Chapter 14

An Analysis of the Distributions of Lithic Artifacts in the Roofs of Three Housepits at Keatley Creek

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Introduction

The analysis of the lithic artifacts found in three of the extensively excavated housepits at the Keatley Creek site has primarily focused on the floor strata. The floors were given special attention because, each was thought to represent a single occupation, because the floors were thought to have simpler depositional histories than the roofs, and because spatial organization inside the houses was thought to be especially relevant to questions about social organization which were the focus of this project.

However, prehistoric activity at the site was not confined to the interior of the houses. Indeed, given the estimated population densities for these structures, (Vol. II, Chap. 1) people probably spent as much time out of doors as the weather allowed. It was therefore considered appropriate to examine roof deposits in order to determine whether any activity patterning could be detected from the distribution of artifacts and whether such patterning could add any new perspectives to the understanding of socioeconomic organization at Keatley Creek. In addition, it was considered important to examine the roofs in order to determine if any discard of lithic materials onto the roofs was creating a biased view of the activities that were taking place inside the houses.

The rooftops or roof edges of the pithouses may have been the preferred area for many outdoor activities because:

- Unlike the areas surrounding the houses, the rooftops would have provided large, regular surfaces which did not need to be cleared of vegetation before they could be used.
- The rooftops were clearly part of the owned area of the houses and could be used by the residents without any contention. Things left lying on a roof might be recognized as belonging to the house while things left lying in the space between houses might not.

Both concerns may have been especially important at a large site like Keatley Creek, where houses were fairly densely clustered.

While it seems likely that the rooftops were used for some activities, it is even more likely that they were used as dumps for refuse collected from the interior of the houses. Where space was at a premium, few other dumping sites would have been as immediately accessible. In fact, since the smokehole in the middle of the roof also served as the doorway, at least in the larger houses, there could hardly have been any more convenient dump site than the roof. It was, so to speak, just outside the door.

The three housepit roofs in this analysis were chosen to represent a broad range of the housepit sizes and, by inference, diversity in social organization at the Keatley Creek site. The smallest is HP 12 with a diameter, measured from rim crest to rim crest, of 9 m.

Housepit 3 has a diameter of 14 m; and HP 7, one of the largest at the site, has a diameter of 19 m. It seems unlikely that the social organization was as important in the organization of space on the roofs as it was on the floors. Still, housepit size may have had some bearing on the uses to which the roofs were put, especially if the slope of the roof surface or other aspects of roof structure varied with size.

The analysis of roof assemblages is complicated by their relatively long and complex depositional histories and by the great volume of the roof deposits. Only a preliminary analysis can be presented here and our understanding of the processes which resulted in the formation of the roofs is far from complete. However, rooftop activities may have been very significant in the lives of the inhabitants of this site. So the rooftop assemblages cannot be ignored.

This paper will address the following questions:

1) How did lithic artifacts get into the roof deposits in HP's 3, 7, and 12?
2) What similarities and differences are there between roof assemblages and assemblages from other strata?
3) What activities may have occurred on the roofs?
4) Were different parts of the roofs used for different activities?
5) What factors may have determined which areas on a roof were selected for which activities?

How did artifacts get into the roof strata?

Most lithic artifacts were probably deposited in the roof strata by one of the following processes:

1) refuse produced during activities on the floor was discarded on roof;
2) refuse produced during activities on the roof was discarded or abandoned on the roof;
3) artifacts were stored on the roof or in the roof structure;
4) during the replacement of decayed roofs, artifact bearing deposits, which had been removed from the housepit and deposited on the rim, were redeposited on the roof. These artifacts may have originally been from the floor, the roof, or the rim.
5) Artifacts from sources outside the housepit may have been deposited in the roof either before or after final collapse.

All of these processes probably contributed, to some extent, to the formation of assemblages in most parts of the roofs. During periods when the houses were occupied, material from the floors which was dumped on the roofs and material discarded in the course of activities on the roofs probably accounted for most of the accumulation and most of the variability in the roof lithic assemblages. Dumps may have been unpleasant areas to work in and dumping of refuse may have interfered with some types of work. So it seems likely that separate areas of the roofs were reserved as activity areas while other areas were used as dumps. Storage of artifacts between poles on the inside of the roofs, as documented ethnographically elsewhere (Hayden & Cannon 1983), probably had much less impact on these assemblages than did dumping and roof-top activities.

Reconstruction or replacement of roofs probably resulted in some mixing of artifacts deposited by dumping and artifacts deposited as the result of roof-top activities, as well as with artifacts from floor deposits that were removed during re-roofing (Vol. I, Chap. 17). Occasional dumping of artifacts from sources outside the housepit as well as the use of collapsed housepit depressions by later hunting parties may have further disturbed patterns resulting from regular roof-top activities and local dumping. Nevertheless, lithic assemblages from the roofs may have characteristics which indicate whether reconstruction, dumping, or roof-top activity were significant contributors to the formation of the lithic assemblages in different areas of the roofs.

Distinguishing Reconstruction, Rooftop Dumping, and Rooftop Activity as Formation Processes

Assuming that lithic assemblages in the roof strata are not mixed beyond recognition or complicated by the introduction of extraneous material, their characteristics will be the product of one or more of the following three processes:

1) During reconstruction of the roofs of the three structures discussed in this study, debitage and modified lithic artifacts would have been scraped from the floor of the house along with the floor matrix, then deposited first on the rim and then on the rebuilt roof. The remains of the collapsed roof may have been mixed with this material but this introduces a level of complexity which is beyond the scope of this initial scenario. The existing floor assemblage is the best model we have for the expected characteristics of a lithic assemblage left on the floor when a house was abandoned. So if the roof, or some part of the roof, contains only lithic artifacts deposited in this manner it should resemble the floor assemblage quite closely.

2) Lithic artifacts were removed from the floor while the house was occupied and dumped on the roof or on some part of the roof. This is a somewhat more selective process than that just described. Some tool types and states of tools are more likely to be dumped than others. The lithic assemblage recovered from an area used as a rooftop dump should resemble the floor less closely than an assemblage from an area which contains only material scraped from an abandoned floor. However, a rooftop dump assemblage should also be somewhat similar to a floor assemblage in that it was, presumably, originally generated by the same suite of activities.

3) Lithic artifacts were deposited on a roof only as a result of activities which occurred on the roof. The roof may have been selected for messy or smelly activities for which the interior of the house was not well suited, that is, for activities which rarely occurred on the floor. So the assemblage of artifacts deposited as a result of these activities might be quite different from the assemblage deposited as the result of activities on the floor.

Some specific characteristics of lithic assemblages in the roof strata are suggested below depending on which of the above processes was dominant in their formation.

Density Distributions

The thickness of the roof strata varied considerably in different areas of the housepits and was, everywhere, much greater than the thickness of the floors. So density distributions (expressed in terms of objects per litre) rather than frequency distributions were calculated for comparative purposes.

Generally, areas in a roof which include only artifacts deposited during the reconstruction process can be expected to have lower densities of all classes of lithic artifacts (fire-cracked rock, debitage, and modified artifacts) than areas used as rooftop dumps or rooftop activity areas. They should also have lower artifact densities than the floors. This is simply because some quantity of soil and other material which did not contain artifacts was almost certainly added to the floor scrapings during the reconstruction of the roof.

All classes of lithic artifacts can be expected to be more densely distributed in areas used as rooftop dumps or rooftop activity areas than in areas of the roof which were not used for either purpose. More specific expectations can be generated for different classes of lithic artifacts.

Fire-cracked Rock

Disposal of fire-cracked rock in activity areas which were in current use would probably have made these activity areas uncomfortable and interfered with work in progress. So fire-cracked rock is likely to be more densely distributed in little used areas than in activity areas on the roof.

Debitage

Rooftop activity areas may have been preferred to the interior of the pithouses as sites for lithic reduction due to better lighting and more convenient waste disposal. If so, debitage should be highly concentrated around rooftop activity areas. On the other hand, the presence, on the floors, of large numbers of unmodified flakes in a wide range of sizes indicates that some lithic reduction did occur inside the houses and high debitage densities could also occur in rooftop dumps as a result of core reduction inside pithouses and subsequent secondary dumping of waste. Clearly separated concentrations of debitage and fire-cracked rock may distinguish rooftop activity areas from rooftop dumps. Areas where concentrations of debitage and concentrations of fire-cracked rock overlap are more likely to have been dumps.

Modified Artifacts

The densities in which all modified artifacts (tools) are distributed in different parts of the roofs might also be expected to vary according to the relative intensity with which dumps or activity areas were used. Also, some activites will have resulted in denser distributions of modified artifacts than others. So differences in modified artifact density are as likely to distinguish between areas which were used more or less intensively or for different activities as they are to distinguish between activity areas and dumps. Areas of a roof which were not used either as dumps or as activity areas should have tool:debitage ratios very similar to that for the floor. On the other hand, dumps and activity areas on the roofs might have tool:debitage ratios somewhat different from those in the floor assemblages.

Modified Artifact Types

Different activities which might have occurred on a roof (butchering vs. primary lithic reduction, for example) are likely to have resulted in the deposition of specific types of modified artifacts. Dumping on the roofs of materials from the floors is more likely to have produced assemblages containing modified artifact types in similar proportions to those on the floor.

