REPORT OF THE 2016 UNIVERSITY OF MONTANA INVESTIGATIONS AT THE BRIDGE RIVER SITE (EeRl4): HOUSEPIT 54 DURING THE BRIDGE RIVER 2 AND 3 PERIODS

By

Anna Marie Prentiss

(With contributions from Kathryn Bobolinski, Thomas A. Foor, and Natasha Lyons)

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Conducted in Collaboration with the Bridge River Band (Xwísten) and the St’át’imc Nation

Anna Marie Prentiss, Ph.D.
Principal Investigator

Department of Anthropology
The University of Montana
Missoula, Montana 59812
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Chapter One
Introduction

(Anna Marie Prentiss)

The Bridge River project of The University of Montana, Department of Anthropology is a long term study of the development of socio-economic and political complexity among hunter-gatherer-fisher peoples in southern British Columbia. The Bridge River site (EeRl4 in the Canadian site numbering system) is a large and spectacularly well-preserved ancient village of approximately 80 semi-subterranean pithouses and over 100 extra-mural pit features consisting of storage pits and food-roasting ovens (Prentiss et al. 2008). Bridge River is one of several such villages (others include Keatley Creek, Bell, and McKay Creek) whose combined record provides an tremendous opportunity to refine our understanding of cultural and ecological processes associated with the development of sedentary communities featuring intensified foraging strategies, wide exchange networks, and social ranking (Hayden 1997; Prentiss et al. 2003, 2007, 2008, 2011, 2012, 2014). It also provides direct insight into the ancient history of the St'át'imc Nation and more specifically the Xwísten people (Prentiss and Kuijt 2012). While previous investigations at Bridge River emphasized village wide mapping, test excavations, and radiocarbon dating, the current research focuses on the incredible occupational record of a single housepit (Housepit 54) to examine a host of questions associated with the experiences and roles of individual families and household groups within the wider processes of demographic, economic, political change that occurred within the village during the period of circa 1500-1000 years ago. The research is designed to significantly impact archaeological and anthropological discussions of the nature of early village life, emergent social inequality, and the complex dynamics of maintaining dense human settlements in the face of regional environmental change (e.g. Ames 2006, 2008; Arnold 1996; Kuijt 2000; Prentiss et al. 2014; Prentiss and Kuijt 2004, 2012; Sassaman 2004). Excavations of Housepit 54 under the NEH support were opened in 2012 and focused on the final occupation associated with the Canadian Fur Trade period (Prentiss 2017). Excavations in 2013 through 2016 permitted us to examine the deeper floors. As documented in this report, we now demonstrate that the house accumulated 15 floors spanning the period of ca. 1100 to 1460 cal. B.P. This introduction reviews project background and goals as originally outlined to the National Endowment for the Humanities and then provides an overview of report contents.

Housepit Archaeology in the Mid-Fraser Canyon

Field research at Bridger River began during the early 1970s by archaeologist Arnoud Stryd as a component in his larger Lillooet Archaeological Project (Stryd 1974, 1980). Stryd's critical early research identified many significant villages in the Middle Fraser (Mid-Fraser) Canyon area and eventually instigated more extensive research, particularly at the Keatley Creek and Bridge River villages, in subsequent decades. Brian Hayden's (1997, 2000a, 2000b; Hayden and Spafford 1993) research program at Keatley Creek emphasized socio-economic and political distinctions between households of different sizes and clearly placed the Mid-Fraser villages on the archaeological map as prime examples of complex hunter-gatherer societies. Anna Prentiss' (Prentiss et al. 2003, 2007, 2008, 2011, 2012, 2014) research at Keatley Creek and Bridge River refined the area's cultural chronology leading to an enhanced understanding of relationships between demographic growth, subsistence intensification, emergent social inequality, and regional effects of climate change.

The Mid-Fraser villages are characterized by groups of semi-subterranean pithouses and associated extra-mural features primarily resulting from cold season sedentary occupation. The remains of these pithouses, known to archaeologists as housepits, generally include floor layers derived from clay-rich sediments often transported from elsewhere, capped by collapsed roof deposits and surrounded by rim-middens consisting of household debris and old roof material. Housepit floors are marked by in situ activity areas that include cooking and storage features and clusters of well-preserved faunal and botanical remains as well as a variety of lithic, bone and botanical artifacts. Storage features generally consist of pits ("cache pits") excavated into subfloor sediments. When in use these pits were generally lined with birch bark and filled with layers of dried food such as salmon (Alexander 2000; Hayden 1997; Prentiss and Kuijt 2012; Teit 1906). Once abandoned as storage facilities these pits become refuse receptacles preserving a wide variety of household debris. Floors in typical Mid-Fraser houses provide the opportunity to examine variation in household and family subsistence activities, use of technologies, and social relationships (Hayden 1997; Lepofsky et al. 1996; Prentiss 2000; Prentiss et al. 2011). Ethnographic and archaeological evidence supports the fact that multiple family groups resided in Mid-Fraser pithouses, their domestic activity areas arranged around the perimeters of the floors (Alexander 2000; Hayden 1997; Prentiss and Kuijt 2012).

Floors are virtually always buried by collapsed roof deposits. Roofs were constructed using a framework of posts and beams covered by matting and then sediment for insulation purposes (Alexander 2000; Prentiss and Kuijt 2012; Teit 1900, 1906). Roofs provided shelter for household occupants but also were a context for dumping household refuse (accessed by an egress ladder from the floor through the center of the roof) and sometimes conducting outdoor activities. Mid-Fraser peoples typically resided under a house roof for an estimated 10-20 years between roof replacements made necessary by wood-rot, insect infestations and other problems (Alexander 2000). Roof replacements required salvage of still usable timbers and subsequent burning of the old roof. This was followed by cleanout of the collapsed roof and sometimes the old floor leading to the formation of a rim-midden or a ring of re-deposited roof and floor deposits around the margin of the housepit. Final house abandonment generally also included burning down the final roof. Roof deposits are quite different from those of floors in featuring a nearly random assortment of artifacts and other remains, little spatial patterning, and frequent evidence of burning. Rim sediments thus preserve a record of many household activities, but they remain in a mixed state.

In many Mid-Fraser villages such as Keatley Creek, housepits retain only their final floor due to post-roof collapse cleanout procedures that typically included excavation and re-deposition of the old floor. In contrast, many Bridge River occupants did not remove their old floors but simply covered them with new layers of floor material (Prentiss et al. 2008; 2012). This has led to an occupation record that preserves not only earlier occupational materials but those crucial spatial arrangements from housepit floors permitting reconstruction of variability in activity areas and potentially inter-family relationships. The record of Housepit 54 (12.5 m in diameter rim crest to rim crest) is the most spectacular in this regard, featuring 17 floors separated in part by 7 roofs. Dating of these floors spans the critical period of ca. 1500-1000 years ago (Prentiss, Foor, and Hampton 2018). Housepit 54 provides us with the opportunity to examine culture change from the standpoint of a long-lived individual household on the scale of inter-generational variability. While many investigators discuss the importance of researching household histories (e.g. Ames 2006), archaeologists almost never encounter a record that permits this to happen in such fine-grained detail. We are presented with this opportunity at Housepit 54.

Cultural Complexity in the Middle Fraser Canyon

Research in the Mid-Fraser villages to date has suggested a process of cultural change that began with the establishment of the villages after about 1800-1900 years ago (Harris 2012; Lenert 2001; Prentiss et al. 2003, 2008). The record from the Bridge River site indicates that earliest Mid-Fraser villages were small, characterized by no more than 5-7 housepits of a range of sizes (some over 15 m. in rim crest diameter). Highly productive fisheries (e.g. Chatters et al. 1995; Finney et al. 2002; Tunnicliffe et al. 2001) and apparently very good terrestrial foraging conditions favored population growth over the next several hundred years (Prentiss et al. 2008; 2014). Recent analysis of Bridge River radiocarbon dates (Prentiss et al. 2008, 2012) suggests that at approximately 1300 years ago the village population may have effectively doubled to at least 30 simultaneously occupied houses (and an estimated population of over 600 persons) coinciding with a similar peak in marine fisheries productivity (Hay et al. 2007; Patterson et al. 2005; Tunnicliffe et al. 2001). Harris (2012) and Lenert's (2001) analyses of radiocarbon dated housepits throughout the Mid-Fraser confirms a similar pattern. After this point we recognize the first signs of inter-household wealth distinctions as measured by variability in predation (deer remains for example), production of expensive to manufacture items like stone beads, pendants, and pipes, animal husbandry (dogs), acquisition of trade goods, and evidence for feasting practices in the form of associated large extra-mural roasting pits and discarded remains of special foods (dogs and fish at Bridge River; dogs, mountain goats and bighorn sheep at Keatley Creek). However, emergent wealth-based inequality also came at a time when populations in the Mid-Fraser had peaked and were in decline soon to be followed by abandonment of the aggregated villages by sometime around or shortly after 1000 years ago.

Developing an understanding of the processes of village growth and emergent inequality has been critical focus of the Bridge River project. The chronology at Bridge River and the wider Mid-Fraser implicates a variety of social and ecological processes considered critical by theorists to the development of complex human societies (Ames 2008; Boone 1992, 1998; Fitzhugh 2003; Henrich and Gil-White 2001; Maschner and Patton 1996; Prentiss 2011; Rosenberg 2009; Smith et al. 2010). Prentiss et al. (2012, 2014) argue that village growth may have occurred through relaxing of standard hunter-gatherer prohibitions against large family size under conditions that favored large groups for purposes of defense and mass-harvest and processing of food (e.g. Binford 2001; Chatters 2004). The region was likely also attractive for people in other drainages who may have been permitted to immigrate. Under benevolent conditions old social constructs prohibiting the development of wealth-based ranking systems (e.g. Bowles et al. 2010) may have originally prevailed. But these rule systems were broken as populations peaked and terrestrial resources (Carlson 2010) and regional fisheries (Chatters et al. 1995) declined. Current evidence at Bridge River and Keatley Creek suggests that competition between houses developed and quickly led to status differentiation at least as measured from the standpoint of accumulated prestige (per Hayden 1998) goods, consumption of rare foods, and development of feasting in select houses. This was probably the first step towards the breakdown of the Mid-Fraser villages since within no more than two centuries all of the dated large villages were apparently abandoned (Kuijt and Prentiss 2004; Prentiss et al. 2003, 2008; 2014). Inter-household status differentiation and competition likely provided the initial conditions for the first abandonments of households as some families may have been simply forced out by more powerful groups potentially denying them first access to crucial food sources (assuming that as in the ethnographies [Kennedy and Bouchard 1992; Romanoff 1992] wealth and status also include control of optimal berry collecting, hunting, and fishing places). Taken to its logical extreme, the famous Mid-Fraser abandonment (Hayden and Ryder 1991; Kuijt 2001; Kuijt and Prentiss 2004) may have been a logical outcome of this process as access to regional food resources became increasingly uncertain.

All things considered, the history of the Mid-Fraser villages and of Bridge River in particular, was the result of a complex interaction between variation in natural resources and decisions made by the human groups that sometimes had unanticipated consequences. The history of population growth, subsistence intensification, and emergent inequality offers important implications for theoretical modeling of the processes by which social inequality develops. In particular, this suggests that variation in access to resources was important (e.g. Fitzhugh 2003; Mulder et al. 2009), as was the formation of competitive kin-groups (e.g. Maschner and Patton 1996) and their uses of feasting for social purposes (e.g. Boone 1998). It has been possible to recognize and develop an initial understanding of these processes on the scale of general inter-household and inter-village patterns but prior to this project research has not demonstrated a detailed understanding of the cumulative effects of decisions made across generations within individual houses. Research at Housepit 54 offers the opportunity to address this deficiency. Several lines of inquiry guide our multi-disciplinary studies.

Research Goals for the Housepit 54 Project

The following discussion outlines project goals as originally explicated to the National Endowment for the Humanities. They provide a guide to project investigations and research conclusions outlined in the concluding chapter.

Demographic History of Housepit 54

While the general pattern of village growth at Bridge River is relatively well known, we know virtually nothing here or elsewhere in the region about specific means by which households maintained adequate numbers to remain viable. Ames (2006) documents a variety of tactics undertaken by traditional Pacific Northwest households to prevent demographic collapse including simple economic success and reproductive health and recruitment of outside persons via marriage arrangements or simple permissions to “move-in.” We will never fully understand the processes of village growth and decline without directly engaging this difficult issue and it is rarely possible either due to inadequate excavations or, more typically, floor matrices that simply do not preserve a record detailed enough to permit direct evaluation of variation in household demographics over time. Study of Housepit 54 permits a number of lines of investigation drawing from several critical questions about demography (where demography is concerned with estimated numbers of families and extrapolated numbers of persons).

The first set of questions concern change over time. Was there significant variation in numbers of occupants in Housepit 54 over time? If change is evident did it fluctuate or was it directional through time? Was demographic change correlated in any way with subsistence change (see below) or some other potentially explanatory factor? Prentiss et al. (2012) suggest that household numbers likely increased under optimal resource conditions leading to establishment of new households; this process could have been reversed during the final century or so of occupation as access to resources turned suboptimal. Variation in housepit demography has been measured indirectly at the Keatley Creek site by examining variability in activity areas (Hayden 1997; Hayden and Spafford 1993). In brief, single family households tend to be organized in activity specific zones around house floors while multi-family households are arranged in family specific areas characterized by multiple activities. To date the only evidence for activities conducted outside of households comes from late dating (BR 3 and 4) roasting ovens and cache pits placed on or adjacent to housepit rims. Some activities may have been conducted on house roofs but this is difficult to recover in situ due to roof collapse processes. Roof data can be used to enhance interpretation of select floors at Housepit 54. On a household scale it is also possible to measure rates of storage and cooking as indicated by cache pit volume, cooking features and fire-cracked rock as indirect indicators of relative variation in numbers of occupants per floor (Prentiss et al. 2007, 2012). We review outcomes of these studies in this report (see also Prentiss, Foor, and Hampton 2018).

The second set of questions concern tactics by which the house was maintained. Was the house occupied by descendants of the first families throughout its lifespan leading up to village-wide abandonment (excluding the contact period floor)? How did occupants maintain their numbers – in situ growth or significant recruitment from external sources? Answering these questions will be considerably more difficult than those of the first set. Archaeological indicators of household demographic continuity could include persistence of artifact manufacturing styles and traditions of household spatial organization. This however could be biased since cultural traditions can be inherited independent of biological heritage (e.g. Richerson and Boyd 2005). Therefore we have initiated a study of paleo-DNA focused on extraction of ancient canid DNA from skeletal remains and coprolites (e.g. Yang et al. 2003; Yang and Speller 2006). In a pilot project, ancient dog DNA was successfully extracted and analyzed from dog bone and dog coprolite samples from the Bridge River site. We apply this approach to analyze more DNA samples from bone and coprolite materials to investigate the continuity of dog DNA sequences, following a model established by Lisa Matisoo-Smith to use faunal DNA as proxy to trace human movements (Matisoo-Smith 2009). In this study, we use dog DNA to establish continuity of the same group of people. The DNA research associated with 2016 samples is ongoing and not considered in this report. DNA studies associated with 2013-2014 materials are found in Prentiss (2015).

Subsistence Change in Housepit 54

Analysis of site-wide faunal assemblages from Bridge River to date suggest that during the period of peak occupation known as BR 3 (ca. 1300-1000 years ago) access to salmon dropped as relative numbers of salmon remains declined. There is also evidence for local depression in deer populations causing human hunters to search more widely before making kills. This is indicated by a decline in head parts and a simultaneous rise in lower limb bones between BR 2 (1300-1600 years ago) and BR 3 suggesting that hunters had to conduct more extensive field butchery (presumably due to greater transport requirements) prior to returning kills to the village (Prentiss et al. 2014). Preliminary analysis of botanical remains also supports indicators of subsistence diversification after 1300 years ago, particularly with the inclusion of more frequent berries from dry environments (in contrast to the earlier BR 2 signature dominated by plants adapted to wetter environments as is typical of montane environments). Virtually nothing is known about the uses of root foods at Bridge River. We lack knowledge of many details particularly as related to changing use of food resources by individual families and specific households. Lyons et al. (2018) provide a study of earth ovens at Bridge River as compared to several regional sites.

Two sets of questions to guide subsistence studies. First research is required into the relationships between subsistence and variation in village demography and regional ecology. More specifically, how were subsistence tactics impacted by village-wide population growth? How were they affected by wider scale climate change and resource variability? Did some of these shifts in subsistence pursuits entail related changes in food storage practices? Research into these questions will emphasize floor-wide and family activity area-specific studies of faunal and botanical remains. Zooarchaeological and paleoethnobotanical analyses address variation in the roles of prey choice, predation strategy, and food processing and transport (e.g. Broughton 1994; Chatters 1987; Lepofsky and Peacock 2004; Prentiss et al. 2012). Gaining a complete understanding of ecosystems requires extra attention to measurement of ecosystem variables using botanical, isotopic, and other paleoecological studies (see methods). Isotopic research focuses on dog remains as these provide proxy markers of variability in human consumption practices. Results of isotope studies from Housepit 54 are compared to patterns derived from other housepits at the site during 2008 and 2009 field seasons. Isotopic research deriving from 2016 samples is ongoing and results are not available in time for this report.

A second set of questions concern the interactions between subsistence activities and social change as reflected in variation in family activity areas within and between floors. Did subsistence pursuits of individual families change during the period (BR 2 to BR 3 transition at about 1300 years ago) in which we recognize a shift from relatively egalitarian to distinctly non-egalitarian social relationships between houses? Foraging theorists suggest that we should expect to see some family and/or household specific changes in prey spectrum, acquisition tactics, and preparation and dispersal to consumers (Bowles et al. 2010; Smith et al. 2010). One facet of this could include the development of household feasting practices which has been identified at other houses at Bridge River during the post 1300 years Before Present (BP) period. If so, how were feasts constructed and what could their payoffs have been? Identification of feasting can be a challenge though scholars point to a range of potential archaeological indicators (e.g. Hayden 2001). Studies of Mid-Fraser feasting are aided by a well-developed ethnographic record from the wider Pacific Northwest pointing to a range of specific characteristics including construction of unique cooking features, use of particular foods (e.g. dogs, and other items), and discard of feasting remains in spatially specific contexts (Kennedy and Bouchard 1978; Perodie 2001). This report includes a review of subsistence research inclusive of zooarchaeological and paleoethnobotanical studies (see also Lyons et al. 2018).

Technology in Housepit 54

The study of Housepit 54 technological variation has wide implications for other areas of study, particularly subsistence and sociality. Technology clearly played a critical role in processes of subsistence intensification and dis-intensification in the Mid-Fraser Canyon (Prentiss and Clarke 2008; Prentiss et al. 2007). To date we have a relatively poor understanding of variation in technological organization (meaning tactics for tool production, use, transport, recycling, and discard as well as processing feature construction, procurement of raw materials such as heating elements and fuel, use, clean-up, refurbishment, re-use, and abandonment in their social and ecological contexts) measured on inter-individual, inter-family and inter-generational scales. However, it was on these scales that technological knowledge was most typically transmitted and technological decisions made.

We cannot fully understand household subsistence strategies without an examination of associated technological organization (e.g. Nelson 1991). There are a range of questions linking technological systems to family and household food acquisition centering on the ability of these groups to gain access to critical tool-stone and other raw material sources (e.g. antler, bone, etc.) and convert the raw material to implements. Did these production and use systems correlate with particular approaches to foraging and how did that vary over time in relation to socio-ecological processes on the wider scale (e.g. Prentiss and Clarke 2008; Prentiss et al. 2007)? In these contexts, did families on each house floor act independently or more in unison as a corporate unit? Did household organizational tactics change across the BR 2 to 3 transition period? Three areas of analysis are necessary to address these questions. First, continuation of ongoing studies of lithic raw material sourcing is essential. A critical part of this is an expanded geochemical assessment of variability in the dominant raw material source, dacite, made possible through x-ray fluorescence analysis. Sourcing was conducted with an Innov-X Delta portable XRF instrument and control samples were analyzed at Dr, Nathan Goodale's XRF facility at Hamilton College, New York. The data collection associated with this research has now been completed and some preliminary results can be outlined in this report. Second, technological and functional analysis of lithic and bone/antler tools have been undertaken with the goal of identifying raw material specific variation in tool production and use. Third, cooking features are being assessed for construction and use histories, particularly in reference to selection and use of cooking stones. To date cooking stones have been quantified and used to explore intensity of cooking and to extrapolate feature function and house floor population. Overall, these studies permit us to examine how technological organization varied within and between floors. We review current outcomes of these ongoing studies in this report.

The second critical analysis of technology focuses on social questions, specifically linking tool production systems to variability in the formation of social groups, networks, and systems of social ranking. An important focus of lithic artifact analysis is on the structure of cultural transmission systems (e.g. O'Brien 2008; Prentiss et al. 2015a, 2015b) as indicators of cultural inheritance. Research at the Bridge River site to date has suggested that artifact manufacture traditions were widely shared on an inter-household basis during BR 2 times (prior to 1300 years ago). However, this appears to have changed after this point with the advent of house-specific trends favoring particular artifact designs (Prentiss et al. 2015b). Despite these provocative results, it has not been possible to investigate in any detail the complex relationships that would be expected within a household during a particular period of occupation or across the life of that house. The proposed research offers the opportunity to investigate some crucial forces necessary for maintenance of coherent house-groups, particularly learning traditions. Analysis of inter-generational teaching-learning strategies is ongoing and some preliminary results are reviewed in this report.

Technological analysis provides a critical dimension to the study of emergent social complexity at Bridge River. While there are clear relationships in the village between production and consumption of prestige artifacts and raw materials (definitions per Hayden 1998), we do not have an adequate understanding of inter-family and inter-generational variability in production and consumption of these goods, particularly as related to changing demographics and socio-economic and political relationships within the village. Of particular importance is the question of how Housepit 54 participated in the shift towards more explicit inter-household competition for resources after 1300 years ago (Prentiss et al. 2012, 2014). Did they increase their rates of production of prestige goods for exchange? Is this marked by a reciprocal return on non-local products? Is there evidence for intensification of select subsistence resources associated with development of feasting events? If present, were these processes driven by one or more families? How were these practices impacted by generational fluctuations in access to food and other resources as well as contacts with other households and villages? Studies of production and consumption of prestige goods is integrated into other research including technological analyses of lithic, bone and shell artifacts, site structural/spatial studies, sourcing analyses, and application of statistical approaches, for example could include phylogenetic research (Prentiss et al. 2015a, 2015c). Extensive research has been conducted to address these questions and is outlined in this report and in published contexts (Prentiss, Foor, Hampton et al. 2018; Prentiss, Foor, and Murphy 2018).

Sociality of Housepit 54

The Bridge River village grew by at least 300% between 1800 and 1250 years ago expanding from a maximum of 7 simultaneously occupied houses to 30 or more. During this time it is likely that many social groups and a range of occupational specialties developed (Prentiss et al. 2008). On the most dramatic scale it is evident that by about 1500 years ago there may have been two clan-like social units present in the village as indicated by the presence of two independent circular arrangements of houses. Then, research demonstrates that by 1250-1300 years ago a pattern of material-wealth based (definition per Bowles et al. 2010) inter-household inequality developed. In this context greatest wealth (measured in ratios of prestige goods, raw materials, non-local raw materials, and mammal remains to excavated sediment) is evident in newly constructed houses. Some older household do not appear to have been quite as successful. Housepit 54 participated in this process increasing its accumulations of these items, in some cases significantly, between BR 2 and BR 3 (pre- and post-1300 years ago).

Prentiss et al. (2012) argue that if new households were the wealthiest then rights to material wealth were unlikely to have been inherited within particular houses at least prior to BR 3 times. The implication is that wealth based inequality developed in situ at Bridge River through some form of competitive process that included establishment of new houses able to develop wealth through new social connections and control of foraging landscapes or immigration of new groups bringing with them new sources of wealth and instigating practices such as unconstrained accumulation of goods that had not been present before. Evidence for competitive economic conditions is present in the form of developing resource depression (per Broughton 1994) in deer populations and declining numbers of salmon likely associated with shifts in global weather patterns (Chatters et al. 1995; Prentiss et al. 2007, 2012, 2014). The effects of competition are evident in patterns of inter-household variation in deer and salmon remains in which BR 2 (before 1300 years ago) households show relatively little variability whereas BR 3 contexts are highly variable.

While the emergence of inter-household competition for food and non-food resources is evident at Bridger River many questions remain regarding how this was manifested within particular households and how it manifested over short time intervals. More specifically, did inequality manifest itself on an inter-family basis? If it did happen – when did it occur? Did incipient social relationships evident on earlier (BR 2) house floors affect later (BR 3) social arrangements? What currencies were used by emerging household elites (if any) to mark status distinctions? What was the effect of this process on other household members? Did the household develop or maintain ritual space(s)? What was the nature of inter-family relationships? Were there changes in inter-family sharing and provisioning across the many floors of HP 54? Studies of sociality at Housepit 54 depend upon the integration of many lines of data. An important research tactic is site structural (e.g. Binford 1978, 1983) analysis with the critical goal of defining variability in activity areas and determining if these represent places where household families resided as opposed to special activity areas (e.g. Hayden 1997; Lepofsky et al. 1996; Schmader 1994; Spafford 2000). Once floor activity arrangements are defined then analyses of artifact, feature, and organic materials can reveal variability in household socio-economic and political practices (as outlined above). This report includes results from research into social change at Housepit 54 (see also Prentiss, Foor, and Murphy 2018; Prentiss, Foor, Hampton, et al. 2018).

Report Contents

This report includes chapters reviewing outcomes of project research stemming from the 2013-2016 excavations at Housepit 54. Chapter Two reviews excavation methods, stratigraphy, fire-cracked rock research, feature characteristics, dating, and spatial arrangements of house floor features. This chapter also includes estimates of demographic change over time at Housepit 54. Chapter Three provides basic data and analyses of lithic artifacts drawing from the 2013 to 2016 field seasons. It also includes analyses of variability in intra- and inter-floor occupation patterns. Chapter Four covers faunal analyses also developed from materials excavated in 2013 to 2016. Chapter Five provides general conclusions. The report concludes with the following appendices: Appendix A (Maps and Photographs), Appendix B (Lithic Artifact Typology), and Appendix C (Paleoethnobotanical report).

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Chapter Two

Archaeology of Housepit 54: Bridge River 2 and 3 Floors and Roofs Excavated in 2016

(Anna Marie Prentiss)

In this chapter I seek to accomplish several goals. I introduce the archaeology of Housepit 54 in its larger context of the Bridge River site and the Middle Fraser Canyon. Then I provide an overview of the 2016 excavations with a focus on excavation and data collection methods. The latter introductory sections are partially excerpted from Prentiss et al. (2015). Finally, I provide and discuss data on stratigraphy, features, dating, and spatial organization as measured by features and fire-cracked rock from occupation floors spanning Bridge River 1-3. Conclusions are drawn regarding occupation dating, relative population density, and household activities during these occupations. Maps and photographs of floors IIa-IIo can be found in Appendix A.

Archaeological Investigations at Bridge River

The Bridge River Archaeological project was initiated as collaboration between the Bridge River Band (Xwísten) and The University of Montana in 2003 and has developed in three phases. The Phase I (2003-2005) focus was on village-wide mapping and test excavations. The goal during this period was to conduct a first test of alternative models of Middle Fraser (Mid-Fraser) village establishment and growth. Drawing from data at the Keatley Creek site, Hayden (1997) and Hayden et al. (1996) had argued that the Mid-Fraser villages were established as early as 2600 cal. B.P. and had not undergone significant change since that period. Prentiss et al. (2003; 2007), also drawing from Keatley Creek data, argued that the villages were initiated later, around 1800-1600 cal. B.P. Research at Bridge River tested these hypotheses by mapping and testing most of the houses in the core village. A total of 67 houses were tested and 55 were radiocarbon-dated out of a total of 80 houses (Prentiss et al. 2008). Results indicated that the village developed during four periods: BR 1 (1800-1600 cal. B.P.), BR 2 (1600-1300 cal. B.P.), BR 3 (1300-1100 cal. B.P.), and BR 4 (600-100 cal. B.P.). The final period (BR 4) had evidence for both pre-Colonial and early Colonial period occupations. Housepit 54 to date is the only known has with definitive early Colonial period (Fur Trade) occupation (Prentiss 2017).

Phase 2 of the Bridge River project was focused primarily on examining inter-household variability during BR 2 and 3 with a goal of testing alternative models of emergent wealth-based inequality. Six housepits were examined using a combination of applied geophysics and limited excavations of activity areas. Results suggested that material wealth-based inequality emerged in the context of village growth and competition for access to key subsistence resources, especially salmon and deer (Prentiss et al. 2012). Excavations were conducted at Housepit (HP) 54 during 2008 permitting our team to develop the first occupation sequence for HP 54. Thirteen occupation floors and seven roof deposits spanning the BR 2-4 periods were identified at HP 54 at that time

The current research represents Phase 3 of the Bridge River project. Phase 3 focuses exclusively on HP 54 with the overarching goal of developing a detailed understanding of the history of this long-lived house. Field research in 2012 focused nearly exclusively on the Fur trade period occupation (Prentiss 2017). The 2013 and 2014 field seasons focused on the deeper floors, more specifically, the IIa through IIj sequence. The 2016 field season permitted us to complete excavation of the IIb-IIe floors in Block D, IIh-IIl floors in Block C, and IIk-IIo floors in Block A.

The 2016 Archaeological Investigations at Housepit 54: Excavation Methods

The 2016 excavations at HP 54 emphasized collection of a wide range of data in order to permit analyses of assemblage content and spatial organization. Excavations were organized by a superimposed grid system consisting of four blocks identified as A-D (see maps in Appendix A). Each block contained 16 1x1 m squares. The squares were further sub-divided into four quads each. The blocks were separated by 50 cm wide balks left in place to permit trans-housepit profile mapping and to preserve a sample of archaeological materials for future investigations. Excavations were conducted relying upon a combination of cultural and arbitrary levels. A number of cultural strata were identified (Table 1). Arbitrary levels were excavated when cultural strata were too thick for a single level. Excavators point provenience mapped all cultural items (artifacts and bones) greater in maximum diameter than one cm and other items including charcoal fragments and fire-cracked rock (FCR) greater than 3 cm. Point-provenienced FCR was collected if over 5 cm in maximum diameter. Soil samples were taken systematically. A two litre sample was taken from the SW and NE (1 and 4 respectively) quads on floors for flotation and paleoethnobotanical analysis at Simon Fraser University as directed by Dr. Natasha Lyons. A .25 litre sample was taken in the SE (2) quad for geochemical and isotopic analysis at Hamilton College, as directed by Dr. Nathan Goodale. Features were either collected in their entirety for flotation or sampled systematically in stratified contexts with one litre samples. All un-collected sediments were screened with 1/8 inch hardware cloth and all cultural materials collected by provenience context for laboratory analysis. Excavators collected a variety of additional data including counts of birch bark rolls and sediment clast sizes. The latter were field-quantified using the Wentworth Scale as a guide using procedures outlined in Fladmark (1978). Data for each block are summarized as mean percentages from contributing squares. Floors were distinguished by the presence of a thin fine clay surface capping a clay and silt with gravels layer. Typically floors were also distinguished by the presence of features and artifacts and faunal remains lying flat on the clay surface. Roofs were recognized by excavators by the consistent presence of oxidized (red) sediments mixed with abundant charcoal and frequent larger sediment clasts. Unlike floors, artifacts are not consistently found on horizontal planes. Hearth features were distinguished from charcoal/ash dumps on the basis of oxidation of surrounding sediments in hearth contexts.

Table 2.1. Cultural strata at Housepit 54 (see dating section below).

Stratum	Description
I	Surface
V	BR 4 (Fur Trade period) Roof
II	BR 4 (Fur Trade period) Floor
XVI	BR 3 Bench/Rim (as identified in 2012 field season)
III	BR 2 and 3 Rim
Va1	Remnant final BR 3 Roof
IIa1	Remnant final BR 3 Floor
XVII	BR 3 Rim-like fill in depression within Block D (likely IIa1 cache pit remnant)

Va	Final Complete BR 3 Roof
IIa	Final Complete BR 3 Floor
Vb1	BR 3 Roof (Blocks B and D)
IIb	BR 3 Floor
IIc	BR 3 Floor
Vb	BR 3 Roof (Block A)
IId	BR 3 Floor
Vb3	BR 3 roof (Block B)
IIe	BR 3 Floor
IIf	BR 3 Floor
IIg	BR 3 Floor
Vc	BR 2-3 Transition Roof (Block A)
IIh	BR 2-3 Transition Floor
IIi	BR 2 Floor
IIj	BR 2 Floor
IIk	BR 2 Floor
IIl	BR 2 Floor
IIm	BR 2 Floor
IIn	BR 2 Floor
IIo	BR 2 Floor
IV	Substrate (non-cultural)

Stratigraphy

Excavations in 2016 permitted us to complete both later BR 3 period floors from Block D and BR 2 floors from Blocks A and C. This section provides information on sediments stratigraphy from those floors and associated roofs. Plan views and profiles can be found in Appendix A.

Block A

Excavations in Block A exposed the deepest floor sequence consisting on floors IIk-IIo (Tables 2.2 – 2.5). Floors IIk and IIl represent the deepest contributors to rectangular house form sequence that also includes floors IIf-IIj. No roof deposits were found within this deepest sequence. We are not clear as to the actual shape of the houses associated with floors IIm-IIo. The margins of the IIm house lie within the north and east balks of Block A and raises the possibility that the margins of this house may have been somewhat angular in form. As evident on plan maps in Appendix A, floors IIn and IIo have margins that bisect Block A forming a curvilinear pattern. This raises the possibility that either these floors were oval in plan or that a somewhat rectangular form had oval end forms. All of the Block A floors contained hearth features and most included cache pits. It is not currently clear exactly what percentage of these floors was sampled by the Block A excavation. Very little differentiation in sediment characteristics was recognized between floors IIl-IIo. All were dominated by clay sized clasts with much lower proportions of other clast sizes, silts and gravels being the next most frequent. No bark rolls were recovered from Block A in 2016.

Table 2.2. Block A Sediment Summary (percentages).

Stratum IIk	Unit							
	6	7	10	11	12	14	15	16
Cobbles	0		.5	.5	0	0	.5	0
Pebbles	3		4.5	4	3	4	4.5	4
Gravels	3		9	7.5	7	3	5	7
Sands	3		5	5	5.5	18	5	6
Silts	6		1	5	24.5	0	2	5
Clays	75		80	78	60	75	83	78

Stratum IIl	Unit							
	6	7	10	11	12	14	15	16
Cobbles	0		0	0	0	0	0	0
Pebbles	4		6	5	5	3	6	7.5
Gravels	18		10	6	5	13	8	4
Sands	4		5	6	5	4	3	6
Silts	5		9	4	7.5	8	13	5
Clays	69		70	79	77.5	72	76	77.5

Stratum IIm	Unit							
	6	7	10	11	12	14	15	16
Cobbles	0	0	0	1	0	0	0	0
Pebbles	10	7	6	8	4	3	5	7
Gravels	15	17	12	11	8	17	20	8
Sands	4	3	3	8	3	0	2	5
Silts	6	8	7	12	10	10	3	10
Clays	65	65	72	60	75	70	70	70

Stratum IIn	Unit							
	6	7	10	11	12	14	15	16
Cobbles	0	0	0	0		0	.5	
Pebbles	3	2	6	8		5	4.5	
Gravels	12	8	12	12		10	15	
Sands	3	10	4	2		2.5	3	
Silts	7	20	6	3		5	7	
Clays	75	60	72	75		77.5	70	

Stratum IIo	Unit							
	6	7	10	11	12	14	15	16
Cobbles	0		0	0		.5	0	
Pebbles	2		5	8		7.5	5	
Gravels	8		12	12		12	13	
Sands	10		8	2		2	2	
Silts	20		10	3		3	5	
Clays	60		70	75		75	75	

Table 2.3. Block A fire-cracked rock data (1=SW, 2=SE, 3=NW, 4=NE Quads).

		Stratum			
Unit	IIk	IIl	IIm	IIn	IIo
6					
(1)				1	
(2)	12	25	15	3	0
(3)	6	4	3	3	1
(4)	5	16	7	4	4
7					
(1)			19		
(2)					
(3)			3	2	
(4)					
10					
(1)	21	13	12	16	8
(2)	0	2	5	0	9
(3)	17	7	6	5	10
(4)	4	0	8	5	10
11					
(1)	0	2			
(2)				0	
(3)	15	31	15	15	15
(4)	38	6	6	1	
12					
(1)			2		
(2)					
(3)	11	24	20		
(4)	0	11	1		
14					
(1)	0	0	8		6
(2)		0		0	18
(3)	5	41	1	3	4
(4)			0		1
15					
(1)	0	16	0	17	0
(2)	20	14	10	4	
(3)	15	14	1	3	4
(4)	4	10	0		
16					
(1)	13	3			
(2)					
(3)	7	4	0		
(4)			6		

Table 2.4. Block A excavation volumes in cubic meters (1=SW, 2=SE, 3=NW, 4=NE Quads).

		Stratum			
Unit	IIk	IIl	IIm	IIn	IIo
6					
(2)	.008	.019	.02	.016	
(3)	.04	.009	.004	.02	.013
(4)	.003	.014	.005	.01	.006
7					
(1)			.009	.003	
(3)			.005	.008	
10					
(1)	.016	.01	.014	.008	.02
(2)	.003	.0033	.003	.003	.006
(3)	.01	.013	.009	.008	.016
(4)	.001	.006	.009	.014	.017
11					
(1)	.009	.009		.002	
(2)				.001	
(3)	.04	.009	.01	.01	.01
(4)	.039	.009	.02	.008	
12					
(1)			.01		
(2)					
(3)	.015	.01	.03		
(4)	.004	.002	.002		
14					
(1)	.005	.05	.007	.006	.015
(2)		.01	.02	.005	.014
(3)	.024	.005	.003	.002	.01
(4)			.005	.002	.014
15					
(1)	.003	.005	.004	.011	.009
(2)	.017	.015	.017	.004	
(3)	.01	.004	.0026	.001	.003
(4)	.019	.01	.01		
16					
(1)	.006	.002			
(2)					
(3)	.003	.002	.008		
(4)			.002		

Table 2.5. Block A Birch Bark Rolls

Unit	IIk	IIl	IIm	IIn	IIo
6	none recovered on any floor				
7					
10					
11					
12					
14					
15					
16					

Block C

Excavations in Block C permitted us to complete the BR 2 portion of the rectangular house form sequence in HP 54 (Tables 2.6-2.9). These floors included IIh through IIl. Similar to findings in Block A, the IIh-IIl floors were thicker and sometimes more complex from an overlapping feature standpoint than those from shallower contexts. Floor IIh clearly had two major periods of occupation. The first (Level 3) was entirely dedicated to operation of two large scale roasting ovens (Features C3 and A8 [2014]). An additional Block C feature in IIh (C1) was later interpreted as clean-out from Feature C3. Given the extent of roasting features on this floor and lack of post holes it as possible that for short time there was no roof and the space was used for large scale cooking events. However, it is clear that when this period ended a more normal floor and roof was reestablished forming IIh levels 1 and 2. Floor IIk was also relatively thick though there was no evidence for a stratified feature sequence and thus it would appear that this floor was established during a relatively short period. Floors IIi, IIj, and IIl were less thick than IIk and IIh and thus more typical of HP 54 floors. The IIh-IIl floor sequence in Block C was dominated by clay sized particles though the proportion of silt was higher than in the deep floors of Block A. Gravels also remain consistently present in numbers typically slightly lower than silt. One bark roll was recovered on floor IIj.

Table 2.6. Block C Sediment Summary (percentages).

Stratum IIh	Unit										
	2	6	7	9	10	11	12	13	14	15	16
Cobbles	1	1	1	2	1	1	1	1	1	3	1
Pebbles	14	8	4	10	11	7	4	7	4	6	5
Gravels	27	15	8	15	26	13	6	7	5	13	4
Sands	30	4	9	1	10	5	6	22	10	13	5
Silts	11	10	25	5	26	33	32	28	63	10	0
Clays	17	62	53	67	26	41	51	35	17	55	85

Stratum IIi	Unit										
	2	6	7	9	10	11	12	13	14	15	16
Cobbles	3		1		2	1		0		1	0
Pebbles	8		6		4	4		5		5	5
Gravels	10		10		19	5		15		7	5
Sands	8		4		11	5		35		4	10
Silts	34		15		36	20		10		6	0
Clays	37		64		28	65		35		77	80

Stratum IIj	Unit										
	2	6	7	9	10	11	12	13	14	15	16
Cobbles	2	1	3	0	1	5			0	1	
Pebbles	5	3	11	5	3	6			5	2	
Gravels	8	7	13	5	10	12			16	3	
Sands	3	6	5	5	15	5			0	3	
Silts	19	27	22	0	21	16			12	4	
Clays	63	56	46	85	50	56			67	87	

Stratum IIk	Unit										
	2	6	7	9	10	11	12	13	14	15	16
Cobbles	3	2	2	2	0	1		1	1	0	
Pebbles	7	8	7	6	5	6		10	8	2	
Gravels	8	12	9	13	4	12		19	20	3	
Sands	3	2	3	1	6	5		2	4	5	
Silts	17	19	16	7	4	10		13	9	6	
Clays	62	57	63	61	81	66		55	58	84	

Stratum IIl	Unit										
	2	6	7	9	10	11	12	13	14	15	16
Cobbles	2	2	1	0	1						
Pebbles	4	5	4	10	5						
Gravels	15	7	9	15	6						
Sands	16	4	4	3	5						
Silts	12	12	4	4	4						
Clays	51	70	78	68	79						

Table 2.7. Block C fire-cracked rock data (1=SW, 2=SE, 3=NW, 4=NE Quads).

		Stratum			
Unit	IIh	IIi	IIj	IIk	IIl
2					
(1)	33		1	16	3
(2)	10			18	2
(3)	6	20	34	29	7
(4)	75			9	14
6					
(1)	15		10	23	18
(2)	154		14	16	10
(3)	8			5	3
(4)	49			5	8
7					
(1)	7	8	27	1	2
(2)	17	27	19	10	
(3)	58	1	23	18	
(4)	43	4	12	13	
9					
(4)	57		2	42	15
10					
(3)	24	2	8	20	
(4)	31		1	18	13
11					
(1)	87	4	7	23	
(2)	87	32	21	34	
(3)	21	3	9	7	
(4)		7	5	3	
12					
(3)	8				
13					
(2)	14			6	
14					
(1)	11		8	12	
(2)	5		14	11	
15					
(1)	7	4	1	1	
(2)	2	3	1	1	
16					
(1)	1				

Table 2.8. Block C excavation volumes in cubic meters (1=SW, 2=SE, 3=NW, 4=NE Quads).

	Stratum				
Unit	IIh	IIi	IIj	IIk	IIl
2					
(1)	.055	.001	.004	.018	.0124
(2)	.045		.002	.027	.01
(3)	.004	.017	.03	.063	.017
(4)	.045		.002	.035	.028
6					
(1)	.03		.017	.06	.055
(2)	.04		.017	.085	.021
(3)	.006		.001	.038	.018
(4)	.007			.017	.015
7					
(1)	.01	.007	.013	.027	.008
(2)	.015	.004	.017	.039	.004
(3)	.02	.001	.02	.01	
(4)	.028	.01	.008	.01	
9					
(4)	.02		.01	.04	.026
10					
(3)	.007	.008	.015	.085	.021
(4)	.019	.02	.006	.046	.023
11					
(1)	.029	.004	.011	.021	
(2)	.023	.016	.018	.01	
(3)	.011	.09	.009	.022	
(4)				.02	
12					
(3)	.008	.004			
13					
(2)	.008	.008		.013	.002
14					
(1)	.02		.008	.025	.003
(2)	.003		.004	.015	.006
15					
(1)	.017	.017	.01	.008	
(2)	.01	.029	.01	.024	
16					
(1)	.02	.04			

Table 2.9. Block C Birch Bark Rolls

Unit	IIh	IIi	IIj	IIk	IIl
6					
7					
10			1		
11					
12					
14					
15					
16					

Block D

Excavations in Block D permitted us to complete the shallow late BR 3 sequence floors for this portion of HP 54 (Tables 2.10-2.14). There were several significant outcomes to this work. We realized that floor IIa is actually not represented in Block D. Thus, we have had to revise the stratigraphic floor sequence such that what had been designated in previous field seasons as IIa became IIb, IIb became IIc, IIc became IId, and IId became IIe. In summary, Block D contains only the IIb-IIe floors. The space that would have been IIa floor was partially covered by a remnant Vb roof over IIb (similar to the same pattern in Block B) a multi-bedded rim (III) stratum, and finally superimposed over that, the stratum Va roof. The stratum III material does not cover all of Block D and is limited to units 7 (northern quads), 8 (northern quads), 11, 12, 15, and 16. The implication is that this portion of the house was retired from use during the IIa floor occupation and converted to a refuse disposal area. Similar to Block B, floor IIe was the earliest floor of the fully expanded house during mid-BR 3 times. As discussed below, the feature distribution on this floor was remarkable with multiple cache pits, hearths, and post-holes of various sizes and configurations. Sediments in the IIb-IIe floor sequence contained higher proportions of silt than recognized elsewhere on the deeper floors (Blocks A and C). However, the proportions were relatively similar to those of these same floors in other blocks. Gravels were proportionately lower than deeper floors in Blocks A and C. A total of 25 bark rolls were recovered from a IId cache pit in Block D.

Table 2.10. Block D Sediment Summary (percentages).

Stratum Va	Unit								
	2	3	6	7	8	11	12	15	16
Cobbles	0	0	1	2	1				
Pebbles	3	3	3	8	6				
Gravels	7	10	11	15	14				
Sands	10	9	20	18	20				
Silts	45	40	40	20	25				
Clays	35	48	25	37	34				

Stratum IIb	Unit								
	2	3	6	7	8	11	12	15	16
Cobbles	0	0	1	0	0				
Pebbles	2	2	3	2	2				
Gravels	8	7	9	7	7				
Sands	10	6	15	15	15				
Silts	60	55	50	31	40				
Clays	20	30	22	45	36				

Stratum IIc	Unit								
	2	3	6	7	8	11	12	15	16
Cobbles	0	0	0	0	0				
Pebbles	1	2	3	3	3				
Gravels	9	9	10	7	8				
Sands	10	10	8	10	9				
Silts	60	65	48	50	40				
Clays	20	14	31	30	40				

Stratum IId	Unit								
	2	3	6	7	8	11	12	15	16
Cobbles	0	0	0	0	0				1
Pebbles	2	2	3	1	2				8
Gravels	8	8	9	9	8				11
Sands	2	3	5	10	20				30
Silts	80	80	78	60	60				15
Clays	8	7	5	20	10				35

Stratum IIe	Unit								
	2	3	6	7	8	11	12	15	16
Cobbles			0	0	2	0	4	0	.5
Pebbles			1	1	7	3	7	3	9.5
Gravels			3	9	11	10	15	9	10
Sands			20	25	35	15	22	12	10
Silts			30	40	30	15	10	35	25
Clays			46	25	15	57	42	41	45

Table 2.11. Block D fire-cracked rock data (1=SW, 2=SE, 3=NW, 4=NE Quads).

		Stratum				
Unit	VA	IIb	IIc	IId	IIe	XVII
2						
(4)	123	19	2	4		
3						
(3)	204	9	9			
(4)	192	9	0	0		
6						
(2)	146	32	3	11	2	
(4)	109	26	5	6		
7						
(1)	164	26	35		1	
(2)	267	8	11	0	0	
(3)					1	
(4)					0	
8						
(1)	135	3	14			
(2)	97	3	2	3	3	
(3)					7	
(4)					1	
11						
(1)					5	
(2)					4	
(3)					17	
(4)					2	
12						
(2)					0	
(3)					13	
(4)					0	
15						
(1)					3	6
(2)					2	
(3)						
(4)						
16						
(1)				8		
(2)					0	
(3)				21		
(4)						

Table 2.12. Block D excavation volumes in cubic meters (1=SW, 2=SE, 3=NW, 4=NE Quads).

		Stratum				
Unit	Va	IIb	IIc	IId	IIe	XVII
2						
(4)	.068	.01	.004	.001		
3						
(3)	.065	.008	.01			
(4)	.07	.03	.006			
6						
(2)	.095	.02	.003		.005	
(3)						
(4)	.068	.005	.0003		.008	
7						
(1)	.14	.01	.0004		.002	
(2)	.108	.01	.0004	.01		
(3)					.002	
(4)					.009	
8						
(1)	.1	.005	.005			
(2)	.039	.004	.001	.008	.001	
(3)					.007	
(4)					.004	
11						
(1)					.005	
(2)					.0008	
(3)					.002	
(4)					.002	
12						
(2)					.015	
(3)					.01	
(4)					.004	
15						
(1)					.01	.01
(2)					.007	
16						
(1)				.006		
(2)					.003	
(3)				.01		

Table 2.13. Block D Birch Bark Rolls

Unit	Va	IIb	IIc	IId	IIe
2					
3					
6					
7					
8					
11					
12					
15				15[1]	
16				10[1]	

[1] Bark rolls from Feature D10 (2014)

Fire-Cracked Rock Distributions and Housepit 54 Demography

Demography has proven to be an important factor in understanding change across the Bridge River site during the BR 1-3 periods (Prentiss et al. 2014). As stated by Prentiss et al. (2015): Data suggest that the village was established sometime before ca. 1800 cal. B.P., growing at an initially slow rate. Rapid demographic growth gave rise to the BR 2 period and its apparent pattern of economic stability and relative egalitarianism. By late BR 2 times there may have been some decline in population, perhaps accompanied by stress on some food resources. However, at ca. 1300 cal. B.P, the BR 2 population appears to have doubled and the arrangement of housepits reorganized. Indicators of socio-economic inequality appear during the subsequent BR 3 period. Housepits were progressively abandoned during this time such that by ca. 1000 cal. B.P. the entire village was no longer inhabited. Prentiss and Williams (2015) suggest that the demographic jumps at the initiation of BR 2 and 3 also marked major changes in the nature of socio-political relations suggesting that household wherewithal was becoming increasingly dependent on membership within emergent social groups.

The HP 54 project provides us with the opportunity to examine these ideas with fine grained data from a single household. While we recognize that patterns of growth and decline occurred on a village-wide scale and at a regional level (Harris 2012), we have a poor understanding of how these processes operated at the scale of individual households. We raise a variety of questions concerning dynamics over time within households. Did household membership grow or decline at the same rate as the larger village? Is there a relationship between shifting occupation density and household economies and social relations? A study of household history at Keatley Creek relying primarily on data from stratified housepit rim material determined that household packing correlated with markers of social status distinctions (Prentiss et al. 2007).

