camp areas. Regardless, the spatial analysis indicates a deeper analysis, combining the point data collected here with other artifact spatial data, is warranted, and could help refine the story of the Scott Miller relic wetland.

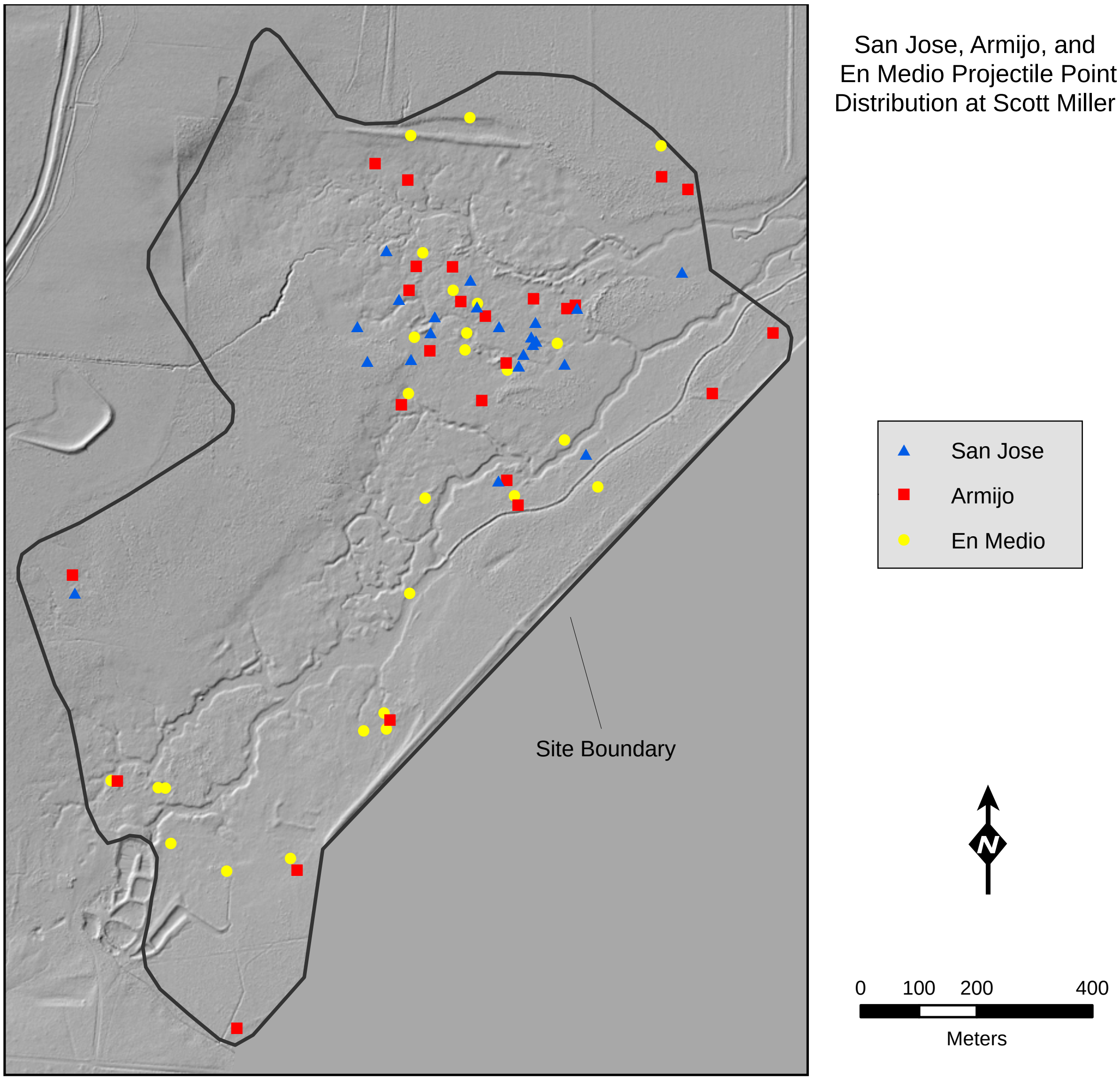

Figure 2.5. Distribution of San Jose, Armijo, and En Medio series points at the Scott Miller site.

