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Evaluating Flake Assemblages and Stone Tool Distributions at a Large Western Stemmed Tradition Site Near Yucca Mountain, Nevada

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Ongoing archaeological investigations by Desert Research Institute near Yucca Mountain, Nevada, have revealed an extensive complex of Western Stemmed Tradition lithic scatters lining Fortymile Wash, a now-dry tributary of the Amargosa River. Data recovery conducted at one of these sites, 26NY7920, allowed for both a detailed internal analysis of the flaked stone assemblage and comparisons with similar sites documented in neighboring regions. Site specific analyses compared debitage and formed tool assemblages found in areas of high artifact concentrations with artifacts found in spatially dispersed contexts. Interregional comparisons examined the relationship between material type and artifact form at Western Stemmed Tradition sites throughout the Desert West.

A wealth of new information about Western Stemmed Tradition (WST) sites in North America has been published in the past decade (Jenkins 1987; Beck and Jones 1988, 1990a, 1990b; Fagan 1988; Willig and Aikens 1988; Zancanello 1988; Warren et al. 1989; Basgall 1991, 1993, 1994; Warren 1991; Hall 1992, 1993; Basgall and Hall 1993, 1994), much of it based on sites in the Mojave Desert. Despite this new information, comprehensive descriptions and analyses of stone artifacts at individual sites are still uncommon in the published literature (for exceptions, see Beck and Jones 1988, 1990a, 1990b; Basgall 1994; Basgall and Hall 1994), and none exists for the eastern Mojave region. Because many of these sites are surficial and lack a depositional environment which preserves floral and faunal remains, site function is currently understood primarily through the analysis of flaked stone, although locational and topographic information remains important. Detailed analyses of debitage and stone tools and their spatial distribution can lead to meaningful inferences about site technology and function.

This paper presents the results of in-field data analysis of stone artifacts from the surface of 26NY7920, a large WST site near Yucca Mountain on the Nevada Test Site (Fig. 1). Examination of the spatial dispersion of stone artifacts allowed the site to be partitioned into three clusters based upon tool and flake densities from across the site. The kinds of stone artifacts found within the clusters were compared with each other and with the rest of the site assemblage found in a nonclustered context, in order to make inferences regarding the segregation of activities at the site. This analysis included evaluating lithic reduction strategies, stone tool content, and toolstone selectivity.

The artifacts from 26NY7920 conceivably represent several thousands of years of human occupancy—the proposed time span for the WST (e.g., Willig and Aikens 1988:12, Fig. 2). A number of factors, including the large expanse of the entire Yucca Mountain WST site complex and a highly redundant physiographic environment, should tend to even out artifact distributional variations. Given these factors, the as-

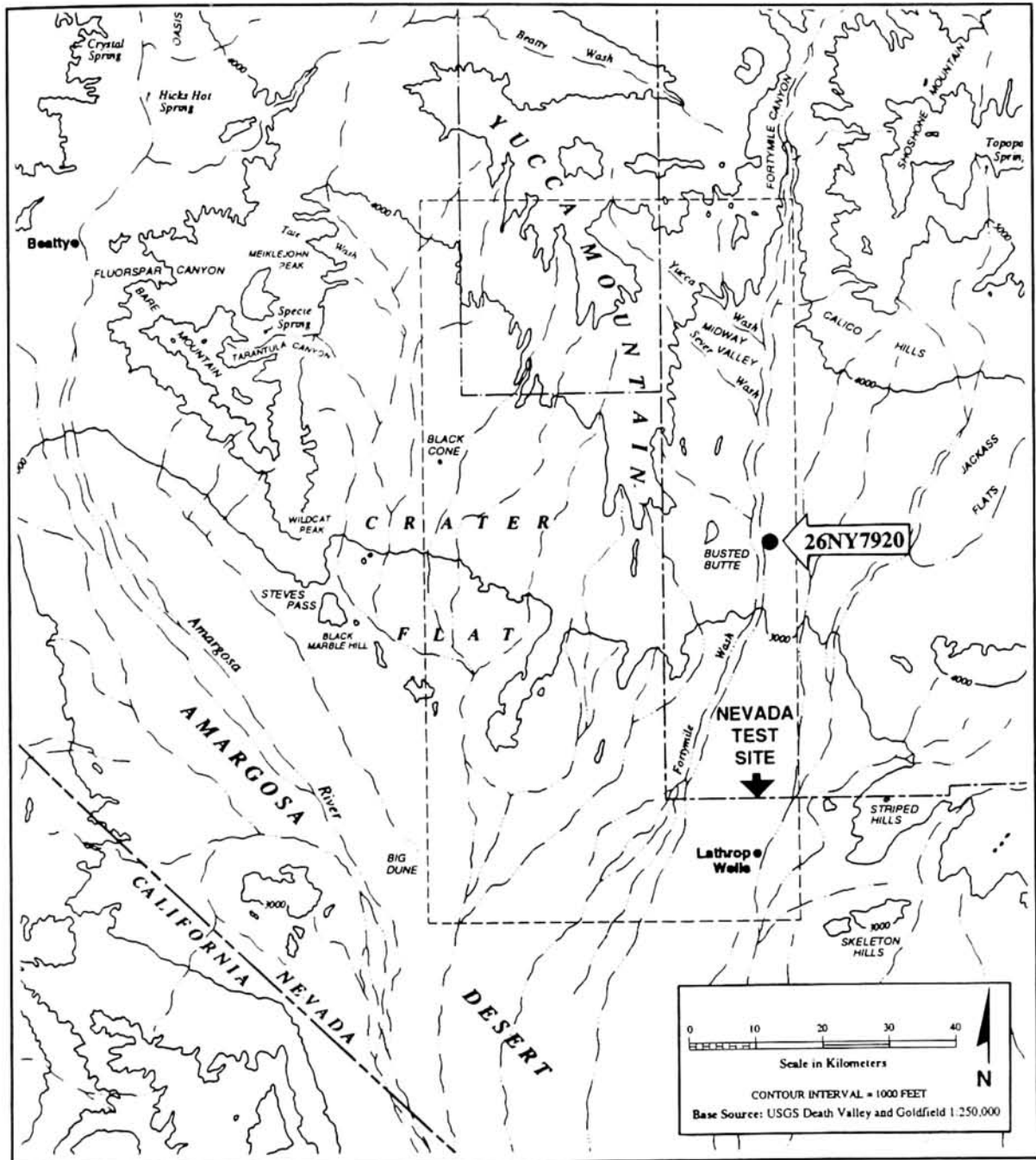


Fig. 1. General location map of 26NY7920.

sumption here is that artifact deposition is likely the result of many short-term, episodic events. The expectation, then, is that there should be no significant differences in the kinds of artifacts found from one portion of the site to another.

Therefore, when flake type and tool type classes are analyzed, the same kinds and proportions of artifacts should be found throughout. Alternatively, all of the artifacts could have been deposited in a much shorter period of time, possibly

a number of intense depositional episodes. This kind of scenario would likely create areas of uneven artifact distribution because of fundamentally different rates of artifact manufacture, use, and discard.

An initial hypothesis of spatial homogeneity is the most parsimonious based upon several facts. Work near Yucca Mountain revealed a large, extensive complex of WST stone artifact scatters that line the Fortymile Wash drainage system (Pippin et al. 1982; Henton and Pippin 1988). Projectile point styles at 26NY7920 and other sites within this complex suggest repeated occupations dating from the terminal Pleistocene through the Early Holocene (see below). The immediate environment along Fortymile Wash is exceedingly uniform, consisting of 20- to 30-m. high flat terraces overlooking wash bottoms with a substrate of sand or desert pavement, covered by creosote bush (*Larrea tridentata*), bursage (*Ambrosia dumosa*), mormon tea (*Ephedra* spp.), and desert trumpet (*Eriogonum inflatum*). Paleoenvironmental data from the immediate region support the fact that vegetation along Fortymile Wash has been much the same since the terminal Pleistocene.

In his investigations at the Nevada Test Site, Spaulding (1985:40) highlighted this point by commenting that "An early change to postglacial vegetation conditions also took place at low elevations on the periphery of the Amargosa Desert" (cf. Livingston and Nials 1990:46). The extensive spatial distribution and the presumed length of occupation at these sites, coupled with a uniform Fortymile Wash environment, provide no clue that one position upon the landscape was better for human activities than any other.

THE WESTERN STEMMED TRADITION CONCEPT

The Western Stemmed Tradition, as an archaeological taxon, refers most specifically to a stone projectile hafting technique (Bryan 1980, 1988). It has a set of artifactual referents that

are temporally associated with the terminal Pleistocene and Early Holocene (e.g., Willig and Aikens 1988); in the Desert West, these referents include all of the Great Basin Stemmed point series. In its broader use, it refers to a corpus of sites and artifacts found throughout western North America. In the Great Basin, Western Stemmed Tradition sites are generally referred to as the Western Pluvial Lakes Tradition (Bedwell 1973; Beck and Jones 1988). Similar sites in the Mojave Desert of southern Nevada and southeastern California are locally known as the Lake Mojave Complex and correspond to the San Dieguito Period in coastal California (Amsden 1937; Wallace 1962; Warren 1967; Warren and Crabtree 1986).

Western Stemmed Tradition sites in the Great Basin and Mojave Desert have many similarities and, despite differences in nomenclature, contain the same kinds of archaeological remains. Based on a small number of radiocarbon dates, WST sites date between 11,500 B.P. and 7,000 B.P. (Willig and Aikens 1988:12, Fig. 2). They are consistently found around now-extinct, large Pleistocene lakes, presumably associated with marshes and large drainages that may have held seasonally increasing water flows (Willig and Aikens 1988:27-28), although the association of these sites to extinct hydrologic features may be due to overly selective surveys or to poor visibility in other physiographic settings. These sites also exhibit a distinct tool assemblage that includes large and small stemmed projectile points that typically have square or sloping shoulders (Great Basin Stemmed series); large basalt/rhyolite/welded tuff bifacial and unifacial tools; domed or mounded unifacial scrapers; crude to finely shaped obsidian or chert knives; other beaked or drill-like unifacial or bifacial tools; crescent-shaped bifacial tools; utilized flakes; and a paucity of associated groundstone (Wallace 1962:173-174; Warren 1967:172-178).

