Chapter 7

Zooarchaeological Analysis at Keatley Creek II. Socioeconomy

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Introduction

One of the goals of the Fraser River Investigations in Corporate Group Archaeology research project was to investigate social and economic organization at the site and within pithouses. In particular, we wanted to understand the internal organization of the pithouses and the role of the different sized residential structures in the socioeconomy. This chapter discusses the patterns of faunal remains on housepit floors and roofs and how they may contribute to our understanding of socioeconomic organization at Keatley Creek. Possible natural processes responsible for the formation of the faunal assemblage are examined in (Vol. I, Chap. 10). Human activities and possible socioeconomic factors responsible for bone distribution and condition within the housepits are considered and discussed in this chapter. Within this context, the spatial distributions of faunal remains, species composition, and species richness from four housepits are examined: a large housepit (HP 7), a medium housepit (HP 3), and two small housepits (HP 12 and HP 9: Stratum VIII).

Clearly defined floor and roof deposits were identified in HP's 7, 3, 12, and 9 on the basis of field criteria. Subsequent faunal analysis indicated little evidence for contamination between deposits (see Vol. I, Chap. 10). Since non-random distributions of remains were apparent, the spatial patterning of faunal remains in floor and roof deposits were examined for evidence of activity, storage, or living areas. The identification of non-random distributions in floor deposits was particularly interesting since floor bones are those at the site most likely to be in primary context and ethnoarchaeological evidence suggests primary refuse will most likely represent the last period prior to abandonment (Bartram et al. 1991; Stevenson 1991). Distributions of faunal remains on the floors of longhouses at Ozette, a Northwest Coast site, have also been used to discern living and activity areas and social status information (Samuels 1991).

As a guide to understanding the socioeconomy of the site and the different sized residential structures, Hayden et al. (1985) hypothesized that Keatley Creek was occupied by residential corporate groups of differing social and economic status. They postulated that the different sized housepits were occupied by groups with different status, wealth, and control. In this scenario, the larger houses should have been occupied by groups with relatively greater status. They also postulated that these larger houses would have maintained greater internal socioeconomic differentiation than the smaller houses because of the range of individuals/families that may be associated with the most powerful residential groups.

With respect to faunal remains, assuming that wealthier groups produce a greater amount of, and more varied refuse, the hypothesis predicts that the larger houses should contain a greater relative density and diversity of remains and a greater number of special or restricted items than the smaller houses. Also, the greater internal socioeconomic differentiation in the

larger houses may be reflected through the division of the floor into separate areas used by distinct domestic groups. This can be distinguished by the regular, repeated patterning of animal remains across the floor suggesting similar use of animal goods in each area. Differences in status, wealth, and/or occupation among these groups may be reflected by the presence of special or restricted items associated with only some of the groups. The absence of regular, repeated patterning of remains would suggest that internal domestic groups were less pronounced, and that activities were more communal. With these predictions in mind, the goal of the faunal analysis was to examine and compare the patterning and characteristics of animal remains within different-sized housepits.

Bartram et al. (1991) have shown with ethnoarchaeological data that distributions of bone refuse may be the result of three factors: 1) the locations of activities producing bone refuse, 2) the intensity of secondary disposal activities, and 3) the intensity of other post-depositional (i.e., trampling, dogs) and post-occupational taphonomic factors. Consumption, butchering, and marrow processing activities seem to be the most important factors determining the location of primary refuse (Bartram et al. 1991; Hayden 1979; O'Connell et al. 1988; Yellen 1977). Recent ethnoarchaeological research also suggests that animal food preparation areas are characterized by relatively high concentrations of larger bones (>25 mm) and that traffic areas are characterized by lower bone density and smaller bone fragments (Stahl and Zeidler 1991). Although sweeping may occur in both types of areas, trampling between sweeping events will fragment and incorporate small bones into floor deposits (Stahl and Zeidler 1991 and references therein). Stahl and Zeidler (1991) suggest that bone refuse accumulates in food preparation areas because of higher bone use in these areas, the intensity of trampling, and because the soft matrix around ashy hearths facilitates the incorporation of debris and makes sweeping clean more difficult. Secondary disposal activities were probably intensive at permanent, seasonally reoccupied winter villages such as Keatley Creek. On the other hand, the condition of the bones suggests that post-occupational taphonomic factors such as weathering or carnivore activity were not of great importance within the housepits.

Methods

Faunal remains were recovered from 6.35 mm mesh dry screens of excavated floor and roof deposits and from the heavy fraction of flotation samples from floor deposits, which allowed recovery of bones down to 1 mm in size. All the faunal remains recovered from the 6.35 mm screens were examined. In the large and medium housepits, faunal remains from flotation samples were examined from about 25% of the floor subsquares; about 16% of the remains from the small housepit were examined. Faunal remains from the flotation samples consist of salmon fragments and tiny, unidentifiable mammal fragments. These data add nothing to our knowledge of species present at the site.

Thus, my analysis and discussion of relative frequencies of taxa, taxonomic richness and evenness are based on the data from the 6.35 mm screens. The distributions of fish bones from the flotation samples from the housepit floors are used to supplement discussions of patterning of bones recovered from the larger screens. For the most part, the distributions of remains from the larger screens were similar to the distributions from the flotation samples. Any differences are discussed below.

The Large House: Distribution of Bones from Floor Deposits

The frequency and distribution of bones from floor deposits in HP 7 are presented in Figure 1. Approximately 2,400 bones were recovered from floor and hearth deposits. About 60% of these are fish (*Onchorynchus* sp.) bones, about 5% are identifiable mammal bones (primarily artiodactyl/deer), and about 35% are unidentifiable mammal bone fragments (probably mostly deer [*Odocoileus* sp.]) (Table 1). The non-random distributions strongly suggest that we are dealing with intact floor deposits with little contamination. The distribution of fish remains, in particular, is convincing since small remains appear to be those most likely to reflect original primary refuse patterns (Gifford 1980; O'Connell 1987; Bartram et al. 1991).

The distribution of different size categories of bones, with larger bones occurring primarily towards the periphery of the floor, suggests housecleaning activities kept the floor clear of large debris. Bones in the 0–2 cm size range follow the same general pattern as the total mammal bones (identified and unidentifiable) do. This is to be expected since 75% of the bones fall into this size range. Bones in the 2.1–8 cm size range follow a similar pattern, although more bones occur towards the periphery of the floor, especially in the south and east (Fig. 1). The concentrations within 2 m of the walls may indicate the position of wooden sleeping platforms under which larger pieces of unwanted or unused materials would tend to accumulate or be stored. Only a few bones larger than

8 cm were recovered and most of these occur near the periphery of the floor, where they may have been tossed or stored under benches or against the wall. Two bones, a deer mandible and the dog skull, may have been left shortly before abandonment, or perhaps intentionally placed in a central location in the case of the dog skull.

Burned bones are scattered in low amounts over the floor, with concentrations associated with hearths and fire-reddened areas, again indicating the relatively undisturbed nature of the floor deposits. The percentage of burned mammal bones is higher in the west (73%) than in the east (44%), suggesting differential use of fires and mammal bone processing or consumption practices between the west and east. In the west, fire use may have been more frequent and used to get rid of garbage (the larger hearths support this), and/or mammal bones may have been roasted more in the west. In the east, mammal bones may have been boiled in the small pits, and/or mammals may have been butchered there for cooking in the west.

About 80% of the artiodactyl elements (N=68) from floor deposits are teeth, metapodials, carpals/tarsals, and phalanges. These are the bones that survive destructive forces well (whether natural or cultural) and are also relatively easy to identify as small fragments. Since the condition of the bones and the presence of even the finest fish ribs indicates bone preservation in floor deposits at the site is good, attrition of elements is most likely due to intensive bone reduction due primarily to marrow extraction and grease production and secondarily to housecleaning and trampling. The high degree of bone fragmentation and loss, due to burning, marrow extraction, tool making, clearing of the floor of large debris, and trampling resulted in few identifiable fragments. These identifiable fragments reflect their resistance to the above processes and their relative identifiability as small fragments, rather than reflecting butchering and sharing practices.