The FCR data can be used to model demographic change across the BR 2 and 3 floors of HP 54. To accomplish this I first provide updated and complete FCR and excavated volume data for all floors. Data presented in Table 2.14 update and correct information provided in a similar table from the 2014 field season report (Prentiss et al. 2015: Table 2.15). It was particularly critical to correct the Block D data given our new understanding of the floor chronology in that area. Block and floor summaries of all FCR and volume data are provided in Table 2.15. From there it is possible to calculate FCR density per floor for an initial approximation of variability in relative density of occupants assuming that FCR counts inform us about rates of cooking and that in turn is informative regarding relatively frequency of persons participating in the cooking process. However, simple density of FCR does not provide us with a projection of actual numbers of persons per floor. To accomplish this we need to develop a mathematical approach to extrapolate from FCR counts to projected numbers of occupants (Table 2.16). That latter is accomplished by development of a divisor against FCR density predicated on the logic that each floor was occupied for about 20 years, 33% of the time in each year (Alexander 2000; Teit 1900, 1909), with two cooking events per day (Teit 1906), requiring five cooking stones each time with all stones recycled across 15 days, 50% removed to roof or rim (based upon floor/roof ratios from HP 54), and finally number of hearth groups (consisting of five persons each; Hayden et al. 1996).

FCR density and projected population by house floor are presented in Figure 2.l. Results suggest a steady though somewhat choppy increase in numbers of occupants from the IIm, n, o floors to a peak point at IIe. It is possible that the estimate for IIe may be inflated due to excess cooking associated with feasting events, though requires further testing. After IIe, data suggest a rapid drop in numbers of occupants followed by a slight rise just before abandonment after IIa. The latter conforms to the village-wide population decline that appears to be linked with subsistence stress associated with a Malthusian ceiling (Prentiss et al. 2014). If this is the case then it is clear that the latter process affected individual houses deeply causes rapid declines in house membership. It is not clear whether this was due to mortality or emigration. Another implication of this result is the evident fact that HP 54 persisted as a house despite losses elsewhere in the village. Indeed, the increased numbers during IIb and IIa suggest that the house was productive on a reproductive level and/or that it attracted new members from other perhaps failing houses. Ultimately, however, HP 54 was abandoned after IIa with the entire associated roof (VA) burned and left covering that last floor. There was a brief and slightly later reoccupation (IIa1) but we get little insight into that floor given that most of it was evidently removed by stratum II occupants.

Table 2.14. Corrected summary of FCR for 2013-2016 field seasons.

FCR Count 2014 floors

Block	IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj
A							318	323	258	105
B				241	284					
C				67	972	976	305			
D		132	155	254						
Total		132	155	562	1256	976	623	323	258	105

FCR Count for 2013 floors

Block	VA	IIa	Vb1	IIb	IIc	Vb2	IId	IIe	IIf
A	350	255	NA	215	256	166	228	143	253
B	909	2363	1603	395	317				
C	821	588	NA	673	390	115	460		
D	912								
Total	2992	3206	1603	1283	963	281	688	143	253
Total[a]	2992	2093	1603	1283	963	281	688	143	253
Total[b]	2992	2650	1603	1283	963	281	688	143	253

[a] Total without 100% FCR from Block B Units 13 and 14 (all quads) and 9 and 10 (northern quads) in IIa

[b] Total without 50% of FCR from Block B Units 13 and 14 (all quads) and 9 and 10 (northern quads) in IIa

FCR Total 2013 floors

	IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj
Total	3206	1283	963	688	143	253				
Alt.[1]	2650	1283	963	688	143	253				

Total FCR Count 2013 and 2014

	IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj
	3206	1415	1118	1250	1399	1229	623	323	258	105
Alt.[1]	2650	1415	1118	1250	1399	1229	623	323	258	105

[1] Reduction of 50% FCR count from Block B units 13 and 14 and 9 and 10 (northern quads) in IIa from 2013.

Volume (m^3) for 2014 floors

Block	IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj
A							.327	.375	.297	.161
B				.168	.106					
C				.081	.362	.516	.273			
D		.355	.127	.233						

Total 2014

IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj
	.355	.127	.482	.468	.516	.6	.375	.297	.161

Volume Excavated for 2013 floors

A	.2826	.4249			.2698	.2414	.105		.256	.2661	.2047
B	.207	.5192	.5045		.193	.171					
C	.688	.36			.318	.359	.04		.295		
D	.372										
Total	1.549	1.304	.5045		.781	.771	.145		.551	.2661	.2047

Volume Summary 2013 floors

	IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj
	1.304	.781	.771	.551	.2661	.2047				

Total Volume 2013 and 2014

	IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj
	1.304	1.136	.898	1.033	.7341	.7207	.6	.375	.297	.161

FCR Count for 2016 floors

Block	IIb	IIc	IId	IIe	IIh	IIi	IIj	IIk	IIl	IIm	IIn	IIo
A								193	243	148	82	90
C					830	115	217	341	95			
D	135	81	53	61								
Total	135	81	53	61	830	115	217	534	338	148	82	90

Volume (m^3) for 2016 floors

Block	IIb	IIc	IId	IIe	IIh	IIi	IIj	IIk	IIl	IIm	IIn	IIo
A								.547	.201	.229	.153	.153
C					.548	.276	.232	.758	.319			
D	.102	.03	.035	.097								
Total	.102	.03	.035	.097	.548	.276	.232	1.305	.52	.229	.153	.153

Table 2.15. Total FCR counts and volumes (m^3) for floors (all field seasons).

	FCR by Block					Volume by Block					FCR/m^3
	A	B	C	D	Total	A	B	C	D	Total	Ratio
IIa	255	893[a]	588		1736	.425	.519	.36		1.304	1331.3
IIb	215	395	673	132	1415	.27	.193	.318	.457	1.238	1142.9
IIc	256	317	390	236	1199	.241	.171	.359	.157	.928	1292
IId	228	241	527	307	1303	.256	.168	.376	.268	1.068	1220
IIe	143	284	972	61	1460	.266	.106	.362	.097	.831	1756.9
IIf	253		976		1229	.205		.516		.721	1704.5
IIg	318		305		623	.327		.273		.6	1038.3
IIh	323		830		1153	.375		.548		.923	1249.2
IIi	258		115		373	.297		.276		.573	650.9
IIj	105		217		322	.161		.232		.393	819.3
IIk	193		341		534	.547		.758		1.305	409.1
IIl	243		95		338	.201		.319		.52	650
IIm	148				148	.229				.229	646.3
IIn	82				82	.153				.153	535.9
IIo	90				90	.153				.153	588.2

[a] Total cut by 75% due to likely Strat. II and XIV content

Table 2.16. Estimate of house floor population sizes. This is a heuristic designed to demonstrate approximate trends.

	FCR Density	N hearth areas	FCR Divisor[a]	Population Estimate
IIa	1331	4	40	33
IIb	1142	4	40	29
IIc	1292	3	54	24
IId	1220	3	54	23
IIe	1756	4	40	44
IIf	1704	3	54	32
IIg	1038	3	54	19
IIh	1249	2	80	16
IIi	650	2	80	8
IIj	819	3	54	15
IIk	409	2	80	5
IIl	650	2	80	8
IIm	646	1	160	4
IIn	535	1	160	3
IIo	588	1	160	4

[a] Divisor calculated as follows: (1) assume 20 years per floor;
(2) 365 days x 20 years = 7300; (3) house occupied 33% of year = 2409 (Teit 1900, 1909);
(4) Two cooking events per day = 4818 (Teit 1906); (5) x 5 rocks = 24,090;
(6) /15 (rock recycling across 15 days) = 1606; (7) /2 (50% removed to roof/rim) = 803;
(8a) /5 (one hearth x 5 people) = 160; (8b) /10 (two hearths x 5 people) = 80;
(8c) /15 (three hearths x 5 people) = 54; (8d) /20 (four hearths x 5 people) = 40.

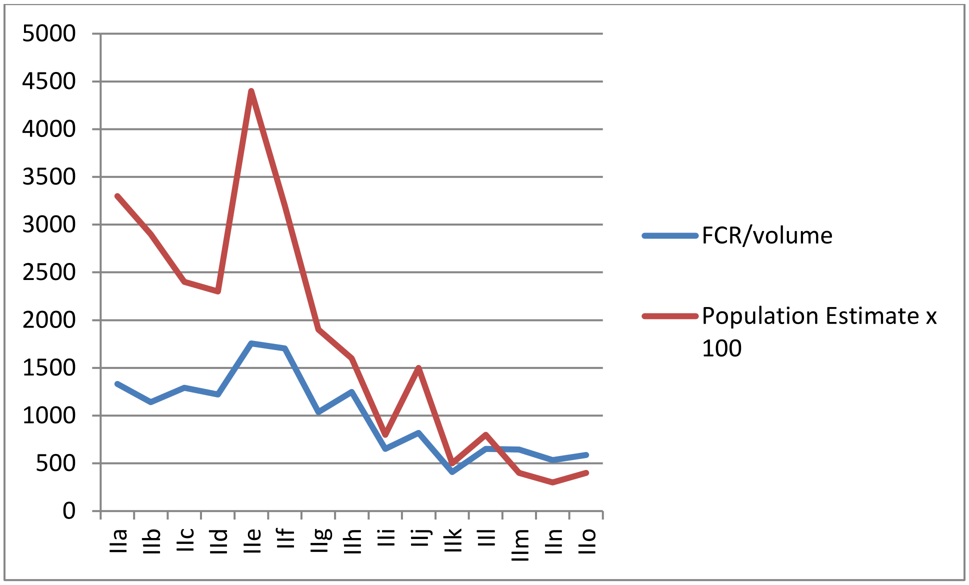

Figure 2.1. Plot of FCR volume and associated HP 54 population estimate.

Features

A total of 82 features were exposed, mapped, and excavated during the 2016 field season. These are described by Block (Tables 2.17-2.19). Plan views of all features are provided in Appendix A as part of general floor maps.

Block A

Floor IIk had nine features including four shallow basin-shaped hearths, three post-holes, and a shallow bowl-shaped depression/pit. Hearth features A5, A7, and A8 are in close proximity to one another raising the possibility that they were not in use simultaneously but more the result of shifts in the organization of work space on this floor. Floor IIl contained two hearths and one deep cylindrical pit. The latter feature is a cache pit in a semi-oval form in plan-view. Fill is unconsolidated with highly abundant FCR clasts suggesting relatively rapid infilling with kitchen-related refuse. Floor IIm contained three deep cylindrical pits, two basin-shaped hearths, one post-hole, and one shallow bowl-shaped depression. Feature A14 was particularly dramatic given great depth and abundant cultural materials including FCR, lithic artifacts, faunal remains, and dog coprolites. Sediments in all deep pits were unconsolidated suggesting refuse disposal. Three surface hearths were found on floor IIn and one surface hearth was recovered on floor IIo. The latter are thin deposits with limited charcoal and some oxidation suggesting a hearth feature used for a relatively brief period.

Table 2.17. Features excavated in 2016 at Housepit 54, Block A. (NA=Not applicable/data not collected [typically due to complete collection of sediments for flotation], ENC=Excavation Not Completed, SB=Shallow Bowl, OH=Oven-like hearth; BH=Basin shaped Hearth, DCP=Deep Cylindrical Pit; DBS=Deep Bell-Shaped Pit, SHPH=Shallow Post Hole, SHH=Shallow Hearth, SH=Surface Hearth [no depth], PH=Post hole, P=Post, SPH=Small Post Hole, CFP=Clay Filled Pit, CPH=Collared Post Hole)

Feature					Sediments			Estimated	FCR	
#	Type	Cob.	Peb.	Grav.	Sand	Silt	Clay	Vol. (cm^3)	Count	Stratum
A1	BH	0	5	8	38	15	34	34,835	9	IIk
A2	PH	0	2	3	5	0	90	848	0	IIk
A3	PH	0	2	3	5	0	90	352	3	IIk
A4	SB	0	2	8	3	7	80	3035	4	IIk
A5	BH	NA						3312	NA	IIk
A6	PH	0	2.5	2.5	1	0	95	883	0	IIk
A7	BH	0	3	6	1	0	90	2641	1	IIk
A8	BH	NA						3077	NA	IIk
A9	BH	NA						5842	NA	IIl
A10	BH	NA						462	NA	IIl
A11	DCP	2	7	12	4	4	70	126,520	250	IIl
A12	DCP	1	9	13	4	18	55	94,026	87	IIm
A13	BH	0	5	13	2	20	60	462	0	IIm
A14	DCP	2	12	18	11	8	49	81,033	140	IIm
A15	BH	0	10	20	0	5	65	38,256	8	IIm
A16	DCP	1	8	17	0	8	64	26,310	10	IIm
A17	DCP	1	5	20	0	3	71	28,666	18	IIn
A18	PH	NA						2461	NA	IIm
A19	SB	NA						3772	NA	IIm
A20	SH	NA						829	NA	IIn
A21	SH	NA						989	NA	IIn
A22	SH	NA						314	NA	IIn
A23	SH	NA						1485	NA	IIo

Block C

Nine features were mapped and excavated on floor IIh. Features C1 and C3 are associated with the earliest occupation of IIh and precede all other features in time. Feature C3 is a large roasting oven with three distinct layers representing at least two periods of use. It contains extensive quantities of charcoal and FCR. Underlying sediments are heavily oxidized suggesting intensive use. Feature C1 was originally thought to represent an extension of the C3 oven. However, it lacks any evidence for underlying oxidation despite extensive charcoal and FCR counts. Thus, it appears to be clean-out material from operation of the C3 oven. Feature C3 lies on the same stratigraphic surface as FA8(2014), another oven feature located in Block A. Combined these features suggest that for a short time, the rectangular variant of HP 54 was operated as a cooking facility. Given the scale of the ovens and distribution of clean-out material, coupled with lack of post-holes for roof support, it seems reasonable to postulate that the facility may have had no roof during this time. Once the FC3 oven ceased being used additional floor sediment was laid down over the features creating a final IIh floor. After that point seven new features were established including five basin-shaped hearths (of various configurations), one shallow bowl-shaped depression, and a concentration of likely cooking rocks, many preformed by percussion into cuboid shapes. Hearths C9, C11, and C13 are superimposed upon one another clearly indicating repeat establishment of heating/cooking features in this location. Floor IIi included two basin-shaped hearths and two post-holes. One of the hearths takes the form of an approximately one meter in length linear trench similar to FC15 (2014) from the IId floor in Block C. We have yet to determine the function of these linear features and whether they differed from more typical round/oval hearth forms. Both contained extensive charcoal and relatively frequent FCR. The FC15 (2014) feature included actual burned timbers running parallel to the long axis of the feature. Floor IIj held three hearths, one post hole, and one shallow-bowl shaped depression. The C18 hearth was relatively large though not extremely deep (mean depth was about 5 cm). Floor IIk contained six features including two postholes, one shallow basin-shaped depression, two basin-shaped hearths, and one deep bell-shaped pit. One of the hearths (C22) was clearly truncated by the C5 bell-shaped pit. The latter feature is spatially large (about 1.2 m in length and 1 m in width) and relatively deep (approximately 60 cm). It contained three distinct layers varying in color and content, thus likely reflecting different depositional events. All layers contained FCR and highly abundant fish bones, along with some lithic artifacts. Highest densities of all materials were found in the uppermost layer. Floor IIl contained only a shallow clay-filled pit and a post-hole. However, much of IIl was truncated by F C5 and the 2008 test trench.

Table 2.18. Features excavated in 2016 at Housepit 54, Block C. (NA=Not applicable/data not collected [typically due to complete collection of sediments for flotation], ENC=Excavation Not Completed, SB=Shallow Bowl, OH=Oven-like hearth; BH=Basin shaped Hearth/Hearth pit, DCP=Deep Cylindrical Pit; DBS=Deep Bell-Shaped Pit, SHPH=Shallow Post Hole, SHH=Shallow Hearth, SH=Surface Hearth [no depth], PH=Post hole, P=Post, SPH=Small Post Hole, CFP=Clay Filled Pit, CPH=Collared Post Hole; RA=Rock Arrangement)

Feature					Sediments			Estimated	FCR	
#	Type	Cob.	Peb.	Grav.	Sand	Silt	Clay	Vol. (cm^3)	Count	Stratum
C1	OH[a]	3	7	24	10	35	21	NA	88	IIh
C3(L1)	OH	1	10	15	9	36	29	200,000	182	IIh
C3(L2)	OH	2	10	18	17	31	22	40,625	61	IIh
C3(L3)	OH	2	9	14	3	49	23	40,625	45	IIh
C4	BH	6	6	8	9	32	39	97,264	37	IIi
C5	DBS	1	5	7	12	7	68	589,347	154	IIk
C6	BH	8	6	10	25	45	6	35,581	55	IIh
C7	SB	3	10	30	10	17	30	33,166	35	IIh
C8	RA	NA						NA	NA	IIh
C9	BH	NA						6960	11	IIh
C10	BH	4	6	11	4	24	51	4286	41	IIh
C11	BH	NA						1344	21	IIh
C12	PH	0	0	5	15	50	30	150	0	IIi
C13	BH	1	9	15	5	25	35	7599	21	IIh
C14	PH	NA						393	NA	IIi
C15	BH	NA						2976	NA	IIj
C16	PH	0	7	19	13	15	46	6756	2	IIj
C17	BH	4	9	13	4	43	27	19,135	16	IIi
C18	BH	5	9	12	6	27	41	28,800	32	IIj
C19	PH	NA						2722	NA	IIk
C20	SB	0	0	10	15	5	70	12,462	0	IIk
C21	BH	NA						2244	NA	IIj
C22	BH	NA						1512	3	IIk
C23	SB	2	4	3	1	5	85	8597	1	IIj
C24	BH	2	4	7	7	20	60	7920	1	IIk
C25	PH	NA						3492	NA	IIk
C26	CFP	NA						17,663	NA	IIl
C27	PH	NA						7308	NA	IIl

[a] C1 is likely accumulated cleanout material from C3.

Block D

A total of 33 features were identified and excavated in Block D during 2016. Floor IIc produced a single shallow hearth that was spatially very extensive. Given its size and shallow depth it is likely that this represents a cooking/heating space that was repeatedly used, though always exactly in the same position. Floor IId contained two shallow bowl-shaped depressions, five post-holes, and one deep bell-shaped pit. The latter feature (D16c) is a likely cache pit, 50 cm by 68 cm in surface diameter and 98 cm in depth, filled with kitchen refuse in several layers. Each layer held abundant FCR, faunal remains, and lithic artifacts. Two of the postholes (D16a, D16b) were excavated into the fill of the cache pit at different stages indicating the pit was filled at different intervals that coincided with establishment/re-establishment of roof support posts. Floor IIe contained 24 features including ten postholes, eight small postholes, one basin-shaped hearth, two shallow hearths, and one oven-like hearth. The Feature D10 and D11 group cluster such that the D10 hearth partially caps the D11 group. D11a is a hearth embedded within sediments of the D11c bell-shaped pit. Likewise, posthole features D11b and D18 (2014) are also embedded within sediments of the D11c pit. This clearly implies a multi-event use-history. A somewhat similar cluster of features consists of another deep bell-shaped pit (D20) capped entirely by a hearth (layer one of D20). Feature D20 is surrounded by postholes of various sizes raising the possibility of some form of temporary architectural feature (e.g. a cooking/smoking tripod) associated with the hearth. Then to the west is feature D25, a large oven-like hearth with extensive charcoal, fire-cracked rock, and oxidation deep into underlying sterile sediments. Both the D11c (85x59 cm in diameter and 71 cm depth) and D20 (77 cm max diameter and 70 cm depth; not fully excavated in terms of width and depth) pits contain multiple layers with highly abundant fish bones, FCR, and lithic artifacts. Features on floor IIe clearly indicate a complex history to this floor that is similar to evidence from Block B where a similar hearth capped bell-shaped pit (B14 [2014]) was excavated in 2014 (Prentiss et al. 2015). It would appear that the seven bell-shaped and cylindrical pits were established first on IIe in Blocks B and D. Once filled with refuse, three of those features were capped with hearths. It is not clear whether the hearths were part of rituals or simply for sanitation purposes.

Table 2.19. Features excavated in 2016 at Housepit 54, Block D. (NA=Not applicable/data not collected [typically due to complete collection of sediments for flotation], ENC=Excavation Not Completed, SB=Shallow Bowl, OH=Oven-like hearth; BH=Basin shaped Hearth/Hearth pit, DCP=Deep Cylindrical Pit; DBS=Deep Bell-Shaped Pit, SHPH=Shallow Post Hole, SHH=Shallow Hearth, SH=Surface Hearth [no depth], PH=Post hole, P=Post, SPH=Small Post Hole, CFP=Clay Filled Pit, CPH=Collared Post Hole; RA=Rock Arrangement)

Feature					Sediments			Estimated	FCR	
#	Type	Cob.	Peb.	Grav.	Sand	Silt	Clay	Vol. (cm^3)	Count	Stratum
D1	BH	NA						5202	NA	IIe
D3	SPH	NA						251	NA	IIe
D4	SPH	0	4	6	20	20	50	763	0	IIe
D5	SPH	0	4	6	25	15	50	509	1	IIe
D6	SPH[a]	0	2	8	15	25	50	7686	1	IIe
D7	SPH[b]	NA						198	NA	IIe
D8	PH	0	5	14	8	12	61	19,128	33	IIe
D9	PH	0	5	10	5	10	70	11,190	1	IIe
D10	SH	0	5	20	30	20	25	5084	3	IIe
D11a	SH[d]	NA						1570	NA	IIe
D11b	PH[c]	NA						NA	NA	IIe
D11c	DBS	1	3	10	15	23	49	231,144	33	IIe
D12	SHH	0	3	7	9	41	40	49376	67	IIc
D14	SB	NA						1362	NA	IId
D15	SB[e]	NA						4616	NA	IId
D16b	PH[f]	0	2	5	37	20	36	2940	3	IId
D16a	PH[g]	0	2	5	28	45	20	4462	3	IId
D16c	DBS	0	3	10	15	25	47	249,900	360	IId
D17	SPH	NA						509	NA	IIe
D18	SPH	NA						570	NA	IIe
D19	PH	0	1	8	11	30	40	954	1	IIe
D20	DBS	1	3	7	6	30	53	250,635	393	IIe
D21	SPH	0	3	9	10	28	50	471	5	IIe
D22	PH	0	1	5	14	10	70	475	5	IIe
D23	PH	NA						502	NA	IId
D25	OH	1	3	9	13	50	20	75,000	105	IIe
D26	PH	NA						352		IIe
D27	PH	NA						393	NA	IIe
D28	PH	0	3	6	6	25	60	570	1	IIe
D29	PH	0	2	4	14	10	70	2813	1	IIe
D30	PH	0	2	4	4	80	10	1060	0	IIe

[a] Three merged small post-holes.

[b] Two merged small post-holes

[c] Post hole (with portion of wooden post) embedded within FD11c cache pit matrix. Not possible to accurately discern base of this feature. Thus no volume estimate is possible.

[d] Shallow hearth located on surface of D11c cache pit.

[e] This is a small pit dug into D16c containing an apparent stone knappers kit in the form of two antler tines and an antler billet along with two slate tools.
[f] This is a posthole within D16c cache pit sediments.
[g] This is another small posthole within D16c cache pit sediments.

Radiocarbon Dating

We submitted five new samples for radiocarbon dating with DirectAMS which brings our total to 30 dates from Housepit 54 (Table 2.20). All of the newly received dates were on charcoal from hearth features in floors IIK-IIo. We used the same calibration procedure as outlined in Prentiss et al. (2015): We calibrated the dates using standard Gaussian distributions and Bayesian posterior probabilities. Bayesian posterior probabilities derive from Bayes Theorem and are calculated as a product of prior probabilities and observed likelihoods. Modelling of posterior probabilities for radiocarbon dates uses the radiocarbon dates as the prior probabilities and the calibrated dates as observed likelihoods. The posterior probabilities are then established using a Markov Chain Monte-Carlo model to provide a sample of solutions. The extent to which this is accomplished is measured with a Convergence Index; considered good if over .95 (all reported dates here have scores above .95). Radiocarbon date calibration and Bayesian modelling was accomplished using OxCal 4.2 (Bronk Ramsey 2014).

Results illustrated in Figure 2.2 suggest that HP 54 was occupied in the range of 1000-1500 cal. BP. Floor IIa1 is best represented by a single date calibrated to approximately 1000 cal. BP. We had expected a second IIa1 date associated with a house post removed in 2008 to calibrate in about the same range. However, the new calibration places it nearly identical to the floor IIA date centered on approximately 1150 cal. BP. There are several outlier dates particularly associated with floor IIi and IIg(2) and these are likely due to movement of charcoal or birch bark (IIi(2)) between floors. The remaining dates are relatively consistent with stratigraphic context. Pending future statistical analyses of date distributions it would appear that if there was steady reoccupation of the 15 HP 54 floors spanning IIa to IIo at ca. 1150-1500 cal. BP then each floor was occupied on average for about 23 years or approximately a generation per floor.

Table 2.20. Radiocarbon record for Housepit 54. All are charcoal dates unless noted.

D-AMS #	Exc. Block	Strat.	Occ. Order (Strat. Youngest to Oldest)	Feature	Uncal. date	1 sigma error
1217-038-01	C	V	1	Roof	112	25
3593	D	II	1	D1(2012) fish bone	500	25
2804	D	IIa1(1	2	D2(2012)	1047	31
2011-1	C	IIa1(2	2/3	house post (2008 exc.)	1173	25
3431	A	Va	3	roof beam	1252	21
3429	B	Va	3	roof beam	1299	21
7496	C	IIa(1)	3	C3(2014)	1212	23
3430	B	Vb1	4	roof beam	1390	23
7498	B	IIb	4	B8(2013)	1295	28
7499	C	IIb(2)	4	C5(2013)	1199	26
7500	B	IIc(1)	5	B9(2013)	1273	26
7497	D	IIc(2)	5	D4(2014)	1220	26
7501	A	IId	6	A11(2013)	1339	23
7502	B	IIe(1)	7	B12(2014)	1268	25
7503	C	IIe(2)	7	C2(2014)	1391	26
7504	A	IIe(3)	7	A13(2013)	1204	18
7505	A	IIf	8	A18(2013)	1400	22
7506	A	IIg(1)	9	A2(2014)	1228	22
7959	C	IIg(2)	9	C27(2014)	1010	26
7507	A	IIh(1)	10	A6(2014)	1348	25
18722	C	IIh(2)	10	C3 Layer 1(2016)	1539	25
18723	C	IIh(3)	10	C3 Layer3 (2016)	1560	30
7508	A	IIi(1)	11	A12(2014)	2257	31
7961	A	IIi(2)	11	Birch Bark on floor	2188	27
7961	A	IIj	12	A22(2014)	1299	27
18724	A	IIk	13	A7(2016)	1487	30
18725	A	IIL	14	A10(2016)	1541	21
18726	A	IIm	15	A15(2016)	1555	30
18727	A	IIn	16	A22(2016)	1561	26
18728	A	IIo	17	A23(2016)	1502	51

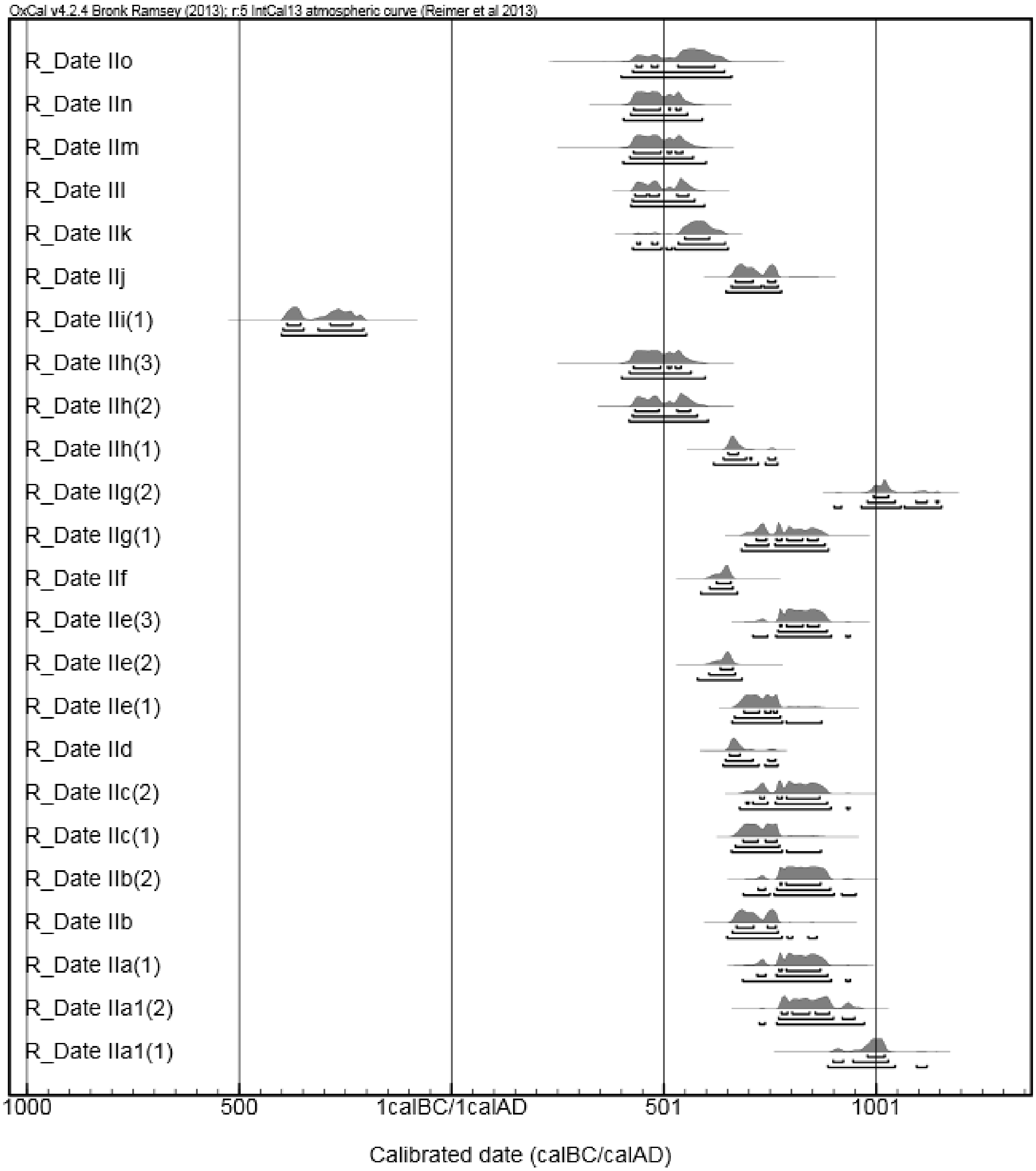

Figure 2.2. Plot of calibrated radiocarbon dates from floors with Bayesian modeling.

Spatial Distribution of Features on Floors and Housepit 54 History

Given completion of the HP 54 excavation, we now have final sample distributions of features from all floors in the house and can draw upon these to make some statements about variation in organization of space over time (Appendix A). It is useful at this point to begin to explore questions of sociality on the HP 54 floors. Williams-Larson et al. (2017) examined floor II dating to the Fur Trade period in light of two alternative social models: communalism and collectivism. Briefly, under communalism individuals "lose the self" for the good of the House (Momoeka 1998) and thus work closely together to provide communal outcomes. The HP 54 fur trade floor was a good example of a communalistic strategy given a single central hearth, activity areas associated with cooking, hide working, lithic tool production, and socializing. This is similar to expectations for 19th century St'át'imc housepit life as described by Teit (1906). Communalism contrasts with collectivism in which individuals and families work to suit their specific goals, cooperating as needed. The House benefits as a byproduct of varying degrees of cooperation (Momoeka 1998). As recognized by Coupland et al. (2009; see also Williams-Larson et al. 2017), this is often manifested spatially in houses as redundant spaces for semi-autonomous individual family or domestic units cooperating with one another to varying degrees. Ethnographically, this pattern is described by Teit (1906) for the Lil'wat or Lower Lillooet. Archaeologically, such a pattern is widely recognized during Pre-Colonial times in the Mid-Fraser area (Hayden 1997; Prentiss et al. 2008, 2012; Smith 2017). Domestic units are typically marked by spatially distinctive cooking hearths, storage features, and associated artifacts and ecofacts. However, the positions of hearth centered activity areas may also be affected by practical contingencies associated with management of space (e.g. Binford 1978, 1983). Hearths located at close proximity to one another could reflect repositioning over time but also particular functions. Entryways into the house could also impact feature placement. Central space would be needed for a roof ladder and space would also be required on a lateral margin for a side entrance (Alexander 2000; Prentiss 2017). Finally, the spatial positioning of storage features could be informative regarding cooperation assuming that spatially concentrated storage raises the possibility of a public goods scenario and thus high degrees of cooperation versus an alternative scenario of spatially disjunctive storage reflecting a family level conception of private goods and thus reduced cooperation (e.g. Bettinger 2015; Eerkens 2013).

A startling finding of the 2016 field season was the recognition that floor IIa only exists in Blocks A, B, and C. The Block D area had apparently been converted to a refuse disposal zone. The northeast portion of IIa in Block A was also impacted by the Fur trade period midden that was partially excavated into the IIa sediments (Prentiss 2017). IIa hearths are otherwise distributed between all blocks, though Block B has an unusually frequent number, which tentatively could reflect repositioning of activities during the life of that floor. This also a large grinding stone in Block B associated with a hearth feature. This same artifact was apparently in use from the IId through IIa floors. Finally one small cache pit is found in the southwest portion of Block A on IIa. Floor IIb likewise contains hearths in Blocks A-C. Block D contains evidence for intensive activities that include a concentration of charcoal that is likely a dump, perhaps from a hearth feature. Thus, the lack of a hearth in this area is likely more the result of sampling than actual lack of such a feature. There is a cache pit on the west side of Block A and the large grinding stone is present in Block B. Floor IIc includes hearths in Blocks B, C, and D. Hearths in Blocks B and C are quite small in contrast to two spatially extensive shallow hearths in Block D. Block D also includes a deep cache pit. The same grinding slab is found in Block B. It is not clear that a hearth-centered activity area existed in Block A during this period. Floor IId contains hearths in Blocks A, C, and D. Block C has two hearths including a meter long hearth with intact burned timbers running parallel to the long axis of the feature. Block D includes two cache pits, one shallow and the other quite deep. The grinding slab recognized in upper floors of Block B rests on the surface of IId. It is not evident that a hearth centered activity area ever existed in Block B and if so it may have been a specialized activity area during this period. Floor IIe is complex with multiple hearths in every block and cache pits in Blocks B and D. Block A includes two small distinct hearth-like features that would have had very limited use. Block B includes five cache pits, at least four of which are quite large. Two hearths are found in the northeast portion of Block B, one capping a cache pit and other placed adjacent to the east. Block C includes two relatively large hearths spatially adjacent to one another. Block D includes two deep cache pits and five hearths. Two hearths cap the cache pits, one is located within the strata of a cache pit, and the other two are spatially adjacent to the cache pits. One of the latter two is a large oven-like hearth, located on the west of the excavation block and thus, towards the center of the house.

Overall, floors IIe-IIa reflect a common pattern; that of hearth centered activity areas consistently placed on the perimeter of the house floors. This pattern is most similar to expectations for a collectivist social strategy and given open space in the centers of floors, could also reflect a roof ladder entrance. This does not eliminate the possibility of a side entrance for some floors, though no evidence for such an entrance has been found. The position of the oven-like hearth on IIe in Block D is also reminiscent of centrally placed feasting hearths in Northwest Coast houses (Samuels 2006). There also appears to be a major shift in the use and placement of cache pits between IIe and all later floors. Floor IIe includes seven cache pits while all later floors have two or less. Placement also shifts from dense arrangements in Block B and southern Block D to northeast perimeter of Block D or southwest perimeter of Block A. Given the presence of the large centrally spaced hearth, it is possible that some of the IIe cache pits could have been associated with production and storage of goods to be used in social events (e.g. feasting). We need to examine positions of cache pits in the deeper floors to more fully assess questions of cooperation and public/private goods.

Floors IIf-IIl are only found in Blocks A and C and are bounded on the east by substrate sediments evident under IIe in Blocks B and D. Rim (Stratum III) sediments are consistently present across the northwest corner of Block C implying that this is a portion of the north wall of the house. Rim sediments we also found in the west end the IIa-IIh floors in the 2008 trench through what is now Block C. Given the straight east wall (east side of Blocks A and C), the angled north wall (rim in NW Block C), and the rim evident in the test trench in Block C, I suggest that it is likely that the house was somewhat rectangular in shape. It seems reasonable to postulate that the entrance would not likely have been placed immediately adjacent to food storage space at the south end of the house (Block A area). This leaves us with the north, west, and east sides. Some floors (IIh and lower) have empty space on the north end implicating the possibility of an entrance in that area. However, other floors (IIf and IIg) have dense clusters of small post-holes and hearths, thus reducing the likelihood of an entrance in that context. Teit's (1900, 1906) ethnographies do not describe the use of rectangular house structures in the St'át'imc area. Such structures were common on the coast and are known from the Columbia Plateau during the period of 1000-1500 years ago (e.g. Galm and Masten 1985). Inferences regarding communalist versus collectivist social strategies could depend on the similar logic as per the larger oval house (floors II, IIa-IIe). Thus a communalist strategy could be marked by a single central hearth and a single spatially constrained location for food storage. A collectivist strategy could be indicated by multiple redundant hearth-centered activity areas, each with their own storage facilities thus reflecting the work-space of semi-autonomous families.

Floor IIf includes three hearths, the largest of these positioned in the northeast of Block C and north-central Block A. A large cache pit is located in the southwest corner of Block A. Another cache pit is found in the southwest corner of Block C though size is not fully known. However, it is associated with a small hearth. The north side of Block C also contains a dense array of small post-holes implying the possibility of a raised wooden bench in this location. This raises the possibility of three domestic activity areas, two with hearth/cache pit associations and one with a bench. Examining the overall organization of space, the most logical place for an entrance is the east side, though excavation is insufficient to confirm this conclusion. Floor IIg includes three clusters of hearths, two in Block C and one in Block A. Similar to IIf, IIg also includes a similar array of small post holes across the north end of Block C, again implying a raised wooden bench. Also similar to IIf, IIg includes a very large cache pit at the south end of Block A. Again the best entrance option given current data is on the east side. IIg also includes a cylindrical pit filled with groundstone tool tools and tool fragments along with other rocks. It could represent a collared post-hole later filled with stone materials and broken tools. The hearths in Block A are very small and it is possible that this area was not commonly used for cooking during the IIg occupation. If that is the case then Block A might have been a household activity area with a common storage facility. Floor IIh (levels 1/2) includes ten hearths distributed throughout a large proportion of both Blocks. In contrast with IIg and IIf however, there is no major hearth and posthole association on the north side of Block C, thus raising the possibility of a north entrance. Similar to IIf and IIg there is a large cache pit in Block A. There is also a ring of preformed cooking stones in the approximate center of Block C. All in all there appear to be two major domestic activity areas, each characterized by a cluster of hearths and associated materials. Level 3 of IIh does not appear to have had a residential function, but rather a focus on large scale cooking in earth ovens. Floor IIi contains two clusters of hearths, the southernmost also associated with two overlapping cache pits, now located in the northeast corner of Block A. It is impossible to evaluate spatial patterns in the southwest of Block C as post of that area was removed by excavators of the Feature C3 roasting pit from IIh Level 3. Best position for an entrance to IIi appears to be the northeast of Block C given sparse materials and lack of features. Floor IIj has three hearth-centered activity areas and a single cache pit located in the northeast of Block A. The best option for an entrance remains on the northeast side of Block C. Floor IIk has six hearths organized in two hearth-centered activity areas. It also includes a large cache pit in the approximate center of Block C. Nearly empty space in the northeast of Block C again implies a north side entrance, though given the shift in cache pit position the entrance could also have shifted to the south end of the house. Floor IIl contains only a single hearth and cache pit associated activity area, located in Block A. In this case two hearths are located alongside a single cache pit in the northwest portion of Block A. It is possible that a second activity area was located in Block C. However, limited excavation and impacts from later features may have prevented our team from recognizing that pattern. Still, a northeast Block A entrance location still appears to be the best option given very sparse materials in this area.

Despite some variation, the IIf-IIl floors display a relatively stable pattern. Each contains two to three hearth-centered activity areas. At least one of those on each floor includes a cache pit. Generally cache pits on located in the southerly portion of the house, though one is found on the north end in floor IIk. Evidence for raised wooden benches at the north end of the house is present on floors IIF and IIg. From the standpoint of activity area positions it would appear that house entrances could have shifted from north/northeast end (IIl-IIh) possibly to east side (IIf and IIg). Paired hearth-centered activity areas could imply the presence of two to three family groups per occupation. While the latter could reflect a collectivist house strategy the cache pit pattern suggests the pattern is not easily interpreted. It is possible that the pattern of one single cache pit per floor could reflect house-wide sharing of certain stored goods. This could also imply that the house space was subdivided not entirely by domestic units but also by special activity areas. A counter hypothesis would be that storage pits were simply controlled by the highest ranked family in the house. The latter seems unlikely given the smaller size of the house and predominantly BR 2 dates. However, these hypotheses will require further testing with analysis of artifacts and food remains.

The three deepest floors (IIm-IIo) are from what are likely smaller houses though excavation of each floor not complete. Nonetheless it is still possible to examine feature distributions to evaluate questions regarding domestic space, specialized activity areas, and spatial contingencies. Floor IIm contains two hearths and three cache pits. Given overlap between the two hearths, it suggests the shifting of work space within a single domestic activity area. No IIm house margin is visible in Block A though the north and east walls of the excavation block likely clearly those floor boundaries. Floor IIn contains three hearths and one cache pit. Given spatial positions, it would appear that two hearth-centered activity areas could be present. The east edge of the floor is recognizable and takes a curvilinear form, but lacks any rim or other sediment accumulation. The margin of the IIn floor suggests that it may have been a small oval-shaped pithouse when originally occupied. Floor IIo represents the smallest floor remnant and possibly the smallest house in the HP 54 floor sequence. The west half of Block A contains the IIo floor angling slightly southwest to northeast. Within IIo, there is a single hearth-associated activity area but no cache pits. The eastern margin of the floor appears to take a curvilinear form similar to IIn, suggestive of a small oval house form.

The IIo-IIf floors were dug into approximately 75 cm of substrate sediments at least on the east side. These data suggest that an initial small oval-shaped housepit (IIo) was established and subsequently expanded. IIn was likely similar though slightly larger than the IIo house. IIm was slightly larger again. The establishment of the IIl house required substantial expansion of the IIm house in a northern direction creating the first north-south trending rectangular house. Subsequent floors filled in the original depression through IIf. The north and likely west sides of the IIo-IIf house depression were probably excavated into rim sediments associated early BR 2 period (1576+/-36 uncal. B.P.) Housepit 32, a very large though comparatively short-lived housepit with a substantial rim deposit that appears to pre-date the IIo-IIm sequence in HP 54. The later floors (IIe-IIa1) were established by eastward expansion that likely involved some substrate excavation but also possibly cutting into rim deposits from other surrounding older houses including Housepits 55 (1368+/-35 uncal. B.P.) and 35 (1535+/-36 uncal. B.P.). The process of periodic re-roofing on HP 54 would have added to sediments to the rims of HP 54 during its long use-life.

Conclusions

The 2016 excavation of HP 54 provided insight into the entire history of this house. Although the actual shape of the earliest floors is somewhat difficult to discern, it would appear that the first version (IIo) of HP 54 was a small oval house excavated into substrate and rim material from an adjacent older house at approximately 1500 cal. B.P. Slight expansions followed as the IIn and IIm floors were established and occupied. Occupying groups on these earliest floors probably consisted of no more than a single extended family. The house was expanded northward to create the first rectangular house form and its associated floor IIl. Dating of the latter event is statistically the same as the founding of the IIo floor implying a time of perhaps no more than 20-30 years for the establishment of the IIo-IIl sequence. Floor IIl may have been occupied by two families, though this remains somewhat unclear. By the establishment of the IIk floor, HP 54 was clearly occupied by at least two family groups at a time and possibly sometimes three. This pattern persisted across the seven floors associated with this house form with one interruption. It is evident that briefly during the early IIh period, the house was converted to a major cooking facility. Social life during the IIl-IIf period was clearly organized in a somewhat collectivist strategy. However, this is made complex by the consistent presence of single large cache pits on each floor raising the possibility of communal storage and food sharing between families. However, alternative hypotheses have been raised and will require further testing. Another pattern recognized during the IIo-IIf periods was the likelihood of relatively steady population growth. The population proxy, based on FCR density, indicates that the rectangular house may have been very crowded by IIf times. The house again doubled in size at ca. 1250 cal. B.P. establishing the IIe floor in a house expanded to its final size. The population proxy indicates that the HP 54 peaked in population during this time. However, given the number and positioning of hearths and cache pits, it is likely that excess FCR is partially explained by development of food –related social events. After IIe cache pits become rarer and the population proxy suggests a rapid decline in numbers of people with lows on the IId and IIc floors. Numbers of occupants may have increased somewhat on the IIb and IIa floors. However, IIa occupants ceased using the Block D area for anything other than refuse disposal as indicated by rim-like deposits (III) filling the space that would otherwise have become IIa. Feature distributions suggest that the occupants of the IIe-IIa floors were organized in a collectivist strategy. The house was abandoned for a time after IIa as marked by the substantial Va burned roof deposit covering all of IIa and III (in Block D). A brief reoccupation (IIa1) appears to have occurred by ca. 1000 cal. B.P. after that the house went out of use until the mid-19th century C.E. when Xwísten ancestors once again returned to HP 54. These occupants removed most of the IIa1 floor to establish their own floor, which was then occupied until the Gold Rush period (Prentiss 2017).

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Chapter Three

Lithic Tools and Debitage

(Anna Marie Prentiss and Thomas A Foor)

Introduction

This chapter describes the 14,573 lithic artifacts (12,873 flakes and 1700 tools and cores) recovered and analyzed to date from the excavated floors of Housepit 54 during the 2013 to 2016 field seasons at the Bridge River Site, British Columbia. The chapter includes a series of analyses designed to explore a number of research questions emphasizing occupational history, technological behavior, and social relationships.

Laboratory Procedures for Debitage and Tool Analysis

The following discussion is excerpted from Prentiss and Foor (2015). Debitage were sorted by raw material, thermal alteration, size, technological type, cortex, and when feasible, fracture initiation (Appendix B). Thermal alteration was marked as present or absent, and defined by a suite of characteristics. Lithic artifacts that had flake scars with a smooth or soapy texture when compared to older surfaces with a grainier or duller texture were likely heat-treated (Whittaker 1994:73). Another defining characteristic for heat-treated lithics was color. Lithics that had a greasy luster, crazing, and or a pink to reddish color were likely to have been heat-treated. Debitage and tools were sorted by size into five categories, extra small (<.64 sq cm), small (.64 to 4 sq cm), medium (4 to 16 sq cm), large (16 to 64 sq cm), and extra-large (>64 sq cm) (Prentiss 1998, 2001:148). Completeness-related types were defined and sorted using a modified Sullivan and Rozen typology (MSRT) (Prentiss 1998; Sullivan and Rozen 1985).

The MSRT typology initially sorted debitage by size, then the presence or absence of a single interior surface (ventral face). Debitage that did not have a single interior surface or ventral face was defined as non-orientable. The next step was to determine whether or not the debitage had a point of applied force (platform). If there was no point of applied force (platform), the debitage was defined as a Medial/Distal Fragment. Subsequently, the debitage was analyzed to determine if it had a sheared axis of flaking (split longitudinally). If the sheared axis of flaking (split longitudinally) was present the flake was defined as a Split Flake. Then, the margins of the flake were examined to determine whether or not they were intact. If the margins were not intact the flake was defined as a Proximal Fragment, if the margins were intact the flake was defined as a Complete Flake. Lastly any debitage that was sorted as a Complete Flake, Proximal Flake, or Split Flake, was analyzed to determine its fracture initiation. The fracture initiations were divided up into 3 categories, Cone, Bend, and Wedge. Cone initiations are typically associated with hard hammer percussion, while Bend initiations are typically associated with soft hammer percussion. Wedge initiations typically result from bipolar lithic reduction. Debitage cortex was measured on the dorsal face of the flake on a scale as follows: Primary (75-100% cortex cover), Secondary (1-74% cortex cover), Tertiary (0% cortex cover). Flakes with platforms and fracture initiations (Complete, Proximal, and Split) were also sorted into technological types include early stage reduction, thinning, R-billet, tool retouch, core retouch/preparation, notching, core rejuvenation, and bipolar reduction (Andrefsky 2005; Hayden and Hutchings 1989).

Tools recovered were sorted using a wide range of characteristics (Appendix B). Size on tools, was determined using metric calipers. All tools were drawn showing multiple faces and margins. Macroscopic as well as microscopic techniques were employed to determine use-wear on tools. Macroscopic techniques utilized the naked eye as well as hand lenses 4x, 8x, and 12x. Microscopic techniques utilized Motic SMZ-168-BP; .75x – 50x zoom microscopes. Use-wear analysis defined such things as polish, rounding, striations, crushing, etc. Measurements were taken on tools to determine edge angle. Edge angle measurements were determined using Wards Contact Goniometer. When tools had more than one distinctive retouched or used edge, the tool was termed as an employable unit or EU (Knudson 1983). Edge retouch characteristics were recorded including retouch face (normal, inverse, bifacial), retouch invasiveness (abrupt, semi-abrupt, invasive), and retouch form (scalar, step, hinge). Finally, all tools were identified by type (Appendix B). The typological classification provides a quick reference for tool morpho-functional types and is not intended to replace more focused attribute based approaches to analysis.

Lithic Tool and Debitage Data

This section introduces key definitions regarding tools classes and raw material type (in part excerpted from Prentiss and Foor 2015). It also provides basic data used in the subsequent analyses.

