Chapter 14

Comparison of Lithic Assemblages from All Excavated and Tested Housepits at the Keatley Creek Site

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Introduction

The primary goal of the excavations at the Keatley Creek site was to investigate the development of social complexity and socioeconomic differentiation among hunter/gatherers in the Mid-Fraser River region of British Columbia's Interior Plateau. It was thought that these developments might have culminated, by the beginning of the Kamloops Horizon of the Plateau Pithouse Tradition (about 1,200–1,100 BP), in the establishment of large, hierarchically-organized, co-residential corporate groups in large pithouses at large sites like the Keatley Creek site. For the purposes of this investigation, four housepits (HP's 3, 7, 9, and 12) representing a broad range of sizes were selected for extensive excavation. All have well defined, relatively undisturbed, living surfaces dating to the early Kamloops Horizon. (Vol. I, Chap. 1 presents a more detailed discussion of the social complexity model and the criteria for housepit selection.) A fifth housepit (HP 90), whose final occupation may date to the earlier Plateau horizon was also extensively excavated. In the process of identifying housepits suitable for extensive excavation, test trenches were excavated in an additional 15 housepits (HP's 1, 2, 4, 5, 6, 8, 47, 58, 101, 107, 108, 109, 110, 111, and 119). This chapter describes the analysed lithic assemblages from 20 excavated or tested housepits and attempts to account for the similarities and differences observed among them. It was hoped that assemblages from test trenches might be used as reliable indicators of the relative socioeconomic status of prehistoric housepit residents. However, many other factors also seem to be reflected in test trench assemblages. Subsequent to this analysis, several other housepits were also tested (HP's 104, 105, 106, and 115).

In addition to representing a wide range of sizes, the different housepits represent different time periods and vary considerably in terms of such environmental conditions as elevation, proximity to other housepits, and access to water, firewood, and other resources. The analysis is further complicated by the fact that the different housepits have very different depositional histories. Some appear to have been occupied only briefly while others have been repeatedly rebuilt, and reoccupied during the 3,000 year history of the site. All are believed to have functioned primarily as dwellings but some may also include deposits resulting from use as temporary campsites or refuse dumps. In addition, different strata types (floors, roofs, rims, hearths, and features) are represented in substantially different proportions in the analysed excavation units from different housepits. Strata were also more clearly distinguished in some housepits than in others.

All of these factors have probably influenced the characteristics of the lithic assemblages deposited in and recovered from the different housepits in varying

degrees. So it would not be surprising if clear relationships between the characteristics of the lithic assemblages and the size or age or locations of the housepits could not be identified. Indeed, some additional significance may be attached to the patterns which do emerge in spite of these confounding influences.

The Data

The lithic assemblages were compared in terms of lithic density (in each housepit as a whole and in the floor strata of each housepit), exotic flake ratio, small flake ratio, and in terms of the proportions in which different modified artifact types were represented. A summary of these data is presented in Tables 1 and 2. Table 1 also shows the diameter of each housepit and the types of temporally diagnostic projectile points recovered, and ranks the housepits by length of occupation, strength of association with the Kamloops Horizon, and distance from the area of the site core, where housepits are most densely distributed Vol. I, Chap. 1, Figs. 17–19; Vol. III, Chap. 11, show the actual locations of the excavated or tested housepits at the Keatley Creek site). All of the variables employed in the analysis are defined and discussed below.

Lithic Density

Lithic density is simply defined as the number of lithic artifacts (i.e., modified artifacts and debitage) recovered per litre of excavation. In some cases the thickness of excavated units was not recorded and the excavated volume of these units had to be estimated from the average thickness of excavation units from the same type of stratum (roof, floor, rim, hearth, or pit feature) in the same housepit, or if this data were unavailable, from the average thickness of excavation units of that stratum type for all excavated housepits. Table 3 presents the data on which the volume estimates are based.

Lithic artifacts are presumed to have been deposited on the floor and roof of a pithouse while it was occupied, and redeposited, first on the rim and then on the roof, each time the pithouse was rebuilt. So lithic density, in a housepit as a whole and in the roof and rim strata in particular, can be expected to have increased the longer a pithouse was occupied.

Lithic density might also be high in housepits whose floors and roofs were regularly used by relatively large numbers of people for activities involving lithic reduction or the use and/or manufacture of stone tools. Pithouses which served primarily as places to eat and sleep and which were only occasionally the sites of manufacturing activities would accumulate lithic artifacts more slowly. If large pithouses housed influential groups who exerted some control over the labor of their neighbors they may have been preferred over smaller housepits as sites for manufacturing activities. They might also have been the most convenient places for large groups to gather, especially for tasks which would probably have required a fair bit of space. Hide-working, butchering, and the preparation of shafts and poles might be examples of such activities.

On the other hand, lithic artifacts might also accumulate in high densities in smaller pithouses which were occupied by specialists in certain crafts or in pithouses which were used for certain specialized activities. Some of these activities may have occurred most frequently in particular parts of the site. One possible example is large-scale woodworking, which may have involved heavy use of stone tools and quite likely occurred most frequently on the periphery of the site, where raw materials would have been most readily available.

Of course, lithic density values are also likely to be high in housepits where strata types, such as floors, hearths, and pits, which tend to have high lithic densities, make-up high proportions of the analysed excavation units.

Floor Density

Floor density was calculated for the floor stratum (or strata) in each housepit in the same manner that lithic density was calculated for each housepit as a whole. Each floor stratum, and the lithic artifacts in it, probably accumulated in the course of a single occupation (usually comprised of 20–30 successive yearly winter stays). Floor density will be higher in floors that were occupied for more yearly winter stays. However, the duration of a housepit's total occupation history, which may include many re-roofings and the simultaneous creation of new floor surfaces (see Vol. I, Chap. 17), should not greatly influence floor density. So floor density is probably a better indicator of the level of activity in a housepit than overall lithic density.

Exotic Flake Ratio

The exotic flake ratio for each housepit is defined as the total number of unmodified chert, chalcedony, and obsidian flakes divided by the total number of

Table 1. Comparison and classification of housepits on the basis of size, duration of occupation, strength of association with the Kamloops Horizon, location, lithic density, and other attributes of the lithic assemblages