The remaining 20% of the artiodactyl bones are as follows. Two clusters of deer foot bones were found on the floor. One cluster of right front foot bones (unbroken) was found associated with a hearth in the south-center and one cluster of left hind foot bones (unbroken) was found at the edge of the floor in the east. A bighorn sheep (*Ovis canadensis*) mandible was found in the north-center and fragments of two deer mandibles, one femur, and one humerus were found in the northeast. In the southeast, two deer scapulae,

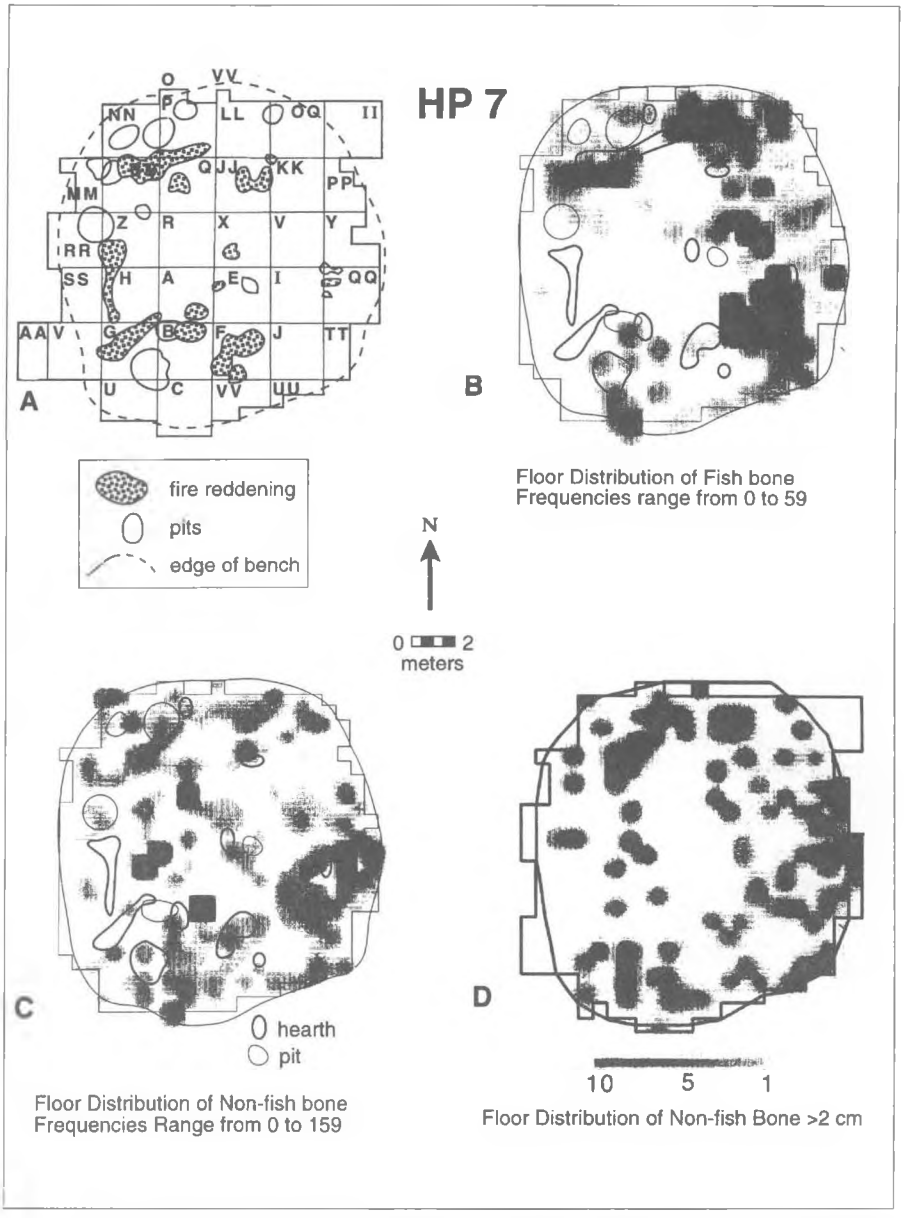

Figure 1. Distributions of faunal remains on the floor of the large housepit (HP 7): fish, non-fish, non-fish > 2 cm.

one mandible, one humerus, one rib, and two sternums were recovered. Differential access to parts of the skeleton cannot be ascertained from the data because of the low number of identified elements and likelihood of redeposition of large remains after food preparation and consumption. The types of skeletal elements present indicate all parts of artiodactyls were utilized in the pithouse, suggesting winter kills within a few kilometers of the site. Ethnoarchaeological evidence suggests axial parts and phalanges in primary context may reflect post-butchery consumption areas because these parts take more time to process for consumption (Bartram et al. 1991). The location of these elements on the floor may therefore support other evidence for consumption areas. The clusters of unbroken foot bones, however, could be the remains of ritual paraphernalia.

Four areas on the floor contain high frequencies of fish, along with less distinct concentrations of mammal bone (primarily artiodactyl/deer) (Fig. 1). These fish concentrations are also well represented in the flotation samples. The only difference is a cluster of fish bones along the wall in the southwest which shows up in the flotation sample, but not in the larger bone sample. This area also has many tiny, identifiable fragments and may have been an area of heavy trampling or extreme bone reduction.

Fish bone concentrations in the northwest, southeast, and south/southwest are associated with large storage pits and hearths. In the south/southwest there is also a concentration of mammal remains. A small concentration of artiodactyl remains and unidentifiable mammal fragments in the northwest is associated with a fire-reddened area and suggests consumption here. In the northwest, in addition to the fish and artiodactyl, are the remains of grizzly bear (*Ursus arctos*), red fox (*Vulpes vulpes*), and bighorn sheep (*Ovis canadensis*), found only in this area. Also, the large pits in this area contain unusual remains such as a dog burial, hawk wing bones, and trade shells (dentalium and *dogwinkle*).

Scattered fish are present in the northeast and artiodactyl bones here are near a small hearth which contains little lithic debitage and fire cracked rock. Since small bone fragments are relatively rare in the northeast, marrow processing apparently did not occur here frequently and food may have been brought into this area in edible units, rather than butchered here. The presence of two deer mandibles and a number of phalanges supports the idea of a post-butchering consumption area (Bartram et al. 1991). The mammal and fish bones may be refuse tossed aside from people working in the area. An abundance of beaver incisors in the northeast may indicate a locus of woodworking.

In the southeast, the artiodactyl concentration is relatively high, as is the fish density. Fish consumption seems to have been particularly high in this area. The presence of both axial and appendicular artiodactyl fragments near the hearth suggests these animals were consumed here also. Hare (*Lepus americanus*) and grouse (Tetraonidae) remains occur only in this area. Small pits suitable for boiling and hearths suggest food preparation activities occurred here. This area also contains moderately dense fire cracked rock and debitage. The presence of more types of artiodactyl skeletal elements here than on the rest of the floor suggests that this may have been an important area for reduction of large artiodactyl parts prior to cooking. The relatively high frequency of small bone fragments here compared to the other areas of the floor further suggest processing for marrow extraction and grease in this area.

In the south/southwest, where debitage and fire cracked rock are found in low quantities, artiodactyl remains in association with hearths suggest deer were consumed. Fish in the area in association with a large storage pit and probably reflect the fish storage function of the pit.

