Chapter 4

Socioeconomy at Keatley Creek: The Botanical Evidence

Dana Lepofsky

Introduction

This chapter reports on the paleoethnobotanical analyses of floor sediments from a small (HP 12), medium (HP 3), and large housepit (HP 7) at Keatley Creek. The specific goals of the paleoethnobotanical analyses were to delineate patterning of floral remains across the floors of the three housepits, and make comparison between the structures which could yield insights into socio-economic differences. To that end, I examined 123 flotation samples from pithouse floor contexts, including 69 samples from HP's 7, 38 samples from HP 3, and 16 samples from HP 12. Roughly 15% of the total subsquares on the excavated portion of the floors of HP's 7 and 3 have been analyzed for archaeobotanical remains. Approximately 12% of the HP 12 floor was examined. Details concerning methods, raw data, and site formation processes have been discussed in Volume I, Chapter 9.

The results from site formation analyses indicated that the housepit floor deposits are relatively intact and undisturbed. Patterning across the floors seems to represent the accumulated effect of repeated activities in discrete areas. The Keatley Creek archaeobotanical remains, then, are ideal for examining the archaeological correlates of socio-economic behavior in the housepits.

Results

The results of the paleoethnobotanical analyses of HP's 7, 3, and 12 are discussed in turn below, followed by comparisons of remains among the three structures. Distributions of archaeobotanical remains across the three housepits are presented in Figures 1–3. The archaeobotanical remains were divided into the three major plant categories recovered on the floor: charcoal, needles, and seeds. Seeds were further divided in the large (HP 7) and medium (HP 3) structures into food seeds, non-food seeds, and unidentified seeds (see Vol. I, Chap. 9 for ethnobotanical descriptions). High concentrations of charcoal, needles, and food and non-food seeds are circled on the figures. In HP 12, where so few seeds were recorded, the total number of seeds recovered per sampling subsquare is presented All analyses are based on the number or weight of specimens recovered per one liter flotation sample.

Housepit 7

Plant Distributions Across the Floor

There are several clusters of charcoal concentration along the floor of HP 7 (Fig. 1). The greatest concentration of charcoal centers around the hearth feature in Square Q, which was no doubt the source of much of the charred wood. The other concentrations are less easy to explain. Some (Squares RR and SS, Squares G and B) are adjacent to fire-reddened areas. However, the remaining clusters are not clearly in association with fire reddening, and there are some fire reddened areas with no associated charcoal concentrations. Likewise, there is only a weak relationship between charcoal and fire cracked rocks across the floor (Vol. II, Chap. 11, Fig. 9).

Except for a few high density areas, there is a relatively low concentration of charcoal across the floor of the housepit. Given the proposed model for intensive use of this housepit (see Vol. II, Chap. 1), I would expect a much greater density of charcoal on the floors. The low density of charcoal suggests either that fires were infrequent in the pithouse (as proposed by Hayden et al. 1996) and/or that the floor was regularly cleaned of the large charcoal pieces so that only the small, scattered fragments remain. The center of the floor (Square A and part of adjacent squares) is particularly devoid of charcoal. Since this may have been a communal, high traffic, or ritual area (Vol. II, Chaps. 1, 11) greater care may have been taken to keep it clear of debris.

Six taxa make up the assemblage of identified charcoal species from the floor of HP 7 (Vol. I, Chap. 9, Table 7). The assemblage is dominated by three taxa: Douglas-fir, ponderosa pine, and *Populus.* Douglas-fir is considerably more abundant than the two other dominant taxa, which occur in relatively equal percentages. Coniferous charcoal generally dominates the samples; only 3 of the total 23 floor samples contain less than 60% coniferous charcoal. There is no apparent patterning across the floor among deciduous-dominated samples.

The distribution of needles across the floor of HP 7 is distinctly non-random (Fig. 1). There is a nearly continuous concentration of needles along the periphery of the floor. The concentration is especially dense along the southern and southeastern periphery of the structure, near what has been identified as a bench (Vol. III, Chap. 4). The concentration of needles along the periphery is particularly striking when compared to the center of the structure where needles are relatively absent. All needles are Douglas-fir and ponderosa pine, with the former dominating.

There are three discrete concentrations of food seeds across the HP 7 floor (Fig. 1). The cluster in the north-central floor area contains the highest density and diversity of food seeds in this category. The density and diversity are especially high when the unidentified seeds are included in the totals (usually