For the purposes of this analysis, each modified artifact from the floors and the roof samples from the

three housepits was assigned to one of the following categories. The various artifact types are described in greater detail in Volume III Chapter 1:

- expedient knives (including types 70, 74, 140, 159, and170)
- utilized flakes (including types 71, 72, 73, and 180)
- scrapers (including types 141, 150, 156, 163, 164, and 165)
- projectile points (including types 19, 100, 101, 102, 109–129, and 137)
- notches (including types 54, 154, and160)
- key-shaped scrapers (type 158)
- bifaces (including types 131, 134,139,185, 192, and 193)
- bifacial knives (type 130)
- bipolar cores (type 146)
- small piercers (type 153)
- drills and perforators (including types 132, 133, 151, and 152)
- spall tools (including types 183, and 184)
- cores (including types 186,187, 189, and 149)
- hammerstones (type 190)
- ground stone (including types 201, 202, 211)
- ornaments (including types 205, 209, 210, and 212–217)
- and miscellaneous artifacts (including types 1, 2, 4, 6, 7, 8, 36, 50, 55, 76, 88, 135, 142, 143, 147, 148, 157, 171, 173, 182, 188, 191, 195, 200, 203, 207, 208, 213, 220).

The latter category consists of fragmentary artifacts, flakes with abrupt (probably accidental) retouch, and flakes removed from the retouched edges of artifacts.

Initially, a sample of the excavated subsquares from each of the three roofs was selected for analysis. The sampled subsquares, which represent at least 10% of each roof, are shown in Figure 1. Utilized flakes alone represent 26.2% of the modified artifacts in the combined roof samples. Expedient knives represent 21.7%. Scrapers represent 11.1% and miscellaneous types represent 10.4%. These types are so abundant that their distributions in the samples can confidently be expected to represent their distributions in the complete roofs. None of the other types represents more than 10% of the modified artifacts in the combined roof sample. Most types represent less than 5%. Since the distributions of these rarer types of modified lithic artifacts in the samples were considered less likely to accurately represent their distributions in the complete roofs, these types were extracted from all of the excavated lithic samples from the roofs. Many of the selected types are thought to have been specialized tools so an accurate picture of their distributions was expected to be important in identifying the locations of activity areas in the roofs. The selected types are listed below:

- projectile points
- bifaces
- bifacial knives
- end scrapers
- key-shaped scrapers
- drills and perforators
- cores
- bipolar cores
- spall tools
- ground stone
- pipe fragments
- convergent knife-like bifaces
- pièces esquillées

Modified artifacts found in the floors and the roof samples from the three housepits were identified with one of five categories of material type: vitreous trachydacite (commonly called vitreous basalt), cherts and chalcedonies, obsidian, quartzite, and other. The latter category includes mostly ground stone; notably sandstone abraders and steatite pipe fragments. As with modified artifact types, it was expected that raw material types would occur in very similar proportions among modified artifacts on the floors and among modified artifacts in the reconstructed roofs. These proportions should be somewhat less similar among modified artifacts deposited in rooftop dumps and may be very dissimilar in rooftop activity areas.

Fragmentation and Wear of Modified Artifacts

In areas of a roof where the lithic assemblage was primarily derived from the floors and was deposited in the process of roof reconstruction, artifacts might be slightly more fragmented than modified artifacts on the floor due to breakage during redeposition. Depending on the kind and intensity of roof top activities, fragmentation and wear of modified artifacts may be more or less advanced in rooftop activity areas than in the floor deposits. Worn and broken artifacts from inside activities are especially likely to have been discarded in dumps. So modified artifacts which have been discarded in rooftop dumps should exhibit the most wear and resharpening and are most likely to be broken compared to those left on the floor, those redeposited in the roof during the reconstruction process, or those in rooftop activity areas.

Chipped stone artifacts other than cores and bipolar cores were examined under a 10× lens and classified as either relatively new (i.e., without visible evidence of wear after initial reduction or retouch), worn (i.e.,

with evidence of wear after initial retouch but no resharpening), resharpened (i.e., with evidence of resharpening), or exhausted (i.e., worn or broken to the point where there is no possibility of further resharpening). Modified artifacts other than cores and bipolar cores were also classified according to their degree of fragmentation (1 = whole, 2 = chipped, 3 = 1/2 to 3/4 of the original artifact, 4 = less than 1/2 of the original artifact, 5 = small fragment).

Debitage

Flakes found in the excavated housepits were classified according to:

1) Size: small flakes (< 2 cm. maximum dimension) vs. large
2) Material type: vitreous trachydacite (commonly called vitreous basalt); chert or chalcedony; obsidian; quartzite. (This category was employed only in the classification of debitage found in the roofs. Quartzite flakes found on the floors were included in the count of chert or chalcedony flakes.)
3) Flake type: primary (usable) flakes; secondary (minimally useful) flakes; billet flakes; bipolar flakes; shatter
4) Cortical surface: cortex present on > 30% of dorsal surface vs. less cortex.

While different modified artifact types may have had different use-lives and thus different discard rates, most debitage is waste from the moment it is manufactured. Debitage collected from the floor and deposited on the roof should, therefore, include the various types of flakes and the various material types in fairly similar proportions. The same is true of flakes with cortex. Generally, this should apply whether debitage was removed from the floor and redeposited in the roof in the reconstruction process or whether it was dumped on the roof while the house was occupied.

The distribution of large and small flakes may be more difficult to interpret. Large flakes are more conspicuous and, thus, more likely to have been removed from the floors and dumped on the roofs than small flakes. However, large primary and billet flakes might also have been introduced into rooftop activity areas as potential tool blanks. So it is unclear whether large flakes should be found in greater proportions in reconstructed roof, in rooftop activity areas, or in rooftop dumps.

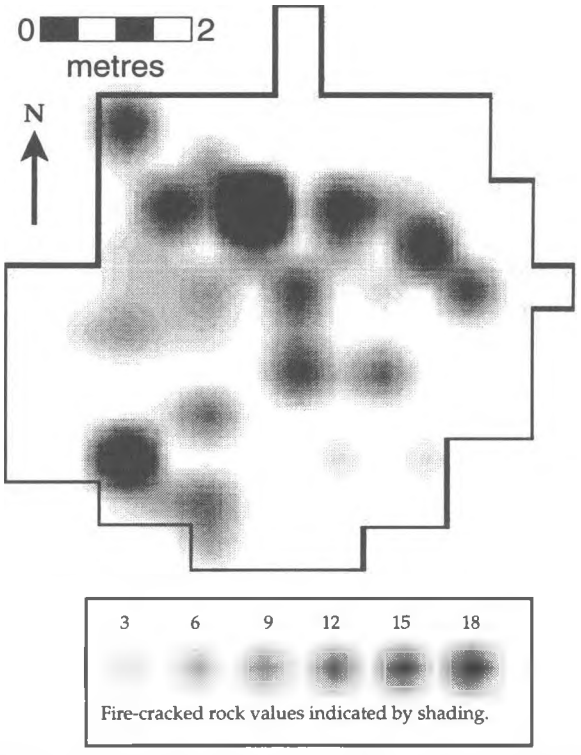

Figure 1. Distribution of FCR in the roof of HP 12 (complete sample).

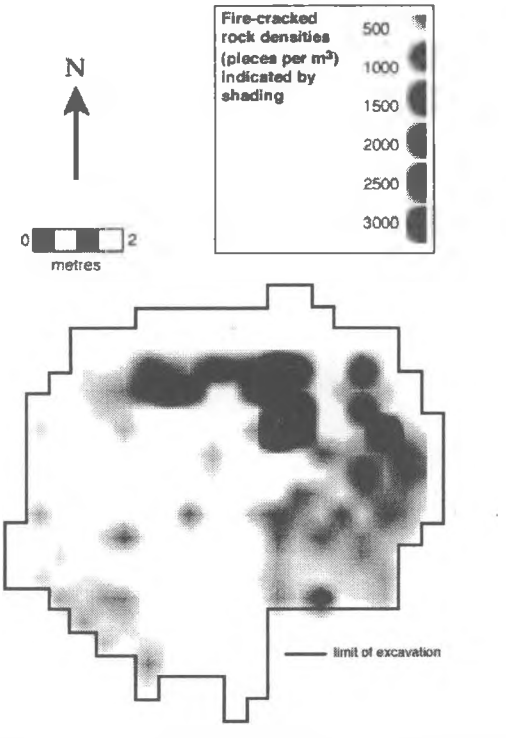

Figure 2. Fire-cracked rock density (pieces per m³) distribution in roof strata in HP 3.

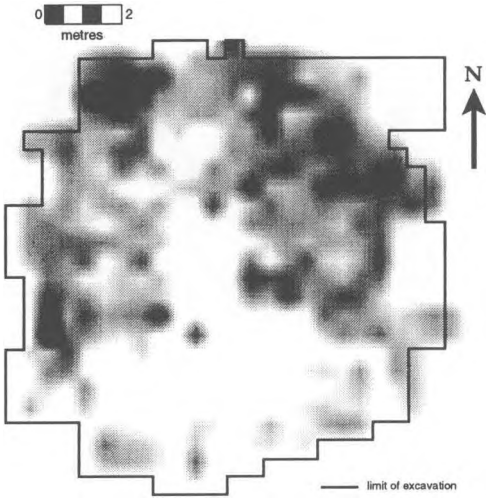

Figure 3. Fire-cracked rock densitiy distribution in all roof strata of HP 7.