Tools were defined under the following definitions. Flake knives are flakes featuring either unifacial or bifacial retouch at low edge angle, typically coinciding with use-wear characteristic of cutting motions (e.g. striations that are parallel to oblique to the working edge). Stage bifaces are those classified within Callahan's (1979) system as Stage 2-4 but also include stage bifaces later modified as other tools including tang knives, knife-like bifaces, and scraper-like bifaces. Projectile points represent late stage bifaces (stage 4 thinning) with hafting modification and distal ends suitable for piercing (unless snapped). Projectile points from Housepit 54 are typically small side-notched "Kamloops" points with straight or concave bases or small corner-notched "Plateau" style point with flat or concave bases. Occasionally there are also diminutive stemmed points ("Kamloops Stemmed"), and larger stemmed styles with concave bases and/or "ears" as is typical of Shuswap horizon technology (Rousseau 2004). Crude points are flakes chipped typically by percussion into the approximate shape of a projectile point, thus resembling work by novice knappers. Flake scrapers represent a variety of forms including single (one margin on dorsal face), inverse (single scraper with retouch on ventral surface), double (two margins), convergent (two margins connected), and scraper on a truncation (retouched truncated flake). All are typified by semi-abrupt to abrupt unifacial retouch and often include use-wear typical of scraping motions (e.g. perpendicular striations and rounding). End scrapers are retouched flakes typified by a loosely triangular shape, unifacial or bifacial retouch on lateral margins and abrupt unifacial retouch on the distal margin associated with use-wear typical for scrapers (e.g. Hayden 1979). Slate scrapers represent slate flakes with use-wear typical of scrapers (as above) and may also include lateral chipping or sawing and facial grinding and polishing (Prentiss et al. 2015). Forms are extremely variable ranging from triangles to rectangles. Some have clear hafting modification and others do not. Slate knives are relatively rare and are much like that of slate scrapers though use-wear is typically of cutting motions. Drills/perforator/burin is a broad class that includes formal drills and perforators (unifacial and bifacial) along with burins. Burins are rare and are typically very small and created on flakes by striking off a longitudinal margin from a platform typically on a truncation. Piercers are a distinctive Mid-Fraser tool form consisting of a small snapped flake with one lateral margin unifacially retouched such that a sharp retouched edge converges with the lateral edge of the truncation. This creates a robust point used for piercing or drilling small holes (e.g. in leather) as is indicated by crushing, rounding, and occasionally rotary-wear. A pieces esquillee is a flake used as a wedge tool typified by bipolar damage but lacking trans-facial flaking as is typical of bipolar cores (Hayden 1980). Notches are flakes with a deep abrupt removal (or removals) designed to create a tool typically used for planing wooden cylinders as might be useful for preparing an arrow shaft, knife handle, or other similar items. Denticulates are flakes with two or more notches. Adzes at Housepit 54 are highly variable within a basic design. All are rectangular in shape with one end characterized by a low edge angle and varying degrees of battering and the opposite end thick and less damaged. Typically, they are made from slate and can include margins that are sawed, chipped or combinations of the two. Groundstone slabs are unique to Bridge River (compared to other Mid-Fraser sites) and are particularly common at Housepit 54. These are much like the metates described elsewhere in western North America and Mesoamerica and are typically made on sandstone or conglomerate. Margins are generally shaped by pecking and faces can be flat but are more typically concave with striations and abrasions typical for metate use. They typically appear fragmentary form in Housepit 54 sediments. Abraders range from simply slabs of rock with abrasion marks (e.g. facial abrasion and striations) to more carefully prepared tools with facial abrasion and lateral sawing or chipping. Included within this tool class are burnishing stones or stone used to polish other stones as indicated by highly polished faces. Freehand cores are residual nodules derived from a process of reduction to generate flakes. These cores are typically small and "exhausted" from extensive prior reduction activities. They may feature a single platform or multiple platforms. Bipolar cores are nodules reduced used the "hammer and anvil" approach such that fracture initiations are wedge- as opposed to cone-initiated as is typical of freehand cores. Beads are a self-evident class; beads are generally made of steatite and derived from a process whereby small pebbles are sawed into approximate form, drilled, and ground to create the final "circular" form. Slate rejects are slabs of slate with chipping, sawing, and/or grinding by no other evidence for actual use. They are generally interpreted as byproducts from manufacture of other items or tools discarded or lost before actual use. Pipes are another self-evident tool class. The BR 2 and 3 floors at HP 54 occasionally include small pipe fragments. These are generally steatite tubular items occasionally with geometric markings on their outer surfaces. Hammerstones are pebbles or cobbles with battering on one or more margins. Used flakes are flakes with use-wear but lacking other forms of retouch. Stone vessels are small groundstone shards typically on metamorphosed stone. The actual form of these items has yet to be identified. Sandstone saws are recognized widely in the Mid-Fraser area and consist of slabs of rock with one lateral margin used for sawing/cutting as indicated by extensive rounding and parallel striations. Sandstone saws are thought to have been used for cutting stone ranging from nephrite jade to slate. Ornaments and sculptures are zoomorphic, anthropomorphic, or geometric forms on pieces of rock. They can be three dimensional as small sculptures (typically in pendant form) or they can be two-dimensional representations of rock surfaces. Mauls are hand-held cylindrical hammers, typically with a wide base as might be useful for crushing certain food items. Mauls in Housepit 54 typically appear as small fragments of originally larger tools. A mano is a hand-held grinding stone in the form of a cobble with pecked lateral margin and smooth abraded face (or faces). They are typically used in conjunction with groundstone slabs for processing food. Polished objects are small nodules with distinct polished surfaces but otherwise too small or fragmentary to classify further as ornaments, burnishing stones, or other items.

Lithic raw materials are diverse at the Bridge River site and include a range of sedimentary, igneous, and metamorphic rocks. Cherts include a range of opaque micro- and cryptocrystalline silicates that could derive from multiple sources (see Rousseau 2000). Chalcedony is a broad class with a variety of translucent silicates including previously recognized yellow chalcedony (Rousseau 2000). Jasper includes fine grained colorful cherts grading from red to butterscotch. These are best known from the Hat Creek Valley (Rousseau 2000). Green chert is a distinctive toolstone found in lag deposits around the confluence of the Bridge and Yalakom Rivers several kilometers northwest of the Bridge River site. Pisolite is a distinctive chert (Bakewell 2000) that is found in a bedrock source and in secondary contexts at the north end of Fountain Ridge several kilometers east of the Bridge River site (Rousseau 2000). Locally occurring sandstones and conglomerates are common as raw material for groundstone tools. Igneous intrusives include grades of granites and diorite both found locally in secondary source deposits. Igneous extrusives, dacite, coarse dacite, basalt, and andesite are combined the most common source materials and can be found in lag deposits in some Mid-Fraser river valleys. They are also known from several bedrock sources east of the Fraser Canyon (Rousseau 2000). Obsidian is non-local and has not yet been sourced at the Bridge River site. Metamorphic rocks were very important to Bridge River site inhabitants. Slate occurs in bedrock contexts in the Bridge River valley and is not well known to have been used outside of this context. A range of additional metamorphic rocks are found in and around the Bridge River valley including nephrite, serpentine, steatite, copper, various metamorphosed igneous intrusives (e.g. gneiss and schist), quartzite, and marble. The latter is best known from the Pavilion Valley east of the main trunk of the Fraser Canyon.

Table 3.1 provides tool counts for floor strata organized by excavation block. Table 3.2 is a cross-tabulation of major artifact classes and general raw material classes. Slate scrapers are identified as an individual class given their importance and uniqueness at this site (Prentiss et al. 2015). Table 3.3 provides data for a variety of source materials that can be used to assess questions regarding access to non-local and prestige raw materials. Tables 3.4-3.6 provide debitage data focused on flake types, dorsal cortex cover, and flake size.

Table 3.1. Lithic tool data from Housepit 54 floors organized by Block (A-D).

Floor	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
AIIa	-	5	3	2	4	-	-	2	-	-	-	1	4	2	-	-	1
AIIb	-	1	2	-	1	-	1	-	-	1	-	-	2	3	2	2	-
AIIc	2	2	4	4	3	2	1	2	-	-	1	-	5	-	-	1	-
AIId	1	1	1	3	-	1	-	1	-	-	-	-	3	2	-	-	-
AIIe	-	-	5	1	3	-	2	-	-	-	1	-	7	-	-	-	-
AIIf	3	4	3	8	7	1	3	4	2	1	3	-	11	1	-	12	5
AIIg	5	1	2	6	9	4	1	3	-	2	3	1	7	6	-	11	1
AIIh	2	3	4	3	11	-	1	3	1	1	12	5	15	8	1	14	2
AIIi	-	1	-	1	1	-	1	-	-	-	4	1	-	1	1	2	2
AIIj	-	-	-	-	1	-	-	-	-	-	12	1	-	-	2	2	1
AIIk	-	-	-	-	-	-	-	-	-	-	5	-	1	-	5	6	-
AIIL	3	1	1	4	4	2	-	-	1	-	6	5	4	-	4	5	5
AIIm	4	-	2	16	12	1	-	-	1	1	24	2	5	1	1	11	-
AIIn	1	1	1	-	2	-	-	-	-	-	2	-	-	1	1	2	-
AIIo	-	-	-	-	1	1	-	1	-	-	2	-	1	1	1	3	-
BIIa	3	-	1	6	3	1	2	1	2	1	9	1	9	-	-	6	2
BIIb	-	1	2	1	4	1	-	-	-	-	1	-	4	1	-	-	-
BIIc	2	3	2	4	1	2	2	2	-	-	1	-	5	1	-	4	1
BIId	4	-	1	3	3	-	-	2	-	-	2	-	2	1	-	2	1
BIIe	1	3	3	5	8	1	1	1	-	-	1	1	5	1	-	9	4
CIIa	-	-	3	1	2	-	-	-	1	-	-	-	5	2	-	3	-
CIIb	2	-	2	1	-	1	-	1	-	-	2	1	5	1	-	1	-
CIIc	-	-	4	2	4	-	1	1	-	-	2	-	2	6	2	1	-
CIId	3	-	7	6	7	2	-	4	1	1	4	1	14	2	-	3	2
CIIe	3	4	7	2	9	4	2	3	2	-	3	1	7	1	1	9	5
CIIf	6	3	4	3	10	3	3	1	1	1	4	2	5	1	1	10	5
CIIg	3	3	4	1	3	2	-	2	1	-	42	4	6	6	4	4	4
CIIh	5	1	4	4	8	2	-	1	3	6	70	2	6	2	5	15	5
CIIi	2	-	-	1	3	-	-	-	-	-	3	-	-	1	1	2	-
CIIj	3	1	1	-	1	1	-	-	-	1	9	1	1	1	2	2	-
CIIk	5	1	1	7	7	-	-	1	1	-	15	1	3	1	2	11	4
CIIL	2	3	1	1	12	3	-	1	1	-	3	1	2	-	-	14	2
DIIb	8	3	8	5	10	3	1	5	-	1	1	1	8	1	-	12	8
DIIc	7	3	10	7	11	3	1	6	-	2	1	4	7	2	-	14	3
DIId	7	5	10	8	12	2	2	3	4	1	4	-	19	-	1	21	5
DIIe	8	5	3	8	6	2	3	2	4	-	7	-	13	-	2	18	2

Column headings: A=Flake and slate knives; B=Formal bifaces; C=Projectile Points; D=Flake and key-shape scrapers; E=hide scrapers (slate, end, stemmed, and spall scrapers); F=drills, perforators and borers; G=small piercers; H=pieces esquillee tools; I=notches and denticulates; J=adzes (all forms including chipped, ground, and sawed); K=abraders (all sizes and forms); L=freehand cores; M=bipolar cores;

N=modified slate (chipped, ground, and/or sawed but lacking use-wear); O=hammerstones; P=used flakes; Q=ritual and ornamental objects (ornaments and ornament preforms and byproducts, figurines, slate with incised images). Rows: capital letters=blocks; IIa-IIo=floor designation.

Table 3.2. Summary of lithic tool classes by broad raw material classes. Flake tools are minimally retouched and used flakes (flake scrapers, knives, piercers, notches, denticulates, pieces esquillee). Bifaces include all formally manufactured bifacial tools and projectile points. Portable long-use tools follow the definition of Hayden et al. (1996) and consist of formally retouched drills, perforators, end scrapers, stemmed scrapers, and key-shaped scrapers. Freehand refers to freehand percussion cores. Bipolar refers to bipolar (or hammer and anvil) cores. Slate scrapers are chipped and sometimes sawed and ground scrapers on slate material. Coarse grain material includes all igneous intrusive, extrusive (with the exception of dacite and obsidian), and metamorphic (with the exception of slate) rock. Cherts include all cherts and chalcedonies.

	Coarse Grain	Cherts	Dacite	Slate
IIa				
Flake Tools	4	3	20	
Bifaces	0	0	9	
Portable long-use		0	0	4
Freehand	1	0	1	
Bipolar	1	3	15	
Slate Scrapers				7
IIb				
Flake Tools	3	2	28	
Bifaces	0	0	17	
Portable long-use		0	0	6
Freehand	1	0	0	
Bipolar	0	2	17	
Slate Scrapers				13
IIc				
Flake Tools	4	4	61	
Bifaces	1	0	25	
Portable long-use		0	1	10
Freehand	2	1	0	
Bipolar	0	0	19	
Slate Scrapers				18
IId				
Flake Tools	8	8	70	
Bifaces	1	2	20	
Portable long-use		0	3	5
Freehand	1	0	1	
Bipolar	0	0	35	
Slate Scrapers				12
IIe				
Flake Tools	5	10	65	

Bifaces	2	1	20	
Portable long-use		0	0	8
Freehand	0	0	2	
Bipolar	3	2	24	
Slate Scrapers				18
IIf				
Flake Tools	1	4	48	
Bifaces	1	2	9	
Portable long-use		0	1	5
Freehand	1	0	0	
Bipolar	1	0	14	
Slate Scrapers				10
IIg				
Flake Tools	2	3	27	
Bifaces	1	0	8	
Portable long-use		0	0	3
Freehand	4	1	0	
Bipolar	3	0	10	
Slate Scrapers				8
IIh				
Flake Tools	2	2	37	
Bifaces	1	1	10	
Portable long-use		0	0	2
Freehand	5	1	0	
Bipolar	3	1	15	
Slate Scrapers				15
IIi				
Flake Tools	0	0	10	
Bifaces	0	0	1	
Portable long-use		0	0	1
Freehand	0	0	0	
Bipolar	0	0	0	
Slate Scrapers				1
IIj				
Flake Tools	1	1	4	
Bifaces	0	0	1	
Portable long-use		0	0	1
Freehand	2	1	0	
Bipolar	0	0	1	
Slate Scrapers				1
IIk				
Flake Tools	1	1	4	
Bifaces	0	0	1	
Portable long-use		0	0	1
Freehand	2	1	0	
Bipolar	0	0	1	

Slate Scrapers				5
IIL				
Flake Tools	2	8	15	
Bifaces	0	2	4	
Portable long-use		1	0	3
Freehand	4	0	1	
Bipolar	0	3	3	
Slate Scrapers				9
IIm				
Flake Tools	3	6	21	
Bifaces	0	0	2	
Portable long-use		0	0	0
Freehand	6	0	0	
Bipolar	0	3	2	
Slate Scrapers				6
IIn				
Flake Tools	0	0	4	
Bifaces	0	0	1	
Portable long-use		0	0	0
Freehand	0	0	0	
Bipolar	0	0	0	
Slate Scrapers				2
IIo				
Flake Tools	0	0	4	
Bifaces	0	0	0	
Portable long-use		0	0	1
Freehand	0	0	0	
Bipolar	0	0	1	
Slate Scrapers				0

Table 3.3. Tools plus debitage select specific source counts for floors and blocks

	Chal	Cop	Jasp	Neph	Obsid	Piso	Slate	Stea
A								
IIa	0	0	4	0	0	1	8	0
b	0	0	0	0	0	2	30	0
c	8	0	3	0	2	2	48	0
d	2	0	2	0	0	1	26	0
e	1	1	0	0	0	1	27	0
f	10	0	5	0	0	3	49	1
g	6	0	7	0	0	6	72	0
h	7	0	3	0	1	5	67	0
i	2	0	0	0	0	5	11	0
j	2	0	2	0	0	3	6	0
k	1	0	0	0	0	0	7	0
l	8	0	1	0	0	6	28	0
m	22	0	3	0	2	5	49	0
n	5	0	0	0	0	1	14	0
o	5	0	0	0	0	2	12	0
B								
IIa	3	0	4	0	4	1	20	0
b	1	0	1	0	0	0	15	0
c	3	0	1	0	3	1	18	0
d	1	0	0	0	3	2	44	0
e	12	0	8	0	1	5	66	3
C								
IIa	10	0	1	0	2	2	28	0
b	7	0	7	0	1	8	38	0
c	9	0	2	0	5	5	47	0
d	11	0	0	0	1	3	55	0
e	10	0	3	0	2	4	93	0
f	7	0	5	0	3	6	79	1
g	6	0	2	0	1	2	28	1
h	18	0	6	0	1	4	114	2
i	4	0	1	0	0	2	12	0
j	6	0	2	0	0	1	36	0
k	17	0	6	0	1	6	114	1
l	6	0	0	0	0	4	26	0
D								
b	11	0	7	0	11	4	126	0
c	15	0	8	2	4	7	171	0
d	26	0	20	0	4	5	174	0
e	19	0	8	0	5	9	144	0

Chal=Chalcedony; Cop=Copper; Jasp=Jasper; Neph=nephrite; Obsid=Obsidian; Piso=Pisolite; Slate=Slate; Stea=Steatite

Table 3.4. Debitage Raw Materials by major flake type.

	Ext	Chal	Chert	Dacite	Obs	Intr	Slates	Metamorph.
IIa								
Biface	4	1	0	40	4	0	0	0
Core	4	1	4	22	0	0	2	0
Retouch	6	4	9	118	2	0	0	1
IIb								
Biface	0	2	0	47	0	0	0	0
Core	5	0	0	16	0	0	4	1
Retouch	19	8	6	214	4	0	12	5
IIc								
Biface	3	2	1	51	1	0	1	0
Core	6	0	1	28	0	1	3	3
Retouch	15	12	16	268	3	1	16	6
IId								
Biface	2	0	2	67	0	0	2	0
Core	0	1	0	24	0	1	3	1
Retouch	21	12	17	342	4	1	15	8
IIe								
Biface	1	2	2	59	0	1	0	0
Core	7	2	1	29	0	4	5	2
Retouch	11	5	13	241	1	1	20	9
IIf								
Biface	2	0	0	12	0	0	0	0
Core	1	1	1	6	0	1	0	0
Retouch	4	0	3	57	0	1	3	0
IIg								
Biface	0	0	0	13	0	0	1	0
Core	1	0	2	5	0	0	0	1
Retouch	2	3	4	70	0	0	13	0
IIh								
Biface	2	1	0	26	0	0	0	0
Core	3	0	0	10	0	2	1	0
Retouch	4	6	4	87	0	0	23	4
IIi								
Biface	0	0	0	6	0	0	0	0
Core	1	0	0	1	0	0	2	0
Retouch	0	0	2	31	0	1	1	2
IIj								
Biface	0	0	0	1	0	0	0	0
Core	0	0	1	0	0	0	2	0
Retouch	1	0	3	29	0	0	4	0
IIk								
Biface	0	0	0	3	0	1	0	0
Core	0	1	1	5	0	1	1	4

Retouch	6	4	11	117	0	0	5	1
IIL								
Biface	0	0	1	4	0	0	0	0
Core	0	0	1	4	0	2	2	0
Retouch	5	5	56	56	0	0	4	1
IIm								
Biface	0	0	0	4	0	0	0	0
Core	0	0	1	4	0	1	1	0
Retouch	2	3	40	49	1	1	2	2
IIn								
Biface	0	0	0	1	0	0	1	0
Core	0	0	0	1	0	0	0	0
Retouch	0	2	11	5	0	0	2	0
IIo								
Biface	0	0	0	1	0	0	0	0
Core	0	0	0	2	0	0	0	0
Retouch	1	2	10	7	0	0	0	0

Ext=Extrusives (excluding dacite and obsidian); Chal=Chalcedony; Obs=Obsidian; Intr=Intrusives plus gneiss; Slates=Slate and silicified shale; Metamorph=Metamorphic rock inclusive of quartzites, nephrite, and steatite.

Table 3.5. Cortex cover by major raw material class and floor.

	Ext	Chal	Chert	Dacite	Obs	Intr	Slates	Metamorph.
IIa								
Primary	0	0	0	1	0	0	0	0
Secondary	0	0	0	5	0	0	0	0
Tertiary	43	15	25	554	6	0	0	3
IIb								
Primary	0	0	0	1	0	0	1	0
Secondary	1	1	0	16	0	0	6	1
Tertiary	95	23	47	965	12	4	206	13
IIc								
Primary	5	0	0	1	0	1	2	1
Secondary	2	0	6	29	0	0	6	1
Tertiary	121	35	52	1204	9	4	279	24
IId								
Primary	0	0	1	5	0	0	2	0
Secondary	31	3	4	17	0	1	5	2
Tertiary	126	37	86	1729	8	6	294	31
IIe								
Primary	4	0	1	10	0	3	5	1
Secondary	7	5	3	45	0	2	16	0
Tertiary	143	37	94	1566	8	17	311	29
IIf								
Primary	0	0	0	0	0	0	0	0

Secondary	1	0	1	1	0	1	0	0
Tertiary	24	9	13	222	0	1	33	0
IIg								
Primary	1	0	0	2	0	0	1	1
Secondary	0	1	3	18	0	0	14	1
Tertiary	17	11	28	361	1	2	85	8
IIh								
Primary	7	0	0	1	0	2	2	0
Secondary	5	2	5	28	0	3	8	0
Tertiary	30	23	34	649	2	4	175	24
IIi								
Primary	0	0	0	0	0	0	0	0
Secondary	1	0	0	9	0	1	0	0
Tertiary	29	6	19	180	0	0	23	2
IIj								
Primary	2	0	0	0	0	0	1	0
Secondary	0	0	2	1	0	0	1	0
Tertiary	14	8	14	135	0	4	41	3
IIk								
Primary	0	0	0	0	0	0	1	2
Secondary	1	0	0	21	0	2	6	2
Tertiary	15	18	49	438	1	3	114	3
IIL								
Primary	1	0	0	1	0	1	0	0
Secondary	1	0	11	22	0	1	2	0
Tertiary	13	14	167	184	0	0	52	3
IIm								
Primary	0	0	0	0	0	0	0	0
Secondary	0	0	4	13	0	0	1	0
Tertiary	17	22	119	251	2	1	48	7
IIn								
Primary	0	0	0	0	0	0	0	0
Secondary	0	0	1	3	0	0	0	0
Tertiary	1	5	43	20	0	0	13	0
IIo								
Primary	0	0	0	0	0	0	0	0
Secondary	0	0	2	2	0	0	0	0
Tertiary	1	5	67	37	0	0	12	1

Ext=Extrusives (excluding dacite and obsidian); Chal=Chalcedony; Obs=Obsidian; Intr=Intrusives plus gneiss; Slates=Slate and silicified shale; Metamorph=Metamorphic rock inclusive of quartzites, nephrite, and steatite.

Table 3.6 Flake size by major raw material class and floor.

	Ext	Chal	Chert	Dacite	Obs	Intr	Slates	Metamorph.
IIa								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	1	0	0	0	0
Medium	11	0	6	59	2	0	23	0
Small	28	7	12	288	3	0	28	3
XS	13	8	7	212	1	0	4	0
IIb								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	1	0	0	1	0
Medium	9	1	1	59	0	0	29	1
Small	42	8	25	276	2	2	103	6
XS	47	15	30	652	10	2	81	8
IIc								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	0	0	0	0	0
Medium	4	2	2	41	0	0	26	0
Small	22	9	14	262	2	0	81	6
XS	32	17	22	583	5	0	108	4
IId								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	0	0	0	3	0
Medium	10	2	5	79	0	1	37	1
Small	50	14	26	468	1	4	120	15
XS	70	24	60	1207	7	1	131	15
IIe								
XL	0	0	0	0	0	1	0	0
Large	2	1	0	4	0	6	6	1
Medium	12	2	5	94	0	2	66	4
Small	38	7	36	524	3	8	125	11
XS	61	32	58	1000	0	10	133	13
IIf								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	0	0	0	1	0
Medium	7	1	4	22	0	0	9	0
Small	6	5	7	116	0	1	16	0
XS	12	3	3	85	0	0	7	0
IIg								
XL	1	0	0	0	0	0	0	0
Large	0	0	0	0	0	0	10	0
Medium	5	0	7	41	0	0	34	3
Small	10	8	11	192	1	2	43	5
XS	2	4	10	148	0	0	13	2
IIh								

XL	0	0	0	0	0	1	0	0
Large	3	0	0	0	0	1	12	2
Medium	18	4	6	86	0	4	63	4
Small	15	13	25	339	1	1	78	14
XS	6	8	8	253	1	0	32	6
IIi								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	0	0	0	2	0
Medium	2	1	1	17	0	0	4	0
Small	9	3	9	98	0	1	15	0
XS	1	2	9	74	0	0	2	2
IIj								
XL	0	0	0	0	0	0	0	0
Large	0	0	1	0	0	1	4	1
Medium	2	0	2	11	0	0	16	0
Small	11	4	5	66	0	3	15	2
XS	3	4	8	59	0	0	7	0
IIk								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	2	0	0	6	1
Medium	1	2	2	42	0	2	28	4
Small	13	12	17	215	0	2	61	1
XS	2	4	30	200	1	1	26	0
IIL								
XL	0	0	0	0	0	0	0	0
Large	1	0	0	0	0	0	0	0
Medium	4	0	4	20	0	0	9	1
Small	8	4	66	92	0	0	31	1
XS	2	10	108	95	0	0	14	1
IIm								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	0	0	0	0	0
Medium	4	1	9	21	0	1	14	3
Small	8	5	45	103	1	1	22	4
XS	5	16	69	140	1	0	13	2
IIn								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	0	0	0	0	0
Medium	0	0	2	6	0	0	6	0
Small	0	0	12	9	0	0	7	0
XS	1	5	30	8	0	0	1	0
IIo								
XL	0	0	0	0	0	0	0	0
Large	0	0	0	0	0	0	0	0
Medium	0	1	1	10	0	0	2	1
Small	1	0	28	18	0	0	7	1

XS	0	4	40	11	0	0	3	0

Ext=Extrusives (excluding dacite and obsidian); Chal=Chalcedony; Obs=Obsidian; Intr=Intrusives plus gneiss; Slates=Slate and silicified shale; Metamorph=Metamorphic rock inclusive of quartzites, nephrite, and steatite; XL=Extra-large; XS=Extra-Small.

Analyses

This section outlines three areas of analysis. First we examine variation in occupations between floors and activity areas within floors. Second, we explore change over time in patterns of technological behavior. Third, we assess the evidence for material wealth based inequality and cooperation in stone tool related activities.

Variation in Occupations

Before we can address questions associated with technological behavior or sociality within Housepit 54 we must establish whether or not occupations between and within floors were consistent. Mid-Fraser pithouses were primarily winter residents, but could be occupied during the warm season as well (Alexander 2000). Houses were places where key foods and tools were stored and thus during the warm season, we would expect periodic visits minimally to drop-off and pick-up various items. It is also possible that some family members would stay behind if unable to make the long hikes needed to gain access to critical hunting, fishing, and gathering locales. Then, one could also imagine scenarios where perhaps due to some unexpected contingencies are house might not be used during a given winter. Thus, it is possible that the nature of accumulated artifacts on house floors could vary with the nature of specific occupations.

We tested for occupational variation using two approaches drawn from the work of Kuhn and Clark (2015). First, we plotted the ratio of tools to flakes against total artifact density. In short visit situations we would not expect major investment in lithic tool manufacture though we could expect some loss or discard of select tools. Thus, archaeologically we could expect to find high tool to flake ratios but low artifact densities. In contrast, long winter stays would include major investment in lithic reduction along with discard of lithic tools associated with breakage and use-related exhaustion. An archaeological signature would consist of lower tool/flake ratios and high artifact density. An examination of Table 3.7 and Figure 3.1 suggests that tool/flake ratios remain low despite some variation in total artifact density suggesting that while intensity of tool manufacture and discard varied the basic organization of behavior on the floor changed little. We can test this further by plotting coefficients of variation (CV) for most common artifact classes as measured across all floors (Table 3.8, Figure 3.2). The assumption here is that if any artifact class was unevenly represented between floors we would recognize high CV scores and wide confidence intervals. Results however indicate that the CV and confidence intervals are low and consistent between all classes, thus further supporting a conclusion that activities were consistent between floors.

Table 3.7. Tool/flake ratio and total artifact density data.

Floor	N Tools	N Debitage	Total	Excavated Volume (m^3)	Artifact Density	Tool/Flake Ratio
IIa	105	708	813	1.304	623.5	.148
IIb	122	1409	1531	1.238	1236.7	.087
IIc	162	1790	1952	.928	2103.4	.091
IId	195	2378	2573	1.068	2409.2	.082
IIe	211	1424	1635	.831	1967.5	.148
IIf	133	883	1016	.721	1409.2	.151
IIg	150	562	712	.6	1186.7	.267
IIh	224	1004	1228	.923	1330.4	.223
IIi	23	261	284	.573	495.6	.088
IIj	43	229	272	.393	692.1	.188
IIk	77	685	762	1.305	583.9	.112
IIL	88	474	562	.52	1080.8	.186
IIm	81	501	582	.229	2541.5	.162
IIn	11	88	99	.153	647.1	.125
IIo	11	128	139	.153	908.5	.085

Table 3.8. Coefficient of variation (COV) and 95% confidence interval range on highest quantity (N>100) artifact classes from Housepit 54.

	Lower	Higher	COV
Projectile Points	0.29	1.01	0.82
Flake Scrapers	-0.61	0.62	0.12
Hide Scrapers	0.241	0.87	0.72
Abraders	-0.57	0.49	0.11
Bipolar Cores	0.25	0.9	0.74
Used Flakes	0.17	0.65	0.55
Debitage	0.16	1.5	0.53

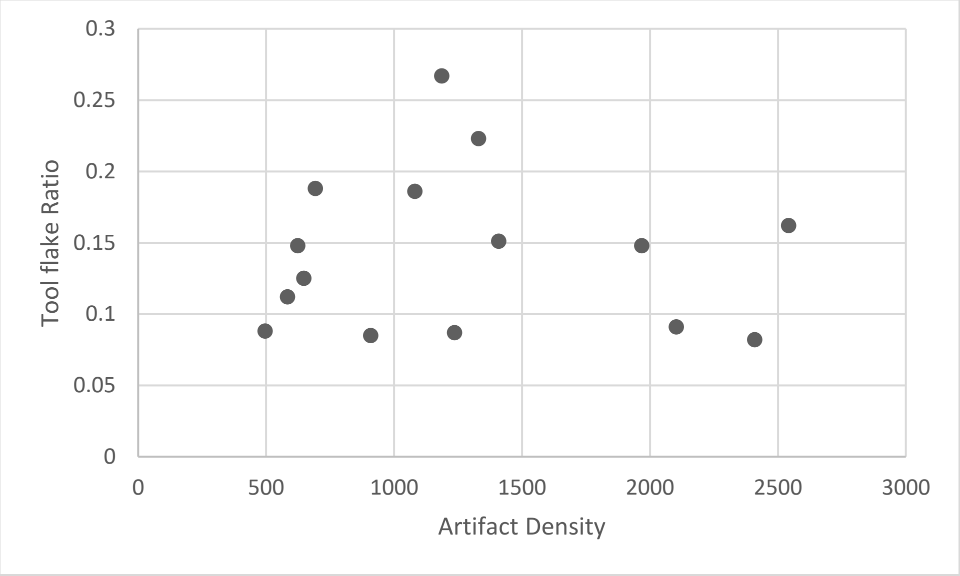

Figure 3.1. Plot of tool/flake ratio by artifact density.

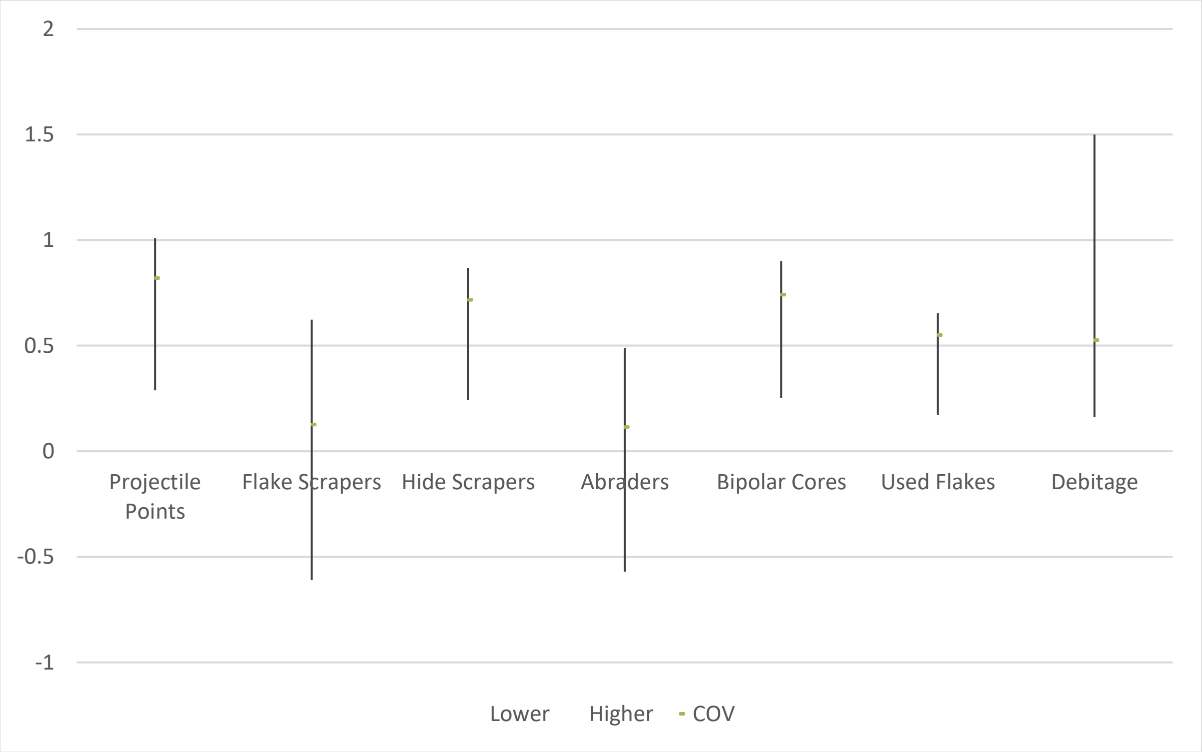

Figure 3.2. Coefficient of variation with 95% confidence intervals for major artifact classes.

A second concern regarding consistency is variability in activity areas within floors. Ethnography and archaeology of the region point to two strategies used to organize house floors (Williams-Larson et al. 2017). A communalist strategy would organize a house floor around specific spaces for particular activities. The Fur Trade floor (Stratum II) at Housepit 54 is a good example of this that included areas designated for cooking, refuse disposal, storage, stone knapping, and sleeping/socializing. In contrast, a collectivist strategy would organize redundant family quarters at regular intervals around the perimeter of the house floor leaving public space in the center. Examples of this include Coast Salish houses (Coupland et al. 2009) and Mid-Fraser houses pre-dating 1000 BP (Lepofsky et al. 1996). To test for these alternatives within and between all Housepit 54 floors we drew from method and theory in reliability analysis to assess potential consistency in lithic tools between all blocks and floors. To accomplish this were first conducted a principal components analysis (PCA) using lithic assemblages defined in Table 3.1. Consistency would be indicated by a first eigenvalue score greater than or equal to .4 and an unrotated component matrix composed of over 50% of variables scoring significantly (above .4) in the positive range on component one. A summary reliability (consistency) statistical called coefficient theta can then be calculated to provide an overall assessment of consistency such that a score between .8 and 1.0 would indicate relatively high consistency. As indicated in Tables 3.9 and 3.10 we achieved a PCA solution with a first component eigenvalue of 41.064 and a component matrix with 13 of 17 variables scoring above .4. We calculated a coefficient theta score of .857. Diversity in the contents of each floor appears most closely related to sample size given a significant correlation coefficient (r=.815, p<.01) between number of artifacts and component scores on component one (Table 3.11). Thus, we conclude that from a statistical standpoint, occupations within and between floors are quite consistent featuring a similar diversity of tools and therefore implicating the dominant pattern of household occupation as more collectivist in nature. In turn, this means that each floor was occupied by families living in their own spaces with variation between floors in the number of likely families present given dimensions of each floor. Floors IIo-IIm had space for one family at least at current levels of archaeological visibility. Floors IIL-IIf in the rectangular house, had space for at least two families each. The large house (IIe-IIa) held space for four (IIe-IIb) and three families (IIa).

Table 3.9. Statistics for principal components analysis of lithic tools from Housepit 54.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.981	41.064	41.064	6.981	41.064	41.064	4.602	27.072	27.072
2	2.597	15.279	56.342	2.597	15.279	56.342	3.403	20.015	47.087
3	1.590	9.353	65.696	1.590	9.353	65.696	2.447	14.396	61.483
4	1.067	6.274	71.969	1.067	6.274	71.969	1.783	10.486	71.969
5	.996	5.859	77.828						
6	.790	4.647	82.475						
7	.556	3.268	85.744						
8	.451	2.653	88.396						
9	.389	2.290	90.686						
10	.365	2.147	92.833						
11	.322	1.892	94.726						
12	.272	1.598	96.324						
13	.239	1.408	97.732						
14	.182	1.072	98.804						
15	.097	.572	99.376						
16	.069	.408	99.784						
17	.037	.216	100.000						

Extraction Method: Principal Component Analysis.

Table 3.10. Component matrix (un-rotated) for PCA on lithic tools from Housepit 54.

Component Matrix

	Component			
	1	2	3	4
VAR00001	.838	.026	-.109	-.119
VAR00002	.673	-.283	-.032	.482
VAR00003	.739	-.220	.280	.013
VAR00004	.643	-.045	-.177	-.528
VAR00005	.832	.009	.131	-.161
VAR00006	.678	-.086	.138	.123
VAR00007	.531	-.455	-.292	.205
VAR00008	.733	-.305	.429	-.030
VAR00009	.692	.151	-.535	.022
VAR00010	.489	.573	.018	-.328
VAR00011	.261	.874	-.108	-.083
VAR00012	.377	.499	.481	.215
VAR00013	.784	-.194	.009	-.115
VAR00014	.097	.280	.729	-.017
VAR00015	-.016	.803	-.236	.373
VAR00016	.874	.124	-.206	-.035
VAR00017	.759	.137	-.048	.376

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Table 3.11. Component scores from the principal components analysis on lithic tools from Housepit 54.

Floor	1	2	3	4
AIIa	0.3189	-1.10073	-0.71302	0.49699
AIIb	-0.60034	-0.82867	0.07872	-0.02189
AIIc	-0.09174	-0.08783	-1.05144	-0.31585
AIId	-0.84955	-0.29651	-0.76529	0.00566
AIIe	-0.4541	-0.29895	-0.89867	-0.7285
AIIf	1.25732	0.66218	-0.54927	-1.02452
AIIg	-0.3345	1.34653	-0.84511	1.62391
AIIh	0.59154	0.19344	0.09998	2.69344
AIIi	-0.34662	-1.10938	0.16675	-0.43279
AIIj	-0.82486	-0.94168	0.63365	-0.40964
AIIk	-0.66688	-1.19971	1.22822	-0.86881
AIIL	0.59873	-1.12508	1.73978	0.27266
AIIm	-1.80576	2.90065	0.19408	-0.24208
AIIn	-0.76513	-0.7662	-0.11497	-0.37774
AIIo	-0.83594	-0.66924	-0.22454	-0.2144
BIIa	-0.41668	0.96677	-0.08683	-1.19206
BIIb	-0.73159	-0.41166	-0.65389	-0.1529
BIIc	0.41499	-0.50785	-0.85283	-0.529
BIId	-0.9636	0.24129	-0.72516	-0.13669
BIIe	0.64309	-0.56907	0.14373	-0.2046
CIIa	-0.93437	-0.12218	-0.55252	-0.25356
CIIb	-0.79154	-0.28614	-0.61721	0.12469
CIIc	-0.71981	-0.52059	-0.40262	0.95162
CIId	-0.36999	1.37344	-1.14106	0.97951
CIIe	2.13249	-0.75196	-0.10919	-0.11276
CIIf	1.55306	-0.27432	0.30065	-0.33393
CIIg	0.87252	-1.35448	1.98668	2.09115
CIIh	-0.6666	2.05754	3.92733	0.3778
CIIi	-1.08999	-0.34128	-0.11564	-0.43048
CIIj	-0.69239	-0.58437	0.54147	-0.05103
CIIk	-0.3641	0.59387	0.74014	-0.51748
CIIL	0.5234	-0.2341	-0.05123	-0.27523
DIIb	1.63306	0.47088	-0.73332	0.84343
DIIc	1.04022	1.17345	-0.96883	2.13216
DIId	2.04522	1.58859	-0.08021	-1.38591
DIIe	1.69154	0.81336	0.47165	-2.38118

Floor designations: Capital letter denotes Block; IIa-IIo denotes floor.

Technological Change

Given that inter- and intra-floor variation is minimal and likely the result of variation in the intensity of activities conducted by household domestic groups we can now be on solid ground to explore patterns of change in tool manufacture and discard across the floor sequence. We approach technological variability through an examination of patterns in debitage, cores, and tools discarded on the floors. We quantify variation using two approaches. First, it is useful to calculate abundance indices (Broughton 1994) in which we examine the quantity of an item in relation to frequencies of other related items in an assemblage. For lithic artifacts this allows us to assess the relative importance of one technological indicator relative to an alternative thus providing a relatively precise perspective on differences in technological decisions over time (Smith 2017). A second, approach is to calculate densities of particular artifact classes to look at absolute frequency relative to associated sedimentary volume. This approach can allow direct insight into the importance of a technology but can be affected by general reductions in total artifact frequencies due to shorter and less populated occupations.

Debitage can provide important insight into variability in technological behavior. We examine debitage variability in reference to three most common raw material classes defined as dacite, cherts (all cherts and chalcedonies), and coarse-grained materials (igneous intrusives and extrusives excluding dacite and obsidian; and metamorphic rocks). We measured technological variation using three indicators. First, three flake types were defined consisting of biface thinning, early stage/core reduction, and manufacturing/maintenance retouch flakes. These are easily recognized technological indicators (Andrefsky 2005) and thus not likely subject to high inter-observer rates of error for trained analysts. Second, we classified flakes as primary, secondary, and tertiary based upon cortex cover (Primary=100% dorsal cortex; Secondary=1-99% dorsal cortex; Tertiary=0% dorsal cortex). For purposes of quantifying variability between floors we combined primary and secondary flakes to create a category of decortication flakes and re-defined tertiary flakes as non-decortication flakes. This distinction is useful to separate debitage associated with removal of outer nodular cortex from those associated with reduction of inner or non-cortex associated material (Mauldin and Amick 1989). Finally, we sorted flakes into several size-related classes assuming that assemblages dominated by the smallest class would be primarily the result of maintenance and limited tool production, while those with high counts of larger flake classes would reflect greater focus on tool manufacture or core reduction (Ahler 1989). Abundance indices were used to quantify variability in all debitage.

Technological histories, as measured by flake type variation, appear to differ by raw material class (Figures 3.3-3.5). For dacite, biface reduction flakes grade from infrequent during IIj-IIm to dominant from IIi to IIa. In contrast core reduction behavior seems relatively consistent at low levels across all floors with the exception of IIj. For cherts, biface and core reduction flakes largely parallel each other with peak numbers on IIe. Finally coarse grained materials are infrequent and where present, tend to be dominated by core reduction flakes. Hidden within these distributions is the fact that maintenance retouch flakes dominate all distributions indicating that while biface and core reduction were present and variable between floors, fine retouch activities dominated lithic reduction behavior throughout. This should not be surprising given the fact that these were winter residences occupied by sizable groups of people reliant upon stone tools for a wide array of activities. These outcomes can be further examined with cortex cover and flake size measures.

Figure 3.3. Biface reduction flakes/all platform bearing flakes compared to core reduction flakes/all platform remnant bearing flakes for dacite.

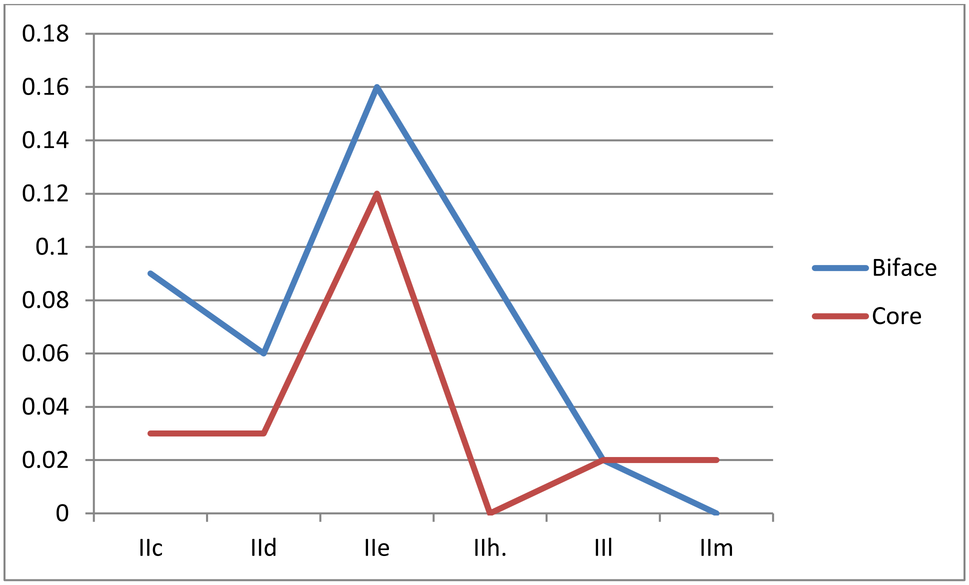

Figure 3.4. Biface reduction flakes/all compared to core reduction flakes/all platform bearing flakes for cherts (20+ flakes).

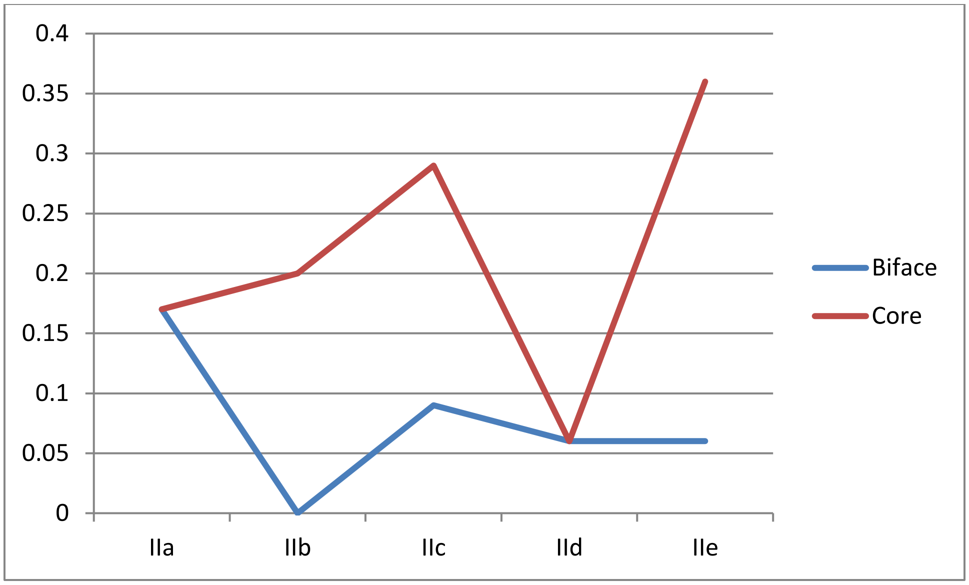

Figure 3.5. Biface reduction flakes/all flakes compared to core reduction flakes/all platform remnant bearing flakes for coarse grained materials (20+ flakes).

Figures 3.6 and 3.7 depict abundance indices for cortex cover and flake size across Housepit 54 floors. Regarding cortex cover, chert data suggest consistent production of very few cortex bearing flakes without any directional pattern. Dacite assemblages also provide low scores though there is a rough trend from highest to approximate lowest between the earliest floors (IIL in particular) to later floors. There is a clear distinction for coarse grained materials between early (IIh-IIL) and later floors (IIg-IIa) indicating greater investment in decortication activities during the BR 2 period floors compared to the BR 3 floor sequence. We quantified flake size with an abundance index of extra-small flakes divided by all other flakes presuming that high scores would strongly reflect maintenance or late stage tool reduction behavior while lower scores would support the likelihood of a greater diversity of reduction activities. Data suggest a remarkably consistent trend for four major raw material classes (cherts, dacite, coarse grained, and slate) whereby lowest scores are found in the IIh-IIk range while peak scores are present during post IIh, effectively on the BR 3 period floors. Overall, cortex cover and flake size data confirm trends recognized with flake type distributions (especially for dacite and cherts) that biface reduction becomes increasingly important during the BR 3 floor sequence but that edge maintenance/retouch is dominant throughout the entire floor sequence. If this is the case then we should expect to see a similar pattern within the tool and core data due to discard of rejected and exhausted items that parallel rates of related debitage production.

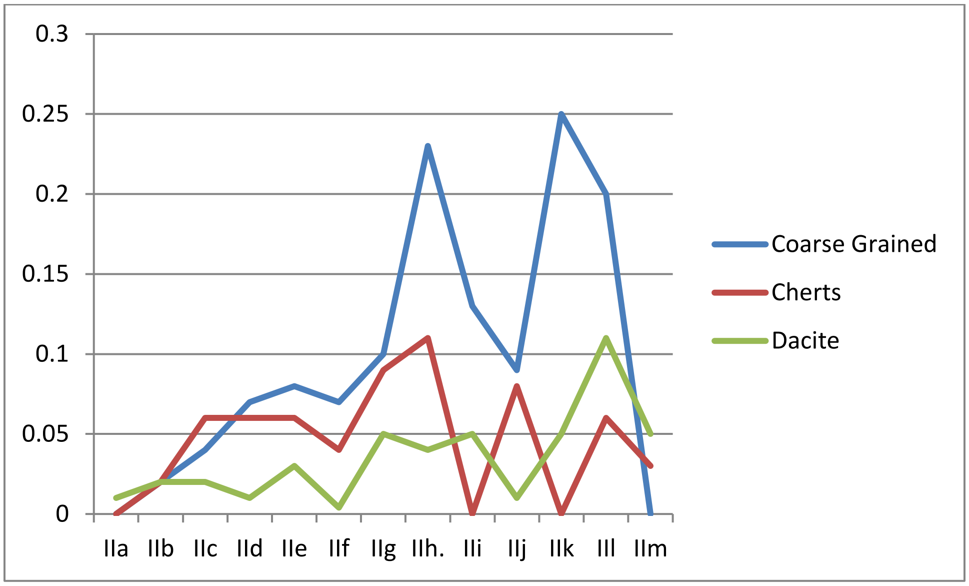

Figure 3.6. Decortication debitage/all debitage for three major raw material classes.