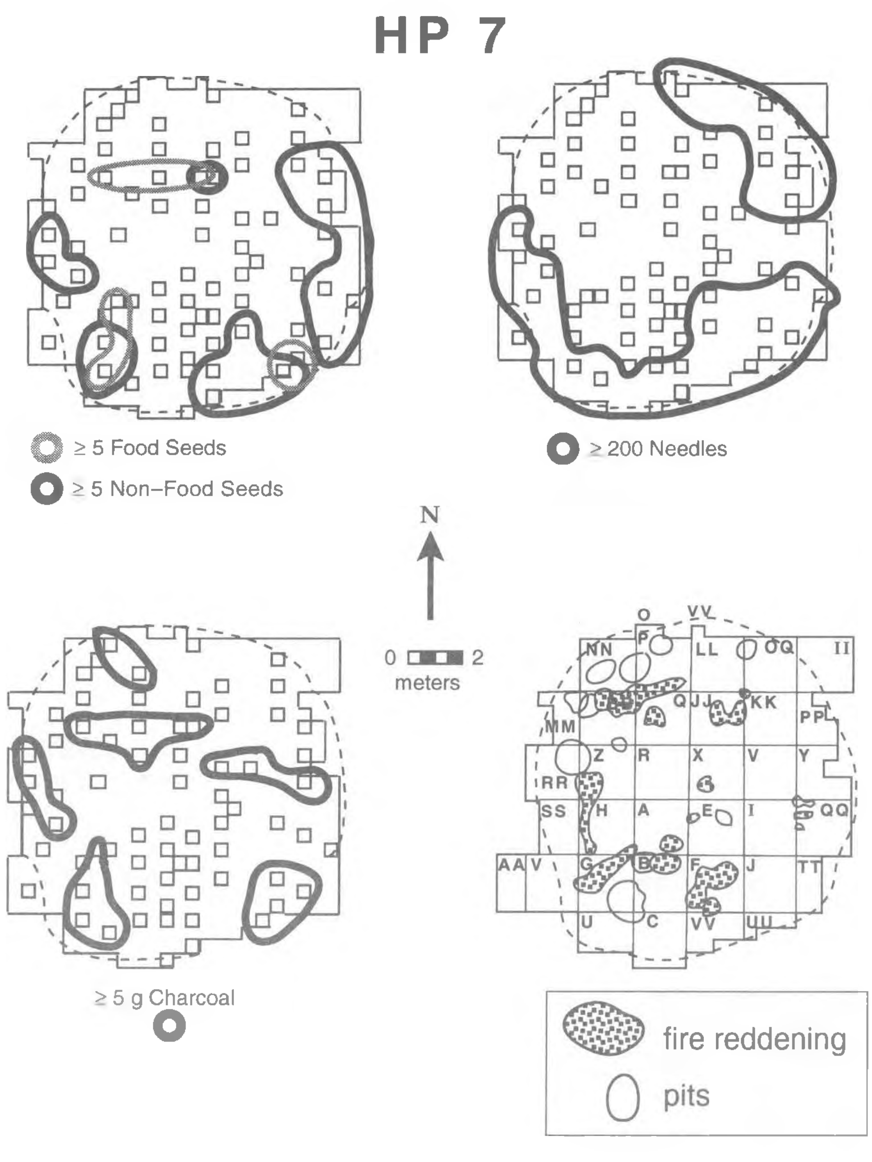

Figure 1. The frequency and distribution of plant remains across HP 7 with high density areas circled and sampled subsquares indicated by small squares. The arrangement of excavated squares is shown at lower right.

each specimen representing only a single taxon). This concentration of seeds correlates well with a charcoal concentration, both of which cluster around the hearth area in Square Q. The wide diversity of seed types in tight association with the hearth strongly suggests that the hearth in Square Q was repeatedly used for plant processing. Another possible (but less likely) explanation is that this hearth was a regular discard area for all plant foods used in the pithouse. Square Q is a good candidate for a special activity area.

Located in the southern end of the housepit floor are the other two food seed clusters. Both, formed only by two subsquares, overlap with concentrations of non-food seed clusters. Both of these food seed clusters also correspond closely to concentrations in charcoal. However, these small clusters may represent more minor plant processing areas. The analysis of additional subsquares adjacent to the clusters would help to better define their nature. Plant food processing that did not involve fire may have occurred elsewhere on the floor, but the residues from these events are not likely to show up in the archaeological record.

Non-food seeds occur in five clusters on the large housepit floor, and are generally spatially distinct from the food seeds (Fig. 1). The southern and eastern peripheries of the floor contain four of the clusters. Although I have separated these periphery concentrations into four discrete clusters, I suspect that the gaps between the clusters have more to do with gaps in our sampling than actual breaks in the distribution.

The concentration of non-food seeds along the south and east periphery of the pithouse corresponds well with the zone of highest needle concentration, and may be related to the proximity of the earthen bench along the northeast, east, and southeast sides of the housepit floor. These clusters are predominantly composed of charred *Chenopodium* and *Poaceae* seeds. The grass seeds and needles may be the remains of a covering for the bench composed of grass stems and conifer boughs. One possible explanation for the concentration of seeds and needles is that the bench was covered by planks or poles which acted as traps for the seeds and needles. No clear explanation for the associated charred chenopods is evident but they may have been accidentally collected along with the grasses.

The north-central part of the housepit floor contains the final concentration of non-food seeds (Squares JJ-7 and JJ-8). This concentration is located at the edge of a hearth which also has a high concentration of food seeds. *Phacelia*, a weedy species, reportedly used medicinally in ethnographic times (Steadman 1936, cited in Turner et al. 1990), dominates the non-food seeds in this square and the adjacent hearth. We cannot at this time determine what purpose the *Phacelia* seeds served, but it is unlikely that their association with the hearth in Square JJ is an accidental one. As with the other two classes of botanical remains, the center of the pithouse is relatively devoid of all seeds.

In general, there is little relationship between seed and faunal concentrations across the floor of HP 7. The one notable exception is in the northwest area of the house. The concentration of food and non-food seeds here corresponds to a cluster of fish bones (Vol. II, Chap. 7) both of which are associated with a fire-reddened area. This area likely functioned as a plant and animal food processing area.

Features on the Floor

The floor of HP 7 has little "featureless" floor space and is composed of a complex array of features (Vol. III, Chap. 4). No pit hearths or rock lined hearths appear on the floor. Evidence for fires is largely based on more diffuse fire reddened areas. In addition to the hearths there are pits of varying sizes. Time constraints restricted us to sampling only one of these pits for plant remains.

Flotation samples were analyzed from three hearths in HP 7 (located in Squares Q-7, JJ-8, and NN-13). A high density of seeds and charcoal was recovered from the first two hearths in Squares Q and JJ, paralleling the results from the adjacent sampled subsequences. The Square Q hearth has relatively few needles in it, typical of the center of the housepit as a whole. Unfortunately, the needles in hearth JJ were not quantified, but judging from the concentrations in adjacent squares, needles in that hearth may be slightly more abundant than expected for that portion of the floor.

The hearth in Square Q is dominated by food remains. The hearth in Square JJ has a relative abundance of both food and non-food remains. It seems likely that hearth Q was the center of the plant processing activities that took place in the adjacent squares. I have already mentioned that the majority of the non-food remains in JJ are *Phacelia* and may indicate some special use for that feature. The presence of a high density of both food remains and non-food remains suggests that this hearth functioned as part of the same plant processing area as hearth Q.

The hearth in the northwest corner of the pithouse (NN-13), like the surrounding floor area, has a low density of all categories of remains. The low density of charcoal within the hearth suggests that it had not been used for some time, was used less frequently, or was kept relatively cleaner than the other analyzed hearths.

In addition, I identified charcoal from a select number of hearths and fire reddened areas (Vol. I, Chap.

9, Table 9). The burn areas are classified by size to determine if different species of wood were used in different sized burn features. Conifers clearly dominate all the samples, regardless of feature size. Ponderosa pine and Douglas-fir appear in roughly the same abundance when all the samples are considered together, although there is a great deal of variation between samples. *Populus* follows in abundance. One specimen of *Betula* sp., from the hearth in Square Q, is the only other taxon represented. These results suggest that there is no apparent difference in the kinds of woods selected for burning in large, as opposed to small, burn features.