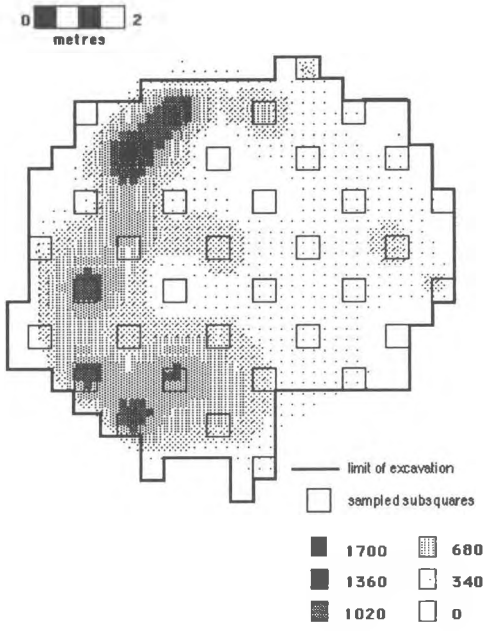

Figure 5. Debitage densities (flakes per cubic metre) in all roof strata of HP 3. Plotted densities are extrapolated from sample subsquares.

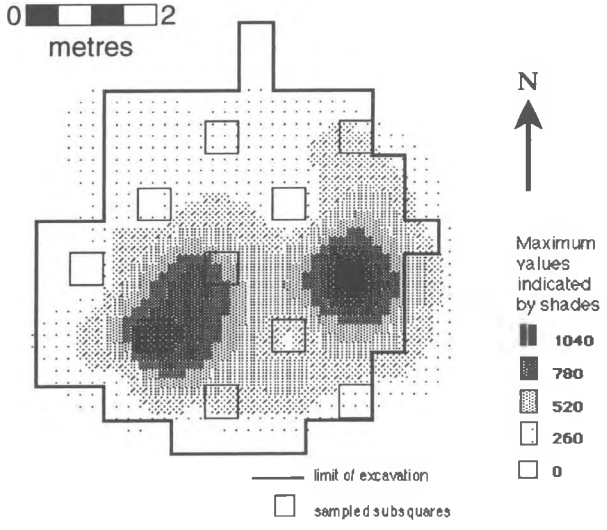

Figure 4. Debitage density in all roof strata of HP 12.

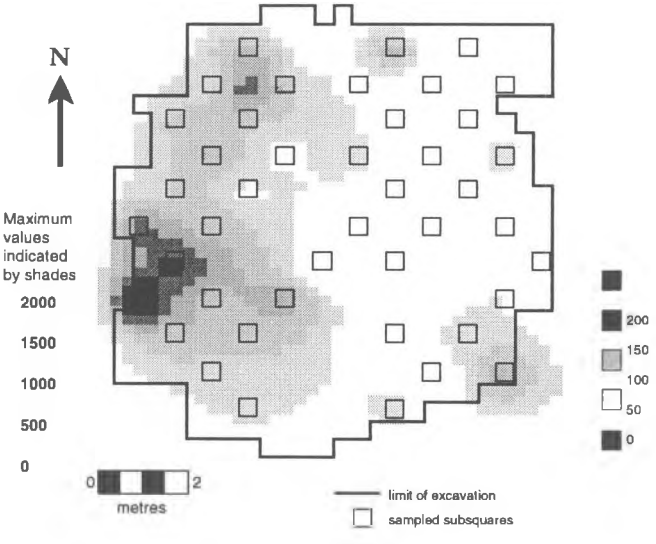

Figure 6. Debitage densities (flakes per cubic metre) in all roof strata of HP 7. Plotted densities are extrapolated from sample subsquares.

Definition of Sectors in the Roofs

After an initial examination of the data, the roofs of the three housepits were each divided into two sectors based on the density distributions of fire-cracked rock and debitage. The fire-cracked rock density distributions shown in Figures 1, 2, and 3 were based on complete samples of the excavated roofs. The density distributions for debitage and modified artifacts were based on much smaller samples. Debitage densities were calculated for each of the sampled roof units where thickness was recorded. Contour maps representing the distribution of debitage densities in each of the three roofs were interpolated from the sampled data. The sampled subsquares and the interpolated debitage density distributions are shown in Figures 4, 5, and 6.

The interpolated density distribution plots suggest that both debitage and modified artifacts occur in dense concentrations in restricted areas of the roofs of HP's 3 and 7. If artifacts were introduced into roof deposits primarily during pithouse reconstruction, i.e., as part of redeposited floor and rim deposits, then lithic artifacts should be more evenly distributed. Therefore, these concentrations were probably deposited as the result of dumping or specialized activities which occurred on the roofs during the period when the houses were last occupied.

Since the fire-cracked rock distributions are based on more complete data than the debitage distributions, they were given greater importance in defining sectors. Distribution maps based on the more complete fire-cracked rock data were compared to distribution maps generated from only the sampled subsquares as a check on the accuracy of interpolated distributions based on lithic artifact frequencies in the sampled subsquares. The interpolated distributions of fire-cracked rock correspond well to the actual distributions, which suggests that the interpolated distributions of all high frequency artifact classes are reasonably accurate.

The sectors were compared in terms of the characteristics which it was thought might distinguish between activity areas and dumps.

Fire-cracked rock is most densely distributed in the northeastern part of all three roofs. In all three housepit roofs, there is also a smaller concentration of fire-cracked rock in the southwest. Therefore, each roof was divided into a southwest (SW) sector and a northeast (NE) sector for analytical purposes.

In HP's 3 and 7, debitage is most densely distributed in the southwest sectors. So the defined sectors also separate the areas of greatest fire-cracked rock density from the areas of greatest debitage density. In HP 12 the defined sectors isolate two apparently distinct concentrations of debitage.

The following section summarizes the data and notes some of the most obvious patterns and interpretations. A full synthesis and interpretation is presented in the last section of this analysis.

Results

Housepit 12

HP 12 is the smallest of the three housepits in this analysis and is believed to have housed a simpler socioeconomic unit than either HP 3 or HP 7. As Figure 1 shows, fire-cracked rock is clearly more densely distributed in the northeast sector of HP 12 than in the southwest sector. Apart from that, frequencies of all types of lithic artifacts are fairly low, and variability in the density distributions is small within HP 12 (Table 1). There is no significant difference between the floor and the sampled roof in terms of fire-cracked rock density. There is no significant difference between the sectors of the sampled roof in terms of debitage density.

Debitage density in the floor deposits is twice as high as in the roof and, since the modified artifact densities are low in both strata, the tool/debitage ratio in the floor is lower than that in the roof. However, the roof sample is small and this difference may not be statistically significant.

Table 1. Lithic artifact densities in the the floor and the sampled roof of HP 12

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
Subsquares	12	12	116	24
Volume (litres)	763	883	1075	1645
Debitage	184	258	672	442
FCR	15	8	26	23
tools	20	19	38	39
flakes/litre	0.23	0.31	0.63	0.26
FCR/litre	0.01	0.02	0.02	0.01
tools/litre	0.03	0.02	0.04	0.02
tools/flakes	0.10	0.07	0.05	0.09

Modified Artifacts

The frequencies and proportions in which the various types of modified artifacts are represented in the floor and in the samples from the two sectors of the roof of HP 12 are shown in Table 2. The frequencies of the selected types which were extracted from the complete collection of excavated lithic samples for each

sector are presented in Table 3. The total number of artifacts in the roof and in each of the sectors was estimated from the sample data. Table 3 also includes estimates of the proportions which the selected types represent of the total number of artifacts. These proportions permit comparison of the artifact assemblages from each of the three roofs in terms of the relative importance of the various modified artifact types.

Table 2. Modified artifact types in the floor and the two sectors of the sampled roof of HP 12.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
utilized flakes	6 30.0%	3 15.8%	14 (36.8%)	9 (23.1%)
expedient knives	4 20.0%	6 31.6%	6 (15.8%)	10 (25.6%)
scrapers	4 20.0%	3 15.8%	8 (21.1%)	7 (17.9%)
projectile points	0 (0.0%)	0 (0.0%)	2) (5.3%)	0 (0.0%)
notches	0 (0.0%)	2 10.5%	3 (7.9%)	2 (5.1%)
bifaces	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
bipolar cores	0 (0.0%)	1 5.3%	0 (0.0%)	1 (2.6%)
end scrapers	0 (0.0%)	0 (0.0%)	2 (5.3%)	0 (0.0%)
cores	0 (0.0%)	2 10.5%	0 (0.0%)	2 (5.1%)
piercers	0 (0.0%)	1 5.3%	0 (0.0%)	1 (2.6%)
spall tools	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
ground stone	1 5.0%	0 (0.0%)	0 (0.0%)	1 (2.6%)
drills & perforators	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
bifacial knives	0 (0.0%)	1 5.3%	0 (0.0%)	1 (2.6%)
hammerstones	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
key-shaped scrapers	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
ornaments	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
miscellaneous	5 25.0%	0 (0.0%)	3 (7.9%)	5 (12.8%)

The sampled portion of the HP 12 roof is chiefly distinguished from the floor by a relative scarcity of utilized flakes, by a relative abundance of expedient knives, and by the presence of two bifacial knives, two cores, a bipolar core, a piercer, and a piece of ground stone. Five bifaces, a key-shaped scraper, a spall tool, a ground stone abrader, and an ornament were found in the roof when all of the excavated roof material was searched. All of these types were absent in the floor. This may indicate that these types were rarely used inside this house but low frequency items may reflect chance associations as well.

Generally, the floor appears to be more similar to the southwest sector of the roof than to the northeast sector in terms of the types of modified artifacts represented. Utilized flakes are more abundant and expedient knives are rarer in the southwest sector than in the northeast sector. End scrapers and miscellaneous artifact types were found only on the floor and in the southwest sector. Key-shaped scrapers are present in the northeast sector but absent in the floor and in the southwest sector. Piercers are present in the sample from the northeast sector but absent in the floor and in the sample from the southwest sector. In terms of the distribution of modified artifact types, the only correspondences between the floor and the northeast sector of the roof are that both contain notches and both apparently lack ground stone tools.

