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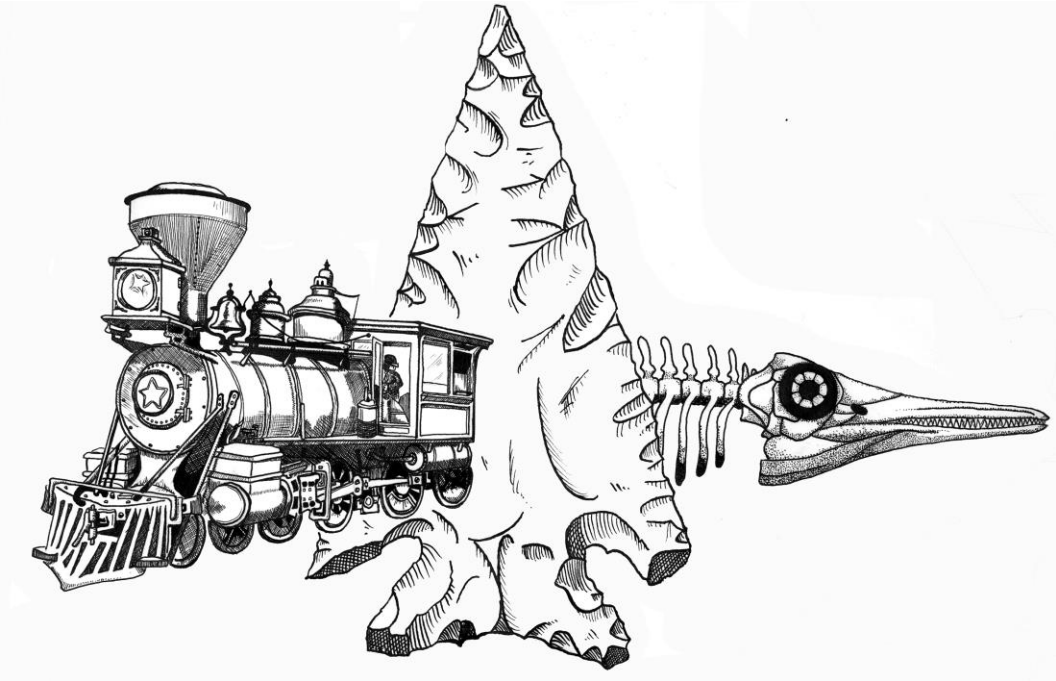

EARLY AND MIDDLE ARCHAIC PROJECTILE POINT TYPOLOGY AND CHRONOLOGY ACROSS THE GREAT BASIN

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and
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PREFACE AND ACKNOWLEDGEMENTS

The impetus for writing this monograph was born out of the excavations of two remarkable sites sitting on opposite ends of the Great Basin Physiographic Province: Bonneville Estates Rockshelter in the eastern Great Basin and Huffaker Springs in the western Great Basin. While Hockett was finishing the first typological analysis of the Bonneville Estates points with Ted Goebel, Spidell and Kristina Wiggins at Kautz Environmental were struggling with the typology of some of the points at the recently excavated Huffaker Springs site located in southeast Reno. Incredibly, after many decades of research and the excavation of thousands of sites across the Great Basin, these two sites represent the oldest stratified human-occupied sites ever excavated in the eastern and western Great Basin subregions – and the typological and chronological analyses of their respective projectile points were happening at about the same time. Spidell called Hockett one afternoon in 2017 and introduced Huffaker Springs, a site that Hockett had no knowledge about. Hockett took the Dead Cedar and Leppy Hills points from Bonneville Estates to Kautz's office in Reno and laid them on the table. The recognition of these points by Spidell and Wiggins was immediate, and something was said akin to "We have those at Huffaker Springs in the western Great Basin". This meeting led to many more discussions and comparison of point types and metrics from the two subregions of the Great Basin. As well, Hockett was also beginning a new study obtaining additional radiocarbon dates from O'Malley Shelter and retyping all the projectile points from that site. Remarkably, despite being excavated in 1969 and 1970, O'Malley Shelter remains the oldest stratified human-occupied site ever excavated in the southeastern Great Basin. The initial thought was to publish a journal article, but once the writing began and the photographing of points commenced, it quickly grew into a manuscript that was far beyond the page limits of a journal. And since most of the sites analyzed here are located on public lands and were excavated or partially excavated with the use of public funds, we felt the best place for its publication was someplace where it would be available free of charge as a downloadable pdf file. Hence, the publication here in the Nevada Bureau of Land Management's Technical Report Series.

This monograph has benefitted greatly from discussions amongst many individuals over the years, principal among them David Hurst Thomas, Daron Duke, Bill Hildebrandt, Kelly McGuire, Jerome King, David Madsen, David Rhode, Ed Stoner, Geoff Cunnar, and Gene Hattori. As always, none of these incredible scholars necessarily agree with the typology we present below, but their contributions in forming our final thoughts are gratefully acknowledged.

In creating our proposed typology, we strive to "keep it simple", and propose that Early and Middle Archaic Great Basin points can be adequately distinguished by some combination of six simple metrics and five indices, as well as the ability to distinguish corner notching from side notching. The following metric abbreviations are used. Note that certain commonly used metrics such as proximal shoulder angle (PSA) are considered unnecessary to accurately type the projectile points analyzed here. Side notches originate above the base of the preform regardless of notch angle, although in many cases side notches are perpendicular to the preform blade. Corner notches originate from the two outer corners of the preform base, reducing the original basal preform width; because side notches originate above the base, the original preform basal width is preserved.

ML = maximum length	NW = neck width	NW + TH index
MW = maximum width	TH = maximum thickness	SH:ML index
BW = maximum basal width	ML:MW index	BW:MW index
SH = stem height; (same as notch height)	NW:MW index	

INTRODUCTION

In a paper presented at the 36th Great Basin Anthropological Conference in Salt Lake City, Utah, Stoner and Cunnar (2018) gave a shout-out to Thomas' (2013) statement on the importance of the 60-year history of studying Great Basin projectile point typology and chronology. Thomas concluded that such studies formed the foundation upon which many other studies of past peoples and cultures in the region were based. Stoner and Cunnar (2018) gave particular importance to Thomas' (2013:145) statement that "…typological analysis remains absolutely critical to our understanding of the archaeological record, particularly the interrelationship between the paleoclimatic and human behavioral evidence". A decade after Thomas' publication, studies continue to contribute to this foundational base even if Great Basin archaeology scholars do not always agree on the specifics of projectile point typological and chronological patterns across the region (Smith et al. 2013; Hockett et al. 2014; Hoskins 2016; Keene 2018; Cunnar et al. 2019; Hockett and Goebel 2019; Jones and Madsen 2019; Spidell and Kautz 2021).

The evolving perspectives on the distribution and timing of projectile point styles in the Great Basin have recently stretched beyond the "long versus short chronology" debate centered upon Elko Series points. Hockett and Goebel (2019) recently reviewed how the long chronology, which argued that Elko Series points were 8,000 to 9,000 years old in the eastern Great Basin but only about 3,500 years old in the western Great Basin, came to be ingrained in the psyche of Great Basin archaeology scholars. Part of the answer is that over time projectile point 'lumpers' combined a variety of metrically, qualitatively, and chronologically distinct corner-notched, side-notched, and stemmed points under the Elko Series. As Hockett and Goebel (2019) demonstrated, however, if the Elko Series type is restricted to its original definition of corner-notched points manufactured on triangular preforms, then it cannot be shown that they date older than ca. 4,000 years ago (years ago = cal BP) anywhere in the Great Basin, albeit with a couple of caveats.

One of the caveats mentioned by Hockett and Goebel (2019) is the O'Malley Shelter site of the southeastern Great Basin where corner-notched points made on triangular preforms that were identified as Elko Series in Fowler et al. (1973) were found in sediments dating to ca. 7,900 years ago. This caveat is now addressed in greater detail below.

Another caveat is that during the manufacture of the many tens of thousands of notched points between 8,500 and 4,000 years ago, it is likely that an "Elko Series-like" point was occasionally made across this time frame. However, without evidence of the *systematic and repeated production* of the type these few specimens should not be considered "Elko Series" points with the equally indefensible interpretation that 'Elko Series points are 9,000 years old in the Great Basin and therefore they are a poor time marker'.

Due to factors that lead to intra-type variability including source material and internal flaws therein, skill of the knapper including children experimenting and learning tool production, reworking of broken points, and time spent manufacturing points, a certain percentage of an archaeologically defined type will not meet our metric definitions. Thus, Holmer (1986) correctly pointed out nearly 40 years ago that when key morphological characteristics such as length, width, thickness, and stem/notch height that define individual types are placed on scatterplots with circles drawn around their distributions, many similarly appearing types grade into one another along their margins, even as their means separate from one another. One key to defending a type and the accuracy of its definition lies in showing that the circles do not overlap to a great degree, leaving most individual specimens but not all of them

distinct from other types (e.g., Hockett and Goebel 2019:29-33, Figures 8, 12, 13).

A third caveat is based on evidence from the Early Middle Archaic (ca. 5,000 to 4,000 years ago) layers at Bonneville Estates Rockshelter (BER) where some corner-notched points made on triangular preforms are morphologically distinct from Elko Series points in several key metrics. These points were manufactured on thin, flat flakes that match the thickness of much later dating arrow points. These points are not only statistically significantly different from Elko Series points in length and thickness, they also were older than Elko Series points at BER. This led Hockett and Goebel (2019) to propose a new type, the "Dead Cedar Corner-Notched" point. Placed on a scatterplot using length and thickness for *x* and *y*, these two key metrics clearly separate Elko Series and Dead Cedar points at that shelter (Hockett and Goebel 2019:33, Figure 12). Furthermore, Dead Cedar points were found in Early Middle Archaic sediments dating between ca. 4,800 and 4,100 years ago along with Humboldt and Gatecliff points. It was also discovered that these small and thin corner-notched points may date to the Early Archaic (ca. 8,300 – 5,000 years ago) at Camels Back Cave in the eastern Great Basin (Hockett and Goebel 2019:33, Figure 13) where they were originally identified as Elko Series (Elston 2005), as well as in the western Great Basin where Spidell and Kautz (2021) recently identified Dead Cedar points in Early Middle Archaic sediments at the Huffaker Springs site in southeast Reno, Nevada.

Additionally, if the original definition of Elko Series is adhered to then other hitherto undefined projectile point types manufactured on lanceolate preforms or notched from the sides rather than the corners may be present that were previously lumped under the Elko Series genre. The recent excavations at BER (Hockett and Goebel 2019; Goebel et al. 2021) revealed an Early Archaic "Leppy Hills Corner-Notched" point that lacked a high stem like Pinto points, was corner-notched from the base, and manufactured on an elongated lanceolate rather than triangular preform. These points were shown to be both metrically and chronologically distinct from Elko points. Leppy Hills points are also present in the lower levels of Danger Cave near BER where they were identified as Elko Series by Hoskins (2016:67, Figures 3.1, specimens 23054.1, 23160.1, and 22993.5). Spidell and Kautz (2021) subsequently identified Leppy Hills points in Early Archaic sediments at Huffaker Springs in the western Great Basin.

Similarly, on the side-notched front, Stoner and Cunnar (2018) defined the "Pequop Side-Notched" point as side-notched manufactured on a triangular preform with a small keyhole notch at the base. This Early Archaic point superficially appears similar to the corner-notched Elko-Eared subtype. Hockett and Goebel (2019) and Spidell and Kautz (2021) subsequently identified the Pequop point in Early Archaic sediments in both BER and Huffaker Springs, respectively. Splitting the Pequop point from the general typological classification "Large Side-Notched" (LSN) is justified not only because of its metric distinction from other LSN points, but also because of its chronological distinction: it is currently known primarily from Early Archaic deposits while most of the other LSN points in the Great Basin can be found in Early Archaic through Late Archaic deposits. If Pequop points can be shown to have a similar lengthy chronological distribution as other LSN points in the future, then subsuming it under the general LSN type designation would be justifiable.

Further, Spidell and Kautz (2021) recently confirmed the existence of the "Carson Side-Notched" point in the western Great Basin first proposed by Kelly (1983). This small and relatively thin side-notched dart point is unlike the post-600 years ago Desert Side-Notched (DSN) point, and dates to the Middle Archaic, ca. 5,000 to 1,500 years ago. As a result, there now appears to be two dart point types in the Great Basin that likely have been typed as either Elko or Rosegate (Dead Cedar) or DSN (Carson) in the past. The former would result in Early Middle Archaic sites being classified as either Late Middle Archaic or Late Archaic, while the latter would result in Early or Late Middle

Archaic sites being classified as Protohistoric. We should be asking ourselves about the potential impact this may be causing to our settlement and subsistence models. And it demonstrates just how correct Thomas (2013) was in asserting that projectile point typology and chronology remains relevant today in Great Basin archaeology.

Lumpers and Splitters: A Further Brief Note on the Logic Behind the Typology

The caveats noted above in the arguments for or against proposing separate projectile point types can be further illuminated by noting that, in the simplest terms, a specific point type should be recognizable as unique both metrically (quantitatively) and narratively (qualitatively) from all other point types proposed. However, it must be stressed again that a certain number of individual point specimens belonging to one type will overlap with other point types in any number of individual metric measurements. Thus, while most Elko points were made on triangular preforms with a mean ML:MW ratio of < 2.0, some of them were occasionally made on a lanceolate preform. As a result, there is not a singular measurement that can be used to distinguish one point type from another metrically. Rather it is a combination of measurements that assist in typing individual point specimens. In this regard, adequate sample size matters. Typing undated individual specimens from surface assemblages with a sample size of one may be a riskier endeavor than typing multiple specimens found in well-dated contexts.

Additionally, there are other qualitative features that complement metrics in the typing of projectile points. An example here are the differences between Humboldt and Black Rock Concave Base (BRCB) points. The former is typically made on lanceolate preforms (ML:MW > 2.0) and they have MBW values < 20mm, while the latter is typically made on triangular preforms (ML:MW < 2.0) and they have MBW values > 20mm. Just as important, however, is that only Humboldt points may display a parallel oblique flaking pattern and appear diamond-shaped in cross section; neither of these qualitative descriptions are found in BRCB points.

Chronological patterning can also play a role in the final logic of lumping or splitting point types. Perhaps the best example is the examination of Elko Series and Dead Cedar points. At first glance, both types appear similar to one another: both are made on triangular preforms, are corner-notched, and have similar metrics in SH and SH:ML ratios. However, metrically the Dead Cedar point is significantly more gracile than Elko points in both overall length and thickness with little to no overlap when plotted on a bi-plot graph (Hockett and Goebel 2019:33, Figure 12). The question becomes, then, to lump or split? Lumping Dead Cedar points into the Elko Series should create a third subtype to go along with the long-standing existing two subtypes: Elko Corner-Notched and Elko Eared. So, a lumper may choose to call these points "Elko Diminutive" or some such designation. The key factor here is that the metric differences between these small and thin corner-notched points compared with the much larger and thicker Elko Series points are worthy of at least a subtype designation. The problem with lumping is that all current evidence also suggests that the small and thin points are older than Elko Corner-Notched and Elko Eared points. What we call Dead Cedar points were first manufactured by about 5,000 years ago, while Elko Series points did not come into production until a millennium later at about 4,000 years ago. Dead Cedar points also may have gone out of production at about the same time as Elko points are first produced. Thus, lumping Dead Cedar points with Elko Corner-Notched and Elko Eared points would lead to the suggestion that "Elko points are 5,000 years old in the Great Basin", implying that Elko Corner-Notched, Elko Eared, and "Elko Diminutive" all entered production 5,000 years ago. While a lumper could propose the caveat that while there are three subtypes of Elko Series points it should be kept in mind that one subtype is at least 1,000 years older than the other two, in point typology this seems illogical to us. This is particularly the case here when considering the fact that Dead Cedar points

are also metrically significantly different than Elko Series points as well. Those facts meet the criteria necessary to establish a new type.

There are a limited number of ways to notch a preform, and it is to be expected that over the course of the last 8,500 years there will be metric, qualitative, and chronological differences between various types that were corner-notched or side-notched. Lumping all corner-notched points or side-notched points into a single type across thousands of years when metric, qualitative, and chronological differences are apparent will add confusion to the practice of typing points and ultimately lead to erroneous applications of subsistence and settlement patterns that use point typology to place individual sites into broader categories such as "Early Archaic" and "Middle Archaic".

Goals of the Monograph

Logical questions to ask following the discussion presented above include: "If Pequop, Leppy Hills, Dead Cedar, and Carson points are valid types, then are they found across the entire Great Basin?"; "Are the proposed dates for the four new point types, as well as the proposed Basin-wide date of ca. 4,000 years ago for the long-standing Elko Series point type consistent across the Great Basin?"; "What are the known earliest dates and point types that usher in the Early Archaic, Early Middle Archaic/Transitional, and Late Middle Archaic periods across the Great Basin (**Table 1**), and are these dates consistent or do they vary from one subregion to another?"

This paper seeks to address these questions by first comparing the projectile point typology and chronology from seven Great Basin sites: Huffaker Springs, Bonneville Estates Rockshelter, Floating Island Cave, Danger Cave, O'Malley Shelter, Spooner Lake, and Mt. Augusta. Together, these sites represent the western, eastern, central, and southeastern Great Basin subregions. The data from these seven sites are supplemented in the discussions that follow with previously reported radiocarbon dates and projectile point illustrations and metrics from Gatecliff Shelter (Thomas 1983; Kennett et al. 2014) and Triple T Shelter (Thomas 1988), although limited specimens from Camels Back Cave (Schmitt and Madsen 2005) and Hogup Cave (Aikens 1980; Martin et al. 2017) are also utilized. Additionally, projectile points from Goshute Valley and Dairy Valley (eastern Nevada), "Elko County" (Owhyee Desert), "Humboldt County" and "Tosawihi" (north-central Nevada; Wiggins and Spidell 2022), "Eastern Sierra Front" (Nevada-California border), and "Winnemucca Lake Basin" (Kramer Cave; Hattori 1982) factor into the analysis that follows (*Figure 1*). The Eastern Sierra Front points were collected from three general areas, from north to south: (1) Donner Lake near its confluence with Donner Creek; (2) south of Lake Tahoe, California; and (3) Bodie Hills to Bridgeport, California. These additional sites and specimens bolster the sample sizes from the western, central, north-central, and eastern Great Basin subregions. Where appropriate, retyping of specimens originally reported from these sites are presented.

Table 1. Cultural periods and their approximate chronologies used in this analysis.

PERIOD	~ CHRONOLOGY
Late Middle Archaic[1]	4,000 – 1,500 years ago
Early Middle Archaic/Transitional[2]	4,700 – 4,100 years ago
Early Archaic[3]	8,300 – 4,800 years ago

[1]The Late Middle Archaic Period ushers new projectile point types including Elko and specific Martis subtypes.

[2]The Early Middle Archaic/Transitional Period ushers new projectile point types including Gatecliff, Gypsum, Humboldt, Dead Cedar, and Carson.

[3]The Early Archaic Period ushers concentrations of grinding stones and new projectile point types including Large Side-Notched, Leppy Hills, and Meadow Valley Corner-Notched.

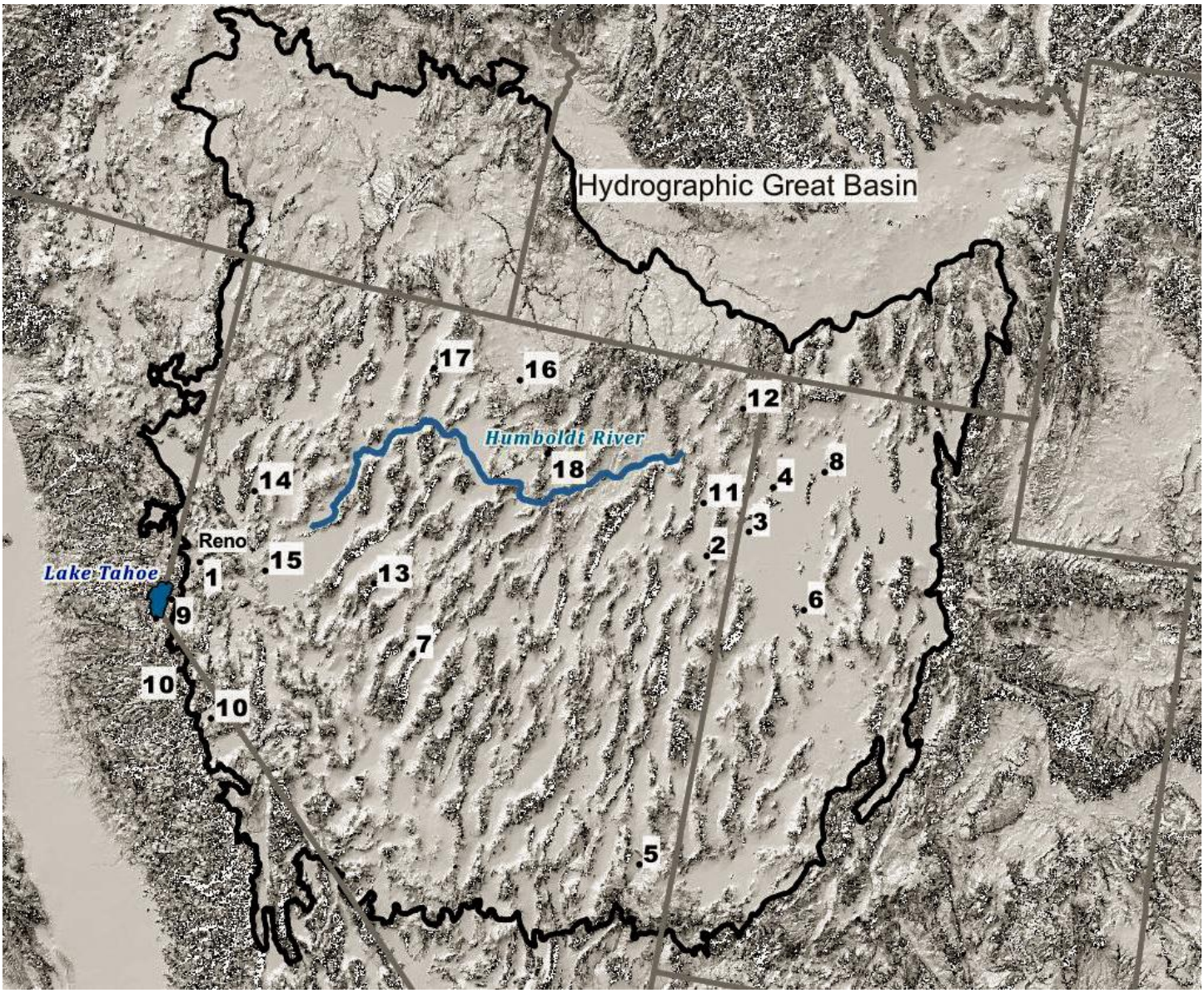


Figure 1. Major sites mentioned in text or primary areas supplying projectile points for this analysis: (1) Huffaker Springs; (2) Bonneville Estates Rockshelter; (3) Danger Cave; (4) Floating Island Cave; (5) O'Malley Shelter; (6) Camels Back Cave and Old River Bed; (7) Gatecliff Shelter and Triple T Shelter; (8) Hogup Cave; (9) Spooner Lake, Donner Lake, and Lake Tahoe; (10) Eastern Sierra Front; (11) Goshute Valley; (12) Dairy Valley; (13) Mt. Augusta; (14) Winnemucca Lake Basin; (15) Carson Sink; (16) Elko County (Owyhee Uplands Area); (17) Humboldt County (Paradise Valley Area); (18) Tosawihi Quarries.

THE PROJECTILE POINT TYPOLOGY

Before providing details of the seven sites mentioned above, we first present our proposed typology and the metric and qualitative features that distinguish each type (**Tables 2 and 3**). We propose that a total of 19 types were manufactured during the Early and Middle Archaic (ca. 8,500 – 1,500 years ago) in the eastern, southeastern, central, and western Great Basin subregions. Some types are restricted to only one of the three periods proposed, while others begin in one period and continue into subsequent periods. A total of seven types are known from the Early Archaic (Meadow Valley Corner-Notched, Leppy Hills, Pinto, LSN, Pequop Side-Notched [Pequop], BRCB, and Martis Side-Notched). Meadow Valley Corner-Notched, Leppy Hills, Pinto, and Pequop are primarily associated with Early Archaic sediments, while the others may be more commonly found in both Early and Middle Archaic sediments. The remaining points listed in Table 2 are Middle Archaic types (see below for further discussions).

To complement the data provided in **Table 3**, *Figures 2-3* show the differences between some of the new point types proposed against the long-standing types they are most like. *Figure 2* shows the visual differences between Leppy Hills, Pequop, Dead Cedar, and Elko-Eared. Each types' key distinguishing metrics are provided in **Table 2**. *Figure 3* further highlights the qualitative differences between Leppy Hills and Elko Series points.

Figure 2. From L >R: Leppy Hills, Pequop Side-Notched, Dead Cedar (Bonneville Estates Rockshelter); Elko-Eared (O'Malley Shelter).

Figure 3. Top left: Leppy Hills A (Bonneville Estates Rockshelter); Top right: Leppy Hills B (Huffaker Springs); Bottom: Elko Series (O'Malley Shelter).

Table 2. The Early and Middle Archaic projectile point types and their associated key metrics and indices.[1] The first six metrics are presented in mean values based on each type's individual values given in Appendix 1.

Type	n[5]	Max Length (ML)	Max Width (MW)	Neck Width (NW)	Max Thickness (TH)	Stem/Notch Height (SH)	Basal Width (BW)	NW + TH Index	SH:ML Index	ML:MW Index[2]	NW:MW Index	BW:MW Index
DSN[3]	86	23.4	12.4	7.0	3.0	6.8	12.1	10.0	.29	1.9		.98
Rosegate[4]	62	27.0	15.9	6.6	3.4	4.7	7.4	10.0	.17	1.7		
Elko	87	40.7	24.0	12.5	5.3	7.4	15.9	17.8	.18	1.7	.52	.66
Dead Cedar C-N	44	24.5	16.4	8.9	3.6	4.9	10.4	12.5		1.5		
Carson S-N	28	20.7	13.3	8.9	3.9	5.3	10.8	12.8	.26	1.6		.81
Gatecliff SS	37	38.6	22.3	11.8	5.3	9.2	11.6	17.1	.24	1.7	.53	.52
Martis C-N	41	37.8	26.2	14.8	6.3	8.3	18.1	21.1	.22	1.4		.69
Martis C-S	47	39.6	21.9	11.4	6.1	7.8	9.0	17.5		1.8		
Martis S-N	41	38.3	22.4	17.0	6.7	8.4	20.6	23.7		1.7		
Sierra Stem	9	27.8	19.3	7.2	4.7	5.7	5.8	11.9		1.4		
Steamboat	15	49.3	18.6	---	6.6	---	---			2.7		
Gypsum	36	40.1	22.3	10.2	5.4	7.1	6.7			1.8		
Leaf	7	40.4	16.8	---	5.7	---	---			2.4		
Humboldt	81	43.8	16.9	---	5.5	---	12.7			2.6		
Little Lake	27	75.3	28.8	19.2	7.9	13.0	15.7	27.1	.17	2.6	.67	.55
BRCB	17	38.4	23.3	---	6.3	---	21.8			1.6		
LSN	56	41.2	21.0	12.0	5.6	9.9	18.5	17.6		2.0		.88
Pequop S-N	8	33.7	21.0	14.5	5.2	8.0	19.4	19.7	.24	1.6		.92
Pinto	28	39.0	20.8	13.5	6.6	10.5	14.8	20.1	.27	1.9		.71
Leppy Hills	37	60.3	22.4	12.6	6.6	7.8	13.7	19.2	.13	2.7	.56	
MV C-N	7	38.4	24.5	11.4	5.9	7.7	14.8	17.3	.20	1.6	.47	

[1]The metrics for all the measurements of each individual specimen representing its type are presented in Appendix 1.

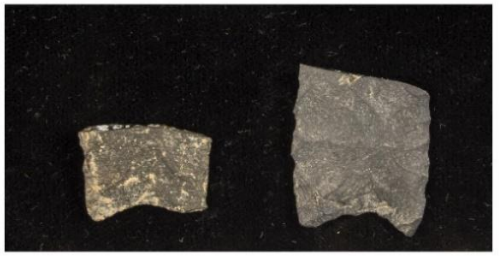
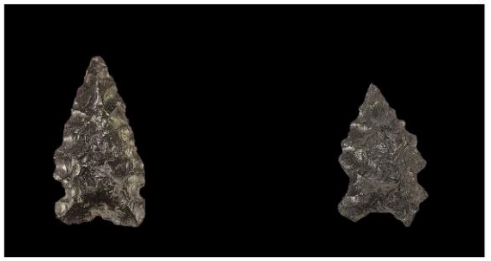
[2]ML:MW index values ≥ 2 = lanceolate preforms; ML:MW index values < 2 = triangular preforms

[3]Desert Side-Notched (DSN) points are Late Prehistoric/Protohistoric in age (ca. 600 – 150 years ago). Their key metrics are presented here primarily to distinguish Large Side-Notched points and Middle Archaic-aged Carson Side-Notched points from similar-looking DSN points.

[4]Rosegate is a term that lumps Rose Spring and Eastgate points (Thomas 1981). These points are Late Archaic in age (ca. 1,500 – 600 years ago). Their key metrics are presented here primarily to distinguish Middle Archaic-aged Dead Cedar Corner-Notched points from Rosegate points since their mean thickness values are nearly identical.

[5]Total projectile point sample = 801

Table 3. Early and Middle Archaic types used in this analysis and their key metrics, indices, and qualitative descriptions. Additional photographs of each type with scale bars are presented in the following sections.