Only a single pit feature (I-3) was analyzed for archaeobotanical remains. This deep depression appears to have been formed by the intersection of a shallow pit with a deeper post hole. The archaeobotanical remains in the pit consist of a moderate amount of charcoal, a relative abundance of needles and almost no seeds.

The archaeobotanical contents of the pit feature suggest that, at the time of abandonment, it was no longer serving its original function. Instead, the presence of charred remains in the pit indicates that the pit had been at least partially filled with secondarily deposited refuse. This supports Hayden's (Vol. I, Chap. 1) suggestion that large pits within the housepits may have been filled with loose floor deposits and domestic debris in between their use for storage. I have already suggested that the floor was regularly cleaned of larger debris. The charcoal and needles in the pit feature may suggest that the pit served as a repository for such sweepings when the feature was not being used for food storage.

There are significant differences in charcoal species abundance between the hearths and general floor of HP 7 (Vol. I, Chap. 9, Tables 1 and 2). When the average percent for all samples are considered, Douglas-fir is significantly more abundant in the floor samples than in the hearth areas (Mann Whitney U test, $p = 0.02$; Pmen floor $X = 62.5 \pm 20.2$, Pinus floor $X = 18.0 \pm 13.7$, Pop floor $X = 14.5 \pm 19.7$, N = 23; Pmen hearth $X = 39.0 \pm 23.9$, Pinus hearth $X = 39.3 \pm 36.5$, Pop hearth $X = 19.3 + 19.2$, N = 8), and there is a trend for pine to be more abundant in the hearth areas than the floors (Mann Whitney U test, $p = .10$). The overall abundance of *Populus* is similar in both contexts ($p = 0.5$).

These results suggest that the floor and hearth charcoal result from different processes. As discussed elsewhere (Vol. I, Chap. 9) the charcoal on the floor has several potential sources. Unless the contents of the hearths are "secondary refuse," which is not suggested, we can assume that the charcoal from the hearths originates from the last, or perhaps the last few fires burned in that hearth. The species of floor charcoal surrounding the hearths are not found in the same abundance as that found in the hearth. This suggests that the floor charcoal represents an accumulation of hearth (and other) debris from a longer time period than represented in the hearth itself. Thus, whereas the hearth gives us a glimpse of a single (or close sequence of) burn event(s), the area surrounding the hearth gives us a more general picture of wood use over time.

Housepit 3

Plant Distributions Across the Floor

There are three concentrations of charcoal on the floor of HP 3, along the northwest, southeast and southwest edges of the floor (Fig. 2). Two of the three areas designated as "concentrations" are represented by a high density of remains in only a single subsquare. Archaeobotanical analyses of adjacent subsquares would no doubt serve to clarify the patterning. Each of the charcoal concentrations corresponds closely to domestic fires indicated by fire-reddened areas on the floor. As in HP 7, the center of HP 3 is relatively devoid of charcoal.

As in HP 7, I identified charcoal from select areas on the floor of the medium housepit (Vol. I, Chap. 9, Table 8). Like HP 7, conifers, primarily Douglas-fir, dominate the assemblage. Pine and *Populus* occur, on average, in relatively equal abundance across the floor as a whole.

There is a concentration of charred conifer needles along the periphery of the HP 3 floor, particularly along the southern edge (Fig. 2). It is unfortunate that we do not have any samples analyzed from the extreme western edge, but it seems as if there is a steady decline in abundance of needles northward from the southern concentration. There are few needles in the center of the floor, a pattern seen also in HP 7. The needles are both Douglas-fir and ponderosa pine, with the former dominating.

Food seeds cluster in three discrete areas, one along the northwestern periphery, and two areas in the southwest quadrant of HP 3 floor (Fig. 2). The concentration along the northern and southwestern edges of the floor correlate with concentrations of charcoal and relatively denser accumulations of needles. The northern cluster is significantly larger, more dense, and more diverse than the smaller concentrations. The northern cluster likely represents a major plant food processing area associated with the hearth is Square EE. The two smaller concentrations to the south may either be smaller plant processing areas or may represent accidental or idiosyncratic depositional events.

As in HP 7, most food seed concentrations appear to correspond to activity areas involving fire. Since the presence of fire increases the likelihood of seed preservation (often via accidents), the correlation between seeds and hearths and fire-reddened areas may be an artifact of preservation. That is, the *absence* of seed concentrations in areas without fire activities may just be a preservational bias.

Non-food seeds concentrate along the periphery of HP 3 floor. Charred chenopods make up the bulk of the non-food seeds. This pattern differs from HP 7 where the non-food category consists primarily of chenopod as well as grass seeds. Without the presence of grass seeds, I cannot formulate a parsimonious cultural explanation for the chenopods along the periphery of the floor of HP 3. The distribution of chenopods along the periphery of the structure may indeed be due to post-occupation depositional processes, but parsimonious "natural" explanations are equally difficult to formulate (Vol. I, Chap. 9). As in HP 7, food and non-food seeds distributions are generally mutually exclusive in HP 3.

Two of the three clusters of food seeds generally correspond to concentrations of faunal remains (Vol. II, Chap. 7). However, given the generally diffuse distribution of faunal remains on the floor of HP 3, the correspondence with seeds may be fortuitous. Paralleling HP 7, all three classes of botanical remains are rare in the center of HP 3 floor.

Features on the Floor

Two hearths from HP 3, in Squares G and F, were analyzed for botanical remains. The feature in Square F is characterized by relatively few remains in all categories, in contrast with the other burn feature analyzed. The hearth in Square G contained fewer needles and more charcoal than the surrounding floor. The relative absence of needles may indicate that the area around the hearth was kept clean of needle matting. Perhaps a clean surface was needed for the various activities which were conducted around the feature or, as prevention against run-away floor fires. The associated small concentration of food seed remains surrounding this hearth may indicate that the feature, like the one in Square F, was the center of a minor food plant processing area. Douglas-fir was the predominate wood charcoal recovered from the feature (Vol. I, Chap. 9, Table 9).