Housepit	Lithic density (all strata)	Lithic Density (floor strata)	Tool: Flake Ratio	Exotic Flake Ratio	Small Flake Ratio	Diameter (m)	Diagnostic Point Types *	Duration of Occupation Rank	Strength of association with Kamloops Horizon	Location	Distance from "Center" Rank
Group 1. Large housepits with long occupation histories and fairly strong Kamloops associations located in or adjacent to the densest concentration of housepits.											
HP1	0.618	1.64	0.11		0.7	20	K/S	4	5	W main	2
HP2	2.004	5.39	0.13			18.5	K/P/S	5	5	SE main	1
HP3	0.772	0.74	0.13	0.04	0.7	14.25	K/P/S/E	6	5	Center main	2
HP4	1.124	1.73	0.12		0.8	10.25	K/P/S	5	4	SW main	1
HP5	0.803	1.14	0.23		0.9	20	K/P/S/E	6	4	S main	1
HP6	1.009	0.77	0.15			13	K/P	3	5	E main	2
HP7	1.121	1.17	0.15	0.09	0.7	18.75	K/P/S/E	6	5	SE main	1
HP8	1.964	3.46	0.12			17.5	K/P	3	4	E bank edge	1
Group 2. Small housepits with short occupation histories.											
HP107						7	P	2	2	S terrace	4
HP108	0.700	3.93	0.06	0.06	0.8	6.5	none	1	1	S terrace	4
HP109	0.310	0.77	0.25		0.7	9.5	fragment	1	1	N terrace	4
HP111	0.439	0.33	0.04	0.27	0.8	5	none	1	1	N terrace	4
HP47	0.389	0.57	0.09	0.04	0.8	6	P	2	2	C bank edge	1
HP119	0.582	0.27	0.05	0.18	0.2	9.8	K	2	6	N terrace	4
Group 3. Small housepits with longer occupation histories and low lithic densities.											
HP12	0.447	0.63	0.08	0.03	0.7	9.25	K/P	3	3	NW main	3
HP58	0.629	0.48	0.04	0.12	0.8	8.5	K/P	3	4	SW main	1
HP9	0.272	0.28	0.17	0.10	0.6	7.8	K/P/S	5	4	S terrace	4
HP90	0.252	0.38	0.08	0.10	0.8	6	P/S	3	2	NW main	3
Group 4. Small housepits with longer occupation histories and high lithic densities.											
HP101	1.675	2.07	0.12	0.74	0.5	7.75	K/P	3	5	W main	2
HP110	7.917	25.4	0.05	0.06	0.9	5.75	K/P	3	3	S terrace	4
Median Values		0.665	0.77	0.12	0.10	0.7	9.75				

* Projectile points are classified as diagnostic of: Kamloops Tradition (K); Pleateau Tradition (P); Shuswap Tradition (S); or earlier cultural phases (E). Where more than one type is present, the types are listed in order of frequency, and if one type represents 50% or more of the points collected from a housepit the symbol for that type is shown in uppercase.

Table 2: Cross tabulation of modified artifact type frequencies by housepit showing absolute frequencies (Count), and percentage of each housepit assemblage represented by each type (Col Pct), the percentage of the total number of artifacts of each type which occurs in each housepit (Row Pct), and the percentage of the total assemblage represented by each type in each housepit (Tot Pct).

Count Row Pct Col Pct Tot Pct	HP 1	HP 2	HP 3	HP 4	HP 5	HP 6	HP 7	HP 8	HP 9	HP 12	HP 47	HP 58	HP 90	HP 101	HP 107	HP 108	HP 109	HP 110	HP 111	HP 119	Row Total
Type																					
	56	34	83	33	176	7	293	18	47	16	4	5	38	31	2	5	6	15	2	26	897
expedient knives	6.2	3.8	9.3	3.7	19.6	.8	32.7	2.0	5.2	1.8	.4	.6	4.2	3.5	2.9	.6	.7	1.7	.2	20.0	
	22.7	30.9	13.9	19.3	31.3	15.2	16.4	12.8	25.0	17.6	23.5	27.8	30.2	17.4	33.3	55.6	21.4	22.1	50.0	26.0	
	1.2	.8	1.8	.7	3.9	.2	6.5	.4	1.0	.4	.1	.1	.8	.7	.0	.1	.1	.3	.0	.6	
	64	19	75	60	137	11	335	31	22	22	4	3	20	54		2	1	14	1	22	897
utilized flakes	7.1	2.1	8.4	6.7	15.3	1.2	37.3	3.5	2.5	2.5	.4	.3	2.2	6.0		.2	.1	1.6	.1	2.5	20.0
	25.9	17.3	12.5	35.1	24.3	23.9	18.8	22.0	11.7	24.2	23.5	16.7	15.9	30.3		22.2	3.6	20.6	25.0	22.0	
	1.4	.4	1.7	1.3	3.0	.2	7.5	.7	.5	.5	.1	.1	.4	1.2		.0	.0	.3	.0	.5	
	26	9	82	10	37	6	276	18	12	11	1	1	12	20		7	5		537	4	
scrapers	4.8	1.7	15.3	1.9	6.9	1.1	51.4	3.4	2.2	2.0	.2	.2	2.2	3.7		1.3	.9		11.9	.7	
	10.5	8.2	13.7	5.8	6.6	13.0	15.5	12.8	6.4	12.1	5.9	5.6	9.5	11.2		25.0	7.4			4.0	
	.6	.2	1.8	.2	.8	.1	6.1	.4	.3	.2	.0	.0	.3	.4		.2	.1			.1	
	2	3	10	1	4	1	53	1	2	3		1	3	1		1	3		91	2	
endscrapers	2.2	3.3	11.0	1.1	4.4	1.1	58.2	1.1	2.2	3.3		1.1	3.3	1.1		1.1	3.3		2.0	2.2	
	.8	2.7	1.7	.6	.7	2.2	3.0	.7	1.1	3.3		5.6	2.4	.6		3.6	4.4			2.0	
	.0	.1	.2	.0	.1	.0	1.2	.0	.0	.1		.0	.1	.0		.0	.1			.0	
	1		4		1	1	20		1	1					29						
key-shaped	3.4		13.8		3.4	3.4	69.0		3.4	3.4					.6						
	.4		.7		.2	2.2	1.1		.5	1.1											
	.0		.1		.0	.0	.4		.0	.0											
	11	2	26	3	21		85	5	9	4	1		6	3	1		4	3		5	189
bifaces	5.8	1.1	13.8	1.6	11.1		45.0	2.6	4.8	2.1	.5		3.2	1.6	.5		2.1	1.6		2.6	4.2
	4.5	1.8	4.3	1.8	3.7		4.8	3.5	4.8	4.4	5.9		4.8	1.7	16.7		14.3	4.4		5.0	
	.2	.0	.6	.1	.5		1.9	.1	.2	.1	.0		.1	.1	.0		.1	.1		.1	
	2	2	7		11		18	2		2		1	1	3		5		54			
bifacial knives	3.7	3.7	13.0		20.4		33.3	3.7		3.7		1.9	1.9	5.6		9.3		1.2			
	.8	1.8	1.2		2.0		1.0	1.4		2.2		.8	.6	3.0		7.4					
	.0	.0	.2		.2		.4	.0		.0		.0	.0	.1		.1					
	7	6	99	14	23	3	203	10	20	9	1	2	5	3	1		1	11		7	425
points	1.6	1.4	23.3	3.3	5.4	.7	47.8	2.4	4.7	2.1	.2	.5	1.2	.7	.2		.2	2.6		1.6	9.5
	2.8	5.5	16.5	8.2	4.1	6.5	11.4	7.1	10.6	9.9	5.9	11.1	4.0	1.7	16.7		3.6	16.2		7.0	
	.2	.1	2.2	.3	.5	.1	4.5	.2	.4	.2	.0	.0	.1	.1	.0		.0	.2		.2	
	25	11	35	13	38	3	85	10	10	2		2	9	21	1		2	2		12	281
notches	8.9	3.9	12.5	4.6	13.5	1.1	30.2	3.6	3.6	.7		.7	3.2	7.5	.4		.7	.7		4.3	6.3
	10.1	10.0	5.8	7.6	6.7	6.5	4.8	7.1	5.3	2.2		11.1	7.1	11.8	16.7		7.1	2.9		12.0	
	.6	.2	.8	.3	.8	.1	1.9	.2	.2	.0		.0	.2	.5	.0		.0	.0		.3	