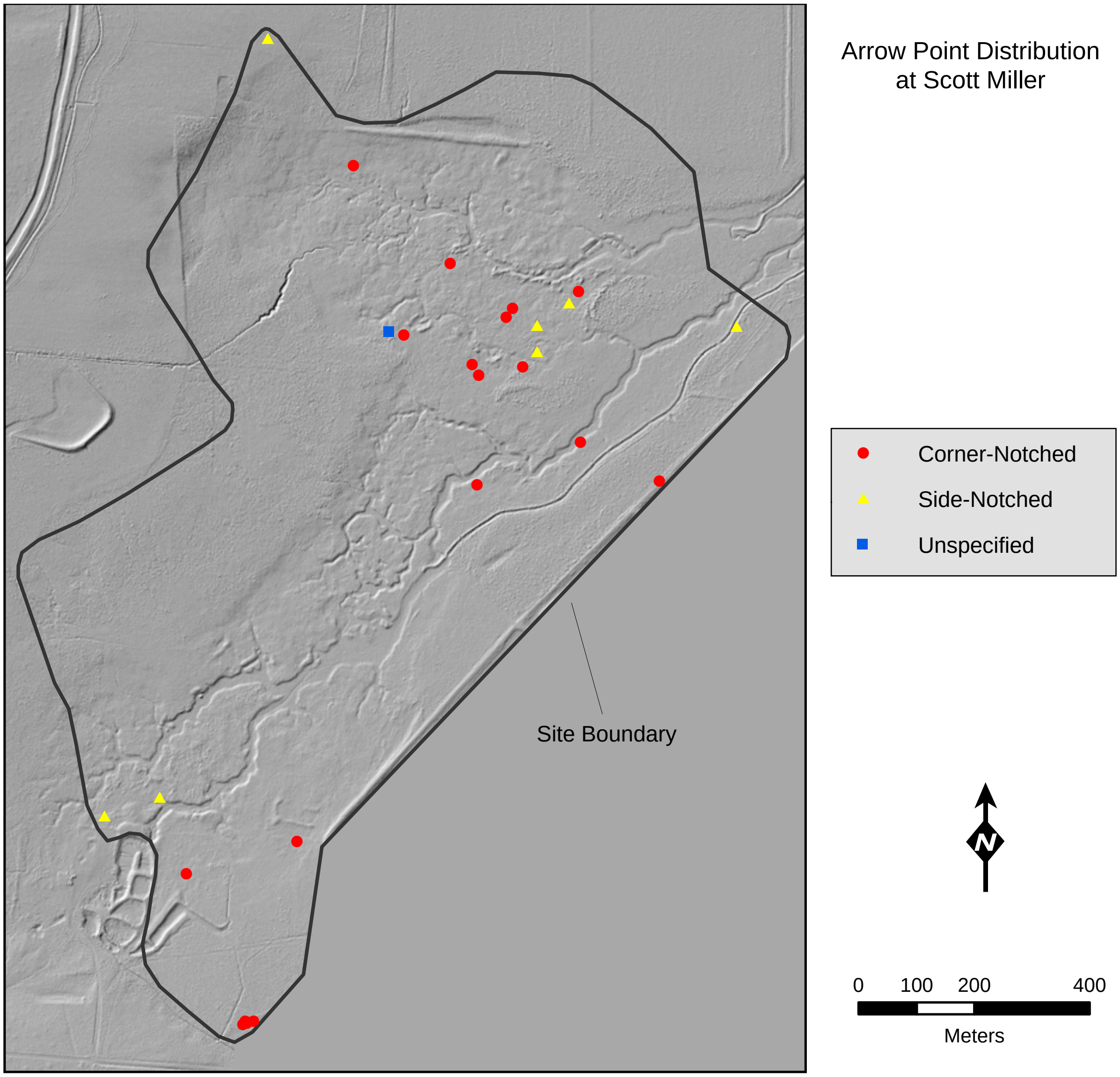

Figure 2.6. Distribution of arrow points at the Scott Miller site.

