Chapter 5. Lithic Debitage

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A total of 5,615 pieces of lithic debitage—the debris left over from the manufacture, finishing, and repair of chipped stone tools—was collected from the Hayes site during the Southern Oregon University excavations. This included 388 individual specimens recovered from fifteen 50 cm x 50 cm shovel test pits and 5,615 individual pieces recovered from twelve 1 m x 1 m excavation units. These artifacts were recovered from a total of 9.25 m^3 of excavated sediment. Debitage was recovered from sediment screened over ¼-inch hardware cloth during the excavation of the shovel test pits and the northwest, northeast, and southwest 50 cm^2 quads of the excavation units, and from sediment screened over ⅛-inch mesh during the excavation of the southeast quad. All debitage recovered from the Hayes site was counted and sorted by raw material, and all the debitage from the ⅛-inch sample was further sorted according to size, presence or absence of cortex, and by technological categories modified from Sullivan and Rozen (1985). From this sample, those flakes that exhibited a striking platform were further analyzed according to their platform and dorsal surface morphology (Tveskov et al. 2002; Tveskov et al. 1996; Byram and Connolly 1995; Musil and Minor 1995). The Hayes site assemblage could not be subdivided into distinct temporal or spatial components (see Chapter 3), and the debitage from all units was treated as a single assemblage.

Since lithic debitage is the byproduct of the reduction of stone into useful implements, debitage analysis can provide insights into the function of a site. Activities such as raw material acquisition, initial bifacial reduction, final tool preparation, and tool repair are activities related to the availability of raw material, the place of the site in a larger settlement pattern, and cultural and technological traditions (Connolly et al. 1994:127; Sullivan and Rozen 1985). The analysis of the lithic debitage from a site can assist in determining the kinds of lithic reduction that occurred there. The Sullivan and Rozen method, employed for the Hayes site in a modified form, is commonly used as an initial level of categorization, although the information it provides regarding reduction technology is somewhat limited. Nonetheless, this classification method allows for comparability between data sets and is therefore used here as a first level of classification and analysis (e.g. Tveskov et al. 2002; Tveskov et al. 1996; Connolly et al. 1994; Musil and Minor 1995).

Sullivan and Rozen's method views lithic reduction as a continuum rather than a set of discrete stages. Their analysis involves classifying debitage according to whether or not a specimen exhibits a single interior surface; specimens without a single surface are grouped as *debris*. Flakes with a single interior surface are then grouped according to the presence of absence of a striking platform. In our simplified scheme, we classed all flakes with a platform as *platform flakes* (i.e. subsuming the *complete flake* and *broken flake* categories proposed by Sullivan and Rozen) and those without platforms as *flakes without platforms* (i.e.

Sullivan and Rozen's *flake fragments*). These categories can be combined with other data drawn from the assemblage. Since greater amounts of cortex can be expected on flakes produced earlier in the reduction process, specimens with cortex on 100% of their dorsal surface were classified as *primary* flakes (Ahler 1990). Flakes with cortex covering less than 100% of their dorsal surface were classified as *secondary* flakes. Finally, flakes exhibiting no cortex were typed as *interior flakes*.

The Hayes site debitage was also grouped into classes based on size--measured by maximum diameter. Although small flakes can be produced at any time in the reduction sequence, flake size generally decreases from the initial stages of tool manufacture to the final thinning and shaping of a finished tool, or the sharpening and repair of a broken tool (Stahle and Dunn 1982; Patterson and Sollberger 1978). Finally, platform and dorsal surface morphology were noted for platform flakes. Generally, the degree of platform preparation (abrading) and the number of facets on a platform (the result of removing flakes from a previously worked edge) will increase towards the later stages of lithic reduction (Byram and Connolly 1995; Musil and Minor 1995; Raymond 1989). Likewise, while initial core reduction debitage will generally exhibit fewer flake scars on their dorsal surface relative to their area, while flakes resulting from later stage reduction will have a higher dorsal flake scar-to-surface area ratio.

Results

Like most sites in southwest Oregon, the most common raw material represented in the Hayes site debitage assemblage is crypto-crystalline silicate, accounting for 96% (nisp=5013) of the flakes recovered from the excavation units (Table 7, Figure 41). Although a systematic study of the sources of crypto-crystalline silicate material in southwest Oregon is lacking, water worn nodules are commonly found in river gravel bars throughout the region, and in tabular form in metamorphic outcrops, such as at Coquille Point near the mouth of the Coquille River (Tveskov et al. 1996; Musil and Minor 1995). Smaller amounts (nisp=12) of other local material (mostly basalt or schist) was also recovered. Finally, 4% (nisp=202) of the Hayes site debitage assemblage were obsidian pieces that would have been imported from volcanic sources located east of the Cascade Range.