Each of these four areas, in the northwest, northeast, southeast, and south/southwest, likely represents discrete activity areas for animal consumption and/or processing. This repeated patterning of remains also suggests the presence of independent domestic groups within this structure. Based on the presence of rare faunal remains and major storage pits and hearths, the group occupying the northwest may have held relatively high status. In the southeast, the concentration of artiodactyl remains, along with extensive fish bones and hare and grouse, may indicate greater access to animals due to proficient hunting or socioeconomic status within the house, or it may indicate an especially intensively used food preparation and consumption area.

The Large House: Distribution of Bones from Roof Deposits

About 3,050 bones were recovered from roof deposits in HP 7. Ten percent are fish bones, 8% are identified non-fish, and 82% are unidentifiable mammal and bird bones (Table 1). Non-random patterning of faunal remains is apparent in the roof deposits, though evidence of historic camp sites indicates many of the dense concentrations of burned artiodactyl bones are post-occupational. Based on the presence of historic artifacts, hearths dug into roof deposits, and surficial concentrations of bones, the roof may be divided into a 2–3 m zone around the perimeter where bones were deposited

during the pithouse occupation and a zone in the center of the roof where post-occupation deposition of bones largely occurred. This division was further checked by noting the location of the bones vertically within roof deposits. Bones in the central zone were primarily found within the first 5–10 cm (roof surface) of deposit. Bones found in the perimeter zone were found primarily below 5–10 cm (i.e., in roof fill and roof bottom deposits).

Fish bones occur almost exclusively in the perimeter zone and almost all of them were recovered from deposits beneath the roof surface. This supports the contention that bones in the outer zone were deposited during occupation, when both fish and mammal debris would likely be thrown up onto the roof or when new roofs were constructed and old living floor deposits were incorporated into the dirt put onto the roofs. The fish bones concentrate primarily in the east, especially in the southeast, with a small cluster in the northwest (Fig. 2).

A number of clusters of identifiable, mammal remains are evident (Fig. 2). The majority of identified bones are artiodactyl/deer, with small amounts of bighorn sheep, beaver, grouse, and hare. The clusters of artiodactyl remains in the northwest, northeast, and east/southeast occur in the zone apparently deposited

Table 1. Taxa recovered from major deposits in HP 3 and HP 7. Numbers are numbers of identified specimens

	HP 7					HP 3			
Taxon	Floor	Roof	Rim	Pits[1]	RF/Rim[2]	Floor	Roof	F. Col.[3]	Pits
Margaritifera falcata	2	4	0	0	0	0	1	0	2
Freshwater shellfish	5	21	5	16	9	2	5	1	0
Nucella sp.	0	0	0	1	0	0	0	0	0
Hinnites giganteus	1	0	0	0	0	0	0	0	0
Dentalium sp.	0	0	1	2	0	0	0	0	0
Oncorhynchus sp.	1,344	319	177	3,161	70	314	14	2	1,713
Accipiter sp.	0	0	0	2	0	0	0	0	1
Buteo sp.	0	0	0	0	0	0	1	0	0
Tetraonidae	4	5	0	1	0	0	0	0	0
Passeriformes	0	0	1	0	2	0	0	0	0
Tyranidae	0	1	0	0	0	0	0	0	0
Bird	0	12	0	3	0	1	2	0	0
Lepus americanus	19	3	2	1	1	0	1	0	0
Tamiasciurus hudsonicus	0	2	0	0	0	0	1	0	0
Castor canadensis	16	8	1	31	2	4	4	0	0
Peromyscus sp.	1	0	0	5	0	0	0	0	0
Neotoma sp.	0	13	0	0	0	0	0	0	0
Microtus sp.	9	4	0	9	0	0	0	0	0
Ondatra zibethica	0	0	1	0	0	0	0	0	0
Canis sp.	1	0	9	1,265	0	41	0	0	1
Vulpes vulpes	1	1	0	0	0	0	0	0	0
Ursus arctos	1	0	0	0	0	0	0	0	0
Martes pennanti	0	1	1	0	0	0	0	0	0
Lynx sp.	0	1	0	0	0	0	0	0	0
Cervus elaphus	1	0	0	1	0	0	0	0	0
Odocoileus sp.	42	75	12	25	10	5	2	4	1
Ovis canadensis	1	3	1	2	3	0	0	0	0
Artiodactyla	27	70	11	13	10	12	18	3	1
Large mammal	176	586	149	77	100	35	29	6	7
Mammal	750	1,917	266	342	105	147	215	137	25
Total	2,401	3,046	637	4,957	312	561	293	153	1,751

1. Medium and large storage pits.
2. Roof/rim deposits on east edge of housepit.
3. Filtered collapse deposits.

during pithouse occupation and almost all of these bones were recovered below the roof surface deposit. The cluster in the southwest occurs nearer the center zone and is associated with a post-occupational hearth. These remains are apparently the result of a post-abandonment hunting camp.

Like the fish and identifiable mammal bones, the unidentifiable bones occur primarily on the eastern side of the roof and distinct clusters are evident (Fig. 2). The clusters in the northwest, northeast, and east/southeast correlate with the identifiable artiodactyl bone clusters within the perimeter zone, and most of the remains were recovered from below roof surface deposits. A number of clusters also occur in the center zone and are associated with surficial hearths and remains. These bones were recovered from roof surface deposits.

Bones in the 0–2 cm size range follow the same pattern as that for all the bones, which is to be expected since 70% of the bones fall into this size range. Bones in the 2.1–8 cm size range follow a similar pattern, as do the few >8 cm bones, except for slightly higher frequencies of larger bones occurring in the northeast.

The patterns of burned bones and artiodactyl elements furnish useful information concerning the depositional and post-depositional processes responsible for the clusters of bones from roof deposits. Although 60% of the total roof bones are burned, only 10% of the bones in the northeast are burned. This is also one of the only areas on the roof where bones other than teeth, metapodials, and phalanges are found. The bone fragments in this area are slightly larger than average roof bones and fragments from artiodactyl humerus, radius, ulna, tibia, scapula, skull, ribs, and vertebrae are found in addition to foot bones and teeth. This is different from most other areas of the roof, where the majority of bones are small, burned fragments, and artiodactyl elements are almost exclusively teeth, metapodial, carpal/tarsal, and phalange fragments. These data, and the location of the bones in the perimeter well below roof surface deposits, suggest that the northeast section of the roof was used for artiodactyl butchering during occupation of the pithouse. A concentration of bones in rim deposits in the north has been interpreted as being the result of refuse dumping and possibly some butchering (Vol. I, Chap. 10).

A major cluster of bones apparently, deposited during pithouse occupation, occurs in the southeast. Forty percent of the bones here are burned, less than the post-occupational concentrations, but more than the cluster in the northeast. Except for the partial skeleton of an immature deer, most of the artiodactyl elements are metapodials, phalanges, and teeth. The characteristics of the bones and the presence of fish indicate this is probably the main area on the roof for disposal of debris from food processing activities which occurred in the pithouse. Rim deposits in the east also contain relatively high amounts of bone that have been interpreted as being the result of refuse dumping, and possibly some butchering.