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Black Rock Concave Base	ML:MW index ≤ 2; mean BW ~22.0mm; mean TH > 6.0mm	Due to its wide base the preform metrics as triangular; concave base with relatively wide blade; eastern variety is generally relatively thin and flat appearing in relation to its broad width, often with TH values 5mm or less; in the west along the eastern Sierra Front these points are often much thicker than their eastern counterparts, often with TH values 6-8mm; random flaking pattern; chert, obsidian, and fine-grained volcanics (FGV) common	
Carson Side-Notched	ML:MW index < 2; mean ML ~20mm; mean BW ~11mm; mean TH ~4.0mm; mean NW + TH index = 12.8mm; BW:MW index ~.80	Generally manufactured on small, triangular preforms; diminutive side-notched point that is relatively thick (often 4.0mm or greater) especially for its size; total length often does not exceed 2cm; BW ≠ MW in many cases as in most DSN points; mean NW + TH index of 12.8mm places Carson, along with Dead Cedar points, as intermediary between arrow points and other dart points; concave bases most common, more rarely straight or convex based; obsidian the preferred raw material	

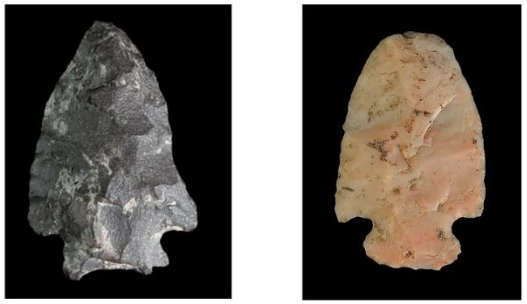
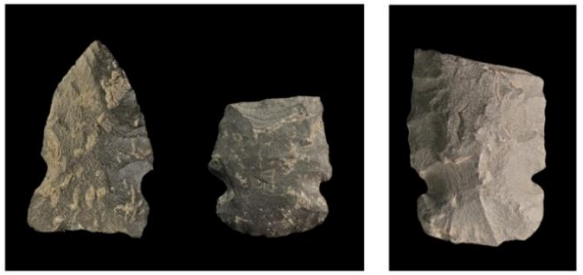
Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Dead Cedar Corner-Notched	ML:MW index < 2; mean ML < 25mm; mean TH ~3.5mm; NW generally ≤ 10mm; mean NW + TH index = 12.5mm	Small, thin, corner-notched point manufactured on triangular preforms; general appearance similar to Elko Series but much shorter and slender with TH values that match later-dating arrow points and neck widths much narrower than Elko Series; mean NW + TH index of 12.5mm places Dead Cedar, along with Carson points, as intermediary between arrow points and other dart points	
Elko Series	ML:MW index < 2; mean ML ≥ 40mm; mean TH > 5.0mm; NW generally ≥ 11mm; mean NW+ TH index ~17.0mm	Generally manufactured on triangular preforms, although those from central NV tend to be on the lower end of lanceolate; notches with moderate depth and originating from the corners of the basal preforms result in a low stemmed appearance; removal of corners of the basal preforms during notching results in tangs wider than the base; base is straight (Elko Corner-Notched) or concave with outward flaring ears (Elko-Eared) and only rarely convex; tangs point downward; thickness generally between 4-6mm; often well flaked; chert a preferred material in some regions	

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Gatecliff Split-Stem	Mean ML:MW index < 2; mean SH ~9mm; BW:MW index generally ≤ .55; mean NW:MW index = .53	Generally manufactured on triangular preforms but occasionally lanceolate; relatively broad, deep and high on the preform corner notches generally create downward flaring side tangs but occasionally outward flaring side tangs; concave base is generally shallow to moderately deep, creating basal tangs that point downward rather than outward; similar in appearance to Pinto but Gatecliff is generally thinner and more finely flaked with narrower basal tangs; similar in appearance to Little Lake but Gatecliff generally displays less depth to the concave base, is more triangular in shape, is more gracile in NW, and has lower NW + TH and NW:MW indices than Little Lake	
Gypsum	Mean ML:MW index = 1.8; SH generally ≤ 8mm	Generally manufactured on triangular preforms but with a mean ML:MW value of 1.8 lanceolate preforms also relatively common; relatively broad shallow notches or shouldering originating from the base create a relatively short, rounded contracting stem; point is called “Gatecliff Contracting Stem” in the central Great Basin, “Gypsum” to the south; uncommon in the northern and western Great Basin	

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Humboldt Concave Base	ML:MW index > 2; mean BW ~13mm; mean TH 5.5mm	Lanceolate preform with a relatively shallow concave base; relatively narrow blade that is also relatively thick and often diamond-shaped in cross section; some degree of parallel oblique flaking may be present; chert, obsidian, and FGV all commonly used as raw material	
Large Side-Notched	ML:MW index highly variable and can be ≥ 2 and < 2; mean BW ~19mm; mean TH ~5.5mm; NW + TH index generally ≥ 15mm; ML often ≥ 40mm	Manufactured on both lanceolate and triangular preforms, this type designation covers a variety of large side-notched points other than Pequop and Martis; includes Northern typified by a concave base that is deep and broad; straight bases also common; rarely convex based in the Great Basin; like DSN points the MW may equal or nearly equal BW, however these points overall greatly exceed DSN points in ML, TH, BW, and NW + TH index values	

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Leaf	ML:MW index ≥ 2; mean ML ~40mm	Lanceolate preform that is simply rounded at its base and occasionally with a small keyhole notch; tends to be broader across its midsection for its overall length than Steamboat points; more commonly found in parts of the southeastern Great Basin	
Leppy Hills	ML:MW index ≥ 2; ML:MW index greatest of all Early or Middle Archaic points at 2.7; mean SH:ML index only .13; mean TH ~6.5mm	Simple projectile point manufactured on lanceolate preforms; along with Steamboat, ML:MW index greatest of all Early or Middle Archaic points; may be corner-notched with a basal concave notch (Type A; 2nd illustration) or corner-notched with a straight or convex base (Type B; 1st illustration); very short stem relative to length; Type A more common in eastern Great Basin, Type B more common in western Great Basin; FGV preferred in western Great Basin	

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Little Lake	ML:MW index ≥ 2; mean ML ~75mm; mean TH ~8mm; mean NW + TH index ~27mm; mean NW ~19mm	Generally manufactured on lanceolate preforms; may take a leaf-like appearance or a relatively narrow lanceolate form; relatively shallow corner notches generally high on the stem creates a high SH with small outward flaring 'buds' or tangs (1st illustration); concave base is generally deep, creating elongated basal tangs that point downward; rarer varieties display straight or Gypsum-like bases (2nd illustration); similar in appearance to Pinto but Little Lake is generally longer, more finely flaked, and with narrower basal tangs; similar in appearance to Gatecliff but Little Lake generally displays more depth to the concave base, more lanceolate in shape (greater ML:MW), is much more robust in NW, and has much higher NW + TH and NW:MW indices; mainly present in western Great Basin	
Martis Contracting Stem	ML:MW index commonly both ≤ 2 and ≥ 2 giving a mean of 1.8; mean TH ~6.0mm; mean BW = 9.0mm	Manufactured on both triangular and lanceolate preforms; lanceolate-looking point with broad flaring tangs generally perpendicular to the preform; generally contracting base below the flaring tangs; often relatively crudely flaked with TH values often exceeding 6mm; FGV a preferred raw material although obsidian also used particularly around the Bodie Hills and Mt. Hicks sources; chert less common	

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Martis Corner-Notched	ML:MW index < 2; mean TH = 6.3mm; mean MW > 26.0mm; mean NW ~15.0mm; mean BW ~18.0mm; mean NW + TH index > 20.0mm	Generally manufactured on triangular preforms; large, relatively crudely flaked corner-notched point that often reaches or exceeds 6mm in thickness; similar in general appearance to Elko Series but much more robust MW, NW, and BW values, as well as NW + TH index; obsidian, FGV, and chert all used	
Martis Side-Notched	ML:MW index generally ≤2; mean TH = 6.7mm; mean NW + TH index ~24mm	Generally manufactured on triangular preforms; large, thick point in which the side notches are typically placed low on the preform just above the base; notches generally shallow and narrow; base is often slightly concave but convex also common; less common is a straight base; often relatively crudely flaked; NW + TH index much more robust than other LSN points; FGV a preferred raw material although obsidian also used; chert less common	

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Meadow Valley Corner-Notched	ML:MW index ≤ 2; mean NW = 11.4mm; mean SH = 7.7mm; mean TH nearly 6.0mm; mean NW:MW index < .50	Generally manufactured on triangular preforms; relatively deep corner notches and high SH produce narrow neck widths and a generally stemmed appearance; thick (mean is 6mm) and relatively crudely flaked; base is generally convex rather than straight or concave; all type specimens currently known (O'Malley Shelter in the southeast) manufactured from obsidian	
Pequop Side-Notched	ML:MW index ≤ 2, and with a mean of 1.6 is more triangular than standard LSN varieties; mean ML < 34mm	Relatively small, triangular side-notched point with keyhole notch in the base; the keyhole notch creates "ears" often confused with the Elko-Eared subtype of the Elko Series, the latter of which are corner-notched points; the side notches can be perpendicular creating outward pointing tangs (1st illustration) or angled creating downward flaring tangs 2nd illustration); consistently triangular in appearance and shortness of ML distinguishes this point from the general LSN group	 

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Pinto	ML:MW index = ~2; mean SH:ML index ~.30; mean TH = 6.6mm	Generally manufactured on lanceolate preforms; generally shallow, broad and high on the preform notches that are at times very shallow leaving only a shoulder; if tangs are present they usually point perpendicular to the side of the preform; highest SH:ML index of any of the Early or Middle Archaic points results in an elongated stem; bases often concave but sometimes with relatively broad keyhole notch that results in “ears” that generally angle outward rather than straight downward as in Gatecliff Split-Stem; relatively thick and crudely flaked; FGV and cherts often used	
Sierra Stemmed	ML:MW index < 2; mean TH ~4.5mm; mean NW ~7.0mm; mean BW ~6.0mm	Manufactured on triangular preforms; deep and broad basal notches create a relatively thin NW and stem with downward flaring and sometimes curved tangs; generally thinner and more finely made than Martis subtypes; FGV and obsidian used, but chert a common raw material as well	

Projectile Point Type	Key Metric Traits	Qualitative Description	Illustrations
Steamboat	ML:MW index ≥ 2; ML often ≥ 50mm; mean TH = 6.6mm	Lanceolate preform that is simply rounded at its base but sometimes bipointed; tends to be narrower across its midsection for its overall length than leaf points; generally longer and thicker than leaf points; along with Leppy Hills, displays greatest mean ML:MW index of all the Early and Middle Archaic points; chert and FGV the preferred raw materials; most common in the west along the eastern Sierra Front	

INTRODUCTION TO THE SEVEN SITES TREATED IN DETAIL

Introduction

The Huffaker Springs site (26Wa9528) is included in an unpublished Cultural Resource Management report submitted to the US Army Corps of Engineers by Kautz Environmental Consultants, Inc. of Reno, Nevada (Spidell and Kautz 2021). The typology and chronology of the Bonneville Estates Rockshelter (CRNV-11-4893) projectile points was recently published by Hockett and Goebel (2019). The points from Floating Island Cave (42To106) are retyped below from Lapp's (2007) original analysis, and the new results were included in Jones and Madsen (2019) although additional points from the site that were not available in 2019 are included here. The projectile points recovered from the 1980's excavation of an intact column of sediments inside Danger Cave (42To13) was reported by Lapp (2007) as well, and those points are retyped here. Additionally, three Early Archaic points from Danger Cave with sinew binding attached were radiocarbon dated and reported by Hoskins (2016) and these points are retyped below. An additional four Early Archaic points with sinew binding attached from Danger Cave are typed and their radiocarbon dates reported here. The Early and Middle Archaic occupations at O'Malley Shelter (26Ln418) were first reported in Fowler et al. (1973) and we supplement that dating sequence with additional radiocarbon dates reported for the first time herein. Only retyped projectile points recovered from individually dated "Feature" numbers at O'Malley Shelter are reported here to provide consistent and securely dated points from the site. The Spooner Lake site (26Do38) was first described by Elston (1971). We undertook a complete reanalysis of the projectile points and submitted additional radiocarbon dates that are presented for the first time below. This site serves as the type site for the Spooner Lake Phase defined for the Lake Tahoe subregion. Finally, the Mt. Augusta site complex (26Ch1383 and 26Ch369) was first reported by McGuire and Hatoff (1991), and the points are retyped below.

The retyping of projectile points follows the systematic ordering first developed in Hockett and Goebel (2019) and Spidell and Kautz (2021), as well as the updated key metrics, indices, and qualitative descriptions that define each point type based on the more expansive database used herein (**Tables 2 and 3**). This exercise sheds new light on the complexity of the ages and morphologies of Early and Middle Archaic projectile points across much of the Great Basin. It should be noted that the northwestern and southwestern subregions of the Great Basin are not covered here.

Also of note is that prior to the Early Archaic Period only Bonneville Estates Rockshelter contains multiple Paleoindian Period projectile points in a well dated stratigraphic context that spans 12,900 to 10,500 years ago. Huffaker Springs contains an odd assortment of small, thick, and crude stem-like projectile points lying below the Early Archaic occupations (Spidell and Kautz 2021; *Figure 4*). These points date to at least 8,000 years ago but the basal deposits at the site were not adequate

to reveal their possible true age and period of manufacture.

There also is a Windust-like short-stemmed point from Danger Cave illustrated by Jennings (1957:109, Figure 80) that was found *in situ* and associated with the lower DI hearths radiocarbon dated to 12,100 years ago (10,300 ^{14}C BP), a date confirmed by Rhode et al. (2006:331, Table 1). There is another short-stemmed Windust-like specimen that appears to be a reworked point recovered from stratum 1 in Hogup Cave (Aikens 1980:42, Figure 21g). This specimen may be up to 9,500 years old.

The Early Archaic Period that supplants the Paleoindian Period is generally recognized by the addition of new projectile point types including Pinto, LSN (including Pequop), and Leppy Hills (Hockett and Goebel 2019). Some combination of these point styles makes their entrance into the Great Basin archaeological record by at least 8,300 years ago in the eastern and southeastern Great Basin, and in the case of Pinto perhaps as early as 9,500 years ago in the east along the Old River Bed Delta, Utah (Duke 2011). This monograph begins the typological and chronological comparison of point types between the seven sites mentioned above at this time.

The morphology and chronology of post-1,500 years ago arrow points across the Great Basin representing the Late Archaic and Late Prehistoric periods (including the Formative/Fremont of the eastern Great Basin) are generally not included in this analysis although key metrics are in **Table 3** and Appendix 1 for Rosegate and DSN points, and photographs of these arrow types are included to further illustrate comparisons between dart and arrow points, particularly between newly proposed dart types such as Dead Cedar and Carson versus Rosegate and DSN, respectively. These metrics, as noted, are especially valuable in the discussion of Dead Cedar and Carson points which may appear to be arrow points based on their small size and thickness but are found in well-dated Middle Archaic Period sediments and key out as dart points using Far Western's Dart-Arrow Index (NW + TH > 11.88mm = dart; NW + TH < 11.88mm = arrow; Hildebrandt and King 2012).

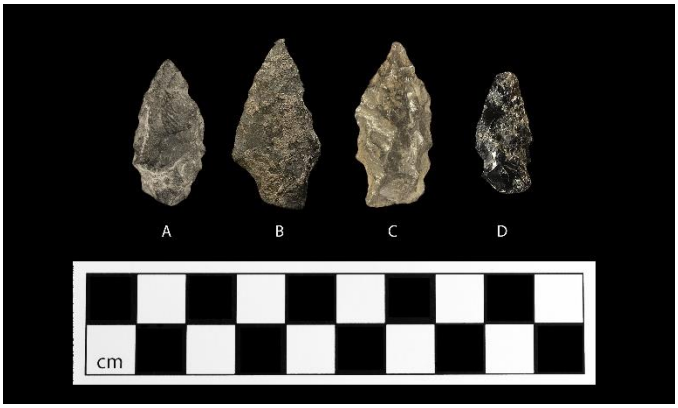


Figure 4. Crudely flaked "Dugway Stubby"-like projectile points from the basal deposits at Huffaker Springs. These points are at least 8,000 years old and appear to have been manufactured just prior to the production of Leppy Hills points at the site.

The Sites and Number of Reliably Dated Projectile Points

Huffaker Springs

Huffaker Springs is an open-air site located in southeast Reno, Nevada (*Figure 5*). The site rests upon a lower terrace adjacent to Steamboat Creek, a tributary of the Truckee River that gathers waters from several streams and creeks that flow from the

eastern side of the Sierra Nevada Mountains including Galena, Thomas, Whites, and Browns creeks. Warm waters bubble to the surface at Huffaker Springs along the eastern side of Steamboat Creek, undoubtedly a draw to its prehistoric inhabitants. The site is at 1,352 meters (4,437 feet) asl, and rests between the floodplain of the valley and the western slope of the Virginia Range to the east (*Figure 5*).

Figure 5. General location of the Huffaker Springs site from near the top of Mt. Rose in the Sierra Nevada Mountains, looking east. Huffaker Springs is located along Steamboat Creek which travels along the base of the Virginia Range (background) on the east side of the Truckee Meadows floodplain in southeast Reno.

Huffaker Springs was excavated by Kautz Environmental Consultants between 2016 and 2018. The site contains over 2m of stratified cultural deposits that were subdivided into eight distinct strata (**Table 4**, page 27). Strata 2-7 date between the Late Paleoindian-Early Archaic transition (ca. 7,900 years ago) to the Late Middle Archaic (ca. 3,150 years ago). Chronological control was obtained via 31 radiocarbon dates of which Spidell and Kautz (2021) accepted 23 as valid.

The unaccepted dates were not out of character with the accepted dates and for the stratigraphic position of the artifacts based on the chronological scales of the Early and Middle Archaic periods. For example, Spidell and Kautz (2021) considered three dates obtained from stratum 7 (ca. 7,900 to 7,400 years ago) as unacceptable because they ranged between ca. 7,050 and 6,750 years ago, which was more in line with the stratum 5 dates of ca. 7,100 to 6,400 years ago (the accepted stratum 6 dates ran between 7,900 and 7,100 years ago). Thus, all the accepted and non-accepted dates obtained from strata 5, 6, and 7 demonstrate that the artifacts retrieved from these three strata are all Early Archaic in age and date between 7,900 and 6,400 years ago. Stratum 4 is also Early Archaic in age with dates ranging between 6,350 and 4,900 years ago. The Early Middle Archaic/Transitional Period is represented by stratum 3 with dates ranging between 4,350 and 3,900 years ago. Therefore, there may have been a 550-year period of nonoccupation of the site between 4,900 and 4,350 years ago. Stratum 2 represents the Late Middle Archaic; two dates both yielded results of ca. 3,150 years ago. The transition from the Early to the Late Middle Archaic occurred between 4,350 and 3,150 years ago at Huffaker Springs.

Approximately 350,000 lithic artifacts and faunal remains were recovered during the excavations, including 294 projectile points of which 179 were typed. Of these, 29 are Early Archaic and 141 are Middle Archaic in age. Based on the projectile points

present in each stratum along with the length of time that each stratum represents, stratum 4 is the terminus of the Early Archaic occupation at Huffaker Springs and stratum 3 is the beginning of the Early Middle Archaic/Transitional Period due to the initial presence of Gatecliff and Humboldt points along with other newly defined Early Middle Archaic types such as Dead Cedar and Carson. The transition to the Late Middle Archaic is ushered into the site by the first appearance of Elko Series points sometime between 3,900 and 3,150 years ago (**Table 4**).

Figure 6. Bonneville Estates Rockshelter, looking west. This large cavern was carved by the high stand waters of Pleistocene Lake Bonneville. A flat Bonneville shoreline terrace juts out from the base of the shelter. The Bonneville Salt Flats are located about 8 kilometers (5 miles) east; behind the shelter further to the west are the Goshute Mountains.

Bonneville Estates Rockshelter

Bonneville Estates Rockshelter is located near the western edge of the Lake Bonneville basin in eastern Nevada about 30 kilometers (19 miles) south of Danger Cave (Jennings 1957) (*Figure 1*). The site was carved by the high stand of Pleistocene Lake Bonneville, resting today at an elevation of 1,585 meters (5,200 feet) asl (*Figure 6*). It is a mid-elevation locale between the Lake Bonneville flats to the east and the uplands of the Goshute Range to the west. The basal deposits in the shelter consist of Lake Bonneville deposited sand and gravels, and the site began accumulating terrestrial sediments shortly after the catastrophic flood that dropped the lake from its high stand (Bonneville shoreline) to the Provo shoreline ca. 17,000 to 18,000 years ago (Miller et al. 2013).

Bonneville Estates Rockshelter was excavated between 2000 and 2009 where 3m of sediment was encountered. No definitive human occupation was encountered between ca. 17,000/18,000 and 13,000 years ago, although paleontological faunal specimens occur in the lower pre-human occupied terrestrial deposits. The sediments containing human occupation date between ca. 13,000 and 100 years ago and the shelter was repeatedly but intermittently occupied throughout that 13,000-year period, particularly during favorable climatic episodes (Goebel et al. 2021; **Table 4**).

The Paleoindian Period is represented by strata 17-18 and dates between 12,900 and 8,700 years ago. Exclusively Western Stemmed points were found in these lowest levels of human occupation. The Early Archaic sediments are represented by strata 12-16, contain primarily LSN points (including Pequop), and date between 8,300 and 4,800 years ago. The Early Middle Archaic/Transitional Period is ushered in by the presence of Gatecliff, Humboldt, and

Dead Cedar points and dates between 4,700 and 4,150 years ago. Finally, the Late Middle Archaic witnessed the emergence of Elko Series points by 4,000 years ago (Hockett and Goebel 2019:20; **Table 4**).

A total of 175 typable projectile points was recovered (Hockett and Goebel 2019:21, Table 3), and their chronological ages are backed by 247 radiocarbon dates obtained primarily from individual hearth features, faunal remains, textiles, and coprolites (Goebel et al. 2021). Of the 175 typable points, 75 are Early Archaic in age, 19 are Early Middle Archaic/Transitional, and 31 are Late Middle Archaic (Hockett and Goebel 2019:20, Table 1).

Figure 7. Floating Island Cave. The Bonneville Salt Flats surround this small, isolated mountain range. Photo courtesy of David B. Madsen.

Floating Island Cave

Floating Island Cave is in western Utah in the eastern Great Basin (*Figure 1*). It is located approximately 65 kilometers (40 miles) northeast of Bonneville Estates Rockshelter, and 35 kilometers (22 miles) northeast of Danger Cave surrounded by the Bonneville Salt Flats. The site rests at 1,345 meters (4,413 feet) asl (*Figure 7*).

Excavations in 1986 exposed a 4m deep column of sediments divided into 27 strata (Lapp 2007; Jones and Madsen 2019). These strata date between 8,400 and 1,350 years ago based on 14 radiocarbon dates and the presence of Mazama tephra at ca. 7,650 years ago (INTCAL 20; Reimer et al. 2020) within stratum 4 (Jones and Madsen 2019:23, Table 3). However, human occupation was not documented prior to 7,000 years ago (**Table 4**).

A total of 63 projectile points was recovered from Floating Island Cave, 52 of which were typable. The Early Archaic occupation of the cave began post-Mazama, with the cultural bearing sediments (strata 6-9; ca. 7,000 to 6,450 years ago) producing 14 typable points, most of which were LSN.

The Early Middle Archaic/Transitional sediments (strata 10-11) are ushered in with the presence of eight typable points including Humboldt and Dead Cedar. There is currently a single date of 3,900 years ago for this Period, signaling a 2,550-year gap in human occupation of the cave between ca. 6,450 and 3,900 years ago during the transition from the Early Archaic to the Early Middle Archaic/Transitional Period. Thus, the 3,900 years ago date may not represent the earliest point of this transition.

The Late Middle Archaic sees the emergence of Elko Series points and is represented by strata 12-20 containing 10 total typable points. The dates for these nine strata range between 2,800 and approximately 1,265 years ago. As before, the date of 2,800 years ago probably does not represent the earliest appearance of Elko

Series points nor the transition to the Late Middle Archaic in the eastern Great Basin.

The 32 typable Early and Middle Archaic points are retyped here after the initial reporting by Lapp (2007) (see also Jones and Madsen 2019:32, Table 6).

Danger Cave

Danger Cave was first reported in 1957 by Jesse Jennings. In 1985 David Madsen and David Rhode excavated a column of intact sediments (*Figure 8*) and retrieved the first reliable set of strata designations and post-8,300 years ago radiocarbon dates for Danger Cave using more modern excavation and radiocarbon dating techniques (e.g., Madsen and Rhode 1990; Rhode and Madsen 1998). Danger Cave is located near the city of Wendover in far western Utah, about 30 kilometers (19 miles) north of Bonneville Estates Rockshelter (*Figure 1*). The cave rests at 1,314 meters (4,311 feet) asl near the elevation of the lower (Gilbert) Lake Bonneville shoreline that was carved during the Younger Dryas ca. 12,900 to 11,650 years ago. Unlike Bonneville Estates Rockshelter whose terrestrial sediments began forming inside the site approximately 17,000 to 18,000 years ago, terrestrial sediments probably began forming inside Danger Cave after 11,650 years ago.

The Danger Cave sediment column (*Figure 8*) was divided into 37 strata with the following correlations to Jennings' (1957) DI-DVI original strata designations: DI: strata 1-4; DII: strata 5-10; DIII: strata 11-24; DIV: strata 25-30; DV: strata 34; DVI: strata 35-37 (Lapp 2007:6, Table 1). Lapp (2007:12-13, Figures 2-3) illustrates 10 typable projectile points recovered between strata 11-20 from the column sample. We note that the point base illustrated in Lapp (2007:13, Figure 3a) from stratum 30 (ca. 5,800 years ago) is not typable because it could represent either a Pinto or a Gatecliff point, and the apparent Humboldt point illustrated in Figure 3b has no provenience, so these two points are not considered further. Given the 5,800 year old date associated with the point base from stratum 30, however, that specimen is likely a broken Pinto point.

The column strata with typable points (strata 11, 12, 15, and 20) are all Early Archaic in age, dating between ca. 8,300 years ago (stratum 11) and between ca. 7,200 (stratum 18) and 6,100 (stratum 24) years ago, as stratum 20 has not yet been dated directly (Jones and Madsen 2019:29, Table 5).

Figure 8. David Madsen (left) and David Rhode (right) excavate an intact column of sediments inside Danger Cave in 1986. Photo courtesy David B. Madsen.

Table 4. Early and Middle Archaic projectile points and their associated radiocarbon dates from seven Great Basin sites[1].

	Early Archaic		Early Middle Archaic (Transitional)		Late Middle Archaic	
Site	Types Present[1]	Strata cal BP[2]	Types Present[7]	Strata cal BP	Types Present[11]	Strata cal BP
Huffaker Springs	Stemmed[3] Leppy Hills Pinto LSN Martis S-N[4]	4-7 7,900 – 4,900	Leppy Hills LSN Pequop S-N Martis S-N Martis C-N[5] Martis C-S[6] Dead Cedar Gatecliff Humboldt Steamboat[8] Carson Sierra Stemmed[9] BRCB[10]	3 4,350 – 3,900	LSN Martis S-N Martis C-N Martis C-S Dead Cedar Gatecliff[12] Humboldt Steamboat Carson Sierra Stemmed BRCB Elko	2 3,150
Bonneville Estates Rockshelter	Leppy Hills Pinto LSN Pequop S-N BRCB	12-16 8,300 – 4,800	LSN Dead Cedar Gatecliff Humboldt	8c; 10-11 4,700 – 4,150	LSN Humboldt Elko	3b; 4-9 4,000 – 1,600
Floating Island Cave	Leppy Hills LSN	6-9 7,000 – 6,450	Pinto Dead Cedar Gatecliff Humboldt	10-11 3,900	Elko	12-22 2,800 - 1,400
Danger Cave[13] (Column) + (Bindings)	Pinto LSN Pequop S-N	S11-S24 8,300 – 6,100	Unknown	Unknown	Unknown	Unknown
O'Malley Shelter	Pinto LSN MVW	1 7,900 – 5,900	LSN Gatecliff Humboldt Leaf Gypsum	3-6[14] 4,600 – 4,100	LSN Gatecliff Gypsum Elko	7-14 4,100 – 2,500
Spooner Lake	Unknown[15]	North (60-80cm) 8,000 – 5,700	Unknown	Unknown	Dead Cedar Carson Martis C-S	Central (40-80cm) 4,000 - 1,650
Mt. Augusta	Pinto LSN	Unknown	LSN? Humboldt	Unknown	Martis Elko	Unknown 3,800

[1]Not all the projectile point types listed date from the beginning to the end of each period. See narrative for the earliest beginning date for each type at each of the seven sites.

[2]Two Steamboat, one Dead Cedar, one Gatecliff, two Martis Corner-Notched, and one Martis Contracting Stem point were identified in stratum 5, ca. 7,100 to 6,400 years ago. These points are considered intrusive from the sediments above stratum 5. Steamboat points, n= 8/10 (80%), postdate ca. 4,350 years ago at the site. The same situation occurs for Dead Cedar points, where 5/6 (83%) postdate ca. 4,350 years ago. Gatecliff points, n= 14/15 (93%), were found in strata 2-3 between ca. 4,350 – 3,150 years ago, suggesting the Gatecliff point in stratum 5 is also intrusive.

[3]A thin layer of tephra was identified in stratum 7. The tephra was confirmed as Mazama, ca. 7,700 years ago, commensurate with the stratum 7 radiocarbon dates.

[4]Martis Side-Notched; these points are a western Great Basin variety of LSN point that display relatively narrow side-notches low on the preform or just above the preform base.

[5-6]Martis Corner-Notched; these points are typically made on triangular preforms but are exceptionally large in length and width, as well as thickness, compared to later Elko Series points. They are primarily restricted to the eastern Sierra Front in the west-central Great Basin. Martis Contracting Stem; similar to Martis Corner-Notched, these points are also exceptionally large and thick but are more lanceolate with a short but distinct stem at the base. They are also primarily restricted to the eastern Sierra Front in the west-central Great Basin. Martis Contracting-Stem and Martis Corner-Notched points = 34/38 (90%) enter the record after ca. 4,350 years ago, suggesting that the three specimens found in the earlier sediments were intrusive into those lower levels.

[7]Two Elko Series points were recovered in stratum 3, ca. 4,350 to 3,900 years ago. If they were produced during this time, they would represent the oldest Elko Series points found anywhere in the central and western Great Basin. Considering that 4/6 (67%) of Elko points were recovered from the overlying stratum 2 sediments, these two points may be intrusive into the stratum 3 sediments, although Elko points are known to occur in the region by at least 3,800 years ago.

[8]Steamboat points are made on lanceolate preforms and are bi-pointed, teardrop, or leaf-shaped.

[9]Sierra Stemmed points are similar in appearance, and are clearly related to, Martis Contracting Stem points, except the former are more deeply notched from both ends of the base creating elongated and flaring tangs. These dart points superficially resemble the much smaller and thinner Eastgate arrow points manufactured after ca. 1,400 years ago.

