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A Sunshine Fluted Point from Southern Nevada

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This paper presents a description and analysis of an obsidian fluted point recently discovered within the bounds of the Nevada Test and Training Range (NTTR) in southern Nevada. Analyses include physical and technological descriptions of the point and source analysis of the obsidian from which it is made. These analyses are followed by a discussion of the typological attribution of the point based on a recent comparison by Beck et al. (2019) of 462 Far Western fluted points with 95 Clovis points from the Southwest, Plains, and Northwest. We conclude with a discussion of where the NTTR point fits in the region's prehistory, and what its raw material source suggests about population mobility during the terminal Pleistocene.

Over the last two decades the fluted point inventory in the Far West has increased dramatically, although it still remains smaller than in regions to the east (Anderson and Miller 2017; Anderson et al. 2010). As a result, an increasing number of archaeologists have begun to note the morphological variation among these points, which has led to the use of terms such as 'Great Basin Fluted' (e.g., Beck and Jones 1997, 2004; Grayson 1993; Smith and Barker 2017), 'Clovis-like' (e.g., Rondeau 2007, 2008, 2010), and 'Western Fluted' (Miller et al. 2013; Rondeau 2016) when they are referenced. In 2009, Beck and Jones conducted a small study in which they compared 17 fluted points from the Sunshine Locality in eastern Nevada with Clovis points on 12 variables. The results indicated that all but one of the Sunshine points were

smaller, had deeper basal concavities, and exhibited more consistent pressure retouch than the Clovis points, which prompted them to argue that the majority of the Sunshine points represent a Clovis derivative that followed Clovis in time.

Beck et al. (2019) recently conducted a more detailed study in which 462 Far Western fluted points were compared with 95 Clovis points from the Southwest, Plains, and Northwest.¹ Given the results of the Sunshine analysis, the results of this comparison were not surprising, as roughly half of the Far Western points did not conform to the Clovis criteria outlined in the study. These 'non-Clovis' points are smaller overall, have deeper basal concavities, exhibit continuous (i.e., sequential) pressure retouch² more often, and often have longer flute scars than Clovis points. The deeper basal concavities of these points are due, in part, to a new technique of fluting in which an isolated platform, or 'nubbin' (see Haynes and Hill 2017:Fig. 11.9), was produced for the removal of the channel flakes. This was done using either indirect percussion (Morrow 2015) or pressure (Frison and Bradley 1981), most likely with some type of device such as a punch (e.g., Crabtree 1966; Frison and Bradley 1981; Morrow 2015). In this respect, as well as in their longer flute scars and consistent sequential pressure flaking, their morphology is more similar to that of post-Clovis fluted points such as Folsom on the Plains, Gainey and Cumberland in the mid-West, Vail/Debert in the Northeast, and Redstone in the Southeast, which supports Beck and Jones' (2009) argument that they are derived from, and are thus younger than, Clovis.

In this paper we present a morphological and technological analysis of a fluted point recently discovered on the Nevada Test and Training Range (NTTR) in southern Nevada. In addition, we present the results of an XRF analysis of the obsidian from which the point was manufactured. Following a brief discussion of the Beck et al. analysis, we evaluate the NTTR point with respect to the criteria used in their 2019 study.

THE NTTR FLUTED POINT

The NTTR fluted point was discovered in 2017 by a crew from the University of Montana while conducting surface survey in Range 71 of the Nevada Test and Training Range. It was found north of Stonewall Flat and Mud

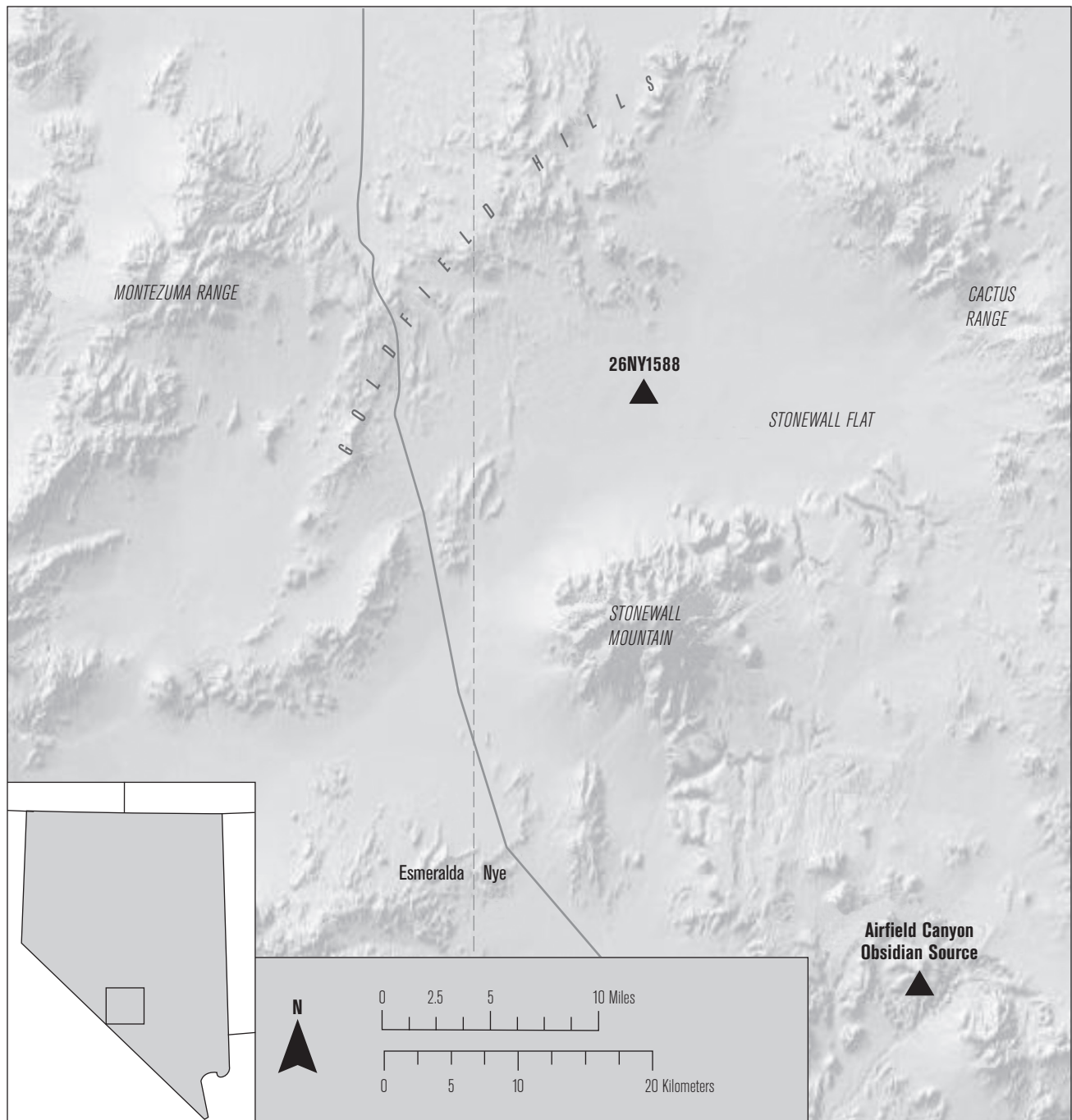


Figure 1. The state of Nevada (inset) showing the general location of the NTTR fluted point in the southern Great Basin.