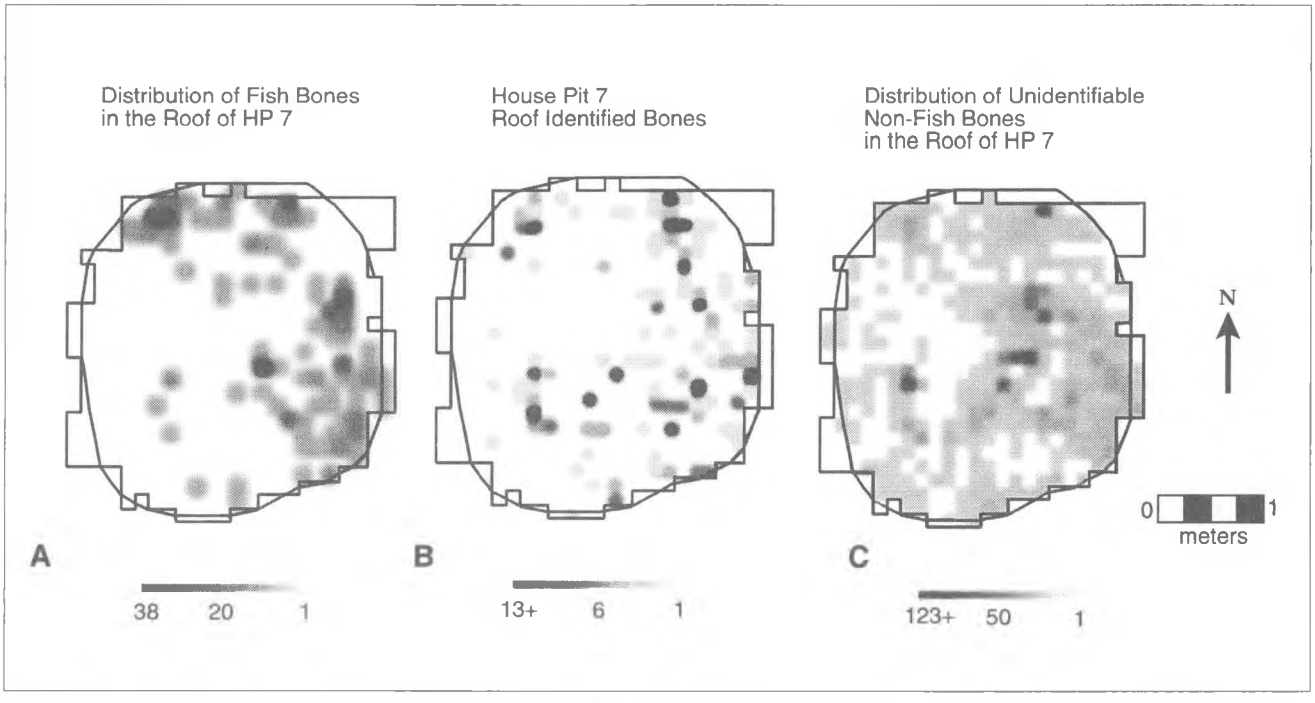

Figure 2. Distributions of faunal remains on the roof of the large housepit (HP 7): fish, identifiable non-fish, unidentifiable non-fish.

The other cluster, apparently deposited during pithouse occupation, appears to be a small refuse dump also. In the northwest, 70% of the bones are burned, there is a cluster of fish bones, and artiodactyl elements consist of phalanges, carpals/tarsals, and metapodials. The presence of a concentration of fire cracked rock in this area supports this interpretation (Vol. I, Chap. 14).

The clusters of bones in the center zone, deposited after abandonment, are mostly burned, small fragments. The identifiable artiodactyl elements are primarily those that would survive butchering and burning and retain identifiability (teeth, metapodials, phalanges). Contextual information indicates these clusters of burned bones probably represent debris from post-occupational hunting camps.

Over 90% of the roof bones from which the type of break could be discerned (generally non-burned, larger fragments) exhibit spiral fractures or step-fractures. This suggests most bones were broken while fresh, probably during butchering (on the roof in the northeast, and in the house) and/or tool making. The majority of identified artiodactyl skeletal elements (73%) are teeth, metapodials, carpals/tarsals, and phalanges, which are relatively easy to identify when fragmented and also survive well. All skeletal elements are heavily fragmented corroborating evidence from the floor that intense bone reduction activity occurred, probably for marrow and grease extraction. Langemann (1987) also suggests intensive bone reduction activities occurred at other pithouse sites around Lillooet. Weathering processes probably also contributed to the fragmentation of some of the roof bones.

The Medium House: Distribution of Bones from Floor Deposits

Approximately 560 bones were recovered from floor deposits in HP 3. Fifty-six percent of these are fish bones, 32% are unidentifiable mammal, and 12% are identifiable mammal (Table 1). As in the large house, most of the remains on the floor are small, suggesting the inhabitants were keeping the activity area clear of large debris. The largest bones occur most often near the periphery, except for a partially articulated post-cranial canid skeleton found on the floor in the west-center area.

The mammal remains on the floor are extremely reduced, as in the large house, meaning that much information concerning artiodactyl butchering and distribution of meat has been lost. Only 17 artiodactyl/deer elements were identified and 53% were metapodials, carpals/tarsals, phalanges, and teeth (elements that survive fragmentation well). A scatter in the east also includes fragments of antler, humerus, vertebra, and sternum.

Fish bones occur around the perimeter of the floor, except for the southeast (Fig. 3). Articulated salmon remains occur near the walls in the east and in the north, suggesting these were areas of little trampling, perhaps under benches. This distribution is similar to the fish distribution from the flotation samples, except more fish were recovered from flotation samples from the northeast. The presence of tiny fish fragments here may be due to heavy trampling. Fish concentrations in the north and southwest are associated with fire-reddened areas. The bottom of a small storage pit was filled with numerous articulated vertebral columns of pink salmon (Vol. I, Chap. 10).

The two largest non-fish concentrations near the west-center are portions of an immature dog (*Canis* sp.) skeleton (Fig. 3). The dog skeleton was found in the top of the floor deposits and may have been deposited during the terminal occupation or shortly after abandonment. The burning of the housepit and the occurrence of a dog skull in a similar position on the floor of the large house (HP 7) suggest that its deposition was an intentional act during the terminal occupation of the housepit.

Other non-fish bones (primarily artiodactyl/deer) are found in the highest frequencies in the north and east/center of the floor, with lightly scattered remains across much of the floor (Fig. 3). The concentration of artiodactyl (and fish) in the east is associated with a small storage pit and fire-reddened areas and may also represent a food processing area. However, a small number of bones in this area, including artiodactyl bones, are larger than other floor bones. Their size and location against the house wall suggests that these bones may represent debris from housecleaning activities. Surprisingly, there are few faunal remains near the large hearth in the southwest.

The patterning of faunal remains, fire cracked rock, and the presence of only one to two hearths on the floor in the medium house suggests that two (possibly three) areas near hearths and storage pits were used in a relatively communal fashion for animal food preparation and consumption rather than distinct social subgroups performing the same animal food-related activities. The fish concentrations associated with fire-reddened areas may represent two discrete fish consumption/processing areas in the north and southwest.