[10]Black Rock Concave Base; these points superficially appear similar to Humboldt Concave Base points. However, BRCB points are typically much wider and thinner than Humboldt points, the latter often displaying parallel oblique flaking and diamond-shaped cross sections generally not seen on BRCB points (Hockett and Goebel 2019:31, Figure 10; Spidell and Kautz 2021:301, Figure 6.7.34).

[11]One Leppy Hills point was recovered from stratum 2. Considering that 15/24 (63%) date between ca. 7,900 to 6,400 years ago, 18/24 (75%) date prior to ca. 4,700 years ago, and 23/24 (96%) date prior to ca. 3,900 years ago, this point is likely either an outlier of another corner notched type, an older point scavenged and reused, or disturbed into the stratum 2 sediments from below.

[12]Gatecliff points are absent in most sites in the north, central, and eastern Great Basin after about 3,500 years ago, but may have a longer use life in the far western Great Basin.

[13]The lower levels of Danger Cave excavated by J. Jennings recovered a large number of Leppy Hills Corner-Notched points, as well as additional Pequop Side-Notched and Pinto points. Several LSN points with "Pequop"-like basal notches were also recovered that were manufactured on lanceolate preforms (see Hoskins 2016:67-68, Figures 3.1-3.2).

[14]One date on stratum 3 (ca. 4,100 years ago; Beta-596965) is considered "too young", and one date on stratum 8 (ca. 4,400 years ago; Beta-595739) is considered "too old". Collectively, based on all the dates obtained, stratum 3 dates between 5,000 and 4,500 years ago (Early Middle Archaic/Transitional), and the Late Middle Archaic begins with stratum 7 at ca. 4,100 years ago (see Table 3 for details). One Elko point was recovered from F52 within the Early Middle Archaic/Transitional sediments, but this point is considered intrusive since 9/10 (90%) reliably dated Elko points post-date ca. 4,100 years ago.

[15]One Carson point was found in the North excavation block area between 60-80cm bpgs, but the sample size is too small to suggest an Early Archaic age for this point.

The chronological pattern of projectile point types from Danger Cave are also now informed by seven radiocarbon dates obtained directly on binding adhering to points recovered from three different samples (**Table 5**). Hoskins (2016) reported on three points with binding recovered from the original excavations by Jennings. These date between 8,065 and 7,630 years ago (Hoskins 2016:45, Table 3.1; **Table 5**). We also obtained radiocarbon dates on an additional four points, one from the recent column sample (stratum 12; Lapp 2007:12, Figure 2h) and three from artifacts found in the back dirt of the original excavations in 2008 (**Table 5**). Three of these latter points date between 6,300 and 6,100 years ago and are analyzed below; one is a Rose Spring arrow point dated to 1,475 years ago and is not considered further due to its Late Archaic Period age.

This provides a total sample of 16 typable points with reliable radiocarbon dates from Danger Cave older than the Late Archaic, and as noted they all date to the Early Archaic. Unfortunately, there are no recent reliable dates on projectile points from the Early Middle Archaic/Transitional or Late Middle Archaic Periods. In terms of strata dating, however, it may be noted that the Middle Archaic column sediments that did not produce any typable points dated between 3,500 and 1,450 years ago, and all the Early Archaic strata regardless of presence of typable points dated between 8,300 and 5,600 years ago. The Danger Cave column sample displays a 2,100-year gap in human occupation between the Early and Middle Archaic transition, mirroring that of nearby Floating Island Cave. Interestingly, Camels Back Cave, also located in the western Bonneville Basin lowlands like Danger Cave and Floating Island Cave (*Figure 1*) displays an 800-year gap between 5,400 and 4,600 years ago in this critical transitional time (Schmitt and Shaver 2005:46, Table 3.1). In comparison, Bonneville Estates Rockshelter, located in the foothills overlooking the Bonneville Basin lowlands, displayed no gap in the Early to Middle Archaic transition, with multiple dates leading up to the end of the Early Archaic (ca. 4,800 years ago) and the beginning of the Early Middle Archaic/Transitional (ca. 4,700 years ago) (Goebel et al. 2021:9, Table 1).

O'Malley Shelter

O'Malley Shelter was excavated in 1969 and 1970 by a crew led by David Madsen (Fowler et al. 1973). The site is in southeastern Nevada about 26 kilometers (16 miles) south of the town of Caliente, Nevada (*Figure 1*). The shelter sits at 1,615 meters (5,300 feet) asl at the base of a cliff face forming one side of Meadow Valley Wash (*Figure 9*).

The O'Malley Shelter sediments were divided into 21 strata that were further collapsed into seven cultural units designated I-VII (Fowler et al. 1973:10,14; *Figure 10*). These strata and cultural units were bracketed by nine radiocarbon dates between ca. 7,900 and 800 years ago (Fowler et al. 1973:15; **Table 4**).

We report here for the first time an additional 17 radiocarbon dates that when added to the six original dates we consider reliable confirm that the Early and Middle Archaic strata designations date between 7,900 and 2,500 years ago (**Tables 4 and 6**). They also provide reliable dates on several strata identified in the original excavations

that the initial six reliable dates did not cover. Each of the distinct strata described as features (F) in the O'Malley Shelter field notes contained multiple field specimen (FS) numbered bags that were collected within these features/strata. Some FS bags contained only lithics, some only bone, and some contained both typable points and bone. The 17 new radiocarbon dates targeted FS bags that contained both typable points and bones collected from within a well-defined feature or stratum that were excavated stratigraphically. This allowed us to confirm the chronological integrity of the identified features/strata both vertically and horizontally across several excavation units.

Figure 9. O'Malley Shelter taken from Meadow Valley Wash. The shelter rests at the base of an outcrop of volcanic tuff.

The Early Archaic (stratum 1) dates from O'Malley Shelter span ca. 7,900 to 5,900 years ago, and two distinct point types were recovered from datable field specimen bags throughout this 2,000-year period (**Table 7**). The Early Middle Archaic/Transitional (strata 3-7) dates span ca. 5,100 to 3,200 years ago. Within this time frame, typable points were recovered from datable field specimen bags between ca. 4,600 and 4,100 years ago (**Table 6**). The Late Middle Archaic (strata 7-12) span ca. 4,050 to 2,950 years ago with typable points throughout.

We note that Fowler et al.'s (1973) Cultural Unit V has two radiocarbon dates between ca. 1,700 and 1,800 years ago and should also date to the latter portion of the Late Middle Archaic. Nevertheless, a re-examination of the projectile points from Cultural Unit V found that a mixture of dart and arrow points, including Gatecliff, Elko Series, Gypsum, and Rosegate are present in the bags associated with this post-stratum 12 Cultural Unit. Cultural Unit V likely begins the period of formative influence in this part of the Great Basin, so the Late Middle Archaic projectile points are reserved for cultural features and field specimen bags contained within strata 7-12 only.

Table 5. Recent radiocarbon dates on sinew binding adhering to projectile points from Danger Cave.

Radiocarbon Sample ID	Projectile Point ID	Projectile Point Type	^{14}C Age	Years Ago[1]
Beta-520994	198	Rose Spring	1,580 ±30	1,475 years ago
Beta-520996	202	LSN	5,320 ±30	6,100 years ago
Beta-520995	75	Pinto	5,280 ±30	6,080 years ago
Beta-520993	197	Pequop	5,440 ±40	6,280 years ago
D-AMS 014556[2]	23106.1	Pequop	6,791 ±28	7,630 years ago
UGAMS-21630[2]	22993.4	LSN	7,000 ±30	7,850 years ago
UGAMS-21631[2]	23665.5	Pinto	7,230 ±30	8,065 years ago

[1]Conversion based on Reimer et al. (2020)

[2]Hoskins (2016:45, Table 3.1)

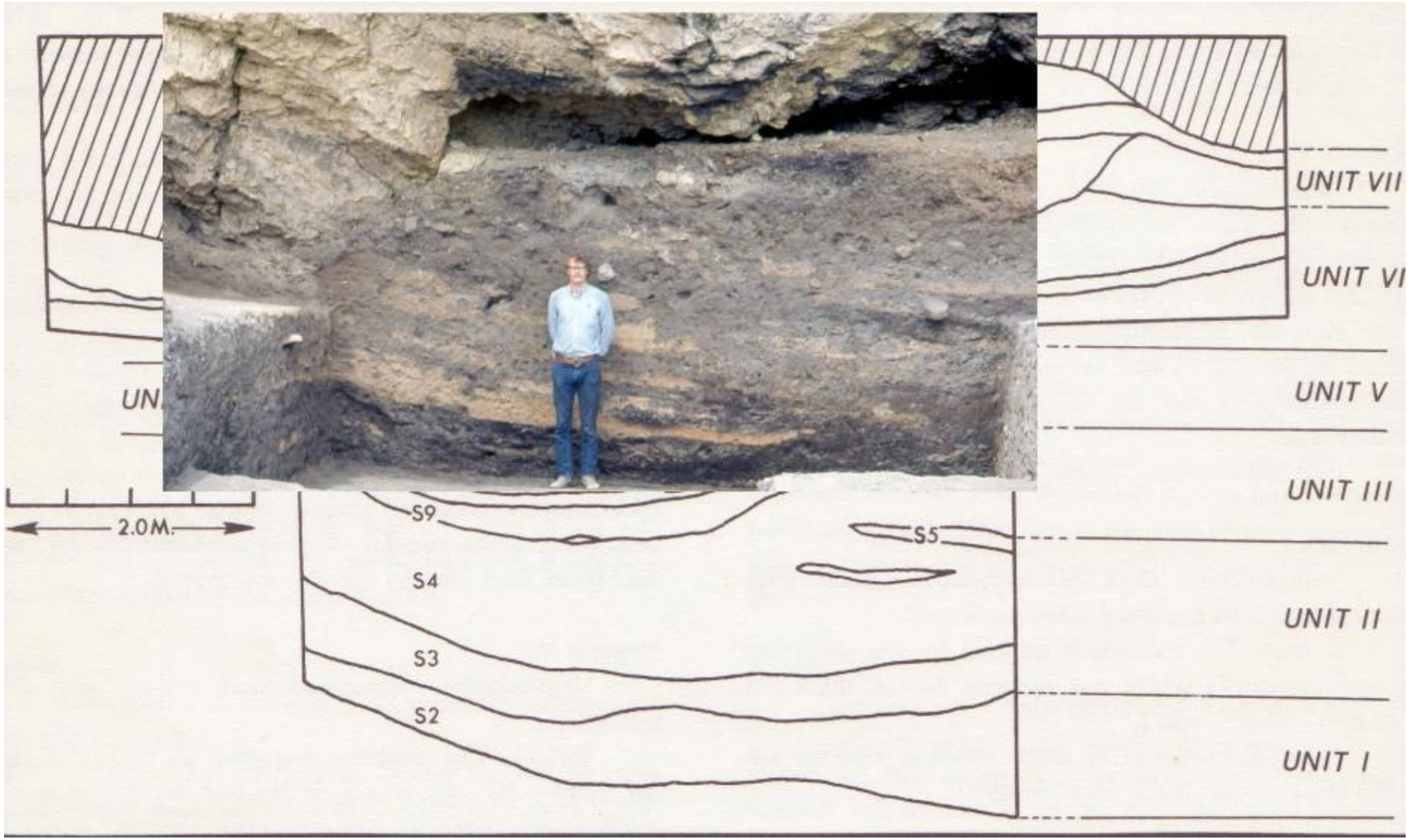


Figure 10. Stitch diagram of the original cultural units (I-VII) and lower strata designations at O'Malley Shelter. Diagram courtesy of David B. Madsen.

Table 6. O'Malley Shelter radiocarbon dates per stratum, feature (F), and field specimen number (FS), and the associated projectile points recovered with each dated FS sample bag.

Lab #[1]	C-14 Age[2]	Years ago	2 σ cal BP	Stratum	F#	FS#	Identifiable Projectile Points in the Dated FS Bag[3]
Beta-635669	2,350 ± 30	2,480	2,403-2,556	13	35	329	1 Gypsum
Beta-635670	2,420 ± 30	2,567	2,424-2,710	11	37	337	1 Elko
Beta-635672	2,450 ± 30	2,569	2,434-2,704	14	27	318	1 LSN; 4 Elko
Beta-596953	2,850 ± 30	2,961	2,873-3,063	12	36	331 332	1 Gatecliff; 2 Gypsum
RL-44[4]	2,970 ± 100	3,135	2,874-3,373	12	7	39	-
Beta-596956	3,030 ± 30	3,219	3,079-3,341	9	39	361	3 Gypsum
Beta-635671	3,420 ± 30	3,756	3,644-3,868	14	27	323	1 Gatecliff; 3 Gypsum; 1 Elko
Beta-595737	3,580 ± 30	3,882	3,730-3,976	8	42	443	1 LSN; 2 Gypsum
Beta-596971	3,660 ± 30	3,985	3,897-4,086	8	42	367	-
Beta-596967	3,730 ± 30	4,054	3,935-4,152	7	56	369	3 Gypsum; 1 Leaf
RL-93	3,740 ± 170	4,109	3,594-4,573	9	40	348	-
RL-106	3,920 ± 170	4,354	3,908-4,831	4	47	275	-
Beta-595732	4,090 ± 30	4,593	4,446-4,808	5	46	445	4 Humboldt; 1 Gatecliff
Beta-596963	4,370 ± 30	4,928	4,856-5,038	4	50	281	-
Beta-463520	4,460 ± 30	5,136	4,969-5,286	4	50	281	-
Beta-596966	5,160 ± 30	5,923	5,765-5,993	1	59	426	1 Meadow Valley C-N
Beta-595728	6,010 ± 30	6,849	6,749-6,942	1	59	446	2 LSN; 2 Meadow Valley C-N
Beta-596954	6,350 ± 30	7,273	7,167-7,413	1	59	449	-
Beta-595733	6,980 ± 30	7,812	7,708-7,926	1	59	431	1 Meadow Valley C-N

Beta-595734	7,020 ± 30	7,859	7,781-7,936	1	59	436	1 LSN
RL-92	7,100 ± 190	7,923	7,586-8,321	1	53	325	-

[1]Five "UGAMS" (University of Georgia) dates were obtained in 2016 from charcoal extracted from a backhoe trench excavated by the authors outside of the shelter entrance in that year. Unfortunately, the trench sediments could not be reliably correlated to the original 1969/1970 excavations and reported in Fowler et al. (1973), and thus are not reported here.

[2]See Table 4 for the full suite of identifiable projectile points that could be reliably associated with the specific features "F" reported above.

[3]Beta dates were obtained in July 2021. Beta-463520 and Beta-463516 were obtained from *Juniperus* charcoal. Beta-596963 was obtained from *Pinus* charcoal. All other Beta dates were obtained from bone. All Beta dates except Beta-596969 (ca. 6,887 years ago; "too old") and Beta-596965 (ca. 4,146 years ago; "too young") obtained from F52, Beta-596957 (ca. 3,930 years ago; "too young") obtained from F58, and Beta-595739 (ca. 4,428 years ago; "too old") obtained from F42 are considered reliable and reported in Table 1. As noted in the narrative, not reported here are the dates obtained from Fowler et al.'s (1973) originally designated Cultural Units V and VI due to possible natural mixing of the sediments.

[4]"RL" dates originally reported in Fowler et al. (1973:15, Table 1). RL-45, RL-46, and RL-91 were collected in 1969 from profile facies before strata were defined and have since been determined to be less reliable to correlate with precise strata and cultural units. Nevertheless, it may be noted that RL-46 (ca. 7415 years ago) was extracted from near the base of the cultural-bearing sediments and is consistent with the other cultural unit I strata and dates. All RL dates were obtained from charcoal.

Table 7. Total number of identifiable projectile points from O'Malley Shelter confidently associated with dated features associated with FS sample bags reported in Table 6.

Features with Typable Points	Radiocarbon Date Ranges (years ago)	Strata	Identifiable Points
27, 29, 35, 36, 37, 39, 42, 56	4,100 – 2,500	7-14	42 Gypsum; 9 Elko; 6 Gatecliff; 3 Leaf; 3 LSN; 1 Small Stemmed
46, 52, 58	4,600 – 4,100	3-6	34 Humboldt; 6 Gypsum; 3 LSN; 3 Leaf; 1 Gatecliff; 1 Small Stemmed; 1 Elko
59	7,900 – 5,900	1	7 Meadow Valley Corner-Notched; 3 LSN

Table 8. Radiocarbon dates and associated projectile points from the Spooner Lake Site[1].

Lab No.	Years Ago	Site Area	Depth bpgs[2]	Typable Projectile Points
UCLA-1995	670	Central	0-15cm	0-20cm 2 DSN; 1 Rosegate; 1 Carson
UCLA-2003 UCLA-1996	1,670 1,735	Central Central	12-32cm 23-43cm	20-40cm 5 DSN; 3 Rosegate; 3 Carson; 2 Dead Cedar; 5 Martis
D-AMS 38620	4,000	Central	40-60cm	40-60cm 1 DSN; 1 Carson; 1 Dead Cedar; 1 Elko; 1 Martis
UCLA-1998	3,320	Central	60-80cm	60-80cm 2 Carson; 2 Dead Cedar; 1 Martis
None	-------	North	0-20cm	1 DSN; 1 Dead Cedar
None	-------	North	20-40cm	1 Martis
None	-------	North	40-60cm	1 Carson; 4 Martis
UCLA-2000 D-AMS 38622 D-AMS 38623	5,720 5,890 6,000	North North North	60-80cm 60-80cm 60-80cm	1 Humboldt; 2 Martis
UCLA-2001	7,970	North	80-100cm	

[1]Dates considered too young or old for their stratigraphic position include UCLA-1997 1,870 years ago; Central; 40-60cm bpgs; UCLA-1999 3,220 years ago; Central; 80-100cm bpgs; D-AMS 38619 800 years ago; Central; 40-60cm bpgs; D-AMS 38621 1,450 years ago; Central; 80-100cm bpgs

[2]bpgs = below present ground surface

A total of 371 projectile points was reported in Fowler et al. (1973:28, Table 4) for the entire assemblage. Many of these points were recovered from relatively thick arbitrary 25cm levels designated as Feature 17 in the early stages of the excavation prior to the delineation of discreet sedimentary and cultural features that were then excavated stratigraphically. As noted above, it is the latter dated features containing typable points recovered from the stratigraphically controlled excavations that are included in the analysis here as many of the arbitrary Feature 17 levels cannot be confidently correlated with the discreet later-defined stratigraphic features.

A total of 121 Early and Middle Archaic identifiable points are now reliably dated at O'Malley Shelter. This includes 10 Early Archaic, 49 Early Middle Archaic/Transitional, and 62 Late Middle Archaic points. All 121 of these points were retyped here.

Spooner Lake

The Spooner Lake site was excavated by Robert (Bob) Elston and reported in 1971. The site is located about 3 kilometers (2 miles) east of Lake Tahoe in the eastern flanks of the Sierra Nevada Mountains (*Figures 1 and 11*) at an elevation of 2,130 meters (6,990 feet) asl.

Elston (1971:77, Map 3) excavated 18 block areas and each block measured 2m x 2m or larger in size, as well as two trenches. These block excavations were generally placed in two zones within the surface site boundaries that we refer to as "Central" and "Northern". The sediments were primarily removed in 20cm arbitrary levels.

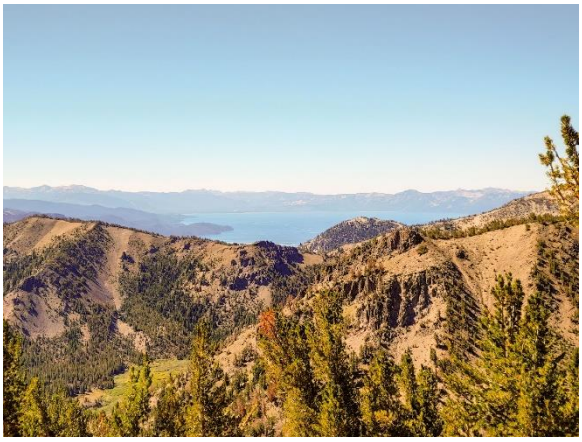


Figure 11. The Lake Tahoe Basin from the trail leading to the top of Mt. Rose Summit. The Spooner Lake Site is located to the right of the photograph about 3 kilometers (2 miles) from Lake Tahoe in a similar alpine ecological zone.

Elston (1971:87, Table 5) reported 10 radiocarbon dates ranging in age from 380 to 7,100 ^{14}C BP. In 2020 we submitted an additional five charcoal samples for radiocarbon analysis to DirectAMS. After carefully reviewing Elston's original field notes and determining the location and depth of each radiocarbon sample, we determined that nine of these 15 total samples were acceptable (**Table 8**). Elston noted various degrees of disturbance within some of the units, likely both cultural-historic related to the excavation of an irrigation ditch near the site and natural rodent burrowing, and some of the radiocarbon dates affirm that conclusion.

In general, it appears as though the top 40cm of the Central area was subject to the greatest degree of disturbance as there were an equal number of post-1,500 years ago arrow points (Rosegate and DSN) and pre-1,500 years ago dart points (Martis, Elko, Carson, Dead Cedar, and Humboldt)

recovered from the top two 20cm levels. The precise depth of the two ca. 1,700 years ago dates within this zone is unclear. Two dates of ca. 3,300 and 4,000 years ago are available for the 40-80cm zone, and these accord well with the fact that 8/9 (89%) of the typable points recovered were dart points.

No valid radiocarbon dates are available for the upper portion of the Northern set of excavation blocks. However, four consistent dates are available for the 60-100cm zone, indicating that the 60-80cm zone dates between ca. 5,700 and 6,000 years ago, and the 80-100cm zone dates to at least ca. 8,000 years ago. The equivalent depth of the Northern block area at 60-80cm appears to be about 2,000 years older than the Central block area. Unfortunately, no typable points were recovered in the 60-100cm zone in the Northern block, but all nine typable points below 20cm were dart points, suggesting that the Northern block sediments between 20-100cm date somewhere between 1,500 and 8,000 years ago. In total, then, there are 18 typable points that can be reasonably attributed to the late Early Archaic or Middle Archaic at Spooner Lake: nine Martis, four Carson, three Dead Cedar, one Elko, and one Humboldt (**Table 8**).

Mt. Augusta

The Mt. Augusta site complex was recorded and test excavated in 1990 by a team led by Kelly McGuire and Brian Hatoff (McGuire and Hatoff 1991). Mt. Augusta is an open-air locale located in the Clan Alpine Mountains of the central Great Basin subregion (*Figure 1*). The site is the highest in elevation of the seven sites described in more detail here at 2,300 meters (7,550 feet) asl. The site complex rests within an upland meadow area named Cherry Valley that houses big sagebrush (*Artemisia tridentata*) and isolated aspen trees (*Populus tremuloides*) (*Figure 12*).

Figure 12. The largely treeless Cherry Valley in the Clan Alpine Mountains, the location of the Mt. Augusta site complex.

McGuire and Hatoff (1991) subdivided the archaeological materials into two main site components. One site (26Ch1383) consisted of at least 125 collapsed rock stack features that formed several alignments and are likely related to mountain sheep (*Ovis canadensis*) trapping or ambushing. A lithic scatter including projectile points was found along these alignments. A nearby lithic scatter (26Ch369) produced both surface and buried points as well as mountain sheep bones dated to ca. 3,800 years ago.

A total of 27 typable points was recovered from the surface and test units (**Table 4**). While most points cannot be associated with precise radiocarbon dates, most of them were LSN and Humboldt suggesting a primarily Early Archaic-Early Middle Archaic/Transitional assemblage. The site is relatively unique for this chronological pattern and for the presence of Martis points.

THE TYPOLOGY AND CHRONOLOGY OF THE PROJECTILE POINTS FROM SEVEN GREAT BASIN SITES

Typological Methods

As noted above, typing the projectile points used in this analysis generally followed Hockett and Goebel (2019), as well as the updated metrics for individual types based on the larger sample size reported herein (**Table 2**). Two notable exceptions were Huffaker Springs where the points were typed by Spidell and Kautz (2021), including the previously suggested Carson Side-Notched point, and O'Malley Shelter, which required the development of a new type for the southeastern Great Basin, the Meadow Valley Corner-Notched. The points from each site are briefly described, and individual examples are illustrated within the narrative that follows for each of the seven sites considered in-depth.

Six Early Archaic projectile point types are now recognized to have been produced in one or more of the subregions represented: (1) Pinto; (2) Leppy Hills, including Leppy Hills A and Leppy Hills B subtypes; (3) Large Side-Notched; (4) Pequop Side-Notched; (5) Martis Side-Notched; and (6) Meadow Valley Corner-Notched. Dead Cedar points may date to the latter part of the Early Archaic at Camels Back Cave (Hockett and Goebel 2019), but because they are not known to occur prior to the Early Middle Archaic/Transitional Period at Bonneville Estates Rockshelter and Huffaker Springs where multiple specimens were found in well dated contexts, they are discussed as part of the Early Middle Archaic/Transitional Period.

Huffaker Springs

<u>The Early Archaic</u>

The Early Archaic sediments at Huffaker Springs (strata 4-8) may contain one holdover type from the previous Paleoindian period (Western Stemmed), and the site also contains new types recently identified at Bonneville Estates Rockshelter. The Western Stemmed points that lie at the base of the sediment profile are all Dugway Stubby-like (*Figure 4*), a term/type first proposed by Jones et al. (2003) for small, thick, and roughly made stemmed points found within the Dugway Proving Grounds of far western Utah. These points may date ca. 7,900 years ago, but as noted previously the age of the lowest basal sediments were not well established. If these Dugway Stubby-like points are 7,900 years old, then these data are commensurate with recent dating of Windust-like stemmed points ca. 7,800 years ago in eastern Nevada in Goshute Valley at the Big Springs locale, the same site that serves as the type site for the Pequop Side-Notched point (Stoner and Cunnar 2018).

Multiple examples of Leppy Hills points were recovered in strata 3-7 suggesting a 4,000-year production period for the lanceolate corner-notched point in the western Great Basin between 7,900 and 3,900 years ago (*Figure 13*). Pinto points enter the record in stratum 7, ca. 7,900 to 7,400 years ago. LSN and Martis Side-Notched points do not enter the record until stratum 5 dated ca. 7,100 to 6,400 years ago suggesting they are a post-Mazama (after

about 7,700 years ago) phenomenon in the western Great Basin (*Figure 13*).

Perhaps the most surprising find from the Early Archaic sediments are Martis Corner-Notched (n=3) and Martis Contracting Stem (n=1) points in stratum 4. If these four points are in good stratigraphic context, then they indicate that large corner-notched points began to be made in the western Great Basin by 4,900 years ago and perhaps as early as 6,400 years ago. As noted in **Table 4** (footnote #2), however, there appears to be some mixing of the stratum 3 and 4 sediments as most Martis Corner-Notched and Martis Contracting Stem points were found in the Middle Archaic sediments (strata 2-3) post-dating 4,350 years ago.

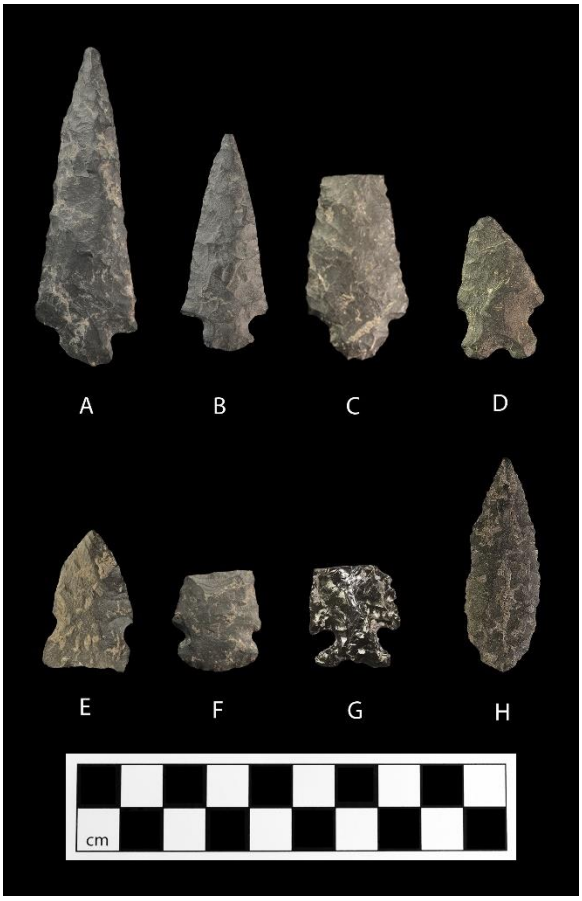


Figure 13. Early Archaic points from Huffaker Springs: Leppy Hills B (A-C); Pinto (D); Martis Side-Notched (E-F); LSN (G); Steamboat (H).

The Early Middle Archaic/Transitional

The Early Middle Archaic/Transitional sediments (stratum 3) at Huffaker Springs (ca. 4,350 to 3,900 years ago) contain the greatest diversity of projectile point types for this time period found anywhere in the Great Basin. Thirteen proposed types are present. Leppy Hills and LSN points (*Figure 14*) carry over from the Early Archaic while Western Stemmed and Pinto points drop out. All three varieties of Martis carry over from the Early Archaic as well. As alluded to above, however, it is possible that the Early Archaic Martis Corner-Notched (n=3) and Martis Contracting Stem (n=1) points recovered in stratum 4 belong to the stratum 3 sediments. A total of 23 of the 25 (89%) Martis Corner-Notched points were recovered from strata 1-3 post-dating 4,350 years ago, and 12 of the 13 (92%) Martis Contracting Stem points were recovered from strata 2-3. It is likely that the Martis Corner-Notched and Martis Contracting Stem points are an Early Middle Archaic/Transitional phenomenon and were initially produced between 4,350 and 3,900 years ago rather than first appearing in the Early Archaic at Huffaker Springs (*Figures 14 and 15*). The same cannot be concluded for Martis Side-Notched points (*Figure 14*), however, as nearly one-third, or eight of the

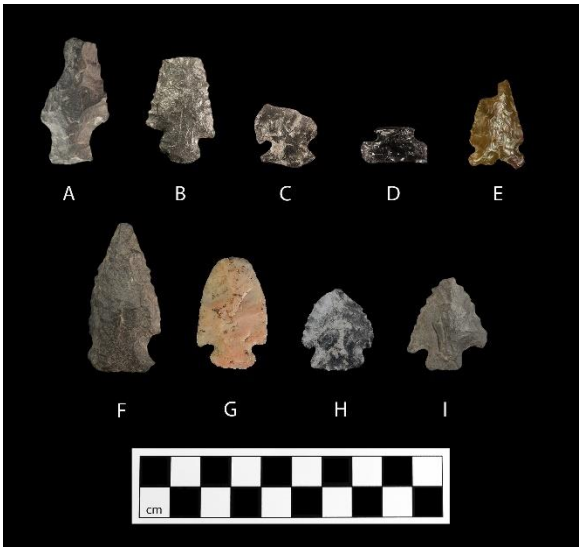


Figure 14. Early Middle Archaic Transitional points from Huffaker Springs: Leppy Hills B (A-B); LSN (C-D); Martis Side-Notched (E-F); Martis Corner-Notched (G-I).