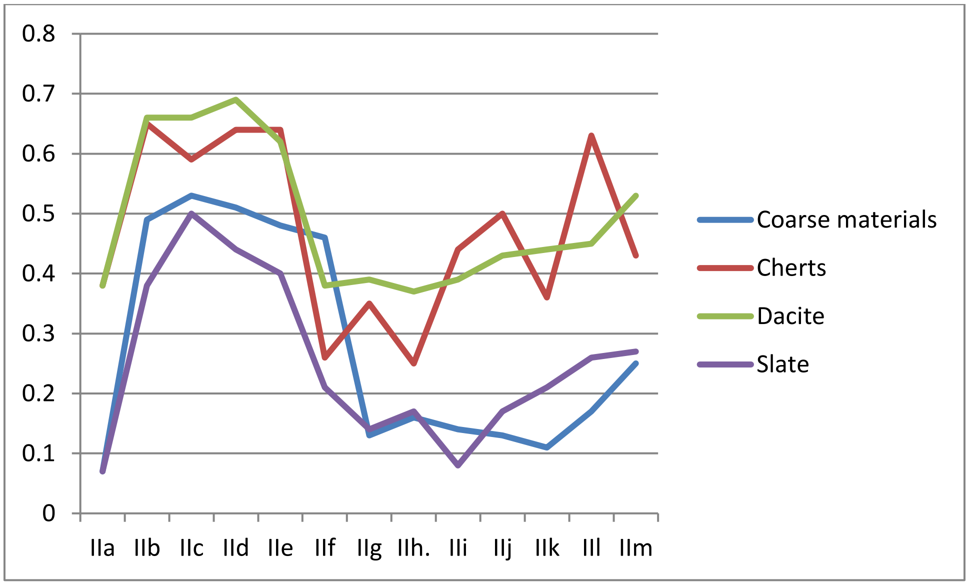

Figure 3.7. Extra-small debitage/all debitage for four major raw material classes.

Conclusions regarding trends in lithic reduction behavior are broadly supported by data on abundance and density of cores and bifaces (Figures 3.8-3.12). Cores or more specifically, freehand (non-bipolar) cores are most common during BR 2 (IIL and IIm) and early BR 3 (IIg and IIh) floors. The trough during IIk-IIi is interesting and is reflected in other classes of lithic artifacts discussed below. Core abundance shows a general trend towards reductions in cores from BR 2 to BR 3 floors with an upturn on IIa. In general these data appear to greater transport of lithic cores during the house during earlier floors. As illustrated in Figure 3.9, where sample sizes permit assessment, transported cores are consistently coarse grain material. This suggests that for fine-grained material, knappers more frequently transported flake blanks and bifacial rough-outs similar to what French (2017) recognized on the Fur Trade period floor at Housepit 54. Abundance indices and biface density (Figures 3.10-3.12) indicate that bifaces became more important to Housepit 54 knappers in comparison to cores and core reduction byproducts (e.g. flake tools). Fine grained materials (cherts and particularly dacite) were consistently important for biface manufacture and their importance appears to have increased slightly over time (Figure 3.13). Given that coarse grained material could be acquired from secondary sources closer to the Bridge River village while cherts and dacite were largely acquired at substantial distance, typically east of the Fraser Canyon, it makes sense in light of predictions from human behavioral ecology (Beck et al. 2002; Kuhn 1994) that items acquired at a distance would be more extensively prepared for transport (thus transported flakes and bifaces) while more local materials could often be hauled in less well-prepared forms.

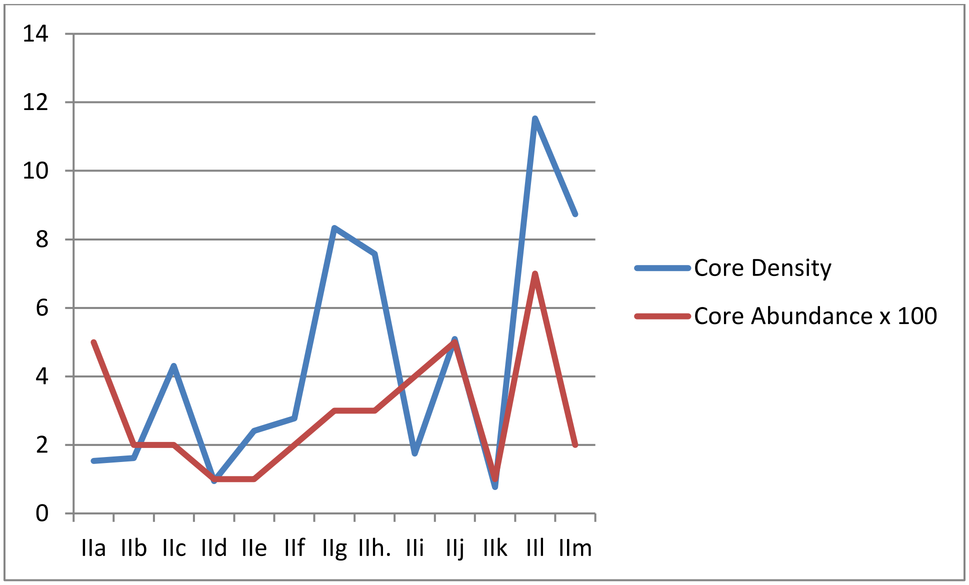

Figure 3.8. Density and abundance indices (N Cores/N all artifacts) for cores.

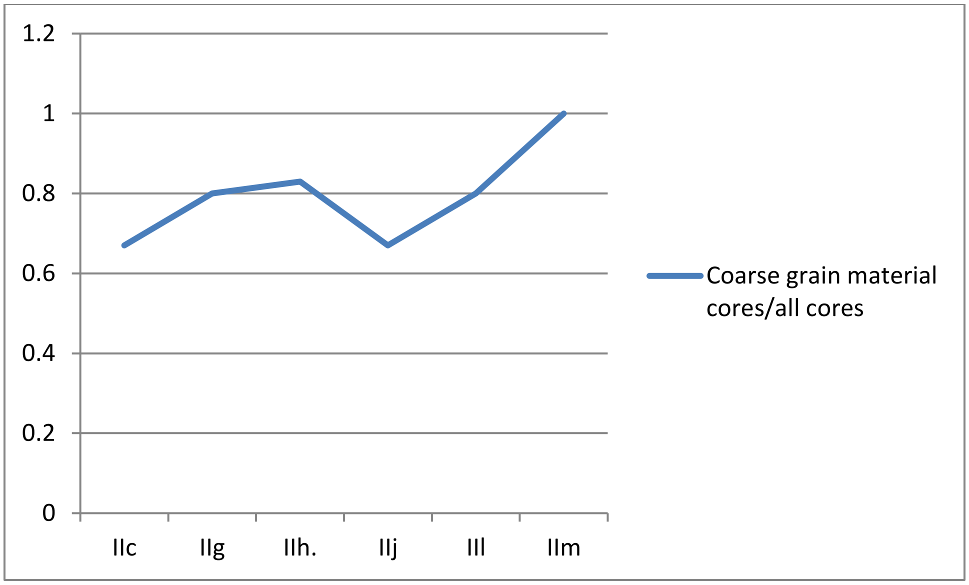

Figure 3.9. Abundance index of coarse grained material cores to all cores.

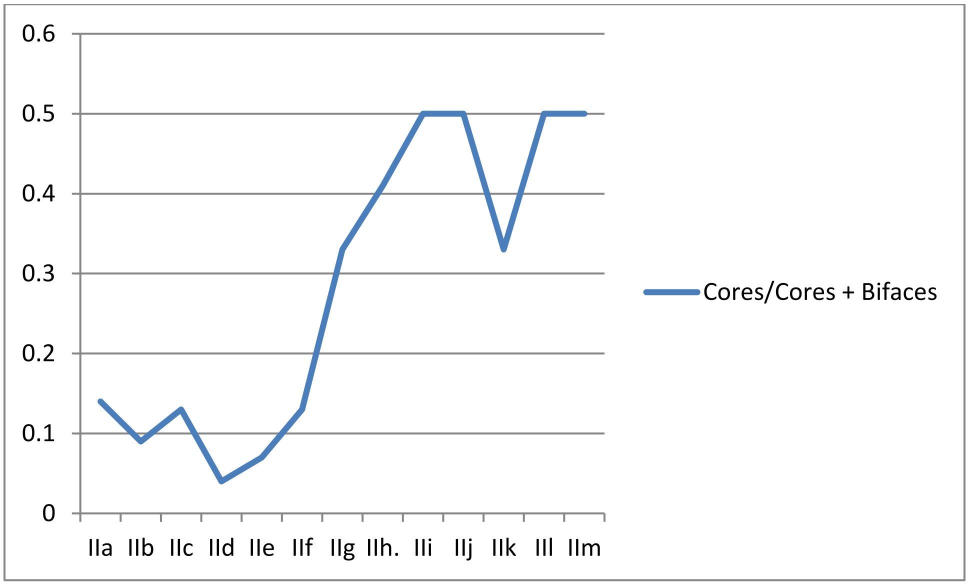

Figure 3.10. Abundance index for cores (N Cores/NCores + NBifaces)

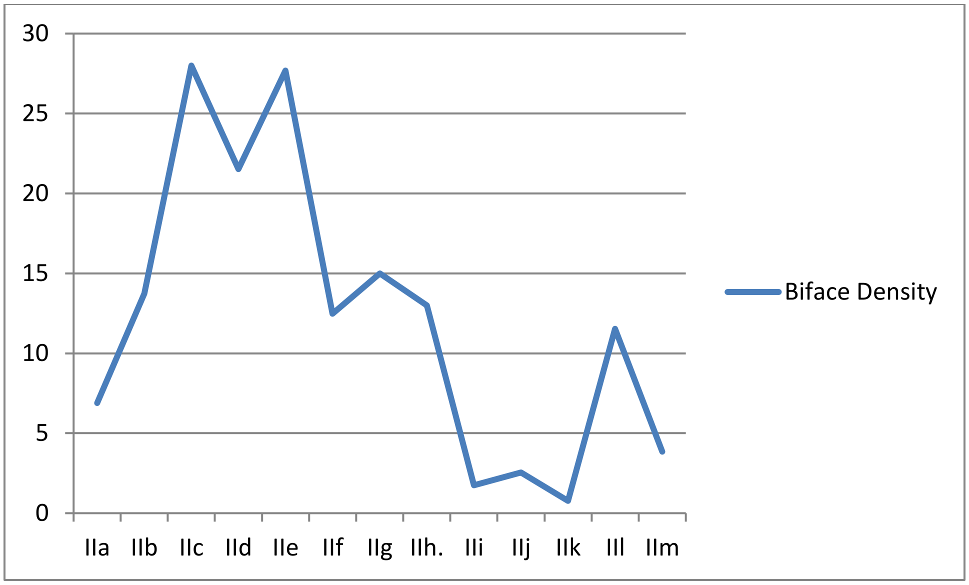

Figure 3.11. Biface density.

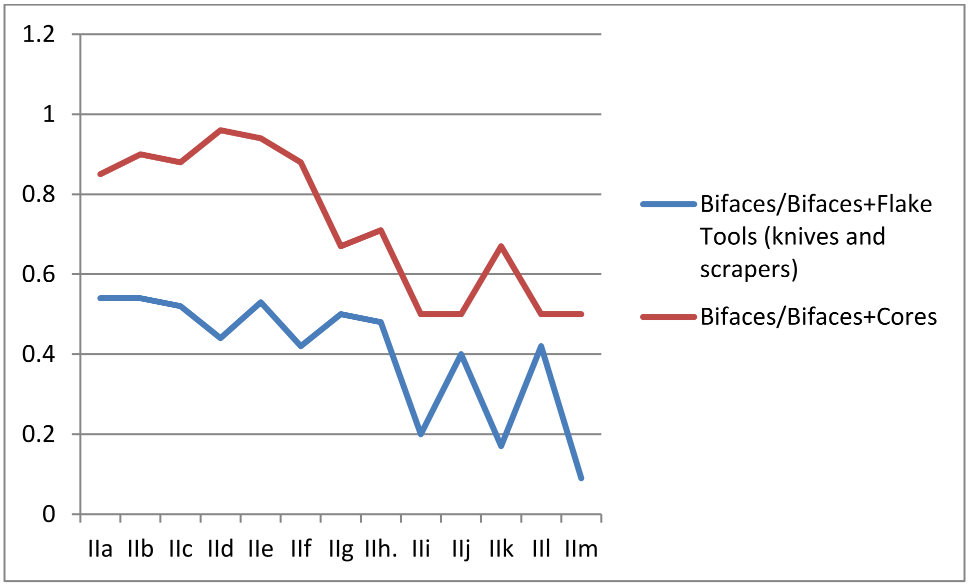

Figure 3.12. Abundance indices for bifaces (NBifaces/NBifaces+NFlake Tools; NBifaces/NBifaces+NCores).

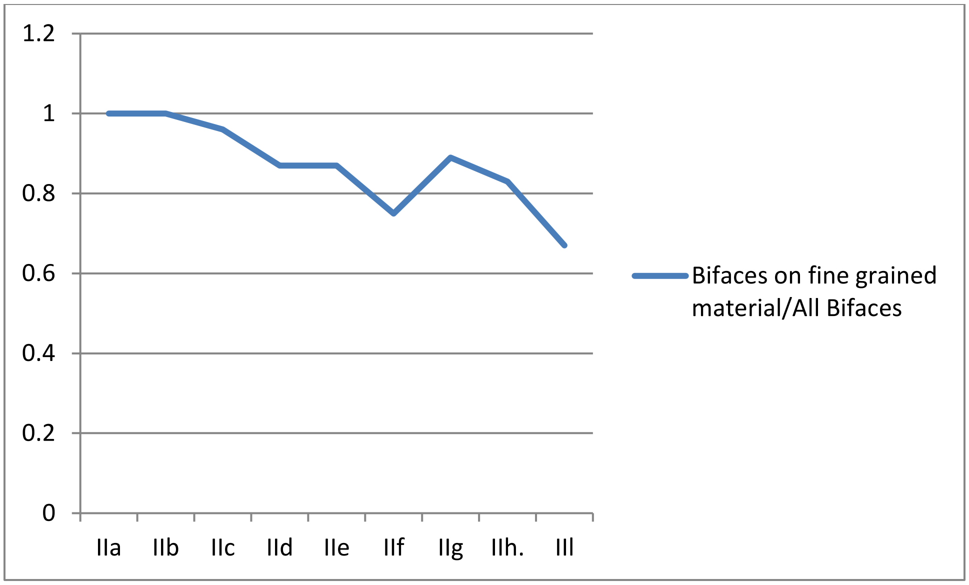

Figure 3.13. Abundance indices for bifaces made on fine-grained materials (cherts and dacite)/bifaces made on all materials for assemblages with greater than two artifacts.

Bipolar technology is manifested at Housepit 54 in the form of small bipolar cores and flakes. Bipolar cores occur on flakes, flake tools, exhausted freehand cores, bifaces, and even broken projectile points and thus appear to reflect strategies for extending the use-life of lithic raw material by winter residents (see also Hayden et al. 1996). Consequently, inter-floor variation in frequencies of bipolar cores could correspond to scale of occupation in the sense of numbers of persons needing lithic toolstone or the average length of winter occupations for a given floor cycle. Three data sets point (Figures 3.14-3.16) to a trough in the frequency of bipolar core reduction during late BR 2 times (IIK-IIi). All also point to very frequent bipolar reduction during earlier BR 2 times and during the BR 3 period. Raw material focus is consistently fine grained sources (cherts and dacite). Comparing these trends to that of relative cache pit volume and projected populations per floor (Chapter 2) it is evident that bipolar technology was particularly important when storage capacity was high. High storage capacity likely meant better access to stored foods potentially enabling longer winter stays. If that was the case then bipolar technology would have been particularly important for long term winter residents needing lithic raw material for a variety of activities. We can explore this relationship further with an examination of data concerning flake tools and portable long-use tools.

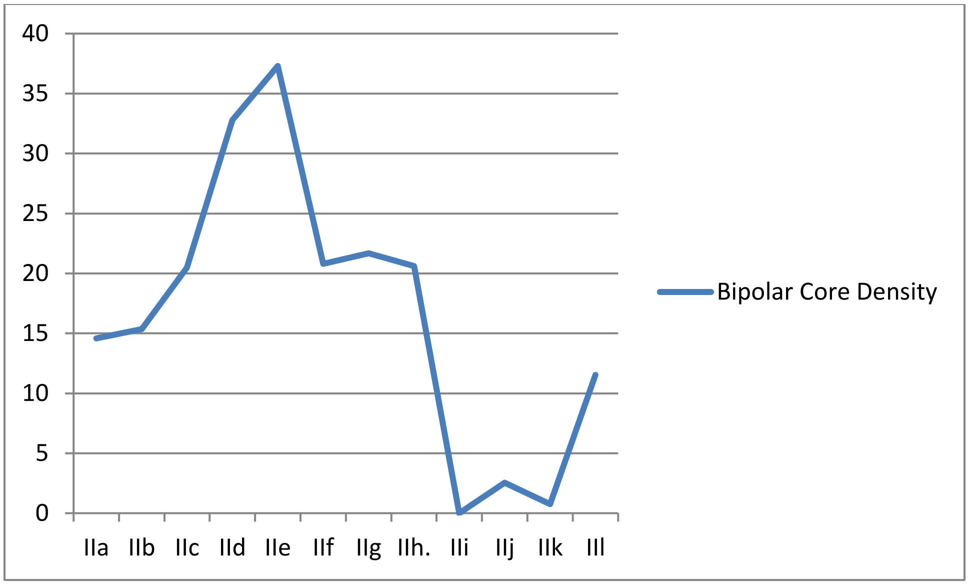

Figure 3.14. Density of bipolar cores.

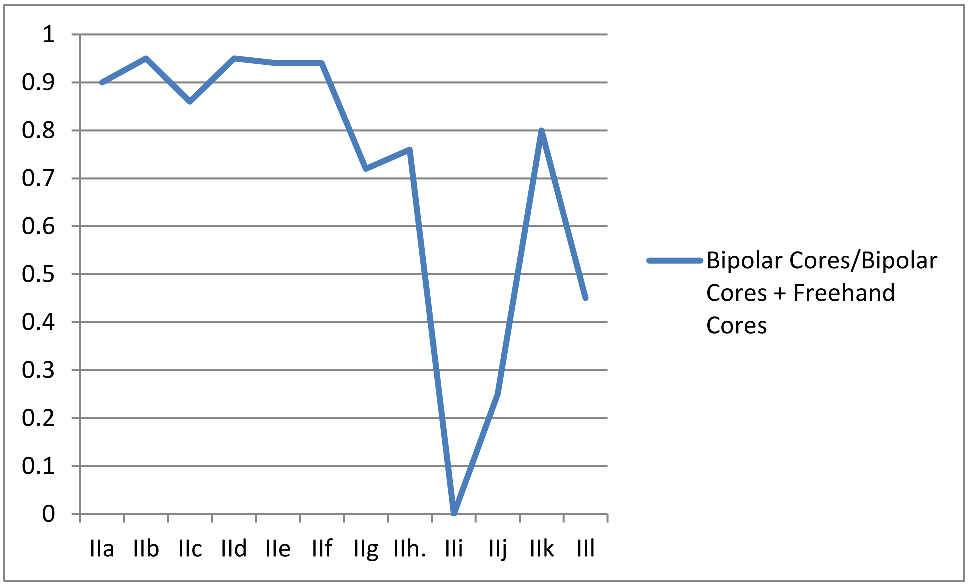

Figure 3.15. Abundance index for bipolar cores (NBipolar Cores/NBipolar Cores+NFreehand Cores).

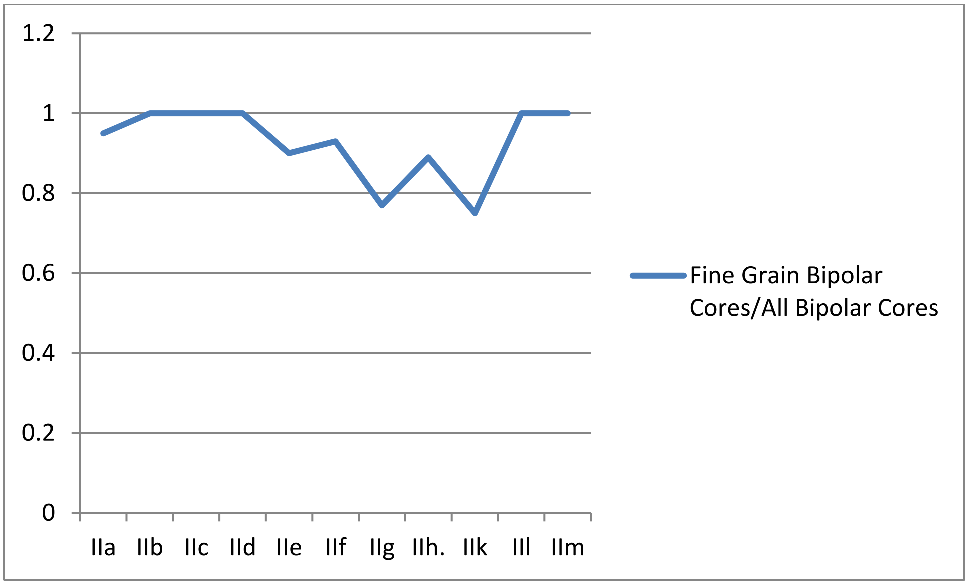

Figure 3.16. Abundance index for bipolar cores (NBipolar Cores on Fine Grained material/NAll Bipolar Cores).

Flake tools in this context refer to minimally modified flakes used for a variety of needs. Some of these specific tool types include single scrapers, double scrapers, convergent scrapers, inverse scrapers, unifacial knives, bifacial knives, used flakes, burins, used truncations, retouched truncations, small piercers, spall tools, and pieces esquillees. Data from Housepit 54 indicate that flake tools were consistently derived from fine grained materials whose use varied in frequency from a low during late BR 2 (IIk-IIi) to a peak on IIe during BR 3 times (Figures 3.17-3.18). These patterns are substantially in line with patterns of bipolar core reduction supporting the idea that bipolar cores were critical for providing flakes for use as a variety of tools. Freehand cores on fine grain material are consistently rare even during times when flake tools and bipolar cores are common thus further supporting the idea that tools on fine grain material were consistently manufactured from flakes either transported to the house from elsewhere or derived from bipolar or biface reduction within the house. An exception to this trend may have occurred during the relatively sparse occupation of the IIj and IIi floors where bipolar core reduction dropped severely relative to freehand core reduction and corresponding flake tool use was also less frequent.

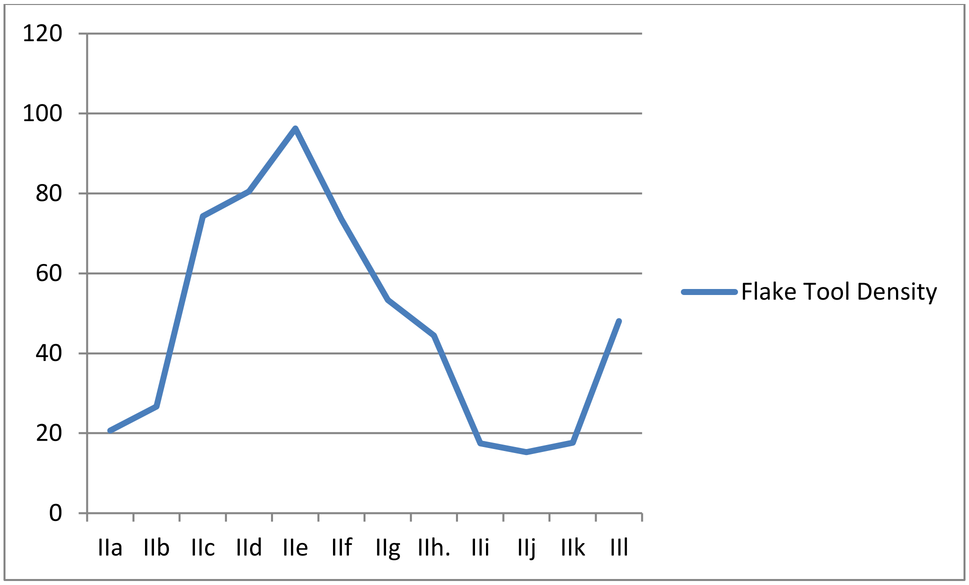

Figure 3.17. Density of flake tools.

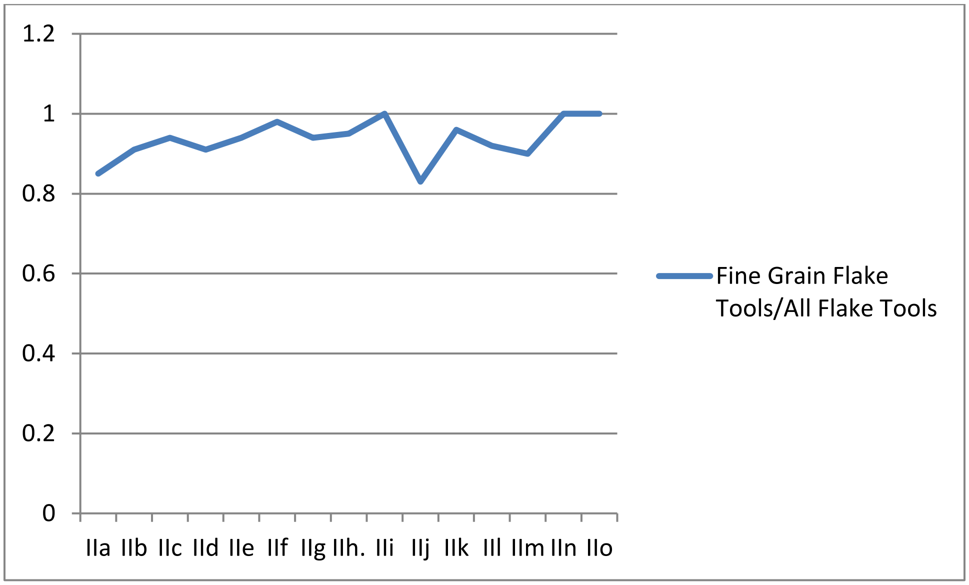

Figure 3.18. Variation in flake tools/all tools for fine grained raw materials.

Portable long-use tools follow Hayden et al.'s definition of formal tools designed for particular functions and likely often hafted and transported. Some of these include end scrapers, stemmed end scrapers, bifacial and unifacial drills, and bifacial and unifacial perforators. Figures 3.19-3.21 indicate that portable long-use tools were consistently manufactured on fine grain material and that densities pattern over time in a similar manner to bipolar cores and flake tools. Portable long-use tools are not directionally patterned in reference to flake tools. Overall these results support the argument that subsistence productivity favored longer stays and more abundant populations which translated into more frequent production and use of both flake and formal bifacial and unifacial tools.

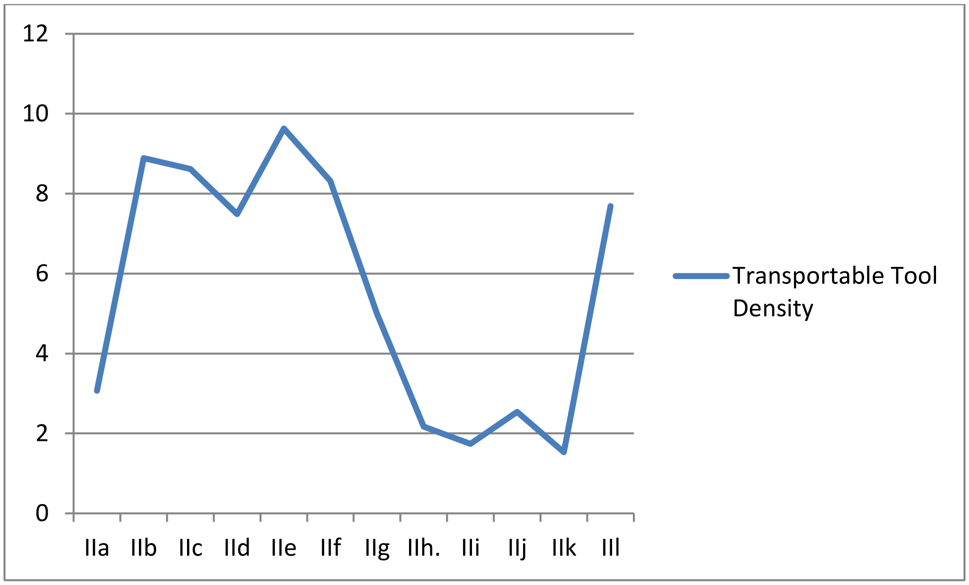

Figure 3.19. Density of portable long-use tools.

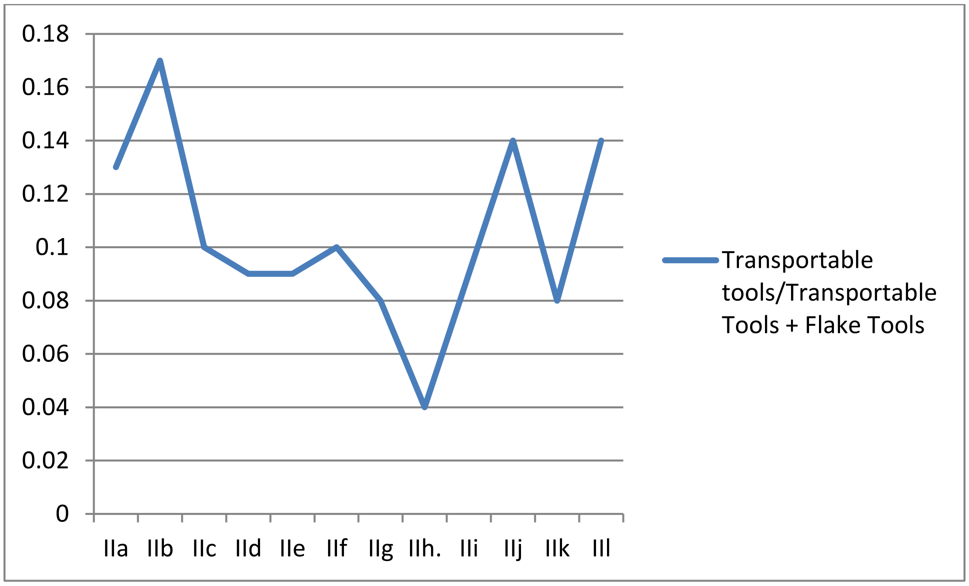

Figure 3.20. Abundance index for portable long-use tools (NPortable long-use tools/NPortable long-use tools+NFlake tools).

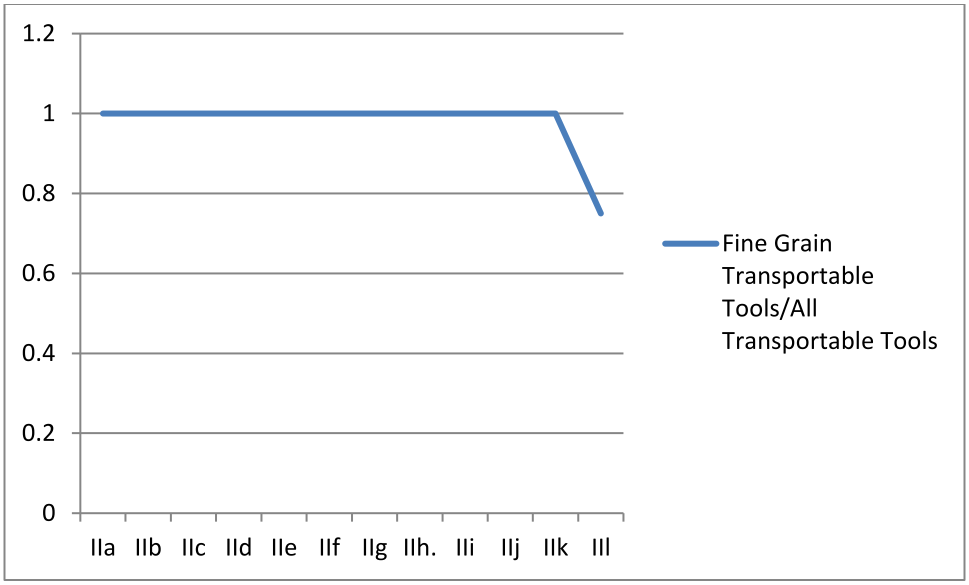

Figure 3.21. Abundance index for NPortable long-use tool on fine grain material/NPortable long-use tools.

Slate technology at the Bridge River site is unique in the Pacific Northwest region (Prentiss et al. 2015, 2017). Slate is widely available in the Bridge River Valley, particularly on the lower slopes close to the Bridge River itself. Slate was transported to the Bridge River valley and there manufactured into a variety of forms including scrapers, knives, adzes, and drill/perforators. Of these tool forms, scrapers are by far the most common and use-wear analysis suggests hide scraping the typical application. Slate scraper density between floors yields a similar distribution to bifaces, bipolar cores, flake tools, and portable long-use tools (Figure 3.22). Clearly the IIk-IIi occupants focused less on lithic tool production and use within the house than those who came before or later. This signature may have been at least in part due to shorter stays by smaller groups. There is little recognizable pattern in the history of slate scrapers in reference to combined flake tools and portable long-use tools.

Abraders vary in form and frequency throughout the Housepit 54 floor deposits. Typically, they are fragmentary with one or more working faces indicated by abraded surfaces and manufactured on sandstone, conglomerate, and igneous intrusives. A subset appears to have been recycled as cooking rocks as indicated by purposeful breakage via flake removal from lateral margins and subsequent thermal damage. We suggest that this is the result of knappers re-shaping abraders into cuboid shapes ideal for use as heating/boiling stones. The distribution of abrader densities indicates that four floors (IIm, IIj, IIh, and IIg) occupied during later BR 2 and early BR 3 times particularly favored manufacture, use, and often recycling of abraders. Research is ongoing as to the specific applications of abraders at Housepit 54. Possibilities include abrading bone, antler and wood tools, food processing, and abrading house roof posts and beams.

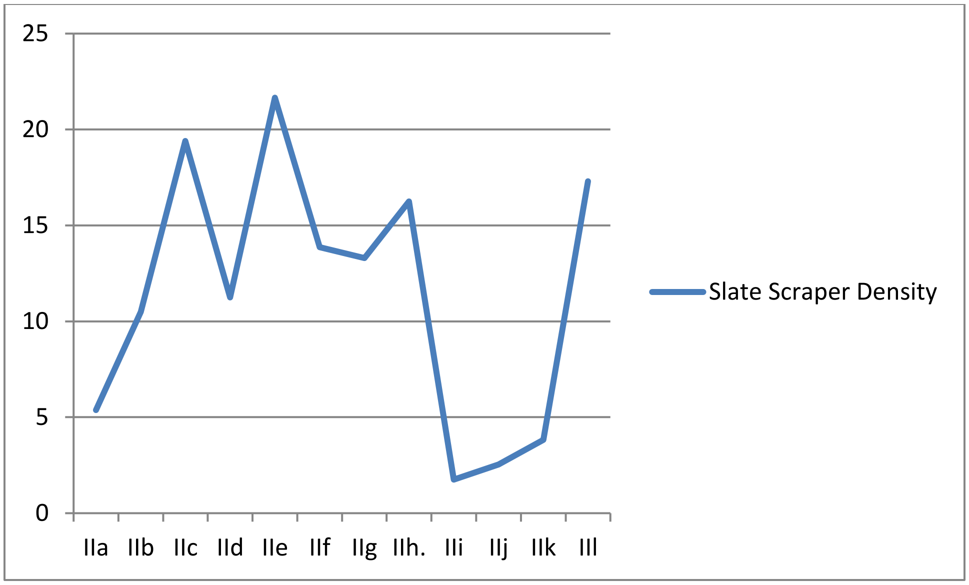

Figure 3.22. Density of slate scrapers.

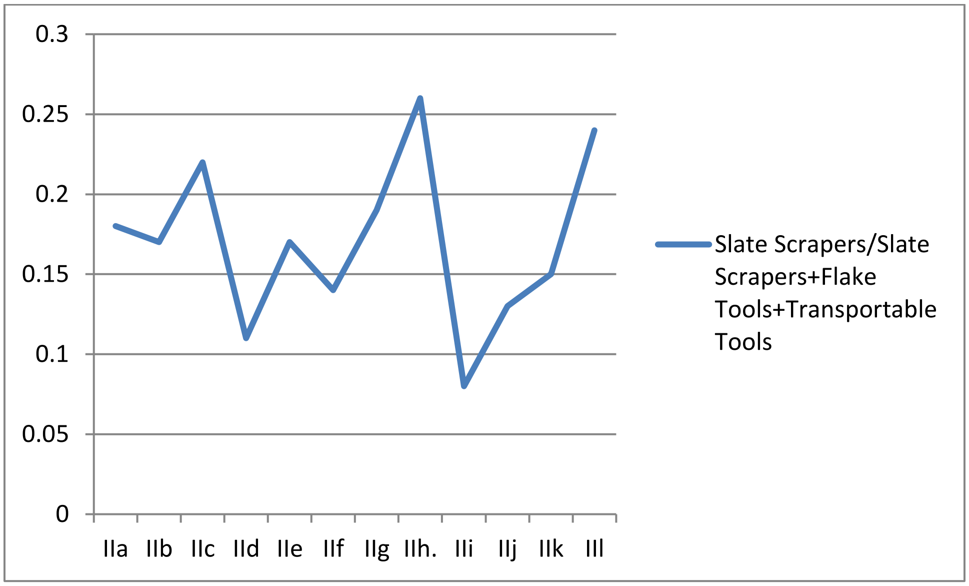

Figure 3.23. Abundance index for slate scrapers (NSlate Scrapers/N Slate Scrapers+NPortable long-use tools).

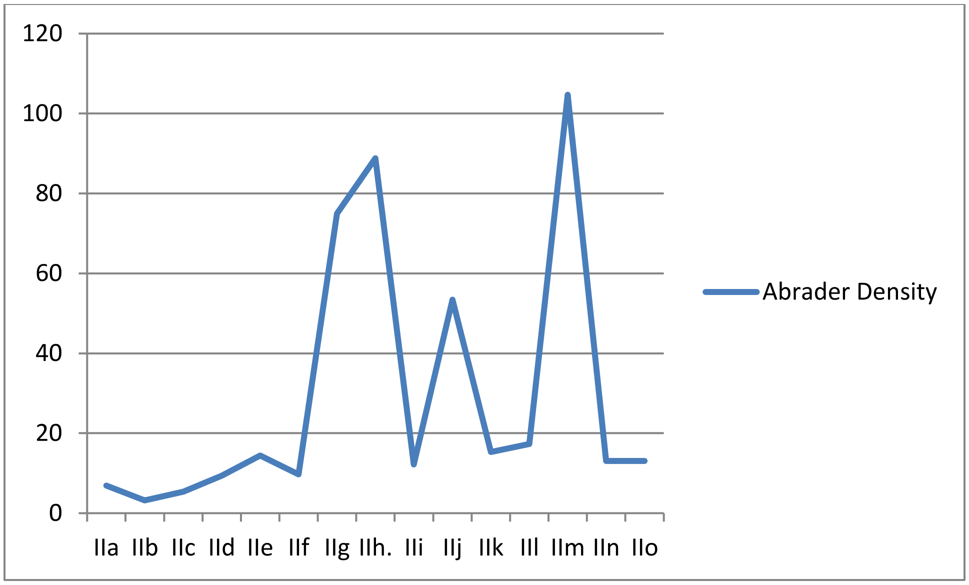

Figure 3.24. Density of abraders.

To summarize this preliminary review of variation in technological indicators, we recognize several patterns. Importance of freehand core reduction declined while frequency of biface reduction increased during the life of the house. There is a particularly rapid change in organization at the BR2-3 transition or beginning on the IIh floor. Freehand core reduction was most prominently used on coarse grained materials. It was of significantly less importance for fine grained materials which appear to have mostly entered the house as flakes or at least partially finished tools. The previously identified population low during the IIk-IIi floors at Housepit 54 is reflected in the lithics data where we see low densities of bifaces, bipolar cores, flake tools, portable long-use tools, and slate scrapers during this interval followed by rapid increases during subsequent floors. Declines in the frequency of these tool classes by the IIa floor reflects a similar decline in food storage within the house. Likely winter stays during this time grew shorter as groups relied to a greater degree on mobility beyond the winter village to acquire late winter food. Overall lithic distributions implicate the possibility that as populations rebounded during early BR 3 floors (post-IIh) house members increasingly prepared for activities requiring formal killing, cutting, and hide scraping tools, which in turn implicates an expanding role for hunting in the household subsistence economy.

Social Change in Housepit 54

An important goal within the wider Housepit 54 project has been to better understand change in social relations between members of the house and the village during the BR 2 and 3 periods. Previous research his indicated that the village had suffered a major reduction in population at the end of the BR 2 period, which was followed by a rapid increase in early BR 3 times (Prentiss et al. 2008, 2012, 2014). Village-wide data also indicate that a pattern of material wealth-based inequality developed on an inter-house basis for a short time during the BR 3 period, subsequent to the abandonment in and around 1000 years ago (Prentiss et al. 2012, 2014). The occupying population of Housepit 54 closely mirrored that of the village. Low occupation density during mid to late BR 2 was replaced by rapid growth during early BR 3 and then decline during mid- BR 3 times (Prentiss, Foor, and Hampton 2018). A preliminary assessment of inequality markers also suggested a pattern of short-lived inequality during early-mid BR 3 times within Housepit 54 (Prentiss, Foor, and Murphy 2018). The latter study quantified inequality using only the IIe-IIa floor data. Thus, it is necessary now to examine the history material wealth-based inequality with the entire house sequence. This provides the opportunity to assess relationships between emergent inequality and household demographics, subsistence economy, and indicators of cooperation.

We quantified inequality using five measures. Recognizing that none of these indices in isolation are perfect measures, these indicators are useful as a group as they offer the chance to recognize the operation of a social system that consists of household production of goods used in part for acquisition of other valuable goods. Thus, a house membership that produces surplus animal hides and valuable stone tools and ornaments is likely not only to be better fed and dressed but also to gain more frequent access to goods from neighboring and more distant groups. To measure this process we made using of the following indices: Non-local raw material measures acquisition of lithic materials from outside the Bridge River valley; prestige raw material measures acquisition of raw materials associated with production of prestige goods (copper, steatite, nephrite, and obsidian); prestige artifacts are items with social value that often challenging to manufacture from specific valued materials (stone beads, pendants, figurines, and any nephrite jade items); bifaces are indicators of gearing-up for hunting trips and acquisition of meat was an important marker of household economic success (Romanoff 1992; Teit 1900, 1906); and hide scrapers are another indicator of success in hunting assuming more game acquired meant more hides.

We quantified variation in material wealth markers using the following procedures. First we collected density data for each indicator for each block within each floor of Housepit 54 (Table 3.12). Second, we conducted a principal components analysis of these data to assess the degree to which the indicators were inter-correlated. Third, we relied upon the component scores to assess the contributions of each block on each floor regarding wealth measures. Then we calculated a sample variance score for each floor to look for the presence and absence of inequality. Finally we compared the variance scores to data regarding population, cache pit volume, and cooperation to explore hypotheses about the timing and causes of emergent competitive behavior.

Table 3.12. Wealth measures for Housepit 54 floor strata by block areas.

B/F	NLM	NLD	PRM	PRMD	PA	PAD	B	BD	HS	HSD	VOL
AIIa	5	11.76	0	0	1	0	8	18.82	4	9.4	0.425
AIIb	2	5.34	0	0	0	0	3	11.11	1	3.7	0.27
AIIc	15	62.24	2	8.3	0	0	6	24.89	3	12.44	0.241
AIId	5	19.53	0	0	0	0	2	7.8	0	0	0.256
AIIe	2	7.52	1	3.76	0	0	5	18.8	3	11.28	0.266
AIIf	18	87.8	1	4.88	5	24.39	7	34.14	7	34.15	0.205
AIIg	19	58.1	0	0	1	3.06	3	9.17	9	27.52	0.327
AIIh	16	42.67	1	2.67	2	5.33	7	18.67	11	29.33	0.375
AIIi	5	16.8	0	0	2	6.73	1	3.37	1	3.39	0.297
AIIj	7	43.49	0	0	1	6.21	0	0	1	6.17	0.161
AIIk	1	1.82	0	0	0	0	0	0	0	0	0.547
AIIL	15	74.63	0	0	5	24.88	2	9.95	4	19.9	0.201
AIIm	32	139.7	2	8.73	0	0	2	8.73	12	52.4	0.229
AIIn	6	39.22	0	0	0	0	2	13.07	2	13.07	0.153
AIIo	7	45.75	0	0	0	0	0	0	1	6.53	0.153
BIIa	12	23.12	4	7.7	2	3.85	1	1.93	3	5.78	0.519
BIIb	2	10.36	0	0	0	0	3	15.54	4	20.73	0.153
BIIc	8	46.78	3	17.54	1	5.85	5	29.94	1	5.85	0.171
BIId	6	35.71	3	17.86	1	5.95	1	5.95	3	17.85	0.168
BIIe	26	245.2	4	37.74	4	37.74	6	56.6	8	25.47	0.106
CIIa	15	41.67	2	5.55	0	0	3	8.3	2	5.56	0.36
CIIb	23	72.33	1	3.14	0	0	2	6.29	0	0	0.318
CIIc	21	58.5	5	13.93	0	0	4	11.14	4	11.14	0.359
CIId	15	39.89	1	2.7	2	5.32	7	18.62	7	2.65	0.376
CIIe	19	52.49	2	5.5	5	13.81	11	30.39	9	24.86	0.362
CIIf	21	40.7	4	7.75	5	9.69	7	13.37	10	19.38	0.516
CIIg	11	40.29	2	7.32	4	14.65	7	25.64	3	10.98	0.273
CIIh	29	52.92	3	5.47	5	9.12	5	9.12	8	14.59	0.548
CIIi	7	25.36	0	0	0	0	0	0	3	12.93	0.276
CIIj	9	38.79	0	0	0	0	2	8.62	1	4.31	0.232
CIIk	30	39.58	2	2.64	4	5.28	2	2.63	7	9.32	0.758
CIIL	10	31.35	0	0	2	6.27	4	12.5	12	37.62	0.319
DIIb	33	72.21	11	24.07	8	17.51	11	24.07	10	63.69	0.457
DIIc	34	216.5	6	38.21	3	19.11	13	82.8	11	70.06	0.157
DIId	65	242.5	4	14.92	5	18.66	15	55.97	12	44.77	0.268
DIIe	41	422.6	14	144.3	2	20.62	8	82.47	6	61.86	0.097

B/F=Block/Floor; NLM=Non-Local Raw Material; NLD=Non_Local Raw Material Density; PRM=Prestige Raw Material; PRMD=Prestige raw Material Density; PA=Prestige Artifacts; PAD=Prestige Artifact Density; B=Biface; BD=Biface Density; HS=Hide Scraper; HSD=Hide Scraper Density; VOL=Sediment Volume.

The PCA produced a single significant component with an eigenvalue of 74.090 and an unrotated component matrix containing all variables with significant positive scores (Tables 3.13 and 3.14). This strongly suggests that our expectations about the systemic relationships between variables are well confirmed. Component scores indicate particularly high scores associated with IIe-IIb on Block D and IIe in Block B. Variance scores are also highest for the IIe-IIb floors supporting the preliminary results of Prentiss, Foor, and Murphy (2018) that inequality appeared on an archaeologically measurable scale on these floors late in the history of Housepit 54 (Table 3.15; Figure 3.25). We quantified cooperation assuming that in a cooperative house with variable talent at different task activities would be somewhat variable in their representation at least at low levels. In a non-cooperative house we would expect little diversity in task representation. To capture that variation we calculated coefficient of variation (CV) scores on difference matrices for each component for each floor. This required a single CV for the IIf-IIL sequence but a summary CV on individual component CVs for the more complex IIe-IIa data (Table 3.15).

Table 3.13. Statistics for principal components analysis of wealth markers.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.704	74.090	74.090	3.704	74.090	74.090
2	.575	11.496	85.585			
3	.431	8.621	94.207			
4	.190	3.805	98.012			
5	.099	1.988	100.000			

Extraction Method: Principal Component Analysis.

Table 3.14. Component matrix for principal components analysis of wealth markers.

Component Matrix

	Component
	1
VAR00001	.945
VAR00002	.851
VAR00003	.759
VAR00004	.925
VAR00005	.809

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Table 3.15. Component scores and sample variance for wealth measures by excavation block areas (A-D) and floor and cooperation measure (CM).

	A	B	C	D	Variance	CM
IIa	-0.55	-0.6	-0.58		0.0006	0.306
IIb	-0.73	-0.46	-0.6	0.93	0.594	0.241
IIc	-0.21	-0.06	-0.35	2.31	1.6	0.197
IId	-0.77	-0.24	-0.4	1.54	1.06	0.166
IIe	-0.51	1.97	0.24	3.84	3.75	0.143
IIf	0.73	-	-0.12	-	0.36	0.357
IIg	0.25	-	0.025	-	0.037	0.55
IIh.	0.09	-	-0.23	-	0.01	0.282
IiI	-0.64	-	-0.69	-	0.001	0.885
IIj	-0.58	-	-0.65	-	0.002	0.535
IIk	-0.91	-	-0.52	-	0.08	0.715
IIl	0.2	-	-0.1	-	0.045	0.76
IIm	0.29	-	-	-	-	
IIn	-0.49	-	-	-	-	
IIo	-0.7	-	-	-	-	

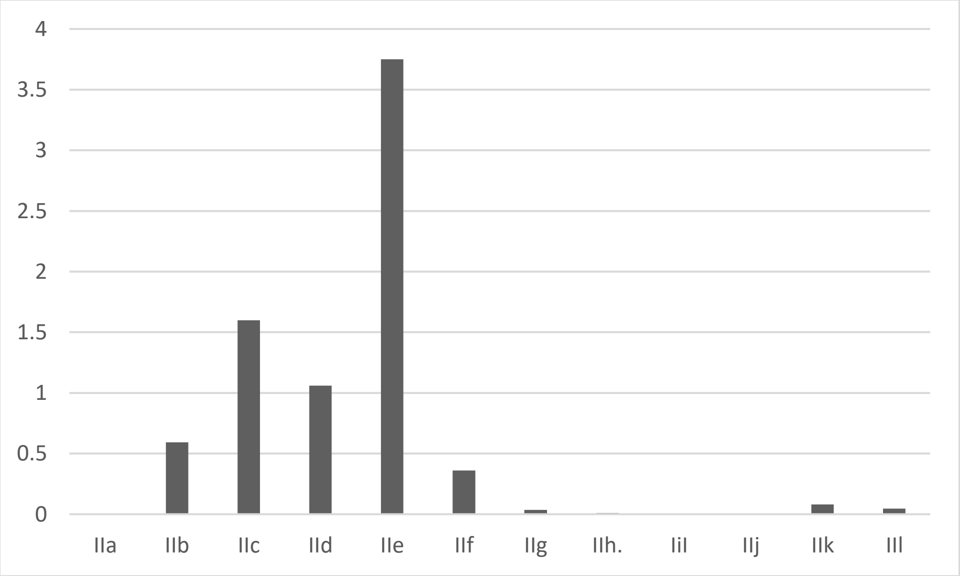

Figure 3.25. Variance of component scores associated with wealth measures.