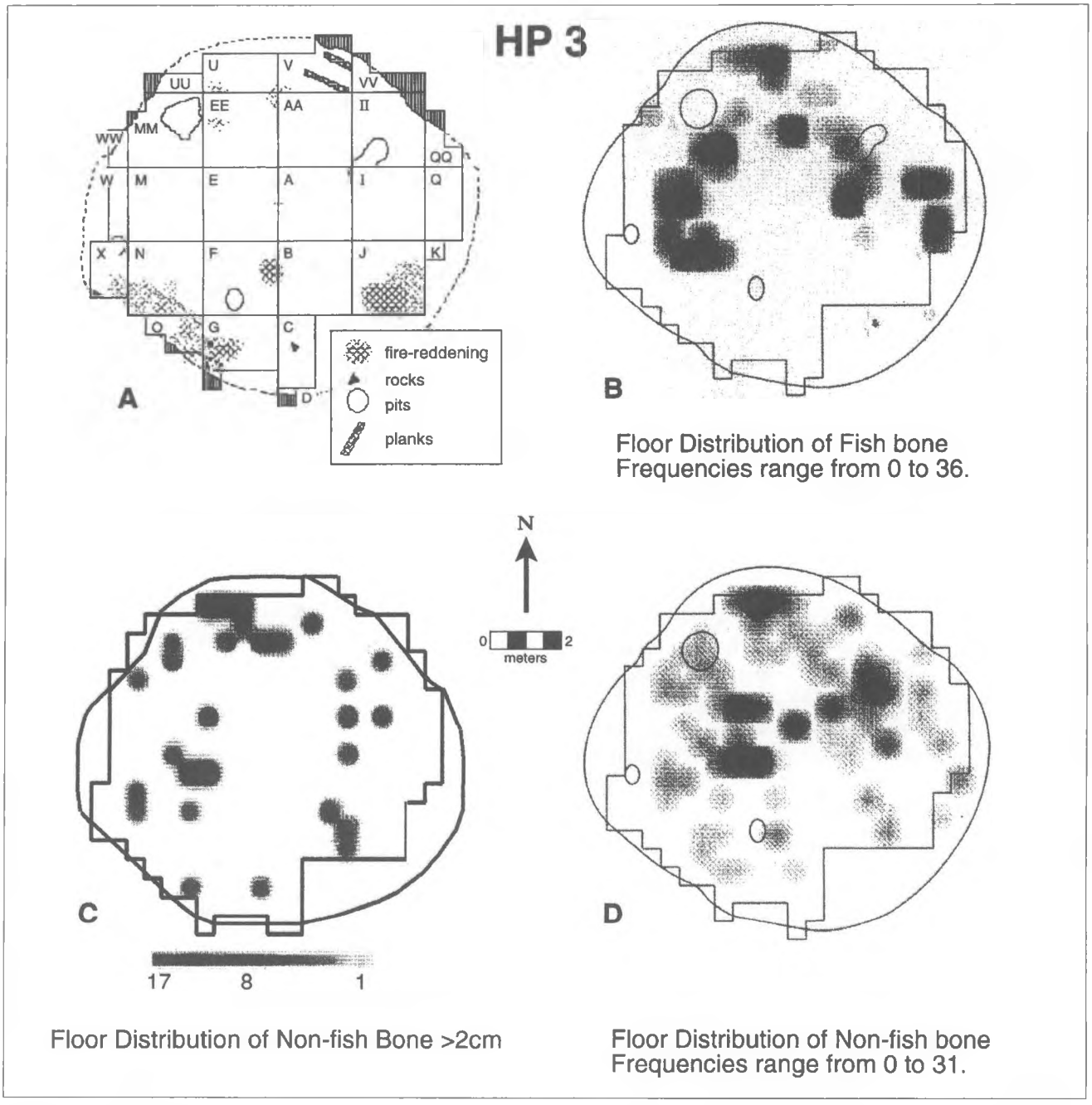

Figure 3. Distributions of faunal remains on the floor of the medium housepit (HP 3): fish, non-fish > 2 cm, non-fish.

The Medium House: Distribution of Bones from Roof Deposits

Approximately 300 bones were recovered from roof deposits. Five percent of these are fish bones, 11% are identifiable mammal, and 84% are unidentifiable mammal (Table 1). As in the large house, non-random clusters of faunal remains are present around the periphery of the roof.

The identifiable remains and bone artifacts clearly cluster around the edges of the roof, especially in the southwest, northwest, and northeast (Fig. 4). This peripheral pattern confirms inferences concerning the peripheral roof deposits in the large house since there is no evidence of post-occupational camps in the medium house. Fish remains and artiodactyl remains (all identified artiodactyl are deer) are found in each of the clusters in small amounts. More bones occur in the north than in the south. The artiodactyl elements (N=20) are all metapodials, carpal/tarsals, phalanges, or teeth, except for a few rib and antler fragments, indicating that survivability had the dominant influence on the pattern of element occurrence and that bone reduction was intensive.

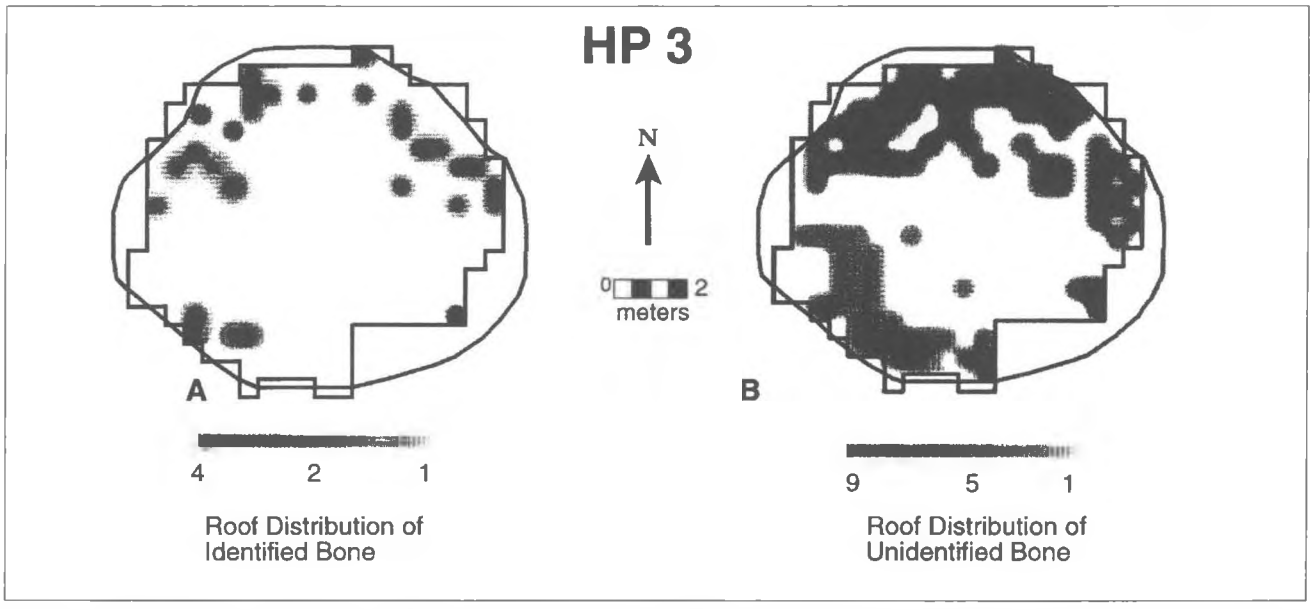

Figure 4. Distributions of faunal remains on the roof of the medium housepit (HP 3): identifiable bones (including fish), unidentifiable bones.

The unidentifiable remains follow the same pattern (Fig. 4) as the identifiable. Most remains occur around the periphery in the north, northwest, and northeast, with a cluster in the southwest. Bones in the 0–2 cm size range and in the 2.1–8 cm size range follow the same pattern, indicating there is no special area where larger bones occur. Burned bones (about 50% of the bones) are also distributed in the same pattern. Basically, the clusters of bones on the roof all have the same attributes.

The patterning of bones in roof deposits parallels the distribution of fire cracked rock in roof deposits (Vol. I, Chap. 14) suggesting the north half of the roof was used as a dump area for refuse from food preparation activities within the house. The similarity in attributes of bones (size, degree of burning, weathering, and taxa represented) in all areas of the roof, and the distribution of bones around the perimeter of the roof may indicate either that a homogeneous type of bone refuse was systematically discarded on the roof, or that floor deposits were mixed with roof deposits by repeated re-roofing events. Mixing of debris on the roof surface with deeper roof deposits may have occurred during the pulling down of sediments for the final burning of the roof with subsequent additional mixing and slumping of roof sediments as the structure burned. If the deposits do reflect relatively intact patterns, the distributions suggest the perimeter of the roof was used primarily to dump small, partially burned debris from interior food processing/consumption activities. There is no evidence that primary butchering of artiodactyls occurred on or adjacent to the roof. Even if some mixing did take place, it is still clear that debris was preferentially thrown on certain sectors of the roof (in the north and southwest).

Housepit 12: Distribution of Bones from Floor and Roof Deposits

About 630 bones were recovered from HP 12 (Table 2). Nineteen percent came from floor deposits, 42% from roof deposits and 39% from interior pits (prior to the excavation of extensive fish remains found at the bottom of a large pit). In general, most of the mammal remains are sharp, pointed, small bone fragments (i.e., bone splinters) indicating extreme bone reduction.