A single pit feature in Square F was analyzed for archaeobotanical remains. This pit was of moderate depth and was used during the most recent occupation of the housepit. The most striking result of the analysis is the relative absence of all categories of plant remains

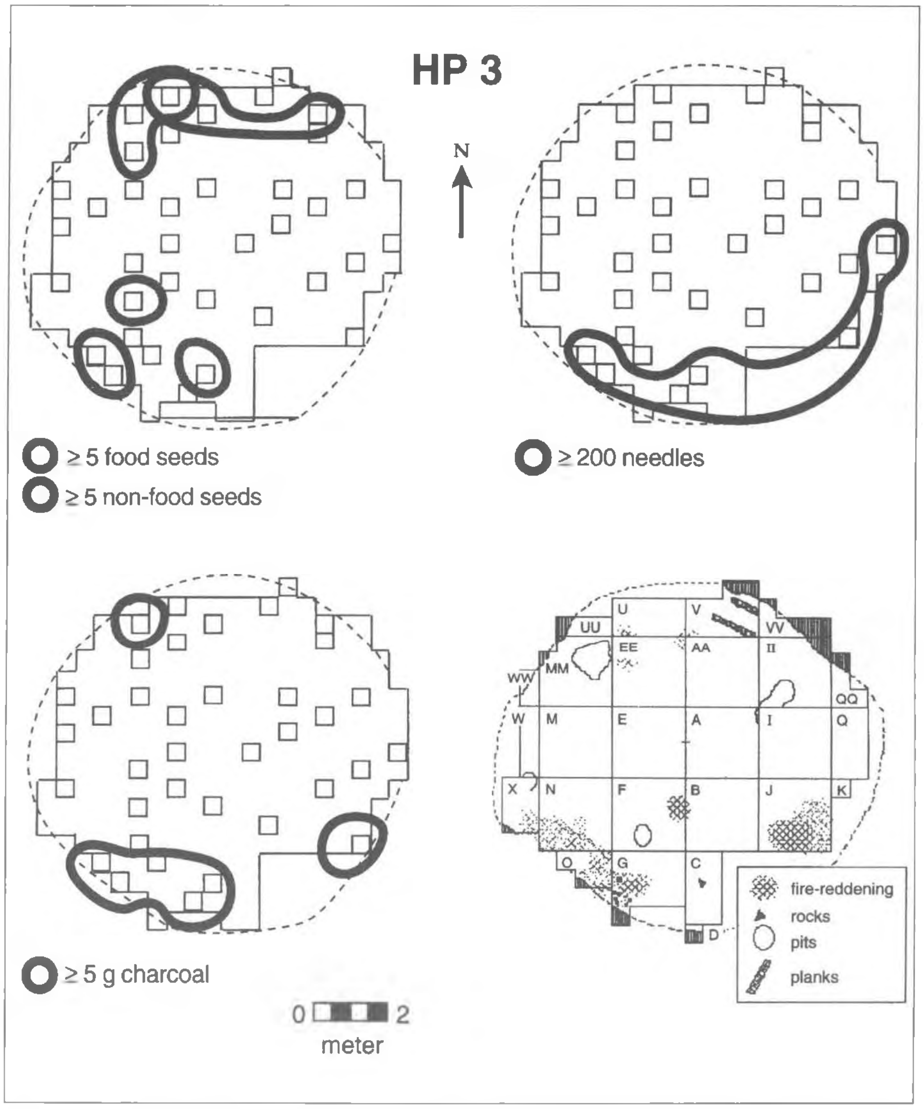

Figure 2. The frequency and distribution of plant remains across HP 3 with high density areas circled and sampled subsquares indicated as small squares. The arrangement of excavated squares is shown at lower right.

in the pit. Faunal analysis of the bottom strata of the pit feature indicates that the pit was used to store salmon, and was not used subsequently for garbage disposal (Vol. II, Chap. 7). The floral analysis supports this latter conclusion. Had the pit been used as a receptacle for waste, a higher proportion of charred remains would be expected; those few plant remains contained within are likely accidental introductions into the feature. It is possible that uncharred plant resources were also stored in the pit, but did not survive in the archaeobotanical record.

Housepit 12

Plant Distributions Across the Floor

Distinguishing patterning across the floor of HP 12 is more problematic than in the two larger housepits (Fig. 3). Because HP 12 has such limited floor space, clusters of remains may be more spatially restricted than in the other housepits. Thus, although we analyzed roughly the same percent of surface area in the three structures for archaeobotanical remains, we may be missing relatively more information in the unsampled subsquares of HP 12. Given the nature of the sampling strategy in HP 12, any missed concentration of remains is likely to be defined by very few subsquares.

Three areas on the floor of HP 12 stand out as containing significantly more charcoal than the surrounding squares (Squares I-9 and J-15, A-2, E-11). The charcoal concentration in the north is associated with a fire reddened area, as well as relatively higher densities of bones and FCR. However, other areas of fire reddening on the floor display a much lower density of charcoal (and other) remains. No charcoal specimens from the floor of HP 12 were identified.

There are also three areas of needle concentration on the floor of HP 12 (Squares I, E, and A; Fig. 3). Each of which roughly correspond with charcoal concentrations. Douglas-fir and ponderosa pine comprise the needle assemblage, with the former far outweighing the latter in number. Nowhere on the floor of HP 12 are needles as densely concentrated as in the two larger structures.

Seed densities are strikingly low in all areas across the floor (Fig. 3), and no area appears to have a greater or lesser concentration than another. Even the areas which have a concentration of both charcoal and needles have few or no seeds. Indeed, only 16 seeds were found across the floor, representing only five taxa. The most ubiquitous seed remain is *Chenopodium*, which is of questionable ethnobotanical significance (Vol. I, Chap. 9), and even its total number is very low.

While each class of remains appears to be less concentrated in the center of HP 12 than the periphery,