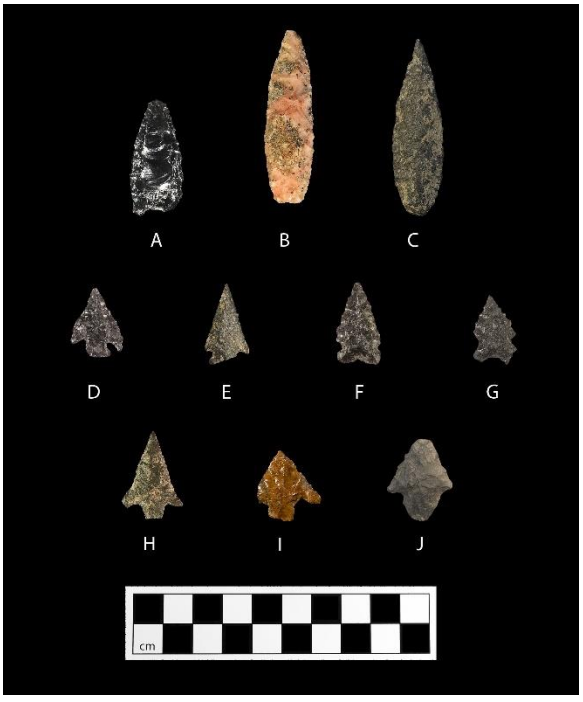


Figure 15. Early Middle Archaic Transitional points from Huffaker Springs: Humboldt (A); Steamboat (B-C); Dead Cedar (D-E); Carson (F-G); Sierra Stemmed (H-I); Martis Contracting Stem (J)

Figure 16. Early Middle Archaic Transitional points from Huffaker Springs: Pequop Side-Notched (A-B); Black Rock Concave Base (C-D).

28 (29%) were found in the Early Archaic strata 4-5 sediments.

New types that emerge in the Early Middle Archaic/Transitional sediments include the expected Gatecliff and Humboldt point types. Other long-standing proposed types emerge as well, including Black Rock Concave Base (*Figure 16*), Sierra Stemmed, and Steamboat points. The recently defined Dead Cedar point emerges for the first time, as do Carson points (*Figure 15*).

The Late Middle Archaic

The Late Middle Archaic sediments at Huffaker Springs (stratum 2) returned two radiocarbon dates of ca. 3,150 years ago. Although not numerous, Elko Series make their entrance with four specimens (*Figure 17*). Every other point type found in the Early Middle Archaic/Transitional strata were also found in the Late Middle Archaic stratum (*Figure 17*). Of these, perhaps the most interesting are the seven Gatecliff points, generally not seen in most

archaeological sites in the Great Basin after ca. 3,500 to 4,000 years ago. Huffaker Springs presents evidence for the late survival of this point type in the far western Great Basin.

Figure 17. Late Middle Archaic points from Huffaker Springs: LSN (A); Martis Side-Notched (B); Steamboat (C); Dead Cedar (D); Carson (E); Gatecliff Split-Stemmed (F); Elko Corner-Notched (G); Martis Corner-Notched (H); Martis Contracting Stem (I); Sierra Stemmed (J).

Bonneville Estates Rockshelter

<u>The Early Archaic</u>

The Early Archaic strata at Bonneville Estates Rockshelter (strata 12-16) contain 75 typable points, 68 (91%) of which are LSN (*Figure 18*). The other seven points are Pequop Side-Notched (*Figure 2*), Leppy Hills (*Figures 2, 3, 19*), Pinto, and Black Rock Concave Base (*Figure 20*). LSN points were found in stratum 16 dating ca. 8,300 years ago, so unlike Huffaker Springs in the western Great Basin these points enter the eastern Great Basin record six centuries prior to the Mt. Mazama eruption. Bonneville Estates Rockshelter serves as the type site for the Leppy Hills point (Hockett and Goebel 2019), and they are found in relatively large numbers at Huffaker Springs and Danger Cave.

Figure 18. LSN points from the Early Archaic sediments in Bonneville Estates Rockshelter.

Figure 19. Leppy Hills A point from the Early Archaic sediments in Bonneville Estates Rockshelter.

Figure 20. Black Rock Concave Base points from the Early Archaic sediments in Bonneville Estates Rockshelter.

The Early Middle Archaic/Transitional

The Early Middle Archaic/Transitional strata at Bonneville Estates Rockshelter are represented by strata 8c, 10, and 11. A total of 19 typable points was defined including seven LSN points, eight Dead Cedar points (*Figure 21*), and two each of the Gatecliff and Humboldt types. The dearth of Gatecliff and Humboldt points inside the shelter is notable because thousands of examples of these two point styles lie in open air settings between the Ruby Mountains and the western side of the Goshute Mountains just to the east of the shelter, particularly associated with large-scale pronghorn (*Antilocapra americana*) traps (Hockett 2005; Hockett and Murphy 2009; Stoner et al. 2020).

The Late Middle Archaic

The Late Middle Archaic sediments in Bonneville Estates Rockshelter are represented by strata 3b and 4-9. Of the 31 typable points recovered, Elko Series, which enter the record for the first time, dominate with 23 (74%) (*Figure 22*). LSN points continue to be manufactured in the eastern Great Basin (six specimens), as do Humboldt points (two specimens).

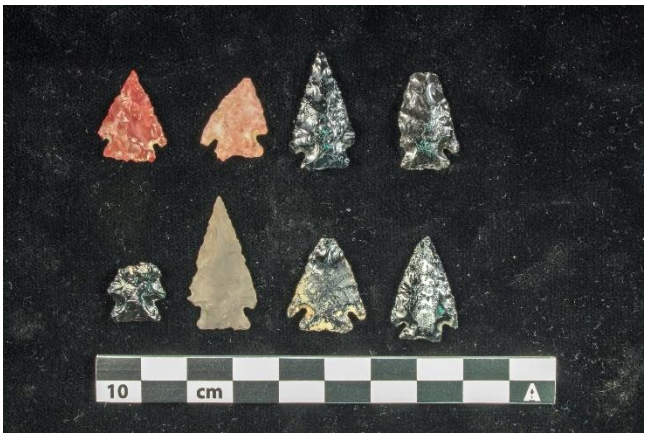


Figure 21. Dead Cedar points from the Early Middle Archaic Transitional sediments in Bonneville Estates Rockshelter.

Figure 22. Elko Series points from the Late Middle Archaic sediments in Bonneville Estates Rockshelter.

Floating Island Cave

The Early Archaic

No typable points were recovered in Floating Island Cave in strata 1-5 dating

between ca. 8,130 and the accumulation of the Mazama tephra inside the cave about 7,700 years ago. The Early Archaic sediments in Floating Island Cave that contain typable projectile points are represented by strata 6-9. The dates for these strata tightly cluster between ca. 7,000 (stratum 7) and 6,500 (stratum 8) years ago, suggesting a relatively brief period of intermittent occupation during the Middle Holocene (Jones and Madsen 2019:23, Table 3). No dates are yet available on stratum 6, but these sediments are sandwiched between the Mazama tephra below (ca.7,700 years ago) and stratum 7 above (ca. 7,000 years ago). Stratum 9 is also undated but contained typical Early Archaic projectile point types including Pinto and LSN. The stratum 9 sediments are currently sandwiched between the Early Archaic date of ca. 6,450 years on stratum 8 below and the Early Middle Archaic/Transitional date of ca. 3,920 years ago on stratum 10 above. The three points from stratum 9 are considered Early Archaic in age.

A total of 13 typable projectile points was recovered from the entire Early Archaic strata 6-9, 12 of which are typable. Of these, eight (67%) are LSN, and one each is represented by the Leppy Hills, Pinto, Humboldt, and Elko types (*Figures 23-25*). Notable here is the recovery of a Humboldt point in stratum 8 dating to ca. 6,460 years ago (*Figure 25*). If accurate, then this age is one of the oldest for Humboldt points from the eastern Great Basin. Also of note is the single Elko Corner-Notched point recovered from stratum 6 (*Figure 23*). Elko Series points are not found in the cave sediments again until sometime after 3,900 years ago, representing at least a 3,000-year gap. As noted earlier, these types of associations likely represent disturbance of a point out of context or the rare occurrence of an individual manufacturing a corner notched point that otherwise are not consistently made at this time. Thus, the point is not considered evidence that 'Elko points are 7,000 years old in the eastern Great Basin'.

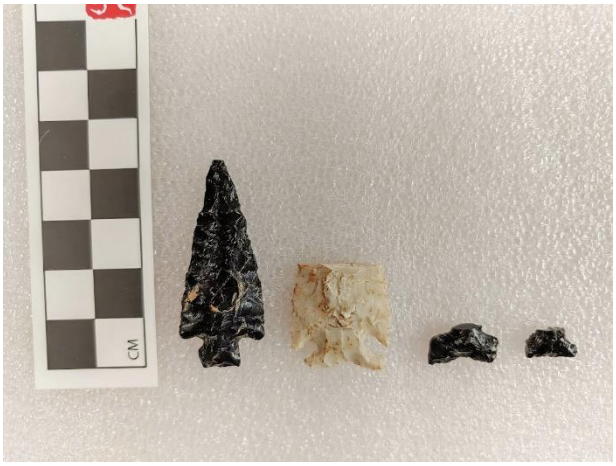


Figure 23. Projectile points from stratum 6, Early Archaic, Floating Island Cave. L > R: Leppy Hills, Elko Corner-Notched, LSN, LSN.

Figure 24. Projectile points from stratum 7, Early Archaic, Floating Island Cave. L>R: LSN, LSN, LSN, LSN.

Figure 25. Projectile points from stratum 8 (top row) and stratum 9 (bottom row), Early Archaic, Floating Island Cave. Top row, L > R: large untyped dart point; Humboldt. Bottom row, L > R: LSN, Pinto, LSN.

Figure 26. Projectile points from stratum 10, Early Middle Archaic Transitional, Floating Island Cave. L > R: Pinto, Pinto, Humboldt, Humboldt, Humboldt, Dead Cedar, Gatecliff.

The Early Middle Archaic/Transitional

Following a relatively brief Early Archaic occupation, Floating Island Cave was abandoned and then reoccupied by ca. 3,920 years ago, represented by stratum 10. Based on this date and the point styles in stratum 11 (undated), the Early Middle Archaic/Transitional sediments in Floating Island Cave are represented by strata 10-11 where a total of eight typable points was recovered. These include three Humboldt, two each represented by Pinto and Gatecliff, and one Dead Cedar (*Figures 26-27*). Note again that no Elko points are present.

Figure 27. Reworked Gatecliff point, stratum 11, Early Middle Archaic Transitional, Floating Island Cave.

The Late Middle Archaic

The Late Middle Archaic in Floating Island Cave is reliably represented by strata 12-20 based on four radiocarbon dates spanning ca. 2,800 (stratum 13) to 1,850 years ago (stratum 20). Elko Series points enter the record for the first time in stratum 12, bracketed by dates of 3,920 (stratum 10) and 2,800 years ago (stratum 13). No direct dates on stratum 12 are currently available. A total of 10 typable points was found in strata 12-20. Of these, six (60%) are Elko

Series, two are LSN, one is Pinto, and one is a Dead Cedar (*Figures 28-29*).

Figure 28. LSN (left) and Elko-Eared (right) points from stratum 12, Late Middle Archaic, Floating Island Cave.

Figure 29. Projectile points from the Late Middle Archaic, Floating Island Cave. L > R: Elko Corner-Notched (stratum 13); Dead Cedar (stratum 13); LSN (stratum 14); Pinto (stratum 14).

Danger Cave

The Early and Late Archaic projectile point typology and chronology at Danger Cave is informed by the post-1957 procurement of 46 radiocarbon dates and 10 typable points from the recent excavation of an intact column sample (Lapp 2007:12-13, Figures 2-3; Jones and Madsen 2019:29-30, Table 5) and seven typable points out of stratigraphic context but which radiocarbon dates were obtained on sinew binding still adhering to each specimen (**Table 5**; *Figures 30-32*). Of these 17 typable points, 16 date to the Early Archaic and one to the Late Archaic.

Figure 30. Pequop Side-Notched point (#197) from Danger Cave; the sinew binding was radiocarbon dated to 6,300 years ago.

Figure 31. LSN point (#202) from Danger Cave; the sinew binding was radiocarbon dated to 6,100 years ago.

Figure 32. Pinto point (#75) from Danger Cave; the sinew binding was radiocarbon dated to 6,100 years ago.

One exceptionally large corner-notched point recovered from column stratum 20 (ca. 6,100 years ago) that was typed as Elko in Lapp (2007:12, Figure 2i) keys out as a Pinto point (after Hockett and Goebel 2019). This is the case because the corners of the base have relatively deep and high corner notches that have a SH:ML ratio that matches more closely with Pinto stemmed points than later dating corner-notched points such as Dead Cedar and Elko Series. Nevertheless, the base is wide on this specimen and un-Pinto like. In fact, it matches more closely with the general morphological character of Early Archaic corner-notched points from O'Malley Shelter located in southeastern Nevada. As detailed below, these large Early Archaic-aged points from O'Malley Shelter are proposed as a new type, the "Meadow Valley Corner-Notched" point. Because the Danger Cave specimen does not fit easily with any of the existing proposed point types from the Early Archaic of the eastern Great Basin (e.g., LSN, Pinto, Leppy Hills), it is simply noted here that its presence is unique in the column sample, and it is similar to the Early Archaic corner-notched points from O'Malley Shelter described below.

Unfortunately, no typable points were recovered from the Early Middle Archaic/Transitional or Late Middle Archaic column sample sediments and none are known to have binding attached from these periods. As noted above, the Late Archaic date on binding was obtained on a Rose Spring point. At ca. 1,475 years old it matches the earliest dates on Rosegate points from Bonneville Estates Rockshelter and together these two sites represent some of the oldest dates on arrow points in the eastern Great Basin.

The Early Archaic

The 15 remaining typable points from dated Early Archaic contexts at Danger Cave span ca. 8,300 (stratum 11 column) to ca. 6,100 years ago (two point binding dates) (**Table 5**; *Figures 31-32*). These 15 typable points include seven LSN (Lapp 2007:12, Figure 2b-f; *Figure 31*), four Pinto (Lapp 2007:12, Figures 2a and 2h; *Figure 32*), two Pequop Side-Notched (*Figure 30*), one Leppy Hills (Lapp 2007:12, Figure 2g), and one Leppy Hills/Pinto (Lapp 2007:13, Figure 3c).

The seven LSN points date between ca. 7,850 and 6,100 years ago based on both column dates from stratum 15 and the two dates on point bindings. Similar to Bonneville Estates Rockshelter, LSN points entered the Danger Cave record pre-Mazama. The four Pinto points date between ca. 8,065 and 7,000 years ago based on column and binding dates as well. The two Pequop point bindings returned dates of ca. 7,630 and 6,300 years ago. The Leppy Hills point was recovered in column stratum 12 which is now bracketed by dates of ca. 8,250 years ago from strata 10 and 11 below it, and ca. 7,600 years ago from stratum 14 above it. Finally, the Leppy Hills/Pinto point was recovered from column stratum 11 dating ca. 8,300 years ago.

O'Malley Shelter

A total of 121 Early and Middle Archaic points are now reliably dated at O'Malley Shelter including 10 Early Archaic, 49 Early Middle Archaic/Transitional, and 62 Late Middle Archaic points.

The Early Archaic

The Early Archaic strata contain 10 typable projectile points (*Figure 33*). Three of these are LSN and seven are large corner-notched points. All 10 points were retrieved from the lowest dated stratum at O'Malley Shelter (F59; stratum 1). Within F59, one of the LSN points was retrieved from FS436 dated to ca. 7,900 years ago, making it pre-Mazama in age. The other two were retrieved from FS446 dated to ca. 6,850 years ago.

Figure 33. The seven Meadow Valley Corner-Notched (top row) and three LSN (bottom row) points from the Early Archaic sediments in O'Malley Shelter.

A total of four of the seven large corner-notched points was recovered from FS bags that have now been radiocarbon dated (**Table 6**). One point was recovered from FS431 dated to ca. 7,800 years ago; two are from FS446 dated to ca. 6,850 years ago; and one is from FS426 dated to ca. 5,900 years ago (**Table 6**).

The large corner-notched points from the Early Archaic F59 layer at O'Malley Shelter were originally typed as "Elko" in Fowler et al. (1973) following the accepted practice at the time. However, these points only

superficially resemble Late Middle Archaic aged Elko Series points. As a result, we propose a new type to designate the O'Malley Shelter Early Archaic aged corner-notched projectile points: the Meadow Valley Corner-Notched (*Figures 33 and 34*).

Figure 34. Six of the newly proposed Meadow Valley Corner-Notched points also illustrated in Figure 33 from the Early Archaic sediments in O'Malley Shelter.

Like later-dating Elko Series the Meadow Valley Corner-Notched points are corner-notched and made on triangular preforms. These differ from the Early Archaic aged Leppy Hills Corner-Notched point from the eastern and western Great Basin subregions in that Leppy Hills points are made on lanceolate preforms. Meadow Valley Corner-Notched points are typically thicker and more robust than Elko Series points; in addition, they often display narrower neck widths due to relatively deep inward trending notches into the preform, as well as narrower base widths due to increased removal of both ends of the original preform base during notching. These latter two morphological traits give several of these points a stemmed appearance compared to most Elko Series points (**Table 2**). In addition, most Meadow Valley Corner-Notched points from O'Malley Shelter have convex bases, a trait uncommon in the Elko Series. Finally, it is also telling that no Meadow Valley Corner-Notched (save a likely scavenged or disturbed out of context specimen) or Elko Series points were found in the Early Middle Archaic/transitional sediments.

The Early Middle Archaic/Transitional

The Early Middle Archaic/Transitional is apparent at O'Malley Shelter by at least 4,600 years ago (FS445 within F46; **Table 6**) and maintains itself until sometime between 3,200 and 2,950 years ago. The period is represented by the appearance, first, of Gatecliff and Humboldt points, and then later by Gypsum and Leaf points by 4,050 years ago. Gypsum is the overwhelmingly dominate point type in the directly dated sediments between 4,050 and 2,950 years ago (*Figures 35-38*).

LSN points also continue from the Early Archaic. Only a single Meadow Valley Corner-Notched point is represented in the Early Middle Archaic/Transitional sediments out of the 121 total typable points, and thus may be intrusive or was reused at this time from an earlier manufactured specimen.

Figure 35. Humboldt points from the Early Middle Archaic Transitional sediments in O'Malley Shelter.

Figure 36. Gatecliff points from the Early Middle Archaic Transitional sediments in O'Malley Shelter.

Figure 37. Gypsum points from the Early Middle Archaic Transitional sediments in O'Malley Shelter.

Figure 38. Leaf points from the Early Middle Archaic Transitional sediments in O'Malley Shelter.

The Late Middle Archaic

As at the other sites analyzed here, the late Middle Archaic at O'Malley Shelter is ushered in by the appearance of Elko Series points (*Figure 39*). At O'Malley Shelter this event is later, however, as no Elko Series points are in directly dated sediments until after ca. 2,950 years ago. In the F27 sediments (ca. 2,600 years ago) Elko Series points join Gatecliff and Gypsum points. There are also three points in the F27 sediments that closely resemble the Early Archaic Meadow Valley Corner-Notched points and one small side-notched point. The Meadow Valley-like specimens are reworked and likely represent scavenging and reuse of Early Archaic-aged broken projectile points.

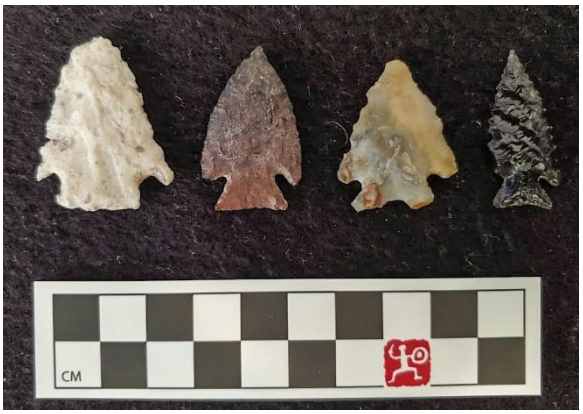


Figure 39. Elko Series points from the Late Middle Archaic sediments in O'Malley Shelter. Compare with Figure 34.

Spooner Lake

As noted earlier the Spooner Lake excavations did not recover typable projectile points in dated sediments as precise as the other five sites treated in detail above. Nevertheless, the site does confirm the presence of Dead Cedar and Carson points during the Middle Archaic (*Figures 40-46*).

Figure 40. Dead Cedar point, Central Block, 20-40cm bpgs, Spooner Lake.

Figure 41. Dead Cedar point, Central Block, 60-80cm bpgs, Spooner Lake.

Figure 42. Dead Cedar point, Central Block, 20-40cm bpgs, Spooner Lake.

Figure 44. Carson Side-Notched point with broken base ends, Central Block, 60-80cm bpgs, Spooner Lake.

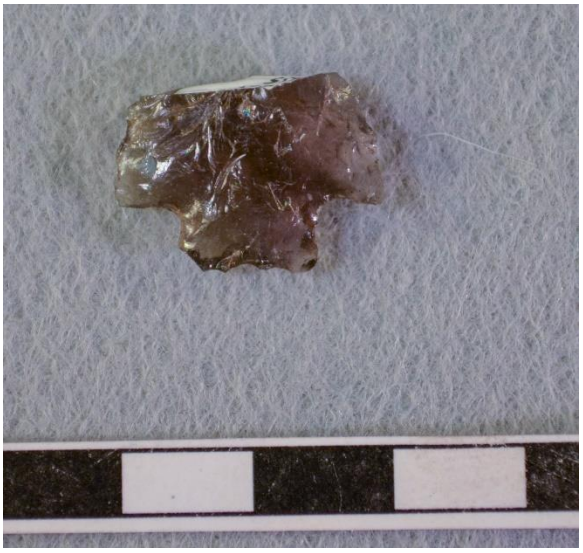


Figure 43. Dead Cedar point, Central Block, 60-80cm bpgs, Spooner Lake.

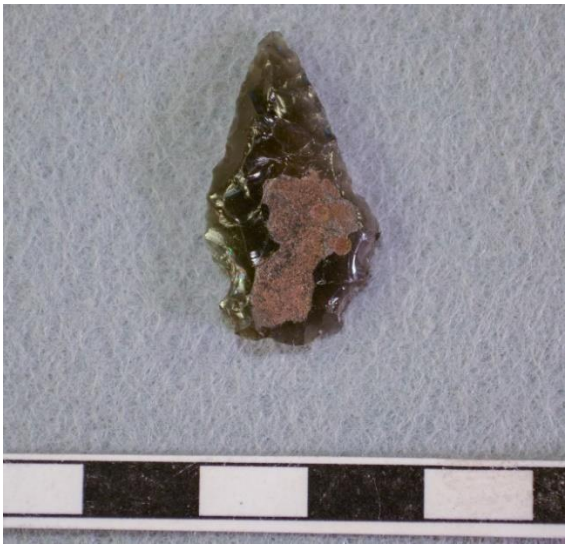


Figure 45. Carson Side-Notched point, North Block, 60-80cm bpgs, Spooner Lake.

Figure 46. Carson Side-Notched point, Central Block, 20-40cm bpgs, Spooner Lake.

Mt. Augusta

As noted above, only a single date is currently available for the Mt. Augusta site complex, ca. 3,800 years ago. This date does not directly inform on the age of any of the points from the site. As a result, the points are classified by period based on cross-dating.

Nevertheless, it was deemed important to include the Mt. Augusta points here because the site is one of the few known from the central Great Basin above 7,500 feet in elevation in which primarily Early Archaic and Early Middle Archaic/Transitional style points are present. As well, the presence of large corner notched points that key out as Martis some 130 kilometers (80 miles) east of the eastern Sierra Front is rather unique.

A total of 27 typable points was recovered from the complex. Of these, 26 (96%) are Early or Middle Archaic types. The other point is a Rosegate (n=1).

Of the 26 Early and Middle Archaic points, 13 (50%) are LSN, six (23%) are Humboldt, three (12%) are Martis Corner-Notched, two (8%) are Pinto and two (8%) are Elko Series.

The Early Archaic

The LSN and Pinto points are likely Early Archaic in age (ca. 8,500 to 5,000 years ago), although the possibility that some of the LSN points could date into the Middle Archaic cannot be discounted. However, in well dated assemblages in which LSN points are the dominant type, these specimens usually date to the Early Archaic. As noted above, 13 LSN points (*Figures 47 and 48*) and two Pinto points (*Figure 49*) were recovered from Mt. Augusta.

The Early Middle Archaic/Transitional

Six Humboldt points (*Figure 50*) were likely manufactured and used during the Early Middle Archaic/Transitional, ca. 5,000 to 4,000 years ago.

The Late Middle Archaic

Three Martis Corner-Notched (*Figure 51*) and two Elko Series (*Figure 52*) points were likely manufactured during the Late Middle Archaic, ca. 4,000 to 1,500 years ago. The Martis points key out well with those typically found along the eastern Sierra Front. To our knowledge, this is the furthest east that Martis points have been recognized in the Great Basin.

Figure 47. Ten of the 13 LSN points from the Mt. Augusta site complex.

Figure 48. Three additional LSN points from the Mt. Augusta site complex. These points have all been reworked after their original manufacture reducing their overall size. Their thickness, however, remains. The obsidian specimen on the far left is 4.7mm thick; the red chert specimen in the middle is 4.5mm thick; and the obsidian specimen on the far right is 3.8mm thick. These values are more congruent with LSN points than DSN points.

Figure 49. Pinto points from the Mt. Augusta site complex.

Figure 50. Humboldt points from the Mt. Augusta site complex.

Figure 51. Martis Corner-Notched points from the Mt. Augusta site complex.

Figure 52. Elko Series points from the Mt. Augusta site complex.

ADDITIONAL PROJECTILE POINTS FROM THE WESTERN AND EASTERN GREAT BASIN

Additional Sites Included in the Analysis

Projectile points from several different locales were also measured and included in this analysis in addition to the seven sites treated in more detail above (see Appendix 1). These locales include a group consisting of dozens of surface sites that are collectively referred to as "Eastern Sierra Front" (*Figure 1*). These sites are located and divided below into (1) Donner Lake; (2) South Lake Tahoe; and (3) Bodie Hills to Bridgeport. Donner Lake is located 24 kilometers (15 miles) northeast of the northern shore of Lake Tahoe in California. The points were recovered along Donner Creek near the place that it flows into Donner Lake. The points from South Lake Tahoe region were collected from several dozen surface sites within a rectangular area southwest of Lake Tahoe's southern shore. This area measures approximately 32 kilometers (20 miles) north-south by 24 kilometers (15 miles) west-east, and centers around the communities of Woodfords and Markleeville, as well as Hope Valley, Diamond Valley, the west fork of the Carson River, and the Mokelumne Wilderness within the Eldorado National Forest. The points from Bodie Hills to Bridgeport are from several dozen sites within an approximately 16-kilometer (10-mile) square centered around the Bodie Hills and Bridgeport, California region.

The Winnemucca Lake Basin is located east of Pyramid Lake in western Nevada; Goshute Valley, Nevada, is in the basin west of the Goshute Mountains between the Toano and Pequop ranges; Dairy Valley is located about 65 kilometers (40 miles) north of Danger Cave in Nevada along the Nevada-Utah border (*Figure 1*); illustrated points from "Elko County" were collected from the Owhyee Desert about 120 kilometers (75 miles) north of Battle Mountain, Nevada (*Figure 1*); and the Tosawihi Quarries are located about 65 kilometers (40 miles) northeast of Battle Mountain, Nevada (*Figure 1*). The Carson Sink is also shown in Figure 1 as sites in that basin serve as the type area for Carson points (Kelly 1983). The points illustrated below are presented to show additional specimens and distributions of the types proposed.

Eastern Sierra Front – Donner Lake

Figure 53. Leppy Hills A point from Donner Lake, western Nevada.

Figure 54. LSN point from Donner Lake, western Nevada.

Figure 55. Martis Side-Notched point from Donner Lake, western Nevada.

Figure 56. Black Rock Concave Base point from Donner Lake, western Nevada.

Figure 57. Dead Cedar point from Donner Lake, western Nevada.

Figure 58. Martis Contracting Stem point from Donner Lake, western Nevada.

Figure 59. Martis Contracting Stem point from Donner Lake, western Nevada.

Figure 60. Pinto point from Donner Lake, western Nevada.

Figure 61. Pinto point from Donner Lake, western Nevada.

Figure 62. Sierra Stem point from Donner Lake, western Nevada.

Figure 63. Sierra Stem point from Donner Lake, western Nevada.

Figure 64. Steamboat point from Donner Lake, western Nevada.

Figure 65. Steamboat point from Donner Lake, western Nevada.

Eastern Sierra Front – South Lake Tahoe

Figure 66. Leppy Hills A point from the South Lake Tahoe region, western Nevada.

Figure 67. Martis Contracting Stem point from the South Lake Tahoe region, western Nevada.

Figure 68. Martis Contracting Stem points from the South Lake Tahoe region, western Nevada.

Figure 69. Martis Contracting Stem point manufactured on quartz from the South Lake Tahoe region, western Nevada.

Figure 70. Carson point from the South Lake Tahoe region, western Nevada.

Figure 71. Carson point from the South Lake Tahoe region, western Nevada.

Figure 72. Elko Series point from the South Lake Tahoe region, western Nevada. Note one side notch (left) and one corner notch (right).