Lake (Fig. 1) in loose association with three flakes, two of obsidian and one of chert. These four artifacts were assigned the site number 26Ny1588 (Smith 2018:57).

The NTTR point (Fig. 2) is made of obsidian, is heavily abraded, and has extensive edge damage, making some technological features, such as lateral edge grinding, difficult to assess. The edge damage

also makes it difficult to tell where the transverse break occurred relative to the point's maximum width. There are, however, two small areas, one on each side, where the original edge is still visible (Fig. 3a). To determine whether the point is expanding or contracting at the break, parallel lines were drawn from the two intact edges to the break. The line on the left cross-cuts the

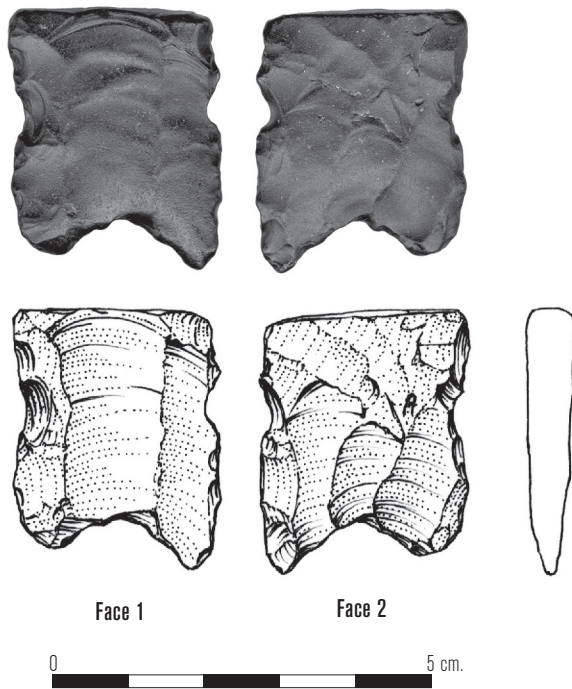


Figure 2. The NTTR fluted point.

edge at the break, even though it has been reworked. The line on the right comes very close to the broken edge just short of the transverse break and would have crosscut this edge if it had not been broken. The cross-cutting of both edges at the transverse break by parallel lines drawn from the base indicates that the point is expanding, at least slightly, and thus is broken just below its maximum width. Because of further breakage along the lateral edges and in the basal concavity, the basal width of 25.36 mm., the basal concavity depth of 6.68 mm., and the basal concavity depth/basal width ratio (BCD/BW) of 0.269 are all estimated values.

The transverse break likely resulted from a bending fracture, possibly while the point was still in the haft, although it is difficult to state conclusively because of the heavy weathering. As noted earlier, both lateral margins exhibit edge damage, some of which appears to have occurred after the point was discarded. An additional edge fracture is evident in the basal concavity, which, due to the heavy patination, probably occurred while the point was still in use. Both ears exhibit breakage as well. The break on the left ear of Face 2 appears to be post-discard. The break on the opposite ear, however, is heavily patinated and so it also probably occurred while still in use. There is no evidence of reworking on either ear.

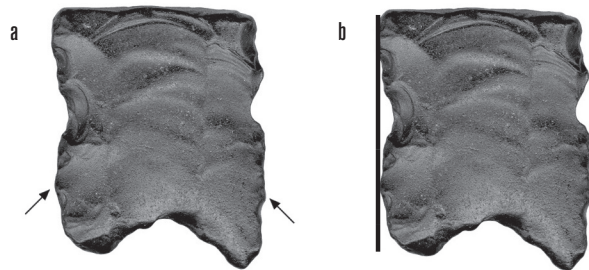


Figure 3. The NTTR point with arrows showing locations where the original edge survives.

Fluting

The point is fluted on a single side (Face 1) and exhibits three pressure thinning flakes on the opposite side (Face 2). Face 1 has a single flute scar that originated in the center of the basal concavity and was truncated by the transverse break. The actual length of the scar is 27.62 mm., but because it appears to be expanding at the break, neither its maximum length nor maximum width can be determined. To the right of the flute scar is a possible guide scar, which is partially obliterated by the flute scar. The flute scar also cross-cuts all scars originating from the left lateral margin.

Obsidian fluted points in the Far West often have scratches on the surface of the flute scars that are believed to have been intentionally applied (see, for example, Rondeau 2007:13). There is no evidence of such scratches on this artifact, although they could be obscured by the heavy abrasion. The abrasion as well as breakage precludes a determination of whether or not there was pressure retouch along the lateral edges or in the basal concavity.

Face 2 is not fluted but exhibits three pressure-flaked thinning scars originating in the basal concavity. It is possible that the scar to the left was meant to be a guide for the removal of a central flute flake, but the size of the middle scar (especially its width) as well as its orientation suggests otherwise. In addition, the flake farthest to the right was the last to be removed and so cannot have been meant to be a guide scar.

X-RAY FLUORESCENCE SOURCE CHARACTERIZATION

Chemical analyses of the NTTR point were performed on a QuanX-EC™ (Thermo Electron Scientific Instruments Corporation) edxrf spectrometer equipped with a silver (Ag) x-ray tube, a 50-kV x-ray generator, digital pulse processor with automated energy calibration, and a

Table 1
QUANTITATIVE COMPOSITION ESTIMATES FOR THE NTTR FLUTED POINT

Cat. Number	Trace Element Concentrations ^a											Ratio	Obsidian Source (Chemical Type)
	Zn	Ga	Rb	Sr	Y	Zr	Nb	Ba	Ti	Mn	Fe ₂ O ₃ ^T	Fe/Mn	
FS-1	nm	nm	167 ±4	57 ±3	26 ±3	115 ±4	24 ±2	264 ±19	nm	309 ±24	1.07 ±.02	30	Airfield Canyon
U.S. Geological Survey Reference Standard													
RGM-1 (measured)	nm	nm	147 ±5	105 ±4	25 ±3	218 ±4	9 ±3	812 ±22	nm	262 ±24	1.85 ±.02	67	Glass Mtn., CA
RGM-1 recommended) ^a	32	15	149	108	25	219	9	807	1,600	279	1.86	nr	Glass Mtn., CA

^aValues in parts per million (ppm.) except total iron [in weight %] and Fe/Mn intensity ratios; ± = 2 sigma expression of x-ray counting uncertainty and regression fitting error at 120–360 seconds livetime. nm = not measured; nr = not reported (from Govindaraju 1994).