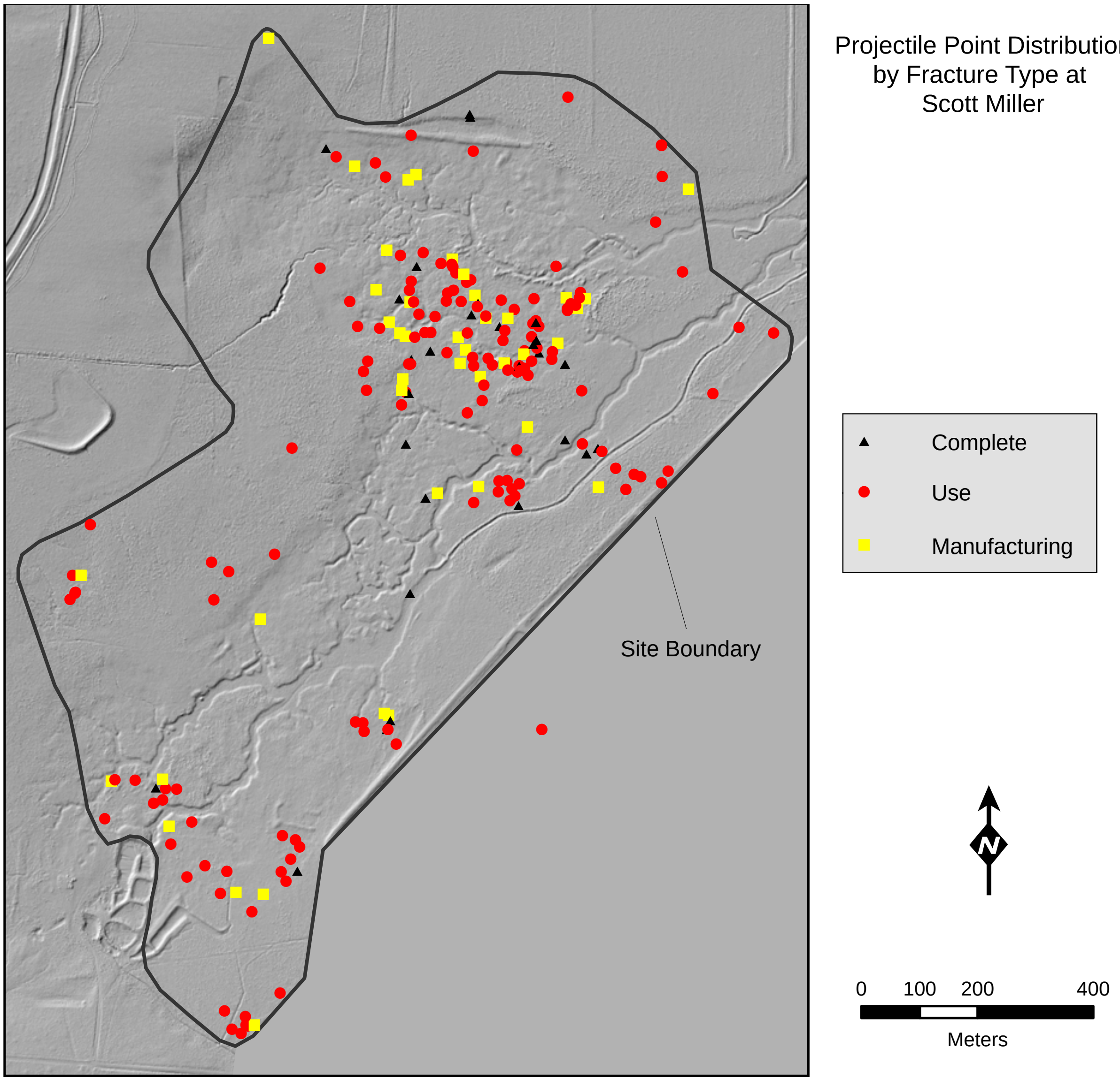

Figure 2.7. Distribution of projectile points, showing complete and mode of fracture at the Scott Miller site.