Table 2: ***(continued)***

Count Row Pct Col Pct Tot Pct	HP 1	HP 2	HP 3	HP 4	HP 5	HP 6	HP 7	HP 8	HP 9	HP 12	HP 47	HP 58	HP 90	HP 101	HP 107	HP 108	HP 109	HP 110	HP 111	HP 119	Row Total
Type																					
bipolar cores	9 3.5 3.6 .2	7 2.7 6.4 .2	36 13.9 6.0 .8	16 6.2 9.4 .4	36 13.9 6.4 .8	5 1.9 10.9 .1	83 32.0 4.6 1.8	16 6.2 11.3 .4	23 8.9 12.2 .5	6 2.3 6.6 .1	1 .4 5.9 .0	1 .4 5.6 .0	8 3.1 6.3 .2	12 4.6 6.7 .3			259 5.8				
sm. piercers	8 10.5 3.2 .2	1 1.3 .9 .0	11 14.5 1.8 .2	1 1.3 .6 .0	18 23.7 3.2 .4		23 30.3 1.3 .5	4 5.3 2.8 .1	2 2.6 1.1 .0	1 1.3 1.1 .0		2 2.6 1.6 .0	2 2.6 1.1 .0	1 1.3 1.0 .0		1 1.3 3.6 .0		76 1.7		1 1.3 16.7 .0	
drills	2 4.4 .8 .0		3 6.7 .5 .1	1 2.2 .6 .0	3 6.7 .5 .1		17 37.8 1.0 .4	4 8.9 2.8 .1	2 4.4 1.1 .0	1 2.2 1.1 .0		2 4.4 1.6 .0	5 11.1 2.8 .1	2 4.4 2.0 .0		3 6.7 4.4 .1		45 1.0			
spalls	1 1.9 .4 .0		10 18.9 1.7 .2		1 1.9 2.2 .0	33 62.3 1.8 .7	1 1.9 .7 .0	2 3.8 1.1 .0	1 1.9 1.1 .0	1 1.9 5.9 .0		1 1.9 .8 .0	1 1.9 .6 .0	1 1.9 1.0 .0			53 1.2				
cores	5 4.7 2.0 .1	1 .9 .9 .0	11 10.3 1.8 .2	1 .9 .6 .0	12 11.2 2.1 .3	1 .9 2.2 .0	54 50.5 3.0 1.2		8 7.5 4.3 .2	3 2.8 3.3 .1	1 .9 5.9 .0		5 4.7 4.0 .1	3 2.8 1.7 .1	1 .9 11.1 .0	1 .9 3.6 .0		107 2.4			
hammerstones	1 3.3 .4 .0	1 3.3 .9 .0	7 23.3 1.2 .2	1 3.3 .6 .0	1 3.3 .2 .0	1 3.3 2.2 .0	11 36.7 .6 .2		2 6.7 1.1 .0			3 10.0 2.4 .1	1 3.3 .6 .0		1 3.3 1.5 .0		30 .7				
ground stone	3 5.7 1.2 .1	1 1.9 .9 .0	15 28.3 2.5 .3		2 3.8 .4 .0		24 45.3 1.3 .5	1 1.9 .7 .0	4 7.5 2.1 .1	1 1.9 1.1 .0		1 1.9 .8 .0	1 1.9 .6 .0			53 1.2					
ornaments	7 14.6 2.8 .2	1 2.1 .9 .0	7 14.6 1.2 .2		1 2.1 .2 .0		11 22.9 .6 .2	1 2.1 .7 .0	12 25.0 6.4 .3	1 2.1 1.1 .0		2 4.2 1.6 .0	3 6.3 1.7 .1	1 2.1 1.0 .0	1 2.1 3.6 .0		48 1.1				
other	17 4.0 6.9 .4	12 2.8 10.9 .3	78 18.4 13.0 1.7	17 4.0 9.9 .4	42 9.9 7.5 .9	6 1.4 13.0 .1	162 38.1 9.1 3.6	19 4.5 13.5 .4	10 2.4 5.3 .2	7 1.6 7.7 .2	3 .7 17.6 .1	3 .7 16.7 .1	8 1.9 6.3 .2	16 3.8 9.0 .4		1 .2 11.1 .0	3 .7 10.7 .1	6 1.4 8.8 .1	1 .2 25.0 .0	14 3.3 14.0 .3	425 9.5
Column Total	247 5.5	110 2.4	599 13.3	171 3.8	563 12.5	46 1.0	1786 39.7	141 3.1	188 4.2	91 2.0	17 .4	18 .4	126 2.8	178 4.0	6 .1	9 .2	28 .6	68 1.5	4 .1	100 2.2	4496 100.0

Table 3: Lithic debitage density estimates by housepit and stratum. M = d/c. Estimated density = a/(2.5(d + M (b-c))). If no excavation units of a given stratum type in a given housepit have recorded thicknesses, the mean thickness for all excavation units of that stratum type with recorded thicknesses is used in place of M.

Housepit/ Stratum Type	Debitage Count (a)	Number of excavation units (b)	Number of excavation units with recorded thickness (c)	Total thickness of excavation units with recorded thickness (d)	Mean thickness of units with recorded thickness (M)	Estimated total volume (litres)	Estimated Density (flakes per litre)
HP1							
surface	213	13				148	0.58
roof surface	216	4				28	3.04
roof	471	34				286	0.66
floor	359	20				88	1.64
subfloor	9	2				42	0.09
feature	194	12				100	0.78
rim	452	68	52	480	9.23	628	0.29
HP2							
surface	66	3				34	0.77
roof surface	71	2				14	2.00
roof	116	3				25	1.84
floor	295	5				22	5.39
subfloor	17	1				21	0.33
feature	18	1				8	0.87
rim	176	9				88	0.80
HP3							
surface	93	18	4	20	5.00	90	0.41
roof surface	357	50	43	306	7.12	356	0.40
roof	1122	95	69	471	6.83	648	0.69
floor	2292	276	240	1081	4.50	1243	0.74
subfloor	9	3				63	0.06
feature	10	5				41	0.10
rim	288	17				167	0.69
HP4							
surface	476	27				307	0.62
roof surface	99	4				28	1.39
roof	290	16				135	0.86
floor	265	14				61	1.73
subfloor	4	2				42	0.04
feature	46	6				50	0.37
rim	132	4				39	1.34
HP5							
surface	0	4	2	18	9.00	36	0.00
roof surface	0	5	5	50	10.00	50	0.00
roof	0	8	4	35	8.75	70	0.00
floor	159	6	3	30	10.00	60	0.00
subfloor	0	1	1	4	4.00	4	0.00
feature	0	12	10	95	9.50	114	0.00
rim	1909	75	63	604	9.59	719	1.06
HP6							
surface	80	6				68	0.47
roof	81	5				42	0.77
floor	84	4				18	1.92
rim	19	2				20	0.39
HP7							
surface	898	74	3	30	10.00	740	0.49
roof surface	402	38	35	191	5.46	207	0.78
roof	4044	208	96	914	9.52	1980	0.82
floor	5424	470	440	1739	3.95	1858	1.17
subfloor	30	7	1	4	4.00	28	0.43
hearth	3	1				7	0.18
feature	365	23				191	0.77
rim	5576	277	264	2379	9.01	2496	0.89
HP8							
surface	83	2				23	1.46
roof	432	10				84	2.05
floor	303	8				35	3.46
subfloor	6	2				42	0.06
hearth	2	1				7	0.12
feature	120	5				41	1.16
rim	49	4				39	0.50
HP9							
surface	11	7	7	80	11.43	80	0.06
roof surface	13	6	4	40	10.00	60	0.09
roof	52	9	9	66	7.33	66	0.32
floor	799	199	179	1109			
feature	7	3	3	30	10.00	30	0.09
rim	4	1	1	10	10.00	10	0.16

Table 3 (*continued*): Lithic debitage density estimates by housepit and stratum. M = d/c. Estimated density = a/(2.5(d + M (b-c))). If no excavation units of a given stratum type in a given housepit have recorded thicknesses, the mean thickness for all excavation units of that stratum type with recorded thicknesses is used in place of M.