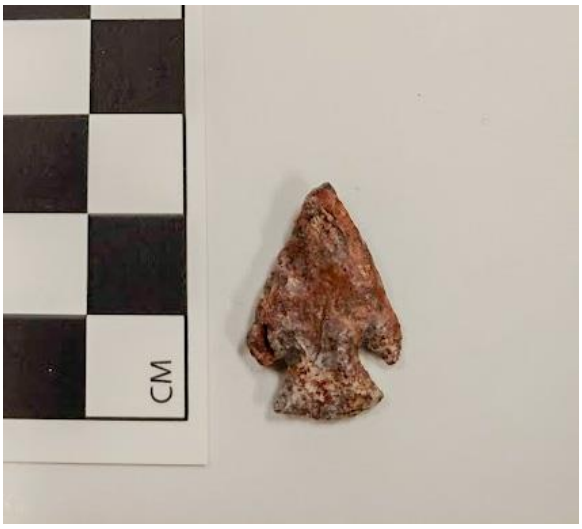


Figure 73. Dead Cedar point from the South Lake Tahoe region, western Nevada. Note the convex base in the Dead Cedar points from this region.

Figure 74. Dead Cedar point from the South Lake Tahoe region, western Nevada. Note the convex base in the Dead Cedar points from this region.

Figure 76. LSN point from the South Lake Tahoe region, western Nevada.

Figure 75. Dead Cedar point from the South Lake Tahoe region, western Nevada. Note the convex base in the Dead Cedar points from this region.

Figure 77. LSN point from the South Lake Tahoe region, western Nevada.

Figure 78. Martis Side-Notched point from the South Lake Tahoe region, western Nevada.

Figure 79. Martis Side-Notched points from the South Lake Tahoe region, western Nevada.

Figure 80. Pinto point from the South Lake Tahoe region, western Nevada.

Figure 81. Sierra Stem points from the South Lake Tahoe region, western Nevada.

Figure 82. Sierra Stem points from the South Lake Tahoe region, western Nevada.

Figure 83. Steamboat point from the South Lake Tahoe region, western Nevada.

Figure 84. Humboldt point from the South Lake Tahoe region, western Nevada.

<u>Eastern Sierra Front – Bodie Hills to Bridgeport</u>

Figure 85. LSN points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 86. Martis Side-Notched points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 88. Black Rock Concave Base points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 87. Humboldt points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 89. Dead Cedar points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 90. Carson points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 91. Martis Contracting Stem points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 92. Martis Corner-Notched points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 93. Elko Series points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 94. Gatecliff points from the Eastern Sierra Front, Bodie Hills to Bridgeport. Gatecliff points from this area were occasionally made on elongated lanceolate preforms like the first two specimens illustrated here.

Figure 95. Steamboat point from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 96. Leaf points from the Eastern Sierra Front, Bodie Hills to Bridgeport. Leaf points appear to be uncommon in the areas included in this analysis except at O'Malley Shelter and the Bodie Hills to Bridgeport subregions.

Figure 98. Pequop Side-Notched points, Dairy Valley, eastern Nevada. Note the decidedly triangular nature of this type, as well as the small keyhole notch in the base.

<u>Dairy Valley – Northeast Nevada/Utah Border</u>

Figure 97. Black Rock Concave Base points, Dairy Valley, eastern Nevada. BRCB points are often thinner (5mm or less) in the eastern Basin compared to those in the western Basin.

Figure 99. LSN points, Dairy Valley, eastern Nevada. LSN points are common in the eastern one-half of Elko County, Nevada, particularly near springs and creeks suggesting that these associated water sources may have been perennial even during the harshest times of the Middle Holocene.

Figure 100. LSN points, Dairy Valley, eastern Nevada. LSN points are common in the eastern one-half of Elko County, Nevada, particularly near springs and creeks suggesting that these associated water sources may have been perennial even during the harshest times of the Middle Holocene.

Winnemucca Lake Basin, Western Nevada

Figure 101. Little Lake point from Kramer Cave, Winnemucca Lake Basin, western Nevada.

Figure 102. Little Lake point from Kramer Cave, Winnemucca Lake Basin, western Nevada. Little Lake points are also found on the western side of the Sierra Nevada Mountains in California, where they are more common than in western Nevada.

Figure 103. Little Lake point from Kramer Cave, Winnemucca Lake Basin, western Nevada.

Figure 104. Little Lake point from Kramer Cave, Winnemucca Lake Basin, western Nevada.

Figure 105. A cache of 10 Humboldt points recovered from Kramer Cave, Winnemucca Lake Basin, western Nevada.

Figure 106. A cache of 10 Humboldt points recovered from Kramer Cave, Winnemucca Lake Basin, western Nevada. Points are the reverse of those illustrated in Figure 105.

Figure 107. Humboldt point from Kramer Cave, Winnemucca Lake Basin, western Nevada.

Goshute Valley – Eastern Nevada

Figure 108. Windust points from the Big Springs site, Goshute Valley, eastern Nevada. These points were found in stratigraphic context dating slightly less than 8,000 years ago. LSN points are known to date to at least 8,300 years ago in the region. Thus, there may be overlap between the last stemmed points and the first notched points manufactured in the eastern Great Basin. If so, then these points may one day be considered Early Archaic rather than Late Paleoindian as grinding stones become more prevalent in the region after ca. 8,500 years ago.

Figure 109. Pequop Side-Notched point from the Big Springs site, Goshute Valley, eastern Nevada. Big Springs serves as the type site for the Pequop point.

Figure 110. Pequop Side-Notched point from the Big Springs site, Goshute Valley, eastern Nevada. Big Springs serves as the type site for the Pequop point.

Figure 111. Pequop Side-Notched point from Goshute Valley, Nevada.

Figure 112. LSN point from Goshute Valley, Nevada. Note that the upper notch area projects outward or perpendicular to the preform as in side notched points, rather than tangs that project downward as in corner notched points. This is a classic example of the kind of point that would be misclassified as "Elko Corner-Notched".

Figure 113. Elko-Eared point from Goshute Valley, Nevada. Note that the tangs are wider than the base indicating corner notching rather than side notching.

Figure 114. Pinto points from Goshute Valley, Nevada. The point on the far right of the photograph is considered a "Pinto Shouldered" point rather than a "Pinto Corner-Notched" point, similar to the point recovered from the Early Archaic sediments in Bonneville Estates Rockshelter (Hockett and Goebel 2019:30, Figure 9). Nevertheless, there is some degree of overlap in shouldering between Pinto and Humboldt points.

Elko County – Owhyee Desert

Figure 115. Elko Series points from the Owyhee Desert, Elko County, Nevada.

Figure 117. Gatecliff Split-Stemmed points from the Owyhee Desert, Elko County, Nevada.

Figure 116. Dead Cedar points from the Owyhee Desert, Elko County, Nevada.

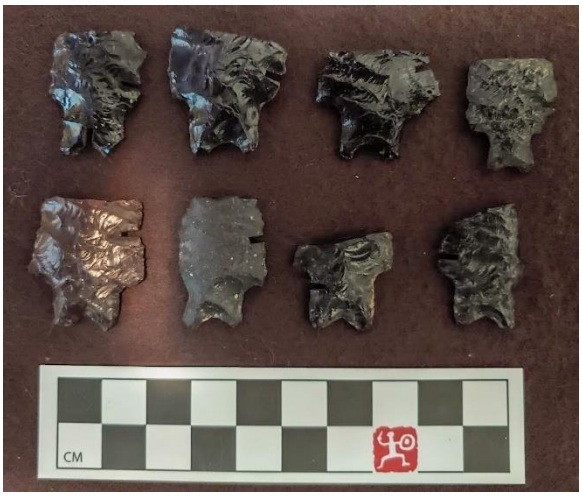


Figure 118. Gatecliff Split-Stemmed points from the Owyhee Desert, Elko County, Nevada.

Figure 119. Humboldt points from the Owyhee Desert, Elko County, Nevada.

Figure 120. Pinto points from the Owyhee Desert, Elko County, Nevada.

Figure 121. LSN points from the Owyhee Desert, Elko County, Nevada.

Figure 122. LSN point manufactured on quartz from the Owyhee Desert, Elko County, Nevada.

Rosegate and Desert Side-Notched Points

The Late Archaic-aged (ca. 1,500 to 600 years ago) Rosegate and Late Prehistoric-aged (ca. 600 – 150 years ago) Desert Side-Notched arrow points are illustrated here to further illuminate their morphological differences from Middle Archaic-aged Dead Cedar and Carson points, respectively. Many Middle Archaic-aged Dead Cedar and Carson points have undoubtedly been typed as arrow points in the past. See **Table 2** and Appendix 1 for metric comparisons.

Figure 123. Rosegate points from the South Lake Tahoe region, Nevada/California.

Figure 124. Rosegate points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 125. Rosegate point from Goshute Valley, Nevada.

Figure 126. Rosegate points from Bonneville Estates Rockshelter, eastern Nevada.

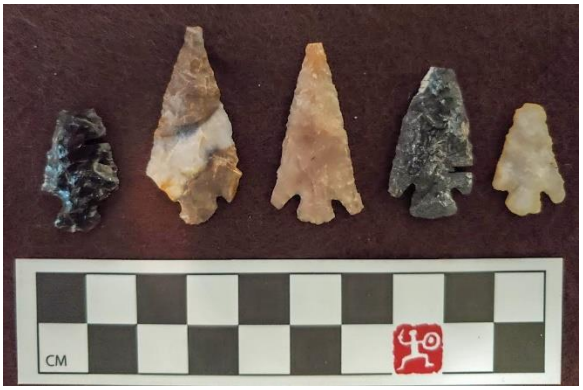


Figure 127. Rosegate points from the Owyhee Desert, Elko County, Nevada.

Figure 128. Desert Side-Notched points from the South Lake Tahoe region, western Nevada/California.

Figure 129. Desert Side-Notched points from the Eastern Sierra Front, Bodie Hills to Bridgeport.

Figure 130. Desert Side-Notched points from the Owyhee Desert, Elko County, Nevada.

DISCUSSION AND CONCLUSION

A comparison of the Early and Middle Archaic projectile point typologies and chronologies from seven sites located in the western, eastern, southeastern, and central subregions of the Great Basin illuminate both similarities and differences that should be considered when interpreting local or subregional prehistoric subsistence and settlement patterns. The seven sites considered here are in four distinct subregions: Bonneville Estates Rockshelter, Danger Cave, and Floating Island Cave are in the eastern Great Basin near the Nevada-Utah border; Huffaker Springs and Spooner Lake are in the far western Great Basin in the Truckee Meadows of southeast Reno and the eastern Sierra Front, respectively; O'Malley Shelter is found in the southeastern Great Basin near the Nevada-Utah border; and Mt. Augusta is in the central Great Basin subregion (*Figure 1*).

Included in this overview within Appendix 1 to add further depth is Goshute Valley and Dairy Valley in the eastern Great Basin, "Elko County" (Owhyee Desert), Tosawihi Quarries, and "Humboldt County" (Paradise Valley area) in the north-central Great Basin, the Winnemucca Lake Basin just east of Pyramid Lake in west-central Nevada, and dozens of sites along the Eastern Sierra Front from north of Lake Tahoe to Bridgeport, California.

In addition, previously published metrics of Gatecliff, Elko, Rosegate, and DSN points from Gatecliff Shelter (Thomas 1983) and Triple T Shelter (Thomas 1988), both in the central Great Basin, are included in Appendix 1 and factored into the mean metrics for these projectile point types. As noted previously, not covered here is the southwestern Great Basin in places like Owens Valley and the northwestern Great Basin (including the Black Rock Desert and southeastern Oregon) which may display both similarities and differences compared to the patterns discussed below.

It may be noted that we make no inferences concerning possible links between point types and ethnic groups. The production of similar point types in different subregions of the Great Basin likely speak to inter-group communication across relatively vast distances in the past, but this does not necessarily equate to closeness of biological affiliation in a genetic sense or whether the groups viewed themselves as 'related' regardless of biology. In addition, if it can be shown that one point style is older in one subregion than another then the movement of that style across Great Basin subregions may indicate movement of people, information, or both.

We instead present these data in more humble terms focusing on the fact that different projectile point types may have beginnings and endings that can be chronologically defined. Because most archaeological sites in the Great Basin cannot be dated in any other manner other than cross-dating using point typologies and chronologies developed from stratified sites with precise radiocarbon dates, cross-dating opens the number of questions we can ask about past adaptations to changing climatic

regimes, for example. Were upland environments used more frequently during specific time periods, and if so, do these occupations correlate with specific climatic regimes? Using cross-dating with the understanding, for example, that Rosegate points are going to date between 1,500 and 600 years ago rather than 8,000 to 5,000 years ago clearly will have a major impact on addressing these kinds of questions if Rosegate points are found in undated surface sites located in upland environments.

In this light, with the suggestion here that there are new point types hitherto unrecognized in the Great Basin until recently, particularly Leppy Hills, Pequop, Meadow Valley Corner-Notched, Dead Cedar, and Carson points, we think the retyping of many assemblages analyzed in the past may be in order. We suspect that in certain subregions of the Great Basin, Leppy Hills points (ca. 8,000 to 4,000 years ago), Pequop points (ca. 8,000 to 4,000 years ago), and Meadow Valley points (ca. 8,000 to 6,000 years ago) were classified as Elko points (ca. 4,000 to 1,500 years ago). As well, Dead Cedar points (ca. 5,000 to 4,000 years ago) may have been classified as Elko points. And finally, Carson points (ca. 5,000 to 3,000 years ago) may have been classified as DSN points (ca. 600 to 150 years ago). This situation may have negatively impacted our past settlement and subsistence interpretations in some cases. If this is the case, it is of no fault of the researchers. Leppy Hills and Dead Cedar points were not isolated in a well dated, stratified context prior to the excavations at Bonneville Estates Rockshelter and the points were analyzed and published (Hockett and Goebel 2019), later to be confirmed at Huffaker Springs (Spidell and Kautz 2021). Pequop points were likewise recently identified as a separate type (Cunnar et al. 2019). Meadow Valley points are suggested as a valid Early Archaic-aged type separate from Elko Series points within the pages of this monograph. And while suspected to be older and a different type than DSN points many years ago (Kelly 1983), Carson points were not isolated in a well dated, stratified context prior to the excavations at Huffaker Springs and the points were analyzed and reported (Spidell and Kautz 2021).

Early Archaic Across the Great Basin

The LSN projectile point is one of the quintessential Early Archaic (ca. 8,500 to 5,000 years ago) types in eastern Nevada as evidenced at Bonneville Estates Rockshelter, Danger Cave, Floating Island Cave, O'Malley Shelter, and Camels Back Cave. The prevalence of LSN points in Goshute Valley and Dairy Valley likely corroborates this interpretation. Bonneville Estates Rockshelter, Danger Cave, O'Malley Shelter, and Camels Back Cave place LSN points in the eastern subregion prior to the eruption of Mt. Mazama about 7,700 years ago. Bonneville Estates Rockshelter indicates LSN points were first manufactured as early as 8,300 years ago in the eastern Great Basin (Hockett and Goebel 2019), and this date is bolstered by a similar date on LSN points from Danger Cave and Camel's Back Cave (Elston 2005). LSN points were in the southeastern Great Basin by 7,900 years ago as evidenced at O'Malley Shelter.

In contrast, LSN points post-date the Mt. Mazama eruption at Huffaker Springs in the western Great Basin. While LSN points, including the Martis Side-Notched type, are

a part of the Early Archaic record in the western Great Basin, at Huffaker Springs the Early Archaic point types that pre-date the Mazama tephra are Leppy Hills and Pinto points. Leppy Hills are a pre-Mazama phenomenon at Huffaker Springs suggesting the Early Archaic there begins by at least 8,000 years ago.

Leppy Hills points are also found at Bonneville Estates Rockshelter, Danger Cave, Floating Island Cave, Camels Back Cave, and along the Eastern Sierra Front but not at O'Malley Shelter. Interestingly, Pinto points, too, are found in all these sites except O'Malley Shelter.

However, the proposed Meadow Valley Corner-Notched point type is seen only at O'Malley Shelter and is likely aligned with the Pinto type given its relative thickness and basal sections that appear stem-like. Similar points may be found in the southwestern Great Basin, too, dating to the Early Archaic but this awaits further research.

Some Early Archaic regionalization in point type development is also seen in the western Great Basin with the emergence of Steamboat points along the Eastern Sierra Front, points that are not seen in the other subregions considered here. However, Steamboat points appear similar to Cascade points found further north, and there may be some cultural, biological, or communication connections there.

Early Middle Archaic/Transitional Across the Great Basin

The Early Middle Archaic/Transitional Period (ca. 5,000 to 4,000 years ago) displays greater regionalization or local development of new projectile point styles compared to the Early Archaic Period. In the western Great Basin at Huffaker Springs local point types not seen in the eastern or southeastern sites include a variety of Martis styles that are side-notched, corner-notched, and contracting stemmed, as well as the Sierra Stemmed type. Martis Side-Notched points enter the Huffaker Springs record first between ca. 7,100 and 6,400 years ago in the Early Archaic and then persist throughout the Early Middle Archaic/Transitional Period. These are followed by the Martis Corner-Notched and Martis Contracting Stem varieties commonly seen at this time. We also propose here that Martis Corner-Notched points are present at the Mt. Augusta site in the central Great Basin, the first such interpretation for this subregion to our knowledge.

In addition, the western Great Basin witnessed the presence of the small Carson Side-Notched point between ca. 4,350 and 3,900 years ago. Every specimen that types as Carson in our sample is made of obsidian. None of the other sites outside the Eastern Sierra Front considered here contains Carson points. Our hunch is that many Middle Archaic-aged Carson points have been typed as Late Prehistoric-aged DSN points in the past in the western Great Basin, perhaps impacting settlement and subsistence models.

In the southeastern Great Basin at O'Malley Shelter, Gypsum points are common but not seen at any of the other six sites analyzed here except Danger Cave (see Jennings 1957:112, Figure 85). Gypsum points enter the O'Malley record by 4,050 years ago. Gypsum points are also found in small numbers in open-air but undated sites along the western margins of the eastern Great

Basin as far north as Elko County, Nevada. Small leaf-shaped points at O'Malley Shelter appear to be absent at the other six sites analyzed in detail here as well but enter the O'Malley Shelter record at the same time as Gypsum points. Leaf points were, however, in the southern part of the Eastern Sierra Front sample.

The small, thin, and corner-notched Dead Cedar point is found across the northern tier of the Great Basin at Bonneville Estates Rockshelter, Danger Cave, Floating Island Cave, Huffaker Springs, Spooner Lake, and along the Eastern Sierra Front but is absent from O'Malley Shelter, Gatecliff Shelter, and Triple T Shelter. They are also in the Owhyee Desert and Humboldt County (Paradise Valley) samples. The combined record shows that Dead Cedar points date between ca. 4,700 and 3,900 years ago at Bonneville Estates Rockshelter and Floating Island Cave in the eastern Great Basin, and between ca. 4,350 and 3,150 at Huffaker Springs in the western Great Basin. Our speculation is that they will continue to be found in sites along the Humboldt River corridor and northward within the Great Basin, and that the Humboldt River floodplain and adjacent lands may have served as a migration and communication conduit between the eastern and western Great Basin subregions.

In contrast, Gatecliff and Humboldt points are ubiquitous across the Great Basin and are present at all seven sites analyzed in detail here except Mt. Augusta. Gatecliff points are securely dated in the western Great Basin at Huffaker Springs between ca. 4,350 and 3,900 years ago which also fits with the direct date of ca. 4,200 years ago on binding adhering to a Gatecliff point recovered in Kramer Cave in the Smoke Creek Desert north of Reno (Smith et al. 2013). In the eastern Great Basin, they date between ca. 4,700 and 3,900 years ago at Bonneville Estates Rockshelter, Floating Island Cave, and Camels Back Cave. In the southeastern Great Basin, Gatecliff points are securely dated at 4,600 years ago at O'Malley Shelter; they may survive until ca. 3,200 and 2,900 years ago when Elko Series points finally appear in the shelter. At the type site of Gatecliff Shelter in the central Great Basin they date between ca. 3,800 and 3,600 years ago (Thomas 1983; Kennett et al. 2014), about 500-900 years later than the western and eastern subregions, respectively. However, one Gatecliff point from nearby Triple T Shelter may date as old as 4,100 years ago (Thomas 1988).

For Humboldt points, they date equivalent to Gatecliff points in the eastern Great Basin at Bonneville Estates Rockshelter and Floating Island Cave, between ca. 4,700 and 3,900 years ago. At Bonneville Estates Rockshelter they survive into the Late Middle Archaic. At Camels Back Cave Humboldt points may date as early as 5,750 years ago. At Huffaker Springs, Humboldt points date similarly between 4,350 and 3,900 years ago, also surviving into the Late Middle Archaic. At O'Malley Shelter, Humboldt points enter the record at about the same time as Bonneville Estates Rockshelter at ca. 4,600 years ago, and they are not seen after ca. 4,150 years ago. In the central Great Basin, Thomas (1988) recovered two Humboldt points from stratum IIIA in Triple T Shelter that dated between 6,000 and 4,800 years ago. Collectively these data suggest that Humboldt points entered the Great Basin archaeological record sometime between ca. 6,000 and 5,000 years ago but often slightly post-dating 5,000 years ago.

Late Middle Archaic Across the Great Basin

The Late Middle Archaic Period is marked by the ubiquitous presence of Elko Series points across much of the Great Basin. The eastern Great Basin appears to mark the earliest emergence of the type at ca. 4,000 years ago at Bonneville Estates Rockshelter and Camels Back Cave. They first appear at Huffaker Springs in the western Great Basin by ca. 3,150 years ago; they appear to emerge latest in the southeastern Great Basin at O'Malley Shelter sometime after 2,950 years ago. In the central Great Basin, the vast majority (94%) of Elko Series points recovered from Gatecliff Shelter post-date ca. 3,500 years ago, and at Triple T Shelter they are not well dated but appear sometime after 4,100 years ago (Thomas 1983; 1988; Kennett et al. 2014).

Concluding Remarks

As noted, the proposed dates for the emergence and termination of specific Early and Middle Archaic projectile point types in the western, eastern, central, and southeastern Great Basin subregions may require updating in the future as new data arise. The best data at our disposal continues to derive from caves and rockshelters with intact stratigraphy, deep chronologies bolstered by abundant radiocarbon dates, and repeated intermittent prehistoric occupations; however, Huffaker Springs and Big Springs in Goshute Valley demonstrate that deeply stratified open-air sites exist as well. Single-component open-air sites with reliable radiocarbon dates that were occupied during the past 1,500 years during the Late Archaic or Late Prehistoric periods are relatively common compared to those dating to the Early and Middle Archaic periods. The fact remains that many open-air sites in the Great Basin that were intermittently occupied just like caves and rockshelters did not have sedimentation rates high enough to separate the various occupations stratigraphically and many have been subjected to relatively high rates of erosion and deflation. Nevertheless, single-component Early and Middle Archaic open-air occupations do exist (e.g., Huffaker Springs and Big Springs), and in places such as the north-central and eastern Great Basin individual radiocarbon-dated open-air assemblages currently match the typologies and chronologies developed from caves and rockshelters such as Bonneville Estates Rockshelter, Danger Cave, Floating Island Cave, and Camels Back Cave (e.g., Hockett and Morgenstein 2003; Hockett and Goebel 2019). There may be single component open air sites with reliable radiocarbon dates that may extend the age ranges of specific point types and periods presented herein; most of these are likely contained in unpublished CRM reports and thus it may take a great deal of leg work to find them.

Ironically, given the hundreds (or thousands) of sites excavated over the decades in the western Great Basin, the Huffaker Springs site represents the oldest stratified radiocarbon dated sequence excavated to date in the subregion. Huffaker Springs is rarer still as it is an open-air locale; its location along a perennial creek allowed for favorable deposition rates and its position next to a large boulder protected the site from being periodically swept away by increased stream flows (Spidell and Kautz 2019). The excavation and reporting of Huffaker Springs on the heels of the reporting of the projectile point typologies and chronologies from Bonneville Estates Rockshelter (Hockett and Goebel 2019), the

latter site bolstered by nearly 250 AMS radiocarbon dates (Goebel et a. 2021) allowed for a "west-east" comparison here that was not possible just a few years ago.

For the southeastern Great Basin, O'Malley Shelter, excavated in 1969-1970, remains the oldest stratified radiocarbon dated sequence in the subregion as of this writing. It is rather remarkable that another site like it has not been found, excavated, and reported in the southeastern Great Basin in the 50 years since Fowler et al. (1973). Fortunately, our supplementation of radiocarbon dates demonstrates that the excavation strategy employed was solid and that the original dated stratigraphic sequence is confirmed. It is true that the beginnings of the excavation strategy at O'Malley Shelter removed levels in 25cm increments. These levels were primarily designated as F17. Such broad 25cm random levels crosscut stratigraphic boundaries such that the projectile points recovered from these levels cannot be used in the kind of fine-grained analysis presented above. However, this initial strategy allowed the excavators to define the individual stratigraphic layers within the site, and the excavation strategy changed from random levels to stratigraphically controlled excavations in which levels were contained within each definable stratum. Radiocarbon dates taken directly from hearth features and, most recently, faunal remains associated with the definable strata, confirms the presence of rockshelter sediments relatively devoid of major mixing from the Early and Middle Archaic periods of occupation. Projectile points recovered from these reliable strata, reported here, provide new information with which to compare typologies and chronologies from this subregion in the future.

Some may find our proposed types as representing "too much splitting" while others may find our designations as "just right". We have, in any case, discussed our reasoning for splitting (e.g., Leppy Hills points are not Elko Series points) and lumping (e.g., Leppy Hills A and Leppy Hills B subtypes), and attempted to solidify our choices with both metric and qualitative descriptions of each point type. Wherever projectile point typologies and chronologies take us in the future, the study and discussion of projectile point typology must remain at the forefront of Great Basin prehistory for it is the base from which our understanding of past behavioral patterns ultimately rest.

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Appendix

Table A-1. Metrics for Black Rock Concave Base Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-0012	BRCB	66.4	25.2	\	6.1	\	25.2	Mt. Hicks	3.9
E. Sierra Front	B-1060	BRCB	59.8	24	\	7.2	\	24	Mt. Hicks	2.6
E. Sierra Front	B-2733	BRCB	58.2	21.5	\	8	\	20	Mt. Hicks	4.9
E. Sierra Front	B-2942	BRCB	36.0	23	\	6.5	\	21	Queen	1.6
E. Sierra Front	B-8030	BRCB	27.2	19.4	\	4.7	\	18.5	Queen	9.5
E. Sierra Front	127-332	BRCB	28.2	24.5	\	4.9	\	21.3	Bodie Hills	4.6
E. Sierra Front	129-410A	BRCB	15.4	20.5	\	7.2	\	20.5	Mt. Hicks	4.5
E. Sierra Front	129-410B	BRCB	28.3	24.6	\	7	\	23.6	Bodie Hills	3.2
E. Sierra Front	131-397	BRCB	24.3	26.4	\	6.7	\	24.3	Bodie Hills	3.2
E. Sierra Front	H-332	BRCB	\	24.5	\	4.9	\	21.3	Obsidian	
Gatecliff Shelter	20.3-7484	BRCB	40.6	24	\	6.2	\	24	Chert	
No Name Valley	53-6	BRCB	\	23	\	\	\	21	Chert	
No Name Valley	81-12	BRCB	\	23.5	\	\	\	20.8	Chert	
No Name Valley	180-3	BRCB	\	29	\	\	\	24.8	Chert	
Huffaker Springs	1268	BRCB	\	19.90	\	7.90	\	19.20	Obsidian	
Huffaker Springs	1994	BRCB	\	23.80	\	5.50	\	24.00	FGV	
Huffaker Springs	5289	BRCB	\	19.10	\	5.50	\	17.30	Obsidian	
Mean			**38.4**	**23.3**	****	**6.3**	****	**21.8**		

Table A-2. Metrics for Carson Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-2971	Carson	32.3	13.6	8.5	2.9	4.3	12.9	Obsidian	
E. Sierra Front	B-8364	Carson	25	10.7	6.4	3.7	6.2	8.9	Bodie Hills	3
E. Sierra Front	123-297	Carson	13.4	13.8	9.2	4.2	4.6	9.5	Bodie Hills	2.7
E. Sierra Front	125-100	Carson	18.9	11.5	6.6	5.2	4.5	8.7	Bodie Hills	1.2
E. Sierra Front	125-103	Carson	18.8	12.6	8.1	4	4.9	9	Sutro Spring	2
E. Sierra Front	125-104	Carson	18.4	13.6	8.5	4.7	4.3	10	Sutro Spring	1.3
E. Sierra Front	125-115	Carson	16.9	12.4	9	4	4.9	10.5	Pine Grove Hills	1.3
E. Sierra Front	125-123	Carson	23.2	14.5	9.7	4.5	7	11.8	Sutro Spring	2
E. Sierra Front	125-124	Carson	20.9	15	8.3	5.4	4.3	11.3	Chert	
E. Sierra Front	125-162	Carson	19.8	12.1	8.6	4	5.5	10.3	Bodie Hills	1.7
E. Sierra Front	131-381B	Carson	19.3	14.9	9.1	4.6	5.6	10	Bodie Hills	1.2
E. Sierra Front	131-381E	Carson	17.4	15.5	9	4.8	4.4	11.1	Bodie Hills	3.2
E. Sierra Front	H-380	Carson	21.6	14.6	10	3.7	5.1	8.9	FGV	
Spooner	Do38-093	Carson	14.6	13.4	9.6	2.9	4.5	9.5	GFLIW;MLH	N/A
Spooner	Do38-174	Carson	17.4	13.8	9.2	2.9	4.6	9.5	Bodie Hills	DH
Spooner	Do38-210	Carson	24.2	16.5	7.2	5.1	4.8	7.4	Bodie Hills	3.7
Spooner	Do38-558	Carson	26.7	14.9	9.9	3.9	5.5	10.7	Bodie Hills	2.6
Huffaker Springs	55	Carson	18.90	11.50	7.40	2.50	5.22	11.00	Obsidian	
Huffaker Springs	1385	Carson	22.00	13.00	\	5.00	7.38	\	Obsidian	
Huffaker Springs	1501	Carson	23.10	15.00	11.20	3.90	6.99	15.00	Obsidian	
Huffaker Springs	1720	Carson	\	11.70	8.50	4.10	3.78	11.70	Obsidian	
Huffaker Springs	3308	Carson	18.80	11.80	*8.50*	3.10	4.51	11.80	Obsidian	
Huffaker Springs	4052	Carson	28.30	15.30	12.20	3.10	6.4	15.00	Obsidian	
Huffaker Springs	5112	Carson	\	15.40	12.90	4.70	5.91	15.40	Obsidian	
Huffaker Springs	6288	Carson	19.30	11.23	7.30	2.80	4.52	10.20	Obsidian	
Tosawihi	6362-1	Carson	14.3	9.4	5.1	2.8	5.5	7.4	Paradise Valley	
Tosawihi	4156-1	Carson	25.4	12.7	9.8	3.4	6	12.7	Chert	
Tosawihi	2061-6	Carson	18.7	12.1	9.5	3.3	7.4	12.1	Obsidian	
Mean			**20.7**	**13.3**	**8.9**	**3.9**	**5.3**	**10.8**		