Peltier cooled solid state detector with 145 eV resolution (FWHM) at 5.9 keV. The x-ray tube was operated at differing voltage and current settings to optimize excitation of the elements selected for analysis. In this case, analyses were conducted for the elements rubidium (Rb K α), strontium (Sr K α), yttrium (Y K α), zirconium (Zr K α), niobium (Nb K α), barium (Ba K α), manganese (Mn K α), and iron (as Fe₂O₃^T), and to generate iron vs. manganese (Fe K α /Mn K α) ratios. X-ray tube current was scaled to the physical size of the specimen.

Further details pertaining to calibration and calibration-imposed resolution capabilities of non-destructive analysis performed here appear in Hughes (1988, 1994, 2015), and artifact-to-“source” (i.e., geochemical type, *sensu* Hughes 1998) comparisons between the trace element composition of the NTTR point were made with primary geological data published in Hughes (1983, 1985, 1986, 1989, 1990, 2001, 2005, 2010), Jack (1976), Macdonald et al. (1992), Nelson (1984), Nelson and Holmes (1979), Noble (et al. 1979), Shackley (1994), and unpublished data (e.g., Hughes n.d.) on certain other Great Basin obsidians.

Edxrf data in Table 1 (see Fig. 4) show that the NTTR point was manufactured from obsidian of the Airfield Canyon chemical type (cf. Hughes 2010:Table 10.2), an obsidian source located within the boundaries of the NTTR, south of Range 71 where the point was collected. The geographic location of this obsidian source (chemical type) is shown in Figure 1.

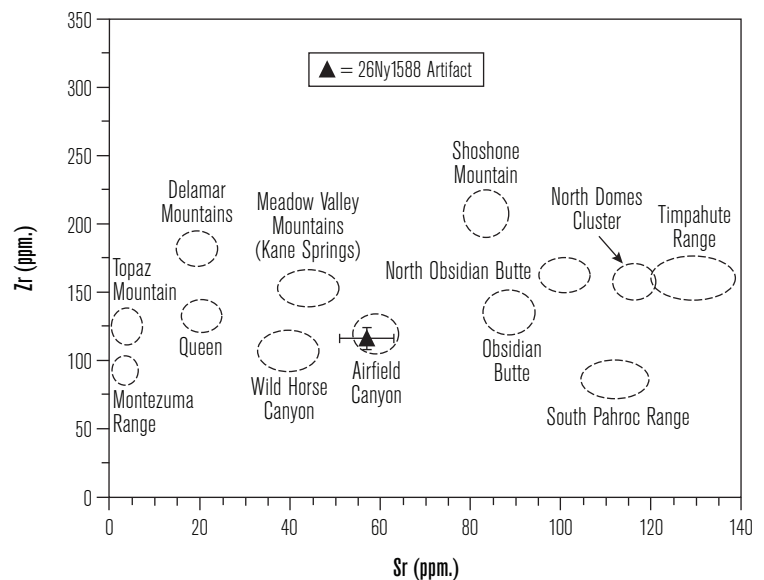


Figure 4. Zr vs. Sr composition of the NTTR fluted point.
Dashed line represents the range of variation measured in regionally significant obsidian sources (from Hughes 2005, 2010, 2019).
Error bars are 2-sigma composition estimates for the NTTR artifact.

TYPOLOGICAL ASSIGNMENT

Distinguishing between Clovis and post-Clovis points can be tricky because the latter are most likely descendants of the former. In such cases there will certainly be differences between the ‘parent’ and its descendants, but as Miller et al. (2013:209) have noted, there will also be similarities. As a result, the distributions of quantitative measures will most likely overlap. The task is made more difficult by the fact that the Clovis fluted point defies definition. That is, there is so much variation among these points, even within the same assemblage

Table 2

**CLOVIS POINT CHARACTERISTICS
AND TYPE DESCRIPTION
(from Howard 1990)**

1. Lateral edges are parallel to moderately convex, mostly the latter.
2. Maximum width usually at or slightly below the mid-point.
3. Basal indentation ranges between 1 and 4 mm., arching completely across basal width.
4. Basal corners range from nearly square to slightly round, without forming ears.
5. Length most often ranges between 75 and 110 mm.
6. Maximum width ranges between 25 and 50 mm. with the majority nearer the former.
7. Fluting generally occurs on both sides.
8. Flutes are most often created by multiple flake removals.
9. Length of flutes is usually 30 to 50 percent of overall point length, with the majority near the former.
10. Minimal post-fluting retouch of basal area.
11. Overall flaking frequently irregular in both size and orientation.
12. Very moderate evidence of pressure flaking.
13. Lower lateral edges are smoothed by grinding.
14. Do not have convex (Folsom-type) channel flake platform remnants.

(Haynes 1964; Miller et al. 2013; Stanford and Bradley 2012), that no criterion defined in absolute terms will be applicable to every specimen. The alternative is a description of the ‘typical’ Clovis point using a set of generalized features that characterize the majority of specimens. In their comparison between Far Western and Clovis fluted points, Beck et al. (2019) employed a set of criteria developed by Howard (1990; Table 2) from which they derived a number of continuous and discrete variables that they believed might distinguish Clovis from non-Clovis points (Fig. 5).³

Histograms were created for all continuous variables in which the distributions of values for Far Western points are overlain by those of Clovis points to discern which variables best distinguish the two datasets. Two of these graphs are shown in Figure 6. Although the distribution of Basal Concavity Depth/Basal Width (BCD/BW)

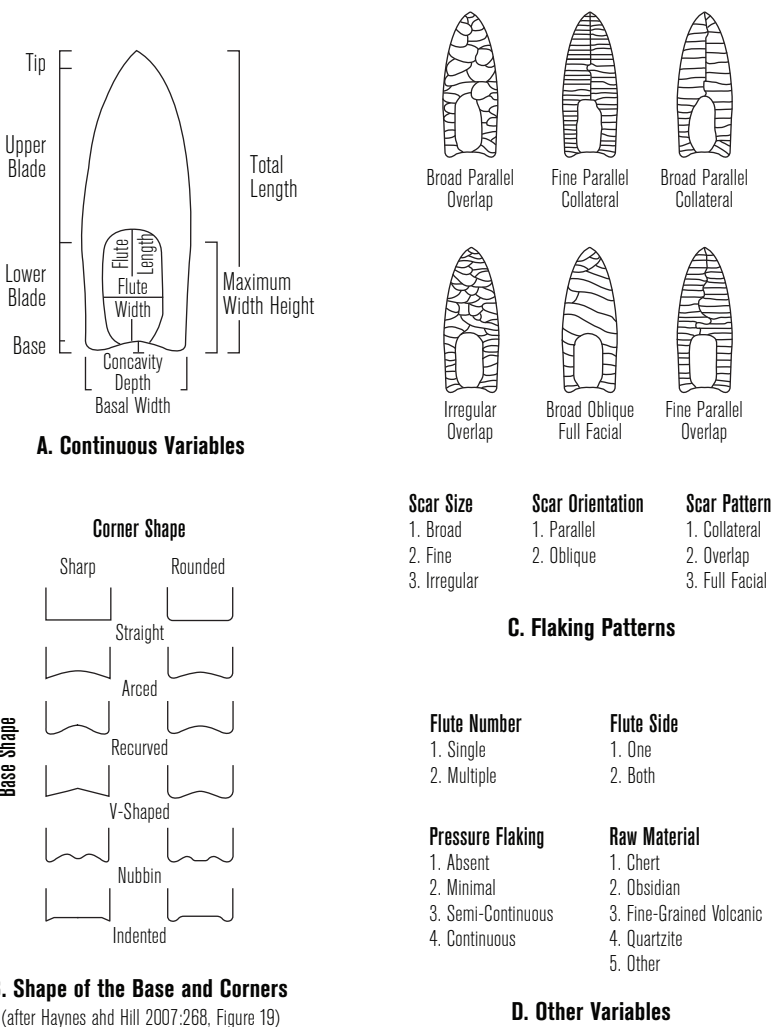


Figure 5. Variables measured in the Beck et al. (2019) analysis.