Insofar as similarity with the floor assemblage is an indication that an area was used as a dump, the southwest sector appears more likely to have been used for this activity than the northeast sector on the basis of artifact type distributions.

Material Types

In HP 12, the floor is quite similar to the sampled subsquares from the roof in terms of the raw materials from which modified artifacts are made. There is also no significant difference between the two sectors of the roof in the distribution of raw material types (Table 4).

Wear

The proportion of the artifacts in the floor of HP 12 and in each sector of the roof which fell into each wear category is shown in Table 5. Most of the modified artifacts found on the floor exhibited very little wear while those in the roof tend to be more worn. There is no significant difference between the two sectors of the roof in terms of the wear states of modified artifacts.

Table 3. Frequencies of selected modified artifact types in all excavated subsquares from the floor and the two sectors of the roof of HP 12 with percentages of estimated total numbers of artifacts based on sample data.

	SW roof	NE roof	Floor	Roof
projectile points	2 (1.9%)	2 (3.1%)	2 (5.9%)	4 (2.4%)
bifaces	3 (2.9%)	2 (3.1%)	0 (0.0%)	5 (3.0%)
bipolar cores	3 (2.9%)	2 (3.1%)	0 (0.0%)	5 (3.0%)
pièces esquillées	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
end scrapers	1 (1.0%)	0 (0.0%)	1 (2.9%)	1 (0.6%)
cores	1 (1.0%)	2 (3.1%)	0 (0.0%)	3 (1.8%)
piercers	0 (0.0%)	1 (1.5%)	0 (0.0%)	1 (0.6%)
spall tools	1 (1.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
ground stone	1 (1.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
drills & perforators	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
bifacial knives	2 (1.9%)	1 (1.5%)	0 (0.0%)	3 (1.8%)
convergent knife-like bifaces	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
hammerstones	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
key-shaped scrapers	0 (0.0%)	1 (1.5%)	0 (0.0%)	1 (0.6%)
ornaments	1 (1.0%)	0 (0.0%)	0 (0.0%)	1 (0.6%)
pipe fragments	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
estimated total number of artifacts	**103**	**65**	**34**	**168**

Fragmentation

The proportion of the artifacts in each sector which fell into each fragmentation category in the floor and in each sector of the roof of HP 12 is shown in Table 6. Broken artifacts (as opposed to whole or chipped artifacts) are slightly more abundant in the roof as a whole than on the floor. Whole artifacts are very rare on the floor but chipped artifacts, which might have been stored as provisional discard items, are quite abundant. The northeast sector of the roof has a very high proportion of whole artifacts which would be anomalous if dumping occurred in the northeast sector and thus reinforces earlier inferences that it appears to be a special activity area.

Debitage

A summary of the variability in the distributions of the different classes of lithic debitage between the roof sectors and between the floor and the sampled roof of HP 12 is presented in Table 7. In every respect, the southwest sector of the roof is more similar to the floor than either is to the northeast sector, though some of the differences are small. The most notable differences are in the relative frequencies of large flakes (> 2 cm.) and of chert and chalcedony flakes, both of which are most abundant in the northeast sector. These distributions also suggest that the northeast sector is the most likely location for an activity area on this roof.

Several types of modified artifacts which were absent on the floor of HP 12 were present in the sampled roof, especially in the northeast sector. This suggests that the roof was used for activities which rarely occurred on the floor. The northeast sector of the roof differs most from the floor in the relative frequencies of the most common artifact types, in the extent to which modified artifacts are fragmented, and in the relative frequencies of large flakes and of chert and chalcedony flakes. Apart from the distribution of fire-cracked rock, the distribution of lithic artifacts in the roof of HP 12 suggests that the northeast sector of the roof is a more likely location for a specialized rooftop activity area than is the southwest sector.

This location may have been chosen for some activity for which the shade of the housepit was desirable, possibly for hide-working or butchering.

Housepit 3

Density Distributions

Housepit 3 is a medium sized housepit with some evidence for wealth and socioeconomic complexity. The roof of HP 3 was divided into a southwest sector and a northeast sector as described above. As can be seen in Figure 2, fire-cracked rock is most concentrated in the northeast sector, especially along the northern edge of the roof. Debitage densities are highest in the southwest sector. Mann-Whitney tests of the variability between the two sectors indicate that the probability that the samples from the two sectors were drawn from populations with the same distribution of debitage

Table 4. Frequencies and percentages of raw material types used in the manufacture of modified lithic artifacts from the floor and the two sectors of the sampled roof of HP 12.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
basalt	17 (85.0%)	17 (89.5%)	34 (89.5%)	34 (87.2%)
chert & chalcedony	2 (10.0%)	1 (5.3%)	3 (7.9%)	3 (7.7%)
obsidian	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
quartzite	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
sandstone	1 (5.0%)	0 (0.0%)	0 (0.0%)	1 (2.6%)
unknown	0 (0.0%)	1 (5.3%)	1 (2.6%)	1 (2.6%)

Table 5. Frequencies and percentages of modified chipped stone artifacts in different wear categories on the floor and in the two sectors of the sampled roof of HP 12. Percentages are based on the number of all chipped stone artifact types, excluding cores and bipolar cores, recovered from the floor excavation and the roof samples.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
new	1 (5.0%)	1 (6.7%)	32 (84.2%)	2 (5.7%)
worn	9 (45.0%)	7 (46.7%)	1 (2.6%)	– (45.7%)
sharpened	10 (50.0%)	7 (46.7%)	1 (5.3%)	– (48.6%)
exhausted	0 (0.0%)	0 (0.0%)	3 (7.9%)	0 (0.0%)

Table 6. Frequencies and percentages of modified chipped stone artifacts in different fragmentation states on the floor and in the two sectors of the sampled roof of HP 12. Percentages are base on the total number of chipped stone artifacts, excluding cores and bipolar cores, in the excavated floor and the sectors of the sampled roof.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
whole artifacts	8 (40.0%)	11 (73.3%)	2 (5.3%)	19 (54.3%)
chipped artifacts	2 (10.0%)	0 (0.0%)	22 (57.9%)	2 (5.7%)
1/2–3/4 of orig. artifact	3 (15.0%)	0 (0.0%)	14 (36.8%)	3 (8.6%)
< 1/2 of orig. artifact	2 (10.0%)	1 (6.7%)	0 (0.0%)	3 (8.6%)
small fragment	4 (20.0%)	3 (20.0%)	0 (0.0%)	7 (20.0%)
uncertain	1 (5.0%)	0 (0.0%)	0 (0.0%)	1 (2.9%)

densities is less than 0.05. The ratio of tools to debitage is somewhat higher in the northeast sector than it is in the southwest sector or in the floor (Table 8).

Modified Artifacts

The frequencies and proportions in which the various types of modified artifacts are represented in the floor and in the samples from the two sectors of the roof of HP 7 are shown in Table 9. The frequencies, in each sector, of the selected types which were extracted from all excavated roof deposits are presented in Table 10. The total number of artifacts in the roof and in each of the sectors was estimated from the sample data and Table 10 also includes the proportions which the selected types represent of the estimated total number of artifacts.

Utilized flakes, scrapers, expedient knives, projectile points, notches, and miscellaneous artifacts are the only categories which, individually, make-up more than 5% of the modified artifacts in the sample from the roof of HP 3. Together they account for 63% of the artifacts found in the roof and 67% of the artifacts found in the floor (see Table 9). The remaining types occur in such low frequencies that variability between the samples from the two sectors of the roof and between the floor and the sampled roof could easily be the result of stochastic variation or sampling error. Overall, scrapers represent a much smaller proportion of the artifacts found in the roof than on the floor. Expedient knives, utilized flakes, points, and notches are correspondingly more abundant, proportionately, in the roof and rarer on the floor.

Among the modified artifact types culled from the whole of the excavated roof, projectile points, bifaces, and bipolar cores, each represent a similar proportion of the modified artifacts in each of the two roof sectors and are much more abundant in the roof than in the floor. Pipe fragments, ornaments, pièces esquillées, and bifacial knives are present in both sectors of the roof but absent in the floor. The southwest sector of the roof also includes the only convergent knife-like biface in the entire housepit assemblage. Piercers, spall tools, and hammerstones are slightly more abundant in the floor than in the roof. The other selected types occur in fairly similar proportions in both the roof and the floor.

In the sampled subsquares, the northeast sector of the roof is most similar to the floor in that it is poorer in utilized flakes and expedient knives and richer in scrapers than the southwest sector.

Insofar as similarity with the floor assemblage is an indication that an area was used as a dump, the northeast sector of the sampled roof appears more likely to have been used for this activity than the southwest sector on the basis of artifact type distributions. However, the greatest differences are between the floor and the roof as a whole.

Wear

The proportions of modified artifacts which were new, worn, or sharpened in the floor and in each of the two sectors of the roof of HP 3 are shown in Table 11. In general, tools from the southwest sector exhibit slightly more wear than tools from the northeast sector. However, both of the roof sectors are more similar to each other in this respect than they are to the floor, where new tools are comparatively abundant and resharpened tools are comparatively rare. This is what one might expect from roof accumulations derived from dumping.

Fragmentation

The proportions of modified artifacts on the floor and in each of the two sectors of the roof of HP 3 which were in each of the five fragmentation states are shown in Table 12. Fragments smaller than 3/4 of the original artifact are considerably more abundant in the roof than in the floor. There is very little difference between the two sectors of the roof in terms of the relative frequencies of fragmented (as opposed to whole or chipped) artifacts (57.8% in the southwest vs. 55.3% in the northeast). The very smallest fragments are most abundant in the northeast sector but it is unclear how this should be interpreted. Overall, the fragmentation states of these modified artifacts are also consistent with the argument that the roof was used for dumping rather than special activities.