Twenty-six percent of the floor bones are fish and these are clustered in the northeast corner of the floor (Fig. 5). Fish remains from the flotation samples occur in the northern part of the floor only. The majority of remaining floor bones are small, unidentifiable fragments. They are found primarily in the north half of the floor near a fire-reddened area (Fig. 5). Fourteen percent of the bones are burned.

The distribution of faunal remains on the floor indicates animal food processing activities took place in the northern part of the house. The single concentration of bone and fire cracked rock and single hearth suggests animal food processing activities took place communally in this small house.

About 90% of the roof bones are unidentifiable fragments. Artiodactyl elements were found in roof fill or roof bottom deposits, not near the surface of the roof. Most of the identifiable bones occur in the north part of the roof, with a few in the east (Fig. 5). The unidentifiable bones also occur primarily in the north, with a major cluster occurring in the northwest. The dis-

tribution of fire cracked rock also follows this pattern (Vol. I, Chap. 14) indicating a disposal zone with the northwest as the preferred area of the roof to dump refuse. The use of the roof as a refuse area and the use of a large interior pit for initial salmon storage and a subsequent waste retainer indicate disposal activities at this small housepit were similar to that at the larger housepits.

Table 2. Taxa recovered from HP 12 and HP 9 (Stratum VIII). Numbers are numbers of identified specimens.

	HP 12			HP 9
Taxon	**Floor**	**Roof**	**Pits**	**VIII**
Freshwater shellfish	0	0	0	4
Fish (*Onchorynchus* sp.)	31	10	206	2183
Bird	0	0	0	2
Common loon (*Gavia immer*)	0	0	0	4
Unidentified mammal	81	234	29	296
Beaver (*Castor canadensis*)	3	3	0	6
Vole (*Microtus* sp.)	0	0	0	2
Canid (*Canis* sp.)	0	1	2	1
Artiodactyla	4	11	1	12
Deer (*Odocoileus* sp.)	1	7	4	0
Elk (*Cervus elaphus*)	1	0	0	4
Total	121	266	242	2514

Comparisons between Housepits

One of the reasons HP 7, HP 3, and HP 12 were chosen for analysis was to explore possible causes for the different sizes of housepits at Keatley Creek and assess potential differences between different size pithouses that might be related to socioeconomic status. These three housepits are well suited for this study since they appear to have been occupied at essentially the same time, were residential structures, and the floors were apparently not substantially altered after abandonment (Vol. I, Chap. 17). The large and medium housepit floors were last occupied during the early Kamloops Horizon (ca. 1,000 BP) while the small housepit appears to have been occupied a few hundred years earlier (Vol. I, Chap. 2).

The distribution of faunal remains on the floors of the three housepits becomes increasingly complex as housepit size increases. Two similarities between the houses stand out. First, remains are relatively scarce in the southern parts of the houses and second, remains, especially fish, are virtually absent from the centers of the houses.

The relative frequencies of important taxa from the three housepits are listed in Table 3. The large and medium houses contain similar proportions of fish, canids, artiodactyls, and large mammal bones on the floor, while the small house contains less fish. When floor and roof deposits are considered, fish are slightly more important in the medium than in the large housepit and mammal plus artiodactyl are slightly more important in the large than in the medium or small houses. It appears that the large housepit utilized proportionately more artiodactyl/large mammal than the medium or small housepits.

In terms of average abundance per square meter of floor, the three housepits are significantly different in total number of bones, number of fish bones, and number of mammal bones (ANOVA, $P<0.0001$ in all cases; Table 4). However, in post hoc 2-way comparisons only the large and medium, and the large and small differed significantly (Tukey HSD, $P<0.01$). Thus the large housepit has a significantly greater density of animal remains than the medium and small structures, but the medium and small structures do not differ in terms of average density of remains. Taking size differences into account, the large house contains more fish, artiodactyl, and mammal (including beaver, hare, grouse and canid) remains than the medium and small housepits.

Table 3: Relative frequencies (percentages) of selected animal taxa.

	HP 7	HP 3	HP 12
Relative frequencies of select taxa from total bones in each housepit floor deposit.			
N =	2,401	561	121
Fish	.56	.56	.26
Canid	<.01	<.01	0
Artiodactyl	.03	.03	.05
Large mammal	.07	.06	.06
Relative frequencies of select taxa from total bones in each housepit floor and roof deposit.			
N =	5,447	854	387
Fish	.30	.38	.11
Canid	<.01	<.01	<.01
Artiodactyl	.04	.04	.06
Large mammal	.14	.07	.07

When species richness is examined, the large housepit has far more taxa than the medium or small structures (HP 7=18, HP 3=6, HP 12=3). However, the total logged number of specimens for each housepit (not shown) falls on the same line indicating a correlation between assemblage size and number of taxa. Thus, while a larger number of exotic and trade items are found in the large housepit, we may expect more taxa simply

because of the relative size of the assemblage. However, since the examined faunal assemblages from the houses are virtually 100% samples of recovered remains identifiable to taxon, sample size effects are not a major issue, behavioral factors should be considered. The presence of more taxa in the large house is probably due to more diverse activities involving animal remains by its inhabitants (i.e., hunting, trade, ritual) compared to the smaller houses.

When species evenness is examined, the three housepits have similar distributions (Fig. 6), and the shapes of the slopes of the three housepits cannot be distinguished statistically (Kolmogorov-Smirnov test, all P values approaching 1.0). The relatively high frequencies of artiodactyl and beaver in the three housepits is notable, as is the absence of shellfish and relative abundance of elk in the small house. With the exception of hare, sheep, and grouse in the large housepit, the large and medium housepits have very similar distributions of remains.

While we have information on only part of the presumed salmon fishery (fish from the fall-fishery stored in underground caches), differences in the species of salmon present between the large and medium and small houses appear to suggest differential access to salmon resources (Vol. II, Chap. 8). Over 90% of the fish in the medium and small houses were found to be pink salmon, while in the large house, a broader range of age-categories of salmon, including mostly pink, but also 3-year-old salmon and a few 4- and 5-year-olds were present. The 3-year-olds probably represent sockeye, although the possibility that they are spring cannot be ruled out (see Vol. II, Chap. 8). Pink salmon spawn in the early fall. Spring and sockeye salmon spawn primarily in the spring and summer, although there is a