Few detailed accounts of WST assemblages in the Mojave Desert have received widespread

publication. Amsden's (1937) description of Lake Mojave artifacts, along with Hunt's (1960) description of similar sites in Death Valley, are probably the most well known. Davis (1978) directed extensive work on WST sites in the China Lake Basin. Recent work in the central Mojave has generated the largest body of information, and detailed accounts of individual site assemblages are available (Warren et al. 1989; Basgall 1991, 1993, 1994; Basgall and Hall 1991, 1993, 1994; Warren 1991; Hall 1992, 1993). The only recent information regarding eastern Mojave Desert WST assemblages comes from the Yucca Mountain region on the Nevada Test Site (Pippin et al. 1982; Henton and Pippin 1988; Amick 1993; Hartwell and Amick 1993). Wallace (1962), Warren (1967), and Warren and Crabtree (1986) produced region-wide syntheses that include the WST period, and new perspectives about such assemblages in the Mojave Desert were proposed by Basgall and Hall (1994).

WESTERN STEMMED TRADITION SITES AT YUCCA MOUNTAIN

Yucca Mountain is a low volcanic mountain range on the northeastern boundary of the Mojave Desert. It is composed of late Tertiary age welded tuffs (Cornwall 1967), and rises 300 to 400 m. above the surrounding alluvial valleys. Elevations range from about 900 m. on Crater Flat to the west to 1,300 m. above sea level at the top of Yucca Mountain. Vegetation is typical of Mojave Desert bajada and mountain communities, with a creosote-bursage (*Larrea-Ambrosia*) community below 1,060 m., a creosote-thornberry-hopsage (*Larrea-Lycium-Grayia*) community between 1,060 m. and 1,200 m., and a blackbrush (*Coleogyne*) community above 1,200 m. (Beatley 1976). Temperatures fluctuate widely, and the area is subject to alternating periods of heat in excess of 38° C. (100° F.) and temperatures at or near freezing (Quiring 1968).

Since 1982, Desert Research Institute (DRI) has conducted archaeological investigations at Yucca Mountain for the U. S. Department of Energy. This work has revealed extensive lithic scatters lining the major washes and valleys on the east side of Yucca Mountain (Pippin et al. 1982; Henton and Pippin 1988). Projectile points at these sites are dominated by Lake Mojave and Silver Lake types—hallmarks of the Western Stemmed Tradition in the Mojave Desert. Inferring the site function of these large lithic scatters is difficult, but they may represent large camps, quarries, or early stage biface manufacturing sites. Small, lower density lithic scatters and isolated artifacts are also common in the highlands of the Yucca Mountain region. Many of these sites have brownware pottery and projectile point types (i.e., Rosegate, Desert Side-notched) commonly associated with aboriginal occupations that date to the Late Holocene (Pippin et al. 1982; Henton and Pippin 1988).

Establishing a local chronology for Early Holocene occupations near Yucca Mountain has proven difficult, primarily due to the fact that few sites have yielded radiocarbon datable materials. When conventional radiocarbon dates have been obtained, most are associated with assemblages believed to be Late Holocene in age and none have dated older than 2,040 B.P. (Buck et al. 1994:9-11, Table 12). Recent efforts have focused on the experimental technique of radiocarbon dating microcolonial fungi encapsulated under rock varnish on welded tuff artifacts; six accelerator radiocarbon assays from sites dominated by Great Basin Stemmed series points range from 4,200 to 10,460 B.P. (Hartwell and Dorn MS). The hydration rinds of more than 54 projectile points have been measured, and preliminary results tend to support the traditional chronological ordering of point types (Buck et al. 1994:9).

Regional studies on terminal Pleistocene and Early Holocene projectile point styles suggest some general chronological trends. Clovis or

Clovis-like lanceolates are believed to predate 10,000 B.P. (Bryan 1980:80-81; Willig and Aikens 1988:9-11, Tables 2a-b). Willow-like blades and large, broad Lake Mojave style points, which are often made from cryptocrystalline or basalt-like materials (cf. Amsden 1937, Beck and Jones 1990a), may predate smaller Lake Mojave or Silver Lake style WST points (Bryan 1980:84-85; Jenkins 1987:228; Basgall 1995:59). Pinto series points are believed to overlap, and then postdate smaller Lake Mojave or Silver Lake style WST points (Warren and Crabtree 1986:184-185; Jenkins 1987:228-229; Basgall and Hall 1994:69; Basgall 1995:59-60). Admittedly, the chronological ordering of these point styles is far from unambiguous, and more work needs to be done in delineating relationships between point morphologies through time (e.g., Bryan 1980). However, this tentative ordering of projectile point styles is helpful in understanding possible temporal trends at sites near Yucca Mountain.

The counts of terminal Pleistocene/Early Holocene point types at three sites from the Yucca Mountain region are shown in Table 1. Of these three sites, only the assemblage at 26NY7920 includes a Clovis-like lanceolate, which was made from a white chert-like material. A single Clovis point, knapped from what may be the same material, was found at 26NY3193, located several kilometers north of 26NY7920 along Fortymile Wash (Reno et al. 1989). Larger Lake Mojave points are present at all three sites shown in Table 1; only one of the eight was made from obsidian. Early weapon assemblages, though, are dominated by smaller Lake Mojave or Silver Lake points. Of these 21 points, 15 were made from obsidian, while three each were made from welded tuff or chert. Site 26NY8187 has five indeterminate Great Basin Stemmed points. Each of these points was made from obsidian, and appear to be from smaller WST projectile point varieties. Finally, 26NY1011 and 26NY8187 each have

three Pinto points, while 26NY7920 has only one. All but one of these points was made from obsidian. If the chronological ordering of points proposed above is generally correct, then it is clear that the Yucca Mountain region, including 26NY7920, was being used even as early as the terminal Pleistocene.

Occupational intensity would seem to have increased with the rise of the stemmed point hafting tradition, and some occupation of the region appears to have continued on into the time when Pinto points were being made. Based upon this evidence, it is proposed that the Yucca Mountain region was used during the terminal Pleistocene and then more intensely throughout early Holocene times. This coincides with the six radiocarbon assays that range from 4,200 to 10,460 B.P. (see above).

SITE DESCRIPTION

Site 26NY7920 was discovered in September of 1991 and is a 1,300 m. long by 200 m. wide lithic scatter located on a sandy alluvial terrace overlooking Fortymile Wash (Fig. 2). Fortymile Wash is a deeply entrenched dry river bed that may have had seasonal water flows and/or a higher groundwater table during the terminal Pleistocene. The physiographic setting of the site along a now-dry fluvial channel is typical of known WST settings in southeastern California and southern Nevada.

The material assemblage for 26NY7920 included 49 bifaces, 20 scrapers (several of which were mounded or domed), 31 utilized flakes (including some large welded tuff flakes that were worked along the end and side), 21 cores, and six hammerstones (Table 2, Fig. 3). Of 19 typeable projectile points, 17 could be classified as Great Basin Stemmed, Lake Mojave, or Silver Lake types; the other two are Pinto and Elko series. One white, silicified, volcanic projectile point base, concave and basally thinned with slightly expanding blade margins, was also found. Although it was not fluted, it did appear

Table 1
PROJECTILE POINT STYLES AT THREE SITES NEAR YUCCA MOUNTAIN

Types	26NY8187			26NY1011			26NY7920			Totals
	WTF ^a	OBS ^b	CHT ^c	WTF	OBS	CHT	WTF	OBS	CHT	
Clovis-like ^d	--	--	--	--	--	--	--	--	1	1
Long-Stem Lake Mojave	1	--	1	2	1	--	2	--	1	8
Short-Stem Lake Mojave	--	--	--	1	3	1	2	3	2	12
Silver Lake	--	1	--	--	2	--	--	6	--	9
Indeterminate Stem	--	5	--	--	1	--	--	1	--	7
Pinto	--	3	--	1	2	--	--	1	--	7
Totals	1	9	1	4	9	1	4	11	4	44

^a WTF includes welded tuff and other points made of basalt or basalt-like material.

^b OBS equals obsidian.

^c CHT includes all cherts, chalcedonies, and silicified volcanics. These materials grade into one another and are often difficult to differentiate.

^d "Clovis-like" refers to projectile points that have no shoulders, have blade margins that are straight or slightly expanding, have a large central basal notch, and are basally thinned.

to be morphologically similar to Paleoindian points found throughout western North America. No groundstone was identified at 26NY7920. A subtle 35-m. diameter soil stain and five concentrations of cores and large flakes were found near the northern end of the site. Associated with the stain and the toolstone concentrations were multitudes of welded tuff flakes.

FIELD METHODS

In January 1993, DRI began in-field data collection. The intent was to delimit the area of the scatter, identify and analyze all the stone tools, and analyze a random sample of the debitage. One hundred fifty-nine stone tools from 26NY7920 were found during a 100% surface survey, and then analyzed between January and March 1993. Analysis included measurements of length, width, thickness, and weight, descriptions of material class and color, and artifact class and type.

Thirty randomly chosen 400 m.² debitage sample units were selected and laid out on the

site. All surface debitage within the 30 sample units was pinflagged and analyzed in the field. About 7.5% of the total site area (12,000 m.² of approximately 160,000 m.²) was sampled. Fourteen different variables were measured for each flake, including size grade, weight, thickness, material type and color, debitage type (decortication, core reduction, bifacial thinning, pressure/platform, indeterminate, and shatter flakes) and flake segment.

No subsurface investigations were conducted at 26NY7920, since the intent was to obtain data through in-field analysis. Subsurface investigations at other sites along Fortymile Wash have shown that artifacts are limited primarily to the surface (Pippin 1984; Reno et al. 1989).