Debitage

The relative frequencies with which various types of debitage occurred in the floor of HP 3 and in the samples from the two sectors of the roof are presented in Table 13. The greatest difference between the floor and the sampled roof is in the relative frequencies of flakes with cortex, which are most abundant in the floor. In this respect, and in almost every other, debitage on the floor is more similar to the debitage in the sample from the northeast sector of the roof than it is to the debitage in the sample from the southwest sector of the roof. The only exception is in the relative frequencies of shatter which is more abundant in the northeast sector of the roof than in either the floor or the southwest sector. Most of the debitage differences between the two sectors of the roof are small but the consistently greater similarities between the floor and the northeast sector of the roof do suggest that the northeast sector is the most likely location for a rooftop dump used for the disposal of materials collected from the floor.

Table 7. Frequencies and percentages of lithic debitage in different categories on the floor and in the two sectors of the sampled roof of HP 12.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
total flakes	184	258	672	442
large flakes (> 2 cm)	45 (24.5%)	73 (28.3%)	175 (26.0%)	118 (26.7%)
chalcedony & chert flakes	5 (2.7%)	16 (6.2%)	16 (2.4%)	21 (4.8%)
quartzite flakes	0 (0.0%)	7 (2.7%)	(0.0%)	7 (1.6%)
obsidian flakes	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
billet flakes	6 (3.3%)	5 (1.9%)	28 (4.2%)	11 (2.5%)
flakes with cortex	10 (5.4%)	13 (5.0%)	36 (5.4%)	23 (5.2%)

Table 8. Lithic artifact densities in the floor and the two sectors of the sampled roof of HP 3.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
Subsquares	53	63	240	116
Volume (litres)	965.00	1342.50	2431.20	2307.50
Debitage	803	689	2146	1492
FCR	90	183	190	273
tools	89	100	276	189
flakes/litre	0.83	0.51	0.88	0.65
fcr/litre	0.09	0.14	0.08	0.12
tools/litre	0.09	0.07	0.11	0.08
tools/flakes	0.11	0.14	0.13	0.13

Synopsis

In HP 3 modified artifacts are more worn and more fragmented in the roof than in the floor, which suggests that lithic artifacts discarded in the course of activities on the floor of HP 3 were dumped on the roof. However, in terms of the proportions in which different types of modified artifacts and debitage occur, there are enough differences between the floor and the two sectors of the roof, to suggest that the roof was also used for activities other than dumping. The southwest sector of the roof differs most from the floor in these respects. So the southwest sector may have been preferred for rooftop activities.

Table 9. Modified artifact types in the floor and the two sectors of the sampled roof of HP 3.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
utilized flakes	23 (25.8%)	20 (20.0%)	43 (15.6%)	43 (22.8%)
expedient knives	22 (24.7%)	20 (20.0%)	40 (14.5%)	42 (22.2%)
scrapers	7 (7.9%)	11 (11.0%)	62 (22.5%)	18 (9.5%)
projectile points	5 (5.6%)	14 (14.0%)	23 (8.3%)	19 (10.1%)
notches	7 (7.9%)	10 (10.0%)	19 (6.9%)	17 (9.0%)
bifaces	2 (2.3%)	3 (3.0%)	6 (2.2%)	5 (2.6%)
bipolar cores	3 (3.4%)	4 (4.0%)	5 (1.8%)	7 (3.7%)
end scrapers	1 (1.1%)	3 (3.0%)	4 (1.5%)	4 (2.1%)
cores	1 (1.1%)	0 (0.0%)	3 (1.1%)	1 (0.5%)
piercers	1 (1.1%)	1 (1.0%)	8 (2.9%)	2 (1.1%)
spall tools	0 (0.0%)	0 (0.0%)	6 (2.2%)	0 (0.0%)
ground stone	0 (0.0%)	1 (1.0%)	6 (2.2%)	1 (0.5%)
drills & perforators	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)
bifacial knives	1 (1.1%)	1 (1.0%)	4 (1.5%)	2 (1.1%)
hammerstones	0 (0.0%)	0 (0.0%)	5 (1.8%)	0 (0.0%)
key-shaped scrapers	0 (0.0%)	0 (0.0%)	1 (0.4%)	0 (0.0%)
ornaments	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
pipe fragments	1 (1.1%)	1 (1.0%)	0 (0.0%)	2 (1.1%)
miscellaneous	13 (14.6%)	11 (11.0%)	39 (14.1%)	24 (12.7%)
total	**89**	**100**	**276**	**189**

Housepit 7

Density Distributions

Housepit 7 is the largest housepit analyzed. Greater socioeconomic differentiation has been attributed to the group which inhabited this pithouse than to the groups which resided in the other two houses. Density figures for the various categories of lithic artifacts on the floor and in the samples from each of the two sectors of the roof are presented in Table 14.

Fire-cracked rock is clearly more densely distributed in the northeast sector of the roof of HP 7 than it is in the southwest sector (Fig. 3). Debitage densities are overwhelmingly higher in the sampled subsquares in the southwest sector. The probability that the samples from the two sectors were drawn from populations with the same distribution of debitage densities is less than 0.001. Modified artifact density is also higher in the southwest sector than in the northeast sector. The ratio of modified artifacts (tools) to flakes is highest in the floor. There is little difference in the tool:debitage ratio between the samples from the two sectors of the roof.

Modified Artifacts

The frequencies and proportions in which the various types of modified artifacts are represented in the floor and in the samples from the two sectors of the roof of HP 7 are shown in Table 15. The frequencies, in each sector, of the selected types which were extracted from all the excavated roof deposits are presented in Table 16. The total number of artifacts in the roof and in each of the sectors was estimated from the sample

Table 10. Frequencies of selected modified artifact types in all excavated subsquares from the floor and the two sectors of the roof of HP 3 with percentages of estimated total numbers of artifacts based on sample data.

	SW roof	NE roof	Floor	Roof
projectile points	34 (18.9%)	36 (18.8%)	23 (8.3%)	70 (18.8%)
bifaces	10 (5.6%)	11 (5.7%)	6 (2.2%)	21 (5.6%)
bipolar cores	15 (8.3%)	16 (8.3%)	5 (1.8%)	31 (8.3%)
pièces esquillées	1 (0.6%)	1 (0.5%)	0 (0.0%)	2 (0.5%)
end scrapers	3 (1.7%)	3 (1.6%)	4 (1.4%)	6 (1.6%)
cores	5 (2.8%)	2 (1.0%)	3 (1.1%)	7 (1.9%)
piercers	1 (0.6%)	2 (1.0%)	8 (2.9%)	3 (0.8%)
spall tools	2 (1.1%)	3 (1.6%)	6 (2.2%)	5 (1.3%)
ground stone	5 (2.8%)	4 (2.1%)	6 (2.2%)	9 (2.4%)
drills & perforators	0 (0.0%)	1 (0.5%)	1 (0.4%)	1 (0.3%)
bifacial knives	1 (0.6%)	2 (1.0%)	0 (0.0%)	3 (0.8%)
convergent knife-like bifaces	1 (0.6%)	0 (0.0%)	0 (0.0%)	1 (0.3%)
hammerstones	1 (0.6%)	1 (0.5%)	5 (1.8%)	2 (0.5%)
key-shaped scrapers	1 (0.6%)	2 (1.0%)	1 (0.4%)	3 (0.8%)
ornaments	0 (0.0%)	1 (0.5%)	0 (0.0%)	2 (0.5%)
pipe fragments	2 (1.1%)	4 (2.1%)	0 (0.0%)	6 (1.6%)
estimated total number of artifacts	**180**	**192**	**276**	**372**

data and Table 16 also includes the proportions which the selected types represent of the estimated total number of artifacts.

As in HP 3 and HP 12, the most frequently occurring modified artifact types in both the floor and the sample from the roof of HP 7 are utilized flakes, expedient knives, scrapers, and miscellaneous artifacts (see Table 15). Expedient knives are the most abundant type in both sectors of the roof and scrapers are correspondingly rare. In the southwest sector of the sampled roof, utilized flakes are also relatively rare. On the floor, all three types occur in fairly similar proportions. Notches are proportionately most abundant in the sample from the southwest roof sector and rarer in the sample from the northeast sector and the floor.

Of the selected types which were extracted from all excavated roof samples, bipolar cores, end scrapers, cores, piercers, and hammerstones are notably more abundant, proportionately, in the floor than in the roof. Projectile points are proportionately more abundant in the roof than in the floor. Pipes are absent in the floor but present in the roof. With selected types, the estimated proportionate differences between the floor and the roof tend to be small. Only in the cases of end scrapers and bipolar cores is the difference greater than 1%.

Within the roof, the differences between the proportions in which the selected types occur in the two sectors also tend to be small. The southwest sector is proportionately richer in projectile points, end scrapers, cores, key-shaped scrapers, piercers, drills and perforators, and bifacial knives. The northeast sector is richest in bifaces, bipolar cores, pièces esquillées, ground stone, and pipes. The northeast sector also contained the only convergent knife-like bifaces and the only hammerstone in the roof.