Housepit/ Stratum Type	Debitage Count (a)	Number of excavation units (b)	Number of excavation units with recorded thickness (c)	Total thickness of excavation units with recorded thickness (d)	Mean thickness of units with recorded thickness (M)	Estimated total volume (litres)	Estimated Density (flakes per litre)
HP12							
roof surface	132	25	25	156	6.24	156	0.34
roof	310	47	47	502	10.68	502	0.25
floor	672	106	106	430	4.06	430	0.63
HP47							
surface	16	2	2	13	6.50	13	0.49
roof	2	1	1	5	5.00	5	0.16
floor	78	6	6	55	9.17	55	0.57
rim	20	1	1	10	10.00	10	0.80
HP58							
surface	46	2	2	10	5.00	10	1.84
roof surface	35	2	2	20	10.00	20	0.70
roof	62	8	8	61	7.63	61	0.41
floor	6	1	1	5	5.00	5	0.48
subfloor	90	7	7	70	10.00	70	0.51
feature	33	3	3	55	18.33	55	0.24
rim	125	7	4	20	5.00	35	1.43
HP90							
roof surface	301	82	82	618	7.54	618	0.19
roof	518	74	73	672	9.21	681	0.30
floor	280	55	52	277	5.33	293	0.38
subfloor	16	3	3	20	6.67	20	0.32
hearth	14	5	5	43	8.60	43	0.13
feature	112	24	24	350	14.58	350	0.13
HP101							
surface	63	5	2	66	33.00	165	0.15
roof surface	35	7	7	47	6.71	47	0.30
roof	155	17	16	128	8.00	136	0.46
floor	943	18	14	142	10.14	183	2.07
feature	1254	7	5	105	21.00	147	3.41
rim	79	4	1	7	7.00	28	1.13
HP108							
surface	18	3	3	30	10.00	30	0.24
floor	86	2				9	3.93
hearth	24	2	1	10	10.00	20	0.48
rim	3	1				10	0.12
HP109							
surface	1	1	2	17	8.50	9	0.05
roof surface	0	1				7	0.00
roof	2	2	1	5	5.00	10	0.08
floor	3	1	3	45	15.00	15	0.08
subfloor	27	3				63	0.17
feature	26	4	1	5	5.00	20	0.52
HP110							
surface	112	2				23	1.97
roof	166	1				8	7.89
floor	1669	6				26	25.40
feature	563	4				33	6.79
HP111							
surface	29	2	1	4	4.00	8	1.45
roof	28	1	1	10	10.00	10	1.12
floor	15	2	2	18	9.00	18	0.33
feature	21	3	3	32	10.67	32	0.26
HP119							
surface	155	4	3	65	21.67	87	0.72
roof surface	52	1	1	35	35.00	35	0.59
roof	2	1				8	0.10
floor	3	1				4	0.27
feature	822	24	16	565	35.31	848	0.39
9	82	1				7	4.59
All surface units	2,360	175	31	353	11.39	1,993	0.47
All roof surface units	1,713	227	99	704	7.11	1,614	0.42
All roof units	7,853	540	209	1,758	8.41	4,542	0.69
All floor units	13,546	1,185	706	3,093	4.38	5,192	1.04
All subfloor units	208	31	39	814	20.87	647	0.13
All hearth units	43	9	1,092	7,160	6.56	59	0.29
All feature units	3,591	136	229	1,900	8.30	1,128	1.27
All rim units	8,832	470	520	5,107	9.82	4,616	0.77

unmodified flakes. Some of the modified artifacts manufactured in the pithouses will have been removed to other locations, and chert, chalcedony, and obsidian artifacts may have been more or less likely to have been removed than artifacts made from vitreous trachydacite, the most common raw material type. Debitage is more likely to have been left where it was generated, and it is less likely that debitage of a particular material type was selectively removed. So the exotic flake ratio for debitage is considered a better indicator of proportions in which different lithic raw materials were used at a pithouse than the same ratio for all lithic artifacts.

Hayden et al. (1996) have suggested that influential co-residential groups living in the largest of the Keatley Creek housepits may have controlled access to desirable lithic raw materials such as obsidian and high quality cherts and chalcedonies. If so, exotic flake ratios could be expected to be highest in the largest housepits. Unfortunately exotic flake data is only available for two of the eight housepits with diameters over 10 m: HP 3, with a diameter of 14.25 m, and HP 7, with a diameter of 18.75 m. Both have exotic flake ratios below the median value, contrary to the expectations of Hayden's argument. Overall, though the data do not indicate a clear relationship between exotic flake ratio and housepit diameter, or between exotic flake ratio and any of the other variables described in this section.

Exotic flakes may be associated with pit features in housepits. Where exotic flake data is available, 65.3% of the debitage recovered from pit features consists of chert or chalcedony flakes versus 20.9% of debitage in all lithic samples. A single pit feature in HP 101 contained 1,134 chalcedony flakes which heavily biased the exotic flake ratio for this entire house. However, housepits where a high proportion of the lithic samples were recovered from pit features do not always have high exotic flake ratios. In HP 110, for example, 30.1% of the lithic samples were taken from pit features, far more than in any other housepit, yet the exotic flake ratio for HP 110 is one of the lowest in the sample.

Small Flake Ratio

The small flake ratio for each housepit is defined as the total number of modified flakes with maximum dimensions greater than 1 cm and less than or equal to 2 cm divided by the total number of modified flakes with maximum dimensions greater than 1 cm. High proportions of small flakes may indicate the reduction of relatively small cores and thus, relatively intensive use of raw material. Alternatively, different activities and different stages of lithic reduction may have generated assemblages with different small flake ratios.

The possibility that high small flake ratios might also be the result of heavy trampling of debitage was also considered. However, trampling was expected to be greatest in large housepits, where there would have been greater freedom of movement, and no relationship was identified between small flake ratio and housepit diameter or between small flake ratio and any of the other variables described in this section.

Relative Frequencies of Modified Artifact Types

For the purposes of this analysis, the full range of artifact types described in Volume III, Chapter 1 has been condensed to the list of 20 types presented in Table 2. The condensed typology is intended to preserve the major functional distinctions developed in the full typology. Ideally, the relative frequencies of various modified artifact types in a housepit's lithic assemblage should provide some indication of the activities which occurred there, and lithic assemblages which contain the various modified artifact types in similar proportions should be considered more likely to be the products of similar activities than assemblages which include these types in markedly different proportions. Differences between housepits may be related to craft specialization, socioeconomic distinctions, and/or technological change over time.