ANALYSIS OF THE FLAKED STONE ARTIFACTS AT 26NY7920

Data on the analysis of the flaked stone artifacts at 26NY7920 will be presented in several parts: (1) a description of stone tool and debitage distributions from across the site; (2) an

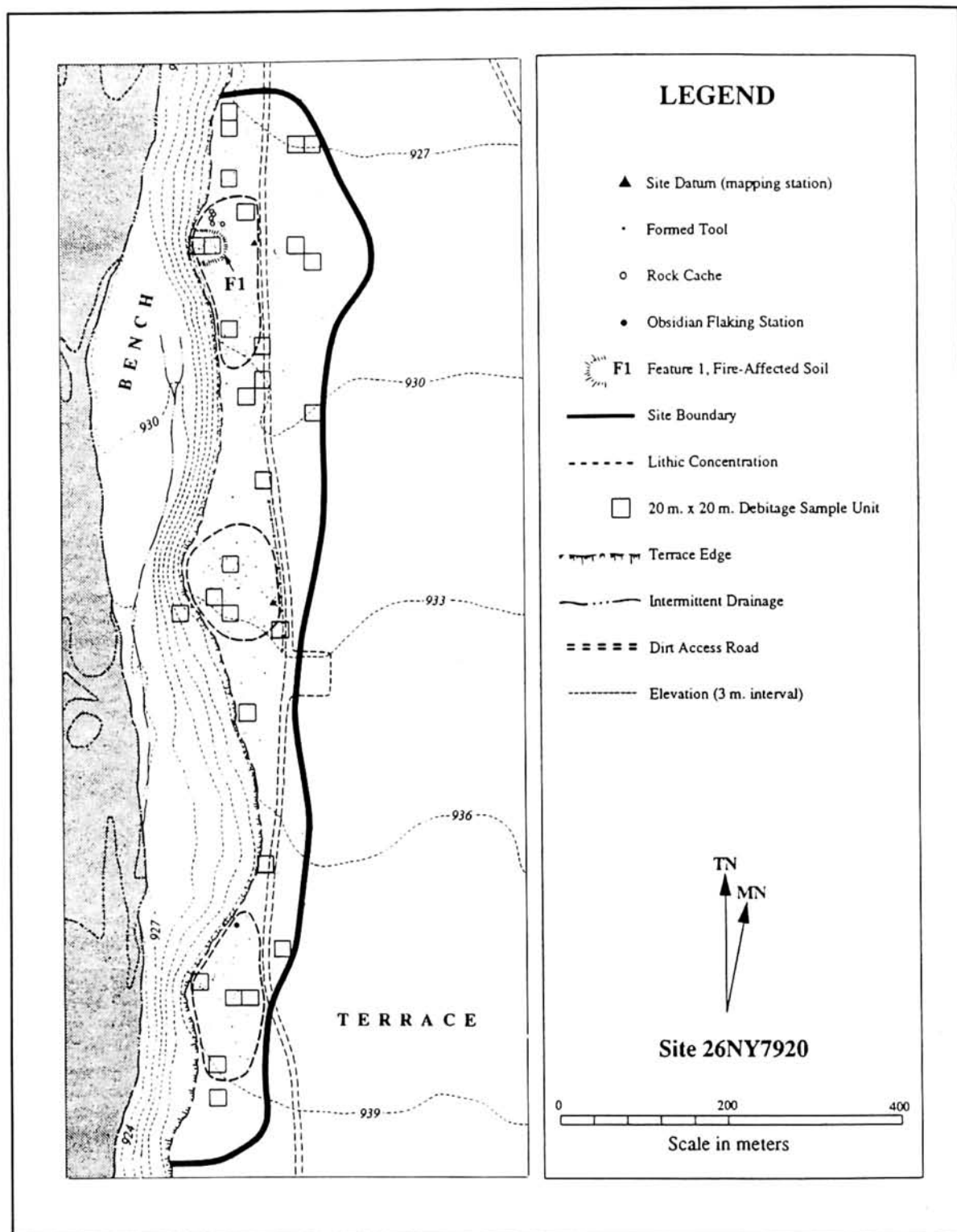


Fig. 2. Site map of 26NY7920.

Table 2
SUMMARY OF STONE TOOLS FROM 26NY7920

Tool Class	Obsidian	Phenocrystic Chert	Welded Tuff	Other	Totals
projectile points	20	3	2	2	27
bifaces	13	2	30	4	49
bifacial tools	0	0	0	1	1
unifacial tools	0	2	1	1	4
scrapers	2	12	2	4	20
utilized flake (nonscraper)	6	11	10	4	31
cores	2	0	16	3	21
hammers	0	0	6	0	6
Totals	43	30	67	19	159

examination of flake type assemblages and flake size grade distributions for various toolstone classes; (3) an analysis of the kinds and quantities of stone tools from clustered and nonclustered location; and (4) a comparative discussion of toolstone selectivity.

Evaluating Artifact Dispersal at 26NY7920

Visual inspection of stone tool dispersion at 26NY7920 revealed three concentrations (see Fig. 2). A total of 159 formed tools was found in the nearly 160,000 m.² of the site, resulting in an average tool density of 1/980 m.² Tool densities within the three clusters were considerably higher. The average tool density in the northern cluster was 1/560 m.², while in the middle cluster it was 1/510 m.², both nearly twice the overall site average. The southern cluster had an average tool density of 1/650 m.² Of the 159 tools, 115 (72%) fell within the three concentrations. Cluster size as a whole was 65,000 m.², so nearly 95,000 m.² of the total site area existed outside these concentrations. Tool density in nonclustered areas was 1/2,100 m.², three to four times lower than within the clusters.

Artifact clustering was further evidenced by the 30 randomly chosen debitage sample units

(Fig. 4). An assumption of randomness can be tested by comparing the flake counts from the debitage sample units to a Poisson distribution. A Poisson distribution is associated with objects (or events) that occur randomly in a continuum of space (or time) (Elliott 1977:22). When a Kolmogorov-Smirnov (K-S) test is used to test the fit of these data to a Poisson distribution, a significant result is obtained: the K-S value is 0.497 with an associated probability of 0.00. This means that the null hypothesis is rejected: flake counts obtained from the 30 sample units do not fit what would be expected if the flakes were randomly distributed. The inference is that the flakes are substantially clustered across the surface of the site. Ten debitage sample units fell within the tool concentrations (Fig. 4). The number of flakes counted within these 10 sample units ($n = 800$) accounted for 77.5% of the total debitage identified at the site ($n = 1,032$). It is also interesting to note that none of the sample units found within the concentrations were below the median (median = 22), and that only two were below the mean (mean = 34.4).

It is clear that these artifact concentrations represent relatively dense and significant clusterings of stone tools and debitage at 26NY7920.

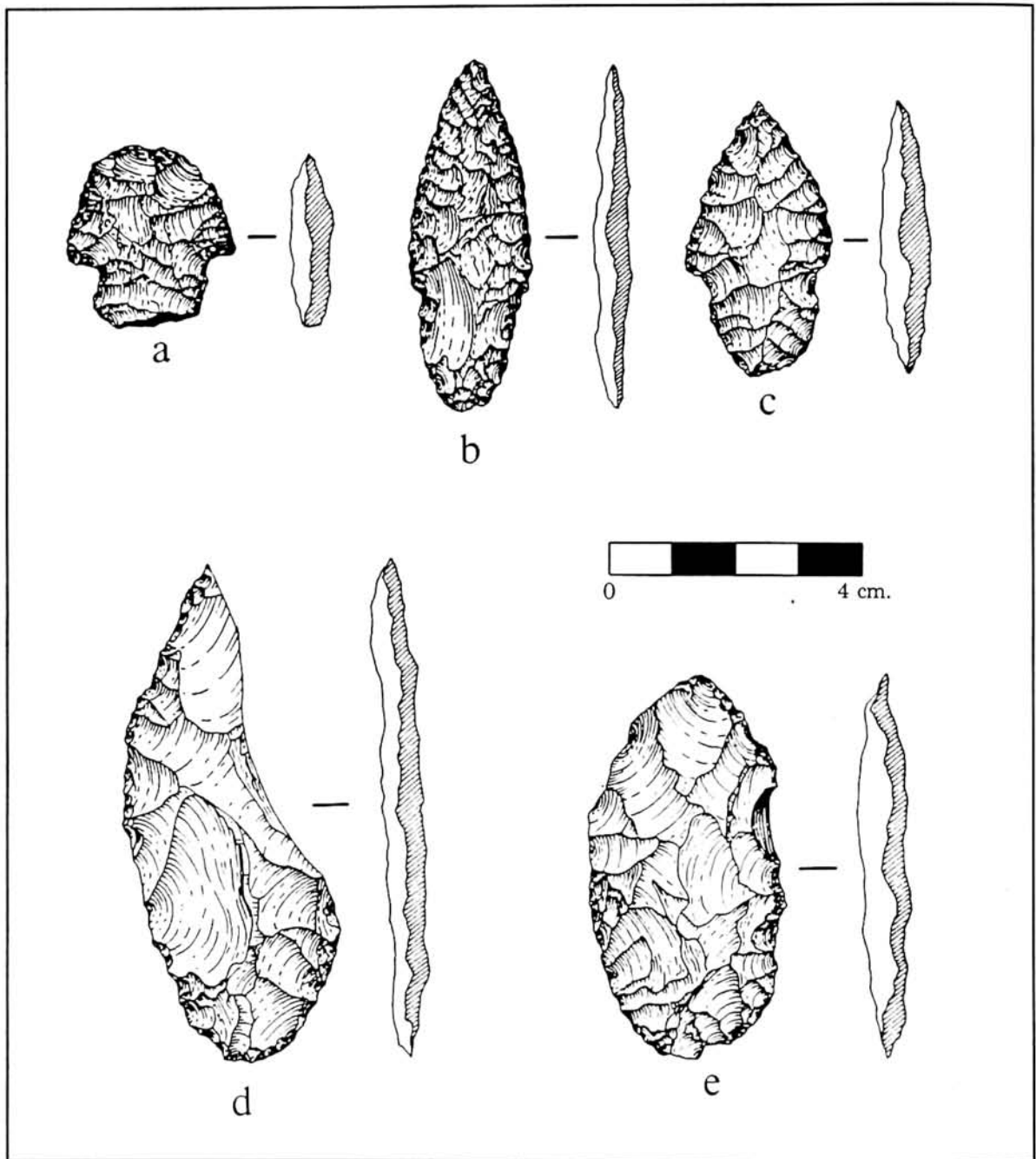


Fig. 3. Selected artifacts at 26NY7920: (a-c) obsidian Great Basin Stemmed projectile points; (d-e) welded tuff bifaces.