Results of these calculations are extremely provocative. Wealth variance is flat until a rapid expansion after IIf followed by a peak on IIe and a subsequent plateau during IId-IIc before a decline during IIb to IIa. This parallels the history of household investment in storage after IIg (Figure 3.26). A similarly close fit between distributions is evident for wealth variance versus projected population (Figure 3.27). The trends diverge after IIc where inequality declines while the house population slightly rises. Finally, the cooperation index trends inversely to wealth variance (Figure 3.28). If the cooperation index is accurate it means that wealth differentiation within Housepit 54 came at a time of declining intra-house cooperation. This seems likely given two additional factors. First, the house had doubled in size at the IIe floor increasing the possibility of collectivist activities that involved family-specific extra-household networking. Second, the positioning of cache pit shifts from a pattern of large and highly visible features prior to IIe to one of limited visibility isolated storage pits post-IIe. The latter could suggest a reduction in sharing of goods within storage features. Overall, these results suggest that household membership permitted a single family (Block D group) to gain disproportionate access and rights to material resources at the doubling of house size (IIe) and to transmit that good and access and rights to goods across three subsequent generations. This came at a time of sudden population packing and a simultaneous peak and then decline in storage while simultaneously adjusting technological activities towards production of gear likely oriented towards hunting.

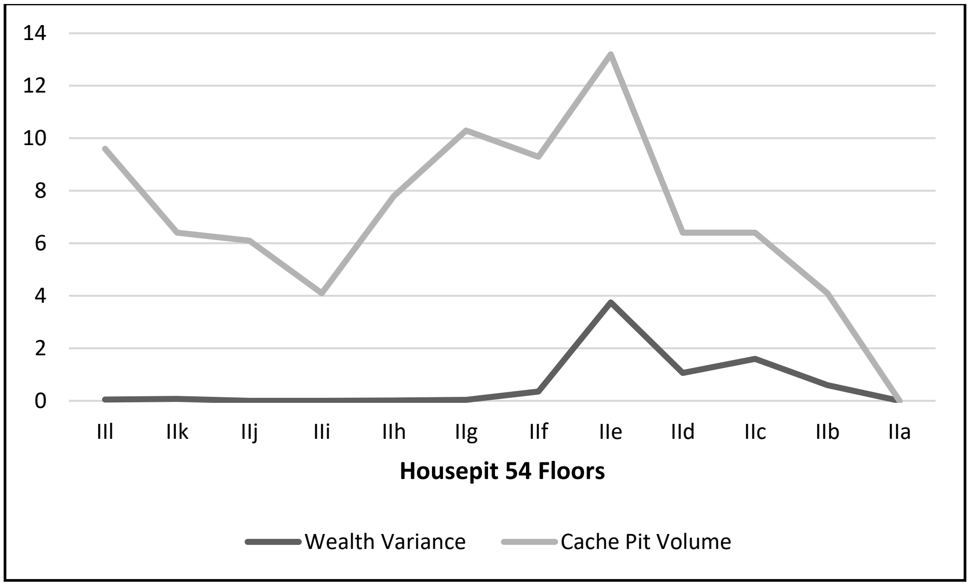

Figure 3.26. Distribution of scores for wealth variance versus cache pit volume (see Chapter 2).

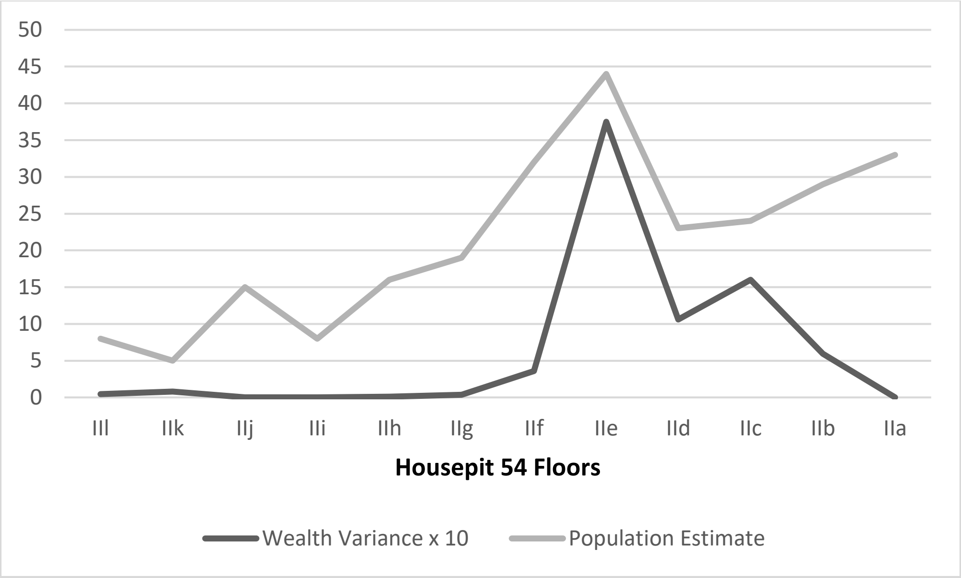

Figure 3.27. Distribution of scores for wealth variance versus house population estimate (see Chapter 2).

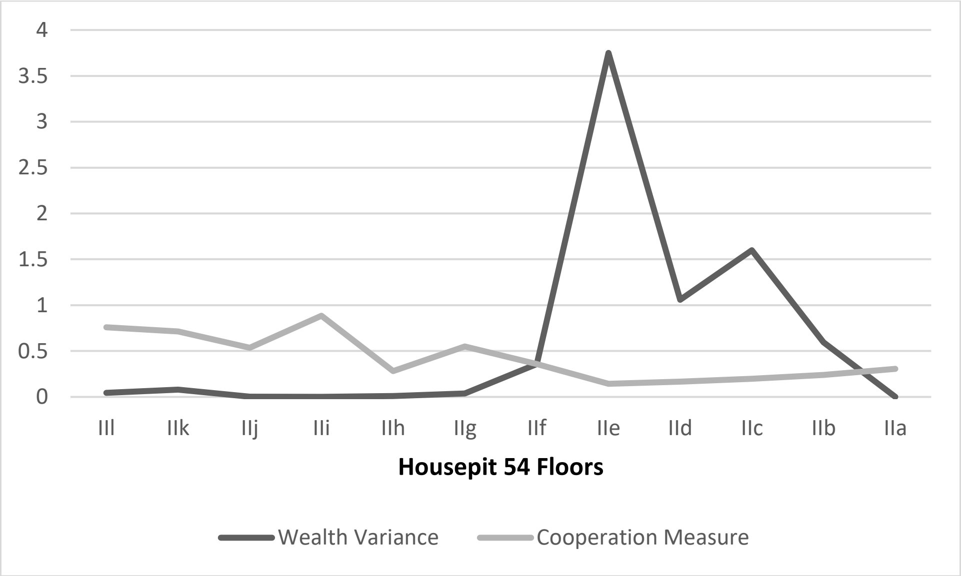

Figure 3.28. Distribution of scores for wealth variance versus cooperation measure.

Conclusions

Analysis of Housepit 54 lithic artifacts from the IIa through IIo floors identified 12,873 flakes and 1700 tools and cores. These artifacts have been used to examine occupational consistency, technological trends, and sociality between the house floors. A number of conclusions have been drawn from these studies. First, data suggest a high degree of consistency in the nature of occupations between floors and activities areas within floors. Lithic artifacts suggest a similar profile of discarded tools between activity areas on floors and between floors.

We interpret this to mean that the house was occupied by domestic groups (families) who consistently occupied household space associated with our excavated blocks. Second, technological analysis confirms technological focus on maintenance of tools primarily made from fine grained materials (dacite and cherts) and to a lesser degree coarse materials and slate. Technological studies also suggest that biface reduction increased in importance over time and that most chipped stone tools and cores fluctuated in frequency between floors as predicted by measures of household economic success (cache pit volume) and projections of population size. Expanded focus on biface production and increases in bipolar cores, flake tools, and formed (portable long-use) tools during BR 3 times is correlated with developments indicated by the analysis of material wealth indicators. Third, analysis of wealth markers indicated one domestic group apparently achieved a high degree of distinction from other such groups within the house. Critically this group appears to have transmitted material and rights and access thereof down across three subsequent generations. The initiation of the pattern appears associated with a peak in subsistence productivity and population but then persisted across decades of declining resource conditions. Thus we conclude that the house and likely village had hit a tipping point likely triggered by the demographic spike and sudden competition for resources that favored a transition from relative egalitarianism to measurable inter-family inequality. However, as noted in Chapter 2, membership in Housepit 54 ended the pattern of inequality and buried the Block D area in rim-like sediment perhaps ritually marking a return to egalitarianism.

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Chapter Four
Faunal Analysis

(Anna Marie Prentiss and Kathryn Bobolinski)

This chapter introduces the faunal remains from floors IIa through IIo in Housepit 54. It concludes with an analysis of subsistence variability between floors that is linked to the previously identified record of demographic fluctuations. Excavations and subsequent lab investigations identified 32,282 Osteichthyes (fish) and 10,463 Mammalia (mammals), 82 avian, 22 Mollusca, and 1097 unidentifiable specimens (total N=43,946) from the Housepit 54 floors and roofs during the BR 2 and 3 periods.

Faunal Analysis Methods

The analysis of the faunal materials recovered from the Bridge River village site during the 2016 field season followed methods widely presented in archaeological literature pertaining to the subject (e.g. Cannon 1987; Gilbert 1980; Gilbert et al. 1981; Grayson 1984; Lyman 1994a, 2008; Reitz and Wing 2008).

During fieldwork, faunal materials were recorded and point-provenienced *in situ* when possible before collection. All other excavated faunal materials were screened through a 1/8th -inch mesh on site. Other faunal materials were recovered from the heavy fractions of the floatation samples taken during excavation. Analyses of heavy fraction samples are still underway and are not described in this report.

Faunal specimens from the Bridge River village site were analyzed individually in a laboratory setting at the University of Montana, Missoula using the comparative collections currently housed in the Phillip L. Wright Zoological Museum and relying upon various published sources. These include *Mammalian Osteology* (Gilbert 1980), *Marine Fish Osteology: A Manual for Archaeologists* (Cannon 1987), *Avian Osteology* (Gilbert et al 1985), *Comparative Osteology* (Adams and Crabtree 2012), *Human and Nonhuman Bone Identification: A Concise Field Guide* (France 2011), *Mammal Remains from Archaeolgical Sites* (Olson 1964), *Osteology for the Archeologist* (Olson 1979), and *Fish, Amphibian and Reptile Remains from Archaeological Sites* (Olson 1968). The faunal specimens were identified to the most specific taxonomic classification possible using the resources mentioned above. All specimens were also classified where possible by animal size class (Table 4.1). The bone specimens were first classified as mammal, avian or fish before being categorized via size class. The faunal specimens were also weighed to the nearest .01 grams and measured in millimeters using calipers. Additionally, all of the faunal materials were analyzed for element type (ulna, humerus, etc.), portion of bone present (proximal, distal, etc.), amount of bone fusion, completeness, bone type (cancellous, cortical, etc.), side (right/left), age (sub adult/adult) and fracture morphology (spiral, transverse, etc.) (Sadek-Kooros 1975). This information, particularly the fracture morphology and the size of the faunal materials, may help to determine the intensity of processing that was performed at Housepit 54. Measures of faunal processing intensity have proven useful in indicating access to resources and could also potentially be used as an indication of resource scarcity (Butler and Campbell 2004; Broughton 1994; Janetski 1997; Prentiss et al. 2012). In addition, the presence of highly fragmentary faunal materials with spiral fracturing on long bones has been connected to marrow and grease extractions (Binford 1978, 1981; Klein and Cruz-Uribe 1984). Lastly, burning on bone materials can indicate how food preparation occurred, where the specimens were in relation to a heat source and how hot the heat source might have been (Shipman et al. 1984).

Also noted in the analysis of the faunal materials was the presence of human modifications on faunal specimens such as cut marks, trampling, and abrasions (Buikstra and Swegle 1989; Fiorillo 1989; Lyman 1978, 1979, 1994b; Micozzi 1991; Haglund and Sorg 1997; Shipman et al. 1984; Reitz and Wing 2008; White 2012). Data regarding the human modification of bone can be used to infer information regarding to food preparation and other human behaviors (Lyman 1994; Reitz and Wing 2008). Additionally, the presence of carnivore marks such as gnawing, punctures, pitting and digestion were noted (Faith et al. 2007; Micozzi 1991, Fernandez-Jalvo et al. 2014; Reitz and Wing 2008). Finally, other observances made by the analysts were written down in the notes section of the faunal forms.

All faunal data collected were initially recorded on paper forms before being typed into a finalized Excel table. Provenience and collection data (excavation unit, excavation quadrant, etc.) were included on both the written and digital copies of the faunal forms.

Table 4.1. Description of the different faunal size classes.

Fauna	**Size Class**	**Definition**
Fish	1	1/2 the size of trout and smaller
	2	Between size class 1 and trout
	3	Between trout and sockeye salmon
	4	Between sockeye salmon and king salmon
	5	Bigger than king salmon
Mammal	1	Mouse-sized animals and smaller
	2	Between mouse and muskrat
	3	Between muskrat and beaver
	4	Between beaver and deer
	5	Bigger than deer
Avian	1	Wood duck-sized animals and smaller
	2	Between wood duck and mallard
	3	Between mallard and Canadian goose
	4	Between Canadian goose and turkey
	5	Bigger than turkey

Data

This section provides basic data in table form (Tables 4.2 to 4.34) to describe faunal remains by major stratum (floors and roofs).

Table 4.2. Taxa from floor IIa.

Taxon/Taxa	**Level**	**Level 2**	**Level 3**	**Level 4**	**Stratum IIa Totals**
Fish	201	9	2	77	**290**
Indeterminate	47	3	0	7	**57**
Oncorhynchus mykiss	1	1	0	0	**2**
Oncorhynchus nerka	11	0	0	0	**11**
Oncorhynchus tshawytscha	12	0	0	12	**24**
Salmonidae	130	6	2	58	**196**
Mammal	409	188	19	31	**648**
Canid	6	0	0	0	**6**
Castor canadensis	3	0	0	0	**3**
Indeterminate	356	184	19	30	**589**
Odocoileus	42	4	0	2	**48**
Ovis canadensis	2	0	0	0	**2**
Unidentifiable	2	0	0	1	**3**
Total	**612**	**197**	**21**	**109**	**941**
Size class	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Stratum IIa Totals**
Fish	43	3	1	1	**48**
1	0	0	0	0	**0**
2	16	2	1	0	**19**
3	15	1	0	0	**16**
4	12	0	0	1	**13**
5	0	0	0	0	**0**
Mammal	388	68	8	22	**486**
1	2	1	0	1	**4**
2	2	0	0	0	**2**
3	31	0	0	0	**31**
4	353	67	8	21	**449**
5	0	0	0	0	**0**
Total	**431**	**71**	**9**	**23**	**534**

Table 4.3. Faunal data from floor IIb.

Taxon/Taxa	level 1	Level 2	Stratum IIb Totals
Fish	4331	82	**4413**
Indeterminate	542	10	**552**
Oncorhynchus	86	0	**86**
Oncorhynchus mykiss	8	0	**8**
Oncorhynchus nerka	2995	72	**3067**
Oncorhynchus tshawytscha	6	0	**6**
Salmonidae	694	0	**694**
Mammal	1945	17	**1962**
Artiodactyl	10	0	**10**
Canid	6	0	**6**
Castor canadensis	13	0	**13**
Indeterminate	1855	13	**1868**
Odocoileus	36	0	**36**
Odocoileus hemionus	24	3	**27**
Rodentia	1	1	**2**
Avian	8	0	**8**
Unidentifiable	51	0	**51**
Total	**6335**	**99**	**6434**
Size class	**Level 1**	**Level 2**	**Stratum IIb Totals**
Fish	3585	82	**3667**
1	1	0	**1**
2	14	0	**14**
3	3558	82	**3640**
4	12	0	**12**
5	0	0	**0**
Mammal	1768	17	**1785**
1	1	1	**2**
2	9	0	**9**
3	90	0	**90**
4	1668	16	**1684**
5	0	0	**0**
Avian	7	0	**7**
1	4	0	**4**
2	2	0	**2**
3	1	0	**1**
4	0	0	**0**
5	0	0	**0**
Total	**5360**	**99**	**5459**

Table 4.4. Faunal data from two features on IIb.

Stratum IIb Feature - Totals		**D-1 2014**
Taxon/Taxa	**Sum**	**Sum**
Fish	**7**	**9**
Oncorhynchus	**0**	**2**
Oncorhynchus nerka	**0**	**7**
Salmonidae	**7**	**0**
Mammal	**4**	**2**
Indeterminate	**4**	**1**
Rodentia	**0**	**1**
Unidentifiable	**0**	**5**
Total	**11**	**16**

Table 4.5. Faunal data from floor IIc.

Taxon/Taxa	level 1	Level 2	Level 4	Stratum IIc Totals
Fish	1826	1	4	**1831**
Indeterminate	882	0	0	**882**
Oncorhynchus	66	0	0	**66**
Oncorhynchus mykiss	12	0	0	**12**
Oncorhynchus nerka	855	1	4	**860**
Salmonidae	11	0	0	**11**
Mammal	1192	0	0	**1192**
Artiodactyl	2	0	0	**2**
Canid	6	0	0	**6**
Castor canadensis	3	0	0	**3**
Indeterminate	765	0	0	**765**
Odocoileus	371	0	0	**371**
Odocoileus hemionus	41	0	0	**41**
Ovis canadensis	4	0	0	**4**
Avian	7	0	0	**7**
Mollusk	1	0	0	**1**
Unidentifiable	85	0	0	**85**
Total	**3111**	**1**	**4**	**3116**
Size class	**Level 1**	**Level 2**	**Level 4**	**Stratum IIc Totals**
Fish	905	1	4	**910**
1	0	0	0	**0**
2	25	0	0	**25**
3	879	1	4	**884**
4	1	0	0	**1**
5	0	0	0	**0**
Mammal	996	0	0	**996**
1	0	0	0	**0**
2	0	0	0	**0**
3	96	0	0	**96**
4	900	0	0	**900**
5	0	0	0	**0**
Avian	3	0	0	**3**
1	1	0	0	**1**
2	0	0	0	**0**
3	1	0	0	**1**
4	1	0	0	**1**
5	0	0	0	**0**
Total	**1904**	**1**	**4**	**1909**

Table 4.6. Faunal data from features on floor IIc.

Stratum IIc Feature - Levels	**B-14**	**D-5**	**D-6**	**D-10**	**D-13**			**D-15**
Taxon/Taxa	**Sum**	**Sum**	**Sum**	**Sum**	**1**	**N/A**	**Sum**	**Sum**
Fish	**4**	**0**	**3**	**125**	61	1	**62**	**62**
Indeterminate	**0**	**0**	**0**	**3**	39	0	**39**	**54**
Oncorhynchus	**0**	**0**	**0**	**0**	14	0	**14**	**7**
Oncorhynchus mykiss	**0**	**0**	**0**	**0**	0	0	**0**	**0**
Oncorhynchus nerka	**4**	**0**	**3**	**122**	8	1	**9**	**1**
Salmonidae	**0**	**0**	**0**	**0**	0	0	**0**	**0**
Mammal	**0**	**15**	**0**	**60**	32	1	**33**	**390**
Artiodactyl	**0**	**0**	**0**	**0**	0	0	**0**	**0**
Canid	**0**	**0**	**0**	**3**	0	0	**0**	**0**
Castor canadensis	**0**	**0**	**0**	**0**	0	0	**0**	**0**
Indeterminate	**0**	**15**	**0**	**55**	32	1	**33**	**19**
Odocoileus	**0**	**0**	**0**	**0**	0	0	**0**	**371**
Odocoileus hemionus	**0**	**0**	**0**	**1**	0	0	**0**	**0**
Ovis canadensis	**0**	**0**	**0**	**1**	0	0	**0**	**0**
Avian	**0**	**0**	**0**	**1**	0	0	**0**	**0**
Mollusk	**0**	**0**	**0**	**0**	0	0	**0**	**0**
Unidentifiable	**0**	**0**	**0**	**1**	25	0	**25**	**0**
Total	**4**	**15**	**3**	**187**	**118**	**2**	**120**	**452**

Table 4.7. Faunal data from floor IId.

Taxon/Taxa	**Level 1**	**Level 2**	**N/A**	**Stratum IId Totals**
Fish	1275	10	573	**1858**
Indeterminate	883	3	455	**1341**
Oncorhynchus	8	0	63	**71**
Oncorhynchus mykiss	77	0	19	**96**
Oncorhynchus nerka	295	7	36	**338**
Oncorhynchus tshawytscha	2	0	0	**2**
Salmonidae	10	0	0	**10**
Mammal	613	6	46	**665**
Artiodactyl	23	0	12	**35**
Canid	4	0	0	**4**
Cervid	6	0	0	**6**
Castor canadensis	4	0	0	**4**
Indeterminate	555	6	24	**585**
Odocoileus	0	0	10	**10**
Odocoileus hemionus	14	0	0	**14**
Rodentia	6	0	0	**6**
Ursus arctos horribilis	1	0	0	**1**
Avian	11	0	0	**11**
Mollusk	19	0	0	**19**
Unidentifiable	26	0	0	**26**
Total	**1944**	**16**	**619**	**2579**

Size class	**Level 1**	**Level 2**	**N/A**	**Stratum IId Totals**
Fish	424	10	118	552
1	0	0	0	0
2	80	0	19	99
3	342	10	99	451
4	2	0	0	2
5	0	0	0	0
Mammal	333	6	22	361
1	6	0	0	6
2	8	0	0	8
3	112	0	0	112
4	202	6	22	230
5	5	0	0	5
Avian	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0

4	0	0	0	0
5	0	0	0	0
Total	757	16	140	1826

Table 4.8. Faunal data from features on floor IId.

Stratum IId Feature - Levels	**A-17**	**C-2**	**D-10 2014**	**D-11**	**D-12**			**D-16**				**D-16a**					**D-16b**				**D-18 2014**		
Taxon/Taxa	**Sum**	**Sum**	**Sum**	**Sum**	**1**	**N/A**	**Sum**	**1**	**2**	**N/A**	**Sum**	**1**	**2**	**3**	**N/A**	**Sum**	**1**	**2**	**N/A**	**Sum**	**1**	**2**	**Sum**
Fish	**3**	**8**	**573**	**0**	100	6	**106**	29	0	537	**566**	5	7	11	1	**24**	0	4	5	**9**	6	1	**7**
Indeterminate	**0**	**5**	**455**	**0**	98	6	**104**	24	0	440	**464**	3	7	11	1	**22**	0	3	5	**8**	3	0	**3**
Oncorhynchus	**0**	**0**	**63**	**0**	0	0	**0**	1	0	1	**2**	1	0	0	0	**1**	0	1	0	**1**	2	1	**3**
Oncorhynchus mykiss	**0**	**0**	**19**	**0**	0	0	**0**	0	0	69	**69**	1	0	0	0	**1**	0	0	0	**0**	0	0	**0**
Oncorhynchus nerka	**3**	**3**	**36**	**0**	2	0	**2**	4	0	26	**30**	0	0	0	0	**0**	0	0	0	**0**	1	0	**1**
Oncorhynchus tshawytscha	**0**	**0**	**0**	**0**	0	0	**0**	0	0	1	**1**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**
Mammal	**8**	**6**	**46**	**1**	19	12	**31**	42	22	152	**216**	4	4	4	1	**13**	2	2	0	**4**	2	0	**2**
Artiodactyl	**3**	**0**	**12**	**0**	0	1	**1**	11	2	2	**15**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**
Cervid	**0**	**0**	**0**	**0**	0	0	**0**	0	0	6	**6**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**
Indeterminate	**4**	**6**	**24**	**1**	19	11	**30**	31	20	141	**192**	4	4	4	1	**13**	2	2	0	**4**	2	0	**2**
Odocoileus	**0**	**0**	**10**	**0**	0	0	**0**	0	0	0	**0**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**
Odocoileus hemionus	**1**	**0**	**0**	**0**	0	0	**0**	0	0	3	**3**	0		0	0	**0**	0	0	0	**0**	0	0	**0**
Avian	**0**	**0**	**0**	**0**	0	0	**0**	0	0	11	**11**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**
Unidentifiable	**0**	**0**	**0**	**0**	0	0	**0**	0	0	9	**9**	0	0	0	0	**0**	0	0	0	**0**	0	0	**0**
Total	**11**	**14**	**619**	**1**	**119**	**18**	**137**	**71**	**22**	**709**	**802**	**9**	**11**	**15**	**2**	**37**	**2**	**6**	**5**	**13**	**8**	**1**	**9**

Table 4.9. Faunal data from floor IIe.

Taxon/Taxa	Level 1	Level 2	Level 3	Level 4	Level 6	Level 10	N/A	Stratum IIe Totals
Fish	5111	9	14	4	0	4	0	**5142**
Indeterminate	3530	0	0	0	0	0	0	**3530**
Oncorhynchus	448	0	0	0	0	0	0	**448**
Oncorhynchus mykiss	168	0	0	0	0	0	0	**168**
Oncorhynchus nerka	960	9	14	4	0	4	0	**991**
Oncorhynchus tshawytscha	5	0	0	0	0	0	0	**5**
Mammal	1236	23	16	7	3	1	2	**1288**
Artiodactyl	17	0	0	5	0	0	0	**22**
Canid	4	0	0	0	0	0	0	**4**
Canis familia	6	0	0	0	0	0	0	**6**
Cervid	1	0	0	0	0	0	0	**1**
Castor canadensis	8	1	1	0	0	0	0	**10**
Indeterminate	1145	21	13	2	3	0	1	**1185**
Odocoileus	1	0	0	0	0	0	0	**1**
Odocoileus hemionus	34	1	2	0	0	0	1	**38**
Ovis canadensis	3	0	0	0	0	0	0	**3**
Rodentia	17	0	0	0	0	1	0	**18**
Avian	9	0	1	0	0	0	0	**10**
Unidentifiable	78	0	0	2	0	0	1	**81**
Total	**6434**	**32**	**31**	**13**	**3**	**5**	**3**	**6521**

Size class	Level 1	Level 2	Level 3	Level 4	Level 6	Level 10	N/A	Stratum IIe Totals
Fish	1182	9	14	4	0	4	0	**1213**
1	3	0	0	0	0	0	0	**3**
2	132	0	0	0	0	0	0	**132**
3	1041	9	14	4	0	4	0	**1072**
4	6	0	0	0	0	0	0	**6**
5	0	0	0	0	0	0	0	**0**
Mammal	541	23	16	7	3	1	2	**593**
1	18	0	1	0	0	1	0	**20**
2	2	0	0	0	0	0	0	**2**
3	83	1	4	1	2	0	0	**91**
4	428	22	11	6	1	0	2	**470**
5	10	0	0	0	0	0	0	**10**
Avian	6	0	1	0	0	0	0	**7**
1	0	0	0	0	0	0	0	**0**
2	5	0	1	0	0	0	0	**6**
3	1	0	0	0	0	0	0	**1**
4	0	0	0	0	0	0	0	**0**

5	0	0	0	0	0	0	0	**0**
Total	**1729**	**32**	**31**	**11**	**3**	**5**	**2**	**1813**

Table 4.10. Faunal data from features on floor IIe.

Stratum IIe Feature - Totals	**A-12**	**B-1**	**B-3**	**B-5**	**B-6**	**B-14**	**B-15**	**B-16**	**C-1**	**C-3**
Taxon/Taxa	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**
Fish	**49**	**0**	**36**	**1**	**1**	**146**	**0**	**0**	**19**	**1**
Indeterminate	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Oncorhynchus	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Oncorhynchus mykiss	**4**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Oncorhynchus nerka	**45**	**0**	**35**	**1**	**1**	**146**	**0**	**0**	**19**	**1**
Oncorhynchus tshawytscha	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mammal	**6**	**6**	**69**	**0**	**1**	**54**	**1**	**1**	**14**	**2**
Artiodactyl	**0**	**0**	**5**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
Canid	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Canis famalia	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**
Cervid	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Castor canadensis	**0**	**0**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	**0**
Indeterminate	**6**	**6**	**58**	**0**	**1**	**38**	**1**	**1**	**11**	**0**
Odocoileus	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Odocoileus hemionus	**0**	**0**	**3**	**0**	**0**	**2**	**0**	**0**	**2**	**1**
Ovis canadensis	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Rodentia	**0**	**0**	**0**	**0**	**0**	**12**	**0**	**0**	**0**	**0**
Avian	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Unidentifiable	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	**55**	**6**	**108**	**1**	**2**	**200**	**1**	**1**	**33**	**3**

Table 4.10 continued.

D1-2016	D-4	D-5	D-8				D-9
Sum	**Sum**	**Sum**	**1**	**2**	**3**	**Sum**	**1**
0	**0**	**0**	12	7	11	**30**	46
0	**0**	**0**	11	6	10	**27**	46
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	1	1	1	**3**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	0	0	0	**0**	0
1	**2**	**3**	6	2	0	**8**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	1	0	0	**1**	0
0	**0**	**0**	0	0	0	**0**	0
1	**2**	**3**	5	2	0	**7**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	0	0	0	**0**	0
0	**0**	**0**	0	0	0	**0**	0
1	**2**	**3**	18	9	11	**38**	46

Table 4.10 continued.

Stratum IIe Feature - Totals [cont.]	**D-11**			
Taxon/Taxa	**1**	**2**	**N/A**	**Sum**
Fish	60	45	763	**868**
Indeterminate	44	38	662	**744**
Oncorhynchus	0	0	0	**0**
Oncorhynchus mykiss	8	0	65	**73**
Oncorhynchus nerka	8	7	31	**46**
Oncorhynchus tshawytscha	0	0	5	**5**
Mammal	8	7	83	**98**
Artiodactyl	0	0	2	**2**
Canid	0	0	0	**0**
Canis famalia	0	0	0	**0**
Cervid	0	0	0	**0**
Castor canadensis	0	0	0	**0**
Indeterminate	8	7	80	**95**
Odocoileus	0	0	1	**1**
Odocoileus hemionus	0	0	0	**0**
Ovis canadensis	0	0	0	**0**
Rodentia	0	0	0	**0**
Avian	0	0	0	**0**
Unidentifiable	0	0	0	**0**
Total	**68**	**52**	**846**	**966**

Table 4.10 continued.

D-20									
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Sum**
166	243	193	474	855	764	69	18	0	**2782**
159	202	173	425	768	632	64	18	0	**2441**
0	34	6	8	0	0	0	0	0	**48**
2	3	1	0	30	44	0	0	0	**80**
5	4	13	41	57	88	5	0	0	**213**
0	0	0	0	0	0	0	0	0	**0**
12	8	21	10	26	10	0	0	0	**87**
0	0	0	0	0	0	0	0	0	**0**
0	0	0	0	0	0	0	0	0	**0**
0	0	2	0	0	0	0	0	0	**2**
0	0	0	0	0	0	0	0	0	**0**
0	0	0	0	0	0	0	0	0	**0**
12	8	19	9	26	10	0	0	0	**84**
0	0	0	0	0	0	0	0	0	**0**
0	0	0	0	0	0	0	0	0	**0**
0	0	0	1	0	0	0	0	0	**1**
0	0	0	0	0	0	0	0	0	**0**
0	0	0	0	0	3	0	0	0	**3**
2	4	16	1	7	5	2	0	1	**38**
180	**255**	**230**	**485**	**888**	**782**	**71**	**18**	**1**	**2910**

Table 4.10 continued.

D-25			**D-29**	**D-30**
1	**2**	**Sum**	**1**	**1**
80	5	**85**	0	0
76	5	**81**	0	0
0	0	**0**	0	0
0	0	**0**	0	0
4	0	**4**	0	0
0	0	**0**	0	0
36	4	**40**	1	1
0	0	**0**	0	0
0	0	**0**	0	0
0	0	**0**	0	0
0	0	**0**	0	0
0	0	**0**	0	0
36	4	**40**	1	1
0	0	**0**	0	0
0	0	**0**	0	0
0	0	**0**	0	0
0	0	**0**	0	0
0	0	**0**	0	0
1	0	**1**	0	1
117	**9**	**126**	**1**	**2**

Table 4.11. Faunal remains from floor IIf.

Taxon/Taxa	**Level 1**	**Level 2**	**Stratum IIf Totals**
Fish	763	3	**766**
Indeterminate	123	0	**123**
Oncorhynchus mykiss	12	0	**12**
Oncorhynchus nerka	620	3	**623**
Oncorhynchus tshawytscha	8	0	**8**
Mammal	465	4	**469**
Artiodactyl	25	0	**25**
Canid	5	0	**5**
Canis familia	2	0	**2**
Canis lupus	3	1	**4**
Castor canadensis	7	0	**7**
Indeterminate	392	3	**395**
Odocoileus hemionus	30	0	**30**
Rodentia	1	0	**1**
Avian	1	0	**1**
Total	**1229**	**7**	**1236**
Size class	**Level 1**	**Level 2**	**Stratum IIf Totals**
Fish	763	3	766
1	0	0	0
2	14	0	14
3	741	3	744
4	8	0	8
5	0	0	8
Mammal	455	4	459
1	1	1	2
2	1	0	1
3	57	1	58
4	396	2	398
5	0	0	0
Avian	1	0	1
1	1	0	1
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
Total	**1219**	**7**	**1226**

Table 4.12. Faunal remains from features on floor IIf.

Stratum IIf Features - Totals	**A-17**	**C-1**	**C-7**	**C-23**	**C-26**
Taxon/Taxa	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**
Fish	5	0	128	0	1
Indeterminate	0	0	0	0	1
Oncorhynchus mykiss	0	0	1	0	0
Oncorhynchus nerka	5	0	127	0	0
Mammal	6	3	7	15	5
Artiodactyl	0	0	0	2	0
Canid	1	1	0	0	1
Canis familia	0	0	0	0	1
Canis lupus	1	0	0	0	0
Indeterminate	3	2	7	11	3
Odocoileus hemionus	1	0	0	2	0
Total	**11**	**3**	**135**	**15**	**6**

Table 4.13. Faunal remains from floor IIg.

Taxon/Taxa	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**N/A**	**Stratum IIg Totals**
Fish	371	17	25	12	7	6	6	0	**444**
Indeterminate	13	0	0	0	2	0	0	0	**15**
Oncorhynchus nerka	357	17	25	12	5	6	6	0	**428**
Oncorhynchus tshawytscha	1	0	0	0	0	0	0	0	**1**
Mammal	360	14	0	22	5	9	1	4	**415**
Artiodactyl	0	0	0	1	0	0	0	0	**1**
Canid	1	0	0	0	0	0	0	0	**1**
Castor canadensis	4	0	0	0	0	0	0	0	**4**
Indeterminate	305	13	0	19	2	9	0	3	**351**
Odocoileus hemionus	50	1	0	2	2	0	1	1	**57**
Ovis canadensis	0	0	0	0	1	0	0	0	**1**
Avian	4	0	0	0	0	0	0	0	**4**
Unidentifiable	2	0	0	0	0	0	0	0	**2**
Total	**737**	**31**	**25**	**34**	**12**	**15**	**7**	**4**	**865**

Size class	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**N/A**	**Stratum IIg Totals**
Fish	368	17	25	12	7	6	6	0	**441**
1	0	0	0	0	0	0	0	0	**0**
2	0	0	0	0	0	0	0	0	**0**
3	367	17	25	12	7	6	6	0	**440**
4	1	0	0	0	0	0	0	0	**1**
5	0	0	0	0	0	0	0	0	**0**
Mammal	241	6	0	5	5	3	1	4	**265**
1	0	0	0	0	0	0	0	0	**0**
2	0	0	0	0	0	0	0	0	**0**
3	35	0	0	1	0	0	0	0	**36**
4	206	6	0	4	5	3	1	4	**229**
5	0	0	0	0	0	0	0	0	**0**
Avian	4	0	0	0	0	0	0	0	**4**
1	0	0	0	0	0	0	0	0	**0**
2	3	0	0	0	0	0	0	0	**3**
3	1	0	0	0	0	0	0	0	**1**
4	0	0	0	0	0	0	0	0	**0**
5	0	0	0	0	0	0	0	0	**0**
Total	**613**	**23**	**25**	**17**	**12**	**9**	**7**	**4**	**710**

Table 4.14. Faunal remains from features on floor IIg.

Stratum IIg Features - Totals	**A-1**	**A-17**	**C-7**	**C-12**	**C-27**	**C-28**	**C-28 2014**	**C-31**	**C-33**
Taxon/Taxa	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**	**Sum**
Fish	34	21	8	1	57	1	3	3	9
Indeterminate	2	0	0	0	0	1	3	0	0
Oncorhynchus nerka	32	21	8	1	57	0	0	3	9
Mammal	56	1	27	24	34	9	17	2	4
Artiodactyl	1	0	0	0	0	0	0	0	0
Indeterminate	49	0	9	23	29	9	17	1	4
Odocoileus hemionus	5	1	18	1	5	0	0	1	0
Ovis canadensis	1	0	0	0	0	0	0	0	0
Unidentifiable	0	0	0	0	0	0	2	0	0
Total	**90**	**22**	**35**	**25**	**91**	**10**	**22**	**5**	**13**

Table 4.15. Faunal remains from floor IIh.

Taxon/Taxa	Level 1	Level 2	Level 3	Level 4	N/A	Stratum IIh Totals
Fish	834	282	169	145	1	**1431**
Indeterminate	552	211	129	0	0	**892**
Oncorhynchus mykiss	2	1	1	0	0	**4**
Oncorhynchus nerka	280	70	39	145	1	**535**
Mammal	389	108	119	39	0	**655**
Artiodactyl	1	2	2	0	0	**5**
Canid	5	1	7	7	0	**20**
Canis familia	2	0	0	0	0	**2**
Canis lupus	2	0	0	0	0	**2**
Cervid	2	2	3	0	0	**7**
Castor canadensis	5	8	4	2	0	**19**
Indeterminate	353	84	99	25	0	**561**
Odocoileus	1	0	0	0	0	**1**
Odocoileus hemionus	11	8	3	4	0	**26**
Ovis canadensis	0	1	0	1	0	**2**
Rodentia	7	2	1	0	0	**10**
Avian	1	0	0	3	0	**4**
Unidentifiable	98	21	20	0	0	**139**
Total	**1322**	**411**	**308**	**187**	**1**	**2229**
Size class	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**N/A**	**Stratum IIh Totals**
Fish	282	73	45	145	1	**546**
1	0	0	0	0	0	**0**
2	2	1	1	0	0	**4**
3	280	72	44	145	1	**542**
4	0	0	0	0	0	**0**
5	0	0	0	0	0	**0**
Mammal	293	54	101	23	0	**471**
1	9	2	1	0	0	**12**
2	2	0	1	0	0	**3**
3	30	13	11	12	0	**66**
4	247	39	88	11	0	**385**
5	5	0	0	0	0	**5**
Avian	0	0	0	3	0	**3**
1	0	0	0	3	0	**3**
2	0	0	0	0	0	**0**
3	0	0	0	0	0	**0**

4	0	0	0	0	0	**0**
5	0	0	0	0	0	**0**
Total	**575**	**127**	**146**	**171**	**1**	**1020**

Table 4.16. Faunal remains from features on floor IIh.

Stratum IIh Feature - Levels	**A-5**		**A-6**		**A-8**		**C-1**		**C-2**		
Taxon/Taxa	**N/A**	**Sum**	**N/A**	**Sum**	**N/A**	**Sum**	**N/A**	**Sum**	**1**	**N/A**	**Sum**
Fish	258	**258**	107	**107**	0	**0**	2	**2**	1	0	**1**
Indeterminate	0	**0**	0	**0**	0	**0**	2	**2**	1	0	**1**
Oncorhynchus mykiss	2	**2**	2	**2**	0	**0**	0	**0**	0	0	**0**
Oncorhynchus nerka	256	**256**	105	**105**	0	**0**	0	**0**	0	0	**0**
Mammal	107	**107**	18	**18**	1	**1**	3	**3**	2	2	**4**
Artiodactyl	2	**2**	0	**0**	0	**0**	0	**0**	0	0	**0**
Canid	11	**11**	0	**0**	0	**0**	0	**0**	0	0	**0**
Canis famalia	2	**2**	0	**0**	0	**0**	0	**0**	0	0	**0**
Canis lupus	0	**0**	0	**0**	0	**0**	0	**0**	0	0	**0**
Cervid	0	**0**	0	**0**	0	**0**	0	**0**	0	0	**0**
Castor canadensis	8	**8**	0	**0**	0	**0**	0	**0**	0	0	**0**
Indeterminate	73	**73**	18	**18**	0	**0**	3	**3**	2	2	**4**
Odocoileus	0	**0**	0	**0**	0	**0**	0	**0**	0	0	**0**
Odocoileus hemionus	10	**10**	0	**0**	1	**1**	0	**0**	0	0	**0**
Ovis canadensis	1	**1**	0	**0**	0	**0**	0	**0**	0	0	**0**
Rodentia	0	**0**	0	**0**	0	**0**	0	**0**	0	0	**0**
Avian	3	**3**	0	**0**	0	**0**	0	**0**	0	0	**0**
Unidentifiable	0	**0**	0	**0**	0	**0**	1	**1**	2	0	**2**
Total	368	**368**	125	**125**	1	**1**	6	**6**	5	2	**7**

Table 4.16 continued.

C-3						**C-6**			**C-7**			**C-9**	
1	**2**	**3**	**4**	**N/A**	**Sum**	**1**	**N/A**	**Sum**	**2**	**N/A**	**Sum**	**1**	**Sum**
35	31	12	13	24	**115**	2	22	**24**	16	64	**80**	0	**0**
35	31	12	13	24	**115**	2	22	**24**	16	64	**80**	0	**0**
0	0	0	0	0	**0**	0	0	**0**	0	0	**0**	0	**0**
0	0	0	0	0	**0**	0	0	**0**	0	0	**0**	0	**0**
16	4	4	3	12	**39**	7	23	**30**	4	3	**7**	2	**2**
0	0	0	0	0	**0**	0	0	**0**	0	0	**0**	0	**0**
0	0	0	0	4	**4**	1	0	**1**	0	0	**0**	0	**0**
0	0	0	0	0	**0**	0	0	**0**	0	0	**0**	0	**0**
0	0	0	0	0	**0**	0	0	**0**	0	0	**0**	0	**0**
3	0	0	0	0	**3**	0	0	**0**	0	0	**0**	0	**0**
0	0	0	0	0	**0**	0	0	**0**	0	0	**0**	0	**0**
12	4	4	3	8	**31**	4	22	**26**	4	3	**7**	2	**2**
0	0	0	0	0	**0**	0	0	**0**	0	0	**0**	0	**0**
0	0	0	0	0	**0**	2	0	**2**	0	0	**0**	0	**0**
0	0	0	0	0	**0**	0	0	**0**	0	0	**0**	0	**0**
1	0	0	0	0	**1**	0	1	**1**	0	0	**0**	0	**0**
0	0	0	0	0	**0**	0	1	**1**	0	0	**0**	0	**0**
0	2	3	2	5	**12**	0	12	**12**	2	0	**2**	0	**0**
51	37	19	18	41	**166**	9	58	**67**	22	67	**89**	2	**2**

Table 4.17. Faunal remains from floor IIi.

Taxon/Taxa	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**N/A**	**Stratum IIi Totals**
Fish	377	121	12	4	0	**514**
Indeterminate	309	102	11	4	0	**426**
Oncorhynchus	28	2	0	0	0	**30**
Oncorhynchus nerka	38	11	0	0	0	**49**
Salmonidae	2	6	1	0	0	**9**
Mammal	112	48	16	51	0	**227**
Cervid	1	2	0	0	0	**3**
Cervus canadensis	0	0	0	2	0	**2**
Indeterminate	108	46	16	49	0	**219**
Odocoileus hemionus	2	0	0	0	0	**2**
Rodentia	1	0	0	0	0	**1**
Avian	2	2	0	0	0	**4**
Unidentifiable	25	22	0	0	1	**48**
Total	**516**	**193**	**28**	**55**	**1**	**793**

Size class	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Stratum IIi Totals**
Fish	48	15	0	4	**67**
1	0	0	0	0	**0**
2	7	2	0	0	**9**
3	33	13	0	4	**50**
4	8	0	0	0	**8**
5	0	0	0	0	**0**
Mammal	34	32	4	51	**121**
1	4	0	0	0	**4**
2	2	1	0	0	**3**
3	2	4	0	2	**8**
4	26	27	4	49	**106**
5	0	0	0	0	**0**
Avian	0	2	0	0	**2**
1	0	0	0	0	**0**
2	0	0	0	0	**0**
3	0	2	0	0	**2**
4	0	0	0	0	**0**
5	0	0	0	0	**0**

Total	**82**	**49**	**4**	**55**	**190**

Table 4.18. Faunal remains from features on floor IIi.

Stratum IIi Feature - Totals	**A-4**		**C-12**		**C-17**	
Taxon/Taxa	**N/A**	**Sum**	**N/A**	**Sum**	**N/A**	**Sum**
Fish	3	**3**	8	**8**	2	**2**
Indeterminate	3	**3**	8	**8**	0	**0**
Oncorhynchus nerka	0	**0**	0	**0**	2	**2**
Mammal	0	**0**	0	**0**	3	**3**
Indeterminate	0	**0**	0	**0**	3	**3**
Unidentifiable	0	**0**	1	**1**	0	**0**
Total	**3**	**3**	**9**	**9**	**5**	**5**

Table 4.19. Faunal remains from floor IIj.

Taxon/Taxa	Level 1	Level 2	Stratum Iij Totals
Fish	487	133	**620**
Indeterminate	458	131	**589**
Oncorhynchus	16	0	**16**
Oncorhynchus nerka	13	2	**15**
Mammal	89	25	**114**
Artiodactyl	1	0	**1**
Indeterminate	88	25	**113**
Avian	0	1	**1**
Unidentifiable	5	13	**18**
Total	**581**	**172**	**753**
Size class	**Level 1**	**Level 2**	**Stratum Iij Totals**
Fish	88	35	**123**
1	0	7	**7**
2	0	0	**0**
3	83	28	**111**
4	5	0	**5**
5	0	0	**0**
Mammal	13	4	**17**
1	1	0	**1**
2	3	0	**3**
3	4	0	**4**
4	4	4	**8**
5	1	0	**1**
Avian	0	1	**1**
1	0	0	**0**
2	0	0	**0**
3	0	1	**1**
4	0	0	**0**
5	0	0	**0**
Total	**101**	**40**	**141**

Table 4.20. Faunal remains from features on floor IIj.

Stratum IIj Features - Totals	**A-23**	**C-16**	**C-18**
Taxon/Taxa	**Sum**	**Sum**	**Sum**
Fish	0	33	17
Indeterminate	0	33	17
Mammal	1	2	2
Indeterminate	1	2	2
Avian	1	0	0
Total	**2**	**35**	**19**

Table 4.21. Faunal remains from floor IIk.

Taxon/Taxa	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**N/A**	**Stratum IIk Totals**
Fish	3072	1507	841	534	76	8	**6038**
Indeterminate	2689	1431	736	488	68	6	**5418**
Oncorhynchus	4	0	0	0	0	0	**4**
Oncorhynchus mykiss	164	27	30	15	5	1	**242**
Oncorhynchus nerka	211	48	68	31	3	1	**362**
Oncorhynchus tshawytscha	3	1	7	0	0	0	**11**
Salmonidae	1	0	0	0	0	0	**1**
Mammal	330	85	62	23	2	1	**503**
Artiodactyl	12	2	2	4	0	0	**20**
Canid	5	1	0	0	0	0	**6**
Canis familia	3	0	0	0	0	0	**3**
Cervid	3	0	0	0	0	0	**3**
Cervus canadensis	3	0	0	1	0	0	**4**
Castor canadensis	1	0	0	0	0	0	**1**
Indeterminate	254	80	60	18	2	1	**415**
Odocoileus	7	0	0	0	0	0	**7**
Odocoileus hemionus	4	0	0	0	0	0	**4**
Ovis canadensis	1	0	0	0	0	0	**1**
Rodentia	37	2	0	0	0	0	**39**
Avian	3	0	0	1	0	0	**4**
Mollusk	0	0	1	0	0	0	**1**
Unidentifiable	242	76	54	26	1	1	**400**
Total	**3647**	**1668**	**958**	**584**	**79**	**10**	**6946**
Size class	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**N/A**	**Stratum IIk Totals**
Fish	394	279	106	46	8	2	**835**
1	13	1	0	0	0	0	**14**
2	185	215	30	15	5	1	**451**
3	193	62	69	31	3	1	**359**
4	3	1	7		0	0	**11**
5	0	0	0	0	0	0	**0**
Mammal	138	11	23	8	0	0	**180**
1	16	2	0	0	0	0	**18**
2	3	0	0	0	0	0	**3**

3	13	2	5	1	0	0	**21**
4	105	7	18	7	0	0	**137**
5	1	0	0	0	0	0	**1**
Avian	2	0	0	1	0	0	**3**
1	2	0	0	0	0	0	**2**
2	0	0	0	0	0	0	**0**
3	0	0	0	1	0	0	**1**
4	0	0	0	0	0	0	**0**
5	0	0	0	0	0	0	**0**
Total	**534**	**290**	**129**	**55**	**8**	**2**	**1018**

Table 4.22. Faunal remains from features on floor IIk.