Regrettably, differences between housepits may also be the product of several confounding factors. Modified artifact types may be represented in different proportions in different types of strata. So differences between housepits may be attributable to the proportions in which different strata types are represented. In addition, the proportions in which different artifact types are represented may vary considerably in different areas of a housepit. In HP 3, for example, modified artifact types occur in quite different proportions in the initial test excavation than they do in the remainder of the excavated area. The proportions in which the various artifact types are represented in the assemblages from individual housepits will also depend, to a large extent, on assemblage size and sampling biases. Assemblage diversity generally increases with assemblage size, so assemblages in which rare types are represented are likely to be large assemblages. Assemblage size ranged from 4 modified artifacts in HP 111 to 2,838 modified artifacts in HP 7. In order to minimize small sample effects, relative frequencies of modified artifact types are compared

only between housepits which yielded 40 or more modified artifacts.

Efforts to classify the housepits into groups in which lithic assemblages include the various modified artifact types in similar proportions have so far proved frustrating. No clear pattern has been identified, especially none which relates the relative frequencies of modified artifact types to any of the other variables described in this section. Accordingly, the housepits have been classified on the basis of these other variables and the modified artifact assemblages from the groups defined by those variables have been compared. A more detailed discussion of the distribution of modified artifact types is presented below.

It may be possible, using more sophisticated statistical techniques, to classify these housepits according to the proportions in which different modified artifact types occur in their lithic assemblages. These methods should be considered with caution, however, given the confounding factors involved.

Length of Occupation History

Richards and Rousseau (1987) have proposed the Plateau Pithouse Tradition as a cultural sequence for the Canadian plateau. They divide this tradition into three horizons: the Shuswap Horizon, estimated to extend from between 4,000 and 3,500 BP to 2,400 BP, the Plateau Horizon, estimated to extend from 2,400 to 1,200 BP, and the Kamloops Horizon, estimated to extend from 1,200 BP to 200 BP, and describe projectile point types considered diagnostic of each horizon. Housepits in which lithic assemblages include projectile points diagnostic of all horizons of the Plateau Pithouse Tradition are assumed to have been occupied for longer than houses in which only one or two horizons are represented. Length of occupation ranks were assigned to the excavated housepits as follows:

1) housepits with no identified projectile points;
2) housepits with projectile points diagnostic of a single horizon;
3) housepits with projectile points diagnostic of two consecutive horizons;
4) housepits with projectile points diagnostic of two temporally separated horizons;
5) housepits with projectile points diagnostic of all three horizons;
6) housepits with projectile points diagnostic of all three horizons and "early" point types.

As was suggested above, lithic artifacts probably accumulated in the rim and roof deposits each time a housepit was rebuilt. So, longer duration represented in occupation ranks may be expected to be associated with high lithic densities.

Strength of Association with Kamloops Horizon

Housepits were ranked according to the strength with which their lithic assemblages appeared to be associated with the Kamloops Horizon on the basis of the types of projectile points present. Strength of association with Kamloops Horizon ranks were assigned to the excavated housepits as follows:

1) housepits with no identified projectile points;
2) housepits where only Plateau points are present;
3) housepits where more than 1/2 of the points present are Plateau points;
4) housepits where Plateau and Kamloops points are present in equal numbers or points from three horizons are present and each horizon is represented by less than 1/2 of the points;
5) housepits where more than 1/2 of the points present are Kamloops points;
6) housepits where only Kamloops points are present.

Distance from Densest Cluster of Housepits

Finally, housepits were ranked according to their distance from the core area of the site, along the banks of the creek bed, where housepits are most densely concentrated. Distance from densest cluster of housepits ranks were assigned to the excavated housepits as follows:

1) housepits located in the densest cluster of housepits;
2) housepits located at the edges of the densest cluster of housepits;
3) housepits located removed from the densest cluster but still in the main part of the site;
4) housepits located on terraces above the main part of the site.

Diameter

Housepit diameter was measured from rim crest to rim crest. Figure 14 (Vol. I, Chap. 1) shows a histogram of the diameters of the housepits at the Keatley Creek

site. The distribution has two distinct peaks which suggest that the housepits may be classified as either large or small. The boundary between the two size categories seems to be between 12 and 14 m. A small group of very large housepits (diameter > 17 m) can also be distinguished.

Classification of Housepits

Large and very large housepits located in or adjacent to the densest concentration of housepits make up almost half of the excavated housepits. The data summarized in Table 1 suggest that these housepits consistently have long occupation histories and relatively high lithic densities, both on the floor and in the housepit as a whole. Among the smaller housepits, short occupations appear to be associated with relatively low lithic densities. Lithic densities vary widely in small housepits with longer occupations. On the basis of this data the housepits were sorted into five categories:

1) large and very large housepits with long occupation histories, fairly strong Kamloops associations, and located in or adjacent to the densest concentration of housepits;
2) small housepits with short occupation histories;
3) small housepits with longer occupation histories and low lithic densities; and
4) small housepits with longer occupation histories and high lithic densities.

Large and Very Large Housepits with Long Occupation Histories, Fairly Strong Kamloops Associations, and Located in or Adjacent to the Densest Concentration of Housepits

All of the excavated housepits with diameters greater than ten meters (HP's 1, 2, 3, 4, 5, 6, 7, and 8) have occupation histories spanning at least two Plateau Pithouse horizons. All except HP's 6 and 8 have occupation histories spanning all three Plateau Pithouse Horizons. Housepits 3, 5, and 7 also have evidence of earlier occupations. Strength of association with the Kamloops horizon is greater than three in all of these housepits, so Kamloops Horizon occupations were probably at least as important as earlier occupations in the formation of their analysed lithic assemblages.

Generally, lithic densities and floor densities in these housepits are equal to or greater than the median values for all houses. Exceptions are HP 1, with a relatively high floor density but an overall lithic density of 0.62, just below the median value of 0.63, and HP 3 with a relatively high overall lithic density but a floor density of 0.74, which is the median value. Interestingly, HP 1 has evidence of Kamloops Horizon and Shuswap Horizon occupations, but no Plateau Horizon points. Possibly, a long period of abandonment resulted in a lower lithic density in this housepit. More probably, though, the absence of Plateau points in the assemblage from this housepit is the result of insufficient sampling.

The high floor densities in these housepits may indicate either that individual occupations lasted longer in these housepits than in many of the smaller housepits, or that large housepits were used more often than small housepits for activities involving stone tools, or both. These factors may also have contributed to the high lithic densities in the housepits as a whole (roof and rim deposits included), though the long occupation histories of these housepits is probably largely responsible for these high overall lithic densities.

Among the large and very large housepits, exotic flake data is available only for HP's 3 and 7, both of which have relatively low exotic flake ratios. These data do not support the argument that groups residing in the larger housepits controlled access to all sources of exotic materials. Small flake data is available for HP's 1, 3, 4, 5, and 7. Four of these housepits (HP's 1, 3, 4, and 7) have small flake ratios less than or equal to median value of 0.75 but HP 5 has the second highest small flake ratio of any excavated housepit at 0.86. This suggests that higher small flake ratios are not the product of increased trampling associated with greater freedom of movement in large housepits. Instead, variability in small flake ratios may be related to variability in the kind or intensity of lithic reduction activities.