shows that the Clovis distribution overlaps with that of Far Western points, which is unsurprising as some portion of the Far Western points undoubtedly are Clovis, a large number of the latter exhibit BCD/BW values greater than those of Clovis. On the other hand, Maximum Width Position offers little help in distinguishing the two datasets since Clovis and Far Western distributions overlap almost completely. Those variables that best distinguish between Clovis and Far Western Points were chosen for use in the analysis; these included Maximum Width, Maximum Thickness, Flute Length, and Maximum Flute Position, as well as Basal Concavity Depth, Basal Width, and the ratio between them (BCD/BW; see Fig. 5).

Discrete variables recorded included Flute Side, Number of Flutes, Post-Fluting Retouch, Degree of

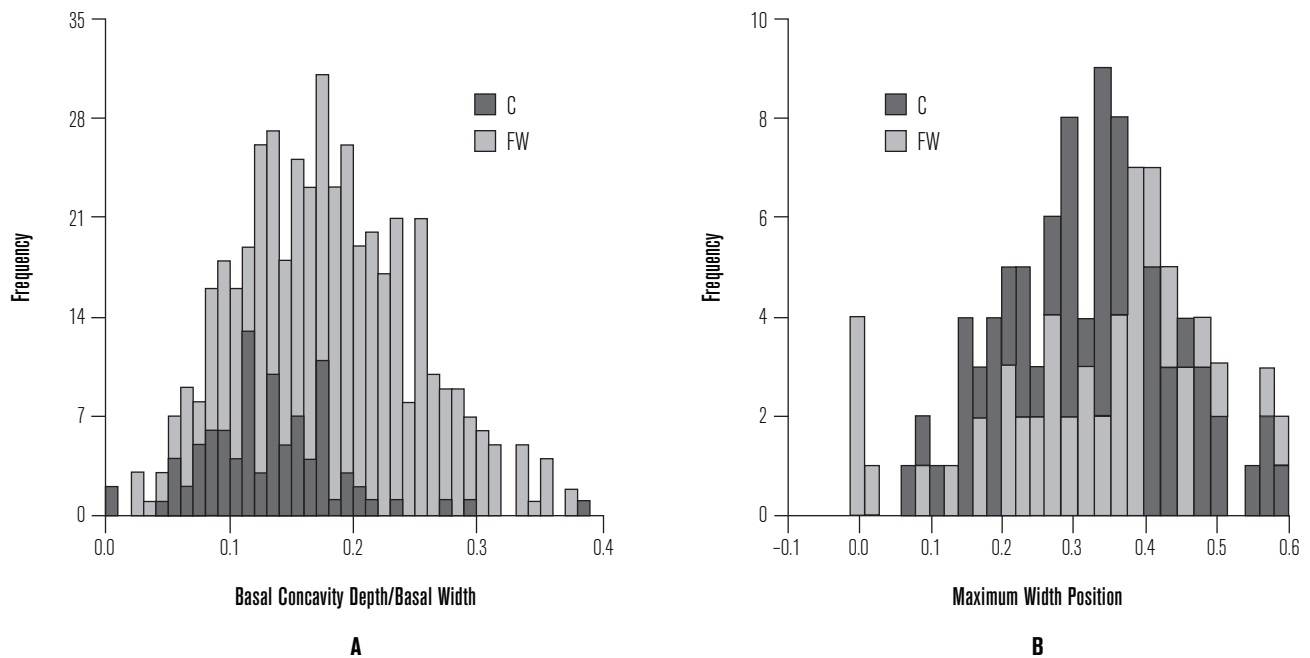


Figure 6. Histograms of Basal Concavity Depth/Basal Width and Maximum Width Position for Clovis points and those from the Western Fluted Point Database.

Pressure Flaking, Raw Material, Corner Shape, and Base Shape (Fig. 5). Bar graphs created for these variables revealed five that distinguish, at least in part, a subset of Far Western points from Clovis (Fig. 7). One additional discrete variable used here, although not noted on Figure 5, is the presence of guide scars, flakes that were removed on both sides of the area to be fluted to guide the removal of the channel flake.⁴

The analysis began with the continuous variables. Each point in the Far Western Database was categorized as ‘Clovis’ (C) or ‘Not Clovis’ (NC), based on where its value fell with respect to one standard deviation from the Clovis mean. For example, the Clovis mean for BCD/BW is 0.132, the standard deviation is 0.048, and the one standard deviation range is 0.074 to 0.190. Given that post-Clovis points have been shown to have deeper basal concavities, the value of this ratio should be larger for Not-Clovis points; that is, greater than the upper limit of the Clovis first standard deviation range. Thus, a specimen having a value ≤ 0.190 would be designated ‘Clovis’ while one with a value > 0.190 would be designated ‘Not-Clovis.’ Clovis mean, standard deviation, and first standard deviation range values for each of the five variables and two ratios are shown in Table 3.

After a point was scored on all eight continuous variables, the scores were summed. A score of 3/5, for example, means that a point scored C on three variables and NC on the other 5. However, because of the fragmentary nature of most points in the Far Western database, not every point could be evaluated on all eight variables. For example, except in the 11 cases in which the maximum width occurred at the base of the point, Maximum Flute Position could be calculated only for complete or ‘nearly complete’ points⁵ ($n = 123$), Maximum Width could be measured only on those points exhibiting at least a portion of the upper blade ($n = 222$; see Fig. 5), and because a point’s maximum thickness is usually at or near its maximum width, Maximum Thickness could be measured only on points for which Maximum Width was measurable. Variables describing basal characteristics, however, were measurable on all points as this was a requirement for a point to be included in the database.