Tool densities within these clusters were substantially higher than densities in other areas across the site. The randomly chosen debitage sample units with the greatest numbers of flakes

consistently fell within these concentrations. Therefore, the use of these concentrations as comparable units of analysis is supported. The next step was to determine if there were any dif-

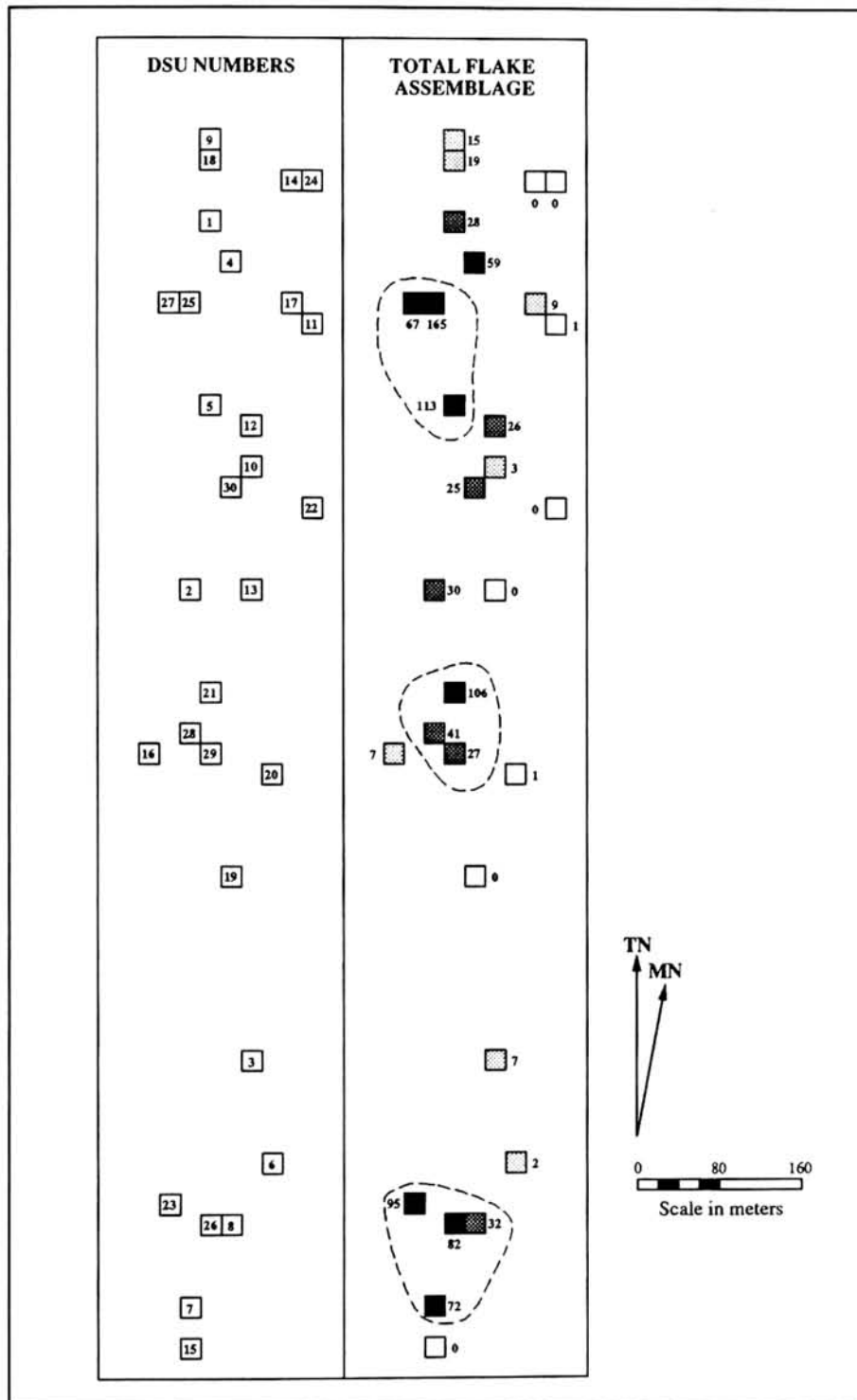


Fig. 4. Location of debitage sample units and stone tool concentrations (flake count per unit is listed next to or below each box; stone tool concentrations are indicated by dashed lines).

ferences in the kinds and proportions of flakes and stone tool types between these clusters and the rest of the site.

Debitage Analysis

In terms of debitage, it was hypothesized that flake assemblages would be similar across the site as a whole. To test this hypothesis, flake types were compared between clustered and nonclustered areas using histograms and chi-square analyses. During in-field analysis, debitage was classified according to six flake types: decortication, core reduction, biface thinning, pressure, shatter, and indeterminate. If the above hypothesis proved to be true, then the relative proportions of flake types would be similar throughout the site, whether from clustered or nonclustered areas.

Evaluating flake type assemblages allows inferences to be made about the lithic reduction process. For instance, sites exhibiting all the above flake types are typically inferred to reflect the whole reduction sequence, from initial core shaping to the pressure flaking of a finalized tool. Patterson (1982, 1990) has shown that the bifacial reduction of stone tools produces predictable flake size distributions. When a semilog plot is made of flake size against total percentage, a straight line will be obtained if bifacial reduction is the primary strategy: small flakes will dominate the assemblage, while the percentage of large flakes will be comparatively small (Patterson 1990:553, Fig. 3). By using both of these analytical methods together, bifacial reduction or other flaking strategies can be identified at 26NY7920.

It is important to remember that the following analysis incorporates data collected only from the surface of the site; no subsurface investigations were conducted. Thus, only relatively large debris is represented in the analyzed sample, while small items are underrepresented. This circumstance undoubtedly skews variable quantities, so reduction strategies must be in-

ferred with some care. However, this does not affect identifying whether intrasite patterning is similar or dissimilar between the various locations across the site.

Welded Tuff. A summary of welded tuff flake types at 26NY7920 is presented in Figure 5. Decortication flakes constitute 12% of the total welded tuff assemblage, ranging from as low as 6% in the southern cluster to as high as 16.5% in the northern cluster. Core reduction flakes comprise 39% of the assemblage, ranging between 37% and 44% in the various locations. Pressure flakes and shatter constitute similarly low proportions in all areas, except in the northern cluster, where shatter comprises 8% of the assemblage (as compared to 1% to 2% in any other area). Indeterminate flakes make up 14% overall, ranging from 9% to 16.5% in separate locations. These data show that there is only limited proportional variation in the above flake types. However, the northern cluster does exhibit higher percentages of both decortication flakes and shatter; these kinds of artifacts are indicators of early stage core or biface reduction.

Biface thinning flakes are the only type that appears to vary widely across the site. While these flakes comprise 29% of the welded tuff assemblage, all of the clusters, with the exception of the northern one, exhibit somewhat higher proportions than the overall average. In the northern cluster, biface thinning flakes make up only 18% of the assemblage. When this is coupled with larger percentages of both decortication flakes and shatter, a clear pattern of early stage core or biface reduction can be inferred for welded tuff in the northern cluster.

When a chi-square and residual analysis of the welded tuff flake type data was performed, considerable variation was exhibited across the surface of the site (Table 3). The overall chi-square value of 62.799 is significant at a probability of 0.005. Examining individual adjusted cell residuals allowed for an evaluation of the

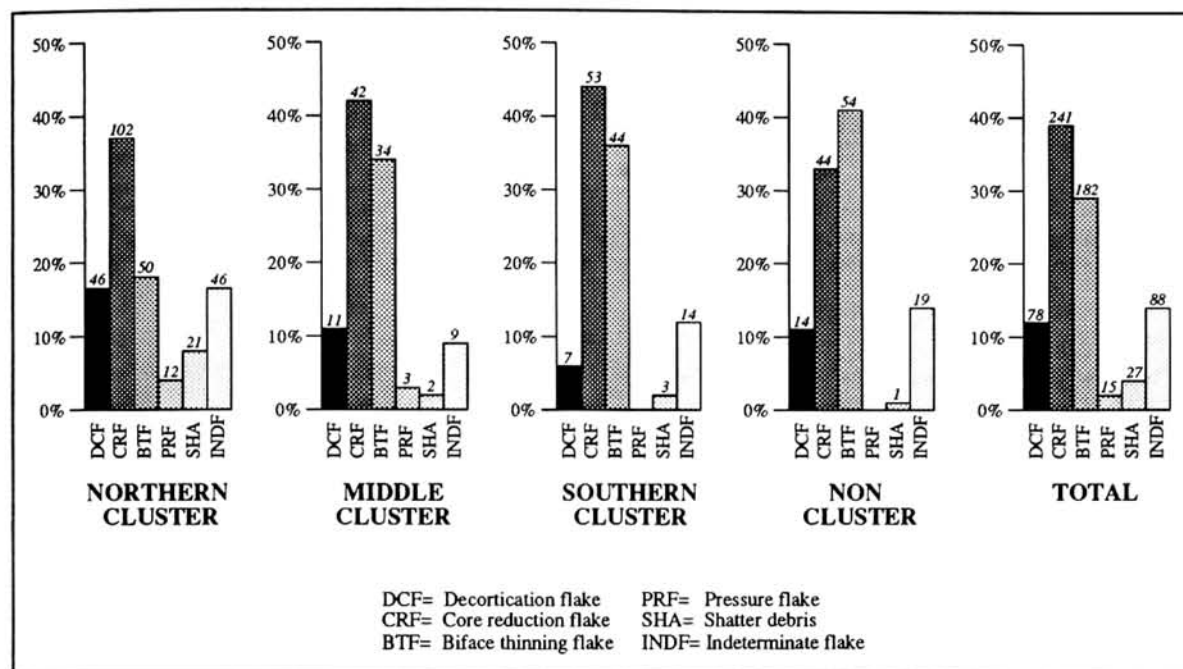


Fig. 5. Welded tuff flake type histograms.

strength and directionality of cell deviations from probabilistic expectations. Adjusted cell residuals of ± 1.95 are significant at a 0.05 level (two standard deviations from the expected cell mean), while residual values of ± 1.00 are significant at a 0.32 level (one standard deviation from the expected cell mean).

What is clear from the results shown in Table 3 is that the types of welded tuff debitage in the northern cluster were considerably different from the rest of the site. Decortication and shatter flakes were considerably more abundant than expected, while biface thinning flakes were well under expectations. Pressure flakes were also found in great abundance. The inference is that, in fact, much more initial core reduction was taking place in the northern cluster, and it may be that the overabundance of pressure flakes was related to platform preparation rather than to tool finishing. Absolute counts of shatter and indeterminate flakes were somewhat low in the middle cluster. In the southern cluster, welded tuff reduction appeared weighted towards

interior core reduction and tool thinning, as evidenced by the significant absence of decortication and somewhat low numbers of pressure and shatter flakes. Finally, nonclustered areas had an overabundance of biface thinning flakes, with low numbers of pressure and shatter flakes.