Table 7. Material distribution by site area.

material	Oven Area		Bluff Area		Runway		Total	
	nisp	%	nisp	%	nisp	%	Nisp	%
ccs	2142	95.6	1963	97.8	908	93.3	5013	95.9
obsidian	95	4.2	47	2.1	60	6.2	202	3.8
other	3	0.2	4	0.1	5	0.5	12	0.3
Total	2240	100	2014	100	973	100	5227	100

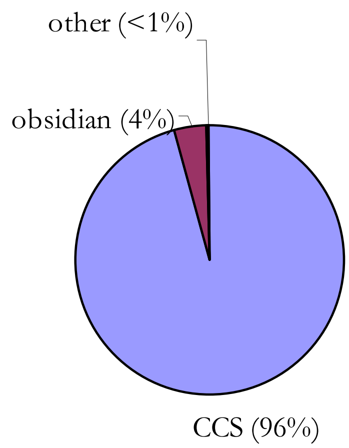

Figure 41. Distribution of material type for the Hayes site debitage.

A total of 2,302 flakes—the ⅛-inch sample recovered from the southwest quad of the excavation units—was categorized according to their type and class (Table 8 and Table 9). Interior flakes dominate the assemblage, accounting for 97% of the crypto-crystalline silicate and 100% of the obsidian specimens. Most (57%) of the crypto-crystalline silicate specimens were classified as flakes without platforms, with 29% of the remainder being flakes with platforms and 14% of the assemblage comprised of the debris. Conversely, most of the obsidian debitage (70%) were flakes with platforms, with 29% of the remainder being flakes without platforms. Only 1% (nisp=1) of the obsidian debitage was classified as debris. The debitage were grouped into the following size classes: less than .5 cm in maximum diameter, 0.5-1 cm, 1-2 cm, 2-3 cm, 3-4 cm, and greater than 4 cm (Table 10, Figure 42). For the most common material classes (i.e. obsidian and crypto-crystalline silicate), the flakes were generally very small. For both obsidian and crypto-crystalline silicate, the majority of the flakes (82% and 69%, respectively) were under 1 cm in size, and fully 100% of the obsidian and 95% of the crypto-crystalline silicate were under 2 cm in maximum diameter.

Table 8. Lithic debitage grouped by material and reduction type.

material	Interior		Secondary		Primary		Total	
	nisp	%	nisp	%	nisp	%	nisp	%
CCS	2108	96.7	59	2.7	15	0.6	2182	100
obsidian	115	100					115	100
other	5	100					5	100
Total	2228	96.8	59	2.6	15	0.6	2302	100

Table 9. Lithic Debitage grouped by material and debitage class.

	flakes with platforms		flakes w/o platforms		debris		Total	
material	nisp	%	nisp	%	nisp	%	nisp	%
CCS	636	29.1	1246	57.1	300	13.8	2182	100
obsidian	81	70.5	33	28.7	1	0.8	115	100
other	1	20	3	60	1	20	5	100
Total	718	31.2	1282	55.6	302	13.2	2302	100

Table 10. Hayes site debitage frequency by raw material and flake size (maximum diameter).

Material	<.5		.5-1cm		1-2cm		2-3cm		3-4cm		>4 cm	
	nisp	%	nisp	%	nisp	%	nisp	%	nisp	%	nisp	%
CCS	405	18.5	1096	50.3	561	25.8	96	4.3	19	0.8	4	0.2
obsidian	32	27.9	74	64.4	8	6.9	0	0	0	0	1	0.8
other	1	20	0	0	4	80	0	0	0	0	0	0
Total	438	19	1170	50.9	573	24.9	96	4.1	19	0.8	5	0.2