Next, each point was evaluated with respect to the discrete variables. Only Pressure Flaking was relevant to all points, and thus scoring on these variables proceeded differently. In the case of Base Shape, for example, all base shapes were present on both Clovis and Far Western points except ‘indented’ and ‘nubbin’ (see Fig. 5), which

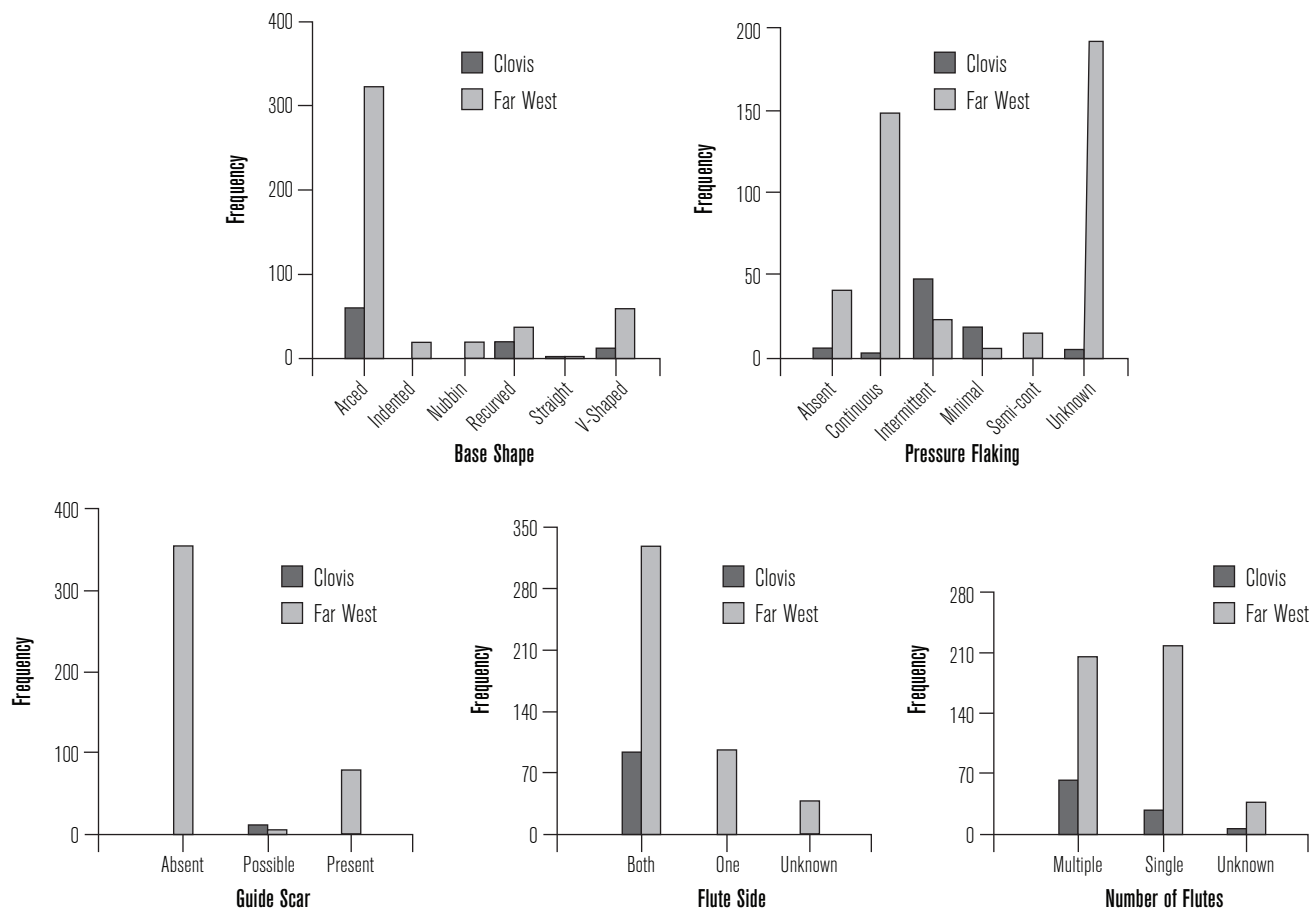


Figure 7. Bar graphs of Basal Shape, Pressure Flaking, Guide Scar, Flute Side, and Number of Flutes for Classic Clovis points and Points from the Far Western Database.

Table 3
DESCRIPTIVE STATISTICS FOR THE CLOVIS POINTS USED BY BECK ET AL. (2019)
FOR COMPARISON WITH FLUTED POINTS FROM THE FAR WEST

Variable	N ^a	Mean	sd	One sd Interval	Category
Maximum Width	81	31.670	6.385	25.28 – 38.05	≥25.28 = Clovis <25.28 = Not Clovis
Maximum Thickness	81	7.850	1.171	6.679 – 14.379	≥6.629 = Clovis <6.529 = Not Clovis
Basal Width	81	27.700	5.476	22.22 – 33.17	≥22.22 = Clovis <22.22 = Not Clovis
Basal Concavity Depth	81	3.429	1.911	1.718 – 5.540	≤5.540 = Clovis >5.540 = Not Clovis
Maximum Flute Length	81	27.830	8.340	19.49 – 36.17	≤36.17 = Clovis >36.17 = Not Clovis
BCD/BW	95	0.132	0.058	0.074 – 0.190	≤0.190 = Clovis >0.190 = Not Clovis
Maximum Width Position	95	0.325	0.129	0.196 – 0.454	≤0.454 = Clovis >0.454 = Not Clovis

^aFifteen of the points in the Clovis comparative collection are from the East Wenatchee Cache. Because of the extremely large size of most of these points, these were not used in comparisons of metric variables, thus the N of 81 except in the case of BCD/BW and Maximum Width Position, which are ratios.

were present only on the latter. Thus, for this variable a point was scored only if it fell into one of these two categories; that is, points with one of these two base shapes were scored NC, while no score was given to points with other base shapes because they could be either C or NC. This was the case as well for Flute Side. Of the 95 Clovis points that Beck et al. used for comparison with the points from the Far West, 94 (98.9%) are fluted on both sides; just one point is fluted on only one side (see Fig. 7). Thus, any point fluted on only one side was given a score of NC for this variable, but no score was given to those with flutes on both sides as they could be either C or NC points. Points on which guide scars could confidently be identified were scored NC, while those on which such scars could only be tentatively identified were given a score of ‘possibly not Clovis’ or PNC. Scores for the discrete variables were then added to those for the continuous variables. For example, using the 3/5 score from above, if this point scored Clovis on one discrete variable and NC on two, the score would be adjusted to 5/8 and the final type assignment would be Not Clovis.

However, type assignment was not always so straightforward. For example, the separation of Clovis and Far Western points is greatest on the histogram of BCD/BW and least on the histogram of Maximum Width (see Fig. 6a). Therefore, in a close case, the former would be given more importance than the latter and thus would be weighted more heavily. In close cases the terms ‘Possibly Clovis’ (PC) and ‘Possibly Not Clovis’ (PNC) were used.

The final type assignments are shown in Table 4. For the remainder of this paper, we refer to both C and PC points as ‘Far Western Clovis’ and NC and PNC points as ‘Not Clovis’.