Small Housepits with Short Occupation Histories

This group includes the two housepits on the north terrace (HP's 111 and 109), two housepits from the south terrace (HP's 107 and 108), one housepit located adjacent to the densest concentration of housepits (HP 119), and one from the dense concentration of housepits at the edge of the stream bank (HP 47). Only Plateau Horizon projectile points were found in HP 47 and HP 107. Only Kamloops Horizon points were found in HP 119. The other three housepits in this group contained no points except for a fragment in HP 109. Overall lithic densities are relatively low in all of these housepits. Even in HP 108, where floor density is quite high at 3.93 lithic artifacts per litre, the lithic density value of 0.70 lithic artifacts per litre is only slightly above the median value of 0.70.

(No lithic density data is available for HP 107 and it is included in this category only on the basis of its size and its apparently short occupation history.)

Low overall lithic densities are expected in housepits with short occupation histories, since it is argued that lithic artifacts accumulated over time in most strata. The high floor density in HP 108 may indicate that some unusual activity occurred there or may simply be a product of sampling bias.

Small flake ratios and exotic flake ratios vary widely within this group which again suggests that these variables are not dependent on housepit size.

Small Housepits with Longer Occupation Histories and Low Lithic Densities

This group includes HP 9, which has evidence of Shuswap, Plateau, and Kamloops occupations, HP's 12 and 58, which have evidence of Plateau and Kamloops occupations, and HP 90, which has evidence of Plateau and Shuswap occupations although the Shuswap occupation may not have been part of the housepit. Housepit 58 is in the part of the site where housepits are most densely concentrated and HP's 12 and 90 are located on the northern periphery of the main part of the site. Housepit 9 is on the southern terrace, well removed from the central area. Overall lithic densities and floor densities are relatively low in these housepits. Small flake ratios are generally near the median value, though HP 58 scores low on this variable. Exotic flake ratios are close to the median value in all of the housepits in this group except HP 12, which has a very low exotic flake ratio.

Small Housepits with Longer Occupation Histories and High Lithic Densities

This group includes HP 101, in the central area of the site, and HP 110, on the southern terrace, both of which have evidence of both Plateau and Kamloops occupations. Lithic density and floor density are high in both housepits, but in HP 110 the values are far higher than in any other excavated housepit, with a lithic density of 7.92 artifacts per litre (compared to the median value of 0.70 artifacts per litre) and a floor density of 25.40 lithic artifacts per litre (compared to the median value of 0.77 lithic artifacts per litre). Housepit 110 scores low on both the small flake ratio and the exotic flake ratio, while HP 101 has the highest exotic flake ratio of any excavated housepit (0.74) and a small flake ratio equal to the median. (The exotic flake ratio in HP 101 is inflated somewhat by the inclusion, in the analysis, of a pit feature containing 1,134 chalcedony flakes. However, even when the contents of this feature are excluded from the analysis, HP 101 has an exotic flake ratio of 0.59, significantly greater than in any other housepit.)

Relationships Between Variables

Overall lithic density and floor density appear to be dependent, to some extent, on housepit diameter and duration of occupation. Relationships between these variables are discussed below. No other striking relationships between the recorded variables were noted. There is no indication, for example, that the exotic flake ratio is dependent on either the size of a housepit or the strength of its association with the Kamloops Horizon (or any other horizon of the Plateau Pithouse Tradition). Nor does housepit size appear to be related to the small flake ratio.

Diameter, Duration of Occupation, Lithic Density, and Floor Density

The large housepits tested consistently have long occupation histories, and relatively high lithic densities. In small housepits with short occupation histories, overall lithic densities are uniformly low, even in housepits whose floor densities are relatively high (HP 108 and HP 109). Presumably, lithic artifacts had a tendency to accumulate in the housepits over time. However, in some of the smaller housepits (HP's 9, 12, 58, and 90), relatively long occupation histories also appear to be associated with low lithic densities, so length of occupation history is not the only factor determining lithic density. In small housepits with longer occupation histories, low overall lithic densities are associated with low floor densities, which suggests that the intensity of manufacture and use of lithic artifacts varied considerably from house to house, and was important in determining overall lithic density. Apparently, most large houses, but only some small houses were used intensively for activities involving stone tools. This observation suggests a possible refinement of the initial scheme for the classification of housepits; small housepits with short occupation histories and high floor densities (HP's 108 and 109) are distinguished from small housepits with short occupation histories and low floor densities (HP's 47, 119, and 111). Since no lithic density data was recorded for HP 107 it cannot be classified at this level.

Relative Frequencies of Modified Artifact Types in the Housepit Categories

As noted above, no meaningful classification of the housepits based solely on the relative frequencies of modified artifact types in the housepit assemblages has been identified in this study. Examination of the data in Table 2 will show that there is not necessarily more similarity, in terms of the relative frequencies of modified artifact types, between housepits within the categories defined above than between housepits in different categories. Some of this variability within housepit categories may reflect differences in the activities which occurred in different housepits within each housepit class, but most of the inter-housepit variability in the relative frequencies of modified artifact types can be attributed to sampling factors. Since probabilistic sampling methods were not employed in the selection of excavation units in tested housepits, only the modified artifacts which were collected from extensively excavated housepits (HP's 3, 7, 9, 12, and 90) can confidently be considered to be representative samples.

Two of these housepits (HP's 3 and 7) were classified as very large housepits with long occupation histories and fairly strong Kamloops associations located in or adjacent to the densest concentration of housepits. The remaining three (HP's 9, 12, and 90) were classified as small housepits with long occupation histories and low lithic densities. Comparisons of the relative frequencies of modified artifact types between these housepits may, therefore, suggest hypotheses regarding different types of activities which may have typically occurred in these two housepit classes. Since the sample of housepits in each class is extremely small, such hypotheses are necessarily preliminary, and are only intended to suggest questions for future analyses.

The relative frequencies of modified artifact types in HP's 3, 7, 9, 12, and 90 are shown in Table 2 and are represented graphically in Figure 1. Generally, the similarities between these housepits are more striking than the differences, suggesting a broadly similar range of activities in both housepit classes. The most notable difference between the two classes is in the relative frequencies of the most common modified artifact types: utilized flakes, expedient knives and scrapers. In the large housepits (HP's 3 and 7) the proportional differences between these types are relatively small; in the small housepits (HP's 9, 12, and 90) they vary more widely. Expedient knives represent very high proportions of the modified artifacts in HP's 9 and 90, while utilized flakes are, proportionately, extremely abundant in HP 12. Possibly this difference reflects a broader range of activities in the large houses and a greater emphasis on a few activities in the small houses. However, assemblage size may also be a factor, since small differences in actual frequencies will result in larger differences in relative frequencies in smaller assemblages. Scrapers are proportionately more abundant in larger houses. Since this modified artifact type is believed to have been used in the working of relatively hard materials, this suggests that activities such as hide-working, bone working and woodworking may have been more common in larger houses. No other modified artifact type is consistently significantly more abundant in one housepit class than the other, though HP 3 is distinguished by an abundance of projectile points and HP 9 by an unusually high proportion of ornaments.