With the exception of the northern cluster, these data suggest that the reduction of welded tuff toolstone focused on interior reduction and tool thinning. The northern cluster, however, showed considerable patterned differences in the kinds and proportions of welded tuff flake types present, with significantly higher quantities of decortication and shatter flakes, and very low numbers of biface thinning flakes. Here, initial core reduction and shaping seemed to have taken place. This cluster was also associated with five concentrations of welded tuff cores and large flakes, further supporting this inference.

The frequency of welded tuff flake sizes by percent is presented in Figure 6. The welded tuff distributions from the surface of the site do not exhibit a straight line from the upper left of

Table 3
 WELDED TUFF FLAKE TYPE AT 26NY7920:
 ADJUSTED CELL RESIDUAL AND CHI-SQUARE MATRIX

Location	Flake Type ^a					
	DCF	CRF	BTF	PRF	SHA	IND
Northern cluster	2.08	-0.45	-3.56	2.15	2.70	1.24
	4.34	0.20	12.65	4.61	7.29	1.54
Middle cluster	-0.43	0.60	0.91	0.38	-1.12	-1.39
	0.19	0.36	0.82	0.14	1.25	1.92
Southern cluster	-2.09	1.05	1.57	-1.69	-0.97	-0.58
	4.36	1.11	2.46	2.87	0.94	0.51
Noncluster	-0.58	-0.92	2.66	-1.77	-1.97	0.14
	0.34	0.84	7.06	3.13	3.86	0.02
Mean	=				26.458	
Variance	=				584.176	
Standard Deviation	=				24.170	
Chi-Square	=				62.799	
Degrees of Freedom	=				15	
Probability	=				<0.005	

^a DCF = decortication flakes, CRF = core reduction flakes, BTF = biface thinning flakes, PRF = pressure flakes, SHA = shatter, IND = indeterminate.

the graph to the lower right; such a distribution has been shown to reflect a biface reduction sequence (Patterson 1982, 1990). Furthermore, all locations, whether clustered or nonclustered, had very similar distributions that were dominated by flakes between 25 and 50 mm. in size (size grade 4), with dramatically smaller proportions of flakes that were immediately smaller or larger. Very small flakes no doubt were missed due to the lack of subsurface investigations. However, ongoing analyses at 26NY1011 (a large welded tuff quarry) and at 26NY8187 (Haynes 1995) suggest that only flakes that are smaller than 13 mm. (size grade 7-8) are generally underrepresented from surface collections when a loose surface stratum is present. The immediate environment at 26NY7920 is very similar to these other two sites, and it is likely that only the smallest of flakes were missed during in-field analysis. If subsurface scrapes had

occurred within the debitage sample units, size grade distributions may likely have been bimodal, with a peak representing flakes smaller than 13 mm. and another for flakes between 25 and 50 mm. The strong modal character of welded tuff debitage (Fig. 6) is due, in part, to the bias present in surface analyses towards larger flake sizes. However, this modality may reflect a tendency for this toolstone to be used at the site for a variety of tools that do not leave a strict bifacial reduction sequence (e.g., flake cores and unifacial tools; cf. Beck and Jones 1990b; Basgall 1994; Basgall and Hall 1994).

In general, welded tuff debitage was demonstrated to be similar throughout most of the site, as evidenced by the nearly identical flake size distributions for both clustered and nonclustered spatial contexts. Flake type data did show significant variation. For the most part, though, this was derived from the northern cluster where in-

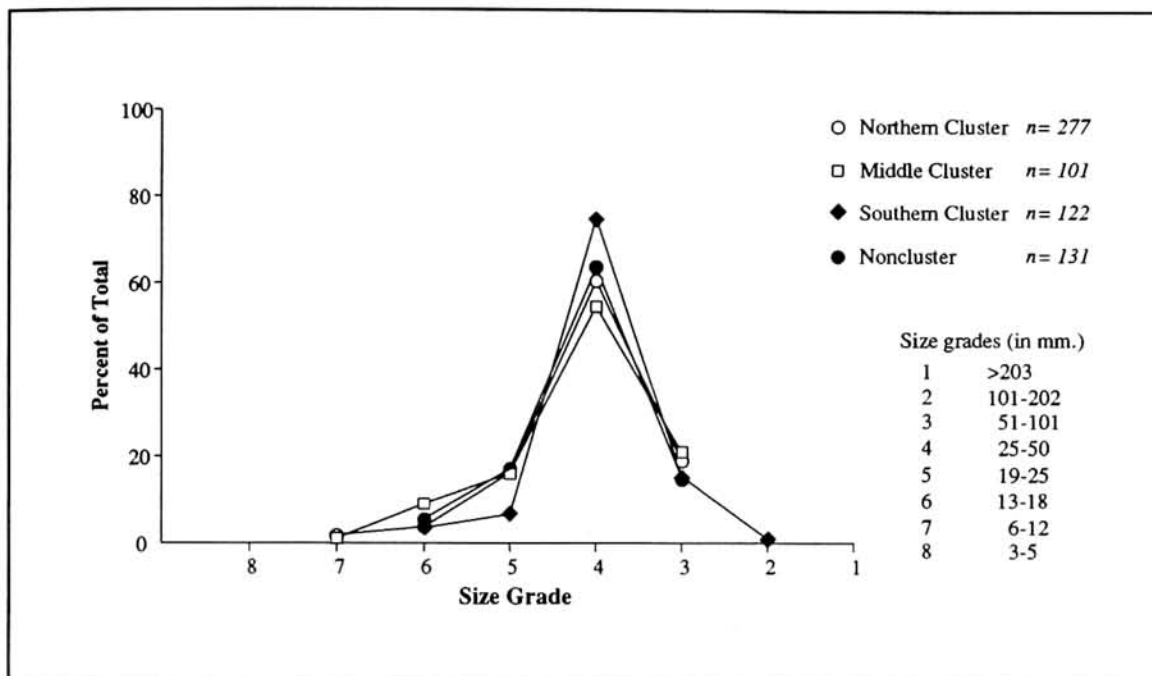


Fig. 6. Welded tuff flake size grade by percent of total assemblage.

dividual cell values accounted for nearly half of the total chi-square. Other locations exhibited minor fluctuations from statistical expectations. While it appears that the initial process of tool-stone reduction may have been segregated at 26NY7920, it also may be that one or more discrete episodes of welded tuff core reduction created the debris.

Obsidian. The obsidian flake type assemblage (Fig. 7) showed some variability. While the proportions of decortication, core reduction, and biface thinning flakes were similar across the site, some proportional variation appeared to exist among pressure, shatter, and indeterminate classes. Decortication flakes, ranging from 11% to 19.3%, comprised similar proportions for each assemblage. Core reduction flakes comprised 23% of the total obsidian assemblage, with proportions ranging from as low as 19% to as high as 26%. Biface thinning flakes (the most common flake type) made up 28% of the assemblage, with similar percentages in all but the northern cluster, which had a low of 19%.

Pressure flakes had similar numbers and proportions in each of the clustered areas, but were slightly more abundant in nonclustered contexts. Shatter flake proportions were similar in clustered areas, while they were particularly low in nonclustered areas. Indeterminate flakes comprised similar proportions in all areas but the southern cluster.

Interpreting the subtle variation in these patterns is difficult, particularly in light of low overall quantities within any specific location. Although not presented graphically herein, a chi-square analysis of these data was performed, and a value of 18.995, with an associated probability of greater than 0.10, resulted. An examination of adjusted cell residuals showed that only shatter flakes in nonclustered contexts were in significantly low numbers. Conversely, these types of flakes were found in somewhat greater quantities in the northern and middle clusters. Indeterminate flakes were found in somewhat greater abundance in the southern area. Differences in the amount of shatter between clustered and non-

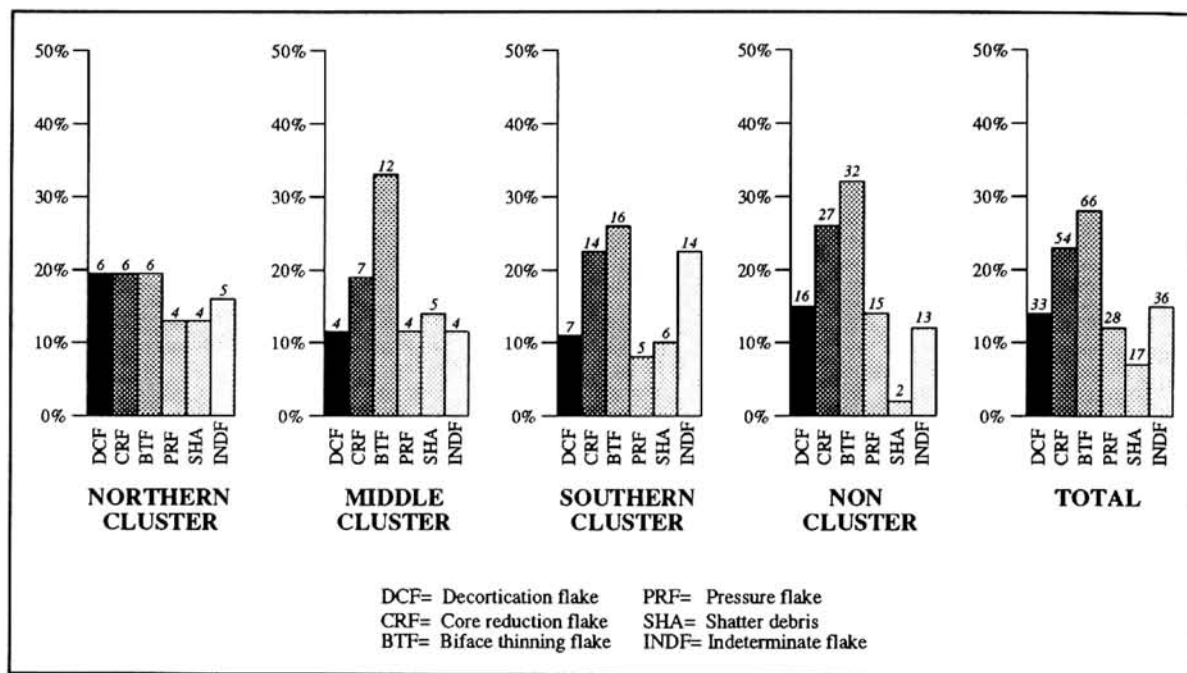


Fig. 7. Obsidian flake type histograms.

clustered areas likely denote increased reduction activities within concentrations. It may be that the indeterminate flakes in the southern cluster were shatter as well. Although absolute counts and proportions were slightly different across the site, there were no patterned differences in the flake types found in different areas. In terms of the overall reduction process, the inference is that, at least when obsidian was used, the whole range of lithic reduction occurred throughout the site.