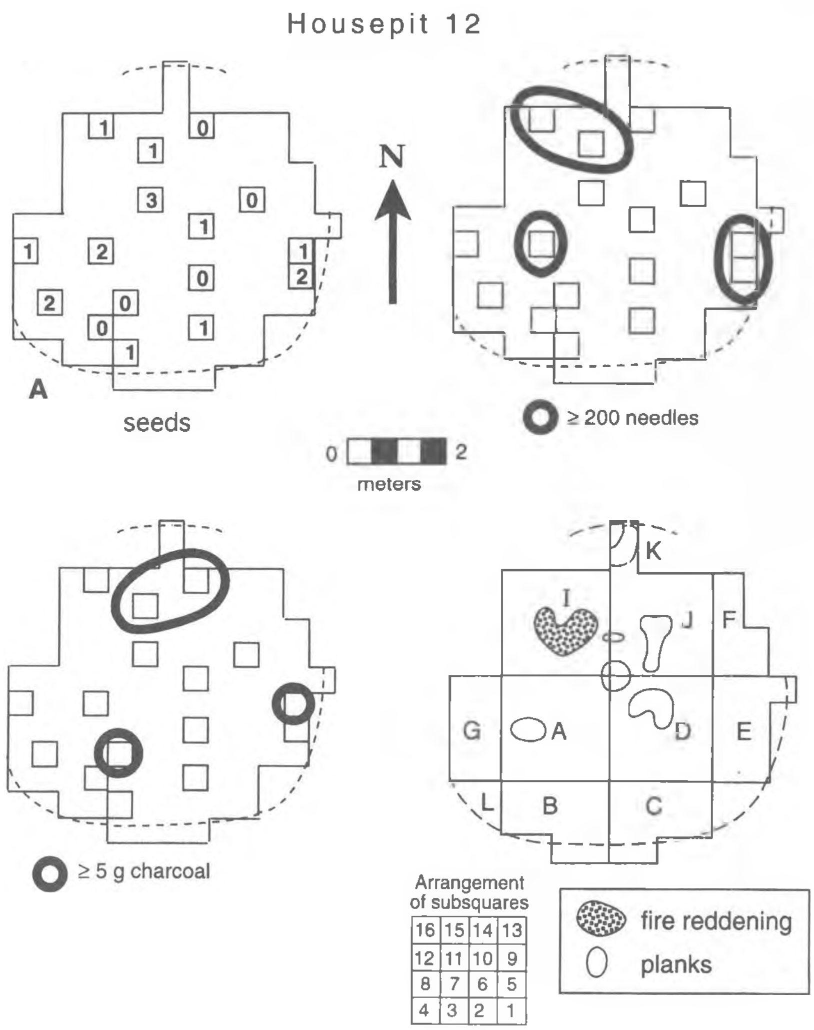

Figure 3. The frequency and distribution of plant remains across HP 12 with high density areas circled and sampled subsquares indicated by small squares. The arrangement of excavated squares is shown at lower right.

this patterning is less marked here than in HP's 7 and 3. The pattern of high needle concentration along the periphery, which is so clear in the other two housepits, is likewise less evident in HP 12.

Features on the Floor

One sample from the fire reddened area in the north of the floor (I-9) was examined for archaeobotanical remains. The sample contained a high density of charcoal, an extremely high density of needles, and virtually no seeds. The same pattern holds for adjacent sampled subsquares. This suggests that the fire reddening may be the result of burning for warmth but not plant processing.

Comparisons of Patterning Across the Floors of the Three Housepits

The relative absence of archaeobotanical remains in the center of the three housepit floors is a consistent pattern in all three categories of remains. This pattern generally parallels that of the faunal remains (Vol. II, Chap. 7). Given the absence of remains in the center, the palaeoethnobotanical remains offer few insights into how the area was used. Given the ease with which charcoal can be displaced, and how difficult it is to clean up, it seems clear that considerable care was taken to keep the housepit center clear of debris. The center may have been a communal use area for the inhabitants of each structure.

Interpreting the variation of charcoal densities across the three floors was accomplished with uneven success. In cases where charcoal frequency correlates with evidence of domestic fires, the source of the floor charcoal is clear. However, this was not always the case.

In HP 7 there is a clear association of charcoal and the hearth in the northcentral portion of the floor. However, the relationship between charcoal densities and other fire reddened areas or non-reddened areas is not straightforward. In HP 3, on the other hand, there is a close relationship between most fire-reddened areas and charcoal frequencies. The only deviation from this pattern is in association with the "last occupation hearth." In HP 12, only one of the three areas of charcoal concentration corresponds to fire-reddening.

How we are to interpret the charcoal densities is unclear. We know from the distribution in the center of the structure that the floor was likely regularly cleaned of large debris. I have suggested elsewhere (Vol. I, Chap. 9) that the absence of large archaeobotanical remains across all of the floor suggests that the floor as a whole was regularly cleaned. If sweeping was involved in clean up activities, it would blur any floor patterning; but the clear association between some categories of remains with discrete areas, suggests that if sweeping was employed the effect was not great. A possible explanation for the lack of charcoal associated with definite hearths may be the fact that these hearths were used infrequently.

The three dominant charcoal species (Douglas-fir, pine, *Populus*) were recovered in the same abundance from the floors of both HP's 3 and 7 (Tables 1 and 3; HP 7 Pmen $X = 62.5 \pm 20.3$, HP 3 Pmen $X = 62.5 \pm 21.6$, Mann Whitney U test, $p = 0.92$; HP 7 Pinus $X = 18.0 \pm 13.7$, HP 3 Pinus $X = 19.3 \pm 20.6$, Mann Whitney U test, $p = 0.80$; HP 7 Pop $X = 14.5 \pm 19.7$, HP 3 Pop $X = 14.7 \pm 7.1$, Mann Whitney U test, $p = 0.16$). Indeed, these taxa have almost identical abundance and standard deviations across the two housepit floors. Douglas-fir was by far the preferred wood, with the other two chosen in roughly equal proportions. There is a greater diversity of wood species represented on the floor of HP 7, but this may be a factor of sample size. In general, it seems that the same wood selection process was conducted by the inhabitants of HP 7 and HP 3. The question remains whether wood abundance reflects similar abundance of species in the natural environment, or more conscious wood selection. As I discussed elsewhere (Vol. I, Chap. 9), a sample from a greater number of housepits, as well as a detailed paleoenvironmental reconstruction, are needed before we are better able to solve this question. No charcoal was identified from the floor of HP 12, so comparisons with this housepit cannot be made.

The suggestion has been made that fuel wood was a relatively rare commodity at Keatley Creek, and that there was differential access to wood based on differences in wealth and status (Vol. II, Chap. 1). If this proposition is correct, there should be some indication in patterns of wood use in the three housepits, i.e., we would expect that the greatest diversity and abundance of fuel wood would be found in the largest, and supposedly the highest status structure (HP 7), whereas the least amount fuel wood should be recovered in the smallest, and supposedly the lowest status structure (HP 12).

I have dealt with this problem in two ways, both of which are not without problems. First, I calculated the average amount of charred wood found on the floor of the three housepits. Although charred wood on the floor of the structures may come from several sources (Vol. I, Chap. 9) it is likely that the majority of charcoal is fuel wood. If the supposition about differential access to fuel wood is correct, we would expect more charcoal in the largest, and supposedly the higher status structure than the other two smaller housepits.