In Table 4 and Figure 2 modified artifact assemblages from each of the four housepit classes are compared. Except in the housepits which were extensively excavated (HP's 3, 7, 9, 12, and 90), these data are derived from test excavations and must, therefore, be considered with caution. Housepits which yielded fewer than 40 modified artifacts (HP's 47, 107, 108, 109, and 111) have been excluded from this analysis. Small housepits with short occupation histories are, therefore, represented only by HP 119. Housepits 101 and 110, which comprise the class of "small housepits with longer occupation histories and high lithic densities," are both included. Since the modified artifacts collected from the test excavations cannot confidently be considered representative of the individual housepits and since the sample of housepits in each housepit class is extremely small, hypotheses based on the comparison of relative frequencies between housepit classes are extremely tenuous, but may suggest questions for future analyses.

The comparison of the relative frequencies of modified artifact types between housepit classes, like that between extensively excavated housepits, gives a general impression of similarity rather than difference. The greatest variability is in the relative frequencies of two of the most abundant artifact types: utilized flakes and scrapers. Utilized flakes are, proportionately, most abundant in small housepits with short occupation histories (i.e., HP 119) and in small housepits with longer occupation histories and high lithic densities. They are very rare in small housepits with longer occupation histories and low lithic densities and comparatively rare in large housepits. Scrapers are, proportionately, most abundant in large housepits and scarcest in small housepits with short occupation histories (i.e., HP 119).

Housepit 119 has an extremely low floor density value, an overall density value below the median,

and a duration of occupation rank of. This suggests that it may have had only a single, comparatively short occupation. The high proportion of utilized flakes among the modified artifacts collected from this housepit may also indicate a single short occupation. Over time, an increasing proportion of utilized flakes are likely to be re-used as expedient knives and other modified artifact types. The proportional scarcity of scrapers in this housepit may indicate that activities such as hide-working, woodworking, and bone-working were relatively unimportant there.

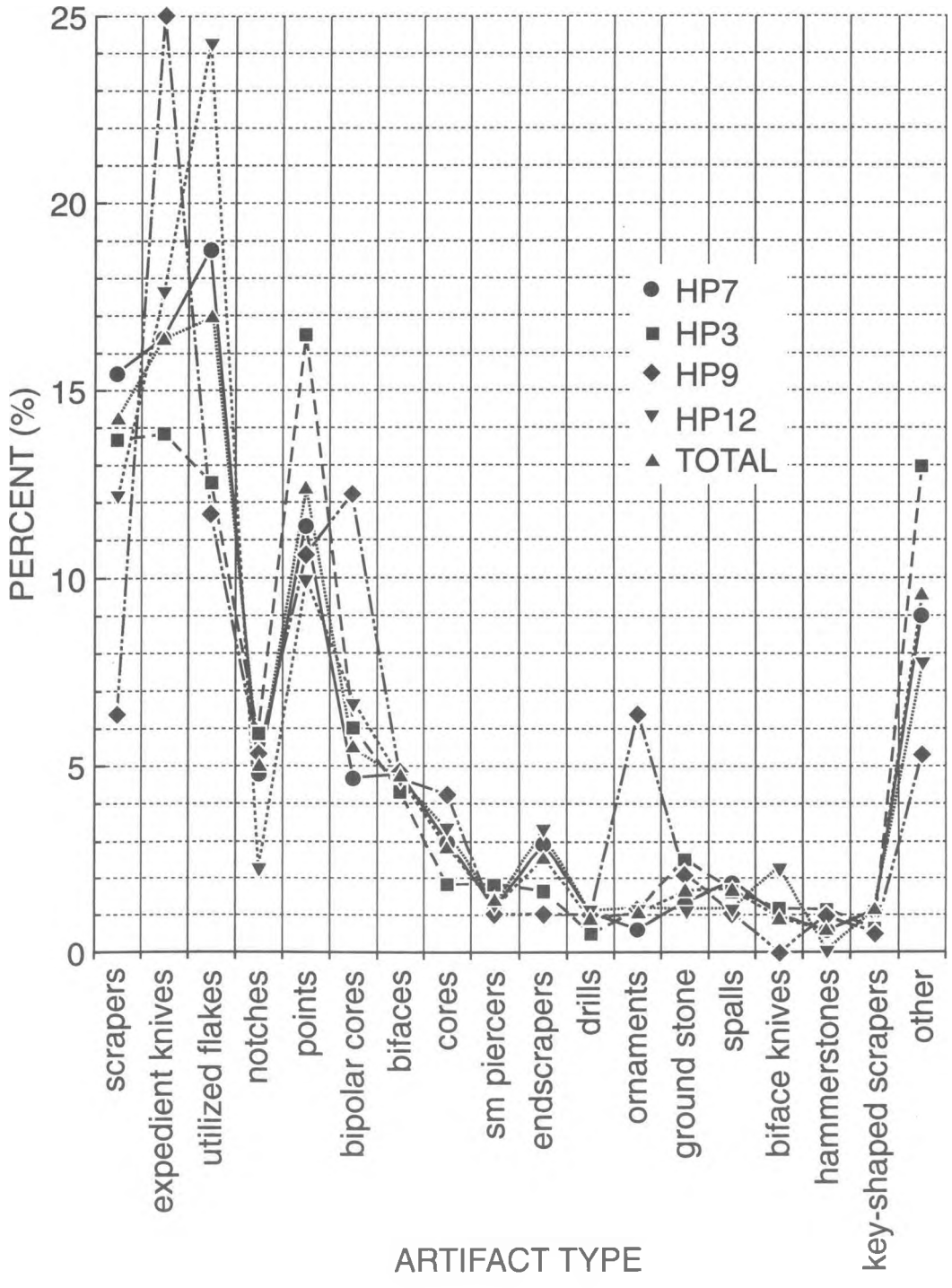

Figure 1: Proportional frequencies of major artifact types from four completely excavated housepits including small (HP's 9 & 12), medium (HP 3), and large (HP 7) structures.

Table 4. Frequency and percentage of modified artifact types by housepit class. Extensively excavated housepits are included for comparative purposes.