3

Research Summary

The Scott Miller site (5RN1136) is located on the Monte Vista National Wildlife Refuge in Rio Grande County, Colorado, and was first documented in 2009. It is located within a relic wetland that is no longer active due to extensive modifications and lowering of the water table in the San Luis Valley. Over 450 artifacts have been collected from the site since 2009, along with over 100 artifacts that have been documented but left in the field. Among these collected artifacts are 219 projectile points that range in age from the Folsom period though the Late Prehistoric period. Lacking from the assemblage are Clovis points—despite some efforts to document human presence during the end of the Pleistocene—and metal arrow points. This chapter begins by summarizing the major results presented in chapter 2. This is followed by a discussion about future research potential at the Scott Miller site and how this work can be used for archaeological analyses across the San Luis Valley.

Summary

The oldest projectile point in the assemblage is a Folsom point midsection. Other Paleoindian points include two typed as Plainview and two typed as Agate Basin. Two additional points may be the Hell Gap type but are too fragmented to discern between Hell Gap and Jay, an early type in the Oshara tradition that may date to the Paleoindian period (see chapter 1). The collection also includes 27 arrow points, including 19 corner-notched arrows, 7 side-notched, and one that is too fragmented to determine. Fourteen points were too fragmented to type as a dart or an arrow.

2021 *Projectile Points from the Scott Miller Site, Rio Grande County, Colorado,* by Christopher M. Johnston, pp. 29-31. Research Contribution 120. Archaeological Investigations in the San Luis Valley 8. Paleocultural Research Group, Broomfield, Colorado.

Oshara tradition dart points, which roughly correlate to the Archaic period, comprise nearly 50 percent of the entire assemblage, and over 80 percent of the typeable assemblage. When combined with dart points that are too fragmented to be typed, dart points account for over 75 percent of the assemblage. Even when the long span of the Oshara tradition is considered (approximately 5500 years), these points are still the most frequent at just over three points per every one hundred years.

Three Oshara tradition series—San Jose, Armijo, and En Medio—account for over 70 percent of the typable dart point assemblage. These three series overlap in age and span from 5000 B.P. to about 1600 B.P., with a relative frequency of just over two points per 100 years. Spatially, these three series are also heavily concentrated in the northern end of the site, near the "Elephant Mounds" area. Two series in particular—San Jose and Armijo—are almost entirely contained to this area, indicating that between roughly 5000 to 2500 B.P. the core occupation zone was at the northern end of the site.

The data from this analysis overwhelmingly indicate the primary function of the site was for hunting, with only minimal evidence of point maintenance and camp activities. Nearly 80 percent of the points are either complete and presumed to be hunting losses or are broken with a fracture type that indicates use, such as impact fractures. Only about 19 percent of the points are broken with fracture types indicating maintenance or manufacture.

San Jose and Armijo points are almost all entirely broken from use or are complete, indicating during this span the site was almost exclusively used for hunting. Over 75 percent of En Medio points also show discard from use (impact fracture or complete). The fracture types and discard modes do not appear to have any spatial patterning relative to the overall distribution. Complete points are more frequently represented in the "Elephant Mounds" area; however, nearly 55 percent of the points broken during manufacture or maintenance are also in this area. Thus, based on the projectile point data, it does not appear there are separate camp or workshop areas within the recorded site boundary. Instead, the data indicate the Scott Miller site was mainly a hunting site for the over 11,000 years.

Raw material types from the south (obsidian, some cherts, dacite, and basalt) and west (cherts, rhyolite) dominate the assemblage. Materials from well-known quarry sites nearby like Trickle Mountain quartzite, and more distant like Trout Creek chert, are nearly absent from the assemblage. Both sources are north of the site, again indicating people using the site likely mostly came from the south.