Stratum IIk Feature - Levels	**A-1**		**A-5**			**C-5**							
Taxon/Taxa	**N/A**	**Sum**	**1**	**N/A**	**Sum**	**1**	**2**	**3**	**4**	**5**	**6**	**N/A**	**Sum**
Fish	19	**19**	14	204	**218**	524	88	356	317	64	106	73	**1528**
Indeterminate	19	**19**	14	204	**218**	419	68	288	248	52	97	65	**1237**
Oncorhynchus	0	**0**	0	0	**0**	0	0	0	0	0	0	0	**0**
Oncorhynchus mykiss	0	**0**	0	0	**0**	51	6	42	40	4	4	0	**147**
Oncorhynchus nerka	0	**0**	0	0	**0**	52	14	26	29	8	4	8	**141**
Oncorhynchus tshawytscha	0	**0**	0	0	**0**	2	0	0	0	0	1	0	**3**
Salmonidae	0	**0**	0	0	**0**	0	0	0	0	0	0	0	**0**
Mammal	0	**0**	0	0	**0**	84	75	35	29	11	15	1	**250**
Artiodactyl	0	**0**	0	0	**0**	0	2	0	3	1	0	1	**7**
Canid	0	**0**	0	0	**0**	0	0	0	3	1	1	0	**5**
Canis famalia	0	**0**	0	0	**0**	0	0	0	2	1	0	0	**3**
Cervid	0	**0**	0	0	**0**	0	1	0	1	0	0	0	**2**
Cervus canadensis	0	**0**	0	0	**0**	0	0	0	0	0	0	0	**0**
Castor canadensis	0	**0**	0	0	**0**	0	0	0	0	1	0	0	**1**
Indeterminate	0	**0**	0	0	**0**	78	71	35	18	5	5	0	**212**
Odocoileus	0	**0**	0	0	**0**	0	1	0	0	1	0	0	**2**
Odocoileus hemionus	0	**0**	0	0	**0**	0	0	0	0	1	0	0	**1**
Ovis canadensis	0	**0**	0	0	**0**	0	0	0	0	0	0	0	**0**
Rodentia	0	**0**	0	0	**0**	6	0	0	2	0	9	0	**17**
Avian	0	**0**	0	0	**0**	3	0	0	0	0	0	0	**3**
Mollusk	0	**0**	0	0	**0**	0	0	0	0	0	0	0	**0**
Unidentifiable	0	**0**	0	0	**0**	38	13	16	4	48	39	29	**187**
Total	**19**	**19**	**14**	**204**	**218**	**649**	**176**	**407**	**350**	**123**	**160**	**103**	**1968**

Table 4.22 continued.

C-22		C-24	
N/A	Sum	N/A	Sum
1	**1**	5	**5**
1	**1**	5	**5**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	2	**2**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	2	**2**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
0	**0**	0	**0**
1	**1**	**7**	**7**

Table 4.23. Faunal remains from floor IIl,

Taxon/Taxa	**Level 1**	**Level 2**	**Level 3**	**Stratum III Totals**
Fish	2576	530	420	**3526**
Indeterminate	2398	470	394	**3262**
Oncorhynchus	1	0	0	**1**
Oncorhynchus mykiss	65	15	19	**99**
Oncorhynchus nerka	111	44	7	**162**
Oncorhynchus tshawytscha	1	1	0	**2**
Mammal	143	96	47	**286**
Artiodactyl	4	3	0	**7**
Canid	3	1	0	**4**
Cervid	0	1	0	**1**
Indeterminate	129	89	46	**264**
Odocoileus	4	1	0	**5**
Rodentia	3	1	1	**5**
Avian	3	0	0	**3**
Mollusk	1	0	0	**1**
Unidentifiable	78	18	2	**98**
Total	**2801**	**644**	**469**	**3914**
Size class	**Level 1**	**Level 2**	**Level 3**	**Stratum III Totals**
Fish	150	53	23	**226**
1	0	0	0	**0**
2	66	14	17	**97**
3	81	38	6	**125**
4	3	1	0	**4**
5	0	0	0	**0**
Mammal	32	7	0	**39**
1	2	1	0	**3**
2	1	0	0	**1**
3	4	1	0	**5**
4	25	5	0	**30**
5	0	0	0	**0**
Total	**182**	**60**	**23**	**265**

Table 4.24. Faunal remains from features on floor IIl.

Stratum III Feature - Levels	**A-4**	**A-11**				
Taxon/Taxa	**Sum**	**1**	**2**	**3**	**N/A**	**Sum**
Fish	**32**	0	12	6	170	**188**
Indeterminate	**32**	0	12	5	133	**150**
Oncorhynchus mykiss	**0**	0	0	0	17	**17**
Oncorhynchus nerka	**0**	0	0	1	20	**21**
Mammal	**0**	1	5	11	70	**87**
Canid	**0**	1	0	0	1	**2**
Cervid	**0**	0	0	0	1	**1**
Indeterminate	**0**	0	4	10	68	**82**
Odocoileus	**0**	0	0	1	0	**1**
Rodentia	**0**	0	1	0	0	**1**
Unidentifiable	**0**	0	0	0	17	**17**
Total	**32**	**1**	**17**	**17**	**257**	**292**

Table 4.24 continued.

C-26		
1	**2**	**Sum**
0	200	**200**
0	175	**175**
0	23	**23**
0	2	**2**
0	2	**2**
0	0	**0**
0	0	**0**
0	2	**2**
0	0	**0**
0	0	**0**
0	2	**2**
0	**204**	**204**

Table 4.25. Faunal remains from floor IIm.

Taxon/Taxa	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Stratum IIm Totals**
Fish	1816	737	306	165	56	**3080**
Indeterminate	1776	633	150	116	49	**2724**
Oncorhynchus	1	0	0	0	0	**1**
Oncorhynchus mykiss	17	44	8	9	3	**81**
Oncorhynchus nerka	15	49	148	40	4	**256**
Oncorhynchus tshawytscha	7	11	0	0	0	**18**
Mammal	207	70	51	33	2	**363**
Artiodactyl	4	6	1	2	0	**13**
Canid	0	2	3	1	0	**6**
Canis famalia	0	0	1	0	0	**1**
Canis lupus	0	0	3	1	0	**4**
Cervid	1	0	1	0	0	**2**
Indeterminate	122	51	40	27	2	**242**
Odocoileus	2	2	0	1	0	**5**
Odocoileus hemionus	0	0	2	0	0	**2**
Rodentia	78	9	0	1	0	**88**
Avian	5	0	1	0	0	**6**
Unidentifiable	45	14	6	4	4	**73**
Total	**2073**	**821**	**364**	**202**	**62**	**3522**

Size class	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Stratum IIm Totals**
Fish	38	103	156	49	7	**353**
1	0	0	1	0	0	**1**
2	18	31	8	9	3	**69**
3	15	62	147	40	4	**268**
4	5	10	0	0	0	**15**
5	0	0	0	0	0	**0**
Mammal	151	47	44	32	2	**276**
1	74	9	0	1	0	**84**
2	1	0	15	1	0	**17**
3	0	3	13	8	0	**24**
4	76	34	16	22	2	**150**
5	0	1	0	0	0	**1**

Avian	0	0	1	0	0	**1**
1	0	0	0	0	0	**0**
2	0	0	1	0	0	**1**
3	0	0	0	0	0	**0**
4	0	0	0	0	0	**0**
5	0	0	0	0	0	**0**
Total	**189**	**150**	**201**	**81**	**9**	**630**

Table 4.26. Faunal remains from features on IIm.

Stratum IIm Features - Levels	**A-12**					**A-13**		**A-14**		
Taxon/Taxa	**1**	**2**	**3**	**N/A**	**Sum**	**1**	**Sum**	**1**	**N/A**	**Sum**
Fish	48	24	59	18	**149**	62	**62**	343	168	**511**
Indeterminate	47	20	57	18	**0**	62	**62**	301	1	**302**
Oncorhynchus	1	0	0	0	**0**	0	**0**	0	0	**0**
Oncorhynchus mykiss	0	0	0	0	**0**	0	**0**	21	0	**21**
Oncorhynchus nerka	0	4	2	0	**0**	0	**0**	21	167	**188**
Oncorhynchus tshawytscha	0	0	0	0	**0**	0	**0**	0	0	**0**
Mammal	8	3	11	1	**23**	0	**0**	151	37	**188**
Artiodactyl	3	0	0	0	**0**	0	**0**	5	2	**7**
Canid	0	0	0	0	**0**	0	**0**	4	0	**4**
Canis famalia	0	0	0	0	**0**	0	**0**	0	1	**1**
Canis lupus	0	0	0	0	**0**	0	**0**	0	4	**4**
Cervid	0	0	0	0	**0**	0	**0**	1	0	**1**
Indeterminate	5	1	10	1	**0**	0	**0**	61	28	**89**
Odocoileus	0	1	0	0	**0**	0	**0**	2	0	**2**
Odocoileus hemionus	0	0	0	0	**0**	0	**0**	0	2	**2**
Rodentia	0	1	1	0	**0**	0	**0**	78	0	**78**
Avian	0	0	0	0	**0**	0	**0**	1	0	**0**
Unidentifiable	3	4	1	4	**12**	0	**0**	20	0	**0**
Total	**59**	**31**	**71**	**23**	**184**	**62**	**62**	**494**	**205**	**699**

Table 4.26 continued.

A-15				**A-16**				**A-17**				**A-19**	
1	**2**	**N/A**	**Sum**	**1**	**2**	**3**	**Sum**	**1**	**2**	**N/A**	**Sum**	**1**	**Sum**
0	13	0	**13**	13	11	12	**36**	106	57	2	**165**	2	**2**
0	8	0	**8**	12	10	11	**33**	97	49	2	**148**	2	**2**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	2	0	**2**	0	0	0	**0**	7	2	0	**9**	0	**0**
0	3	0	**3**	1	1	1	**3**	2	6	0	**8**	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	0	2	**2**	1	0	4	**5**	11	4	2	**17**	1	**1**
0	0	0	**0**	0	0	0	**0**	2	0	0	**2**	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	0	2	**2**	1	0	4	**5**	9	4	2	**15**	1	**1**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	**0**
0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	**0**
0	0	0	**0**	0	0	0	**0**	5	0	0	**5**	2	**2**
0	**13**	**2**	**15**	**14**	**11**	**16**	**41**	**123**	**61**	**4**	**188**	**5**	**5**

Table 4.27. Faunal remains from floor IIn.

Taxon/Taxa	**Level 1**	**Level 2**	**Stratum IIn Totals**
Fish	254	23	**277**
Indeterminate	253	23	**276**
Oncorhynchus	1	0	**1**
Mammal	32	1	**33**
Artiodactyl	2	0	**2**
Cervid	1	0	**1**
Castor canadensis	1	0	**1**
Indeterminate	28	1	**29**
Avian	1	0	**1**
Unidentifiable	16	0	**16**
Total	**303**	**24**	**327**

Size class	**Level 1**	**Stratum IIn Totals**
Fish	1	**1**
1	0	**0**
2	0	**0**
3	1	**1**
4	0	**0**
5	0	**0**
Mammal	25	**25**
1	0	**0**
2	0	**0**
3	1	**1**
4	24	**24**
5	0	**0**
Total	**26**	**26**

Table 4.28. Faunal remains from floor IIo.

Taxon/Taxa	Level 1	Level 2	Stratum IIo Totals
Fish	175	85	**260**
Indeterminate	150	76	**226**
Oncorhynchus	0	1	**1**
Oncorhynchus mykiss	19	7	**26**
Oncorhynchus nerka	6	1	**7**
Mammal	20	16	**36**
Artiodactyl	1	1	**2**
Canid	1	0	**1**
Castor canadensis	1	0	**1**
Indeterminate	17	14	**31**
Rodentia	0	1	**1**
Unidentifiable	6	8	**14**
Total	**201**	**109**	**310**

Size class	Level 1	Level 2	Stratum IIo Totals
Fish	22	9	**31**
1	0	0	**0**
2	17	6	**23**
3	5	2	**7**
4	0	1	**1**
5	0	0	**0**
Mammal	10	8	**18**
1	0	1	**1**
2	0	2	**2**
3	3	0	**3**
4	7	5	**12**
5	0	0	**0**
Total	**32**	**17**	**49**

Table 4.29. Faunal remains from a feature on floor IIo.

Stratum IIo Feature - Levels	**A-23**	
Taxon/Taxa	**1**	**Sum**
Fish	2	**2**
Indeterminate	2	**2**
Mammal	1	**1**
Indeterminate	1	**1**
Total	**3**	**3**

Figure 4.30. Faunal remains from the Va roof.

Taxon/Taxa	**Level 1**	**Level 2**	**Level 3**	**N/A**	**Stratum Va Totals**
Fish	507	888	161	1	**1557**
Indeterminate	210	246	15	0	**471**
Oncorhynchus	0	1	3	0	**4**
Oncorhynchus mykiss	25	8	1	0	**34**
Oncorhynchus nerka	198	606	138	0	**942**
Oncorhynchus tshawytscha	8	13	0	0	**21**
Salmonidae	66	14	4	1	**85**
Mammal	944	397	107	15	**1463**
Artiodactyl	6	2	2	0	**10**
Canid	5	3	4	0	**12**
Castor canadensis	5	5	2	0	**12**
Indeterminate	822	361	83	14	**1280**
Odocoileus hemionus	104	24	15	0	**143**
Ovis canadensis	2	0	0	0	**2**
Rodentia	0	2	1	0	**3**
Ursus americanus	0	0	0	1	**1**
Avian	14	4	0	0	**18**
Unidentifiable	15	10	18	0	**43**
Total	**1480**	**1299**	**286**	**16**	**3081**

Size class	**Level 1**	**Level 2**	**Level 3**	**N/A**	**Stratum Va Totals**
Fish	333	873	150	1	**1357**
1	0	0	0	0	**0**
2	61	26	5	1	**93**
3	262	839	145	0	**1246**
4	10	8	0	0	**18**
5	0	0	0	0	**0**
Mammal	807	341	79	15	**1242**
1	1	1	0	0	**2**
2	3	3	2	0	**8**
3	10	10	5	0	**25**
4	793	327	72	15	**1207**
5	0	0	0	0	**0**

Avian	12	4	0	0	**16**
1	0	0	0	0	**0**
2	1	1	0	0	**2**
3	11	2	0	0	**13**
4	0	1	0	0	**1**
5	0	0	0	0	**0**
Total	**1152**	**1218**	**229**	**16**	**2615**

Table 4.31. Faunal remains from the Vb1 roof.

Taxon/Taxa	**Level 1**	**Stratum Vb1 Totals**
Mammal	97	**97**
Castor canadensis	2	2
Indeterminate	83	83
Odocoileus hemionus	8	8
Ovis canadensis	3	3
Rodentia	1	1
Total	**97**	**97**
Size class	**Level 1**	**Stratum Vb1 Totals**
Mammal	90	90
1	0	0
2	1	1
3	5	5
4	84	84
5	0	0
Total	**90**	**90**

Table 4.32. Faunal remains from the Vb roof.

Taxon/Taxa	Level 1	Stratum Vb Totals
Fish	41	**41**
Oncorhynchus nerka	32	**32**
Salmonidae	9	**9**
Mammal	21	**21**
Artiodactyl	1	**1**
Indeterminate	18	**18**
Odocoileus hemionus	1	**1**
Rodentia	1	**1**
Total	**62**	**62**
Size class	**Level 1**	**Stratum Vb2 Totals**
Fish	41	**41**
1	0	**0**
2	0	**0**
3	41	**41**
4	0	**0**
5	0	**0**
Mammal	21	**21**
1	0	**0**
2	1	**1**
3	0	**0**
4	20	**20**
5	0	**0**
Total	**62**	**62**

Table 4.33. Faunal remains from the Vb3 roof.

Taxon/Taxa	**Level 1**	**Level 2**	**Stratum Vb3 Totals**
Fish	1	1	**2**
Oncorhynchus mykiss	1	0	**1**
Oncorhynchus nerka	0	1	**1**
Mammal	15	2	**17**
Indeterminate	14	1	**15**
Odocoileus hemionus	1	1	**2**
Total	**16**	**3**	**19**
Size class	**Level 1**	**Level 2**	**Stratum Vb3 Totals**
Fish	1	1	**2**
1	0	0	**0**
2	1	0	**1**
3	0	1	**1**
4	0	0	**0**
5	0	0	**0**
Mammal	15	2	**17**
1	0	0	**0**
2	0	0	**0**
3	0	0	**0**
4	15	2	**17**
5	0	0	**0**
Total	**16**	**3**	**19**

Figure 4.34. Faunal remains from the Vc roof.

Taxon/Taxa	**Level 1**	**Stratum Vc Totals**
Fish	95	**95**
Indeterminate	1	**1**
Oncorhynchus mykiss	1	**1**
Oncorhynchus nerka	92	**92**
Oncorhynchus tshawytscha	1	**1**
Mammal	106	**106**
Artiodactyl	16	**16**
Indeterminate	68	**68**
Odocoileus hemionus	22	**22**
Total	**201**	**201**
Size class	**Level 1**	**Stratum Vc Totals**
Fish	199	**199**
1	0	**0**
2	1	**1**
3	93	**93**
4	105	**105**
5	0	**0**
Mammal	2	**2**
1	0	**0**
2	0	**0**
3	1	**1**
4	1	**1**
5	0	**0**
Total	**201**	**201**

Basic Data Distributions

In order to explore variation in Housepit 54 faunal remains it was necessary to calculate a number of quantitative indices relying upon the IIa-IIl floors. Floors IIm-IIo are excluded as we remains unclear as to the actual extent of these floors making it impossible to calculate accurate density measures. We explore relative importance of major prey species using densities calculated by dividing counts by sediment volume per floor (see Chapter 2). We further examined variation in prey importance over time using abundance indices (c.f. Broughton 1994). More specifically, we calculated an Osteichthyes index using the equation ΣNISP Osteichthyes/ΣNISP Osteichthyes + NISP Mammalia. We also calculated a Salmonidae index with the equation ΣNISP Salmonidae/ ΣNISP Salmonidae + NISP Artiodactyla. Finally, we measured diet breadth using evenness and richness indices. For evenness, we used Pielou's J index (Pielou 1966). For richness, we calculated NTaxa. Data are summarized on Tables 4.35 to 4.38.

Table 4.35. Densities by floor for Osteichthyes (bony fish) and Salmonidae (salmon and trout).

	Osteichthyes Density	Salmonidae Density
IIl	6780.8	507.7
IIk	4626.8	475.1
IIj	1577.6	78.9
IIi	897	153.6
IIh	1550.4	583.9
IIg	740	715
IIf	1062.4	891.8
IIe	6187.7	1939.8
IId	1739.7	484.1
IIc	1973.1	1022.6
IIb	3564.6	3118.7
IIa	222.4	178.7

Table 4.36. Densities by floor for Mammalia (mammals) and Artiodactyla (hoofed mammals).

	Mammalia Density	Artiodactyla Density
IIl	555	25
IIk	385.4	29.9
IIj	290.1	2.5
IIi	396.2	12.2
IIh	709.6	44.4
IIg	691.7	98.3
IIf	650.5	76.3
IIe	1549.9	78.2
IId	622.7	60.9
IIc	1284.5	4504
IIb	1584.8	589
IIa	496.9	38.3

Table 4.37. Abundance indices (AI) for Osteichthyes and Salmonidae.

	Osteichthyes AI	Salmonidae AI
IIl	0.92	0.95
IIk	0.92	0.94
IIj	0.84	0.97
IIi	0.69	0.93
IIh	0.69	0.93
IIg	0.52	0.88
IIf	0.62	0.92
IIe	0.8	0.96
IId	0.74	0.89
IIc	0.61	0.69
IIb	0.69	0.98
IIa	0.31	0.82

Table 4.38. Evenness (Pielou's J) and richness (NTaxa) for Housepit 54 floors.

	Evenness	Richness
IIl	0.19	6
IIk	0.21	9
IIj	0.2	2
IIi	0.26	5
IIh	0.31	7
IIg	0.27	6
IIf	0.17	6
IIe	0.15	7
IId	0.26	8
IIc	0.36	7
IIb	0.07	6
IIa	0.4	5

We measured fish remains on the scale of all fish (Osteichthyes) and salmonids (Salmonidae). The two measures should be similar as each are likely dominated by salmonids. The primary difference between them is the presence of otherwise unidentifiable spines and ribs within Osteichthyes. The relationships are relatively similar with three high points representing periods of likely high access to salmonids and lows representing periods of weakness in the fishery (Figure 4.1). Results correspond with our previous assessment of demography and storage (Prentiss, Foor, and Hampton 2018).

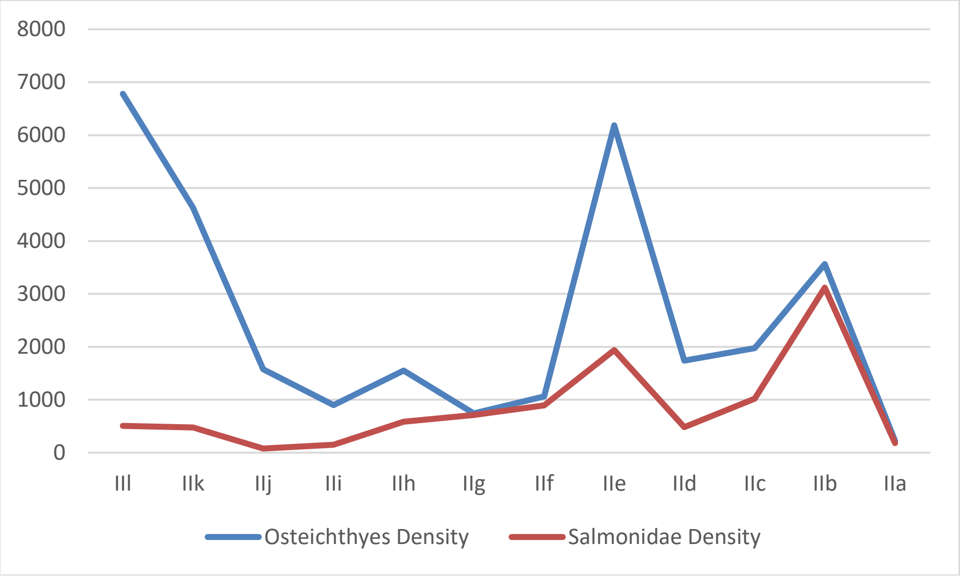

Figure 4.1. Densities by floor for Osteichthyes (bony fish) and Salmonidae (salmon and trout).

Inter-floor variability in mammal and artiodactyl densities correspond only in part to the fisheries record (Figure 4.2). Similarly, there is a deep trough during IIi and IIj and a subsequent increase on BR 3 floors. Twin peaks on IIe and IIb in the density of mammal remains could reflect increased focus on artiodactyls but likely also reflect high local populations of these animals. This could be a bi-product of human population dynamics that had been low prior to IIe and IIb. Abundance indices allow us to make better sense of these data (Figure 4.3). It is evident from these data that to a substantial degree, deer provided critical food when fisheries were weak. This we see low points in the abundance indices on IIg and IIc when artiodactyl data show higher points. An exception to this is on IIe where both fisheries and artiodactyl populations appear to have been productive favoring significant accumulations of both. It is also possible that the house on IIe invested in collecting larger than normal quantities of food at this time for social reasons. These conclusions are further supported by the evenness measure (Figure 4.4) in which re recognize low evenness generally associated with productive fisheries (IIL-IIK, IIf-IIe, and IIb). In contrast we also recognize high evenness when the fishery is weak (IIi-IIg, IId-IIc, and IIa).

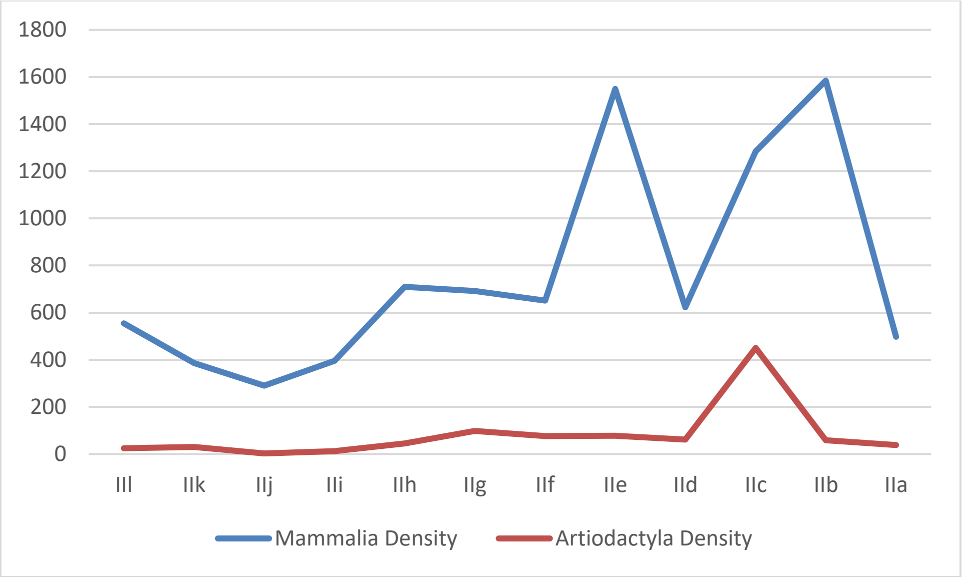

Figure 4.2. Densities by floor for Mammalia (mammals) and Artiodactyla (hoofed mammals).

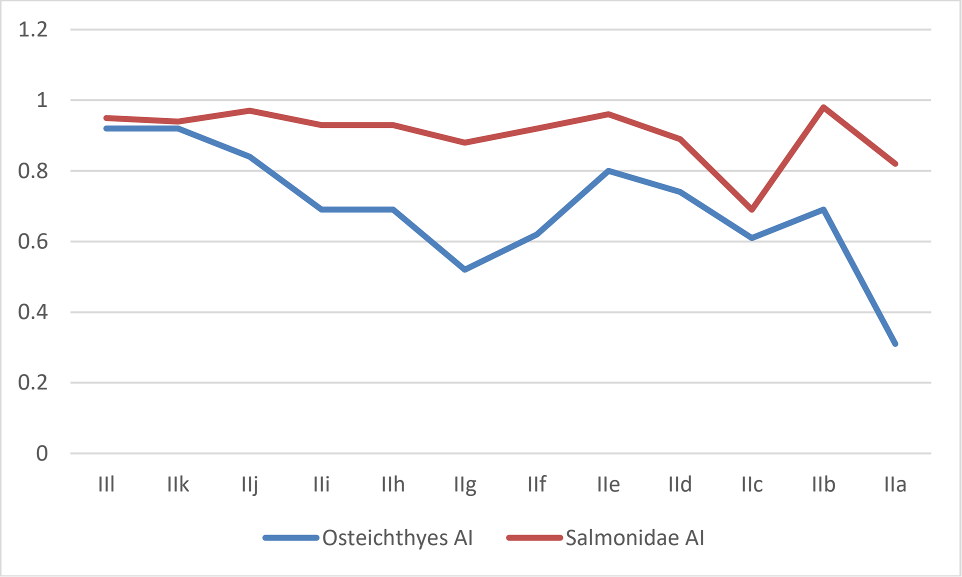

Figure 4.3. Abundance indices (AI) for Osteichthyes and Salmonidae.

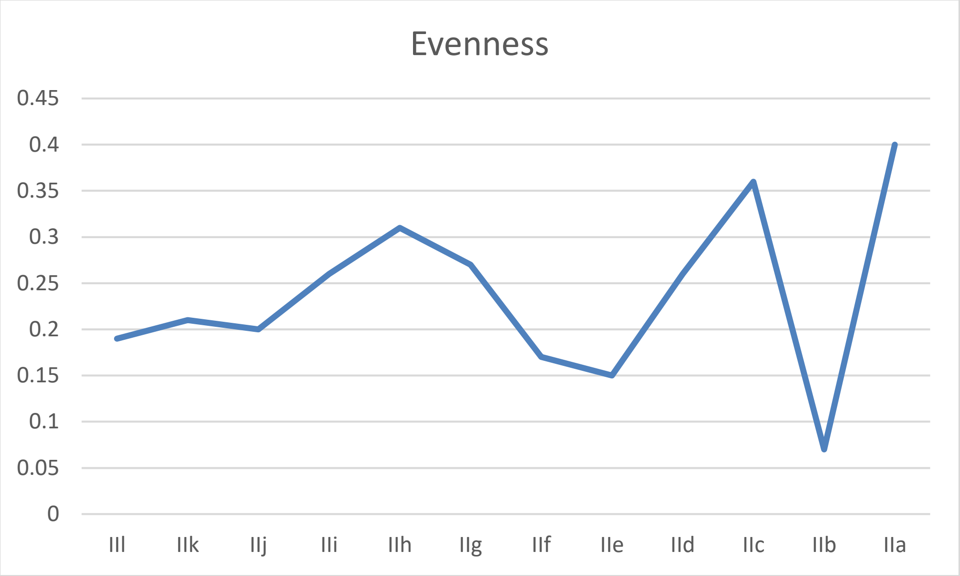

Figure 4.4. Evenness (Pielou's J) for Housepit 54 floors.

Richness is correlated with sample size (r_{ho}=.65, p=.022) but the distribution still reflects some dynamics. In particular, the low score on IIi and IIj are consistent with an argument that winter occupations at this time were brief.

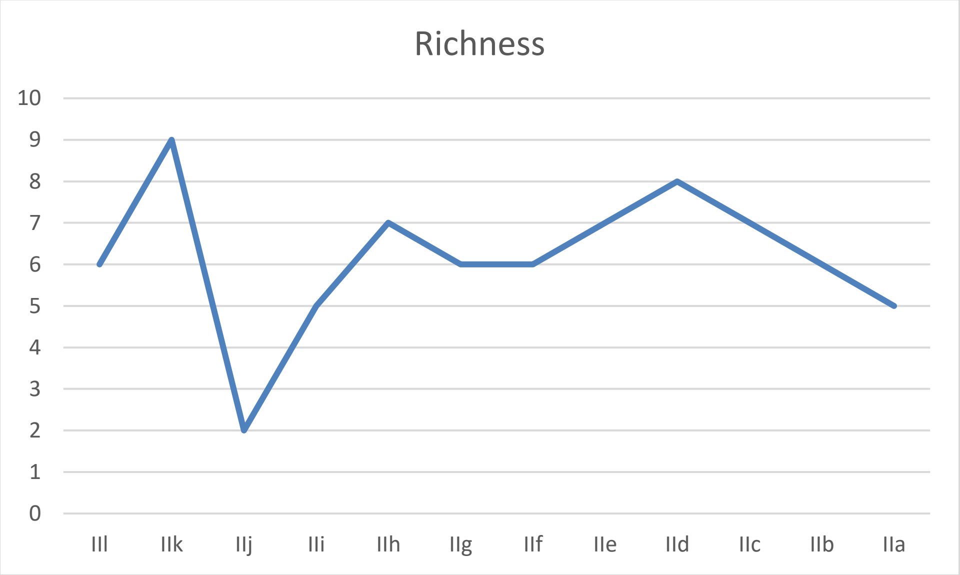

Figure 4.5. Richness (NTaxa) for Housepit 54 floors.

Data analysis regarding taphonomic variability on Housepit 54 floors is ongoing and thus the data presented here are tentative pending further investigation. However, we have enough to begin to recognize some patterns (Tables 4.39 and 4.40). We developed two abundance indices to measure inter-floor variation in element frequencies under the assumption that highly transported assemblages would favor appendicular parts for artiodactyls (Williams-Larson 2017) and thoracic vertebrae (associated with highest utility value) for salmonids (Prentiss et al. 2012b). The appendicular index is defined as ΣNISP appendicular elements/Σ NISP appendicular + ΣNISP axial elements. Data (Figure 4.6) suggest that hunting pressure varied largelywith human population as reflected in Housepit 54 (Prentiss, Foor, and Hampton 2018). The index scores are lowest on IIi and IIj and rise steadily towards IId before fluctuating lower and then higher on IId through IIa. The exception to the population relationship is IId where data suggest the HP 54 population had dropped substantially. These data (Figure 4.6) indicate that artiodactyl hunting continued with transport distances likely increasing or the relative frequency of long distance trips increasing. Our thoracic vertebrae index is constructed as: ΣNISP thoracic vertebrae / Σ NISP thoracic vertebrae + ΣNISP all other elements. These data pattern to relationships with productivity of the fishery with its strongest periods on IIl-IIk and IIe. The rise in the thoracic index on IIa is not in line with other indicators as bone densities measure suggest a reduction in access to salmonids at this time. This could be an artifact of the stage in data quantification regarding elements and will be subject to further exploration.

Table 4.39. Preliminary element data for mammals and salmonids (*Oncorhynchus sp.*) used to calculate appendicular and thoracic vertebrae abundance indices.

Floor	ONC TH	ONC CR+PTH	ONC THOR Index	MA AP	MA AX+SK	MA AP Index
IIa	22	8	.43	91	20	.82
IIb	60	249	.13	27	23	.54
IIc	67	74	.26	21	19	.53
IId	85	146	.26	35	17	.67
IIe	278	368	.38	30	17	.64
IIf	47	76	.32	23	18	.56
IIg	33	44	.29	18	20	.47
IIh	22	78	.19	16	11	.43
IIi	3	21	.06	1	3	.25
IIj	4	10	.18	0	1	0
IIk	239	280	.44	6	14	.3
IIl	110	97	.5	5	7	.42

ONC TH=*Oncorhynchus sp*. NISP thoracic vertebrae; ONC CR+PTH=*Oncorhynchus sp*. NISP cranial plus post-thoracic vertebrae; ONC THOR Index=abundance index for *Oncorhynchus sp*. thoracic vertebrae; MA AP=Mammal NISP appendicular elements; MA AX+SK=Mammal NISP axial and skull elements; MA AP Index=Mammal appendicular abundance index.

Table 4.40. Preliminary data for calculation of abundance indices for calcined bone and bone size (both for mammals).

Floor	NSP Calcined	Calcination Index	NSP <9 mm size	Smallest Size Class Index
IIa	51	.17	134	.44
IIb	50	.1	216	.43
IIc	44	.05	186	.38
IId	50	.09	202	.35
IIe	60	.08	250	.36
IIf	34	.12	120	.43
IIg	24	.1	100	.43
IIh	40	.09	226	.5
IIi	10	.06	83	.5
IIj	0	0	57	.5
IIk	37	.07	92	.19
IIl	14	.05	47	.16

NSP=Number of specimens.

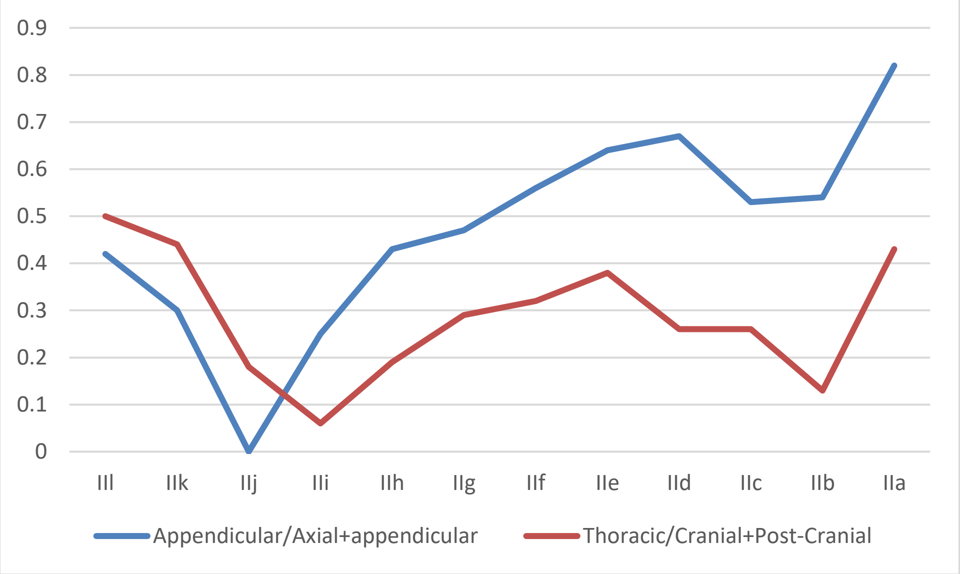

Figure 4.6. Abundance indices drawn from preliminary data regarding element distributions.

We examined variation in the degree of burning on mammal bones using this index, ΣNSP calcined bones/Σ NSP calcined + ΣNSP all bones. Our goal was to assess investment in roasting bones for marrow extraction assuming that greater investment in this activity would be correlated with greater populations (with more intensive winter needs). Results (Figure 4.7) generally correlate with population of the house though IIe has a lower score than expected. It is possible that burning varied with population size only because with more people came large and more intensively used hearth features (Prentiss, Foor, and Hampton 2018) in turn providing greater opportunities for burning bones via disposal of refuse. We measured degree of destruction on bones using this index, ΣNSP smallest size class/Σ NSP all bones. Our hypothesis here was similar to that of the assessment of burning, that higher populations would seek to extract greater sustenance from bones in the form of bone grease requirement significant damage to bones. The result (Figure 4.7) is approximately inverse to population raising the possibility that lower population periods were associated with reduced access to key nutrients and thus requiring greater investment in extracting food (grease) from bones. As with other taphonomic measure, this conclusion will require further investigation.

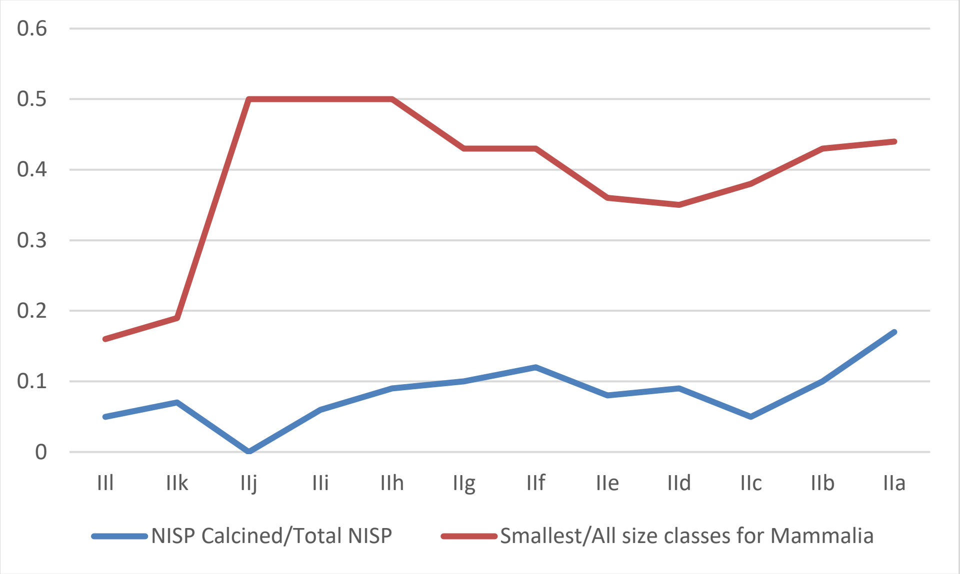

Figure 4.7. Abundance indices drawn from preliminary data regarding calcined bone and bone size distributions.

Discussion

A total of 43,946 animal bones were recovered from the 15 deep floors and roofs of Housepit 54. A number of analyses are still underway but as noted above we have enough data to explore some basic questions regarding subsistence variability between floors. Drawing from these data we could offer a number of tentative conclusions. First, bone preservation is generally excellent as indicated by intact fish bones including cranial parts, vertebrae, and fins. Second, bones were intensely processed by inhabitants of each floor such that most mammal bones are highly fragmented and many are burned. Variability in intensity of burning and fragmentation varies with house population and subsistence economy. Generally, periods of food shortage likely favored more intensive destruction. Frequency of intensive burning seems to correlate with investment in large and numerous hearth features under large house populations. Third, we recognize fluctuation in access to keystone food resources. Salmon were clearly most abundant during early floors (IIl-IIk) and the IIe and IIb floors. Lowest densities are found on the IIj-IIf, IId-IIc, and IIa floors. Patterning in salmon densities correlates with investment in storage and substantially with estimated population. Densities of artiodactyls (primarily mule deer) may reflect impacts of hunting pressure as numbers fall after the IIl-IIk occupations and steadily rise through IIe before falling on IId, rising again on IIc-IIb, and collapsing on IIa. The IIc-IIb rise could reflect reduced pressure during IId associated with declining human hunting pressure from the village at large. Renewed pressure from IIc-IIb may have in turn reduced numbers as reflected by the drop on IIa. Fourth, the population peak on floor IIe clearly comes at a time of peak fisheries and likely high artiodactyl populations. Given that measurable inequality in material goods appears on IIe (Prentiss, Foor, Hampton, et al. 2018) we would argue that rapid population packing under optimal food resource conditions likely occurred at IIe favoring a reorganization of rights to food resources and exchange relationships.

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Chapter Five

Conclusions

(Anna Marie Prentiss)

The 2016 investigations at Bridge River permitted our teams to open all stratified floors at Housepit 54. As outlined in Chapter 2, the excavations revealed 17 anthropogenic floors. We also identified seven roof deposits. Floor II and its associated roof (V) was first identified as a Fur Trade period occupation and this is considered in detail in Prentiss (2017). Next in the sequence is IIa1 (and roof Va1), a ca. 900-1000 cal. B.P. remnant of a more extensive occupation substantially removed by Fur Trade period occupants. We established stratum XVII that bisects all cultural strata in western Block D is likely a cache/refuse pit associated with the latter floor. The next stratigraphic sequence provides an unbroken record of occupation spanning ca. 1100-1460 cal. B.P. across 15 floors and 5 roofs (Prentiss, Foor, and Hampton 2018). Floors IIa to IIe and roofs Va, Vb1, Vb, and Vb3 are associated with Housepit 54 at maximum size and shape. Floors IIf to IIl and roof Vc represent Housepit 54 in its rectangular shape buried directly below the western half of the IIa-IIe floors. Finally, floors IIm-IIo are found below the southwestern portion (Block A) of Housepit 54 and while the exact size of these houses are not entirely clear, we estimate that they were likely single family occupations in smaller houses (compared to the IIf-IIl rectangular house). Excavations recovered 14,573 lithic artifacts, 43,946 faunal remains, and 1198 botanical items (533 seeds and 666 needles). As in previous seasons, sediment samples were collected systematically for geochemical analysis and charcoal was taken for identification and radiocarbon dating. Five new samples were submitted for radiocarbon dating bringing the total number of dates from Housepit 54 to 30. The new dates focused on the deepest floors and permitted a refined analysis of the entire sequence. Results are detailed in Prentiss, Foor, and Hampton (2018) and demonstrate the chronology that includes BR 2 (IIh-IIo [ca. 1300-1460 cal. B.P.]), BR 3 (IIa1 to IIh [ca. 1000-1300 cal. B.P.]), and BR 4 (II [ca. 1852-1858 CE]) occupations.

Demography was an important component of the Housepit 54 project. As outlined in Prentiss, Foor, and Hampton (2018) we estimated demography in three ways. First, we calculated potential house populations using a simple formula involving an assumption of two square meters per person. This resulted in an unsatisfying stair-step model of growth from low numbers on IIm-IIo, through medium sizes on IIf-IIl, to maximum projections on IIa-IIe. We calculated another set of estimates based upon relationships between fire-cracked density, rock taphonomy, and numbers of hearths to create a more detailed model in which early low numbers (around 5 people) on IIo rose to a maximum of 44 on IIe. Subsequent populations were projected to have dropped on IIc-IId and then increased somewhat on IIa and IIb. We tested this model with a floor-by-floor plot of hearth volume that approximated the same sequence. We then began a process of examining underlying reasons for demographic change using measures of relative cache pit volume (Prentiss, Foor, and Hampton 2018). Our logic here was that investment in storage pits would generally reflect the productivity of keystone food resources given a likely complex system of field procurement and storage coupled with winter transport for short-term storage and consumption inside houses. Results indicate two high points (IIl and IIe) with two troughs implicating two subsistence cycles wherein abundant access gave way twice to weakness. These results open further questions as to how groups persisted across periods of weak and abundant subsistence resources. We can address some of those by considering evidence for animal predation drawing from faunal remains. Paleoethnobotanical studies defined an array of berry species regularly used on Housepit 54 floors. However, sample sizes of recovered items was low for most floors and it is so far difficult to draw significant conclusions from these results.

A very large quantity of faunal remains (NSP=43,946) were recovered from the Housepit 54 floors. These results provide an excellent opportunity to examine subsistence change across the history of the house. These results can then be used to better understand demography and social history. Several trends were evident in our data. First, it is very clear that the productivity of the salmon fishery fluctuated significantly. Fish remains are dominated by sockeye salmon and it is evident that the sockeye fishery was very strong during the occupation of the earliest floors (IIK-IIl) after which fisheries productivity weakened for a number of generations as reflected by low salmon densities on floors IIf-IIj. There appears to have been a single generation spike in productivity on floor IIe followed be a two-generation trough (IIc-IId), a brief rebound on IIb, and a final decline on IIa. Second, mammal remains are very fragmentary but appear to be dominated by artiodactyls (most likely mule deer). Mammal densities drop on floors IIj and IIi before increasing thereafter to form a three generation plateau on IIf-IIh and a subsequent upward spike on IIe. After this point, mammal densities fluctuate substantially with a major drop on IId, and rebound on floors IIb and IIc, and a collapse on IIa. We believe these fluctuations may be responses to hunting pressure linked to village population dynamics. The village was nearly abandoned during Housepit 54's IIj and IIi floors and this could have provided an opportunity for deer populations to slowly rebound from pressure during peak BR 2 times (Housepit 54's IIk-IIo floors). The IIe peak could mark both deer herd productivity but also enhanced hunting during the Bridge River population boom considered further below. Such a scenario would also explain the post IIe drop in mammal remains as a response to brief intense pressure. The rebound on IIb-IIc could be understood as another response to declining human population during BR 3 times (Prentiss et al. 2014). The IIb-IIc mammal boom is particularly well reflected on the IIc floor where we recognize a spike in artiodactyl elements representing a period when artiodactyls were less intensively processed (thus leaving more recognizable elements).

Our understanding of subsistence variation is enhanced by examining other indices. Briefly, fish and salmonid abundance indices reflect the same trends. It is clear that while salmon consistently dominated diets, there were periods where mammals became very important, particularly during the IIf-IIj and IIa-IId periods. Mammal predation appears to have been used to fill in subsistence gaps when fisheries weakened. This trend is well reflected in the faunal evenness data where low evenness is associated with times of highest fish densities. Taphonomic indices so far appear to reflect similar trends whereby higher populations favored more frequent extended hunts and times of resource stress favored more intensive bone processing (particularly IIh-IIj). All told, the faunal data suggest that Housepit 54 inhabitants were highly aware of their food resource options and responded in economically logical ways. When keystone resources (especially salmon) were abundantly available diets focused on those resources. When access to those foods weakened, people broadened their diets. But subsistence may have interacted with cultural practices in more complex ways. Groups made decisions regarding technological organization, winter residential mobility, and social relationships that varied over time and were very likely influenced by subsistence issues.

The lithic artifact assemblage from Housepit 54 floors was also large (N=14,573) and highly variable between floors. Fortunately some general trends are evident and these generally match patterns recognized in the faunal data. First, lithic raw materials are dominated by a glassy volcanic rock termed dacite. Archaeologists of the Mid-Fraser villages have long recognized that this is the dominant toolstone and have generally assumed it to be of largely local origin. However, geo-chemical analyses to date on Housepit 54 dacite samples have demonstrated that the majority comes from Arrowstone Hills flows located about 50 km from the Bridge River site. This raises the significant likelihood that exchange relations were maintained between villages with connections extending to that distance for routine movement of toolstone. Future research will focus on how sources of dacite varied over time. Second, we are able to recognize some important changes in the organization of lithic toolstone transport and production across the Housepit 54 floors. The general model for lithic raw material transport in the Mid-Fraser villages derives from Hayden et al.'s (1996) Keatley Creek research and asserts that toolstone was transported in the form of small preformed cores. French (2017), drawing upon Housepit 54 data from the Fur Trade period occupation, argued that raw material entered Housepit 54 as flakes or finished tools. Clearly, groups practiced variable strategies depending upon context. This fact is well illustrated in the debitage and tool form data from Housepit 54 where several general trends are evident. Biface reduction flakes become significantly more common after the IIh floor, in essence between the BR 2 and 3 floors. In contrast, core reduction debitage remains somewhat stable, particularly for cherts and to a lesser degree, dacite. Investment in reduction of local coarse grained materials declines across the occupations. The frequency of bifaces and projectile points increases dramatically between the BR 2 and 3 floors potentially reflecting expanded focus on gearing-up for more frequent (over time) extended artiodactyl hunts as is reflected in the faunal data. Transported cores generally decline between BR 2 and 3 floors. These data suggest that an early strategy of transported cores was not abandoned but became less important over time as emphasis on household lithic reduction activities shifted from core-flake to biface blank for tool preparation. For the latter it may have been more efficient to important more frequent larger flakes rather than small cores. Bipolar cores provide additional insight as these items reflect activities associated with extending the use-life of exhausted raw material (Hayden et al. 1996). Bipolar core data from Housepit 54 demonstrate a high degree of consistency in frequency with the exception of the late BR 2 floors (IIi and IIj in particular). Occupants of these early floors appear not to have invested significantly in bipolar reduction. Given that faunal counts are also low on these floors, a reasonable interpretation would be that groups simply did not stay for long time spans during winters on these floors.

The lithic artifact data offer significant implications for understanding variation in sociality between floors (Prentiss, Foor, Hampton, et al. 2018; Prentiss, Foor, and Murphy 2018). We developed ad analyzed lithic artifact data to first demonstrate a high degree of consistency between floors and hearth-centered activity areas within floors. This permitted us to conclude that space in the house was always organized to provide living space for household domestic groups (families). This then permitted us to assess variability in inter-family access to exchange goods and other markers (e.g. prestige objects and raw materials) of material affluence. Multivariate analysis of several measure of material wealth provided evidence that significant inequality appeared abruptly on the IIe floor and persisted through IIb before disappearing on IIa. Significantly, the Block D (northeast portion of the house) maintained the strongest signals of ability to accumulate material wealth during this time. This suggests that once it came into existence, differential wealth-based status was inherited between generations during the BR 3 period. It appears to have emerged during the sudden village-wide population boom associated with the IIe floor at Housepit 54. To our team this raises the likelihood that inequality was a temporary byproduct of several generations of competitive conditions for food resources manifested in new alliances for exchange and probable control of access to hunting, fishing, and gathering locales. The return to egalitarian conditions on the IIa floor also suggests that house groups may have rejected inequality before abandonment.