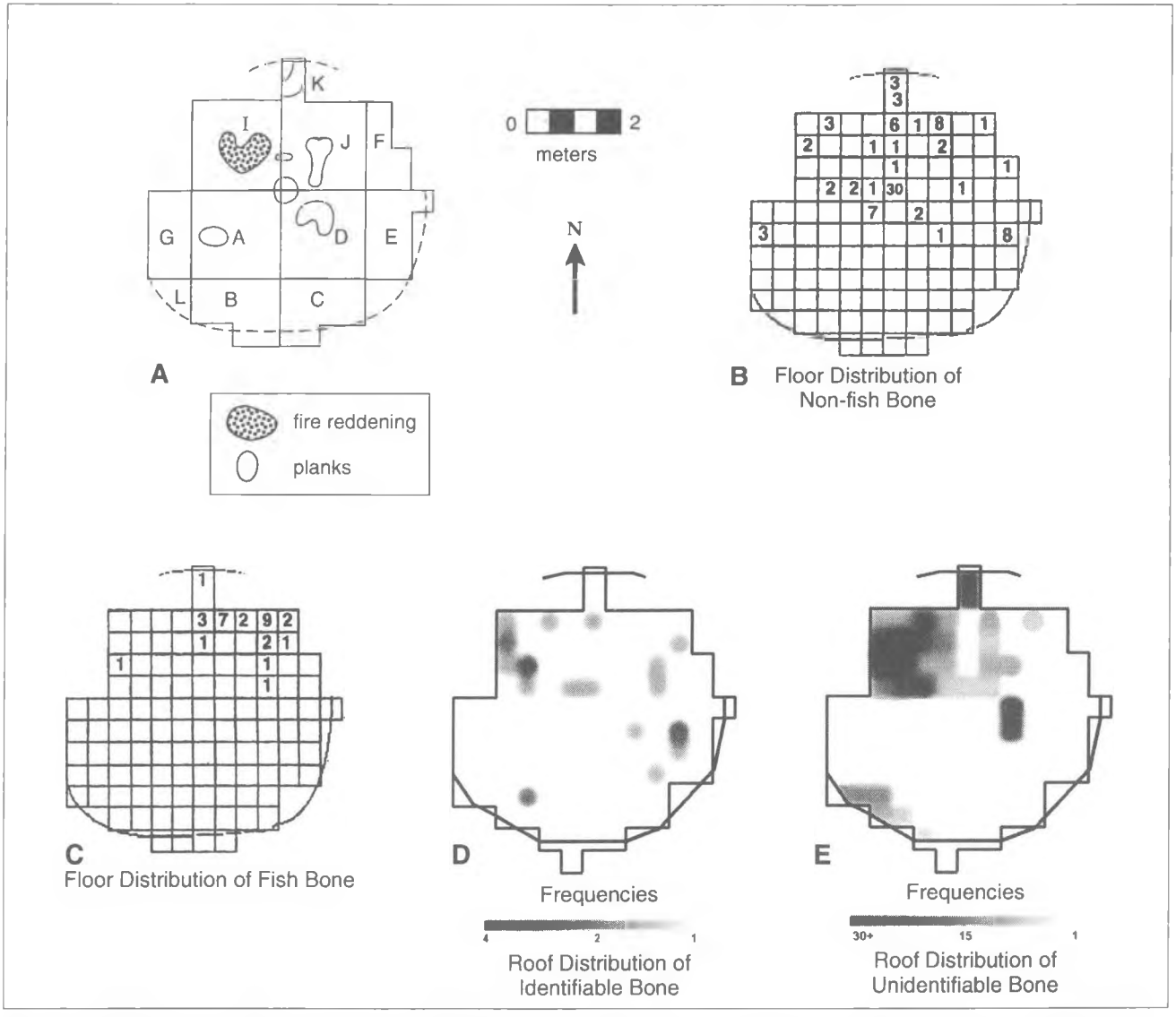

Figure 5. Distributions of faunal remains on the floor and the roof of small housepit (HP 12): fish on floor, non-fish on floor, identifiable bones (including fish) on roof, unidentifiable bones on roof.

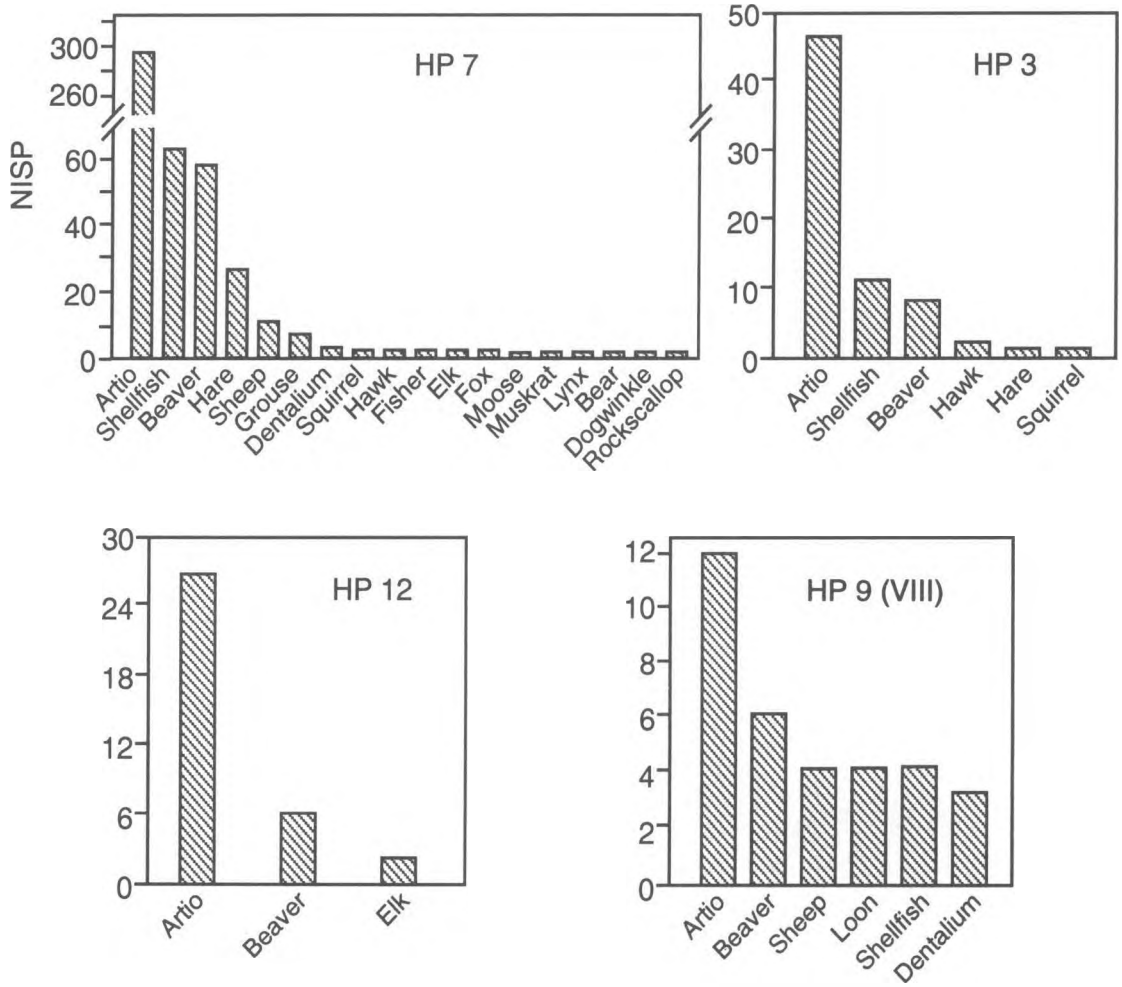

Figure 6. Abundance of faunal taxa from the housepits, excluding fish and dogs. Artiodactyl includes identified deer, elk, and sheep remains. Shellfish means freshwater shellfish.

small sockeye run in November. The presence of sockeye or spring salmon in the large house may be indicative of special access to fishing stations from which species other than pink salmon could be caught.

Ethnographically, important fishing stations were often owned and ownership was associated with privileged access to the most desirable salmon and resulting prestige, although owners had access to public fishing sites as well (Romanoff 1992a). Ownership of the most productive stations, where the most desirable species could be caught in most abundance, generally was an important means of acquiring wealth and status. Thus, it is possible that access to different species of salmon by inhabitants of the large housepit may be related to higher status and wealth. A number of taxa are present in the large housepit which have not been found elsewhere in the site (purple-hinged rock scallop, dogwinkle, fisher, fox, bear, lynx, and moose). The access to special fur-bearing taxa and trade items supports other indications of the possible high status of the inhabitants of the large housepit.

Table 4. Frequencies of selected animal taxa per square meter of floor. Numbers are based on numbers of identified specimens.