The obsidian flake percentages by size grade was more meaningful in terms of interpreting the reduction process for this material class (Fig. 8). As with the welded tuff assemblage, obsidian flake distributions do not reflect a bifacial reduction sequence as outlined by Patterson (1990). In three of four locations across the site, size distributions were very similar. There were negligible quantities of flakes smaller than 5 mm., with successively larger quantities of flakes between the size grades ranging from 6 to 19 mm., with a modality at 19 to 25 mm.

There was a drop in the number of flakes between 25 and 50 mm., with only one obsidian flake larger than 50 mm. recorded. Only the middle cluster showed a significant departure from this trend. The higher proportions of large flake sizes in the middle cluster might suggest increased early stage reduction or a desire for specific large-sized flakes or, more likely, might be related to low sample size. Previous research at Yucca Mountain showed that obsidian is locally abundant, although nodules are typically small (Department of Energy 1990). The reduction of local obsidian has been shown to reflect a sectioning technique, or a split-cobble reduction strategy (Schiffer 1976:105; Reno et al. 1989: 81-82; Jones 1995:94-95). The obsidian flake size distributions at 26NY7920 probably reflect this strategy.

The differences in the proportions of obsidian flake types were minor, and not considered to be significant. Flake size distributions were also similar within all but the middle cluster. The distribution of this cluster may be due to a num-

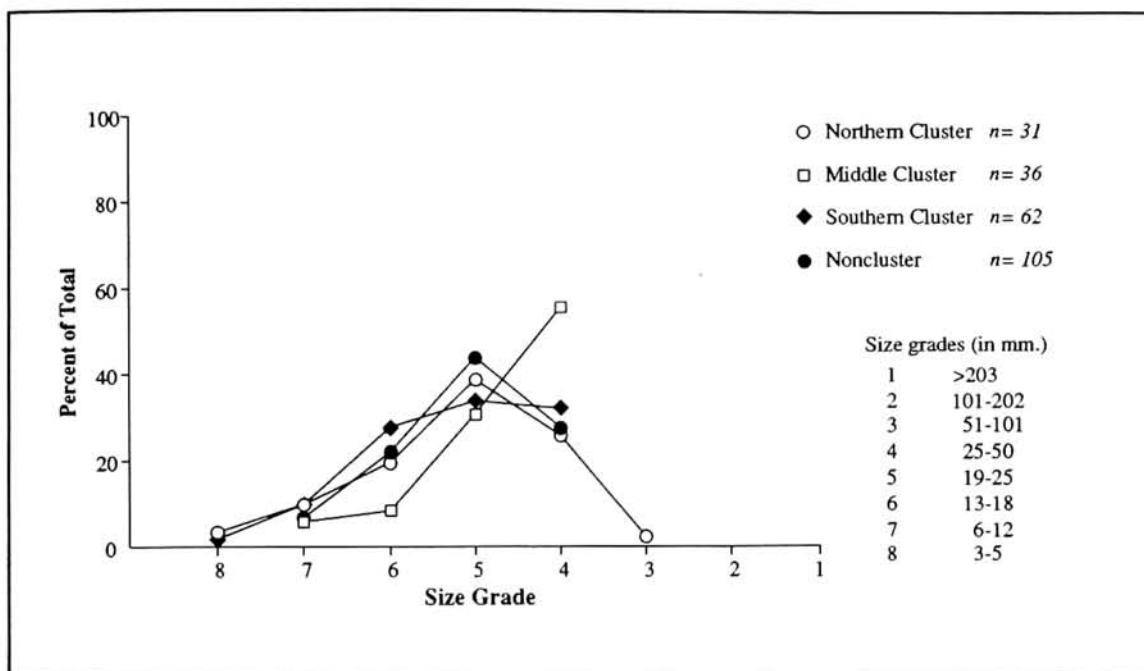


Fig. 8. Obsidian flake size grade by percent of total assemblage.

ber of factors, but is most likely the result of small sample size ($n = 36$). Based upon flake types, the whole range of the reduction sequence at 26NY7920 is reflected in the obsidian debitage. This is to be expected, since small obsidian nodules can be found throughout the alluvium along Fortymile Wash. Furthermore, flake size distributions are inferred to reflect a split cobble or sectioning reduction strategy (cf. Schiffer 1976; Reno et al. 1989; Jones 1995).

Phenocrystic Chert. Flake type proportions for phenocrystic chert debitage are summarized in Figure 9. Although there was a total of 95 chert flakes, quantities within specific areas were extremely low. Therefore, any inference made with these data must be viewed with caution. What is evident is that all the assemblages exhibited similar trends. No decortication flakes were found and biface thinning flakes dominated all the assemblages. Core reduction flakes comprised 20% of the total phenocrystic chert debitage, with 15% in nonclustered contexts, and ranging between 23% and 29% in clustered lo-

cations. Biface thinning flakes constituted 60% of the total phenocrystic chert assemblage, ranging from as high as 73% ($n = 30$) in nonclustered locations to as low as 38% ($n = 8$) in the northern cluster. Low proportions of pressure and shatter flakes were also found throughout, with only five of each identified. Indeterminate flakes comprised between 10% and 20% of the flakes, except in the northern cluster, where they comprised 23% of the assemblage.

A chi-square analysis of the data supported the proposal that there are only slight variations in flake type quantities between areas. The chi-square value of 14.951 is not significant at a 0.10 probability level, and none of the adjusted cell residuals exhibited values that are significant at a 0.05 level. Although several minor residual variations (± 0.32) exist, the inordinately low numbers of phenocrystic flakes make any inferences tenuous at best. The data indicated that there was little or no evidence of early stage core reduction. The relatively high proportions of biface thinning flakes suggest that the reduc-

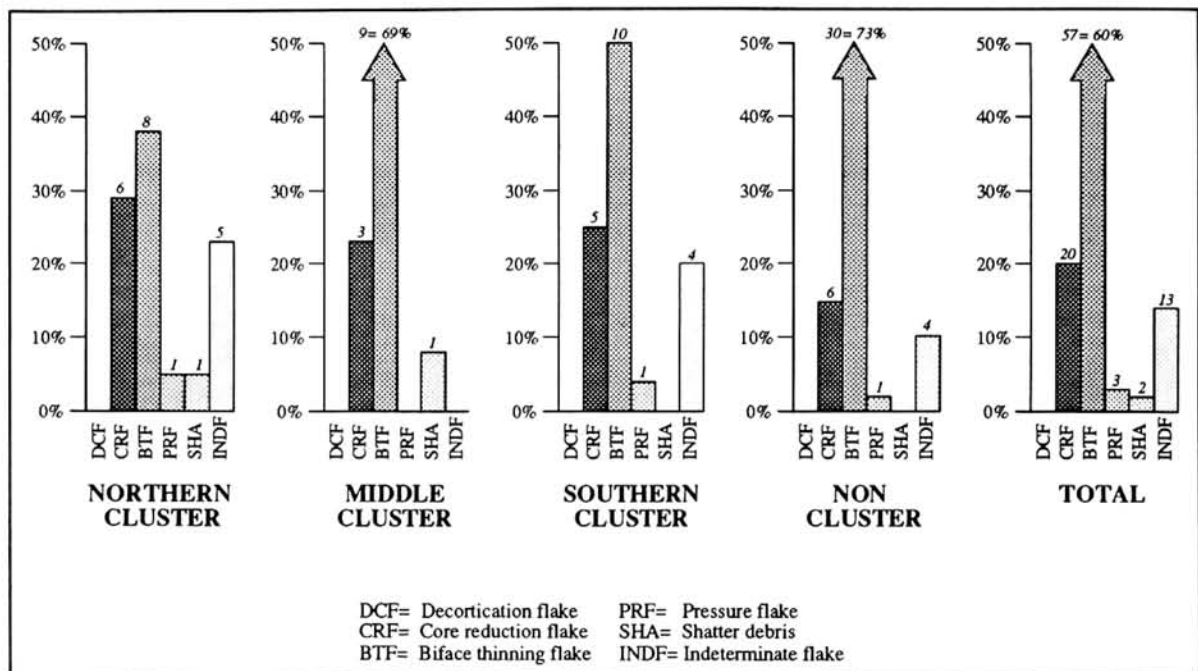


Fig. 9. Phenocrystic chert flake type histograms.

tion strategy was likely focused on tool thinning or shaping. Despite the fact that there were only a few pressure flakes, many of the indeterminate flakes had thin lateral margins, indicative of later stages in the reduction process. The preponderance of biface thinning and indeterminate flakes, with a concomitant lack of decortication debris, suggests that relatively complete tools or purposefully shaped cores were brought to the site for completion and/or use.

The percentages of flake size grades for phenocrystic chert in clustered and nonclustered locations are shown in Figure 10. They mimic Figure 9 in that all of the distributions are similar, with low proportions of very small debitage (less than 20 mm.) and a preponderance of flakes between 20 and 50 mm. Only two flakes larger than 50 mm. were found. Debitage size grade distributions do not reflect a bifacial reduction sequence, as discussed above. No doubt very small phenocrystic chert flakes were not identified in the surface analysis. If surface

scrapes had taken place within the debitage sample units, it is likely that the phenocrystic chert flake size distribution would be bimodal or truncated. The inference is that the reduction of phenocrystic chert reflects a strategy focused either on the thinning or sharpening of tools, or on obtaining specific size flakes for unifacial or utilized flake tools.