Figure 4 illustrates the average amount of charcoal on the three housepit floors. Charcoal abundance on the three floors are statistically different from one another (ANOVA, $p = 0.05$; HP 7 char $X = 4.4 \pm 3.9$, HP 3 char $X = 2.8 \pm 2.0$, HP 12 char $X = .9 \pm 2.8$), but in a posthoc 2-way comparison only HP 7 and HP 3 floor charcoal are significantly different (Tukey HSD, $p = 0.06$). Thus, HP 7 has significantly more charcoal on the floor than HP 3, but not more than HP 12. From this, we can conclude, that on average more fires may have been burned in HP 7 than HP 3, but there was no difference in fire intensity in HP 7 versus HP 12, nor in HP 3 versus HP 12. This conclusion is supported by a greater degree of fire-reddening underlying the hearths of HP 7 than HP 3. Whether the burning of more fires has more to do with access to fuel or the intensity which HP 7 as a whole was used, cannot be determined.

A second method of evaluation of the possible connection between status and access to fuel wood is to examine the types of wood being selected for fuel in the different sized structure. As I mentioned earlier, on average, the three most common wood species occur in almost exactly the same proportions on the floor of HP's 7 and 3. This pattern suggests that if there was a shortage of wood it was across all species, and did not effect species selection for fuel.

Figure 4 illustrates the abundance of charred conifer needles across the floors of the three housepits. Although HP 7 appears to have a greater mean abundance of charred needles across the floor, the three housepits are not statistically different from one another in needle abundance (ANOVA, $p = 0.4$; HP 7 need $X = 444.7 \pm 971.8$, HP 3 need $X = 235.5 \pm 463.2$, HP 12 need $X = 278.1 \pm 536.6$). Although the absolute abundance of needles in the three housepits is similar, the presence of the peripheral concentrations in HP's 7 and 3 but not HP 12 indicates that the needles may have been used differently in the smallest housepit. The absence of remains of boughs or plants in HP 12 suggests that the inhabitants slept directly on the housepit floor, or the structure was not intended for sleeping. At present we cannot determine the source of the sporadic high concentrations of needles on the floor of HP 12.

The extremely high concentration of Douglas-fir and ponderosa pine needles around the southern periphery of HP 7 and HP 3 floors likely indicates the deliberate covering of the floor with boughs for bedding or floor covering, as was done in ethnographic times (Teit 1900:199). Hayden (Vol. I, Chap. 17) has proposed that several paired small post holes along the periphery of HP 7 are the remains of sleeping platforms and the boughs may have been used to cover these platforms. In HP 7 it seems likely that grasses were used as floor or bedding coverings as well.

The placement of floor or bench coverings along the edge of HP 7 and 3 delineates the periphery of those structures from the remainder of the pithouse. The conifer needles (and grass in HP 7) distinguish the area as a place where people regularly sat and/or lay. Planks near and parallel to the northeast and east walls of HP 3 indicate probable platforms. The relatively denser needles along the southern edges of the two structures may indicate that those areas in particular were preferred areas for sleeping. The south would have been the darkest portion of the structures, and if used primarily for sleeping may have freed up other areas for activities requiring more light.

The average number of seeds per liter flotation sample across the floors of the three housepits is illustrated in Figure 4. The three housepits differ from one another in the number of total seeds recovered (ANOVA, $p = 0.02$, HP 7 $X = 6.8 \pm 9.2$, HP 3 $X = 4.7 \pm 5.0$, HP 12 $X = 1.0 \pm 0.9$), but only HP 7 is significantly different from HP 12 in a post hoc 2-way comparison (Tukey HSD, $p = 0.02$). If number of seeds can be taken to represent intensity of use (an admittedly uncertain assumption), these results suggest more intensive use of seed plants in the large housepit than HP 12, but similar use in HP's 7 and 3, and HP's 3 and 12.

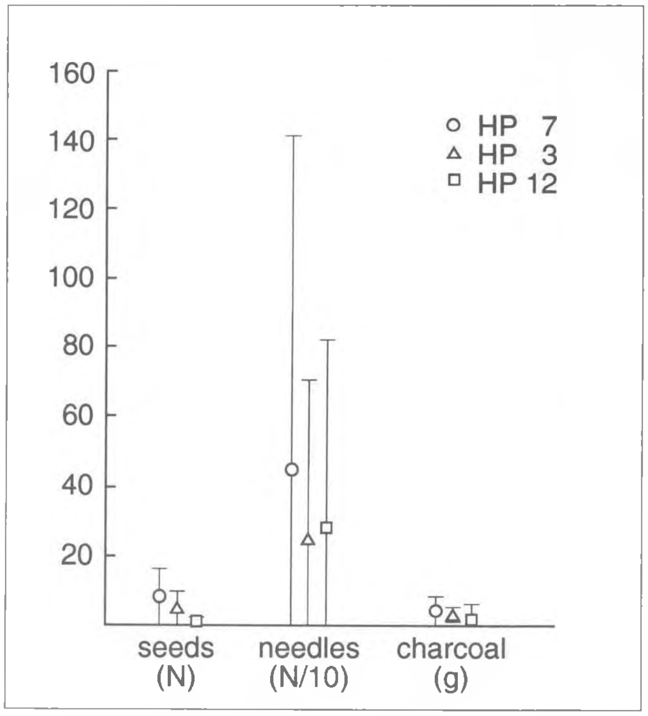

Figure 4. The average density of charcoal, needles, and seeds per one liter sample from the floors of the three housepits.

Another useful comparison is species richness represented by the number of seed taxa on the floors of the three housepits. Although I was only able to identify a limited number of taxa, the unidentified category represents many additional taxa (in most cases each unidentified specimen represents a single taxon). When number of taxa represented in the unidentified category are taken into account, it is clear that HP 7 floor has far more taxa represented by seeds than either of the other two housepits (HP 7 = 108, HP 3 = 28, HP 12 = 5).[1]

The role of sample size must be evaluated before we can draw conclusions about behavioral differences based on species richness in the three housepits. When the logged total number of seed taxa in the three structures is plotted against the total logged number of specimens (Fig. 5), the three structures fall on the same line suggesting that total number of seed taxa can be accounted for by sample size. However, a plot of the number of seed taxa against the number of specimens (Fig. 6) illustrates that the slopes are beginning to level off in HP's 3 and 7. Thus, although the addition of more samples would bring us closer to the true species richness, the larger structures seem to have been adequately sampled to draw conclusions about relative species richness.