	Frequency/Sq. M. Floor Space		
	HP 7	**HP 3**	**HP 12**
Fish	11.9	4.0	0.8
Artiodactyl	0.6	0.2	0.2
Large mammal	1.6	0.4	0.2
Uniden. mammal	6.6	1.9	1.9
Total bones	21.2	7.2	3.1

Housepit 9 (Stratum VIII)

Housepit 9 was excavated after the analysis of fauna from HP's 3, 7, and 12 was completed. However, its fauna is important for understanding variability in small housepits. Like HP 12, HP 9 (Stratum VIII) is a small, completely excavated late transitional Plateau/early Kamloops Horizon floor. This is where the similarities end. Stratum VIII has a larger and more varied assemblage than HP 12 (Table 2). Although species richness correlates with assemblage size for the four examined housepits, the fact that we have virtually 100% samples suggests that other factors are influencing the greater number of taxa present in Stratum VIII compared to HP 12 (Plog and Hegmon 1993). Also, HP 12 and HP 9 (Stratum VIII) approach opposite confidence limits around the regression line (not shown), suggesting again that Stratum VIII has a higher species richness than HP 12. When species evenness is examined (Fig. 6) the HP 9 (Stratum VIII) and HP 12 assemblages do not statistically differ (Kolmogorov-Smirnov test, p=.944). Stratum VIII contains more mammal bones per floor space, and a relatively large number of mammalian taxa, with relatively equal importance of representation, than HP 12. Most of the mammal fragments are small and the size range of the fragments is not different from that of the other houses (64% are less than 2 cm, 35% are 2–8 cm, and 1% are greater than 8 cm).

In addition, Stratum VIII has a significantly higher density of fish remains than do the floors of the other three housepits (86% of the assemblage are fish, as opposed to 26% from the HP 12 floor). A large number of these remains are articulated fish spines and ribs, indicating relatively intact fish parts were left on the floor. This suggests little disturbance has occurred to floor deposits since the remains were left and that fish may have been handled or processed differently in Stratum VIII than in HP's 7, 3, and 12. Earlier occupations in HP 9 also contain frequent, articulated fish remains on the floor (Vol. I, Chap. 10), suggesting fish handling in HP 9 did not change through time.

The distributions of fish and non-fish remains in HP 9 (Stratum VIII) indicate that the bones are densest in the southeast part of the floor; and this is where the few large bones were recovered. Remains in the other sections concentrate near the floor periphery and no clear domestic units can be identified with the faunal data. Rather, the southeastern part of the floor may have been used for animal food processing or garbage dumping, while other areas were cleared through trampling and/or cleaning. The presence of concentrated cobbles in the southeast suggests that the accumulated fish and mammal remains in that area are more likely debris from dumped floor material.

The differences between HP 12 and HP 9 (Stratum VIII) could be explained by differences in abandonment conditions and/or differences in usage of the two structures. Differential housecleaning is not probable because the remains from Stratum VIII are not larger than remains from the other structures. It is the frequency of small fragments which differs. HP 9 apparently did not burn down as the other structures discussed here did, supporting the idea that different abandonment conditions contributed to the differences in the remains. Few bones are burned (5%) relative to the other structures (14% in HP 12, 33–50% in the other houses). While this is probably partly due to the fact that the structure did not burn, the lack of fire-reddened areas on the floor suggests bones may have been butchered there for consumption elsewhere and that garbage bones were not put into hearths (or that the hearths were cleared out prior to abandonment), and/or that the fragments are debris from bone toolmaking. Different usage is also suggested on the basis of the artifact analysis. Alexander (Vol. III, Chap. 7) suggests that Stratum VIII was used on an intermittent basis for hideworking and antler processing and preparation for hunts. She notes that the relatively high diversity of stone, bone, and antler artifacts suggests special activities and that some of these suggest high status. The unusual attributes of the faunal assemblage and the presence of loon (*Gavia immer*) bones (found nowhere else at the site), dentalium, and many large antler fragments supports this assessment. The large amount of remains on the floor, particularly in the southeast, suggests small faunal debris was left/dumped on the floor at the time of abandonment, while the unusual faunal assemblage attributes, taxa, and artifacts suggest the structure was used for activities differing from those in HP 12.

Conclusions

In support of our hypothesis, the density and diversity of faunal remains correlates well with housepit size. The largest housepit has the greatest density of remains, followed by the medium housepit. Similarly, faunal species richness was correlated with housepit size. Density of faunal remains across house floors at the Ozette site are also found to correspond to social status differences among the occupants of the structures, although the highest status house contained the least faunal debris (Samuels 1991). This is explained by different housecleaning practices among the occupants of the structures (Samuels 1991).

The largest structure examined at Keatley Creek exhibits regular, repeated patterning of faunal remains. Faunal remains in the large housepit are associated with a number of storage pits and fire-reddened areas, and artiodactyls and fish seem to have been processed and consumed in four distinct areas of the house. In contrast, faunal remains in the medium structure are less discrete, although concentrations of fish associated with fire-reddened areas and storage pits suggest two animal consumption/processing areas within the house. This suggests that activities related to the consumption and processing of animals in this house were more communal than in the large house. The small housepit has the simplest pattern, with a single, diffuse concentration of remains, suggesting that animal processing activities were communal in this structure as well.

The four distinct consumption/processing areas associated with storage pits and hearths indicate the presence of four domestic groups in the large housepit. These faunal consumption/processing areas are distinguishable form each other by the presence of special faunal items or evidence for distinct types of activities, such as woodworking. This suggests differential socioeconomic rank among the four domestic groups in the large house.

The presence of more artiodactyl in the large house may indicate differential access to deer and the presence of dog remains in the large house, apparently treated in a special way, may be related to the use of hunting dogs documented ethnographically. Ethnographically, hunters were afforded high status and wealth (Romanoff 1992b). There were few formal hunters because it required a great deal of difficult training and energy output. Also, deer may have been a very important source of protein during times when salmon runs failed, when salmon stores were depleted, or when salmon stores went rancid (Romanoff 1992b).

The patterning and size distributions of remains on the floors of the large, medium, and small housepits indicate housecleaning activities and trampling kept the floors relatively clear of large debris and suggest that most of the remaining fragments were in primary context. The small remains from floor deposits were useful for discerning probable living and animal processing areas within housepits, as Stahl and Zeidler (1991), among others, have predicted from ethnoarchaeological research. Also, the patterning of remains from roof deposits yielded information concerning refuse dumping and butchering areas.

Most mammal remains recovered from all housepit deposits at Keatley Creek were highly fragmented, probably for marrow extraction and bone tool manufacturing. In addition, evidence for cleaning up of large bone fragments from the floors implies that any large bone remains originally left on the floors were removed. Thus, much of the detail concerning butchering patterns and sharing of parts of artiodactyls within the pithouses is lost, although the few deer obtained in the winter appear to have been widely shared in the houses.

The faunal data support the hypothesis that larger residential housepits will exhibit greater internal socioeconomic differences than smaller housepits. The regular, repeated patterning of faunal remains on the floor of the largest housepit indicate that it was divided into distinct domestic groups. These subgroups exhibit variability with respect to the characteristics of animal remains, some of which may be attributable to variability in socioeconomic ranking within the house. Inhabitants of the medium-sized housepit appear to have processed and consumed animal food communally in a few areas of the house and there are no indications of status differences related to animal remains. Inhabitants of the small housepit appear to have processed and consumed animal food communally as might be expected of several closely related nuclear families or a cooperating extended family.

The faunal data also support the hypothesis that housepit size correlates with socioeconomic status. The large housepit has the greatest density and diversity of remains, and has particularly high densities of artiodactyl, fish and dog. Differences in species richness indicate that more diverse activities took place in the largest housepit. These data, apparently less communal animal food processing, and special access to exotics and trade items, suggest that the large housepit was a relatively wealthy household compared to the medium and small houses and that the wealthy inhabitants may have included hunters. The suggested access to different species of salmon in the large housepit may be another indication of higher status and wealth.

The faunal assemblage from HP 9, Stratum VIII, a housepit floor similar in size and time of occupation to the small housepit, suggests that this small pithouse was used for different activities than the other houses. It may have been used as a special purpose structure rather than primarily as a dwelling, and suggested animal-related activities include antler-tool processing and artiodactyl butchering. The assemblage contains items that suggest the structure was used by high-status individuals.

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