As is the case with Clovis, Not-Clovis points cannot be strictly defined because no criterion defined in absolute terms will be applicable to every specimen. Following Howard (1990), we have produced a set of general characteristics that describe the majority of Not-Clovis points in the Far Western Database (Table 5).

Turning now to the NTTR point, because it is broken below its maximum width, the only continuous variables that can confidently be used for evaluation are those describing basal characteristics and (to some extent) thickness. The basal width of this artifact falls within the Clovis range, but the basal concavity depth and BCD/BW

Table 4**TYPE ASSIGNMENTS FOR THE POINTS
IN THE FAR WESTERN DATABASE**

Type Assignment	N	%
Clovis	187	40.5
Possibly Clovis	32	6.9
Not Clovis	158	34.2
Possibly Not Clovis	67	14.5
Tie	18	3.9
Total	462	100.0

Table 5**SUNSHINE FLUTED POINT CHARACTERISTICS
AND TYPE DESCRIPTION**

1. Total Length ranges between 34.78 and 180.17 mm. ^a
2. Maximum width ranges between 15 and 65 mm., with the majority (75%) falling between 25 and 40 mm.
3. Maximum width generally occurs usually slightly below to slightly above the mid-point.
4. Maximum thickness ranges between 3.6 and 12.0 mm., with the majority (75%) falling between 5.5 and 9.0 mm.
5. Basal concavity depth ranges between 0.4 and 11.19 mm., with the majority (75%) falling between 3.6 and 5.0 mm.
6. Basal Width ranges between 14.9 and 39.2 mm, with the majority (75%) falling between 7.0 to 28.0 mm.
7. The Basal Concavity Depth/Basal Width Ratio ranges between 0.026 and 0.50 mm., with the majority (75%) falling between 0.12 to 0.25 mm.
8. Base shape is most often arced, but can vary among indented, v-shaped, recurved, or nubbin. The latter refers to the cases in which part of the striking platform is still present in the basal concavity of the point.
9. Although fluting more often occurs on both sides, 41% have flutes on only one side.
10. Flutes are most often created by multiple flake removals, although 58% have single flute scars on at least one side.
11. Length of flutes ranges between 15 and 68 % of overall point length, with the majority (75%) ranging between 26% and 54% of overall length.
12. Often exhibit one or more guide scars.
13. Most often have consistent sequential pressure retouch along lateral edges.
14. Overall flaking patterns vary but many have fine parallel collateral flaking. Overshot flaking is absent although overface flaking may occasionally be present.
15. Lower lateral edges as well as basal concavity most often are smoothed by grinding.

^aThese values are not good indicators of the total lengths of the Sunshine points because there are only 10 Non-Clovis complete points that haven't been extensively resharpened.

ratio do not (Table 6). In addition, the thickest part of the point is just below the transverse break. As stated earlier, a point's maximum thickness generally occurs at its

Table 6**COMPARISON OF THE NTTR FLUTED POINT WITH CLOVIS THRESHOLD VALUES FOR BASAL WIDTH, BASAL CONCAVITY DEPTH, BCD/BW, AND THICKNESS**

Variable	NTTR R-71 Point Value	Clovis Threshold	Designation
Basal Width	25.36	≥ 22.22	Clovis
Basal Concavity Depth	6.68	< 5.540	Not Clovis
BCD/BW	0.26	< 0.190	Not Clovis
Thickness	5.57	< 6.629	Not Clovis

maximum width, and given that the NTTR point appears to be broken only slightly below its maximum width, the fact that its thickness is well below the Clovis threshold also suggests the point is not Clovis.

Two qualitative variables, Flute Side and Guide Scars, can be evaluated for this point. As noted above, 98.89% of the 95 Clovis points used for comparison in the Beck et al. (2019) analysis were fluted on both sides. Thus, the fact that the NTTR point is fluted on only one side is strong evidence that it does not represent Clovis with respect to this variable. In addition, there is a possible guide scar to the right of, and cross-cut by, the flute scar, providing additional support for a non-Clovis attribution.

DISCUSSION

Although only a few variables could be evaluated for the NTTR fluted point, the results of our analysis support the conclusion that it is not a Clovis point. The NTTR point value of 0.269 for BCD/BW not only falls outside of the first standard deviation range from the Clovis mean, it actually falls within the *third* standard deviation range from that mean. This fact alone is convincing evidence that the NTTR point does not represent Clovis, especially given that the distribution of BCD/BW shows the greatest distinction between Clovis and Far Western points. This evidence is supported by the point's thickness, which (although taken slightly below the maximum width) is well below the Clovis mean. In addition, the point is fluted on only one side and exhibits a possible guide scar, both of which are rare for Clovis points. We believe the sum of the evidence against this point being Clovis is convincing.

The question, then, is whether all of the non-Clovis points can be subsumed under a single type name.

Figures 8 and 9 show the distributions of, and thus variation within, Clovis, Far Western Clovis, and Non-Clovis points. We note that the variation among Non-Clovis points is no greater than that among Clovis points for any of the continuous variables. Since this is the case, all of the non-Clovis points can be included within a single type. Beck et al. (2018) have suggested the name Sunshine Fluted after the Sunshine Locality mentioned earlier. Traditionally, a new point form is named after the site or location near where it was first discovered and/or described (e.g., Clovis for the Clovis site, Folsom for the Folsom site, Gainey for the Gainey site, etc.) Unfortunately, we do not know where or when the first non-Clovis fluted point was first found in the Far West. Because the first systematic comparison was done between Clovis and fluted points from the Sunshine Locality (Beck and Jones 2009), it seems appropriate to name the new type after this site. Therefore, we attribute the NTTR point to the Sunshine Fluted type.

Folsom points appear on the southern Plains around 10,980 rcy B.P. (Clark and Collins 1992; Holiday 1997), which is slightly earlier than the proposed ending date of 10,900 rcy B.P. for Clovis (Haynes 1992, 1993; Holliday 2000), but coincides roughly with the appearance of other post-Clovis points in North America (see appendix in Miller and Gingrich 2013). In the Far West, however, there are very few radiocarbon dates associated with fluted points, either Clovis or post-Clovis, and those that exist are all problematic in some way (Table 7). The East Wenatchee, Heil Pond, and Twain Harte (Sylwester) dates are 'associated' with undeniable Clovis points, although the Twain Harte dates are much younger than the terminal date for Clovis.⁶

The Danger Cave point could not be evaluated because it has been lost, but the Sunshine, Connelly Cave, and Henwood dates are all associated with points all but one of which were identified as non-Clovis in the Beck et al. analysis. The best of the dates from these sites is $10,320 \pm 40$ rcy B.P. from the Sunshine Locality in eastern Nevada (Beck and Jones 2009). However, the charcoal that was dated was present in alluvium and was recovered ca. 11 cm. above the point, so that it serves as an upper limiting date at best (that is, the point is at least as old as the date). These dates, such as they are, lend at least some support to the contention that these points follow Clovis in time and thus are likely Clovis derivatives.