During the Oshara tradition, which itself is rooted in New Mexico, people journeyed to the Scott Miller site after spending some time to the south. Obsidian, one of the few materials that can be directly tied to a source location—likely all from the Jemez sources in New Mexico—comprises about 13 percent of the total point assemblage. Of the 29 obsidian points, 28 are Oshara tradition dart points (the other a corner-notched arrow). Additionally, over 86 percent of the points from other definite southern sources, like basalt and dacite, are Oshara tradition dart points.

Many sites in the San Luis Valley show evidence of repeated occupations; however, many of these are either tightly spaced occupations like those seen at the Upper Crossing site (Mitchell and Falk 2017) which spans the Late Archaic to the Late Prehistoric, or they contain just a few components represented by individual projectile points (Johnston 2020a). The near continuous occupation at Scott Miller—from the Folsom period through the Late Prehistoric—is rare in this region and situates the site as an especially important site within the broader archaeological history of the San Luis Valley.

Future Research

The analysis presented here on the Scott Miller site projectile points lays a foundation for additional research, both with this assemblage but also across the entire San Luis Valley. The projectile point data clearly indicate the site was used primarily as a hunting site. This conclusion is supported by the nature of the entire assemblage, which is dominated by projectile points. These data, however, could be combined with other artifact data to bolster the interpretations drawn here. This would be particularly useful for a spatial analysis that could show other artifact classes—such as pottery, groundstone, or flaking debris—that are often more typically associated with camp activities. Are points that broke from manufacture or maintenance spatially associated with these artifacts? If so, do they date to specific periods based on the point styles? Do those artifacts cluster in groups that may show workshop or camp areas that is not clearly seen in just the projectile point data?

Another line of future inquiry related to the projectile points is a more detailed typology on the arrow point assemblage. Arrow points only comprise only about 13 percent of the known point assemblage (excluding the unknown types); however, as noted in chapter 2, their morphology is quite variable. Regional arrow point typologies are lacking but more research could be done to build a better arrow point chronology that may highlight additional patterns not discerned in this analysis, both at the Scott Miller site and across the entire San Luis Valley.

Unfortunately, many typological analyses from sites in the San Luis Valley have not used the Oshara typology system, at least as described by Chapin (2005, 2017). This is both in part because it is relatively new and because researchers have utilized better known systems from areas like the Great Basin and Great Plains, which are often not relevant to the San Luis Valley. Future analyses of projectile point assemblages in the San Luis Valley should incorporate Chapin's work on the Oshara tradition. They should also utilize the data from the Scott Miller assemblage as it is the most extensive assemblage of Oshara tradition points in the region. Doing this will help develop a more comprehensive point chronology for the region during this period.

More regional data will also better define the distribution of the three most frequent Oshara tradition series—San Jose, Armijo, En Medio—within the region. For instance, is the frequency distribution at Scott Miller reflective of these three types being ubiquitous in the northern Rio Grande and San Luis Valley compared to other Oshara types? Or, alternatively, do these three series just represent more inclusivity within Chapin's Oshara tradition typology? They are three of the five series with multiple types, so it is possible this distribution has merely been created by lumping the different types within each series as one. More analyses using Chapin's (2017) series and types within each series could create a large enough sample size to discern meaningful temporal patterns.

Lastly, the chronology of the Oshara tradition is quite variable, with some types rather well dated and others with much longer ranges. Although buried stratified sites are rare in the San Luis Valley, any dates associated with Chapin's (2017) Oshara tradition types will only help refine this over time. Future researchers and students could also examine older assemblages and reports from excavated sites and apply the new Oshara tradition framework to augment future work using Chapin's updated Oshara tradition typology.

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Appendix A:
Projectile Point Codes

Table A.1. Projectile point codes and descriptions.