Although we cannot yet estimate the true richness of HP 12 seed taxa, there do appear to be real differences in taxon abundance in the three structures. When we compare all three housepits at the total number of identifiable specimens of the small structure, the other larger structures have already accumulated more taxa than accumulated in the small house at this point (i.e., at NISP = 16, HP 7 = 12 taxa, HP 3 = 13 taxa [interpolated], HP 12 = 5 taxa). This indicates that the patterns observed in the small house are not merely an artifact of sample size. Thus, HP 7 has, by far, greater species richness than HP 3, which in turn is more rich than HP 12.

An examination of the rate of accumulation of species relative to the addition of new specimens is an another avenue for examining differences is species diversity between housepits. In Figure 7, the number of seed taxa and number of seed specimens have been logged and a regression line fit for the relationship within each housepit. When the slopes of the three lines are compared, HP 7 is significantly different than the medium and small housepits (ANOVA f-test for homgeneity of slope; $p < 0.0001$ in both cases), but HP 3

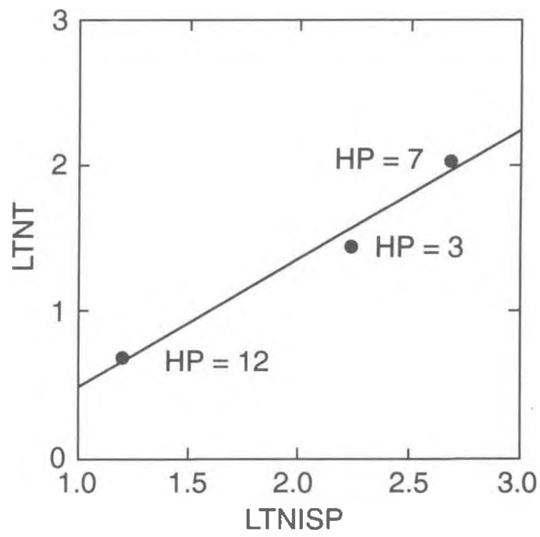

Figure 5. Logged total number of seed taxa in the three housepits plotted against the total logged number of specimens.

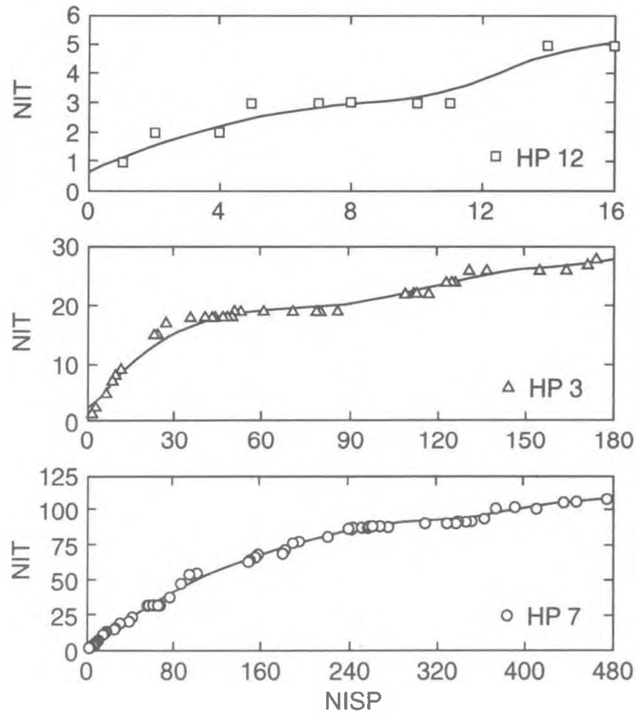

Figure 6. The number of seed taxa plotted against the number of specimens in the three housepits.

1. The number of taxa in HP's 7 and 3 are slightly inflated because I am unable to go back to many of the original samples and group the unidentifiable seeds into like taxa. Since the majority of taxa are represented by only a single specimen, this will not significantly alter the analysis. Any biases that are introduced should be parallel in both HP 3 and 7.

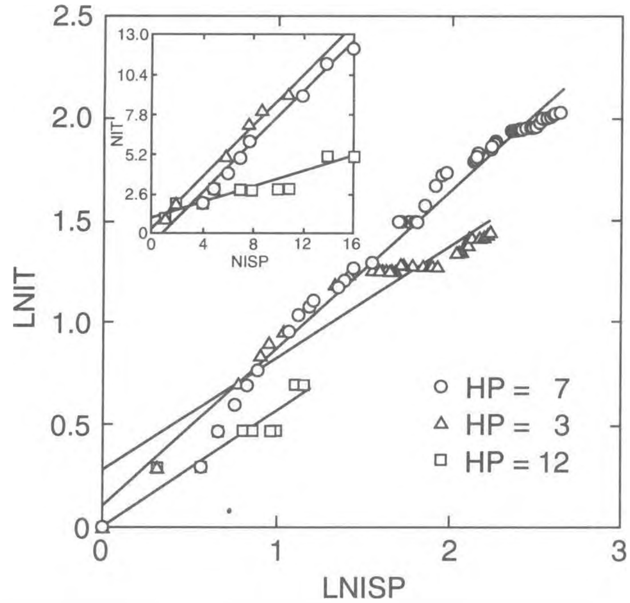

Figure 7. Logged number of seed taxa (LNIT) plotted against logged number of seed specimens (LNISP). Regression lines are fit for the relationship within each housepit. Inset: Comparison of number of seed taxa (NIT) plotted against number of seed specimens (NISP) when the same number of specimens is examined in all three structures.