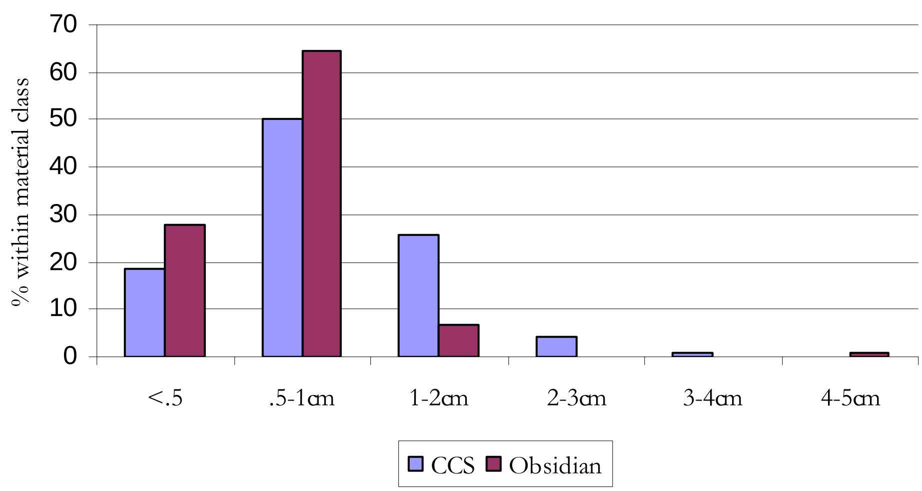

Figure 42. Size distribution of lithic debitage from the Hayes site.

Finally the platform morphology and the number of flake scars on the dorsal surface of all the platform flakes from the ⅛-inch sample were examined. A simple typology was used to classify platform morphology, and flakes were classified as having either a *complex* (multi-faceted or abraded) or *simple* (single faceted) platform (Table 11 and Table 12). This analysis shows some contrast between material types, with 38% of the obsidian flakes and 29% of the crypto-crystalline silicate flakes having complex platforms. To some degree, the obsidian flakes from the site were being struck from more intensely prepared and worked cores. This difference is also noted in measuring the ratio of the number of negative flake scars on the flake's dorsal surface to the overall flake size. For flakes with both complex and simple platforms, the obsidian had a much higher ratio in comparison to the crypto-crystalline silicate.

Table 11. Platform morphology by material.

material	total nisp	# with complex platforms	%
CCS	493	143	29
obsidian	81	31	38.2
Other	1	0	0

Table 12. Attributes of Hayes site flakes with platforms.

	flake size	nisp	mean dorsal scar/area
CCS, simple platform	0-.5 cm	66	4.12±2.67
	0.5-1 cm	266	2.34±1.24
	1-2 cm	130	1.25±0.72
	2-3 cm	31	0.91±0.59
	3+ cm	4	0.93±0.43
	total	**497**	**1.91±1.36**
CCS, complex platform	0-.5 cm	29	5.01±2.30
	0.5-1 cm	74	2.42±1.29
	1-2 cm	32	1.53±0.73
	2-3 cm	6	0.78±0.78
	3+ cm	2	1.00±1.06
	total	**143**	**2.15±1.72**
obsidian, simple platform	0-.5 cm	7	5.43±1.51
	0.5-1 cm	39	2.9±1.90
	1-2 cm	4	1.62±0.63
	total	**50**	**3.31±1.94**
obsidian, complex platform	0-.5 cm	11	6.73±1.35
	0.5-1 cm	18	3.94±1.61
	1-2 cm	2	2.00±0.71
	total	**31**	**4.22±2.38**

Summary

According to Sullivan and Rozen (1985), higher percentages of flake fragments and complete platform flakes might be expected to be produced by final tool preparation from blanks or bifaces or from the repair of damaged tools, whereas reducing large cores into bifaces or blanks results in the production of larger proportions of debris as well as primary and secondary flakes. The Hayes site debitage assemblage is relatively small and of a low density in comparison to other southwest Oregon sites (e.g. summary information in Tveskov et al. 2002:123; Winthrop et al. 1993:105-108) and is characterized by a relatively low proportion of large debris or cores in favor of relatively small interior flakes. The quarrying of lithic material or the initial reduction of stone into bifaces or blanks are clearly not activities indicated by the sample analyzed here. The size, type, class, and platform and dorsal surface morphology of the Hayes site assemblage is thus most indicative of the final stages of the lithic reduction and the repair of chipped stone tools. On the basis of our analyzed debitage assemblage, it seems reasonable to suggest that the occupants of the areas of the Hayes site examined by our excavation were bringing finished or nearly finished bifaces or blanks to the site, and the debitage that we recovered is largely the result of the subsequent finishing, use, and repair of these tools while on the site.

There are minor differences, however, in how the two most common material classes—crypto-crystalline silicate and obsidian—were used at the site. The obsidian debitage is generally smaller, and was apparently worked more intensely. This pattern, common in southwest Oregon sites, is likely a reflection of the greater value of this tool stone and a measure of its relative scarcity. While crypto-crystalline silicate would have been available within the immediate range of seasonal round of people living on the South Fork Coquille River, obsidian would have had to have obtained form a great distance—from sources east of the Cascade Range.