Table A-3. Metrics for Dead Cedar Corner-Notched Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-0057	Dead Cedar	25.4	14.6	6.5	2.6	5.6	10.6	CD-Sawmill	2.5
E. Sierra Front	B-0059	Dead Cedar	29.5	17.8	9.5	3.9	4.3	8.4	Garfield Hills	2.3
E. Sierra Front	B-1055	Dead Cedar	30.3	\	8	3.5	4.5	8.9	Bodie Hills	3.2
E. Sierra Front	B-8670	Dead Cedar	24.9	17.5	10.1	3.3	6.5	12.4	Mt. Hicks	3.2
E. Sierra Front	B-8715	Dead Cedar	28.0	19.3	9.2	3.3	5.5	11	Queen	3.4
E. Sierra Front	125-111	Dead Cedar	23.1	17.6	8.5	4	3.2	8.2	Mt. Hicks	1.9
E. Sierra Front	125-113	Dead Cedar	25.9	14.3	8.8	2.6	2.9	9.4	Bodie Hills	2
E. Sierra Front	125-214	Dead Cedar	18.1	13.1	8.4	3.1	4.7	8.9	Bodie Hills	2.3
E. Sierra Front	126-306B	Dead Cedar	16.1	15.3	8.5	3.4	5.5	9.9	Bodie Hills	1.8
E. Sierra Front	128-327	Dead Cedar	17.2	13.2	8.8	3.7	6.2	9.8	Bodie Hills	3
E. Sierra Front	130-425	Dead Cedar	21.3	17.2	8.3	3.2	3.3	8.3	Bodie Hills	3.5
E. Sierra Front	131-373	Dead Cedar	26.9	20.1	9.9	2.9	4.5	11.8	Bodie Hills	2
E. Sierra Front	131-381C	Dead Cedar	18.7	18.6	10.4	4.5	4.4	10.6	Sutro Spring	NVB
E. Sierra Front	131-381D	Dead Cedar	23.1	16.9	8.2	3.9	4.9	8.8	Bodie Hills	2.2
E. Sierra Front	H-90	Dead Cedar	35.9	17	9	3.2	4.5	8.7	Chert	
E. Sierra Front	H-265	Dead Cedar	30.5	16.2	9	4.3	5	9.6	Chert	
Pancake Range	EJ-1	Dead Cedar	17.5	12.7	8.3	3.3	5.5	9	Butte Mountains	4.2
Spooner	Do38-077	Dead Cedar	24.2	16.3	10.4	3.5	4.6	11.4	Sutro Spring	2.5
Spooner	Do38-158a	Dead Cedar	30.9	19.6	10.6	4.2	5.3	11.7	Queen	N/A
Spooner	Do38-215	Dead Cedar	\	18.8	9.6	4.3	4.9	9.9	Mt. Hicks	N/A
Spooner	Do38-463	Dead Cedar	20.0	16.1	8.9	3	4.1	10.7	Majuba Mountain	N/A
Spooner	Do38-478	Dead Cedar	23	16.8	9.5	4.4	4.3	10	Sutro Spring	1
BER	15647	Dead Cedar	22.3	12.8	8.4	3	6.4	11.1	Obsidian	
BER	12656	Dead Cedar	23.6	13.9	8.1	3.5	4.2	10.5	Obsidian	
BER	12662	Dead Cedar	25.7	14.3	9.2	4	4.8	11.6	Obsidian	
BER	15585	Dead Cedar	19.7	15.1	9.6	3.2	4.8	11.4	Chert	
BER	15645	Dead Cedar	18.6	14.5	9.1	3.4	4.7	11.1	Chert	

BER	15606	Dead Cedar	29.2	15.2	9.6	2.5	5.6	11.3	FGV	
BER	11226	Dead Cedar	24.8	17.1	8.8	3.3	5.1	10.6	Obsidian	
BER	12657	Dead Cedar	22.9	14.6	8.4	3.1	4	9.3	Obsidian	
Danger Cave	NHMU-19352	Dead Cedar	22.3	19.2	8.2	3.9	6.3	10.6	Chert	
E. Sierra Front	DL-355	Dead Cedar	30	20.2	9	3	5.7	9.5	Buffalo Hills	3.6
Floating Island Cave	192.2	Dead Cedar	25.3	14.5	7.4	3.4	4.3	12.6	Chert	
Floating Island Cave	388	Dead Cedar	32.9	19.1	12	3.3	5	13.1	Chert	
Huffaker Springs	898	Dead Cedar	23.90	18.10	7.00	3.50	4.94	8.60	Obsidian	
Huffaker Springs	1034	Dead Cedar	18.20	19.50	8.90	4.50	5.68	10.50	FGV	
Huffaker Springs	1487	Dead Cedar	28.50	15.70	8.30	2.90	3.73	9.90	FGV	
Huffaker Springs	1654	Dead Cedar	24.30	18.20	8.10	4.00	5.44	9.98	Obsidian	
Huffaker Springs	1804	Dead Cedar	19.20	19.00	7.50	3.40	5.54	10.28	Obsidian	
Huffaker Springs	5181	Dead Cedar	24.50	20.60	9.10	3.90	3.71	9.97	FGV	
Huffaker Springs	6360	Dead Cedar	23.00	18.30	8.30	4.50	7.3	9.92	FGV	
Humboldt County	934-2	Dead Cedar	28.7	16.6	10.8	4.4	5.5	12.7	Double H /Whitehorse	
Elko County	06-98	Dead Cedar	27.9	19.1	8.7	3.5	5.5	13.7	Obsidian	
Elko County	47	Dead Cedar	25.5	17	9.1	4.2	4.5	12.3	Obsidian	
Mean			**24.5**	**16.4**	**8.9**	**3.6**	**4.9**	**10.4**		

Table A-4. Metrics for Desert Side-Notched Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-0006	DSN	17.8	13	8.8	2.8	7.3	13	Chert	
E. Sierra Front	B-0010	DSN	29.9	10	4.7	2.8	6.1	10.1	Bodie Hills	2.3
E. Sierra Front	B-0013	DSN	19.1	12.2	8.4	2.8	\	12.2	Silver Peak	1.6
E. Sierra Front	B-0016	DSN	30	13.4	7.1	3.2	9.4	13.4	Mt. Hicks	1.5
E. Sierra Front	B-0027	DSN	23.2	11.8	6.9	2.4	\	11.8	Queen	1.1
E. Sierra Front	B-0043	DSN	27.4	11.2	5.9	2.9	\	10	Queen	1.7
E. Sierra Front	B-0047	DSN	27.9	15.2	6.5	3.7	8.6	15.2	Mt. Hicks	NVB
E. Sierra Front	B-0060	DSN	22.7	12.2	8.2	1.9	6.5	12.2	Mt. Hicks	1.3
E. Sierra Front	B-1089	DSN	31	13.8	6.2	2.9	8.6	13.6	Queen	1.8
E. Sierra Front	B-1115	DSN	26.9	12.4	5.2	3.2	\	3.2	Queen	2
E. Sierra Front	B-1518	DSN	30.3	13	8.5	2.8	2.9	8.6	Chert	
E. Sierra Front	B-1527	DSN	28.0	13.2	7.9	2.7	8.1	13.2	Chert	
E. Sierra Front	B-2934	DSN	30.5	14.3	7.4	3	\	14.3	CD-Sawmill	1.2
E. Sierra Front	B-2936	DSN	23.5	11.4	8.3	2.8	4.6	10.7	Bodie Hills	1.8
E. Sierra Front	B-2944	DSN	20.8	13.1	8.6	3.3	6.9	13.1	Chert	
E. Sierra Front	B-2948	DSN	24.6	15.1	9.7	3.8	8.9	15.1	Chert	
E. Sierra Front	B-2969	DSN	22.6	15.2	8.4	3	7.7	15.2	Bodie Hills	1.4
E. Sierra Front	B-2980	DSN	\	14.1	7.5	4	9.2	14.1	Bodie Hills	NVB
E. Sierra Front	B-2984	DSN	27	13.1	6.7	3.1	10.1	13.1	Bodie Hills	2.7
E. Sierra Front	B-3009	DSN	25.6	12.5	7	3.7	\	12.5	Queen	2.4
E. Sierra Front	B-3016	DSN	30.1	11.9	7.1	2.5	6.2	11.9	Chert	
E. Sierra Front	B-8367	DSN	21.5	12.7	7.3	2.7	5.7	12.9	Bodie Hills	NVB
E. Sierra Front	B-8487	DSN	24	11.7	4.4	2.3	\	11.7	Queen	1.9
E. Sierra Front	B-8676	DSN	27.9	12.3	7.1	2.5	7.5	10.9	Mt. Hicks	1.5
E. Sierra Front	B-8677	DSN	26.7	12.8	7	2.5	\	12.8	Queen	2.3
E. Sierra Front	B-8678	DSN	22.2	11.5	8.3	3.2	\	11.5	CD-Lookout	2
E. Sierra Front	B-8910	DSN	24.1	\	\	3	7.1	\	Queen	1.7
E. Sierra Front	125-116	DSN	18.9	13.4	7.6	3.7	4.9	8.2	Sutro Spring	2

E. Sierra Front	125-156	DSN	14.9	12.4	8.1	3.5	4.8	12.4	Bodie Hills	1.3
E. Sierra Front	125-157	DSN	20.5	13.7	6.1	3.3	7.8	13.7	CD-Lookout	1.8
E. Sierra Front	125-158	DSN	19.5	11.9	8	3.6	4.5	9.9	Bodie Hills	2
E. Sierra Front	125-159	DSN	18.2	15.9	7.8	2.9	6.4	15.9	Bodie Hills	1.2
E. Sierra Front	125-160	DSN	16.5	11	5.7	3	3.8	11	Pine Grove Hills	NVB
E. Sierra Front	125-161	DSN	18.7	9.4	5.3	1.8	4.4	8.1	Bodie Hills	NVB
E. Sierra Front	125-163	DSN	15.3	10.2	6	3.3	5.6	9.3	Bodie Hills	1.3
E. Sierra Front	H-139	DSN	33.5	11.3	8	2.8	8.5	11.3	Obsidian	
E. Sierra Front	H-140	DSN	31.7	13.2	5	3.7	7.5	13.2	Obsidian	
E. Sierra Front	H-141	DSN	27.9	13.3	6	2.9	7.5	13.3	Obsidian	
E. Sierra Front	H-142	DSN	26.8	11.9	7	2.6	7.5	11.9	Obsidian	
E. Sierra Front	H-143	DSN	19.6	13.9	6	2.8	7.5	13.9	Obsidian	
E. Sierra Front	H-144	DSN	25.9	14.6	6	3.8	7.5	14.6	Obsidian	
E. Sierra Front	H-145	DSN	19.6	12	6	2.5	10.5	12	Obsidian	
E. Sierra Front	H-146	DSN	22.3	11.8	4.5	3.7	10.5	11.8	Obsidian	
E. Sierra Front	H-147	DSN	18.4	14	6	3.4	7.5	14	Obsidian	
E. Sierra Front	H-148	DSN	26.3	9.6	5	3.1	7	9.6	Obsidian	
E. Sierra Front	H-171	DSN	16.5	14	8.5	3.5	9	14	Chert	
E. Sierra Front	H-173	DSN	26.5	13.1	6	3.4	10	13.1	Chert	
E. Sierra Front	H-180	DSN	19.8	13.2	8	2.2	6.5	13.2	Chert	
E. Sierra Front	H-195	DSN	28.2	12.9	8	2.9	6	12.9	Chert	
E. Sierra Front	H-259	DSN	26.7	13.4	7	2.8	7.5	13.4	Chert	
E. Sierra Front	H-260	DSN	38.2	11.5	5	3.9	7.5	11.5	Chert	
E. Sierra Front	H-261	DSN	28.9	12.5	7	3.4	7	12.5	Chert	
Spooner	Do38-419	DSN	22.6	10.9	7.6	2.5	6.2	\	Bodie Hills	1.1
Gatecliff Shelter	20.3-3569	DSN	24.7	13	7.3	3	\	13	Obsidian	
Gatecliff Shelter	20.2-8112	DSN	14.8	13	7.8	2	\	13	Chert	
Triple T Shelter	20.3-4123	DSN	34.6	13.2	7	3.4	\	13.2	Chert	
Alta Toquima	20.4-1077	DSN	17.6	12.7	6.2	3	\	12.7	Quartz	
Alta Toquima	20.4-1110	DSN	15.3	9.7	3.7	2.4	\	9.7	Chert	
Alta Toquima	20.4-6339	DSN	20.9	14.2	7.8	3.4	\	14.2	Chert	
Alta Toquima	20.4-6345	DSN	17.5	10.5	4.5	2.4	\	10.5	Chert	

Alta Toquima	20.4-6675	DSN	23.6	10.4	7.6	2.5	\	9.8	Chert	
Alta Toquima	20.4-6683	DSN	20.6	12.4	5.9	3.8	\	12.4	Chert	
Alta Toquima	20.4-6685	DSN	23.5	11.6	3.5	2.8	\	11.6	Obsidian	
Alta Toquima	20.4-6783	DSN	21.1	11.1	6.4	2.9	\	11.1	Chert	
Alta Toquima	20.4-6934	DSN	15.8	12.6	4.6	2.9	\	12.6	Obsidian	
Tosawihi	01-01	DSN	29	10.5	6.4	3	3.6	9.4	Chert	
Tosawihi	2024-2	DSN	21.9	12.9	7	2.9	7.8	12.9	Chert	
Tosawihi	6362-2	DSN	20	12.6	5.5	2.5	7.7	12.6	Chert	
Tosawihi	3011-1	DSN	18.9	8.2	5	2.8	6.2	8.2	Paradise Valley	
Tosawihi	510-38	DSN	22.7	12.1	6.8	2.7	6.5	12.1	Chert	
Tosawihi	2002-1	DSN	15.5	9.6	7.8	3.1	5.3	9.6	Chert	
Tosawihi	5078-1	DSN	19.2	11.6	8.4	3.1	5.7	11.5	Obsidian	
Tosawihi	1016-1	DSN	21.6	14.7	8.9	2.9	7.5	14.7	Malad	
Tosawihi	503-7	DSN	28.6	12.7	7.4	3.1	5.9	12.7	Chert	
Tosawihi	6101-3	DSN	24.5	14	10.9	2.5	\	14	Chert	
Humboldt County	4555-1	DSN	18.6	13.9	8.3	2.8	\	13.9	Massacre Lake/ Guano Valley	
Humboldt County	7-07	DSN	20.1	12.4	8.7	2.9	7	12.4	Chert	
Elko County	06-21	DSN	23.5	12.6	10.2	3.7	5.3	12.6	Obsidian	
Elko County	06-22	DSN	17	10.7	9.5	3.2	4	10.7	Obsidian	
Elko County	06-23	DSN	22.5	12.3	7.8	4.3	3.7	12.3	Obsidian	
Elko County	06-26	DSN	22	11	7.7	3.5	4.9	10	Obsidian	
Elko County	06-25	DSN	20	10.9	6.8	2.5	5.4	10.9	Obsidian	
Elko County	06-20	DSN	27.8	14.5	7.4	4.1	6	14.5	Obsidian	
Elko County	14108	DSN	33	13.4	7.6	3.2	8.2	13.4	Chert	
Elko County	052400	DSN	21	10	8	3.8	6.6	10	Chert	
Elko County	06-58	DSN	26	13.3	6.3	3.9	8.8	13.3	Obsidian	
Mean			**23.4**	**12.4**	**7.0**	**3.0**	**6.8**	**12.1**		

Table A-5. Metrics for Elko Corner-Notched Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-2773	Elko	\	26.2	12.5	4.8	6.7	12.9	Chert	
E. Sierra Front	B-2972	Elko	27.5	17.6	10.3	4.5	4.7	12.4	Queen	1.3
E. Sierra Front	B-3441	Elko	32.1	21	11	4.9	6.3	14.6	Queen	3.7
E. Sierra Front	B-8374	Elko	36.5	17.9	9.4	3.8	4.6	10.9	Chert	
E. Sierra Front	B-8905	Elko	30.0	17	10.1	4.2	3.5	9.2	Queen	5.2
E. Sierra Front	125-106	Elko	35.9	17.9	10.4	4.6	4.9	11.5	CD-Sawmill	NVB
E. Sierra Front	125-125	Elko	31	17.3	8.9	4.3	6.1	10.7	Bodie Hills	1.8
E. Sierra Front	125-129	Elko	34.4	17.6	8.2	4.1	6	10.8	Bodie Hills	2
E. Sierra Front	H-72	Elko	51.7	26.3	15	7.3	7.4	15	Chert	
E. Sierra Front	H-85	Elko	57.1	30	20.5	5.7	7.8	26.6	Obsidian	
E. Sierra Front	H-378	Elko	\	30.2	22	6	13	26	Chert	
Goshute Valley	G-004	Elko	35.5	22.2	10.7	5.8	7	17.5	Chert	
Summit Lake	T41N	Elko	\	\	10.2	2.8	5.2	12	Massacre Lake/ Guano Valley	2
BER	686	Elko	25.7	18.6	12	5.1	6.3	\	Chert	
BER	8858	Elko	34.6	20.2	12	5.9	7	\	Chert	
BER	2493	Elko	47.5	23.9	15	4.7	8.2	\	Chert	
BER	6012	Elko	36.3	21.2	14	5.5	5.1	\	Chert	
BER	17963	Elko	32.9	20.7	9	4.1	6.5	\	Chert	
BER	12007	Elko	38.6	23.8	12	5	6.5	\	Chert	
BER	12018	Elko	33.2	22.1	11	4.2	6	\	Chert	
Gatecliff Shelter	20.2-9357	Elko	69	19.7	11.6	5.6	\	15.7	Chert	
Gatecliff Shelter	20.3-1372	Elko	34.1	23.6	13.8	3.9	\	18	Chert	
Gatecliff Shelter	20.3-1406	Elko	49.6	27.4	14.7	4.7	\	23.4	Chert	
Gatecliff Shelter	20.3-1499	Elko	42.6	30.6	16	8.1	\	16.8	Chert	

Gatecliff Shelter	20.3-1876	Elko	31.9	25	14.2	4.4	\	16.4	Chert	
Gatecliff Shelter	20.3-2613	Elko	42.2	22.2	11.1	4.5	\	15.8	Chert	
Gatecliff Shelter	20.3-1319	Elko	24	18	9.9	4.6	\	13	Chert	
Gatecliff Shelter	20.3-1909	Elko	36.8	26.3	14.8	4.5	\	19.8	Chert	
Gatecliff Shelter	20.3-3464	Elko	50.9	25.1	11.7	5.6	\	14	Chert	
Gatecliff Shelter	20.3-3496	Elko	39.6	22.9	12.1	5.3	\	15.1	Chert	
O Malley Shelter	175-2	Elko	\	26.3	14.7	7.9	8.5	16.6	Chert	
O Malley Shelter	136-3	Elko	\	27.5	14.2	6.6	8.1	16	Chert	
O Malley Shelter	214-1	Elko	\	24	9.4	4.8	7.7	16	Chert	
O Malley Shelter	215-3	Elko	46	26.5	13.9	6.9	8.1	18.7	Chert	
O Malley Shelter	300-8	Elko	\	22.3	10.3	6.2	7.1	15.1	Chert	
O Malley Shelter	323-16	Elko	41	29.4	16.9	5.1	6.7	18.4	Chert	
O Malley Shelter	318-2	Elko	34	25.4	14	4.9	6.9	17.3	Chert	
O Malley Shelter	352-1	Elko	34.6	17.5	7.6	3.9	7.3	13.2	Obsidian	
O Malley Shelter	321-1	Elko	35.4	21.8	10.8	3.9	7.5	15.6	Chert	
Alta Toquima	20.4-6485	Elko	48.6	25	13.4	6.1	\	17.5	Chert	
Alta Toquima	20.4-6948	Elko	33	22.7	13.4	5.6	\	14.7	Chert	
Alta Toquima	20.4-7070	Elko	34.1	22	13.1	5.7	\	17.7	Quartzite	

Alta Toquima	20.5-0223	Elko	38.5	23.4	10	4.6	\	17.5	Chert	
Alta Toquima	20.5-0239	Elko	22.5	13.4	8.3	3.6	\	11.1	Chert	
Alta Toquima	20.5-0444	Elko	25	16.8	10.3	4.4	\	15	Chert	
Alta Toquima	20.5-0650	Elko	43.8	18.4	9.1	4.8	\	10.1	Chert	
Alta Toquima	20.5-0681	Elko	33.2	22.6	10.6	3.1	\	18.6	Chert	
Alta Toquima	20.5-2483	Elko	36.8	16	10.3	3.9	\	13.1	Chert	
Alta Toquima	20.5-2582	Elko	32.4	18.4	8.7	4.4	\	12.9	Chert	
Alta Toquima	20.5-2598	Elko	40.7	21.6	9.9	4.5	\	12	Chert	
Floating Island Cave	422	Elko	44	18	11	5	7	13	Chert	
Floating Island Cave	365A	Elko	49	28	14	6	6.6	13	Chert	
Floating Island Cave	168	Elko	34	30	17	6	7.1	18	Obsidian	
Floating Island Cave	330	Elko	40	21	12	5	6.2	13	Chert	
Floating Island Cave	184	Elko	54	25	12	5	5.9	16	FGV	
Floating Island Cave	306	Elko	40	22.9	13	4.9	7	14.5	Chert	
Floating Island Cave	301	Elko	41	22.7	9.4	5.1	7.4	15.5	FGV	
Floating Island Cave	265	Elko	29.3	24	8.5	4.3	6.9	13	Chert	
Mt. Augusta	2	Elko	\	16.8	9.5	4.9	5.1	9.3	Siltstone	
Mt. Augusta	3	Elko	41	\	10.3	4.6	5.3	\	Chert	
Huffaker Springs	1059	Elko	\	29.60	11.50	5.20	6.54	12.10	FGV	

Huffaker Springs	3027	Elko	\	22.60	10.30	5.70	7.49	13.90	FGV	
Huffaker Springs	3818	Elko	\	21.50	11.30	5.70	7.19	12.70	CCS	
Huffaker Springs	5178	Elko	\	21.80	9.50	7.70	6.03	11.70	FGV	
Huffaker Springs	5801	Elko	33.70	22.60	9.50	5.00	7.63	12.10	FGV	
Huffaker Springs	6244	Elko	\	19.80	8.97	5.60	5.96	10.30	FGV	
Elko County	1525-1	Elko	31	25.1	12	5.5	4.7	7.9	Browns Bench	
Elko County	2433-1	Elko	\	22.6	11.5	4.5	7.3	16.1	Browns Bench	
Winnemucca Lake	EMPP-36	Elko	\	26.5	13	4.4	7.8	20	Obsidian	
Tosawihi	5005-2	Elko	37.3	24.8	12.5	4.8	6.3	12.5	Chert	
Humboldt County	655-1	Elko	37.2	21.7	11.6	4.5	7.1	16.5	Paradise Valley	
Humboldt County	633-1	Elko	32.1	19.9	9.6	4.3	5.8	12.5	Majuba Mountain	
Humboldt County	662-1	Elko	41.2	20.3	9	3.7	6.2	16	Paradise Valley	
Humboldt County	924-1	Elko	31.8	25.1	9.8	4.1	6.4	10.9	Paradise Valley	
Humboldt County	2766-2	Elko	34.8	20.5	6.7	4.7	6.7	9.1	Double H Whitehorse	
Humboldt County	979-2	Elko	27.9	20	9.7	5	6.3	14.7	Craine Creek	
Humboldt County	1551-1	Elko	39.8	25.4	15.8	5.1	8.3	21.3	Craine Creek	
Humboldt County	3756-1	Elko	48.2	21.9	15.9	5.1	6.4	18.4	Double H Whitehorse	
Elko County	6NB-5	Elko	\	27	14	5	6.8	\	Chert	
Elko County	I7-21	Elko	\	28.8	16.1	4.6	5.7	17.2	Chert	
Elko County	7-5	Elko	\	29.9	14.1	5.1	6.5	17.9	Chert	

Elko County	7-2-1	Elko	\	22.3	9.1	4.5	7.7	12.4	Chert	
Elko County	70	Elko	25.5	18.6	11	4.6	7.4	12.9	Obsidian	
Elko County	172	Elko	37	22	11.3	5.2	7.1	12.2	Obsidian	
Elko County	177	Elko	41	19.8	12.6	5.3	7.9	14.6	Obsidian	
Elko County	201	Elko	\	\	10.2	5.2	7.9	14.2	Obsidian	
Elko County	193	Elko	34	19.9	13	5.1	6.3	15	Obsidian	
Elko County	189	Elko	\	30.8	17	5.2	9.4	21.3	Obsidian	
Elko County	164	Elko	\	23.8	11.7	5.3	7.9	15	Obsidian	
Elko County	SITE13	Elko	\	26.3	12.9	4.4	9.8	16.7	Chert	
Elko County	A1	Elko	37.1	21	9.6	4.5	7.4	15.3	Obsidian	
Elko County	7-2	Elko	\	18.5	7.8	4	7.7	13.8	Obsidian	
Elko County	06-100	Elko	\	19.2	11.2	4.4	7.8	15.5	Obsidian	
Mean			**40.7**	**24.0**	**12.5**	**5.3**	**7.4**	**15.9**		

Table A-6. Metrics for Gatecliff Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-1050	Gatecliff	34.8	21.4	11.2	5.1	12.4	12.8	Mt. Hicks	DH
E. Sierra Front	B-1059	Gatecliff	69	26.8	16.3	7.2	17.2	12.9	Mt. Hicks	NVB
E. Sierra Front	B-1287	Gatecliff	\	28	10.8	5.2	11	13.8	Chert	
Gatecliff Shelter	20.3-2121	Gatecliff	45.5	19.3	12.5	4.7	\	12	Chert	
Gatecliff Shelter	20.3-6585	Gatecliff	41.5	17.3	11.5	5.3	\	12.2	Chert	
Gatecliff Shelter	20.3-7290	Gatecliff	36.1	25.3	11.8	4.2	\	12.5	Chert	
Gatecliff Shelter	20.3-7352	Gatecliff	51.7	22.9	11	5	\	10.6	Chert	
O Malley Shelter	445-8	Gatecliff	36.3	23.7	12.7	4.9	6.7	10.9	Obsidian	
O Malley Shelter	268-4	Gatecliff	45	24.7	13.1	5.1	9	11.5	Chert	
O Malley Shelter	331-4	Gatecliff	36.7	22	10.1	3.8	7.5	8.8	Obsidian	
O Malley Shelter	323-18	Gatecliff	\	24.9	11.1	6.1	7.5	8.8	Chert	
Alta Toquima	20.4-6939	Gatecliff	17.7	20.9	8.2	3.9	\	7.5	Chert	
Alta Toquima	20.5-0780	Gatecliff	36.9	25.8	15	7.5	\	10.2	Obsidian	
Floating Island Cave	192.4	Gatecliff	41	25	11	4	\	14	FGV	
Floating Island Cave	354	Gatecliff	33	21	11	7	7.6	12	Obsidian	
Huffaker Springs	3272	Gatecliff	33.70	17.60	9.60	4.50	6.55	7.80	FGV	
Huffaker Springs	3519	Gatecliff	37.60	17.80	8.79	6.50	6.78	8.50	FGV	
Huffaker Springs	3757	Gatecliff	23.50	20.10	9.50	4.90	5.04	9.40	FGV	
Elko County	2755-2	Gatecliff	55.7	25.3	12.3	5.2	8.5	13.1	Malad	

Tosawihi	8041-4	Gatecliff	37.2	19.8	11.6	5.6	8.5	10.2	Paradise Valley	
Tosawihi	01-4	Gatecliff	43	17.3	9.3	4.9	5.2	8.8	Chert	
Humboldt County	660-1	Gatecliff	41.4	20.9	11.4	4.8	8.1	11	Paradise Valley	
Humboldt County	934-1	Gatecliff	28.3	19.5	10	5.2	7.9	11.3	Majuba Mountain	
Humboldt County	1613-1	Gatecliff	30.6	20.8	12.1	5	7.6	11.8	Massacre Lake/ Guano Valley	
Elko County	06-03	Gatecliff	30	19.6	10.4	4.8	7.1	11.4	Browns Bench	
Elko County	182	Gatecliff	33.7	20.8	10.2	4.4	7.3	12	Paradise Valley	
Elko County	65	Gatecliff	\	20	13	4.8	13	13.7	Browns Bench	
Elko County	66	Gatecliff	\	22.5	14.7	5.1	12.7	14.8	Browns Bench	
Elko County	68	Gatecliff	\	22.1	14	6.2	12.6	13	Browns Bench	
Elko County	67	Gatecliff	\	21.4	12	6	9	13.5	Browns Bench	
Elko County	208	Gatecliff	\	21.1	13.4	5.1	11	14.1	Obsidian	
Elko County	87	Gatecliff	44.2	27	13.1	7	8.4	11.6	Obsidian	
Elko County	06-63	Gatecliff	\	25.9	15.3	6.1	12.6	14.8	Obsidian	
Elko County	06-92	Gatecliff	\	26.9	13.5	5	11.2	13.6	Obsidian	
Elko County	74	Gatecliff	\	25	14.5	5.8	10.6	13.7	Obsidian	
Elko County	06-62	Gatecliff	\	20.5	9.3	4.8	8.8	11.6	Obsidian	
Elko County	06-14	Gatecliff	\	22.6	10.7	5.5	9.6	10.8	Obsidian	
Mean			**38.6**	**22.3**	**11.8**	**5.3**	**9.2**	**11.6**		