A major implication of this research concerns the resiliency of the Housepit 54 households in the face of dramatic resource and population swings. Our collective data so far suggest that the members of the house coped with major resource down-turns in two ways. During late BR 2 when fisheries declined and remained weak for several generations, Housepit 54 membership reduced the length of their winter occupation likely shifting from reliance on stored food to a probable winter-mobile immediate return strategy. This allowed them to maintain the house in a context of near complete village-wide abandonment. Low populations meant the deer populations slowly rebounded which in turn favored higher numbers in Housepit 54. Then the fishery rebounded dramatically at IIe but within a generation returned to a less consistently productive pattern. This time the Housepit 54 membership chose not to engage in greater winter mobility. Rather, some families clearly established social networks outside the house to insure access to trade goods and likely food resources. The pattern of intra-house inequality suggests that it worked particularly well for one multi-generational domestic group, at least for several generations. Abandonment of the house appears to have come at a point when the fishery and the artiodactyl populations hit a major simultaneous low. At that point there was probably no other option than to shift strategies to what was likely a pattern of annual residential mobility. The house appears to have been ritually closed with a large scale burning of the roof that was different from the selective small scale roof closings of previous generations (Prentiss et al. 2019).

Our team continues to investigate social relations across the history of Housepit 54. A major question concerns family persistence and replacement. It is well known that a major challenge for House societies is maintaining enough people to support the House even if it was a collectivist enterprise consisting of two to four households (e.g. Ames 2006). Loss of membership for whatever reason could be catastrophic for persistence of the larger enterprise. Thus, it was incumbent upon the collective membership to insure enough occupants. This could be accomplished be simply growing existing families across generations. But it could also be accomplished by attracting extended kin or even non-kin to reside in the House. Ethnography tells us that typically brothers (and families) moved in with other brothers' families (Teit 1906). However, we can imagine many other contingent scenarios. Consequently, we ask did such social movements occur at random or were they patterned over time, perhaps occurring more often during periods of stress as we have identified on IIi-IIh, IIc-IId, and IIa. Our current research process includes developing models for alternative scenarios of this kind and associated measures. Measures focus on inter-floor variability in the spatial positioning of work and transmission of techniques for tool manufacture. We assume that outsiders moving to the house would bring greater variation to these measures than those simply continuing to live in the same spaces. We are also evaluating evidence for teaching-learning of lithic tool manufacturing techniques. To date, data suggest that even beginner's tools were made to be used thus implicating apprentice-like roles for youth of the house.

Several other areas of major ongoing research should provide a variety of important insights. Ancient DNA research (Dr. Dongya Yang) into canids has so far suggested the presence of two haplotypes in the Bridge River village at ca. 1200-1300 years ago. One of them appears to have been a breed unique to this valley. Current studies are adding additional extracted aDNA from dog bones and dog coprolites. One implication is that dogs may have been selectively bred for functional roles in the community. However, some dogs were also consumed though it is not clear whether dogs were primarily eaten on ritual occasions, during famine periods, or as a matter of course. We have initiated a side-study of aDNA from stone tools and have had some success. Most notably, our team (Dr. Meradeth Snow) extracted, amplified, and sequenced mountain lion (*Puma concolor*) DNA from a BR 3 period slate hide scraper. An additional slate tool was found to contain domesticated dog DNA consistent with domestic dog signatures from bones and coprolites. Isotopic research (Dr. Michael Richards) has allowed us to distinguish between larger and smaller canids, respectively as wolves versus domesticated dogs. The large canids had diets that match deer profiles while smaller canids match salmon profiles. The latter result is further confirmed by the abundant presence of salmon bones in dog coprolites. Sediment geochemistry studies are currently underway. All element and isotope data have been acquired from sediment samples across every Housepit 54 floor (Dr. Nathan Goodale) and the work has begun to interpret variation in outcomes. This study holds the strong possibility of enhancing our understanding of intra-floor organization of space looking beyond distributions of features, artifacts, and faunal remains (e.g. Goodale et al. 2017). We are also currently engaged in a comprehensive study of spatial organization across every floor based upon the latter items. This should be completed and submitted for publication later in 2019. Analysis of macrobotanical remains (Dr. Natasha Lyons) thus far has focused on data from hearths and cache pit features (Appendix C). Our next goal it to investigate samples systematically collected across floors.

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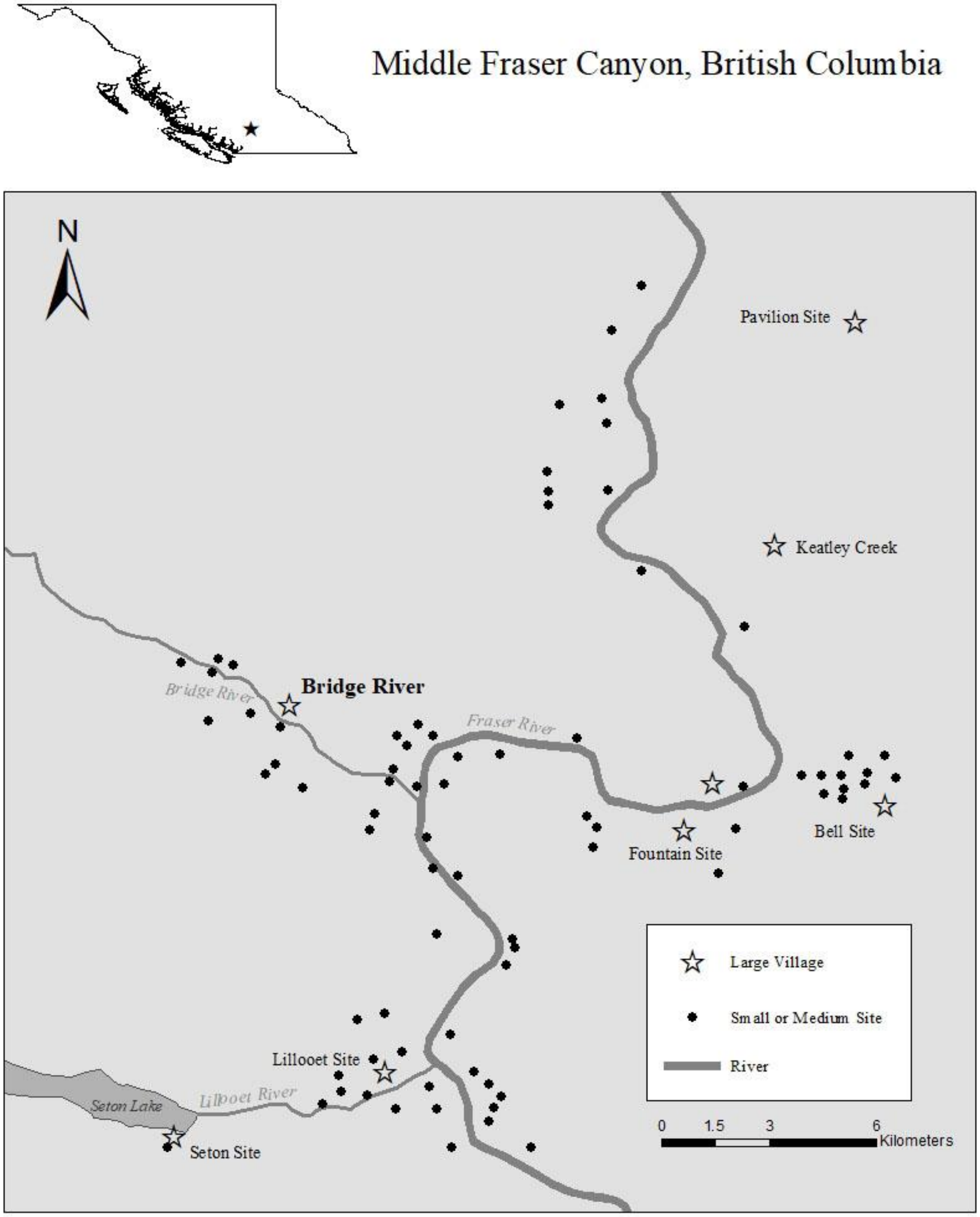
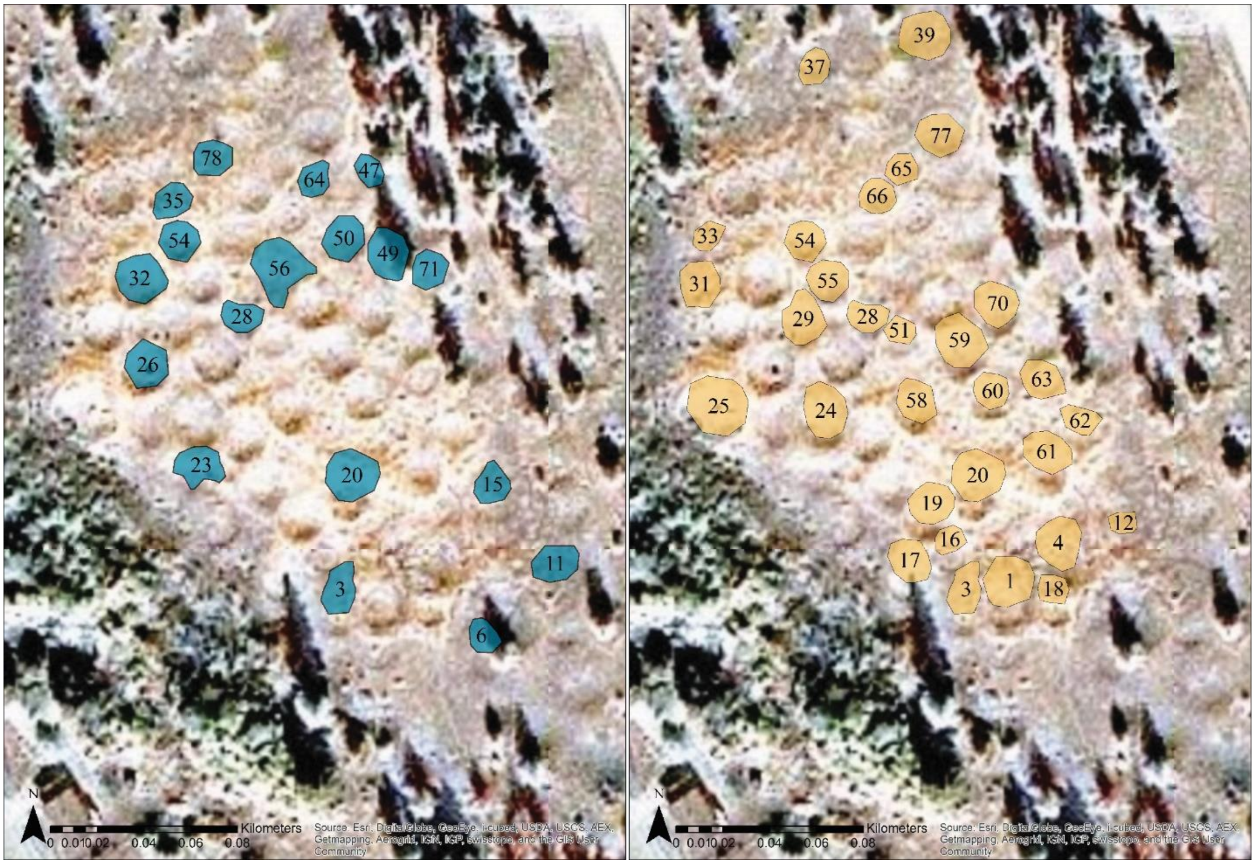
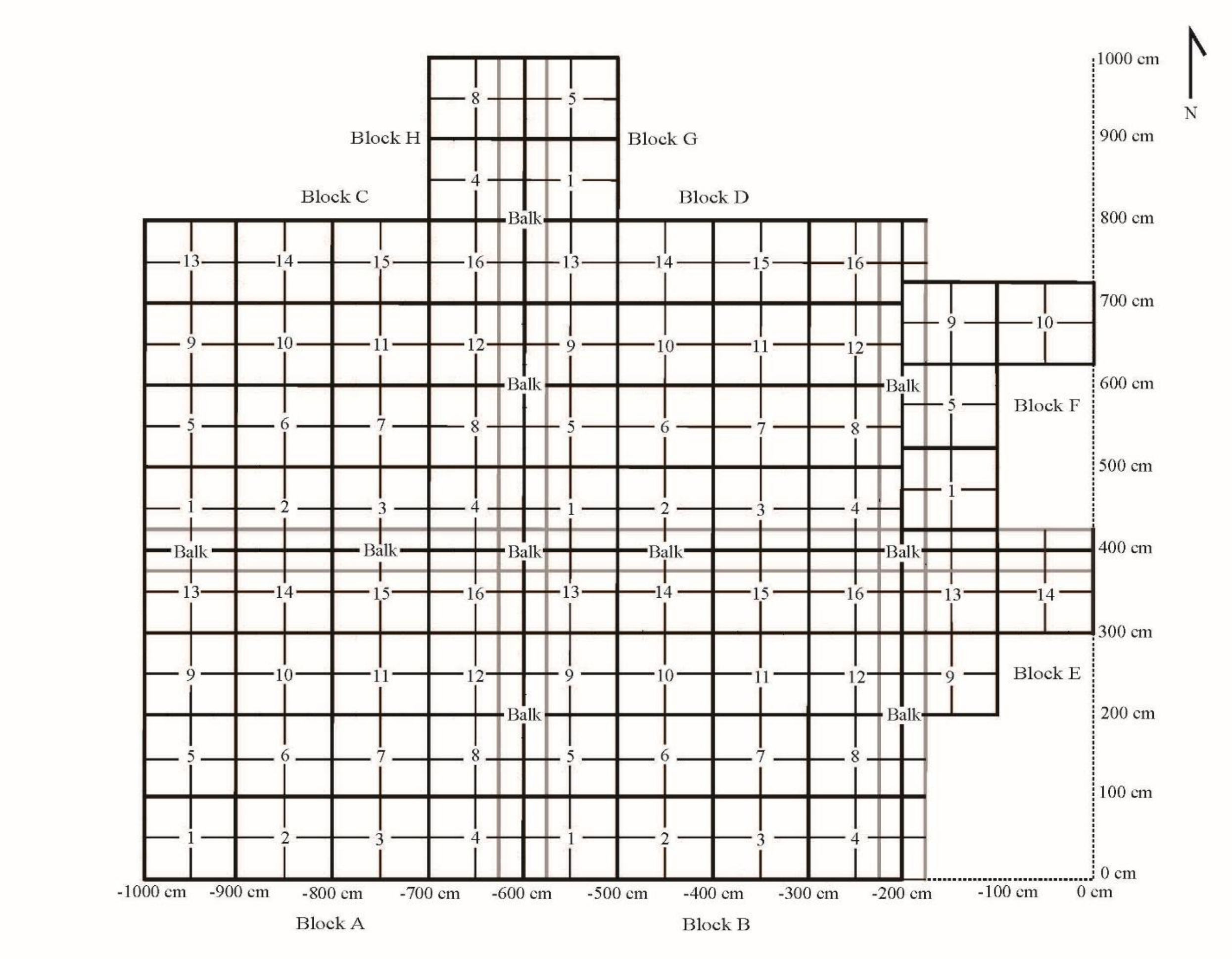
Appendix A
Maps and Photographs



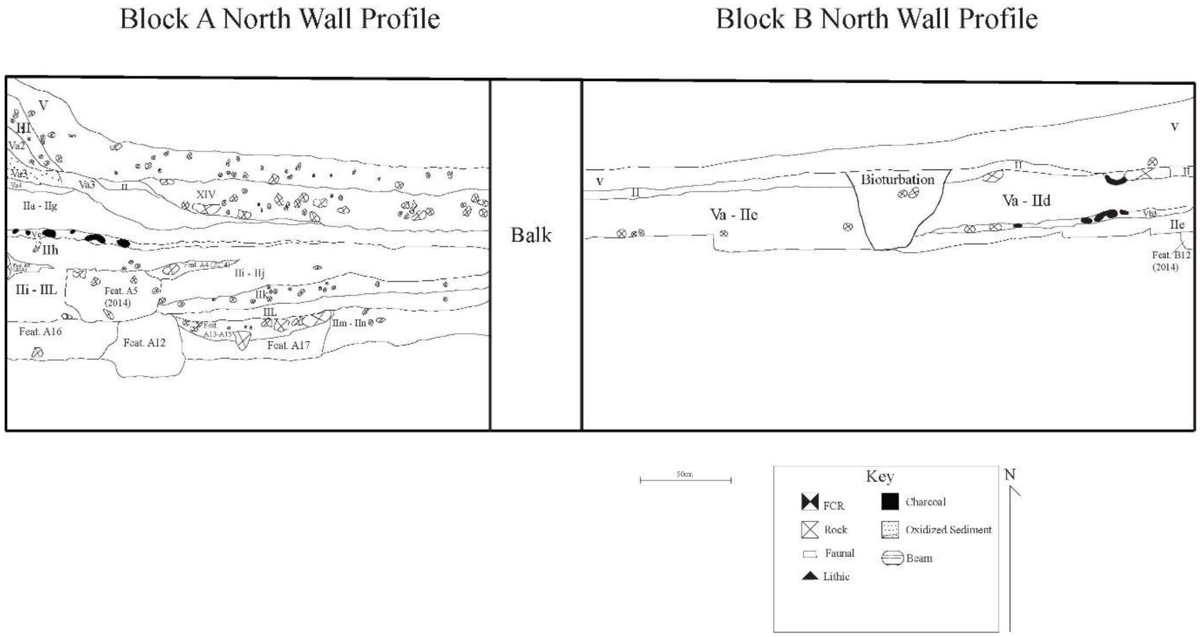
Bridge River site location.



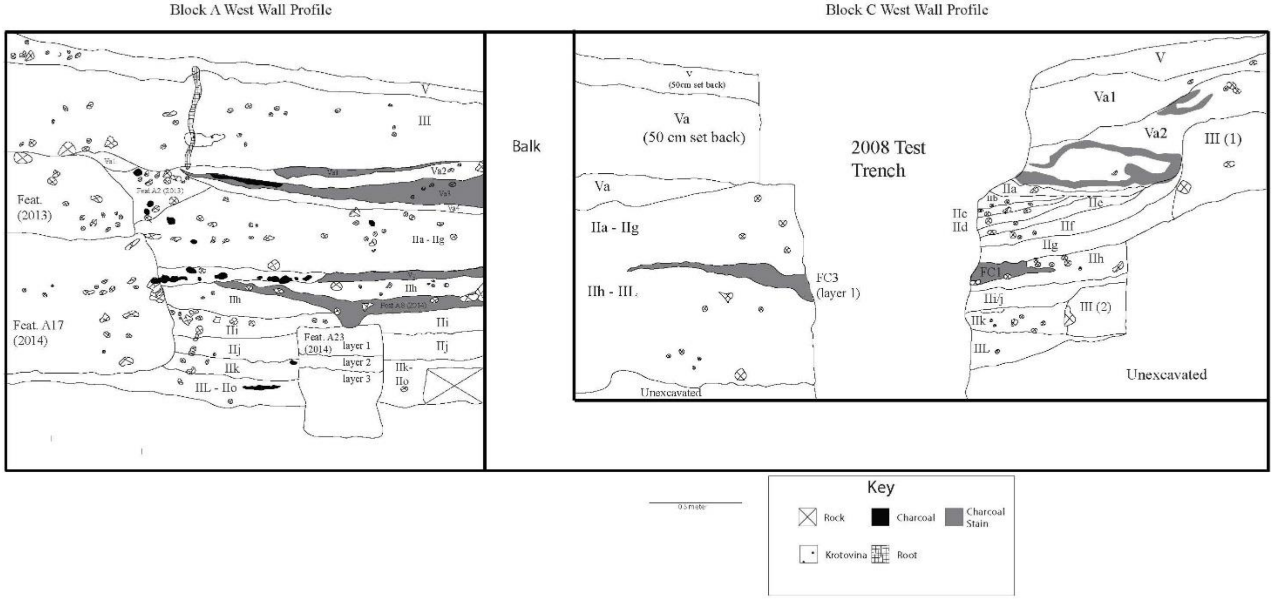
Bridge River site during the BR 2 and 3 periods. Note presence of Housepit 54 in each map.



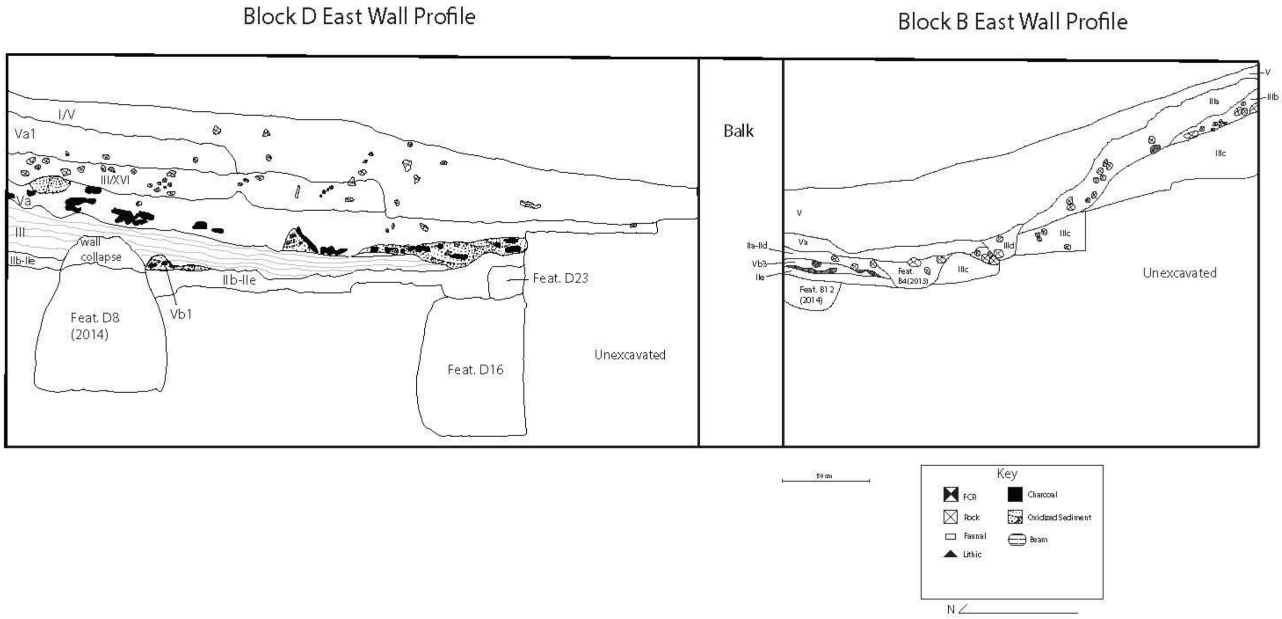
Excavation grid for Housepit 54.



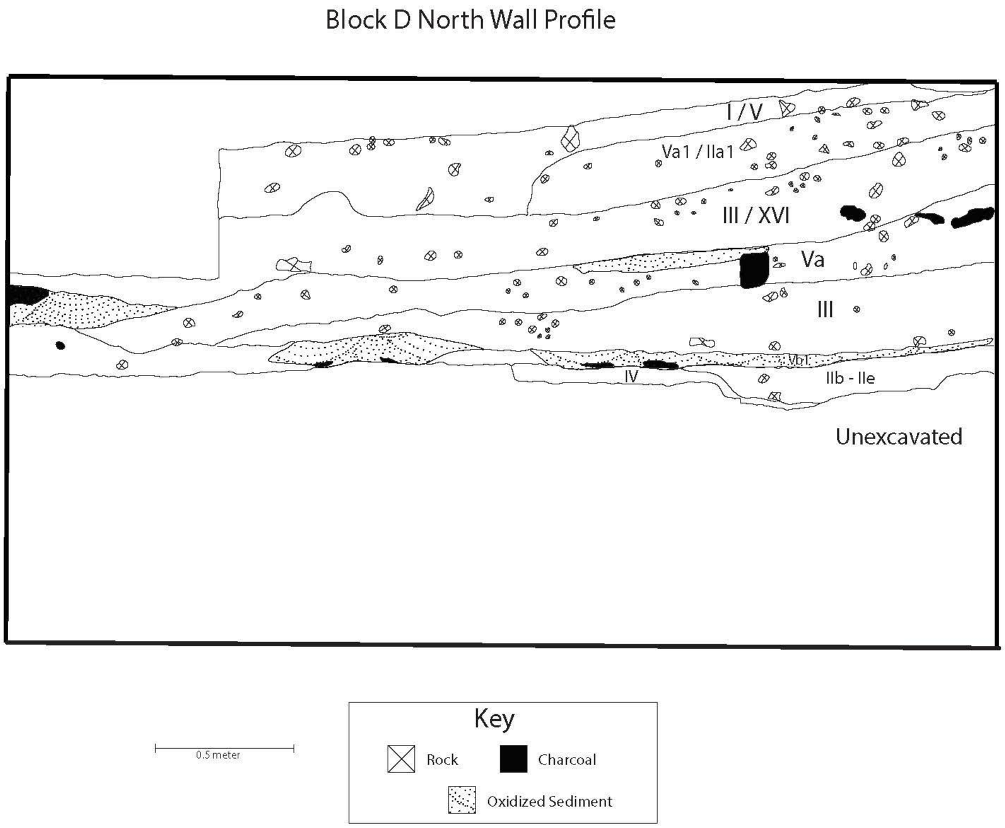
North wall profile for Blocks A and B.



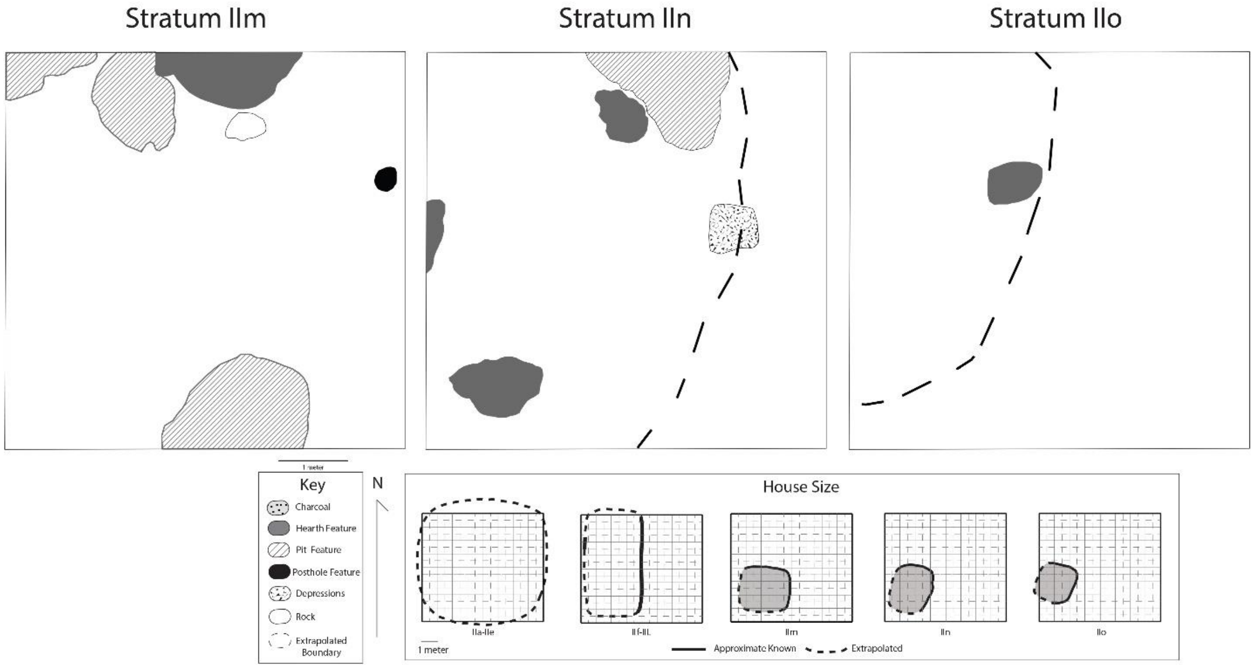
West wall profile for Blocks A and C.



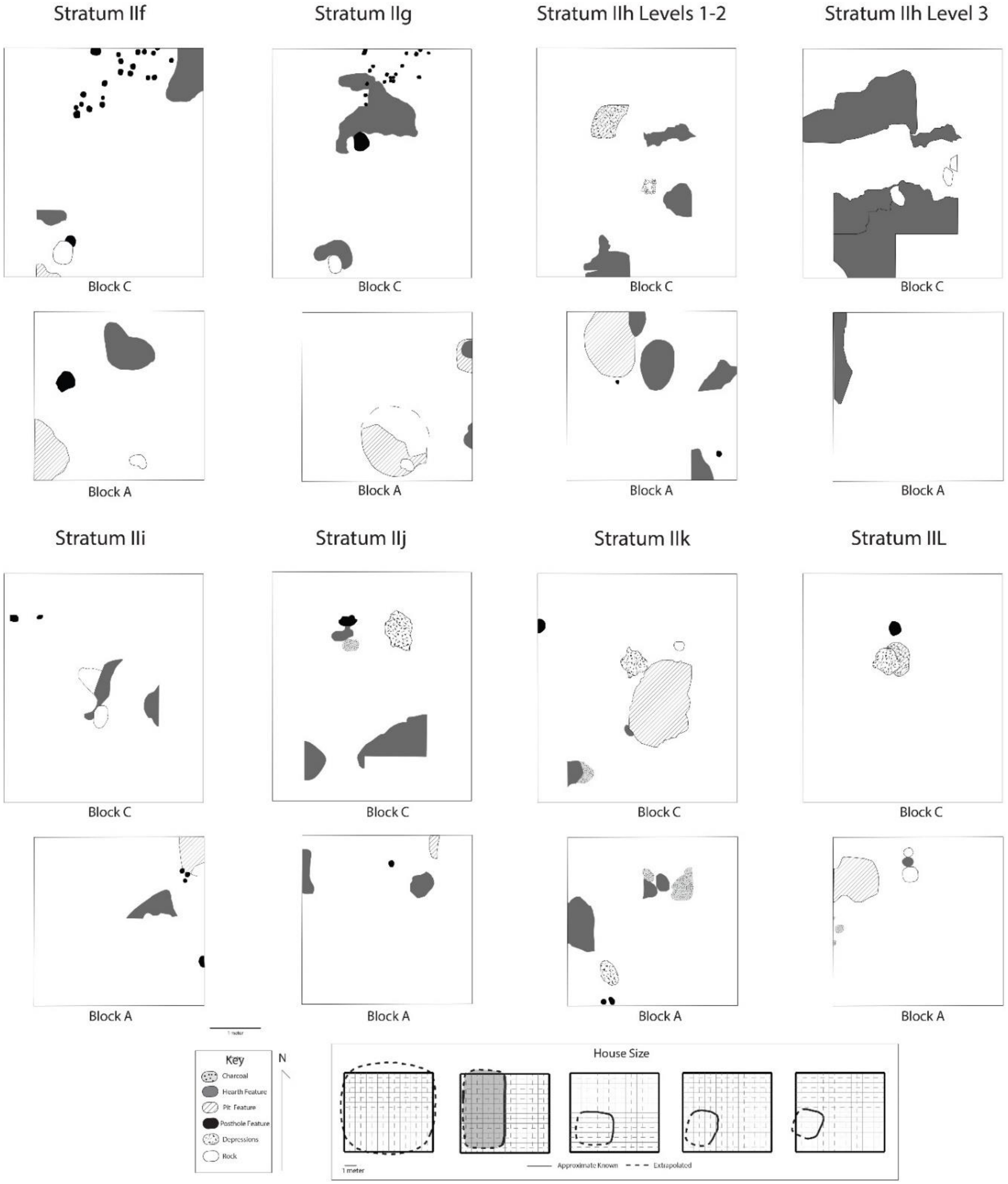
East wall profile for Blocks D and B.



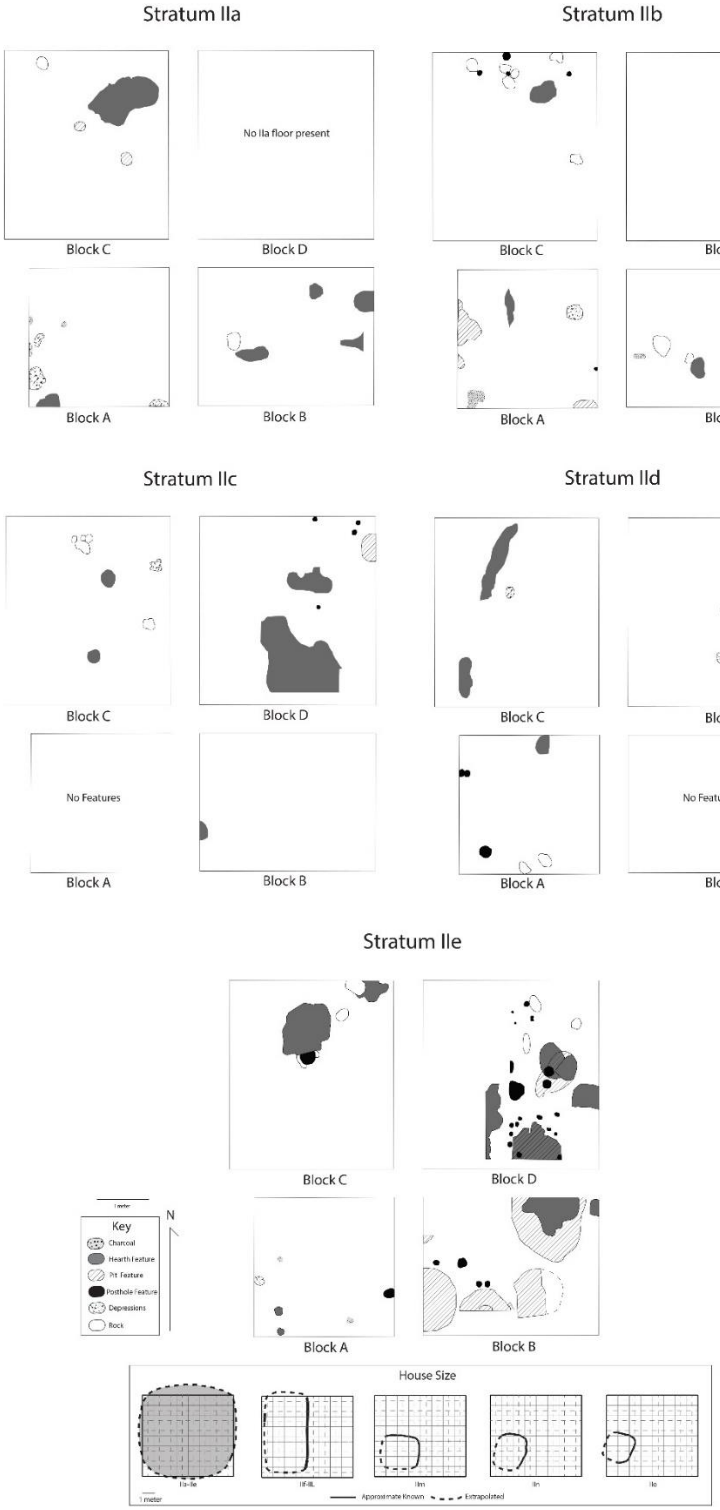
North wall profile for Block D.



Features on floors IIm-IIo.

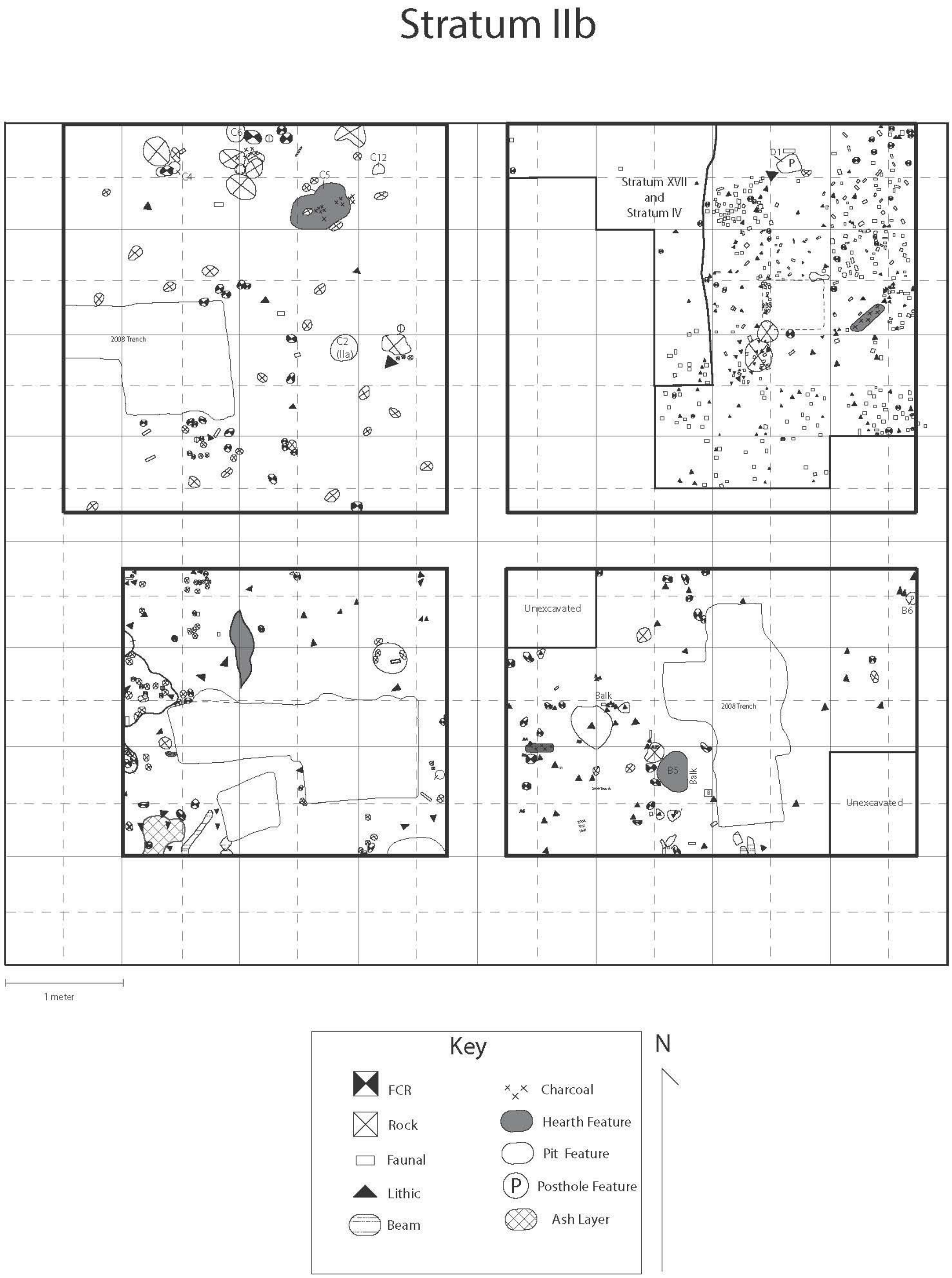


Features on floors IIf-IIl.



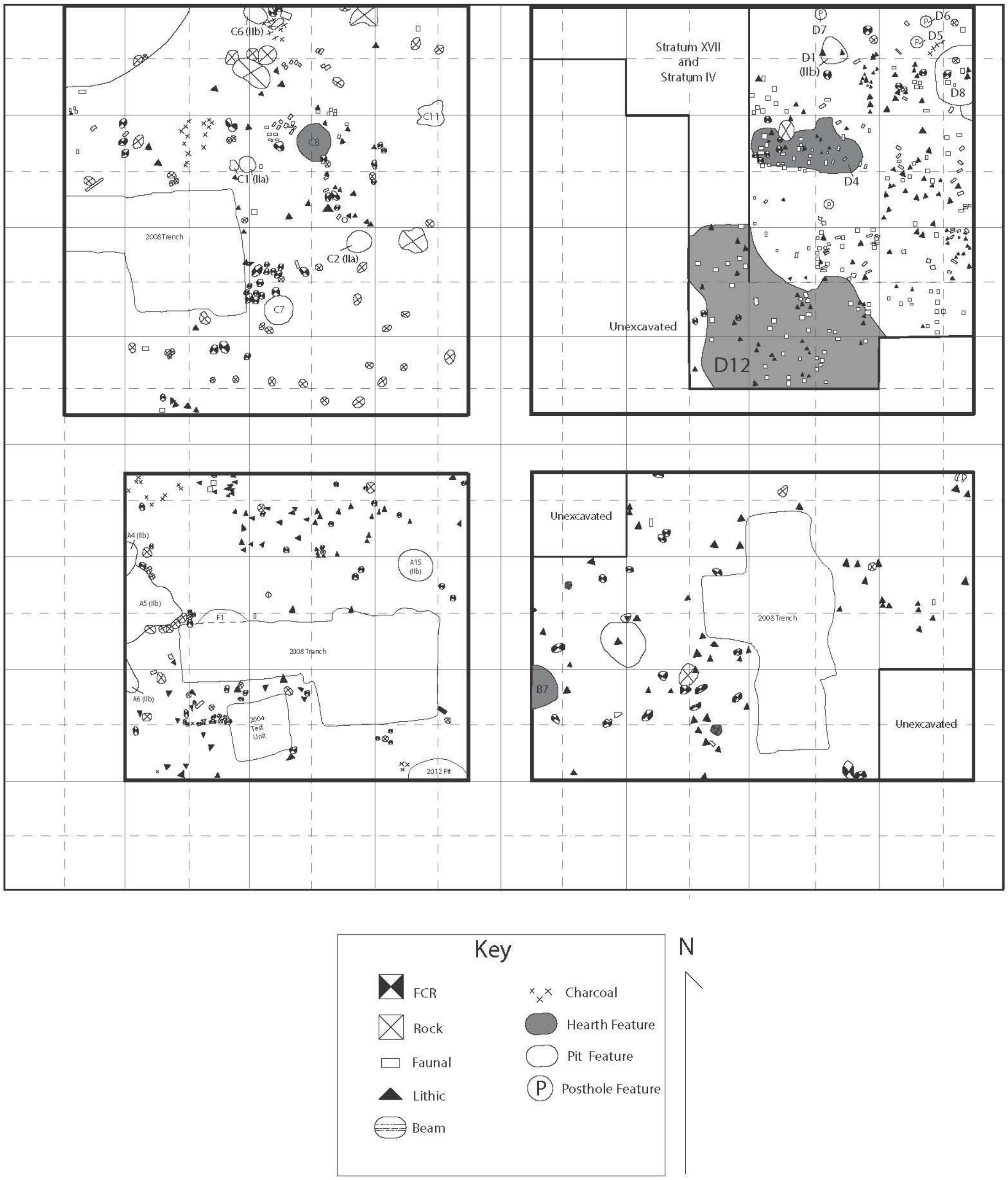
Features on floors IIa-IIe.

Plan map for floor IIa.

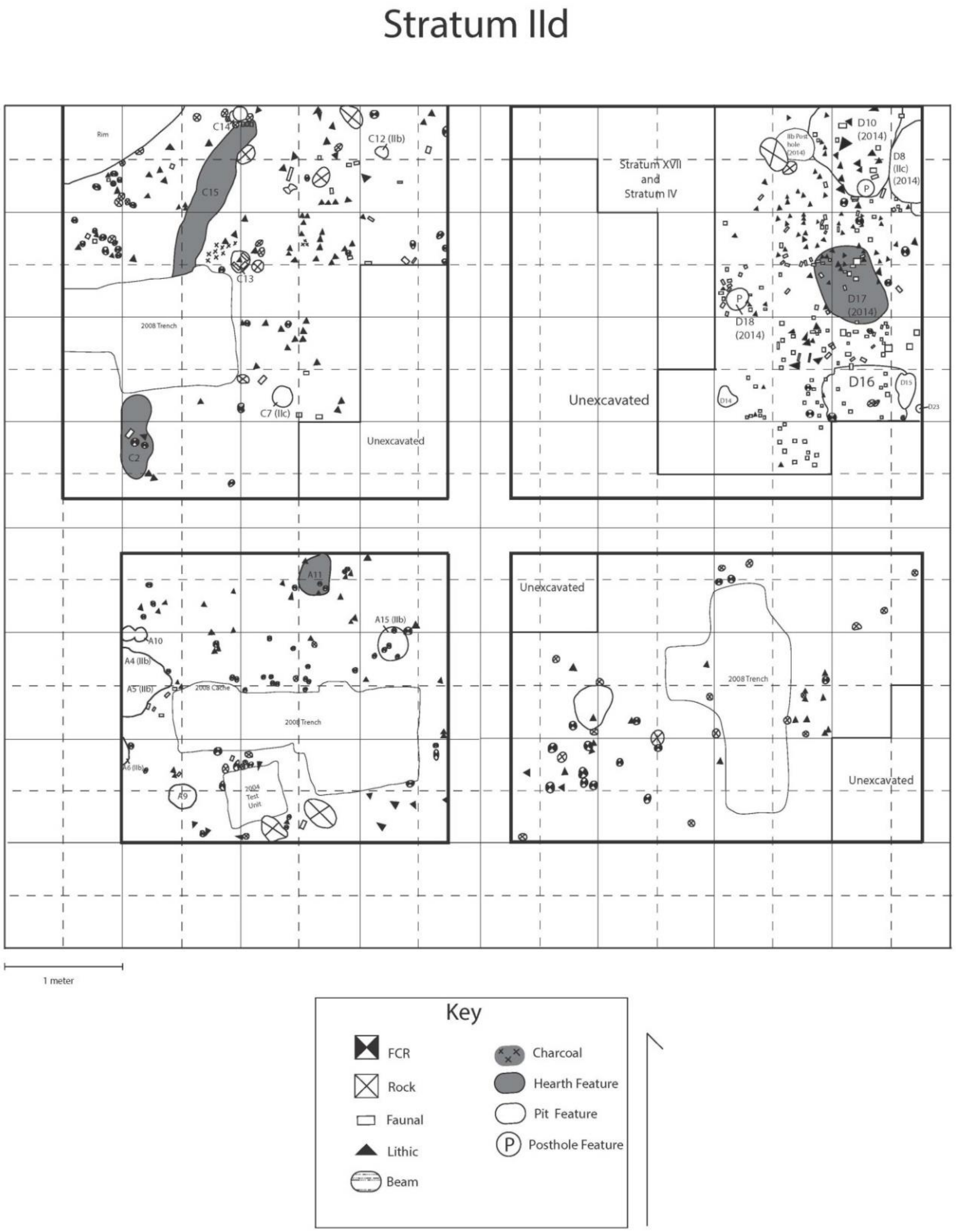

Stratum IIb

Plan map for floor IIb.

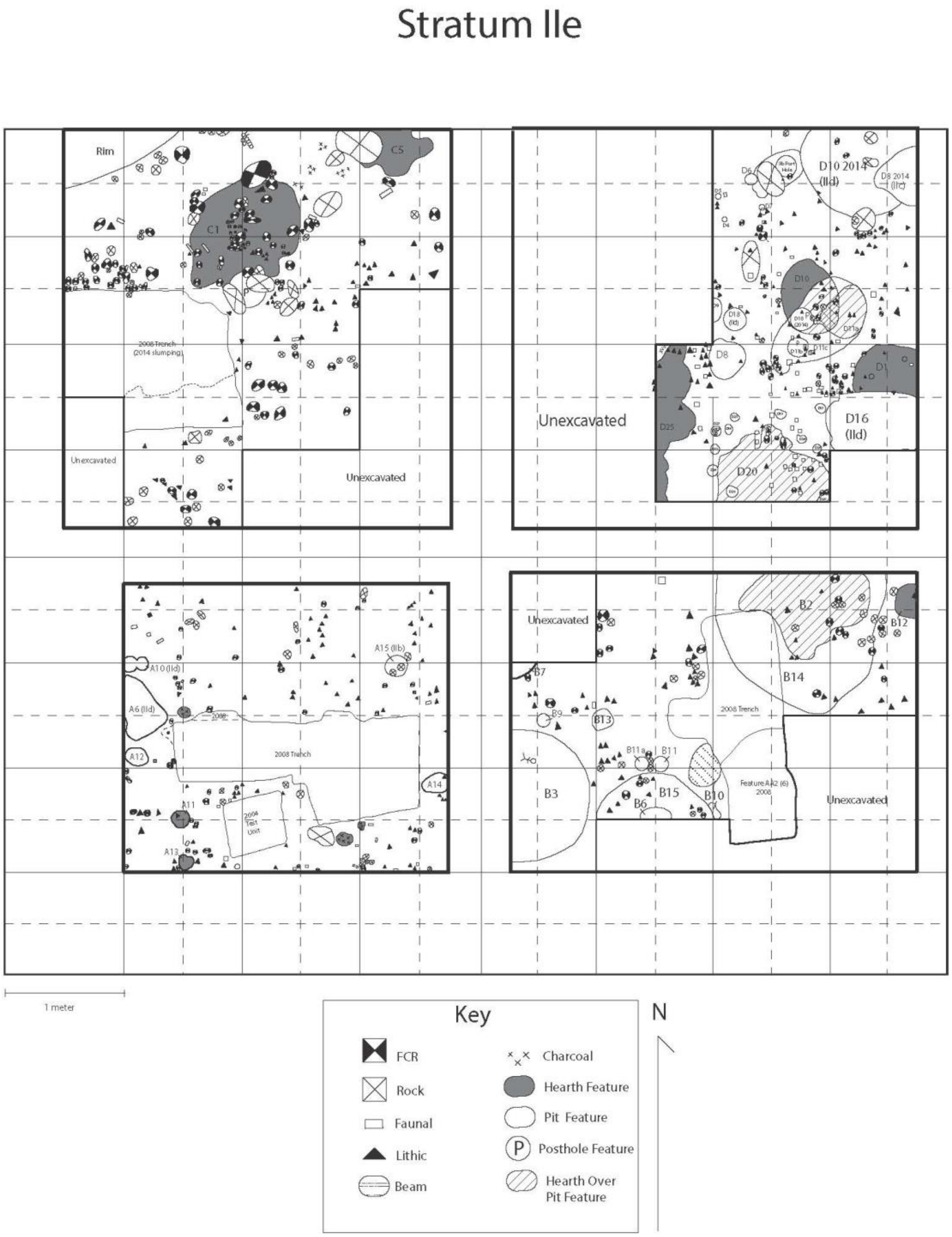
Stratum IIc



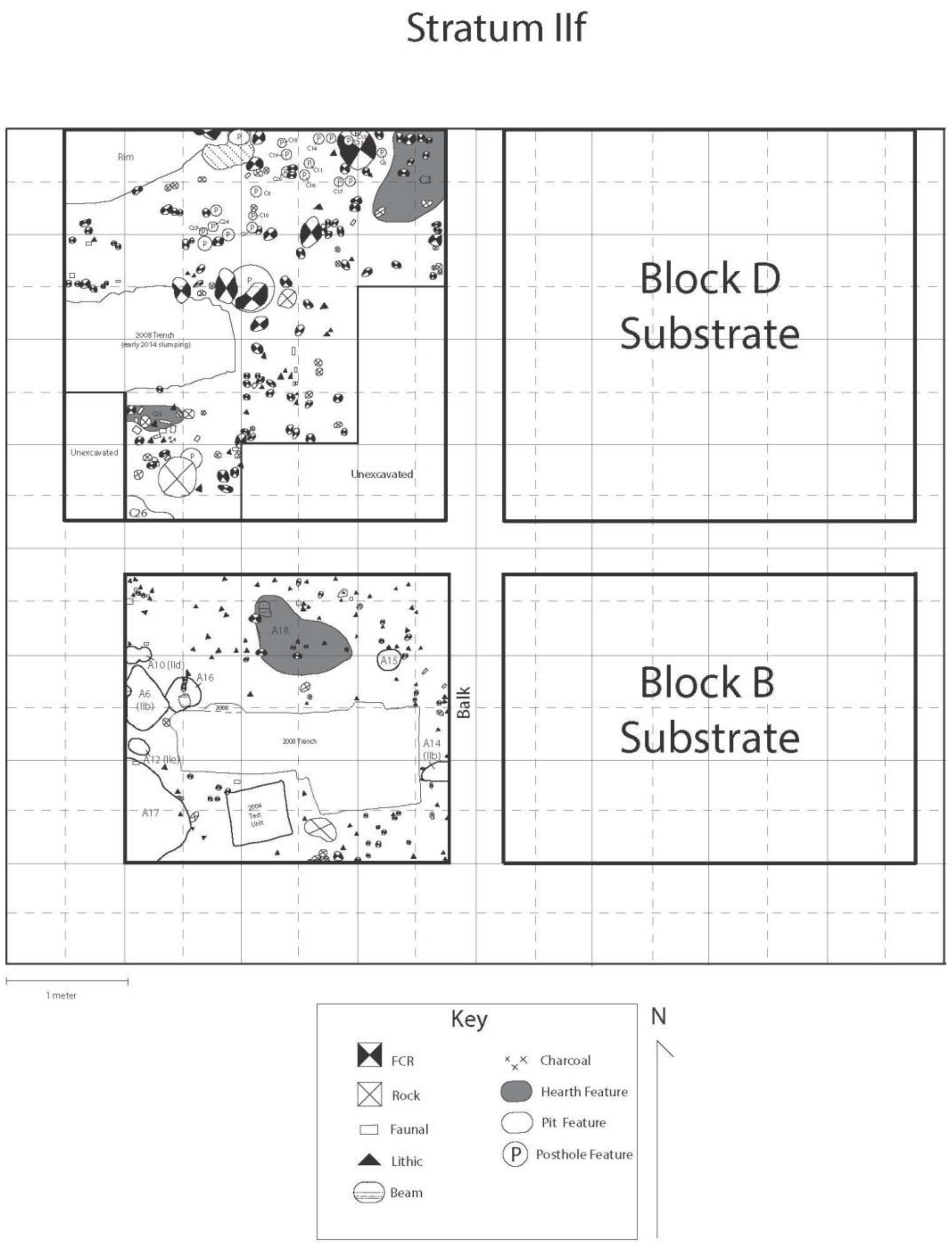
Plan map for floor IIc.