Code	Description
FS	**Field specimen number**
RAWM	**Raw material type**
1	Chert
2	Chalcedony
3	Quartzite
4	Rhyolite/tuff
5	Basalt
6	Petrified wood
7	Obsidian
8	Sandstone
9	Unknown
10	Argillite
11	Schist
12	Quartz
13	Metaquartzite
14	Unknown igneous
15	Conglomerate
16	Dacite
WEIGHT	**Mass nearest 0.1g**
LENGTH	**Extant length of object (mm)**
WIDTH	**Extant width of object, perpendicular to length (mm)**
THICK	**Maximum thickness of object (mm)**
BURN	**Burning**
0	Absent
1	Present
HEAT	**Heat treatment**
0	Unheated
1	Possibly present
2	Definitely present
3	Unknown due to burning
9	Not applicable
CORT	**Cortex**
0	Absent
1	Present
COMP	**Completeness**
1	Complete
2	Nearly complete, primary part of core or tested raw material
3	Distal end (tip)

Table A.1. Projectile point codes *continued.*

4	Proximal end (base)
5	Medial fragment or segment
6	Indeterminate end
7	Margin fragment
8	Channel flake or channel flake fragment
9	Other fragment
CASE	**Multiple tool codes on same object**
FORM	**Projectile point shape**
1	Stemmed
2	Notched
3	Lanceolate
9	Unknown or can't be coded
AR/DT	**Arrow or dart**
1	Dart
2	Arrow
9	Unknown or can't be coded
BASE	**Base shape**
1	Concave
2	Convex
3	Flat
9	Unknown or can't be coded
GRND	**Ground base/stem**
0	None, unground
1	Light to moderate grinding
2	Heavily ground
SER	**Serrated blade**
1	Yes
2	No
9	Unknown or can't be coded
USEPH	**Use Phase**
1	Unfinished, useable
2	unfinished, unusable (broken or rejected)
3	finished, usable (unbroken; includes usable cores)
4	finished, unusable (broken, burnt, exhausted, rejected; includes exhausted cores)
REJECT	**Reason for rejection, failure, discard**
1	has potential for further work or use
2	bending fracture or end shock
3	perverse fracture
4	material flaw or poor quality stone
5	outré-passé fracture
6	compound hinge/step occurrence
7	impact fracture
8	small size or exhaustion
9	indeterminate
10	heat or thermal fracture
11	lateral break
12	broken by radial fracture
13	crescentic chunk from tool margin
14	channel flake or fragment
15	recycled into another form or use, by bipolar process
16	burination spall

Table A.1. Projectile point codes *continued.*

17	resharpening flake coded as a tool; no further use possible
18	recycled into another form or use, by non-bipolar process
RESH	**Resharpening**
0	absent
1	present
RECY	**Recycling**
0	absent
1	recycled into different function
COMP2	**Projectile point completeness**
1	complete
2	resharpened tip, complete base
3	missing tip
4	basal fragment
5	fragment with ground edge
6	distal segment
7	distal part lacking base
8	missing part of base or haft
9	not applicable or indeterminate
DSA	**Distal shoulder angle (see Chapin 2017)**
PSA	**Proximal shoulder angle (see Chapin 2017)**
TYPE	**Projectile point type**
1	Jay
2	Bajada Stemmed A
3	Bajada Stemmed B
4	Bajada Stemmed C
5	Bajada-unspecified
6	San Jose Stemmed A
7	San Jose Stemmed B
8	San Jose Grants
9	San Jose Side-Notched
10	San Jose Square Stemmed
11	San Jose-unspecified
12	Moquino Square Based
13	Moquino Small Side-Notched
14	Moquino Concave
15	Moquino-unspecified
16	Armijo Side-Notched A
17	Armijo Side-Notched B
18	Armijo Stemmed
19	Armijo Corner-Notched
20	Armijo-unspecified
21	Augustin
22	Pelona
23	En Medio Corner-Notched
24	En Medio Eared
25	En Medio Side-Notched
26	En Medio-unspecified
27	Collier Basal-Notched
28	Corner-Notched Arrow
29	Side-Notched Arrow
30	Un-notched Arrow

Table A.1. Projectile point codes *continued.*

31	Folsom
32	Dart-Unspecified
33	Arrow-Unspecified
34	Agate Basin
35	Plainview
36	Jay or Bajada
99	Unknown
COMMENT	**Notes on object**

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