While modified artifact density in the southwest sector of the roof is greater than in the northeast sector, the roof deposits are considerably thicker in the northeast sector and the two sectors are quite similar in terms of the number of artifacts per unit area (3.8 artifacts per sampled subsquare in the southwest sector vs. 3.4 artifacts per sampled subsquare in the northeast). The excavated area in the northeast sector is also considerably greater than that in the southwest sector. Thus, the total estimated number of modified artifacts in the northeast sector is nearly twice that for the southwest sector (1330 vs. 686). Nearly twice as many modified artifacts of the selected types were found in the northeast sector as in the southwest sector (202 vs. 117). So, it is not surprising that almost all of the selected types occur in greater numbers in the northeast sector than in the southwest. The exceptions are bifacial knives

Table 11. Frequencies and percentages of modified chipped stone artifacts in different wear categories on the floor and in the two sectors of the sampled roof of HP 3. Percentages are based on the number of all chipped stone artifact types, excluding cores and bipolar cores, recovered from the floor excavation and the roof samples.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
new	17 (20.72%)	14 (14.9%)	46 (17.8%)	31 (17.4%)
worn	40 (47.6%)	47 (50.0%)	140 1(54.1%)	87 (48.9%)
sharpened	22 (26.2%)	29 (30.8%)	65 (25.1%)	51 (28.7%)
exhausted	1 (1.2%)	2 (2.1%)	4 (1.5%)	3 (1.7%)
uncertain	4 (4.8%)	1 (1.6%)	3 (1.2%)	5 (2.8%)

Table 12. Frequencies and percentages of modified chipped stone artifacts in different fragmentation states on the floor and in the two sectors of the sampled roof of HP 3. Percentages are base on the total number of chipped stone artifacts, excluding cores and bipolar cores, in the excavated floor and the sectors of the sampled roof.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
whole artifacts	43 (51.2%)	43 (45.7%)	152 1(58.5%)	86 (48.3%)
chipped artifacts	7 (8.3%)	7 (7.5%)	21 (8.1%)	14 (7.9%)
1/2-3/4 of orig. artifact	11 (13.1%)	19 (20.2%)	24 (9.2%)	32 (18.0%)
< 1/2 of orig. artifact	14 (16.7%)	9 (9.6%)	36 (13.9%)	23 (12.9%)
small fragment	7 (8.3%)	14 (14.9%)	25 (9.6%)	21 (11.8%)
uncertain	2 (2.4%)	2 (2.1%)	2 (0.8%)	4 (2.2%)

Table 13. Frequencies and percentages of lithic debitage in different categories on the floor and in the two sectors of the sampled roof of HP 3.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
total flakes	184	258	672	442
large flakes (> 2 cm)	45 (24.5%)	73 (28.3%)	175 (26.0%)	118 (26.7%)
chalcedony & chert flakes	5 (2.7%)	16 (6.2%)	16 (2.4%)	21 (4.8%)
quartzite flakes	0 (0.0%)	7 (2.7%)	(0.0%)	7 (1.6%)
obsidian flakes	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
billet flakes	6 (3.3%)	5 (1.9%)	28 (4.2%)	11 (2.5%)
flakes with cortex	10 (5.4%)	13 (5.0%)	36 (5.4%)	23 (5.2%)

Table 14. Lithic artifact densities in the floor and the two sectors of the sampled roof of HP 7.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
Subsquares	70	37	464	57
Volume (litres)	3140.8	2155.5	4347.5	5296.3
Debitage	2577	1622	5424	4199
FCR	355	1136	1393	1491
tools	265	125	885	390
flakes/litre	.82	0.75	1.03	0.93
fcr/litre	0.45	0.59	0.32	0.55
tools/litre	0.08	0.06	0.20	0.07
tools/flakes	0.10	0.08	0.20	0.09

Table 15. Modified artifact types in the floor and the two sectors of the sampled roof of HP 7.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
utilized flakes	66 (24.9%)	16 (12.8%)	188 (22.3%)	82 (21.0%)
expedient knives	74 (27.9%)	36 (28.8%)	164 (18.5%)	110 (28.2%)
scrapers	30 (11.3%)	14 (11.2%)	198 (22.7%)	44 (11.3%)
projectile points	15 (5.7%)	15 (12.0%)	49 (5.5%)	30 (7.7%)
notches	18 (6.8%)	7 (5.6%)	47 (5.3%)	25 (6.4%)
bifaces	8 (3.0%)	5 (4.0%)	26 (2.9%)	13 (3.3%)
bipolar cores	5 (1.9%)	3 (2.4%)	32 (3.6%)	8 (2.1%)
end scrapers	3 (1.1%)	6 (4.8%)	27 (3.0%)	9 (2.3%)
cores	7 (2.6%)	4 (3.2%)	19 (2.1%)	11 (2.8%)
piercers	3 (1.1%)	2 (1.6%)	13 (1.5%)	5 (1.3%)
spall tools	1 (0.4%)	0 (0.0%)	12 (1.4%)	1 (0.3%)
ground stone	1 (0.4%)	2 (1.6%)	10 (1.1%)	3 (0.8%)
drills & perforators	3 (1.1%)	3 (2.4%)	8 (0.9%)	6 (1.5%)
bifacial knives	3 (1.1%)	1 (0.8%)	3 (0.3%)	4 (1.0%)
hammerstones	0 (0.0%)	0 (0.0%)	8 (0.9%)	0 (0.0%)
key-shaped scrapers	3 (1.1%)	0 (0.0%)	6 (0.7%)	3 (0.8%)
ornaments	1 (0.4%)	0 (0.0%)	2 (0.2%)	1 (0.3%)
miscellaneous	25 (9.4%)	10 (8.0%)	72 (8.1%)	35 (9.0%)

and key-shaped scrapers. Both of these types make up a greater proportion of the estimated total number of modified artifacts in the southwest sector than in either the floor or the northeast sector. This may indicate that the southwest sector was the preferred location for some activity involving the use of bifaces and key-shaped scrapers. As argued in Volume I Chapter 12, and by Rousseau (1992), bifaces and key-shaped scrapers are tools generally associated with long-distance hunting. This suggests gearing-up and/or the repair and replacement of hunting tools as activities which may have occurred in the southwest sector of this roof.

The relative frequencies of utilized flakes in the two sectors of the roof suggests that the northeast sector is somewhat more similar to the floor than the southwest sector. Insofar as similarity to the floor can be taken as an indication of dumping, this distribution suggests that the northeast sector may have been used for this purpose. The modified artifact types which are proportionately most abundant in the southwest sector, notably key-shaped scrapers and bifacial knives, are likely to have been fairly highly curated types with specialized functions. This suggests that this sector is the more likely location for specialized activity areas. In this context it is also worth noting that bifaces in the early stages of reduction are rare in the southwest sector. Only 2 of the 21 Stage 2 and Stage 3 bifaces in the entire roof assemblage were found there. However, this sector does contain 7 of the 19 Stage 4 bifaces; 6 of them in a fairly tight group in the extreme southwest. Stage 4 bifaces are also likely to have been highly curated, specialized tools. By contrast, the bipolar cores which characterize the northeast sector are likely to have had a comparatively high discard rate and are, therefore, more likely to have been dumped as waste material rather than deposited in activity areas.

Wear

Compared to the floor, the roof of HP 7 is poor in new artifacts and rich in worn artifacts (Table 17). Sharpened artifacts occur in similar proportions in both strata. In the northeast sector of the roof a considerably greater proportion of the modified artifacts are worn and sharpened than in the southwest sector. This may indicate that dumping was more common in the northeast sector than in the southwest sector.

Fragmentation

In terms of the fragmentation states of modified artifacts (Table 18), the roof of HP 7 is distinguished from the floor by the scarcity of chipped artifacts. Broken, as opposed to chipped, artifacts are considerably more abundant in the roof than in the floor. This supports the argument that the roof was used as a

dumping area. The smallest fragments are more common in the southwest sector of the roof than in the northeast sector.

Debitage

The relative frequencies with which various types of debitage occurred in the floor of HP 7 and in the samples from the two sectors of the roof are presented in Table 19. The most notable difference between the floor and the roof is in the relative frequency of billet flakes, which are rarer in the roof. The two sectors of the roof are quite similar in most respects. Obsidian is absent in the southwest sector but present in the northeast sector and on the floor. This suggests that the debitage in the northeast sector is more likely to have been collected from the floor. However, since obsidian flakes apparently occur in 7% of the subsquares in the roof, the probability that a sample of 23 subsquares would contain no obsidian flakes is fairly high ($p = 0.182$).

Summary and Interpretation

Were lithic artifacts from the floors of these three housepits dumped on the roofs?

Several characteristics of the lithic assemblages in the roofs of the two largest housepits, HP's 3 and 7, suggest that lithic waste from the floors of these housepits was deposited on the roofs:

1) Fire-cracked rock is more densely distributed in the roofs than in the floors and is consistently concentrated in specific areas, most notably along the north and northeast edges of the roofs.

2) Despite the greater abundance of scrapers in the floors, a higher proportion of the modified artifacts in the roofs are extensively re-sharpened than in the floors. Relatively new tools are more abundant in the floors.

3) Whole and chipped tools are more abundant in the floors of these two housepits than in the roofs. Fragments of tools, especially the smallest fragments, are more common in the roofs.

4) The tool:debitage ratio is greater in the floors than in the roofs. It might be expected that a high proportion of the waste flakes generated at a pithouse would eventually be deposited in nearby dumps. On the other hand, a comparatively high proportion of modified artifacts would have been removed to other sites or deposited in the locations where they were used or stored. A high tool:debitage ratio may,

Table 16. Frequencies of selected modified artifact types in all excavated subsquares from the floor and the two sectors of the roof of HP 7 with percentages of estimated total numbers of artifacts based on sample data.