Like obsidian, debitage assemblages for phenocrystic chert were similar in kind and proportion across the entire site. Unlike welded tuff and obsidian, though, the full range of the reduction process using phenocrystic chert did not take place at 26NY7920. The small number of phenocrystic chert core reduction and shatter flakes and the high proportion of biface thinning flakes suggest that the initial stages of the reduction process for this toolstone occurred offsite. It is posited, then, that prepared phenocrystic chert tool products were transported to the site in the form of bifacial or unifacial tools, or as prepared cores for the manufacture of flakes.

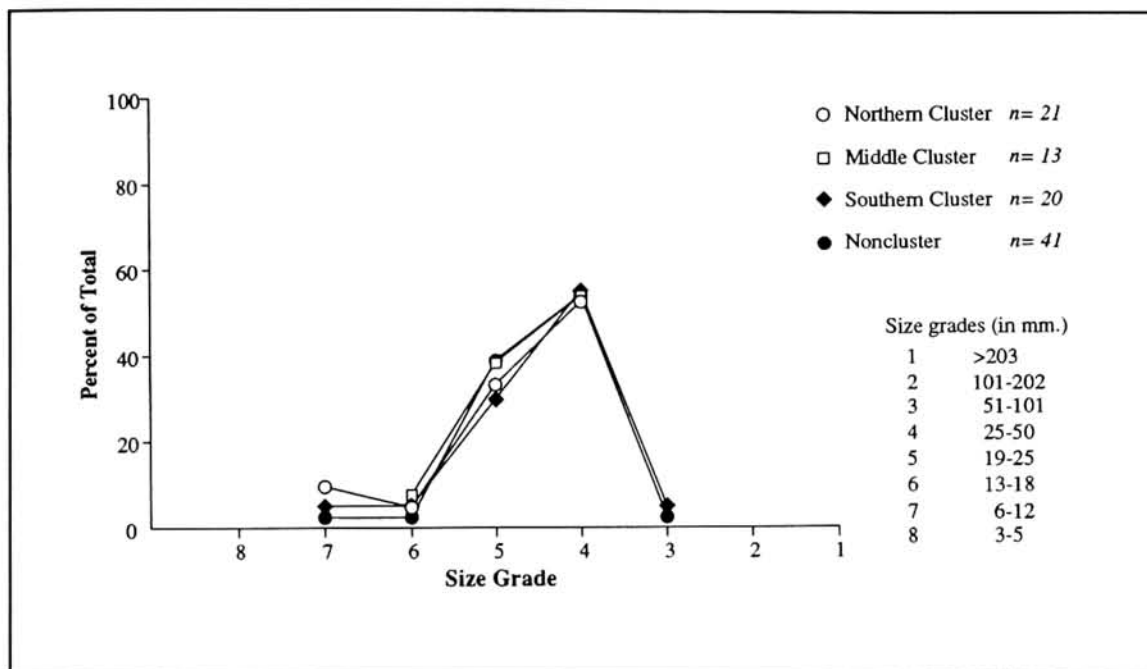


Fig. 10. Phenocrystic chert flake size grade by percent of total assemblage.

Stone Tool Analysis

Determining whether various stone tools were located in the same relative proportions across 26NY7920 was the next step in the analysis. If relative tool quantities varied little from place to place, then the inference is that techno-functions were highly similar, and that the rate of artifact manufacture, use, and discard remained constant throughout several thousand years of site occupation. On the other hand, if differences occurred, then it is possible that functionally or technologically differentiated activity areas could be posited, or that some other factors, such as increased depositional rates associated with several intense periods of occupation, affected the overall distribution of tool types.

The kinds and proportions of tools found in clustered and nonclustered areas at the site are shown in Table 4. Projectile points were found in similar proportions throughout. They comprised 14% of the assemblage of the northern

cluster ($n = 6$), to as high as 20% in the middle and southern assemblages. Biface stage forms dominated all three clustered tool assemblages, comprising 44% in the northern and 30% in the middle and southern clusters. This tool type comprised only 19.5% of the tool assemblage in nonclustered locations. Variation in these proportions may suggest some differential use of biface stage forms between clustered and nonclustered space. Other types of bifacial and unifacial tools are uncommon at 26NY7920.¹ They contributed no more than 3% ($n = 1$) in any clustered assemblage and up to three such tools (6.5%) in more dispersed locations.

The middle cluster exhibited some substantial differences in the overall proportions of several tool classes as opposed to the rest of the site. Scrapers made up only 7.5% of the tool assemblage in the middle area, while in the northern, southern, and nonclustered areas, they comprised 12% to 17.5%. The proportions were quite different for utilized flakes in the middle cluster, where 35% of the assemblage was com-

Table 4
SUMMARY OF TOOL TYPE BY LOCATION AT 26NY7920

Location	Projectile Points	Bifaces	Bft/Uni*	Scrapers	Utilized Flakes	Cores/Hammers	Totals
Northern cluster	6	19	0	5	4	9	43 (27%)
Middle cluster	8	12	1	3	14	2	40 (25%)
Southern cluster	6	9	1	5	5	4	30 (19%)
Noncluster	7	9	3	8	8	11	46 (29%)
Totals	27 (17%)	49 (31%)	5 (3%)	21 (13%)	31 (19.5%)	26 (16.5%)	159
	Mean		=		6.625		
	Variance		=		150.603		
	Standard Deviation		=		12.272		
	Chi-Square		=		24.218		
	Degrees of Freedom		=		15		
	Probability		=		0.05 > 0.10		

* Bft = bifacial tools; Uni = unifacial tools.

posed of this tool type. Utilized flake proportions in other locations were at most half that. Cores and hammerstones constituted 21% to 24% of tool assemblages from the northern cluster and noncluster locations, and 13% from the southern assemblage, but only 5% ($n = 2$) from the middle cluster.

A chi-square test was performed to evaluate whether differences in the absolute numbers of tool types per location are significant (Table 5). The chi-square value of 24.218, with 15 degrees of freedom, is not significant at a probability of 0.05. It is, however, significant at a probability of 0.10. While eight of 24 cells exhibited residuals greater than one standard deviation from statistical expectations ($p < 0.32$), only one has an associated probability less than 0.05, and nearly half of the overall chi-square value was derived from the middle cluster. While this cluster had somewhat fewer scrapers than expected, the number of utilized flakes was over two standard deviations above probabilistic expectations. The numbers of cores and hammerstones were also somewhat low. Bifaces were somewhat abundant in the northern cluster, but less so in nonclustered locations. Of the 19 bifaces found in the northern cluster, 14 are

made of welded tuff. This is not surprising, as welded tuff debitage dominated the flake assemblage in this portion of the site. Moreover, there were no bifacial and unifacial tools (not including scrapers) found in the northern area. There were also relatively low numbers of utilized flakes in the northern cluster. Along with low numbers of bifaces, more dispersed areas show relatively high numbers of cores. The low overall significance level of the chi-square test, coupled with relatively weak statistical variation within individual cells (Table 5), does not warrant an inference that segregated activity areas existed across the surface of 26NY7920. Rather, this variation is believed to be related to distinct occupational events that exhibit slight dissimilarities in the intensity of artifact production, use, and discard.

Summary of Analysis

Some technological variation has been identified at 26NY7920. In terms of debitage, only welded tuff flake types in the northern cluster demonstrated significant patterned differences. The reduction of welded tuff in this area appeared focused upon initial core reduction, while the rest of the site was likely geared towards

Table 5
 TOOL TYPE BY LOCATION AT 26NY7920:
 ADJUSTED CELL RESIDUAL AND CHI-SQUARE MATRIX

Location	Projectile Points	Bifaces	Bft/Uni*	Scrapers	Utilized Flakes	Cores/Hammers
Northern cluster	-0.49	1.65	-1.17	-0.29	-1.56	0.76
	0.24	2.72	1.36	0.08	2.42	0.58
Middle cluster	0.47	-0.10	-0.23	-1.01	2.28	-1.81
	0.22	0.01	0.05	1.02	5.18	3.29
Southern cluster	0.41	-0.08	0.06	0.53	-0.36	-0.42
	0.17	0.01	0.00	0.28	0.13	0.17
Noncluster	-0.30	-1.44	0.30	0.80	-0.33	1.30
	0.09	2.07	1.69	0.63	0.11	1.68

* Bft = bifacial tools; Uni = unifacial tools.

tool shaping and thinning. However, no differences were found across the site in terms of welded tuff flake size distributions. Obsidian debitage reflected the whole range of the reduction process, and flake size distributions support the inference that split cobble technology was the preferred style of tool manufacture. The phenocrystic chert assemblage lacked decortication flakes, and was dominated by biface thinning debris; reduction appeared focused on the finishing or refurbishing of tools or the production of flakes. Although obsidian and phenocrystic chert have very different reduction strategies, the activities that involved each individual toolstone were highly similar from one portion of the site to another. The subtle differences found at various locations are believed to be the result of analytic bias, sample size, or slight differences in depositional events. Differences in reduction strategies for each material type suggest that different types may have been used for the manufacture of different kinds of tools (see below).

While some differences in tool distributions were evident, overall patterning suggested that these were only minor variations (Table 5). There were somewhat larger numbers of biface

stage forms in the northern cluster, with lower quantities of utilized flakes. Conversely, fewer bifaces were located in nonclustered areas, while somewhat more cores were found. Most of the variation, however, comes from the middle cluster; there are slightly fewer scrapers, an abundance of utilized flakes, and only a few cores or hammerstones.

Taken as a whole, these differences were not found to be statistically significant. The composition of artifact concentrations and areas of artifact dispersion are, therefore, not interpreted as substantively different. The variation in flaked stone assemblages are inferred to be more indicative of periodic occupational episodes that have only slight differences in artifact production, use, and discard, rather than segregated activities. Tool class variation at sites in the north-central Mojave also attest to similar, albeit subtle, differences overall (Basgall 1994; Basgall and Hall 1994). This does not mean that stone tool function was entirely the same throughout WST assemblages. It may be that the identification and enumeration of gross tool classes (i.e., projectile points, biface stage forms, unifacial and utilized flake tools) are not sensitive enough indicators of functional variation. The kinds and

amounts of edgewear along tool margins may prove to be better indicators of these things, while the enumeration of gross tool and material classes may be better indicators of topographic, geographic, or inter- and intrasite occupational intensity.