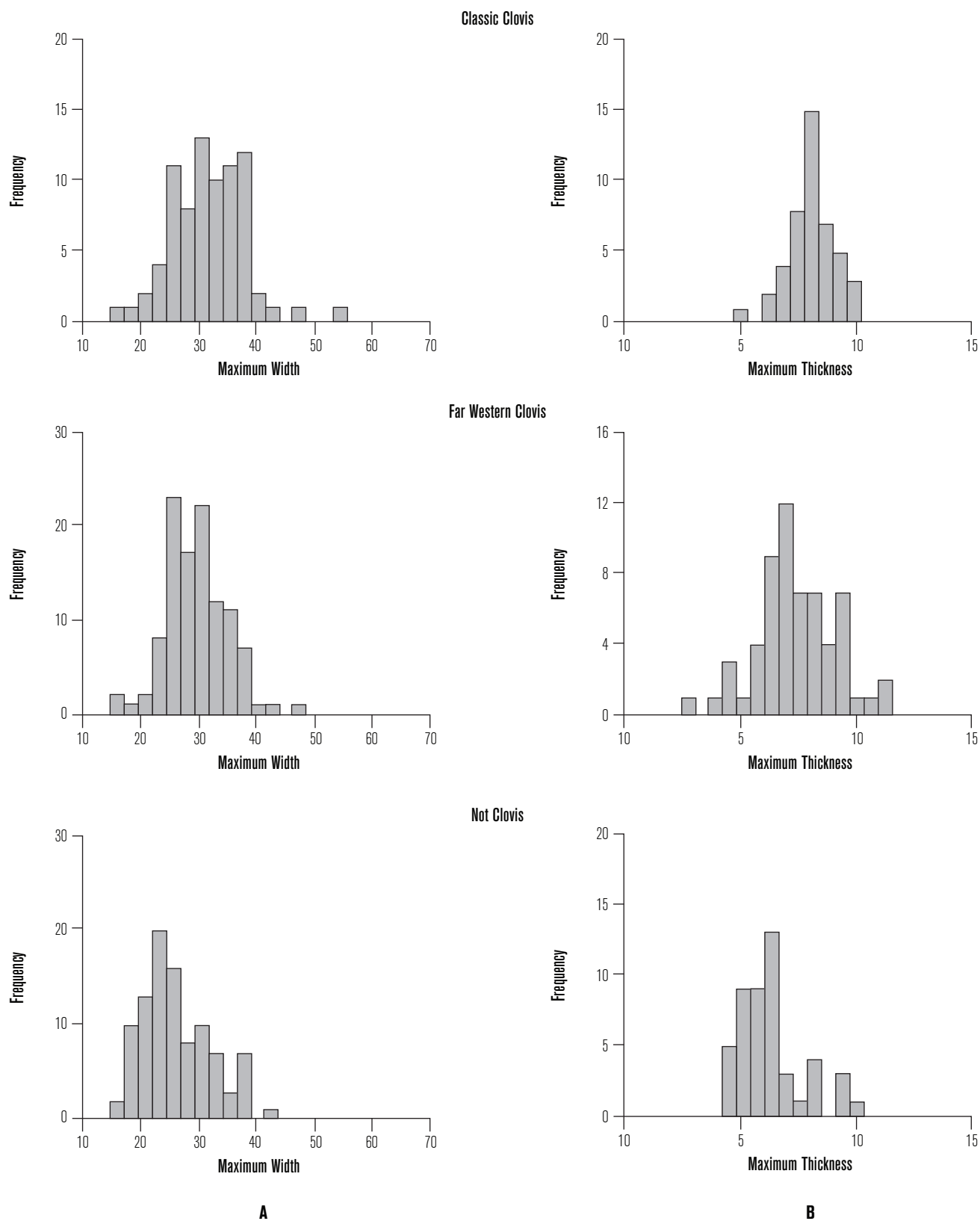


Figure 8. Histograms of Maximum Width and Maximum Thickness for Classic Clovis and points from the Far Western Database identified as Clovis and Not Clovis.

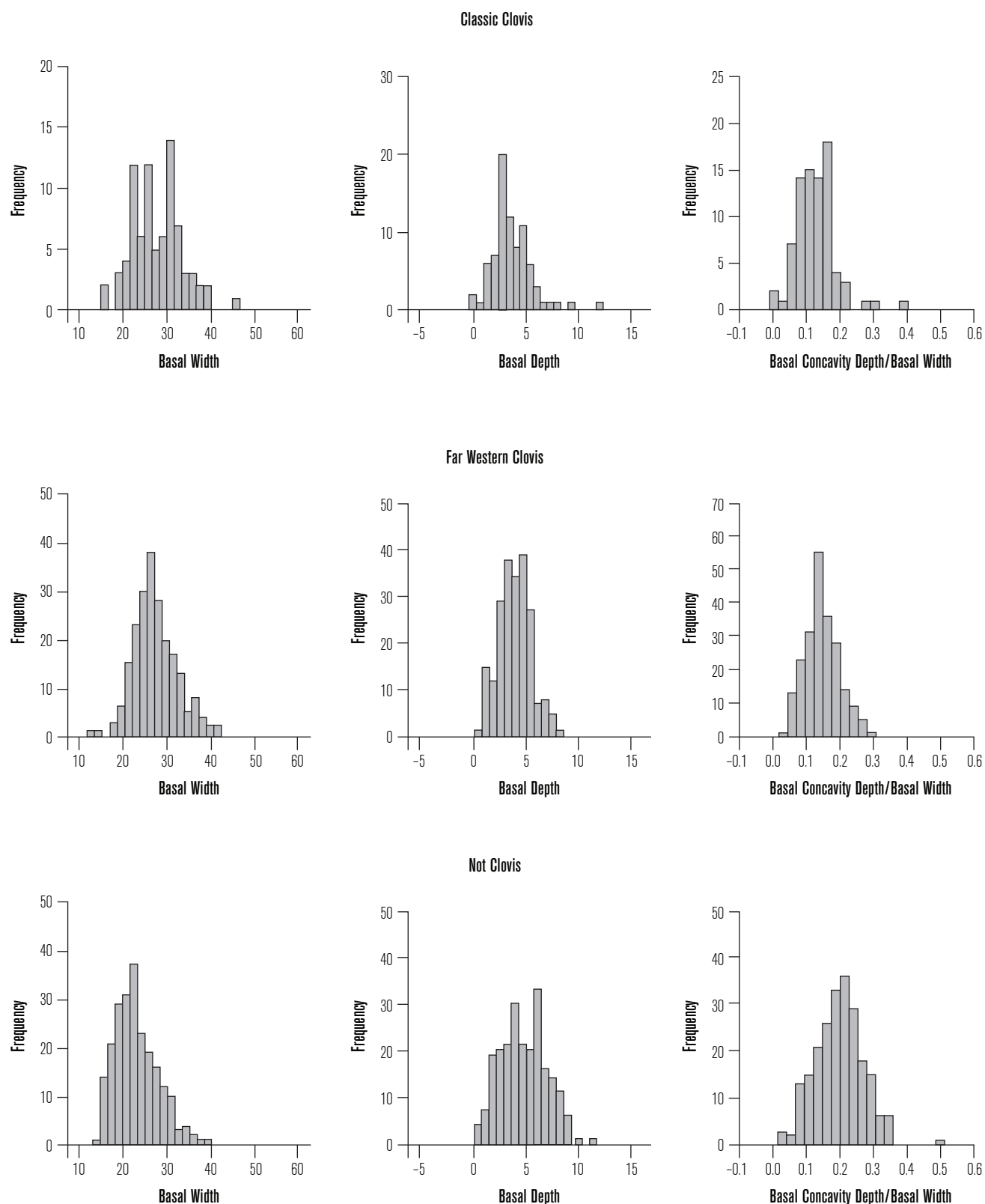


Figure 9. Histograms of Basal Width, Basal Concavity Depth, and BCD/BW for Classic Clovis and points from the Far Western Database identified as Clovis and Not Clovis.