	SW roof	NE roof	Floor	Roof
projectile points	46 (6.7%)	72 (5.4%)	49 (5.5%)	118 (5.9%)
bifaces	14 (2.0%)	30 (2.3%)	26 (2.9%)	44 (2.2%)
bipolar cores	11 (1.6%)	29 (2.2%)	32 (3.6%)	40 (2.0%)
pièces esquillées	1 (0.1%)	2 (0.2%)	5 (0.6%)	3 (0.1%)
end scrapers	8 (1.2%)	10 (0.8%)	27 (3.1%)	18 (0.9%)
cores	10 (1.5%)	17 (1.3%)	19 (2.1%)	27 (1.3%)
piercers	4 (0.6%)	2 (0.2%)	13 (1.5%)	6 (0.3%)
spall tools	6 (0.9%)	11 (0.8%)	12 (1.4%)	17 (0.8%)
ground stone	1 (0.1%)	11 (0.8%)	10 (1.1%)	12 (0.6%)
drills & perforators	4 (0.6%)	5 (0.4%)	8 (0.9%)	9 (0.4%)
bifacial knives	6 (0.9%)	4 (0.3%)	3 (0.3%)	10 (0.5%)
convergent knife-like bifaces	0 (0.0%)	3 (0.2%)	0 (0.0%)	3 (0.1%)
hammerstones	0 (0.0%)	1 (0.1%)	8 (0.9%)	1 (< 0.1%)
key-shaped scrapers	6 (0.9%)	4 (0.3%)	6 (0.7%)	10 (0.5%)
ornaments	2 (0.3%)	1 (0.1%)	2 (0.2%)	3 (0.1%)
pipe fragments	1 (0.1%)	2 (0.2%)	0 (0.0%)	3 (0.1%)
estimated total number of artifacts	**686**	**1330**	**885**	**2016**

Table 17. Frequencies and percentages of modified chipped stone artifacts in different wear categories on the floor and in the two sectors of the sampled roof of HP 7. Percentages are based on the number of all chipped stone artifact types, excluding cores and bipolar cores, recovered from the floor excavation and the roof samples.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
new	106 (42.1%)	17 (14.7%)	303 (36.7%)	123 (33.4%)
worn	80 (31.8%)	55 (47.4%)	189 (22.9%)	135 (36.7%)
sharpened	34 (13.5%)	40 (34.5%)	223 (27.0%)	74 (20.1%)
exhausted	21 (8.3%)	1 (0.9%)	69 (7.9%)	22 (6.0%)
uncertain	11 (4.4%)	3 (2.6%)	41 (5.0%)	14 (3.8%)

therefore, be characteristic of areas used for dumping.

5) Taken together, utilized flakes and expedient knives, which are likely to have been expediently used and to have had relatively high discard rates, are more abundant in the roofs of these two housepits than in the floors. The relative abundance of projectile points in both roofs is somewhat surprising. A high discard rate for points is one possible explanation. Another is that an unusually high proportion of points, which were presumably used in outdoor activities, were deposited in outdoor use contexts.

   Scrapers, which are more likely to have been stored for repeated use and to have had relatively low discard rates, are more abundant in the floors than in the roofs. Some of the rarer tool types which are also likely to have had relatively low discard rates also appear to be proportionately less abundant in the roofs than in the floors. Spall tools, drills and perforators, hammerstones, and key-shaped scrapers are all proportionately more abundant in both floors than they are estimated to be in the corresponding roofs. (Bifacial knives and end scrapers, however, appear to be most abundant in the roofs).

6) With the exception of a single ornament, six pipe fragments, and two pièces esquillées in the sample from the roof of HP 3 and three pipe fragments in the roof of HP 7, all of the artifact types which are represented in either roof are represented in the respective floors. It appears that smoking may have been an exclusively outdoor activity. Apart from that, it seems that if some parts of the roofs of HP 3 and HP 7 were used for activities which did not occur on the floors of those housepits, those activities must have involved the same tool types which were also used on the floors. By contrast, the floor of HP 12 lacks several (albeit rare) tool types which are present in the roof. This suggests that one part of the roof of HP 12 was used for activities which may not have occurred on the floors.

It is difficult to account for most of these characteristics without concluding that worn and broken tools as well as waste flakes and fire-cracked rock were removed from the floors and discarded on the roofs of HP's 3 and 7.

In HP 12, on the other hand, many of the differences between the roofs and the floors in the two larger housepits are reversed. There, the tool:debitage ratio is higher in the roof than in the floor. Utilized flakes are considerably more abundant in the floor than in the roof. Several types which are present in the roof are absent in the floor.

Table 18. Frequencies and percentages of modified chipped stone artifacts in different fragmentation states on the floor and in the two sectors of the sampled roof of HP 7. Percentages are base on the total number of chipped stone artifacts, excluding cores and bipolar cores, in the excavated floor and the sectors of the sampled roof.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
whole artifacts	155 (61.5%)	77 (66.4%)	328 (39.8%)	232 (63.0%)
chipped artifacts	30 (11.9%)	4 (3.5%)	371 (45.0%)	34 (9.2%)
1/2–3/4 of orig. artifact	24 (9.5%)	17 (14.7%)	75 (9.1%)	41 (11.1%)
< 1/2 of orig. artifact	18 (7.1%)	9 (7.8%)	25 (3.0%)	27 (7.3%)
small fragment	24 (9.5%)	6 (5.2%)	10 (1.2%)	30 (8.1%)
uncertain	1 (0.4%)	3 (2.6%)	16 (1.9%)	4 (1.1%)

Table 19. Frequencies and percentages of lithic debitage in different categories on the floor and in the two sectors of the sampled roof of HP 7. Data are incomplete for some categories and percentages are based on the total number of flakes for which data were recorded.

	SW roof (sample)	NE roof (sample)	Floor (complete)	Roof (sample)
large flakes (> 2 cm)	301 (32.0%)	489 (30.8%)	1232 (27.5%)	790 (31.3%)
chalcedony & chert flakes	88 (9.4%)	123 (7.8%)	395 (8.8%)	211 (8.3%)
quartzite flakes	12 (1.3%)	23 (1.5%)		35 (1.4%)
obsidian flakes	0 (0.0%)	4 (0.3%)	19 (0.4%)	4 (0.2%)
billet flakes	29 (3.1%)	39 (2.5%)	420 (9.4%)	68 (2.7%)
flakes with cortex	45 (4.8%)	65 (4.1%)	228 (5.1%)	110 (4.4%)

In other respects, HP 12 does bear a weak resemblance to HP's 3 and 7. Scrapers *are* slightly more abundant in the floor of HP 12 than in the roof sample but the difference between the roof and the floor is much smaller than in either of the larger housepits and too small to be statistically significant. As in HP's 3 and 7, a greater proportion of modified artifacts *are* whole or chipped in the floor of HP 12 than in the roof but, here too, the difference is small (2.5% difference) compared to the differences between the floors and the roofs of the larger housepits (12.6% difference in HP 7 and 10.4% difference in HP 3).

The only pattern which is clearly consistent between HP 12 and the two larger housepits is in the heavier

wear states among the modified artifacts in the different strata. New artifacts are more abundant in the floors of all three of the housepits than in any of the corresponding roofs. Extensively sharpened artifacts are more abundant in the roofs than in the floors. In fact, the differences between floor and roof in this respect are extreme in HP 12 where 91.43% of artifacts in the floor exhibit no wear and 50% of the artifacts in the roof have been extensively re-sharpened.

Apart from greater stochastic variation due to smaller sample size, there are at least two possible reasons why rooftop activities, as opposed to rooftop dumping, may have been more important in the formation of the lithic assemblage from the roof HP 12 than was the case in the roofs of the two larger houses. First, because HP 12 is so much smaller, there may simply not have been enough indoor space for some of the activities which occurred inside the larger houses. These activities may, of necessity, have been moved to the roofs. As was suggested above, the fact that many modified artifact types which are present in the roof sample are absent in the floor may indicate that the roof was used for some activities that did not occur on the floor.

Second, HP 12 appears to have had few internal posts to support the roof. Only one posthole was identified in the floor of HP 12. The entrance to this housepit may, therefore, have been at the the side of the roof rather than through the smokehole in the center of the roof. Such entryways can be seen in photographs of some smaller earth-banked winter lodges lacking internal posts (Alexander 1992: Plate 3.3) and have been documented in HP 90 at Keatley Creek. If lithic waste were removed from the floor through a doorway in the rim, it would be distributed in a very different pattern than if it were thrown down from the center of the roof. Debitage and modified artifacts might simply be thrown through the door onto the ground. Fire-cracked rock may have been piled on the roof, away from the door, because it would be more likely to become an obstacle around the doorway. It may also have been a useful addition to roof soil.

Did any activities other than dumping occur on the roofs?

Housepit 12

As noted in the previous section, the diversity of modified artifact types in the roof of HP 12, their relatively low degree of fragmentation, and the relatively high tool:debitage ratio suggest that some activities occurred on the roof of that house which did not occur on the floor. In the two larger houses, on the other hand, the roof assemblages, in general, are characterized by properties attributed to the dumping of lithic refuse. While these observations are indicative of the processes which were dominant in the formation of each roof assemblage as a whole, they do not preclude the possibilty that some areas in any of the roofs of the larger housepits were used as activity areas or that some part of the roof of HP 12 was used as a dump.