Toolstone Selectivity

Toolstone selectivity is known to be influenced by many different factors, including acquisition strategy (Binford 1979; Bamforth 1986), the geographic distribution of quarries (Beck and Jones 1990b; Bamforth 1992), and raw material quality and abundance (Hartwell and Amick 1993; Andrefsky 1994), among others. Despite differences in a number of the above factors, Western Stemmed Tradition assemblages at Butte Valley in the central Great Basin (Beck and Jones 1990b) and at Fort Irwin in the north-central Mojave Desert (Basgall 1994; Basgall and Hall 1994) exhibited similar, highly patterned use of certain toolstones for specific tools.

While obsidian is found in limited quantities at some Fort Irwin sites, the use of the material for projectile points, as opposed to most other tool forms, appeared to be favored (Basgall 1994:67, Table 6). This same observation is true for sites in Butte Valley, although obsidian is just as common for bifacial tools (Beck and Jones 1990b:289). In both the Fort Irwin and Butte Valley regions, there is a strong association between cryptocrystalline silicates and unifacial tools, such as scrapers, and utilized flakes (Beck and Jones 1990b:294; Basgall 1994:67, Table 6). Basalt and basalt-like materials consistently make up a large proportion of bifaces, as well as some projectile points and flake tools (Beck and Jones 1990b:293; Basgall 1994:65).

The kinds of reduction strategies employed at 26NY7920 vary according to the type of toolstone in question. When coupled with the above information, this suggests that different raw material types may have been used for specific

tool forms near Yucca Mountain. Were specific toolstones selected for specific tool classes at Yucca Mountain? Data collected during in-field analysis provided an opportunity to address this question. If site occupancy occurred repeatedly over several millennia, this should have the net effect of evening out covariation between toolstones and tool types, unless certain materials are consistently used for specific tools over the entire length of occupation.

The raw data for a chi-square analysis are presented in Table 6, while the adjusted cell residuals and chi-square values are shown in Table 7. The data do not include the "other" bifacial or unifacial tool category because of exceedingly low values, and lumps all scrapers and utilized flakes together. The chi-square value of 92.30, with nine degrees of freedom, is significant at a probability of less than 0.005. This value reflects a great deal of covariation between material types and tool classes. Individual adjusted cell residuals (Table 7) show the strength and directionality of the different material types for specific tool classes. Obsidian was consistently selected for the manufacture of projectile points. The absolute number of obsidian projectile points was more than four standard deviations above what would be expected, given associated row and column probabilities. Conversely, welded tuff does not appear to be associated with this tool class; its value is nearly three standard deviations below probabilistic expectations.

In terms of biface stage forms, phenocrystic chert had far fewer than expected, while welded tuff had many more. Each of these material types is more than two standard deviations away from probabilistic expectations; phenocrystic chert is not used for biface stage forms, while welded tuff was consistently used to manufacture such tools. Utilized flakes and scraper tools were consistently made of phenocrystic chert. The cell residual is over four standard deviations above what would be expected, given row and

Table 6
TOOL TYPES BY MATERIAL AT 26NY7920

Tool Class	Material				Totals
	Obsidian	Phenocrystic Chert	Welded Tuff	Other	
projectile points	20	3	2	2	27 (17.5%)
bifaces	13	2	30	4	49 (32%)
utilized flakes/scrapers	8	23	12	8	51 (33%)
cores/hammers	2	0	22	3	27 (17.5%)
Totals	43 (28%)	28 (18%)	66 (43%)	17 (11%)	154
Mean	=		9.625		
Variance	=		141.088		
Standard Deviation	=		11.878		
Chi-Square	=		92.30		
Degrees of Freedom	=		9		
Probability	=		<0.005		

column probabilities. The "other" material type category is also positively associated with utilized flakes and scrapers. This category consisted primarily of what is believed to be non-local chert and chalcedony. Obsidian and welded tuff did not appear to be selected nearly as often for the manufacture of such tools. Finally, there were far greater numbers of welded tuff cores and hammerstones than expected, while only a small number of these tools were made from other material types.

What is clear is that toolstone use at 26NY7920, and probably throughout WST sites near Yucca Mountain, was highly patterned. Material type selection for specific tool classes mimics that found at other WST sites located in the central Great Basin (Beck and Jones 1990b) and in the north-central Mojave Desert (Basgall 1994; Basgall and Hall 1994). This pattern appears to have been followed regardless of access to, and geographic distribution of, various toolstone quarries.

Obsidian is locally abundant throughout the Yucca Mountain region; consequently, projectile points were made almost exclusively of this material. Obsidian appears to be scarce in Butte

Valley and at Fort Irwin. When obsidian tools are found in these regions, they are most often in the form of projectile points, although basalt-like materials appear to have played an important role when obsidian points were exhausted (Beck and Jones 1990b:290; cf. Basgall 1994: 67, Table 6; Basgall and Hall 1994:74). At 26NY7920, welded tuff—a basalt-like material—is found primarily in the form of biface stage forms, cores, and hammers. Tools made from similar materials at WST sites in other regions are typically biface stage forms as well. The functional role of these tools as knife-like cutting implements appears questionable, and in Butte Valley and at Fort Irwin they have been inferred to be multipurpose tools, such as knives or flake cores, or as reducible into points or other bifacial tool forms (Beck and Jones 1990b:292; Basgall and Hall 1994:76). This same inference appears to be true at 26NY7920.

Table 6 suggests that at 26NY7920, welded tuff was not heavily used for unifacial or utilized flakes. However, the number of such tools made of tuff is ranked second overall, and Table 2 indicates that there is only one more utilized flake made out of phenocrystic chert than of

Table 7
**TOOL TYPES AT 26NY7920:
 ADJUSTED CELL RESIDUALS AND CHI-SQUARE MATRIX**

Tool Class	Material			
	Obsidian	Phenocrystic Chert	Welded Tuff	Other
projectile points	4.66	-0.88	-2.93	-0.57
	21.71	0.77	8.50	0.33
bifaces	-0.19	-2.39	2.11	-0.61
	0.04	5.70	4.44	0.37
utilized flakes/scrapers	-1.73	4.65	-2.28	1.03
	3.00	21.63	5.19	1.06
cores/hammers	-2.07	-2.25	3.18	0.02
	4.27	5.07	10.14	0.00

welded tuff. An inference that welded tuff is often used to produce utilized flakes is also supported by the modal flake size distribution noted in Figure 6, suggesting a desire for specific size flakes, rather than the reduction of these artifacts into finished knives or points. Since obsidian was locally available, welded tuff was generally not used for these artifacts, except when very large forms were needed (see Table 1). It is in the form of scrapers that phenocrystic chert is overabundant (see Table 2). Although phenocrystic chert is found in the general region, based upon debitage and tool profiles, it appears to have been brought to the site as prepared tools or, possibly, in the form of flake cores. These findings are entirely consistent with material and tool-kit profiles elsewhere (Beck and Jones 1990b:292-295; Basgall 1994: 65-66).

SUMMARY AND CONCLUSIONS

Activities involving the manufacture and use of flaked stone artifacts appear to have been technologically and functionally similar throughout most of 26NY7920. The inference is that the same kinds of activities resulted in areas of high artifact density, as well as areas of artifact

dispersal. In other words, the same kinds of behaviors were evident throughout site space, while for the most part the segregation of specific techno-functions did not occur. There are probably several interrelated factors involved in producing such a site structure. As noted earlier, the immediate physiography of 26NY7920, and the Fortymile Wash area in general, is exceedingly uniform; paleoenvironmental reconstructions suggest an environment that has seen little change since the terminal Pleistocene (Spaulding 1985:40). Thus, there is no clue to suggest that any position upon the landscape is better suited for occupation than any other. Furthermore, current documentation shows that Early Holocene occupations along Fortymile Wash are spatially and temporally extensive. The extensiveness of this site complex suggests that at any specific location, occupation was short-term and episodic over the course of several thousand years. Most differences in the flaked stone assemblage at 26NY7920 are likely due primarily to slight differences in the rate of artifact production, use, and discard. Other significant variation is believed to be related to momentary changes in techno-function, or occupational intensity. The use of specific toolstone

for certain tools is maintained to be not only highly patterned, but similar to WST sites in other regions. The similarity in artifacts found over such a large site area episodically visited for several thousands of years supports a hypothesis that techno-functional adaptations changed little over the course of human occupation.

One important question remains: What is the behavioral and/or organizational meaning of the high density clusters? The kinds of artifacts imply some form of residential location. Unfortunately, without accounting for depositional rates, artifact diversity, or the range of economic activities taking place within them, the suggestion that they are residential bases or temporary camps is tenuous at best. Attempting to answer such questions should be the primary research orientation for future studies at 26NY7920 and the Fortymile Wash area in general. Future research should focus on characterizing the larger makeup of this specific Early Holocene complex in detail. Additionally, comparisons with contemporaneous sites in other regions are in order (e.g., Fort Irwin in the north-central Mojave and Butte Valley in central Nevada). Such analyses should involve analyzing occupational intensity through space, and, if possible, through time, by comparing artifact densities at different sites. Questions concerning artifact diversity (see Pielou 1975; Dannel 1989) should also be investigated in order to address the range of techno-functional pursuits undertaken by prehistoric peoples.

This analysis not only reports the kinds of artifacts at 26NY7920, but also characterizes the structure of those remains in terms of their spatial distribution, flake and tool assemblages, and toolstone selectivity. Comparable data on other Western Stemmed assemblages is limited to only a couple of locations throughout the Desert West, despite the fact that a great deal of work has been done on these sites. If the earliest

widespread occupation of the west is to be better understood, stone artifacts at these sites need to be analyzed in detail and reported. Data can then be compared, highlighting differences and similarities in technology and/or function among generally contemporaneous sites or with Middle to Late Holocene assemblages, in order to understand regional differences and long-term directional change.

NOTE

1. A bifacial tool is a bifacially manufactured artifact other than a biface stage form or projectile point. While biface stage forms are generally elliptical in form and symmetrical from proximal to distal ends, bifacial tools are typically asymmetrical and can have wide morphological variability from proximal to distal ends (e.g., a drill-shaped object, or an object with multiple points). A unifacial tool is a flake or split cobble exhibiting tool manufacture only on the dorsal surface. Scrapers are a kind of unifacial tool that exhibit stepped-microflaking and steep edges (45° to 90°) along straight or concave tool margins. Scraper tools are also made along the margins of individual flakes.

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