Modified Artifact Type	Large HPs (HPs 1,2,5& 8)	Small HPs with short occupation histories (HP 119)	Small HPs with long occupation histories and low lithic densities (HPs 12, 9, & 90)	Small HPs with long occupation histories and high lithic densities (HPs 101 & 110)	Extensively excavated HPs (HPs 3, 7, 12, 9, & 90)
scrapers	464 *12.67%*	4 *4.00%*	35 *8.64%*	25 *10.16%*	393 *14.09%*
expedient knives	700 *19.11%*	26 *26.00%*	101 *24.94%*	46 *18.70%*	477 *17.10%*
utilized flakes	732 *19.98%*	22 *22.00%*	64 *15.80%*	68 *27.64%*	474 *16.99%*
notches	220 *6.01%*	12 *12.00%*	21 *5.19%*	23 *9.35%*	141 *5.05%*
points	365 *9.96%*	7 *7.00%*	34 *8.40%*	14 *5.69%*	336 *12.04%*
bipolar cores	208 *5.68%*	0 *0.00%*	37 *9.14%*	12 *4.88%*	156 *5.59%*
bifaces	153 *4.18%*	5 *5.00%*	19 *4.69%*	6 *2.44%*	130 *4.66%*
cores	85 *2.32%*	0 *0.00%*	16 *3.95%*	3 *1.22%*	81 *2.90%*
sm. piercers	66 *1.80%*	1 *1.00%*	5 *1.23%*	2 *0.81%*	39 *1.40%*
endscrapers	75 *2.05%*	2 *2.00%*	8 *1.98%*	4 *1.63%*	71 *2.54%*
drills	30 *0.82%*	2 *2.00%*	5 *1.23%*	8 *3.25%*	25 *0.90%*
ornaments	28 *0.76%*	1 *1.00%*	15 *3.70%*	3 *1.22%*	33 *1.18%*
ground stone	46 *1.26%*	0 *0.00%*	6 *1.48%*	1 *0.41%*	45 *1.61%*
spalls	46 *1.26%*	1 *1.00%*	4 *0.99%*	1 *0.41%*	47 *1.68%*
bifacial knives	42 *1.15%*	3 *3.00%*	3 *0.74%*	6 *2.44%*	28 *1.00%*
hammer stones	23 *0.63%*	0 *0.00%*	5 *1.23%*	2 *0.81%*	23 *0.82%*
key-shaped scrapers	27 *0.74%*	0 *0.00%*	2 *0.49%*	0 *0.00%*	26 *0.93%*

On the other hand, the proportional abundance of utilized flakes in small housepits with longer occupation histories and high lithic densities (HP's 101 and 110), clearly does not reflect either short occupation histories or short duration of individual occupations. Both of these housepits have duration of occupation ranks of 3 and high floor densities. Also, scrapers, while proportionately scarce in comparison to utilized flakes in these housepits, are abundant in actual terms. More scrapers were collected per unit of excavated volume in these two housepits than in any other housepit class. So activities which involved working hard materials were probably as important in HP's 101 and 110 as they were in even the largest pithouses. One possible explanation of the proportionate abundance of utilized flakes among the modified artifacts collected from these two housepits may be that large numbers of utilized flakes were deposited over a relatively short period of time near the end of the last occupations of these houses. The great majority of the utilized flakes collected from HP's 101 and 110 were found in the floor strata.

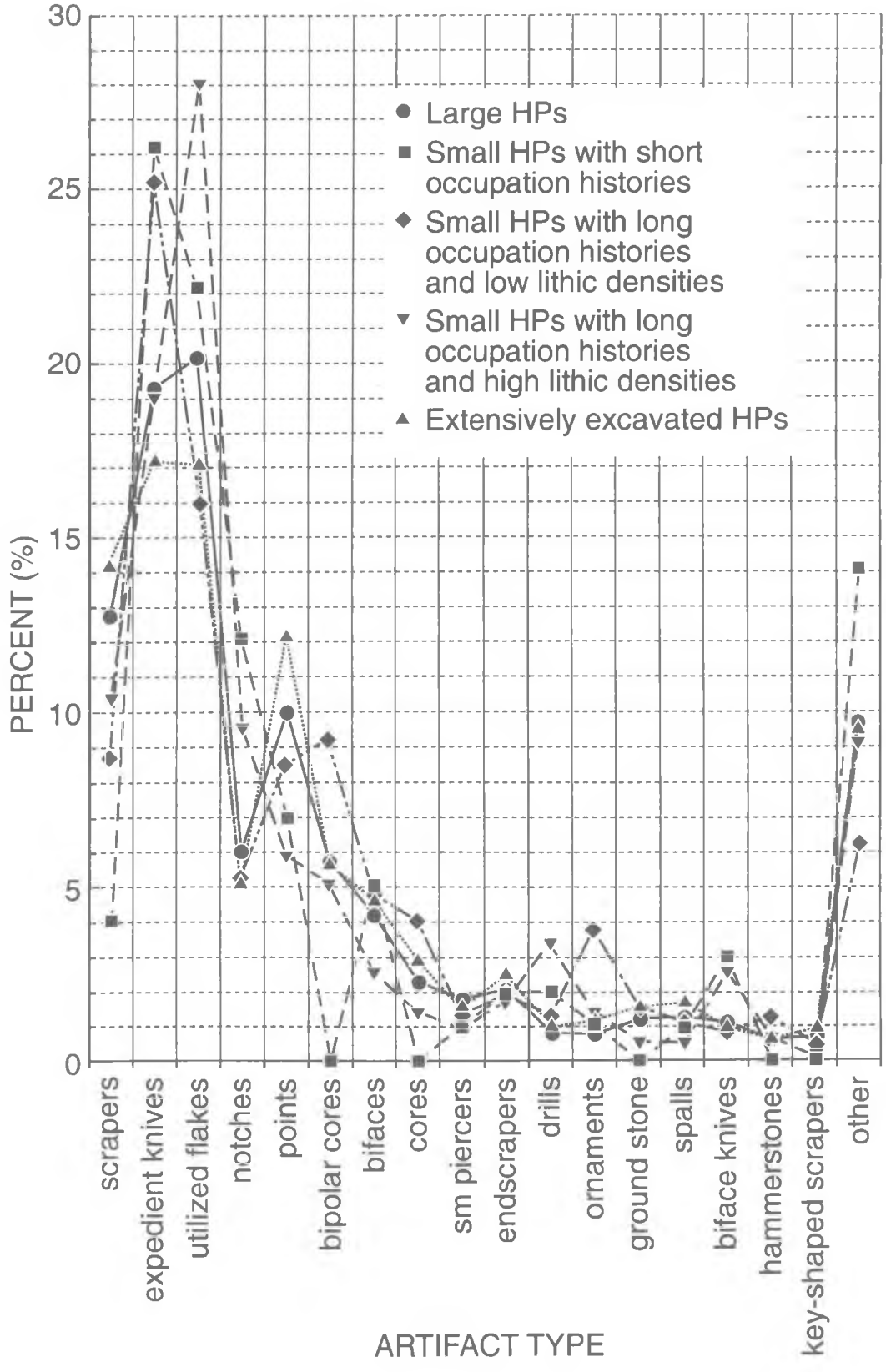

Figure 2: Proportional frequencies of major artifact types from housepit test trenches, grouped by structure size and occupation characteristics.

Summary and Conclusions

Large and very large housepits with long occupation histories and fairly strong Kamloops associations, located in or adjacent to the densest concentration of housepits, exhibit broad similarities to one another in terms of several characteristics of their lithic assemblages including: overall lithic density, lithic density in floor strata, and the proportions in which some types of modified artifacts (e.g., utilized flakes and scrapers) are represented. Generally, these data are consistent with a model of comparatively high levels of activities involving the use of stone tools, in these houses, with particular emphasis on activities involving the working of hard, durable materials such as hides, bone, and wood. The lithic assemblages collected from smaller houses are more diverse in terms of the characteristics examined in this analysis and no clear relationship was identified between any characteristic of the lithic assemblages and any of the other variables considered. This suggests greater diversity among smaller housepits in terms of the kinds of activities that occurred there, but offers little in the way of explanation for that diversity. Such explanations must await analyses, involving more extensive excavations in a larger sample of small housepits.

Reference

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1987 *Late Prehistoric Cultural Horizons on the Canadian Plateau.* Burnaby, BC: Department of Archaeology, Simon Fraser University Publication No. 16.