Evidence of dumping in the roof of HP 12 and, indeed, in all three roofs can be seen in the uneven distribution of fire-cracked rock. Fire-cracked rock was almost certainly deposited in the roofs as refuse which originated on the floors. Its patterned distribution indicates that it was most probably removed from the floors and deliberately deposited on the northern parts of the roofs while the houses were occupied. If it had been incorporated into the roofs during the process of reroofing it seems unlikely that its distribution would be so patterned and so different from the distribution of debitage (Figs. 1–6), or that the patterning would be so consistent between housepits.

In the roof of HP 12, the northeast sector has the most whole artifacts, the greatest modified artifact diversity, and the greatest fire-cracked rock density. This may indicate that, at least in HP 12, some outdoor activities occurred in the same area where fire-cracked rock and other lithic waste was dumped.

The southwest sector of the roof of HP 12 is more similar to the floor than to the northeast sector in terms of: modified artifact diversity; the proportions in which different modified artifact types, different material types, and different fragmentation states are represented among modified artifacts; and the proportions in which various flake types and material types are represented in debitage. Only the distribution of wear states clearly departs from this pattern. Relatively unused artifacts are much more common in the floor than in either sector of the roof. On the whole, though, the southwest sector of this roof is similar enough to the floor, in most respects, to suggest that this part of the roof was rarely used as an activity area. The lithic assemblage in the southwest sector of the roof is more characteristic of artifacts which originated on the floor. Either they were discarded and removed from the floor during the period when the house was occupied or they were scraped from an abandoned floor and redeposited on the roof during the process of roof reconstruction. The apparent concentration of lithic artifacts in limited areas within the southwest sector suggests that at least some of those artifacts were dumped on the roof rather than mixed into roof soils during the process of reconstruction.

Housepit 3

In HP 3, the northeast sector of the roof has been identified as the most probable location for a rooftop dump both because of the northerly concentration of fire-cracked rock and because the northeast sector is most similar to the floor in many respects. The proportions in which the various types of flakes, including flakes with cortex, and the different raw material types occur in the debitage in the northeast sector are more similar to the proportions in which they occur on the floor than to the proportions in which they occur in the southwest sector. The same can be said of material types among modified artifacts. The proportions of utilized flakes, expedient knives, and scrapers among modified artifacts on the floor are more similar to those in the northeast sector than those in the southwest sector.

A greater proportion of the modified artifacts in the northeast sector are fragmented (as opposed to whole or chipped) and a greater proportion are re-sharpened than on the floor. The differences between the floor and the northeast sector in both respects are probably due to selective discard of re-sharpened and broken artifacts in the northeast sector of the roof. However, even higher proportions of the modified artifacts in the southwest sector of the roof are fragmented and re-sharpened. Also, the tool:-debitage ratio is less in the southwest sector than in either the northeast sector or the floor. These distributions are not consistent with what would be expected if the southwest sector had been reserved exclusively for some activity other than dumping. Rather, they suggest that dumping was not restricted to the northeast sector. The southwest sector may have served both as an activity area and as a dump.

The southwest sector is distinguished from the northeast chiefly by a relative abundance of utilized flakes and by relative scarcities of scrapers, and notches. A low discard rate has been attributed to scrapers and there is no obvious reason to suppose that the discard rate for notches would be especially high. So it is not surprising that these types should be scarce in an area used only for dumping. Conversely, given the high discard rate attributed to utilized flakes, they might be expected to occur in high proportions in areas used as dumps. It is not clear, though, why utilized flakes should be considerably more abundant in the southwest sector than in the northeast sector if the only activity which occurred in both sectors was dumping. There may have been some reason that utilized flakes were preferentially discarded in the southwest sector, but it seems equally likely that the higher proportion of utilized flakes among the modified artifacts in the southwest sector is the result of some additional activity in that sector which involved the use of this modified artifact type. To summarize, the distributions of lithic artifacts in the roof sample suggest that, in HP 3, unlike HP 12, dumping occurred in both sectors of the roof and that additional roof-top activities enriched the southwest sector in certain tool types (utilized flakes).

Housepit 7

While neither sector of the roof of HP 7 was clearly more similar to the floor, the distribution of fire-cracked rock, the distributions of modified artifact types, the high proportions of worn and extensively re-sharpened artifacts, and the high proportion of fragmented artifacts in the northeast sector identified this sector as the more probable location for a dump on the roof of this housepit. As in HP 3, whole and chipped artifacts are more abundant in the floor than in either sector of the roof and the southwest sector does contain a concentration of fire-cracked rock. So it seems likely that dumping also contributed to the formation of the assemblage in the southwest sector of the roof.

As in HP 3 (and HP 12), the southwest sector of the roof of HP 7 is characterized by a high proportion of utilized flakes. This similarity between the housepits lends some support to the argument that similar activities occurred in the southwest sectors of these roofs. The southwest sector of the roof of HP 7 is also comparatively rich in Stage 4 bifaces, bifacial knives, and key-shaped scrapers, which may also indicate the occurrence of some special activities in this zone.

What activities, other than dumping, may have occurred on the roofs?

The distributions of modified artifact types are really the only clues that the lithic assemblages provide as to the nature of whatever activities may have occurred on the roofs of these three pithouses. These data allow considerable latitude for speculation, but I will propose some possible interpretations.

Utilized flakes are the modified artifact type which are most clearly characteristic of the southwest sectors of both of the two larger housepits (HP's 3 and 7). These are such general purpose tools that they may have been deposited in the course of any number of activities. Given the apparent association of dense clusters of utilized flakes with high densities of fire-cracked rock in the southwest sectors of the roofs of both HP 3 and HP 7, the preparation of foodstuffs is one possibility. Manufacturing processes involving plant fibers or dressed skins are another.

Most of the more specialized artifact types for which complete samples were collected occur in the roofs of these two HP's, (and in the southwest sectors) in sufficient numbers to suggest that activities associated with these artifact types are at least as likely to have occurred on the roofs as on the floors. Hammerstones are one possible exception. The scarcity of hammerstones in the two roofs may indicate that activities involving the early stages of lithic reduction were not common on the roofs or it may indicate that these tools were stored elsewhere.

Pipe fragments are absent in the floors but present in both roofs, especially in the northeast sectors. This may indicate that smoking was primarily an outdoor activity.

None of the more specialized types for which a complete roof inventory was obtained is consistently associated with either the southwest or the northeast sector in both HP 3 and HP 7. In HP 3 most of these types tend to be fairly evenly distributed between the two sectors. The southwest sector of HP 7 is distinguished by an abundance of key-shaped scrapers and bifacial knives. Key-shaped scrapers have been identified with the preparation of wooden shafts (Rousseau, 1992). Bifacial knives are robust tools with relatively acute cutting edges suited to sawing or slicing and may have been associated with woodworking or heavy butchering (see Vol. I, Chap. 12).

What factors may have determined which areas on a roof were selected for which activities?

Whatever activities, other than dumping, may have occurred on the roofs of these three housepits, both the distributions of fire-cracked rock and the distributions of modified artifacts suggest that orientation to the sun or to the compass played some role in determining which areas on a roof were used for which activities. However, apart from the disposal of fire-cracked rock, dumping of lithic artifacts does not seem to have been restricted to one sector or another.

Rather it appears that while fire-cracked rock was preferentially dumped in the northern parts of the roofs of all three housepits, dumping of debitage and modified lithic artifacts was not restricted to either sector (Figs. 4–6). Thus dumping was not restricted to the northern parts of the roofs simply because the ladders were laid against the north side of the smokehole. Only fire-cracked rock appears to have been selectively dumped to the north, either because it served some purpose there or because it would have interfered with some activity in the southern areas. Certainly, fire-cracked rock is bulkier and more obtrusive than other kinds of lithic debris.

However, insofar as there are some indications in the lithic assemblages of activities other than dumping on the roofs, it does not appear that, when locations were selected for activities involving the use of stone tools, areas where fire-cracked rock had been dumped were necessarily avoided. In fact, the apparent close association of fire-cracked rock with utilized flakes in the southwest sectors of the three roofs suggests that the dumping of fire-cracked rock may have been associated with some activity there. Perhaps fire-cracked rock was dumped in designated outside activity areas so that lithic elements could be sorted for recycling and use.

Instead of being excluded from activity areas, fire-cracked rock may have been discarded where there was least foot traffic on the roof or even where it served some positive purpose. It is possible, for example, that fire-cracked rock served to bulk up the roof covering in the northern parts of the roofs or to help keep insulation in place.

On the other hand, there are some possible rooftop activities, or inactivities, which need not have involved the deposition of any lithic artifacts. Dumps of fire-cracked rock might have been especially inconvenient in rooftop areas set aside for basking in the warmth of a winter's afternoon sun.

The choice of locations for different activities on the pithouse roofs was probably influenced by other factors, besides orientation to the sun. Wind direction or proximity to water or fuel are possibilities. Orientation to the river or the mountains may have had some symbolic significance. At any rate, it is remarkable that orientation of lithic artifact distributions is so similar in all three housepits.

The aim of this paper was to investigate the processes by which lithic artifacts were introduced into housepit roof deposits. Some of these artifacts undoubtedly derive from the incorporation of floor deposits in roof soils during reroofing events. This process probably accounts for background distributions of fire-cracked rock, debitage, and modified artifacts throughout the roof deposits. However, it can be concluded, on the basis of the distinctive characteristics of concentrations of lithic artifacts in the roofs, that the roofs of these three housepits were used both for dumping and for some other activities. We cannot say with certainty, at this point, what those activities were but there are indications that similar locations on the roofs were chosen for similar activities in all three houses.

These three housepits hardly represent an adequate sample of the more than one hundred housepits at the site. Overall though, the results of this preliminary analysis certainly suggest that there are patterns in the distributions in the housepit roofs which are worthy of future investigation.

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