Table A-7. Metrics for Gypsum Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
Gatecliff Shelter	20.3-2338	Gypsum	38.9	20.3	8.9	4.7	\	7.1	FGV	
Gatecliff Shelter	20.3-3659	Gypsum	36.1	21.4	9.7	4.5	\	7.8	Chert	
Gatecliff Shelter	20.3-6397	Gypsum	35.6	22.9	8.7	4.8	\	8.1	Chert	
Gatecliff Shelter	20.3-6444	Gypsum	33.4	17	7	4.3	\	6.3	Chert	
Triple T Shelter	20.3-6470	Gypsum	37.5	17.4	8.6	4.7	\	6.6	Chert	
O Malley Shelter	358-3	Gypsum	36	22.6	11.9	5.3	9.5	9	Obsidian	
O Malley Shelter	358-5	Gypsum	66.2	31	13.3	6.1	7.8	8	FGV	
O Malley Shelter	358-7	Gypsum	39.5	22.9	11.6	5	8.9	6.5	Obsidian	
O Malley Shelter	358-4	Gypsum	58.6	24	9.8	7.6	6.1	5.5	Chert	
O Malley Shelter	358-20	Gypsum	\	25.6	13.2	6.4	11.1	6.1	Chert	
O Malley Shelter	358-1	Gypsum	65.4	17.6	12.5	5.7	8.4	6.6	Chert	
O Malley Shelter	358-2	Gypsum	39.7	17.9	9.4	5.5	7.8	4.9	Obsidian	
O Malley Shelter	229-1	Gypsum	27.5	20	5.2	4.2	2.9	4	Obsidian	
O Malley Shelter	223-3	Gypsum	26.8	19.4	9.9	5.7	5.5	8.3	Obsidian	
O Malley Shelter	241-14	Gypsum	\	31.1	16.6	6	7.9	12.6	Chert	

O Malley Shelter	241-1	Gypsum	32.2	20.5	11.7	5.6	5.5	8.8	Obsidian	
O Malley Shelter	223-5	Gypsum	64	24.5	10.6	7.3	7.3	7.3	Chert	
O Malley Shelter	252-2	Gypsum	35	22.6	11.8	5.2	6	6.2	Obsidian	
O Malley Shelter	147-2	Gypsum	37	24.6	10.5	6	4.6	3.9	Obsidian	
O Malley Shelter	234-1	Gypsum	34.2	27.7	10.7	4.1	7.6	5.7	Obsidian	
O Malley Shelter	334-2	Gypsum	40	26	9.5	5.1	4.2	6.5	Obsidian	
O Malley Shelter	334-14	Gypsum	38.5	26.4	13.1	5.5	5.2	7.1	Obsidian	
O Malley Shelter	334-10	Gypsum	31.7	22.5	8.7	3.5	5.7	6.4	Obsidian	
O Malley Shelter	334-11	Gypsum	30.9	21.8	9.3	4.9	6.1	5.7	Obsidian	
O Malley Shelter	338-3	Gypsum	45.7	19.1	11.6	7.2	8.4	6.5	Chert	
O Malley Shelter	338-1	Gypsum	37.2	20.9	11.1	4.9	7.4	7.1	Obsidian	
O Malley Shelter	337-7	Gypsum	43.6	25.9	10.9	5.2	7.7	6.9	Obsidian	
O Malley Shelter	369-4	Gypsum	34.2	21.3	7.9	6.3	7.5	5.7	Chert	
O Malley Shelter	369-2	Gypsum	37.6	21.3	11.1	6	10	6.1	Obsidian	
O Malley Shelter	362-1	Gypsum	30.4	22.6	7.9	4.9	6.2	5.7	Quartzite	
O Malley Shelter	443-14	Gypsum	49	22.8	11.5	5.7	9.2	8.3	Chert	
O Malley Shelter	375-3	Gypsum	50.4	24.3	10.1	4.4	6.6	7	Obsidian	
O Malley Shelter	375-12	Gypsum	41.9	21.6	10.8	7.1	7.8	6.1	Quartzite	

O Malley Shelter	323-15	Gypsum	47.1	22.2	9.5	4.5	7.5	7.4	Obsidian	
Alta Toquima	20.5-0667	Gypsum	23.1	15.1	7.2	5.4	\	6.2	Chert	
Alta Toquima	20.5-0701	Gypsum	37	16.8	5.4	3.9	\	3.4	Chert	
Mean			**40.1**	**22.3**	**10.2**	**5.4**	**7.1**	**6.7**		

Table A-8. Metrics for Humboldt Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-0048	Humboldt	43.7	15.6	\	4.8	\	12.9	Chert	
E. Sierra Front	B-2735	Humboldt	53	19	\	6.6	\	13.5	Glass Mnt.	
E. Sierra Front	B-2995	Humboldt	\	13.6	\	3.8	\	7.4	Bodie Hills	2.3
E. Sierra Front	B-2996	Humboldt	42.7	17.1	\	4.6	\	13.3	Mt. Hicks	5.2
E. Sierra Front	B-2997	Humboldt	38	14.9	\	5.4	\	12.8	Bodie Hills	DH
E. Sierra Front	B-7286	Humboldt	\	20.4	\	5.9	\	10.5	Mt. Hicks	4.2
E. Sierra Front	B-8497	Humboldt	55.6	19.8	\	6.5	\	9.7	Garfield Hills	4.4
E. Sierra Front	121-270	Humboldt	30.5	18.3	\	9.1	n/a	18.3	Mt. Hicks	5.6
E. Sierra Front	126-309	Humboldt	37.4	18	\	6.7	4.4	15.6	Bodie Hills	4.7
E. Sierra Front	128-323	Humboldt	45.6	18.3	\	7.2	n/a	15.9	Queen	5.6
E. Sierra Front	131-395	Humboldt	15.6	15.3	\	4.5	n/a	15.3	Sutro Spring	6.1
E. Sierra Front	131-396	Humboldt	19.2	15.4	\	5.7	n/a	13.4	CD-Lookout	6.5
E. Sierra Front	H-75	Humboldt	58.1	24.8	\	6.1	\	12.3	Welded Tuff	
E. Sierra Front	H-152	Humboldt	37.6	18.6	\	6.9	\	14.5	Basalt	
Goshute Valley	G-2241	Humboldt	58	19.5	\	6.7	\	14.2	Chert	
Spring Valley	SV-001	Humboldt	64	14.7	\	4.8	\	14.2	Chert	
Gatecliff Shelter	20.3-7480	Humboldt	31.7	11.5	\	4.8	\	9	Chert	
Gatecliff Shelter	20.3-9614	Humboldt	33.2	13.5	\	4.7	\	13.5	Chert	
Gatecliff Shelter	20.3-9605	Humboldt	43.2	19.9	\	3.1	\	19.9	Chert	
Triple T Shelter	20.3-7608	Humboldt	31.9	18.5	\	6.7	\	11.8	Obsidian	
Triple T Shelter	20.3-6477	Humboldt	32.4	8.8	\	6	\	8.8	Obsidian	
O Malley Shelter	418-12	Humboldt	44.7	16.3	\	5.8	\	16.2	Obsidian	
O Malley Shelter	445-1	Humboldt	26.2	13.4	\	3.6	\	12.7	Obsidian	
O Malley Shelter	445-3	Humboldt	42.2	19	\	6.4	\	18.6	Obsidian	

O Malley Shelter	445-6	Humboldt	47.5	13.9	\	5.5	\	12	Obsidian	
O Malley Shelter	445-7	Humboldt	33.9	16.4	\	4.6	\	12.9	Obsidian	
O Malley Shelter	385-26	Humboldt	29.3	13.2	\	3.2	\	10.8	Obsidian	
O Malley Shelter	385-19	Humboldt	53.2	23.8	\	6.1	\	18.4	Obsidian	
O Malley Shelter	404-9	Humboldt	42	16.7	\	4.2	\	9.6	Obsidian	
O Malley Shelter	379-13	Humboldt	48.6	11.6	\	5	\	11.2	Obsidian	
O Malley Shelter	375-2	Humboldt	34.9	16.4	\	5.7	\	13.3	Obsidian	
O Malley Shelter	441-10	Humboldt	39.3	17.3	\	6.1	\	6.1	Obsidian	
O Malley Shelter	441-14	Humboldt	66	19.6	\	6.3	\	13	FGV	
O Malley Shelter	402-2	Humboldt	41.1	16.5	\	6.1	\	7.7	Obsidian	
O Malley Shelter	394-7	Humboldt	43.6	17.2	\	5.8	\	14.9	Obsidian	
O Malley Shelter	425-1	Humboldt	39.5	13	\	5.6	\	8.5	Obsidian	
O Malley Shelter	270-9	Humboldt	50.6	17.5	\	5.9	\	10.2	Obsidian	
O Malley Shelter	422-5	Humboldt	45	21.8	\	6.4	\	15.2	Obsidian	
O Malley Shelter	268-1	Humboldt	31.2	16	\	4.4	\	15.1	Obsidian	
Alta Toquima	20.4-1126	Humboldt	33.3	20	\	5.3	\	20	Chert	
Floating Island Cave	178	Humboldt	50	17	\	7	\	9	FGV	
Floating Island Cave	229.2	Humboldt	51	18	\	6	\	15	FGV	
Floating Island Cave	192.1	Humboldt	66	17	\	8	\	12	Chert	
Floating Island Cave	192.3	Humboldt	37	16	\	4	\	13	Chert	
Floating Island Cave	151	Humboldt	56	15	\	5	\	11	Obsidian	
Mt. Augusta	20	Humboldt	\	18.6	\	5.7	\	12.6	Chert	
Mt. Augusta	21	Humboldt	\	21.8	\	6.1	\	18.6	Siltstone	
Mt. Augusta	22	Humboldt	\	13.9	\	5.4	\	12.1	Obsidian	
Mt. Augusta	23	Humboldt	\	17.4	\	5.5	\	12.9	Siltstone	
Mt. Augusta	24	Humboldt	28.9	18.1	\	4.9	\	17.4	Siltstone	
Mt. Augusta	25	Humboldt	25	12.6	\	4.1	\	11.6	Chert	
Huffaker Springs	3317	Humboldt	\	16.90	\	6.60	\	11.20	Sinter	
Huffaker Springs	4011	Humboldt	33.00	10.00	\	5.00	\	9.00	Obsidian	
Huffaker Springs	6175	Humboldt	40.10	18.20	\	5.10	\	\	Obsidian	

Huffaker Springs	6262	Humboldt	31.90	16.70	\	7.30	\	14.80	FGV	
Tosawihi	6606	Humboldt	34.5	15.4	\	4	\	8.7	Obsidian	
Winnemucca Lake	EMPP-25	Humboldt	89	25.3	\	7	\	13.7	Obsidian	
Winnemucca Lake	EMPP-33	Humboldt	66.9	22.2	\	5.9	\	18.4	Chert	
Winnemucca Lake	EMPP-34	Humboldt	49.5	21.7	\	7.5	\	9.7	Chert	
Winnemucca Lake	3371	Humboldt	\	22.1	\	6.3	\	11.3	Obsidian	
Winnemucca Lake	3374	Humboldt	65.2	23.0	\	6.7	\	8.7	Chert	
Winnemucca Lake	2206	Humboldt	\	22.0	\	6.3	\	11.0	Obsidian	
Winnemucca Lake	498-1	Humboldt	57.1	12.4	\	4.5	\	\	FGV	
Winnemucca Lake	498-2	Humboldt	51.8	17.1	\	5.1	\	17.1	Obsidian	
Winnemucca Lake	498-3	Humboldt	55.0	13.3	\	6.5	\	12.9	Chert	
Winnemucca Lake	498-4	Humboldt	49.1	15.6	\	4.7	\	13.8	FGV	
Winnemucca Lake	498-5	Humboldt	48.1	14.7	\	5.1	\	14.4	Obsidian	
Winnemucca Lake	498-6	Humboldt	44.7	13.9	\	5.3	\	10.9	Obsidian	
Winnemucca Lake	498-7	Humboldt	43.2	11.5	\	3.4	\	10.7	FGV	
Winnemucca Lake	498-8	Humboldt	43.8	11.7	\	3.7	\	11.7	FGV	
Winnemucca Lake	498-9	Humboldt	36.7	12.8	\	3.6	\	10.8	Obsidian	
Winnemucca Lake	498-10	Humboldt	42.3	14.0	\	5.1	\	13.0	Obsidian	
Tosawihi	2500-1	Humboldt	35.2	18.3	\	5.6	\	18.3	Paradise Valley	
Elko County	T2-04	Humboldt	48.4	20.1	\	5.9	\	14.8	Obsidian	
Elko County	06-15	Humboldt	\	16.5	\	5.6	\	14.4	Browns Bench	
Elko County	06-83	Humboldt	\	15.4	\	5.6	\	14.7	Browns Bench	
Elko County	213	Humboldt	\	17.6	\	5.1	\	14.6	Obsidian	
Elko County	171	Humboldt	\	17.8	\	5.2	\	12.8	Obsidian	
Elko County	205	Humboldt	48	16.2	\	4.9	\	14.7	Obsidian	
Elko County	210	Humboldt	\	\	\	4.7	\	11.2	Obsidian	
Elko County	168	Humboldt	\	20.3	\	5.2	\	16.9	Obsidian	
Winnemucca Lake	3371	Humboldt	\	22.1	\	6.3	\	11.3	Obsidian	
Winnemucca Lake	2206	Humboldt	\	22	\	6.3	\	11	Obsidian	
Winnemucca Lake	498-10	Humboldt	42.3	14	\	5.1	\	13	Obsidian	

Winnemucca Lake	498-7	Humboldt	43.2	11.5	\	3.4	\	10.7	FGV	
Winnemucca Lake	498-1	Humboldt	57.1	12.4	\	4.5	\	\	FGV	
Winnemucca Lake	498-3	Humboldt	55	13.3	\	6.5	\	12.9	Chert	
Winnemucca Lake	3374	Humboldt	65.2	23	\	6.7	\	8.7	Chert	
Winnemucca Lake	498-6	Humboldt	44.7	13.9	\	5.3	\	10.9	Obsidian	
Winnemucca Lake	498-9	Humboldt	36.7	12.8	\	3.6	\	10.8	Obsidian	
Winnemucca Lake	498-4	Humboldt	49.1	15.6	\	4.7	\	13.8	FGV	
Winnemucca Lake	498-8	Humboldt	43.8	11.7	\	3.7	\	11.7	FGV	
Winnemucca Lake	498-2	Humboldt	51.8	17.1	\	5.1	\	17.1	Obsidian	
Winnemucca Lake	498-5	Humboldt	48.1	14.7	\	5.1	\	14.4	Obsidian	
Mean			**43.8**	**16.9**	****	**5.5**	****	**12.7**		

Table A-9. Metrics for Leaf Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
O Malley Shelter	359-1	Leaf	54.3	19.2	\	6.8	\	\	Quartzite	
O Malley Shelter	391-18	Leaf	32	14.7	\	4.6	\	\	Obsidian	
O Malley Shelter	402-3	Leaf	39.6	17.7	\	6.2	\	\	Obsidian	
O Malley Shelter	300-3	Leaf	29.6	15.6	\	4.9	\	\	Chert	
O Malley Shelter	278-1	Leaf	40.6	15.5	\	5.3	\	\	Obsidian	
O Malley Shelter	261-3	Leaf	48.3	14	\	5.2	\	\	Obsidian	
O Malley Shelter	292-1	Leaf	38.4	20.7	\	7	\	\	Chert	
Mean			**40.4**	**16.8**	****	**5.7**	****			

Table A-10. Metrics for Leppy Hills Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-8820	Leppy Hills	84.2	24.7	13.4	7.5	11.9	12.4	FGV	
E. Sierra Front	H-130	Leppy Hills	46.8	21.1	11	6.7	7.9	11.6	FGV	
E. Sierra Front	H-133	Leppy Hills	\	27.7	16	6.7	12.3	16.5	Obsidian	
E. Sierra Front	H-137	Leppy Hills	77	26	18	\	12	17	FGV	
E. Sierra Front	H-422	Leppy Hills	81	24	15	11.8	13	11	FGV	
BER	18757	Leppy Hills	59.2	20.4	9.9	4.3	5.7	11.4	FGV	
E. Sierra Front	DL-337	Leppy Hills	56.9	21.6	10	6.2	6.6	9.7	FGV	
Danger Cave	NHMU-85720	Leppy Hills	50.1	20.7	15	6.3	7.6	18.8	FGV	
Danger Cave	NHMU-18958	Leppy Hills	52.1	19.2	12.2	4.4	5.6	16.2	FGV	
Danger Cave	NHMU-18850	Leppy Hills	63.9	18.5	11.2	4.1	7	15	FGV	
Danger Cave	NHMU-18796	Leppy Hills	51.4	22.7	13.1	4.7	6.3	19.1	Chert	
Danger Cave	NHMU-19175	Leppy Hills	44.6	19.9	10.4	4.5	7.3	19.9	FGV	
Floating Island Cave	395	Leppy Hills	41	17	7	5	5	8	Obsidian	
Huffaker Springs	17	Leppy Hills	\	\	14.80	8.00	6.95	\	Obsidian	
Huffaker Springs	569	Leppy Hills	\	23.20	13.30	8.60	12.65	14.90	FGV	
Huffaker Springs	570	Leppy Hills	\	19.20	10.90	7.90	7.75	13.80	Obsidian	
Huffaker Springs	614	Leppy Hills	\	18.90	10.60	7.50	8.83	10.60	FGV	
Huffaker Springs	647	Leppy Hills	\	21.80	10.90	7.80	8.49	14.30	Obsidian	
Huffaker Springs	931	Leppy Hills	\	23.90	11.80	6.50	8.07	14.00	FGV	
Huffaker Springs	1154	Leppy Hills	\	26.00	14.30	8.00	8.3	15.00	FGV	
Huffaker Springs	1350	Leppy Hills	\	26.20	11.30	6.30	8.77	12.40	FGV	
Huffaker Springs	1358	Leppy Hills	\	23.00	10.80	5.50	6.49	11.60	FGV	
Huffaker Springs	3403	Leppy Hills	\	\	12.60	6.00	5.4	13.30	FGV	
Huffaker Springs	3436	Leppy Hills	\	22.00	13.00	6.00	6.49	12.00	FGV	
Huffaker Springs	4109	Leppy Hills	66.30	22.60	15.50	6.90	7.51	\	FGV	
Huffaker Springs	4992	Leppy Hills	61.70	29.30	17.50	8.30	8.86	20.10	FGV	

Huffaker Springs	5149	Leppy Hills	\	\	11.00	6.20	7.52	11.00	FGV	
Huffaker Springs	5306	Leppy Hills	\	\	13.35	7.50	7.47	16.10	Obsidian	
Huffaker Springs	5309	Leppy Hills	\	24.00	14.20	6.80	7.59	8.90	FGV	
Huffaker Springs	5895	Leppy Hills	\	21.50	14.40	6.00	6.98	17.20	Obsidian	
Huffaker Springs	5920	Leppy Hills	\	25.80	14.80	6.00	7.14	16.20	FGV	
Huffaker Springs	6123	Leppy Hills	\	21.70	11.60	7.50	8.81	12.90	FGV	
Huffaker Springs	6193	Leppy Hills	\	23.70	11.20	6.80	7.56	12.60	FGV	
Huffaker Springs	6219	Leppy Hills	75.50	24.30	12.20	7.30	6.14	12.60	FGV	
Huffaker Springs	6229	Leppy Hills	52.30	20.90	10.60	5.90	5.88	12.10	FGV	
Huffaker Springs	6230	Leppy Hills	\	19.50	10.10	6.60	6.02	\	FGV	
Huffaker Springs	6393	Leppy Hills	\	17.40	12.80	6.70	5.87	8.90	FGV	
Mean			**60.3**	**22.4**	**12.6**	**6.6**	**7.8**	**13.7**		

Table A-11. Metrics for Little Lake Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
Winnemucca Lake	EMPP-1	Little Lake	58.9	31.2	19.5	6.4	20.4	17.7	Obsidian	
Winnemucca Lake	EMPP-2	Little Lake	52.7	26.1	19	7.6	11.2	15.8	Obsidian	
Winnemucca Lake	EMPP-3	Little Lake	61	25.6	18.5	6.5	14	15.5	Obsidian	
Winnemucca Lake	EMPP-4	Little Lake	38.8	20.4	16	4.5	9.3	12.2	Obsidian	
Winnemucca Lake	EMPP-5	Little Lake	49	26.4	18	6.3	9.8	13.2	Obsidian	
Winnemucca Lake	EMPP-6	Little Lake	65.3	27.7	19.5	8.6	10.1	14.7	Obsidian	
Winnemucca Lake	EMPP-7	Little Lake	55.4	30.6	19.5	6.4	12	16	Obsidian	
Winnemucca Lake	EMPP-8	Little Lake	45.7	24.5	16	6.1	11.7	12.2	Obsidian	
Winnemucca Lake	EMPP-9	Little Lake	54	26.4	21	6.9	16.6	15.5	Obsidian	
Winnemucca Lake	EMPP-10	Little Lake	53.1	32.1	20	6.7	13	16.7	Obsidian	
Winnemucca Lake	EMPP-11	Little Lake	64.2	20.2	17	7.1	11.2	15.8	Obsidian	
Winnemucca Lake	EMPP-12	Little Lake	62.2	18.5	14	6.1	11.8	14.2	Obsidian	
Winnemucca Lake	EMPP-13	Little Lake	62.8	17.1	14	7.3	10.4	12.7	Obsidian	
Winnemucca Lake	EMPP-14	Little Lake	68	22	15.5	8.4	14.8	12.3	Obsidian	
Winnemucca Lake	EMPP-15	Little Lake	66.4	23	14	7.2	10.3	10.4	Obsidian	
Winnemucca Lake	EMPP-16	Little Lake	63.8	22.1	19	6.5	7.2	13.9	Obsidian	
Winnemucca Lake	EMPP-17	Little Lake	69.5	21.1	15	6.9	8.6	13.3	Obsidian	
Winnemucca Lake	EMPP-18	Little Lake	67.9	24.1	16	8.6	12.8	15	Obsidian	
Winnemucca Lake	EMPP-19	Little Lake	66.8	24.1	16	6.1	10.8	10.6	Chert	
Winnemucca Lake	EMPP-20	Little Lake	55.7	30.8	16	5.4	11.3	9.6	Chert	
Winnemucca Lake	EMPP-21	Little Lake	46.7	22.5	18	9.7	10.1	15.4	Obsidian	
Winnemucca Lake	EMPP-22	Little Lake	58.7	23.8	17	6.9	11.5	13	Obsidian	
Winnemucca Lake	EMPP-29	Little Lake	73.7	20.9	15	6.5	8.7	13.1	Obsidian	
Winnemucca Lake	2847	Little Lake	86.3	25.7	19.9	7.8	10.8	14.9	Obsidian	
Winnemucca Lake	2272	Little Lake	69.1	24.3	16	6.8	11	14.3	Obsidian	
Winnemucca Lake	3367	Little Lake	83	31	18.4	6.7	12.1	16.1	Obsidian	
Winnemucca Lake	1752	Little Lake	97.4	27	7.8	5.8	8.1	7.8	Obsidian	
Winnemucca Lake	2847	Little Lake	86.3	25.7	19.9	7.8	10.8	14.9	Obsidian	
Winnemucca Lake	2272	Little Lake	69.1	24.3	16	6.8	11	14.3	Obsidian	
Winnemucca Lake	3367	Little Lake	83	31	18.4	6.7	12.1	16.1	Obsidian	
Winnemucca Lake	1752	Little Lake	97.4	27	7.8	5.8	8.1	7.8	Obsidian	
Mean			**75.3**	**28.8**	**19.2**	**7.9**	**13.0**	**15.7**		

Table A-12. Metrics for Large Side-Notched Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-1080	LSN	34.9	15.3	8.9	3.5	\	15.3	Queen	2.2
E. Sierra Front	B-2729	LSN	27	22.7	10.5	4.5	9.9	17.7	Saline Range	7.7
E. Sierra Front	B-2741	LSN	39.0	21.1	10.5	5.1	9.2	13.3	Chert	
E. Sierra Front	H-71	LSN	33.3	20.3	18	8.8	8	18.1	Quartz	
E. Sierra Front	H-77	LSN	34.4	21.4	6.5	9.7	11.9	18.7	Quartz	
E. Sierra Front	H-317A	LSN	\	26	17	8.8	12	20.5	FGV	
E. Sierra Front	H-317B	LSN	40	22	14	7.1	7	\	FGV	
Goshute Valley	EIF-6592	LSN	44	21.7	9.3	4.8	9.1	17	Brown's Bench	5.7
Triple T Shelter	20.3-3045	LSN	27	15.5	13	4	\	15.5	Chert	
Triple T Shelter	20.3-4005	LSN	25.1	18.3	10.1	4.4	\	18.3	Chert	
Danger Cave	NHMU-19096	LSN	39.9	21	14.2	5.2	8.3	20.1	FGV	
Danger Cave	NHMU-19111	LSN	45	22.9	12.7	6.4	9.5	21.5	Obsidian	
Danger Cave	NHMU-19347	LSN	50.5	23.5	18.5	5.7	7.2	22	Obsidian	
Danger Cave	NHMU-18926	LSN	45.4	25.1	16.6	5.1	7.3	23	FGV	
Danger Cave	NHMU-19234	LSN	39.9	22.5	11	5.2	6.9	18	Chert	
Danger Cave	NHMU-53815	LSN	51.8	25.9	14.4	5.2	13.7	25.1	Chert	
Danger Cave	NHMU-19252	LSN	43.7	21.6	10.6	5.6	9.5	21.6	Chert	
Danger Cave	NHMU-18794	LSN	40.1	21.3	14.1	5.8	12.6	20.9	Obsidian	

Danger Cave	NHMU-19252	LSN	46.9	22.6	16.3	4.6	9.8	20.9	FGV	
Danger Cave	NHMU-18845	LSN	48.9	25.5	13.3	4.9	10.4	25.5	Chert	
Danger Cave	NHMU-29284	LSN	63.2	21.8	14.2	5.3	13.4	21.8	FGV	
O Malley Shelter	446-1	LSN	57.3	22.5	12	6.3	11.3	21.8	Chert	
O Malley Shelter	446-4	LSN	\	19.6	7.4	5.7	7.4	15.6	Chert	
O Malley Shelter	364-1	LSN	46.6	18.5	11.2	5.5	17.3	18.5	Obsidian	
O Malley Shelter	375-1	LSN	55	21.6	11.3	6	10.5	13.2	Obsidian	
O Malley Shelter	48-37	LSN	38.5	21	9.9	6.3	13.3	19.4	Obsidian	
Floating Island Cave	236A	LSN	39	22	12	5	\	20	Obsidian	
Floating Island Cave	415A	LSN	37	17	8	4	\	17	Obsidian	
Floating Island Cave	346	LSN	39	22	17	7	8	20	Obsidian	
Floating Island Cave	213C	LSN	45.9	17.1	7.1	5	8.8	17	Obsidian	
Mt. Augusta	7	LSN	\	\	9.7	4.7	8.1	\	Obsidian	
Mt. Augusta	8	LSN	23.5	15.3	8.1	4.6	11.6	14.7	Obsidian	
Mt. Augusta	9	LSN	\	\	7.4	3.8	13.4	\	Obsidian	
Mt. Augusta	10	LSN	\	18.9	10.9	4.9	8.3	18.9	Chert	
Mt. Augusta	11	LSN	\	20.2	10.3	5	10.3	20.2	FGV	
Mt. Augusta	12	LSN	\	21.8	14.8	9.1	11.9	16.6	Siltstone	
Mt. Augusta	13	LSN	23.1	18.2	9.1	5.7	8.6	15.3	Chert	
Mt. Augusta	14	LSN	\	\	10.6	6.6	\	21.7	Chert	
Mt. Augusta	15	LSN	\	\	7.4	4.7	\	\	Siltstone	
Mt. Augusta	16	LSN	\	18.4	\	3.7	10.9	\	Chert	
Mt. Augusta	17	LSN	\	18.1	9.5	6.2	7.3	11.9	Chert	
Mt. Augusta	18	LSN	\	23.9	11.6	6.9	10	19.3	Chert	

Mt. Augusta	19	LSN	25.7	18.3	11.7	4.9	8.9	18	Obsidian	
Huffaker Springs	564	LSN	\	\	12.10	4.70	\	22.00	Obsidian	
Huffaker Springs	1192	LSN	\	21.50	9.50	6.70	9.82	17.70	Obsidian	
Huffaker Springs	1292	LSN	\	18.70	11.20	4.90	8.88	18.70	Obsidian	
Huffaker Springs	2039	LSN	\	26.50	10.70	5.20	11.91	\	FGV	
Huffaker Springs	3155	LSN	\	\	\	5.10	11.14	15.50	Obsidian	
Huffaker Springs	3287	LSN	\	21.60	12.10	6.80	10.34	18.40	Obsidian	
Huffaker Springs	3992	LSN	\	20.80	14.50	4.40	9.74	20.80	FGV	
Winnemucca Lake	EMPP-41	LSN	71.5	25.7	17.5	7.5	9.6	\	Obsidian	
Tosawihi	2001-10	LSN	43.4	18.8	16.1	4.4	5.9	18.8	Chert	
Elko County	06-59	LSN	33.6	20.5	12	5.8	10.5	18.4	Obsidian	
Elko County	06-33	LSN	\	21.4	15.7	5.5	8.6	19.3	Obsidian	
Elko County	06-105	LSN	44	26	16.5	5.8	9.2	20.3	Obsidian	
Elko County	Elko-1	LSN	\	16.4	8.2	5.9	9.6	\	Quartz	
Mean			**41.2**	**21.0**	**12.0**	**5.6**	**9.9**	**18.5**		