Table 7
RADIOCARBON DATES ASSOCIATED WITH
FLUTED POINTS IN THE FAR WEST

Site	Uncalibrated Radiocarbon Date (B.P.)	Reference
East Wenatchee Clovis Cache, WA ^a	11,600 ± 50	Kuehn et al. (2009)
Heil Pond, ID ^b	10,888 ± 260	Reid (2011)
Connley Cave No. 5, OR ^c	9,540 ± 260 7,430 ± 140	Bedwell (2973)
Sunshine Locality, NV ^d	10,320 ± 50	Beck and Jones (2009)
Danger Cave, UT ^e	10,080 ± 130	Madsen and Rhode (1990)
Henwood, CA, Component 1 ^f	8,470 ± 370 4,360 ± 280	Douglas et al. (1988)
Sylwester (Twain Harte), CA ^g	9,240 ± 40 9,510 ± 35 9,640 ± 40 9,970 ± 45 10,200 ± 69	Moratto et al. (2017)

^aThis is a maximum date.

^bThere is no clear association between this date and the fluted point at this site.

^cIt is debated whether or not this point is fluted (see Beck et al. 2004).

^dThis is a minimum date.

^eTwo fluted points were reportedly recovered from the 'lowest levels' of Danger Cave by Elmer Smith in 1941 (Jennings 1957:47). Although radiocarbon dates presented by Jennings (1957) indicated a pre-11,000 rcy B.P. age for the lowest level (DI), re-dating of the stratigraphic sequence indicates that the earliest deposit identified by Jennings (1957) as DI, as well as the lower part of DII, date to ca. 10,100 rcy BP (Madsen and Rhode 1990:98).

^fDouglas et al. (1988:134) state that the younger date is questionable because it is out of line with the other dates, which include 7,150 ± 290 and 7,400 ± 280 for Component 2.

^gThe Sylwester point was found in 1969 eroding from the floor of a streambed. Moratto et al. (2017) report on their excavation at the site in 2011 during which they located two strata similar to that described by the person who found the point in 1969, one of which they believe the point may have come from.

CONCLUSION

Clovis is believed by many, if not most, archaeologists to represent a colonizing population that moved relatively quickly across the landscape (e.g., Fiedel 2013; Haynes 1992, 1993; Waters and Stafford 2007). The Clovis people eventually reached most areas of North America, as Clovis points have been found in nearly every one of the 48 contiguous states (Miller et al. 2013). A rapid expansion of Clovis groups is inferred from the fact that Clovis artifacts have been found, in some cases, hundreds of kilometers from their toolstone sources (e.g., Frison and Bradley 1999; Holen 2010). By the time Clovis disappeared around 10,900 rcy B.P. (Miller et al. 2013), populations had increased, and over the following centuries mobility appears to have decreased

in some regions, such as the Northeast (e.g., Ellis 2004), as people settled in to particular areas. We might suggest a scenario regarding lithic source use that parallels these changes in mobility. With a decrease in mobility, the use of distant sources may have decreased as well, and if so, the use of more local sources would have increased. Airfield Canyon obsidian, for example, from which the Sunshine Fluted point from the NTTR is made, erupted only 55 km. from where the point was lost or discarded, providing evidence for the use of relatively local raw materials (e.g., Smith 2015; Tuohy 1984) in post-Clovis times. However, substantiating the hypothesis that this represents an actual decrease in overall mobility in post-Clovis times will require more source evidence from additional Sunshine points in this area, which we hope will be forthcoming in the future.

NOTES

¹Almost half (49) the 95 points used in this study are classic Clovis points from the following sites: Blackwater Draw, Casper, Dent, Domebo, Escapule, Lehner, Leikem, Miami, Murray Springs, and Naco. The remaining 46 are from the Fenn, Simon, and East Wenatchee caches. Only ratio and qualitative data were used for the points from the East Wenatchee cache due to the extremely large size of many of these specimens.

²Bradley et al. (2010:101) state that pressure flaking on the Clovis points that they have examined "ranged from invasive to abrupt marginal to continuous or discontinuous. But what doesn't seem to occur is serial retouch." In contrast, post-Clovis fluted points commonly exhibit such retouch.

³The description of the analysis of 462 Far Western fluted points draws heavily on the description presented in Beck et al. 2019.

⁴Although guide flakes may have been used by Clovis knappers (e.g., Moratto et al. 2017), they are rarely visible on the finished product because—as Morrow (2015:146) points out in contrast to Crabtree (1972)—the fluting of Clovis points was conducted earlier in the reduction sequence than previously thought, and was followed by a considerable amount of thinning and shaping. Consequently, any evidence of guide scars would, in most cases, have been removed during this latter process. In contrast, post-Clovis points were fluted relatively late in the reduction process; this was followed by minimal post-fluting flaking, and thus guide flakes, if they were not obliterated by the fluting process, should still be visible. Therefore, visible guide scars were used as evidence that a point was not Clovis.

⁵Nearly complete points are those missing only a small portion of the upper blade and/or tip and that can be reconstructed for measurement.

⁶The Twain Harte (Sylwester) point was discovered by 11-year-old Laurie Sylwester in 1969. A small portion of the point was found protruding from a 'blue clay' that she said had been exposed in a streambed by heavy rains. In 2011 Moratto and colleagues relocated the find spot with the help of Laurie Sylwester and conducted an excavation in an attempt to locate the 'blue clay' and obtain material for radiocarbon dating. They were successful in finding two strata below a sandy matrix: a blueish grey, gleyed clay that was underlain by a dark grey loam, one of which, they believe, was the source of the point. They obtained four radiocarbon dates from these two strata, the oldest of which was $10,200 \pm 60$ B.P., well after the disappearance of Clovis. Because the point is undeniably a Clovis point, Moratto et al. suggest that these dates indicate that the Clovis period lasted longer in this region. It is more likely, however, given that the point was found in a disturbed context, that it was removed from its original depositional context and redeposited, as it was found in a streambed.

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