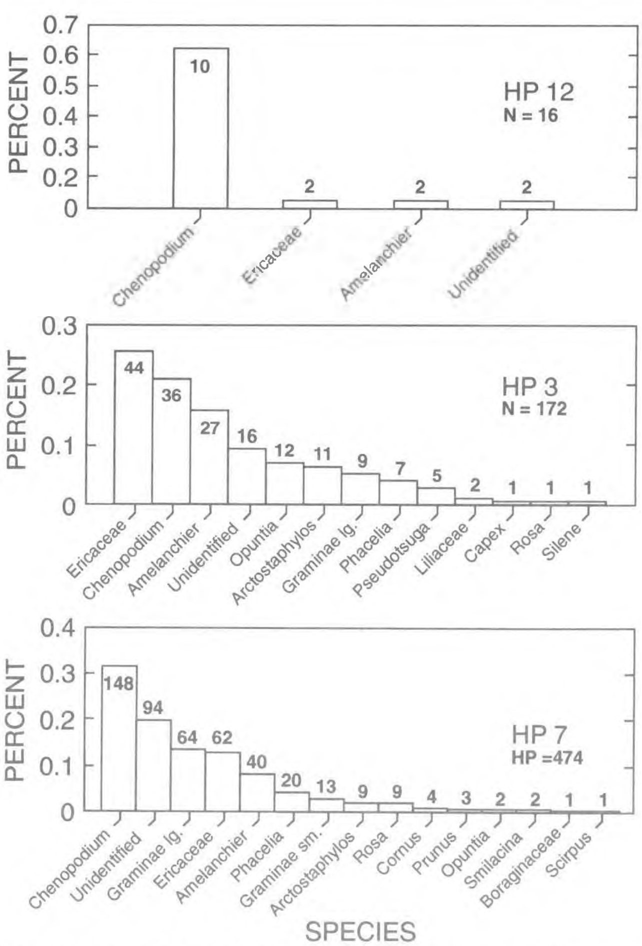

Figure 8. Abundance of plant species recovered from the floors of the three housepits.

and HP 12 are statistically similar ($p = 0.89$). When the same number of specimens is examined in all three structures (Fig. 7, inset) HP 12 has a considerably slower accumulation rate than the two larger structures. From this we can conclude that the accumulation rate of number of species/specimens generally corresponds to housepit size.

Finally, we can compare the three housepits in terms of species eveness, as represented by seed taxa (Fig. 8). HP 12 appears to be the least even distribution of the structures, and HP 3 and HP 7 appear relatively more even. However, the shapes of the frequency distributions in Figure 8 cannot be distinguished statistically (Kolmogorov-Smirnov test, HP 7 and 3: $p = 0.70$; HP 7 and 12: $p = 0.37$; HP 3 and 12: $p = 0.43$).

Although the shape of the HP 7 and HP 3 distributions are similar, there are important differences in the seed species composition of each, especially among the less common species. The three most abundant species in the medium and large structures (not including the unidentifieds) make up approximately 65% and 60%, respectively, of the entire distribution. In the case of the large housepit, the total includes chenopods, grass, and *Ericaceae*. In the medium structure the three most common taxa are *Ericaceae*, chenopods, and saskatoons. Of the seven most rare species in each distribution, only two are shared between the two structures. This may be the result of sample size, or may in fact represent actual differences in species use in the two housepits. Chenopods dominate the small housepit assemblage.

Taken together, the three different sized housepits are distinct in terms of abundance, richness, and distribution of plant species across the floors. HP 7 stands out as having the most dense remains, the greatest number of taxa relative to the density of remains, and the highest accumulation rate of taxa. On the opposite end of the spectrum is HP 12, with few remains, few taxa, and a low accumulation rate. HP 3 is intermediate in species density, richness, and accumulation rate.

The distribution of plant remains is similar on the floors of HP's 7 and 3, but distinct in HP 12. Discrete plant food processing areas on the floors of HP 7 and HP 3 are composed of one primary area, and two more minor areas. Both of the primary processing areas, and the two minor areas in HP 3 are associated with hearth areas. In HP's 7 and 3 the concentration of needles (and grass seeds and stems in HP 7) along the periphery of the floors distinguish these peripheral areas as places for sleeping or sitting. The relatively high abundance of remains along the southern periphery of HP 7 may indicate that this area served a slightly different use. No plant processing areas or peripheral concentration of needles were recognized in HP 12, and we can only conclude that a limited amount and kind of plant processing was conducted in this structure.

The only consistent pattern in all three housepits is the relative absence of remains in the center of the floors—a pattern paralleled in the faunal and lithic remains (Vol. II, Chaps. 7 & 11). The center of each structure may have been used equally by all members of each pithouse for some kind of communal events or activities. Given that the clear space is only about 3 m^2 in HP 12, these activities could not have required much room.

Discussion

The results of the paleoethnobotanical analyses offers some insights into the socioeconomy within and between the three different sized housepits. In general, there is a correlation between housepit size and density, diversity, and accumulation rates of floral remains. This may indicate that the large housepit (HP 7), followed by the medium housepit (HP 3), was used more intensively and was the location of more diverse activities. However, whether this patterning of plant remains can ultimately be related to status differences, to a larger work force having access to a more diverse resource base, or to differences in the length of use of the floor before abandonment, cannot be answered with the present data alone. The similarity in remains between HP's 7 and 3 does suggest the two structures were occupied by residential corporate groups which differed in size but not in basic nature (vs. HP 12).

Patterning of floral remains across the floors provides information on the internal organization of the three different sized structures. The presence of only one major plant processing areas on the floors of HP's 7 and 3 suggests either communal plant processing by the pithouse inhabitants or that the processing of plants was the responsibility of one subgroup or individual within the house (see Vol. II, Chap. 11). The relative absence of plant remains in HP 12 does not allow us to make strong conclusions about the nature of plant processing in that small house, and we can only hypothesize that any plant processing activities were conducted communally there. The lack of remains in the center of the three housepits argues for at least some communal activities within the structures.

In none of the housepits is there paleoethnobotanical evidence of internal social divisions. In contrast to the results of the lithic analysis (Vol. II, Chap. 11) there is no evidence for repeated sector activities involving plant food processing and consumption; indeed, the plant concentrations in HP 7 crosscut the sectors defined by the lithic remains. Likewise, the relatively continuous distribution of needles (and grass) around the peripheries of HP's 7 and 3 also suggests that the use of the periphery was the same for each domestic group along the wall or that there was a lack of well-defined internal divisions within these structures.

References

Hayden, B., G.A. Reinhardt, R. MacDonald, D. Holmberg, and D. Crellin
1996 Space per capita and the optimal size of housepits. In G. Coupland and E. Banning (Eds.), *People Who Lived in Big Houses: Archaeological Perspectives on Large Domestic Structures*, pp. 151–164. Prehistory Press, Madison, Wisconsin.

Teit, James A.
1900 The Thompson Indians of British Columbia. *American Museum of Natural History Memoirs* 2(4).

Turner, N.J., L.C. Thompson, M.T. Thompson, and A.Z. York
1990 Knowledge and usage of plants by the Thompson Indians of British Columbia. *British Columbia Provincial Museum, Memoir* 3.