Table A-13. Metrics for Martis Contracting Stem Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-0002	Martis Stem	36.9	16.6	8.3	4.6	4	7.1	Bodie Hills	2.1
E. Sierra Front	B-0003	Martis Stem	39.5	19.3	8	4.9	5.4	7	Bodie Hills	NVB
E. Sierra Front	B-0009	Martis Stem	46	12.3	5.2	4	7.4	3.6	Mt. Hicks	3.8
E. Sierra Front	B-1016	Martis Stem	62.1	22.2	12.4	6.8	8	6.6	Mt. Hicks	3.8
E. Sierra Front	B-1051	Martis Stem	51.9	18.2	7.9	4	4.1	7.1	Mt. Hicks	3.2
E. Sierra Front	B-1054	Martis Stem	39.5	18.5	9.2	5.4	8.9	8.9	Mt Hicks	NVB
E. Sierra Front	B-1061	Martis Stem	47.5	24.9	9.8	5.5	4.5	6.6	Mt. Hicks	NVB
E. Sierra Front	B-1079	Martis Stem	46.7	14.5	7.7	5.1	5.3	7.8	Queen	4.4
E. Sierra Front	B-2782	Martis Stem	\	20.2	9.9	5.3	7.5	6.3	Chert	
E. Sierra Front	B-2975	Martis Stem	32.2	15.7	7.6	4.6	3.5	7.3	Saline Range	2.6
E. Sierra Front	B-2990	Martis Stem	39	15.8	8.2	6.8	6.4	7.1	Bodie Hills	2.3
E. Sierra Front	B-3007	Martis Stem	32	19.6	\	7.3	\	4.3	Bodie Hills	3.2
E. Sierra Front	B-7285	Martis Stem	\	26.3	11.3	5.2	9.3	5.4	Mt. Hicks	NVB
E. Sierra Front	B-8363	Martis Stem	52.9	26.6	11.5	5.9	8.3	5.6	Bodie Hills	4.9
E. Sierra Front	B-8492	Martis Stem	58.2	25.6	11.7	6.5	5.8	6.7	Queen	4.9
E. Sierra Front	B-8894	Martis Stem	37.8	22.5	8.7	4.1	6.3	4.3	Queen	3.4
E. Sierra Front	125-098	Martis Stem	30.2	25.4	14.1	5.8	\	8.3	Queen	2.7
E. Sierra Front	128-313	Martis Stem	28.9	17.6	10.5	5.8	\	10	Mt. Hicks	4.6
E. Sierra Front	131-374B	Martis Stem	30	26.9	12.1	7.2	\	11.4	Bodie Hills	2.6
E. Sierra Front	131-375	Martis Stem	54	18	10.3	5.4	\	6.7	Mt. Hicks	3
E. Sierra Front	H-96	Martis Stem	\	33.3	16	9.1	12.6	15.9	FGV	
E. Sierra Front	H-97	Martis Stem	24.7	25.1	15	8.2	8.5	14.2	FGV	
E. Sierra Front	H-134	Martis Stem	\	22.2	12	7.1	13.8	12.2	Obsidian	
E. Sierra Front	H-166	Martis Stem	31.3	20.2	9.5	3.6	4	7.6	FGV	
E. Sierra Front	H-254	Martis Stem	38.9	21.7	12	7.5	8.2	9.8	FGV	

E. Sierra Front	H-299	Martis Stem	36.8	22.4	11.5	5.5	10.3	9.7	FGV	
E. Sierra Front	H-300	Martis Stem	42.8	21.8	12	4.2	10.4	10.7	FGV	
E. Sierra Front	H-301	Martis Stem	27.6	21.3	13	6.9	7.2	10.1	FGV	
E. Sierra Front	H-314	Martis Stem	41.8	23.9	13	7.3	8.7	11.7	FGV	
E. Sierra Front	H-315	Martis Stem	37.5	21.8	12	7.5	9.7	8.3	Chert	
Spooner	Do38-543	Martis Stem	27.8	25.3	12.2	6.1	7.2	10	Bodie Hills	5.2
E. Sierra Front	DL-582	Martis Stem	\	14.3	\	6.3	8.9	5.1	Sutro Spring	3.5
Huffaker Springs	536	Martis Stem	\	25.10	15.30	7.80	9.37	15.10	FGV	
Huffaker Springs	537	Martis Stem	39.60	17.60	14.50	5.60	12.01	12.70	FGV	
Huffaker Springs	740	Martis Stem	\	21.30	11.60	8.60	8.86	11.80	FGV	
Huffaker Springs	937	Martis Stem	\	27.10	11.60	4.20	8.31	10.30	FGV	
Huffaker Springs	1159	Martis Stem	\	22.40	10.80	5.70	9.19	9.10	FGV	
Huffaker Springs	1204	Martis Stem	31.50	21.20	10.70	5.90	5.61	10.20	FGV	
Huffaker Springs	1217	Martis Stem	\	28.40	12.60	6.60	6.49	11.10	FGV	
Huffaker Springs	1312	Martis Stem	\	23.50	12.90	7.80	7.2	10.30	CCS	
Huffaker Springs	1328	Martis Stem	\	21.50	11.80	6.00	6.92	5.80	Sinter	
Huffaker Springs	3266	Martis Stem	\	25.70	13.50	3.38	7.16	13.50	FGV	
Huffaker Springs	4030	Martis Stem	\	23.80	11.20	7.20	5.83	8.80	Sinter	
Huffaker Springs	5099	Martis Stem	54.90	22.70	12.40	8.60	11.14	9.90	FGV	
Huffaker Springs	5671	Martis Stem	\	26.80	13.00	7.60	5.4	8.10	Obsidian	

Huffaker Springs	6174	Martis Stem	\	21.50	13.40	6.30	8.78	13.60	FGV	
Huffaker Springs	6191	Martis Stem	28.40	22.80	13.10	7.20	9.12	8.20	FGV	
Mean			**39.6**	**21.9**	**11.4**	**6.1**	**7.8**	**9.0**		

Table A-14. Metrics for Martis Corner-Notched Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-0169	Martis C-N	36.1	26.7	13.3	4.9	8.7	\	Queen	3.9
E. Sierra Front	B-2730	Martis C-N	34.7	29	13.2	5.9	8.7	21.1	Mt. Hicks	9.9
E. Sierra Front	B-2737	Martis C-N	31.6	6.2	12.9	6.1	9.3	19.1	Mt. Hicks	VW
E. Sierra Front	B-2743	Martis C-N	22.9	23.7	11.5	3.7	8.3	19.7	Queen	8.5
E. Sierra Front	B-2744	Martis C-N	34.0	30	13.9	5.7	7.9	21.6	Queen	7.3
E. Sierra Front	B-2749	Martis C-N	45.1	31.5	13.8	6.1	12.2	16.5	Bodie Hills	VW
E. Sierra Front	B-2780	Martis C-N	45.0	44.2	22.9	5.3	9.2	23	Obsidian	
E. Sierra Front	B-3000	Martis C-N	39.1	28.1	13.9	5.4	7.7	17	Queen	5.4
E. Sierra Front	B-4657	Martis C-N	\	26.2	14.8	5.8	9.5	17.6	Bodie Hills	2.5
E. Sierra Front	B-7283	Martis C-N	\	36.3	29.2	5.2	9.8	37.1	Queen	VW
E. Sierra Front	B-8489	Martis C-N	47.4	29.8	14.1	7.4	9.8	17.2	Queen	6.7
E. Sierra Front	125-136	Martis C-N	31.8	26.7	13.8	6	9.3	15.7	CD-Lookout	DH
Spooner	Do38-132	Martis C-N	37.5	21.7	12.7	6.9	\	\	Bodie Hills	2.8
Mt. Augusta	4	Martis C-N	38.7	29.3	14.5	4.9	7.3	16.6	Chert	
Mt. Augusta	5	Martis C-N	\	33	17.7	7.6	11.4	22.4	Chert	
Mt. Augusta	6	Martis C-N	\	31.3	17.3	7.8	12.7	24	Chert	
Huffaker Springs	538	Martis C-N	\	23.20	13.35	6.65	6.59	15.60	FGV	
Huffaker Springs	584	Martis C-N	\	23.30	15.80	5.40	5.76	17.90	Obsidian	
Huffaker Springs	899	Martis C-N	30.00	25.50	16.36	6.60	7.05	19.00	FGV	
Huffaker Springs	922	Martis C-N	\	23.80	11.50	5.50	\	18.30	FGV	
Huffaker Springs	923	Martis C-N	39.10	26.26	11.58	5.90	\	15.00	FGV	
Huffaker Springs	1091	Martis C-N	42.20	30.00	18.21	8.03	12.86	21.80	FGV	

Huffaker Springs	1094	Martis C-N	37.50	19.80	11.70	4.90	6.92	11.70	Obsidian	
Huffaker Springs	1162	Martis C-N	\	26.10	11.70	5.30	9.26	16.00	FGV	
Huffaker Springs	1169	Martis C-N	39.80	21.00	14.42	8.56	7.74	15.30	FGV	
Huffaker Springs	1318	Martis C-N	\	39.00	15.96	7.97	6.12	16.64	FGV	
Huffaker Springs	1460	Martis C-N	\	23.50	11.77	7.61	8.11	13.40	FGV	
Huffaker Springs	1819	Martis C-N	\	16.30	\	7.00	8.84	16.30	Obsidian	
Huffaker Springs	1891	Martis C-N	\	20.20	12.10	6.69	\	14.70	FGV	
Huffaker Springs	2025	Martis C-N	\	21.40	12.50	8.10	6.32	15.00	CCS	
Huffaker Springs	3035	Martis C-N	37.50	24.80	13.84	6.90	5.41	15.80	FGV	
Huffaker Springs	4078	Martis C-N	39.20	24.00	12.70	4.30	\	16.00	Sinter	
Huffaker Springs	5140	Martis C-N	46.70	24.40	17.70	7.70	\	20.10	FGV	
Huffaker Springs	5299	Martis C-N	39.80	26.00	15.40	6.50	\	15.40	FGV	
Huffaker Springs	6037	Martis C-N	\	23.90	14.17	5.62	4.46	16.30	FGV	
Huffaker Springs	6065	Martis C-N	43.00	29.50	18.10	7.30	\	21.90	FGV	
Huffaker Springs	6080	Martis C-N	\	26.90	18.10	6.40	7.67	19.90	FGV	
Huffaker Springs	6165	Martis C-N	31.80	27.90	11.43	6.70	\	12.50	FGV	
Huffaker Springs	6319	Martis C-N	\	24.80	11.90	6.70	5.73	14.90	FGV	
Huffaker Springs	6557	Martis C-N	\	27.30	18.70	5.50	6.81	24.30	FGV	

Huffaker Springs	6603	Martis C-N	\	21.70	14.10	4.30	\	15.20	Obsidian	
Mean			**37.8**	**26.2**	**14.8**	**6.3**	**8.3**	**18.1**		

Table A-15. Metrics for Martis Side-Notched Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B1058	Martis Side-Notched	72	30.7	24.3	6.1	10.6	29.7	Mt. Hicks	NVB
E. Sierra Front	B-4658	Martis Side-Notched	\	25.8	21.1	4.8	8.2	22.7	Queen	3.4
E. Sierra Front	B-7284	Martis Side-Notched	33.5	22	15.4	7	8.6	\	Queen	DH
E. Sierra Front	B-8454	Martis Side-Notched	64.5	29	22	6.6	12.5	20.5	Chert	
E. Sierra Front	B-8493	Martis Side-Notched	47	24.8	20.1	7.5	8	24.5	Fish Springs	1.8
E. Sierra Front	124-336	Martis Side-Notched	24.7	19.6	16	7.3	6.7	19.1	Bodie Hills	2.3
E. Sierra Front	125-095	Martis Side-Notched	28.3	23.2	20.3	7.7	7.8	22.5	Buffalo Hills	2.5
E. Sierra Front	127-328	Martis Side-Notched	25.1	21.7	17.3	7.3	9.7	20.4	Bodie Hills	1.8
E. Sierra Front	131-376	Martis Side-Notched	27.5	20.1	16.6	5.6	6.7	19.1	Buffalo Hills	1.6
E. Sierra Front	H-264	Martis Side-Notched	41.7	22.5	19	7.9	10.5	21.3	FGV	
E. Sierra Front	DL-354	Martis Side-Notched	\	\	\	5.1	\	21.2	BS/PP/FM	3.7
Huffaker Springs	1100	Martis Side-Notched	51.50	24.70	18.46	8.27	8.08	23.50	FGV	
Huffaker Springs	1125	Martis Side-Notched	34.20	20.20	15.30	6.15	10.65	20.20	FGV	
Huffaker Springs	1155	Martis Side-Notched	\	24.00	19.57	10.49	10	23.00	FGV	
Huffaker Springs	1161	Martis Side-Notched	\	22.00	16.82	6.80	6.67	21.90	FGV	
Huffaker Springs	1193	Martis Side-Notched	\	20.90	13.07	9.39	7.91	16.80	FGV	

Huffaker Springs	1303	Martis Side-Notched	\	19.00	14.64	6.69	8.97	19.20	FGV	
Huffaker Springs	1349	Martis Side-Notched	29.10	20.30	16.80	6.40	5.69	19.40	FGV	
Huffaker Springs	1363	Martis Side-Notched	31.20	21.60	17.10	6.60	5.43	21.60	FGV	
Huffaker Springs	1693	Martis Side-Notched	\	19.70	14.98	6.88	7.25	16.70	FGV	
Huffaker Springs	1889	Martis Side-Notched	\	23.90	18.69	5.54	12.25	21.50	FGV	
Huffaker Springs	2005	Martis Side-Notched	39.70	21.30	17.01	6.87	7.59	20.30	FGV	
Huffaker Springs	2041	Martis Side-Notched	37.00	18.30	13.15	7.11	9.34	14.10	FGV	
Huffaker Springs	3043	Martis Side-Notched	\	20.60	14.31	7.03	8.57	19.50	FGV	
Huffaker Springs	3248	Martis Side-Notched	41.60	19.70	14.25	6.27	6.53	16.06	FGV	
Huffaker Springs	3309	Martis Side-Notched	\	22.40	16.96	7.88	9.96	21.00	FGV	
Huffaker Springs	3354	Martis Side-Notched	\	27.60	20.76	6.40	8.23	26.60	FGV	
Huffaker Springs	3513	Martis Side-Notched	36.00	23.10	17.79	6.47	8.66	23.10	Sinter	
Huffaker Springs	3568	Martis Side-Notched	\	24.80	14.88	8.87	11.62	20.14	Obsidian	
Huffaker Springs	3657	Martis Side-Notched	\	20.70	15.24	6.47	6.36	20.70	FGV	
Huffaker Springs	3811	Martis Side-Notched	\	20.60	15.70	5.39	5.83	20.60	CCS	
Huffaker Springs	3963	Martis Side-Notched	\	22.60	16.73	5.65	8.73	20.50	FGV	
Huffaker Springs	4053	Martis Side-Notched	36.40	23.70	13.78	6.85	8.02	16.00	FGV	
Huffaker Springs	4094	Martis Side-Notched	\	25.50	19.51	5.40	8.19	25.00	FGV	

Huffaker Springs	5190	Martis Side-Notched	\	20.00	14.16	4.81	4.72	15.70	FGV	
Huffaker Springs	5758	Martis Side-Notched	\	23.50	18.82	7.31	14.04	22.10	FGV	
Huffaker Springs	6119	Martis Side-Notched	\	22.10	18.69	6.42	8.97	22.50	FGV	
Huffaker Springs	6185	Martis Side-Notched	31.10	21.00	14.66	6.51	6.1	16.74	FGV	
Huffaker Springs	6332	Martis Side-Notched	\	19.20	13.16	4.34	6.57	17.30	FGV	
Huffaker Springs	6340	Martis Side-Notched	\	\	17.50	\	9.46	23.80	FGV	
Winnemucca Lake	EMPP-38	Martis Side-Notched	33.5	19.7	15	4.6	7.4	18.2	FGV	
Mean			**38.3**	**22.4**	**17.0**	**6.7**	**8.4**	**20.6**		

Table A-16. Metrics for Meadow Valley Corner-Notched Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
O Malley Shelter	446-5	Meadow Valley C-N	34.3	19.4	8.8	5.1	7.8	11.4	Obsidian	
O Malley Shelter	446-3	Meadow Valley C-N	43.4	27.9	15.1	8.2	9	16	Obsidian	
O Malley Shelter	431-16	Meadow Valley C-N	50	24.1	13.4	5.9	7.2	16.7	Obsidian	
O Malley Shelter	444-1	Meadow Valley C-N	35.8	23.2	10	5	7.7	13.2	Obsidian	
O Malley Shelter	444-56	Meadow Valley C-N	36.2	22.7	10.8	5.5	5.6	12.9	Obsidian	
O Malley Shelter	426-1	Meadow Valley C-N	35.4	27	9.4	5.4	9.5	19.7	Obsidian	
O Malley Shelter	450-2	Meadow Valley C-N	34	27	12.2	6.5	7.1	13.5	Obsidian	
Mean			**38.4**	**24.5**	**11.4**	**5.9**	**7.7**	**14.8**		

Table A-17. Metrics for Pequop Side-Notched Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
BER	24347	Pequop S-N	34	24.1	15.2	4.6	7.2	19.5	FGV	
Goshute Valley	G-003	Pequop S-N	27.5	19.5	12.1	5.3	9.5	18.5	Obsidian	
No Name Valley	106.41	Pequop S-N	31.8	21	15	4.5	7	20	Obsidian	
No Name Valley	94-17	Pequop S-N	35	21	14.5	4	7	19	Chert	
Huffaker Springs	568	Pequop S-N	43.60	25.40	15.50	7.40	11.73	22.40	FGV	
Huffaker Springs	3830	Pequop S-N	36.10	21.10	16.30	4.80	6.01	20.20	FGV	
Tosawihi	166-01-1	Pequop S-N	25.4	13.9	11.1	4	5.8	13.9	Obsidian	
Humboldt County	1005-1	Pequop S-N	36.3	21.9	16	6.8	9.7	21.9	Massacre Lake/ Guano Valley	
Mean			**33.7**	**21.0**	**14.5**	**5.2**	**8.0**	**19.4**		

Table A-18. Metrics for Pinto Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-2725	Pinto	29.4	18.6	13	5.4	10.3	15.4	Queen	VW
E. Sierra Front	B-2736	Pinto	48.5	31.4	19.3	9.4	14.4	20.9	Mt. Hicks	12.5
E. Sierra Front	125-135	Pinto	42.2	26.5	16.6	9.7	\	18.5	Bodie Hills	5.5
Goshute Valley	G-001	Pinto	34	19.4	14.7	5.3	9.5	14.8	Brown's Bench	
Goshute Valley	10054-65	Pinto	44.3	25.6	12.4	6.4	12.9	15.2	Chert	
Badger Springs	Elko-1	Pinto	44.3	21.2	14.8	10.1	11.7	13.5	Brown's Bench	12.7
Goshute Valley	G-002	Pinto	41.5	17.1	12.1	6.1	7.9	10.5	Brown's Bench	
Goshute Valley	13180-10	Pinto	37.1	21	12.5	7.1	11.6	15.3	FGV	
Goshute Valley	10071-21	Pinto	30	18.9	14.2	6.5	12.1	15.7	FGV	
Goshute Valley	10071-72	Pinto	47.7	21.2	12.8	6.8	13	18.4	FGV	
Goshute Valley	10070-33	Pinto	27.7	22.7	15	6.4	13.1	17.3	Brown's Bench	
Goshute Valley	10054-64	Pinto	37.8	20.1	12.3	5.7	11.8	14	Chert	
Goshute Valley	10054-67	Pinto	41	20.2	13.2	6.6	11.8	16	FGV	
Danger Cave	NHMU-42104	Pinto	\	18.8	\	5.7	9.1	14.8	Obsidian	
Floating Island Cave	229.1	Pinto	43	15	\	6	\	11	Obsidian	
Floating Island Cave	492	Pinto	36	15	9	5	9	10	Obsidian	
Floating Island Cave	381	Pinto	48.1	18	10.9	5.8	10.9	10.7	FGV	
Mt. Augusta	26	Pinto	\	25	17.2	7.8	11	18	Siltstone	
Mt. Augusta	27	Pinto	\	20.1	15.7	8.9	11.2	17.9	Siltstone	
Huffaker Springs	1335	Pinto	42.40	23.50	14.40	6.60	6.34	14.90	FGV	
Huffaker Springs	3381	Pinto	31.30	20.90	13.60	5.70	8.1	14.50	Obsidian	
Huffaker Springs	5263	Pinto	\	17.20	10.90	5.10	7.3	13.20	Obsidian	
Huffaker Springs	5849	Pinto	34.40	20.80	14.00	6.80	9.71	18.00	FGV	
Huffaker Springs	6231	Pinto	\	20.50	11.20	4.30	6.35	13.00	FGV	

Elko County	204	Pinto	\	22.1	14	7.2	11.1	13.7	Obsidian	
Elko County	06-37	Pinto	\	20.9	15.2	7.5	13.3	13.2	Paradise Valley	
Elko County	176	Pinto	\	18.5	10.8	5.5	9.6	13.9	Obsidian	
Elko County	132	Pinto	\	22.9	11.1	5.7	9.9	12	Obsidian	
Mean			**39.0**	**20.8**	**13.5**	**6.6**	**10.5**	**14.8**		

Table A-19. Metrics for Rosegate Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-0026	Rosegate	37.6	18.7	8.4	3.4	4.5	8.5	Chert	
E. Sierra Front	B-0441	Rosegate	39.7	16.5	8	3.8	5.8	9.6	Bodie Hills	2.2
E. Sierra Front	B-0461	Rosegate	22.0	12.1	7.7	3.2	6.2	8.1	Bodie Hills	2.8
E. Sierra Front	B-2740	Rosegate	\	20.7	8.8	3.2	3.1	8.5	Chert	
E. Sierra Front	B-2933	Rosegate	28.4	13	3.5	3.2	4.1	3.6	Queen	2.4
E. Sierra Front	B-7333	Rosegate	25.5	21.8	8.2	3	4.3	8	Queen	2.2
E. Sierra Front	B-8490	Rosegate	35.7	16.3	7.9	3.8	2.8	8.1	Pine Grove Hills	2.7
E. Sierra Front	B-8536	Rosegate	20.8	12.4	5.2	3.5	5.2	6.4	CD-Sawmill	2.6
E. Sierra Front	125-099	Rosegate	20.3	12.7	6.5	2.5	4	6.6	Mt. Hicks	2.1
E. Sierra Front	125-101	Rosegate	20.7	9.9	5.1	3	5.6	6.5	Bodie Hills	1.5
E. Sierra Front	125-105	Rosegate	20.2	12	6	3.7	6.4	6.9	Bodie Hills	1.3
E. Sierra Front	125-107	Rosegate	27.2	11.8	6.3	3.2	5.4	6.3	Bodie Hills	NVB
E. Sierra Front	125-112	Rosegate	19.9	15.1	4.8	2.9	4.3	4.8	Chert	
E. Sierra Front	126-306A	Rosegate	19.9	17.3	5.7	3.9	5.9	7.9	Bodie Hills	2.5
E. Sierra Front	126-306C	Rosegate	18	10.3	4.4	2.9	3.3	5.5	Mt. Hicks	2
E. Sierra Front	126-306D	Rosegate	21.2	13	6.1	3.5	5.6	8.4	CD-Lookout	2.5
E. Sierra Front	131-381A	Rosegate	13.8	16.5	7.1	3.3	3.6	12.3	Bodie Hills	1.1
E. Sierra Front	H-73	Rosegate	24.4	14.3	6	3.8	5	4	Chert	
E. Sierra Front	H-87	Rosegate	17.8	11	6	2.9	3.3	4.7	Chert	
E. Sierra Front	H-92	Rosegate	\	21.2	8	2.8	\	8	Chert	
E. Sierra Front	H-208	Rosegate	26.3	15.8	7	3.1	4	6.2	Chert	
E. Sierra Front	H-209	Rosegate	29	14.5	7	3.1	4	7.7	Chert	
Spooner	Do38-064	Rosegate	18.3	13.3	7.1	3.4	3.4	8.9	Sutro Spring	1.1
Spooner	Do38-073	Rosegate	21.9	18.3	\	2.3	\	\	Bodie Hills	2.4
Spooner	Do38-074	Rosegate	23.5	10.1	5	3.2	5.1	7.5	Sutro Spring	2
Spooner	Do38-159	Rosegate	24.2	15.2	6.2	2.8	4.2	7.5	Sutro Spring	1.2
Spooner	Do38-311	Rosegate	17.5	13.9	\	3.1	\	\	Sutro Spring	1.4
Spooner	Do38-467	Rosegate	19.1	14.9	7.1	4.1	4.2	8.1	Buffalo Hills	N/A
Goshute Valley	G-003	Rosegate	45.7	17.4	6.4	3.8	6.6	7.5	Chert	

Gatecliff Shelter	20.2-8139	Rosegate	52	15.5	7	4.5	\	9.4	Chert	
Gatecliff Shelter	20.3-300	Rosegate	18.1	15.4	4.8	4.2	\	5.2	Chert	
Gatecliff Shelter	20.3-530	Rosegate	33.4	19.5	7.4	3.1	\	8	Chert	
Gatecliff Shelter	20.3-1335	Rosegate	26.6	14.6	6.1	2.9	\	6.4	Chert	
Gatecliff Shelter	20.3-1468	Rosegate	35	15.2	7	4.4	\	7.2	Chert	
Gatecliff Shelter	20.2-8172	Rosegate	27.2	16	6.9	3.4	\	7.9	Chert	
Gatecliff Shelter	20.2-9618	Rosegate	33.3	20.4	7.5	3.1	\	7.5	Chert	
Triple T Shelter	20.3-4116	Rosegate	33.5	19.8	7.1	3.1	\	7.7	Chert	
Triple T Shelter	20.3-6604	Rosegate	32	16.4	6.7	3	\	8	Chert	
Alta Toquima	20.4-6351	Rosegate	19.7	13.6	6.4	3	\	6.7	Chert	
Alta Toquima	20.5-0193	Rosegate	23	22.4	8.2	2.7	\	8	Chert	
Alta Toquima	20.5-0880	Rosegate	26.6	17.5	6.4	3.7	\	7.6	Chert	
Alta Toquima	20.5-2159	Rosegate	25	20.5	7.7	3.2	\	7.9	Chert	
Alta Toquima	20.5-2255	Rosegate	26.4	18.2	5.5	2.6	\	7.2	Chert	
Alta Toquima	20.5-2578	Rosegate	31.9	13.9	5.5	2.6	\	8.2	Chert	
Floating Island Cave	62	Rosegate	30	19	6	3	4.1	10	Obsidian	
Floating Island Cave	283	Rosegate	23	12	6	3	3.1	7	Obsidian	
Mt. Augusta	1	Rosegate	22.8	12.8	5.9	4.3	4.9	8.7	Obsidian	
O'Malley Shelter	175-1	Rosegate	25.2	15.9	6.4	4.2	2.9	6.2	Obsidian	
O'Malley Shelter	157-1	Rosegate	\	13.2	7.1	3.3	6.2	9.5	Obsidian	
Huffaker Springs	6261	Rosegate	15.60	28.90	9.70	4.50	\	9.30	Sinter	
Winnemucca Lake	EMPP-35	Rosegate	28.5	16.7	6	3.4	4.1	6.5	Obsidian	
Tosawihi	517-1	Rosegate	26.9	15.9	5.2	3.4	3.7	6	Chert	

Humboldt County	1564-2	Rosegate	32.7	16.9	7.6	3.7	6.7	9.5	Massacre Lake/ Guano Valley	
Humboldt County	1564-3	Rosegate	33.5	15.6	8	4.2	7.1	8.8	Double H/Whitehorse	
Humboldt County	1579-1	Rosegate	23.7	11.7	6.2	3.9	4.5	6.4	Obsidian	
Humboldt County	2257-1	Rosegate	40.4	17.1	7.7	3.7	3.3	5.4	Majuba Mountain	
Humboldt County	3757-1	Rosegate	23.6	12.7	6.4	3.4	5.5	7.2	Paradise Valley	
Elko County	190	Rosegate	32	16.6	7.3	3.7	6.3	9.4	Paradise Valley	
Elko County	55	Rosegate	\	17.9	7.7	3.8	4.6	8.6	Obsidian	
Elko County	IS05	Rosegate	41	18.6	7.1	3.6	4.5	6.9	Chert	
Elko County	I7-20	Rosegate	38	18.5	6.4	3.6	4.1	7.4	Chert	
Elko County	I7-15	Rosegate	\	14.8	6.3	3.4	4.9	7.4	Chert	
Mean			**26.2**	**15.5**	**6.5**	**3.3**	**4.6**	**7.5**		

Table A-20. Metrics for Sierra Stemmed Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	H-321	Sierra Stem	30.9	20.3	5.5	7	7.5	3	Chert	
E. Sierra Front	H-311	Sierra Stem	20.3	15.8	9	3.5	4	3	Chert	
Huffaker Springs	1152	Sierra Stemmed	26.00	14.10	6.80	4.70	6.69	7.70	Obsidian	
Huffaker Springs	1267	Sierra Stemmed	28.70	17.30	5.10	3.90	5.14	5.10	Obsidian	
Huffaker Springs	1334	Sierra Stemmed	24.40	22.30	8.60	4.68	5.83	9.22	CCS	
Huffaker Springs	3672	Sierra Stemmed	30.10	20.70	7.80	3.80	5.7	6.20	FGV	
Huffaker Springs	3897	Sierra Stemmed	\	19.50	6.80	5.80	4.08	5.20	Obsidian	
Huffaker Springs	3996	Sierra Stemmed	34.40	24.10	7.50	5.60	6.26	5.00	FGV	
Huffaker Springs	6036	Sierra Stemmed	\	19.40	7.98	3.58	6.07	7.35	FGV	
Mean			**27.8**	**19.3**	**7.2**	**4.7**	**5.7**	**5.8**		

Table A-21. Metrics for Steamboat Projectile Points Used in this Analysis.

Project Name	Artifact #	Type	Length (Max)	Width	Neck Width	Thickness	Stem Height	Basal Width	Sourcing Result	Hydration Result
E. Sierra Front	B-0040	Steamboat	53.9	18.8	\	7.5	\	\	Mt. Hicks	1.3
E. Sierra Front	B-0052	Steamboat	39.2	17.2	\	5.5	\	\	Mt. Hicks	3.7
E. Sierra Front	B-0729	Steamboat	32.6	17	\	5	\	\	Mt. Hicks	4.2
E. Sierra Front	H-82	Steamboat	29.4	11.9	\	4.8	\	\	Quartz	
E. Sierra Front	H-89	Steamboat	73.3	18.2	\	7.5	\	\	Chert	
E. Sierra Front	H-325A	Steamboat	58.4	28.1	\	7.9	\	\	FGV	
E. Sierra Front	H-325B	Steamboat	40.9	16.6	\	7.8	\	\	FGV	
E. Sierra Front	DL-527	Steamboat	39.5	19.7	\	6.4	\	\	Bodie Hills	3.9
Huffaker Springs	1495	Steamboat	48.70	17.60	\	6.00	\	\	FGV	
Huffaker Springs	1606	Steamboat	59.80	17.10	\	8.00	\	\	Sinter	
Huffaker Springs	1662	Steamboat	76.90	26.30	\	5.00	\	\	FGV	
Huffaker Springs	2082	Steamboat	31.70	19.00	\	6.80	\	\	FGV	
Huffaker Springs	3510	Steamboat	54.90	16.00	\	7.80	\	\	Sinter	
Huffaker Springs	3597	Steamboat	51.00	17.80	\	7.00	\	\	FGV	
Huffaker Springs	6149	Steamboat	\	17.40	\	5.70	\	\	FGV	
Mean			**49.3**	**18.6**	****	**6.6**	****	****		