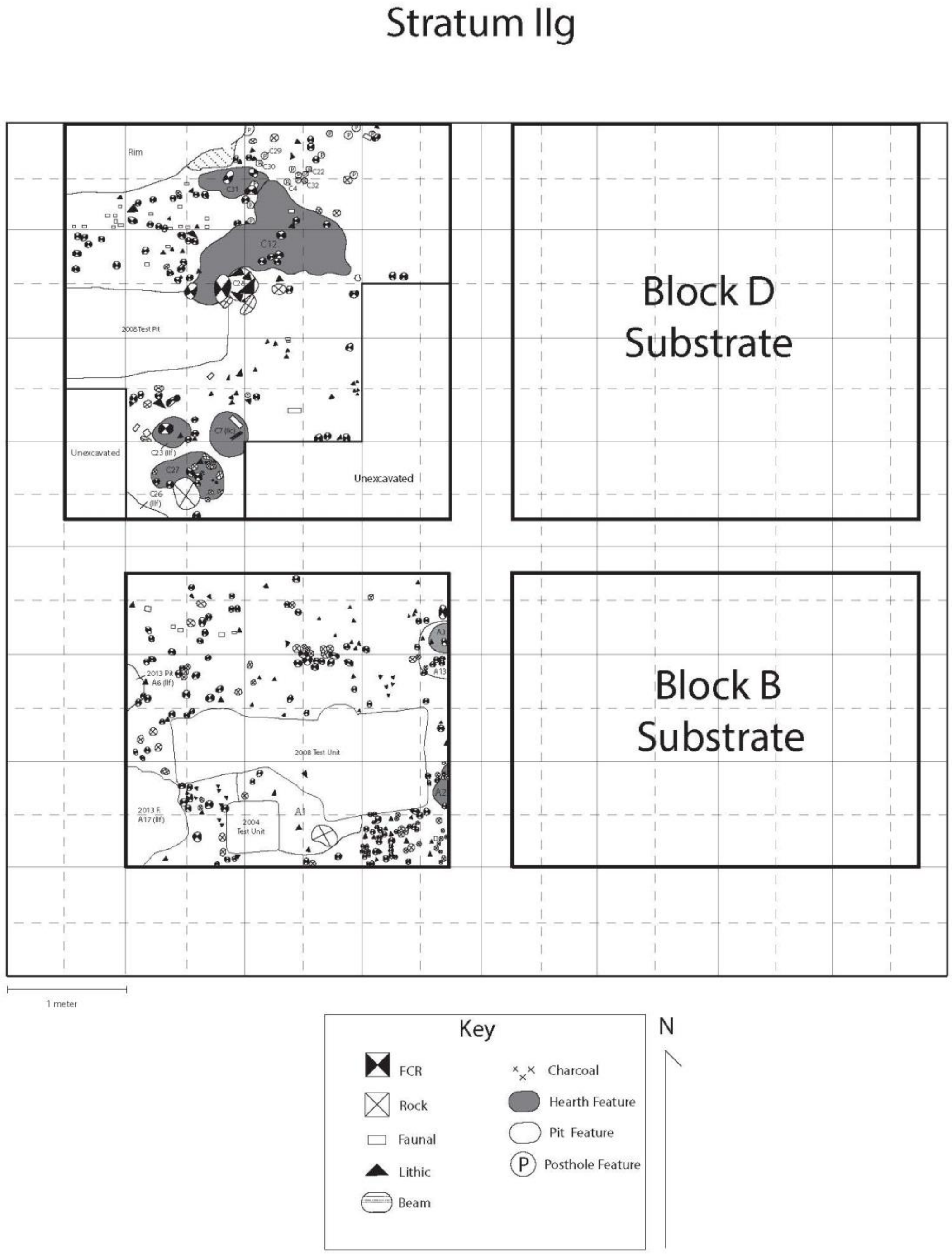
Plan map for floor IId.



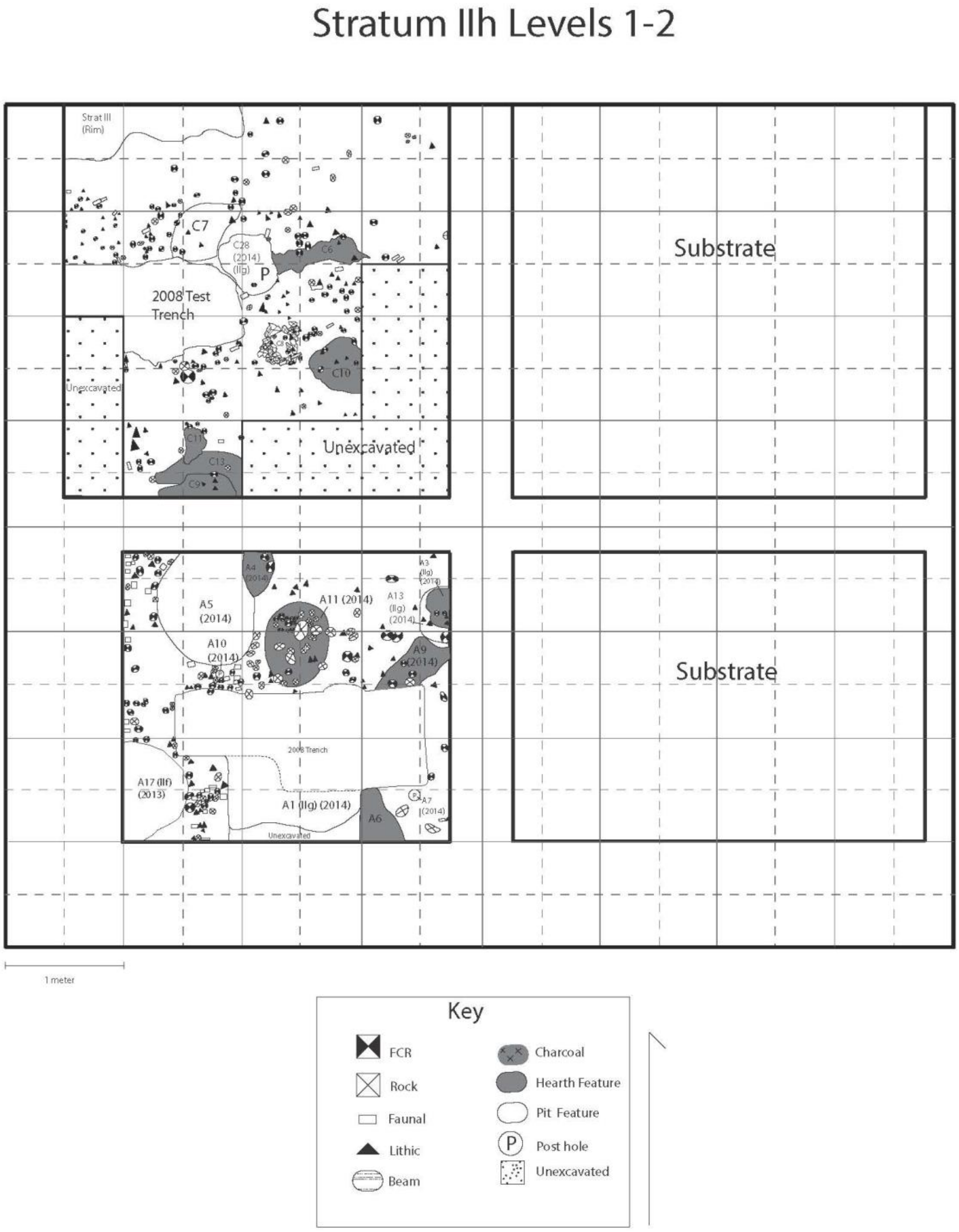
Plan map for floor IIe.



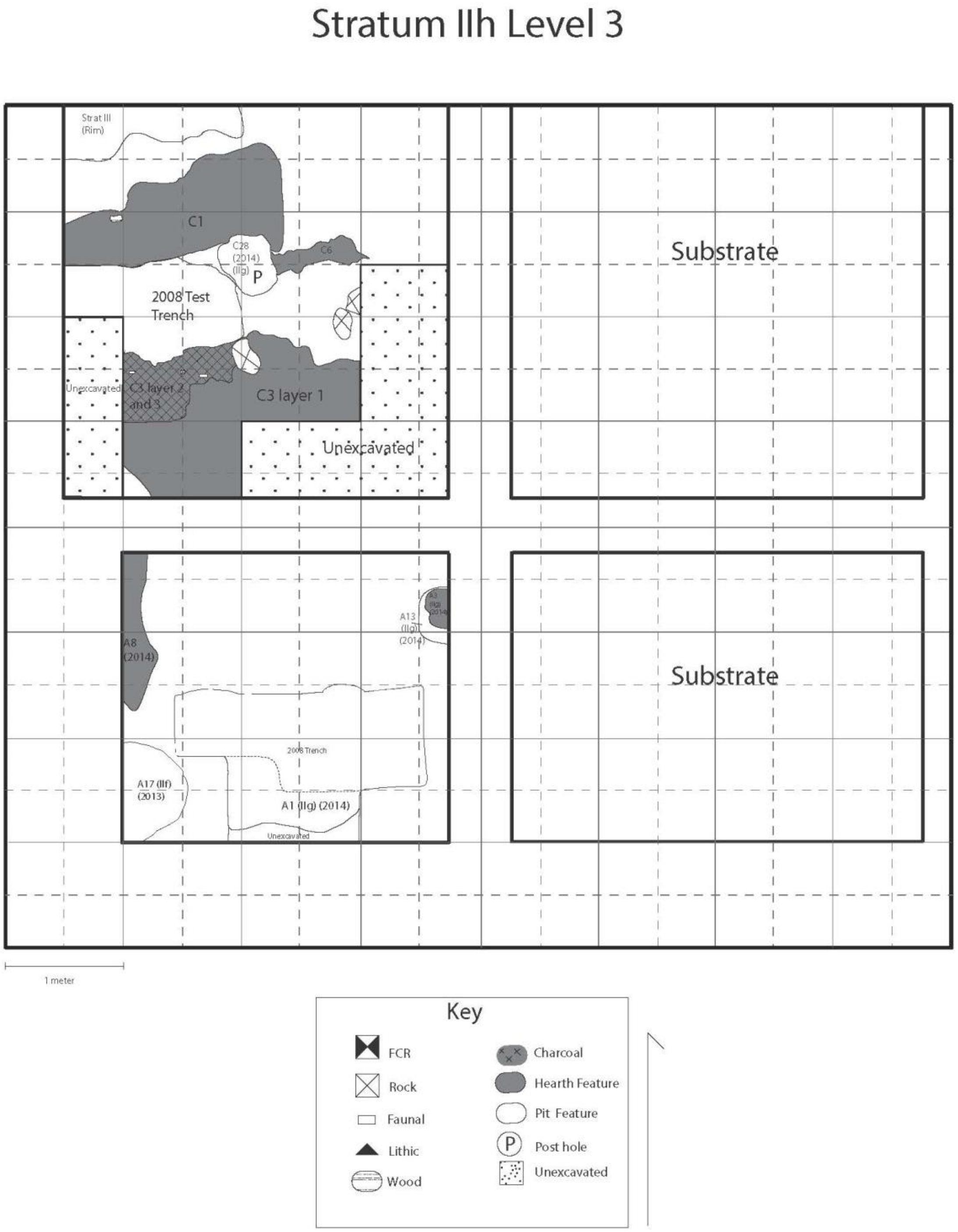
Plan map for floor IIf.



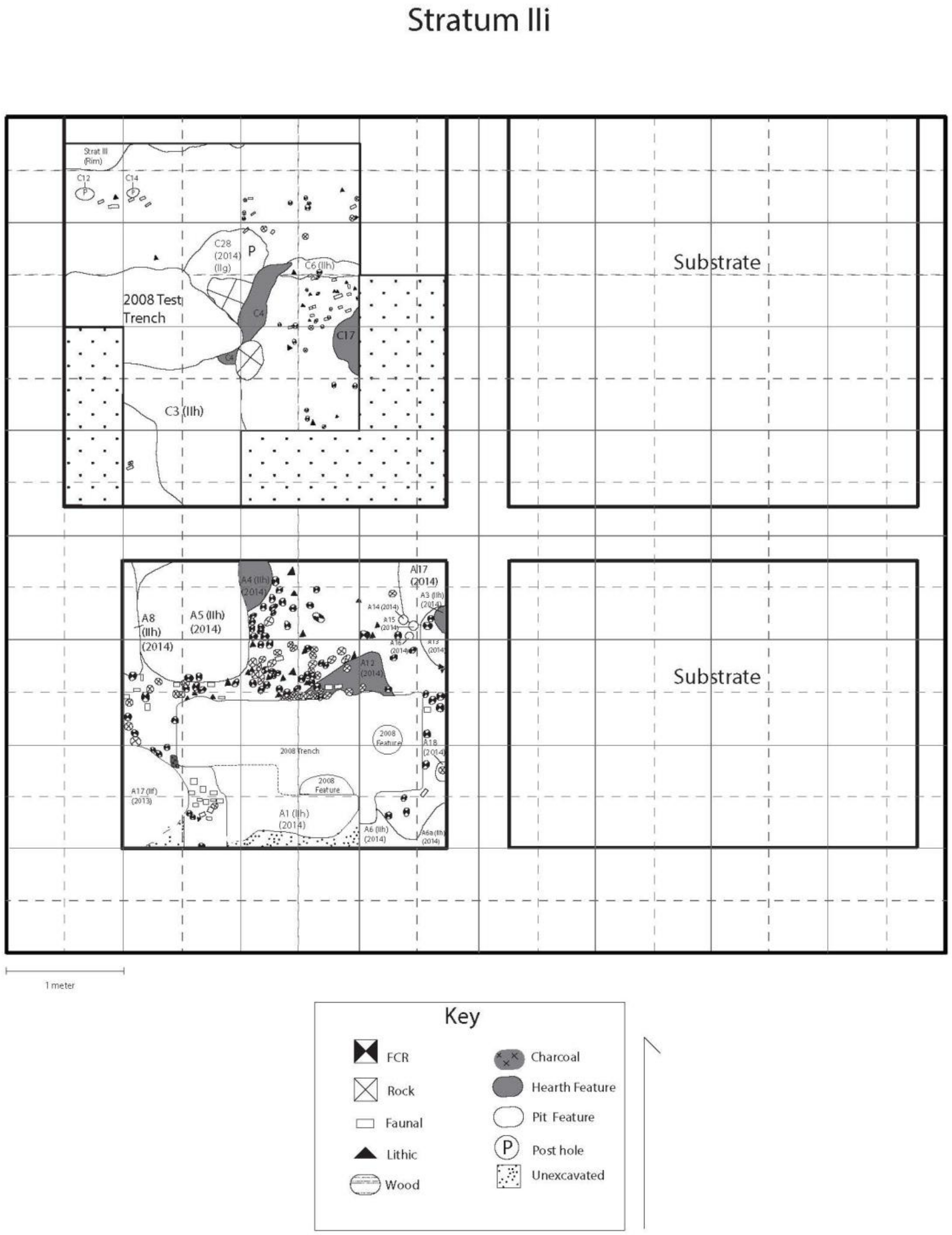
Plan map for floor IIg.



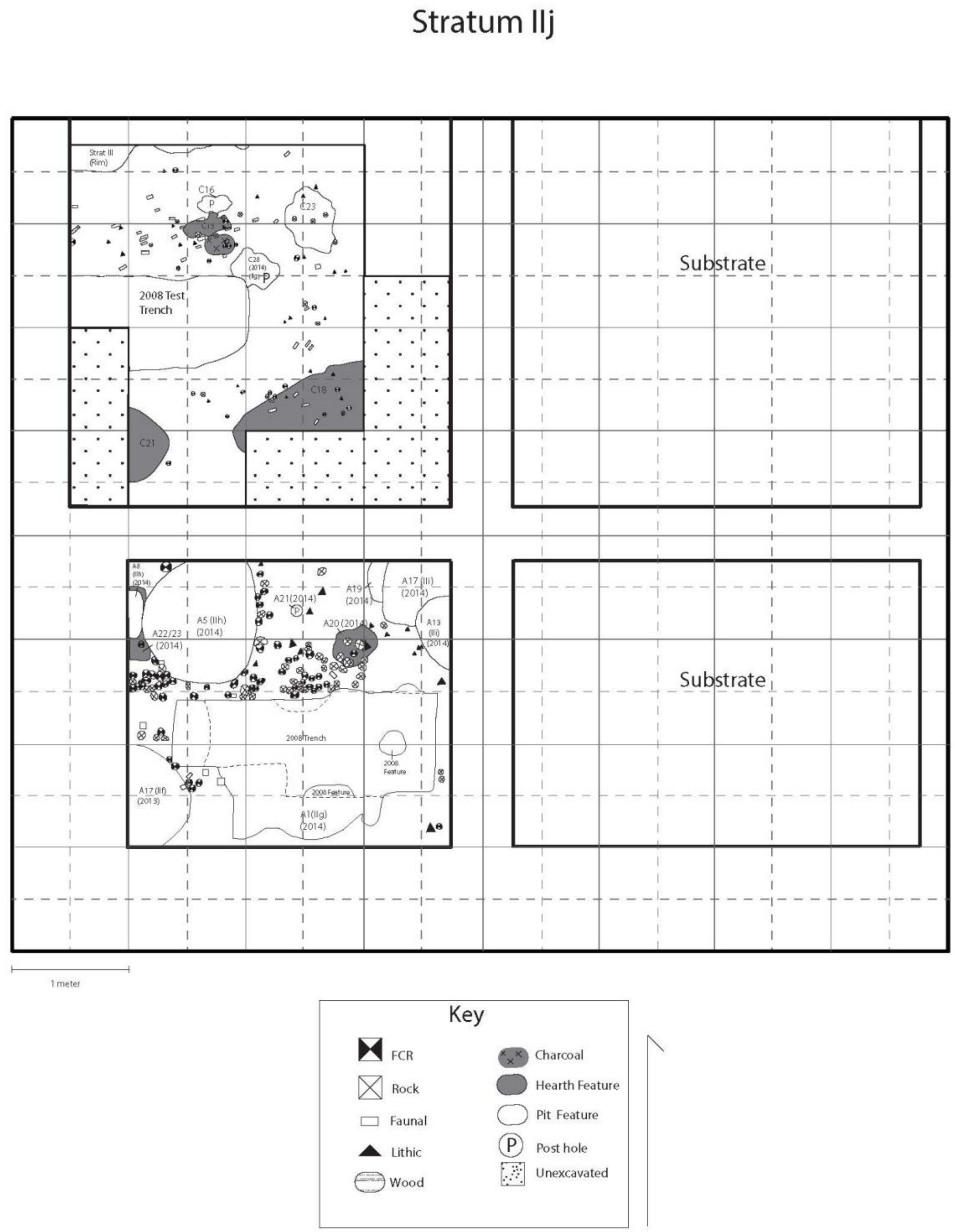
Plan map for floor IIh, levels 1 and 2.



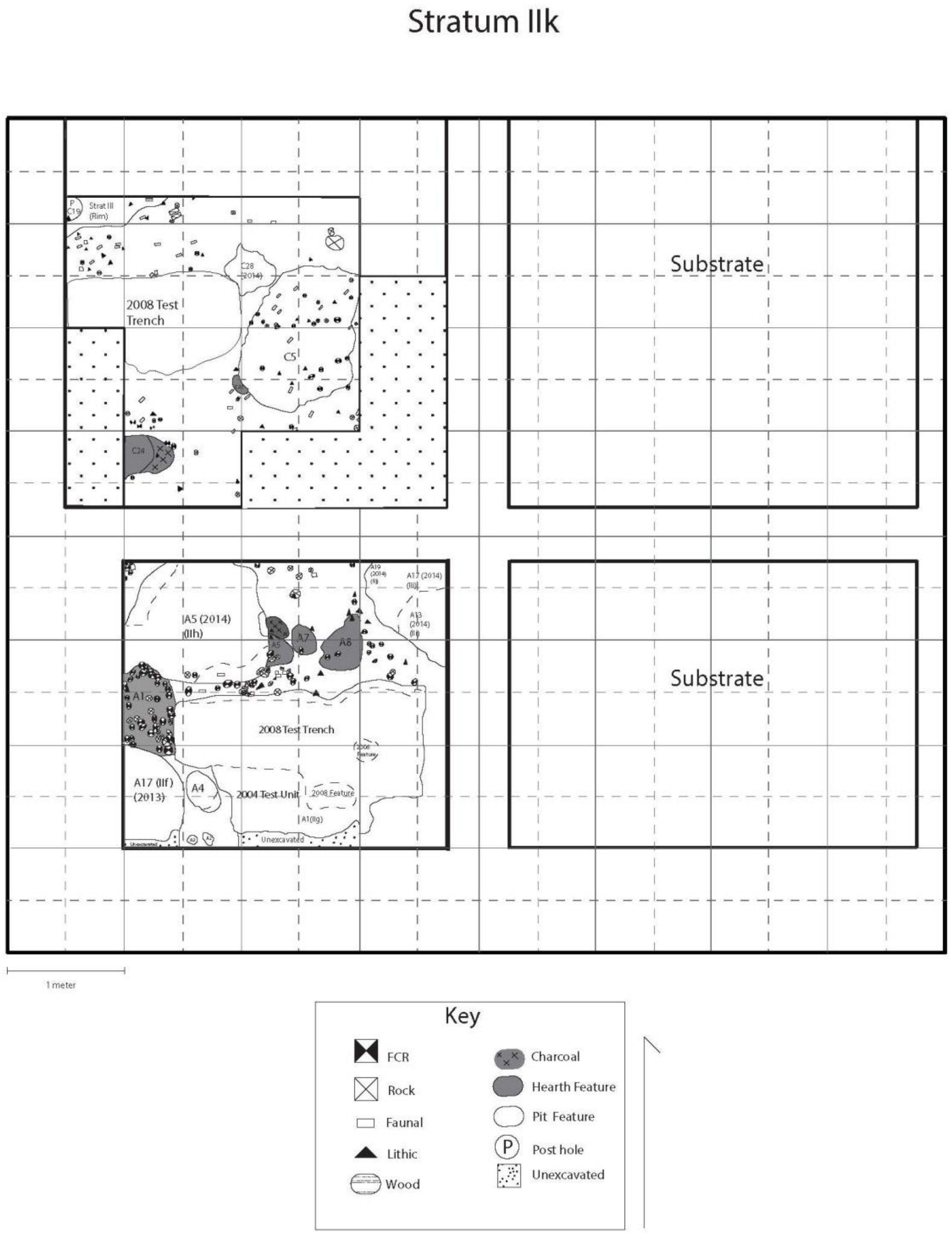
Plan map for floor IIh, level 3.



Plan map for floor IIi.

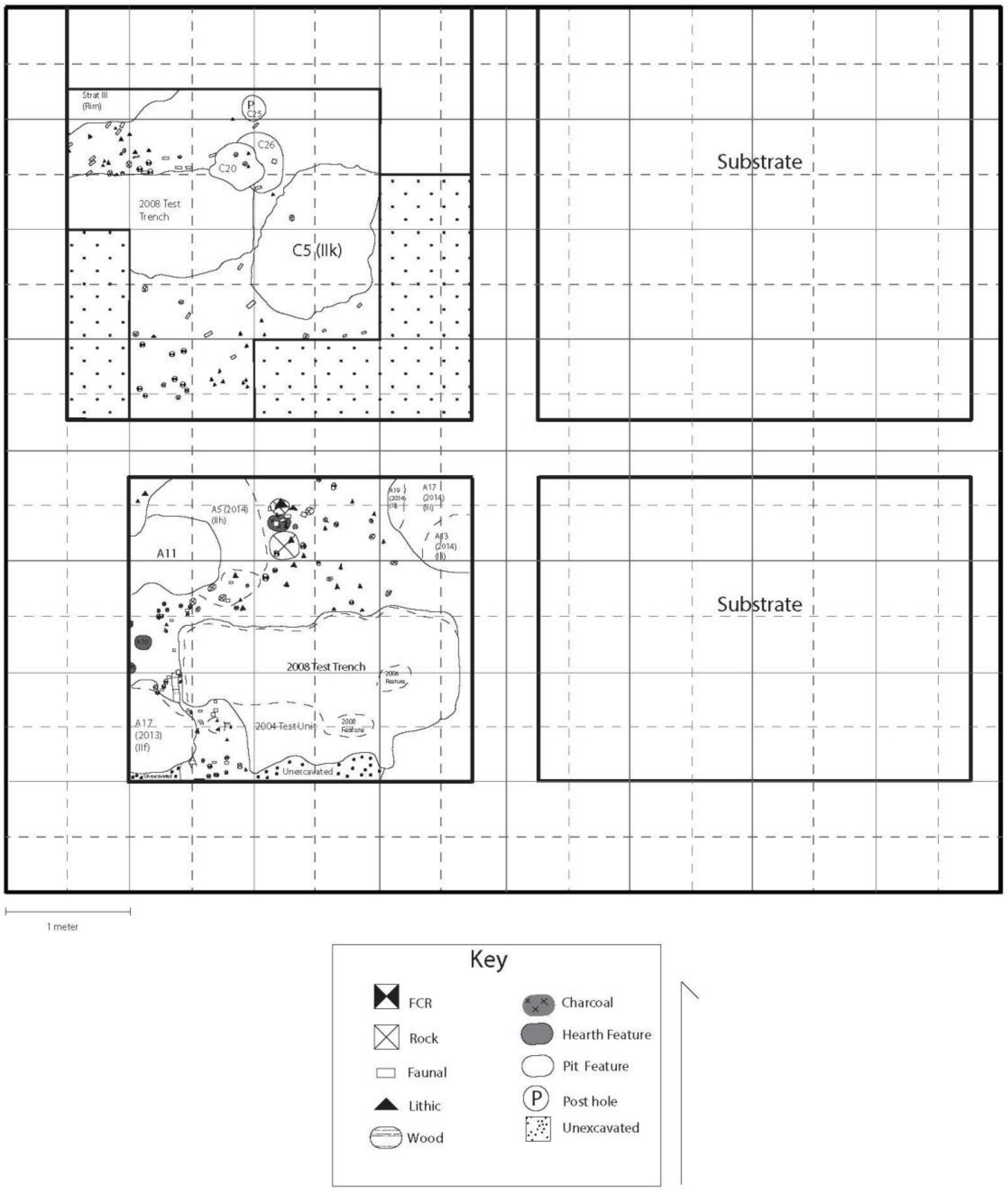


Plan map for floor IIj.

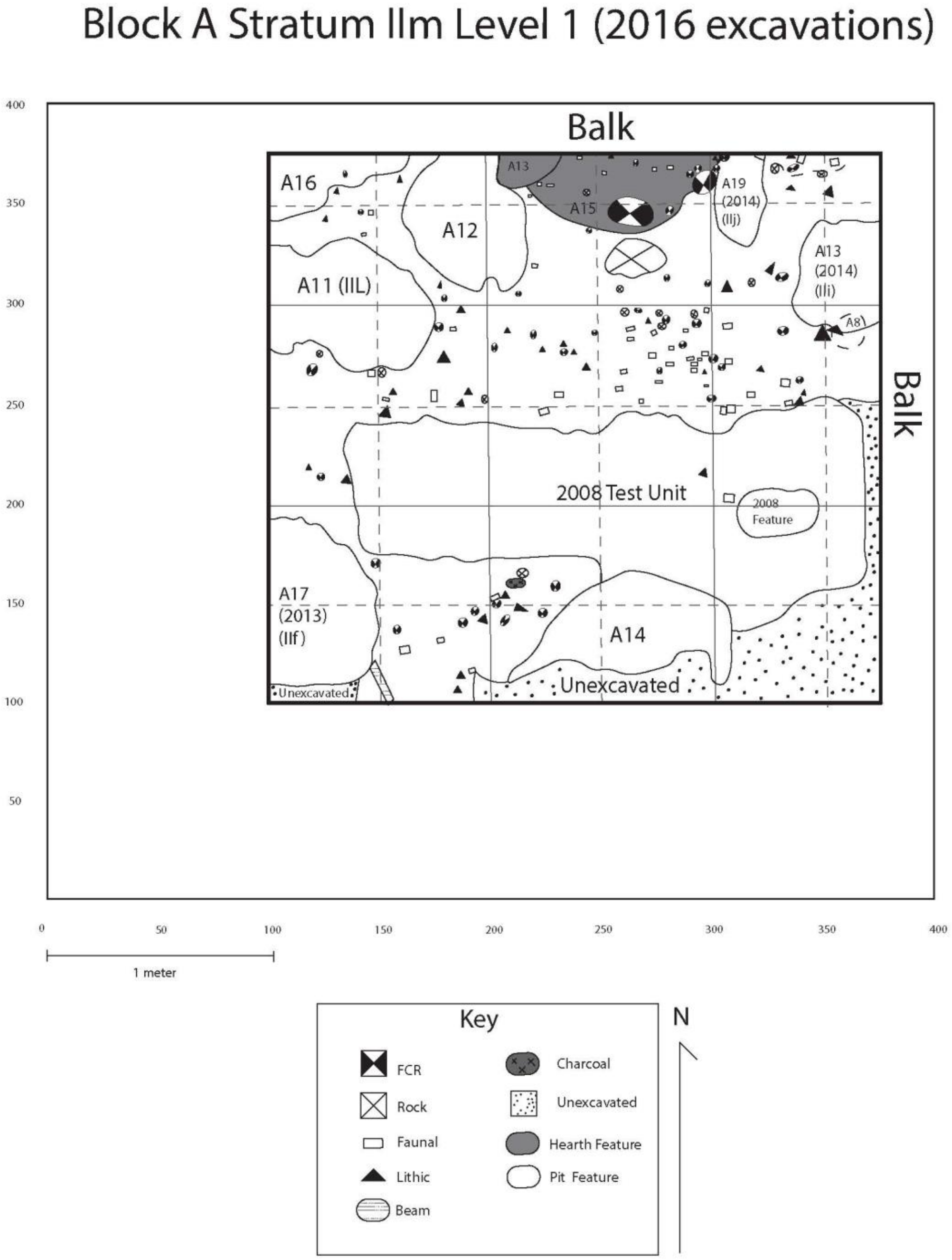


Plan map for floor IIk.

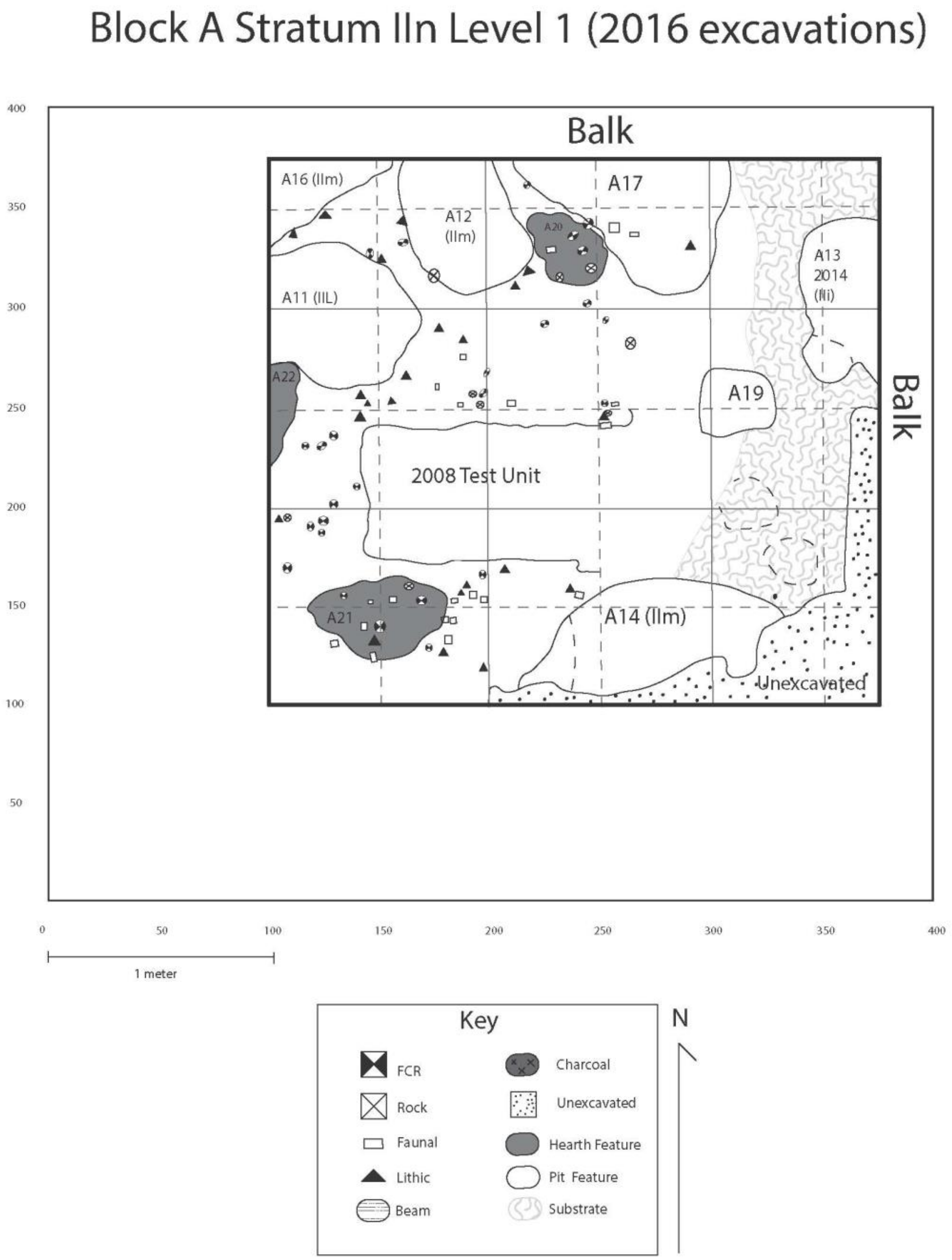
Stratum IIL



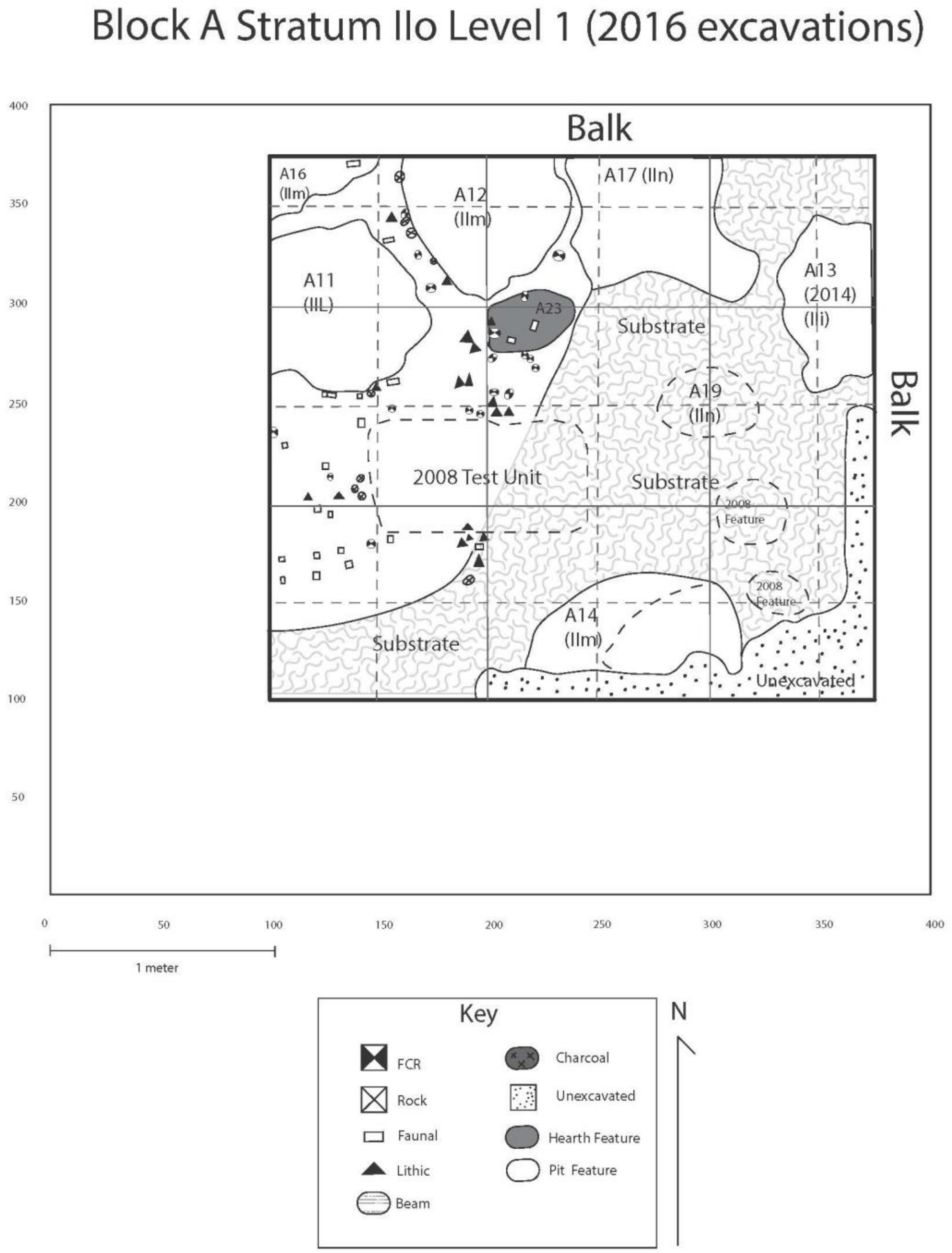
Plan map for floor IIl.



Plan map for floor IIm.



Plan map for floor IIn.



Plan map for floor IIo.


Block D, IIe surface, initiation of 2016 excavation.

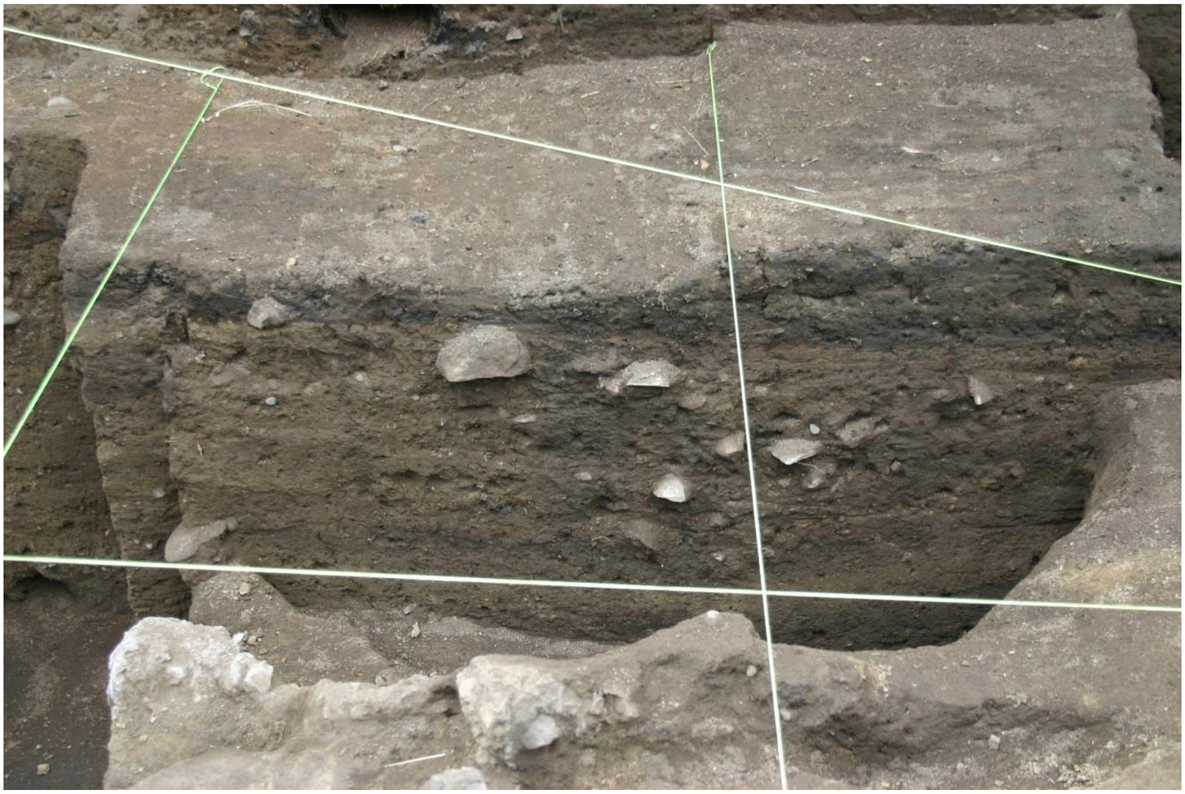

Block C, IIh surface, initiation of 2016 excavation.

Block A, IIk surface, initiation of 2016 excavation.

Feature A1, IIk floor, Block A. Subsequent feature and floor photos are presented in the approximate order encountered in 2016.

Features A2 and A3, IIk floor, Block A.

Feature B14 (2014) profile unexcavated portion showing micro-bedding.



Feature B15 (2014) from floor IIe profile showing micro-bedding.

Feature D1, Block D, IIe floor (field label for IId is incorrect)

Feature D1 (2014), IIb floor Block D (IIa field label is incorrect)

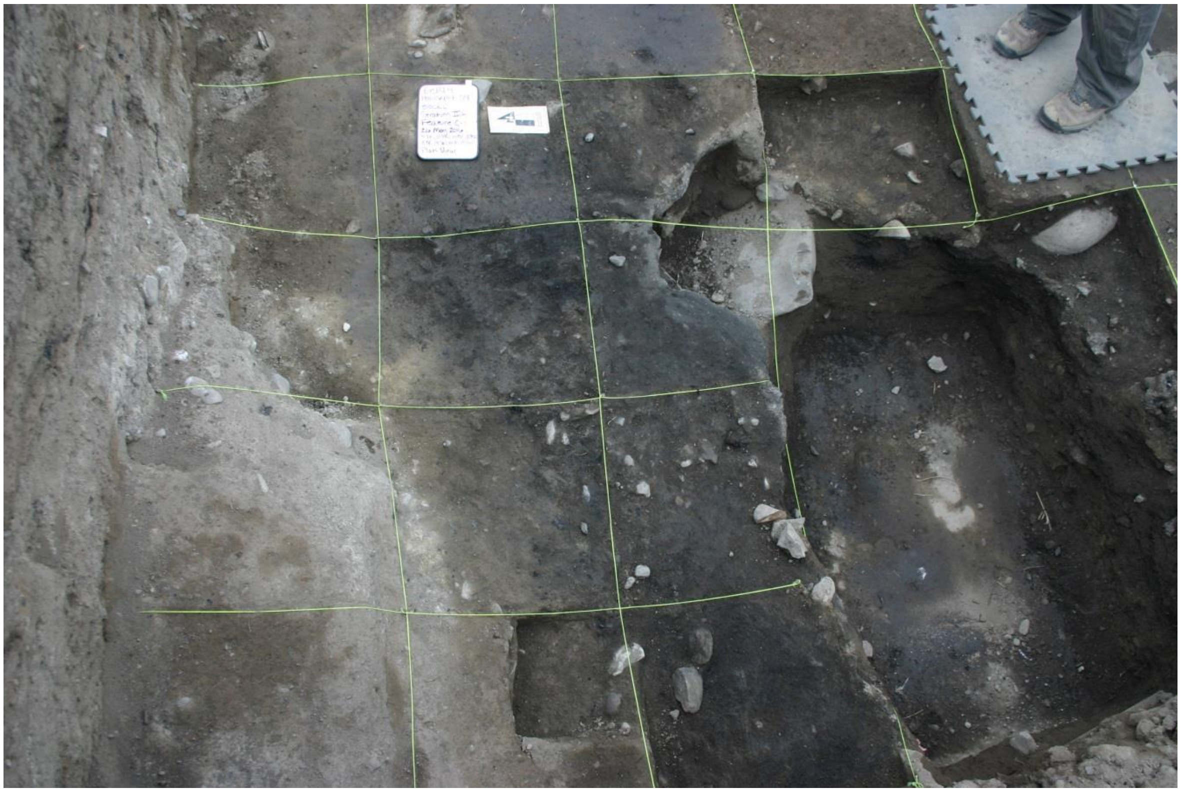
Feature A4, IIk floor, Block A

Feature A4 base, IIk floor, Block A

Features D4-D7, IIe floor, Block D (field label of IId is incorrect)

Feature D10 (2014) base, floor IId, Block D (field label of IIc is incorrect)

Feature C1, IIh floor, Block C



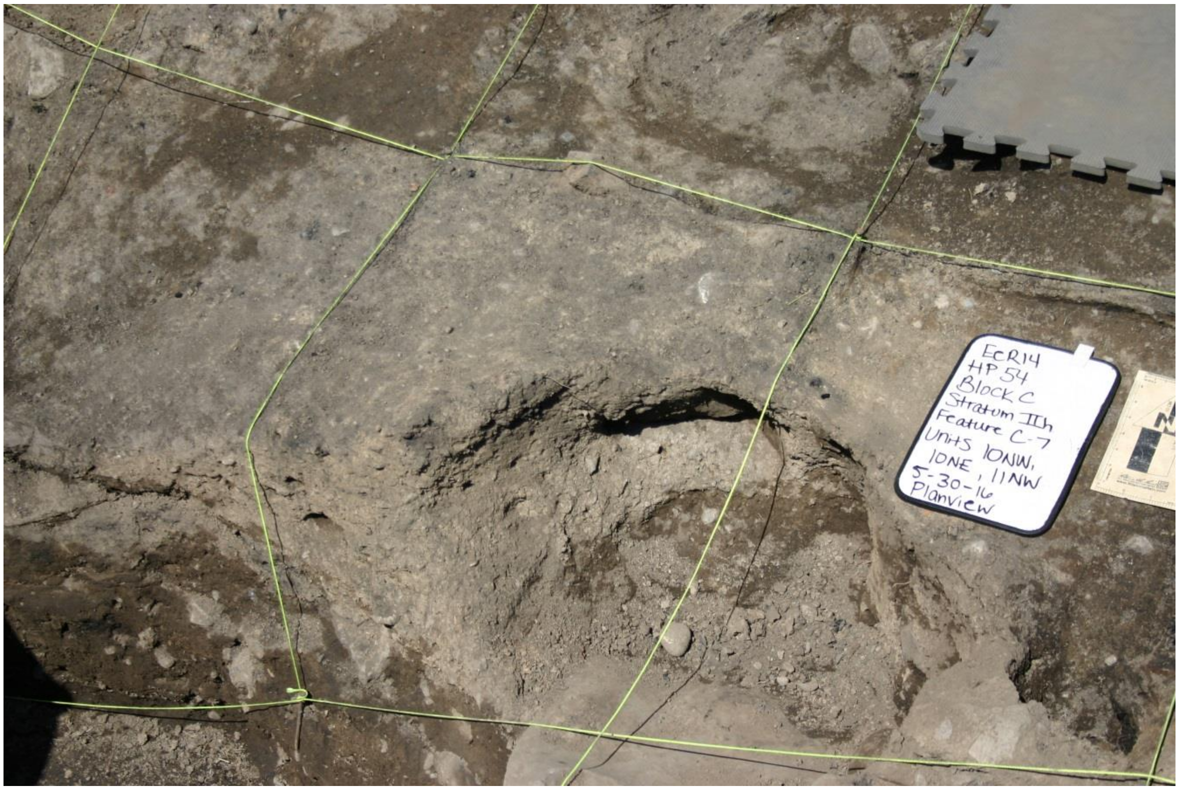
Feature C1, IIh floor, Block C

Feature A5, IIk floor, Block A (field designation of A4 is incorrect)

Feature A5, IIk floor, Block A (field designation of A4 is incorrect)

Feature A7, IIk floor, Block A

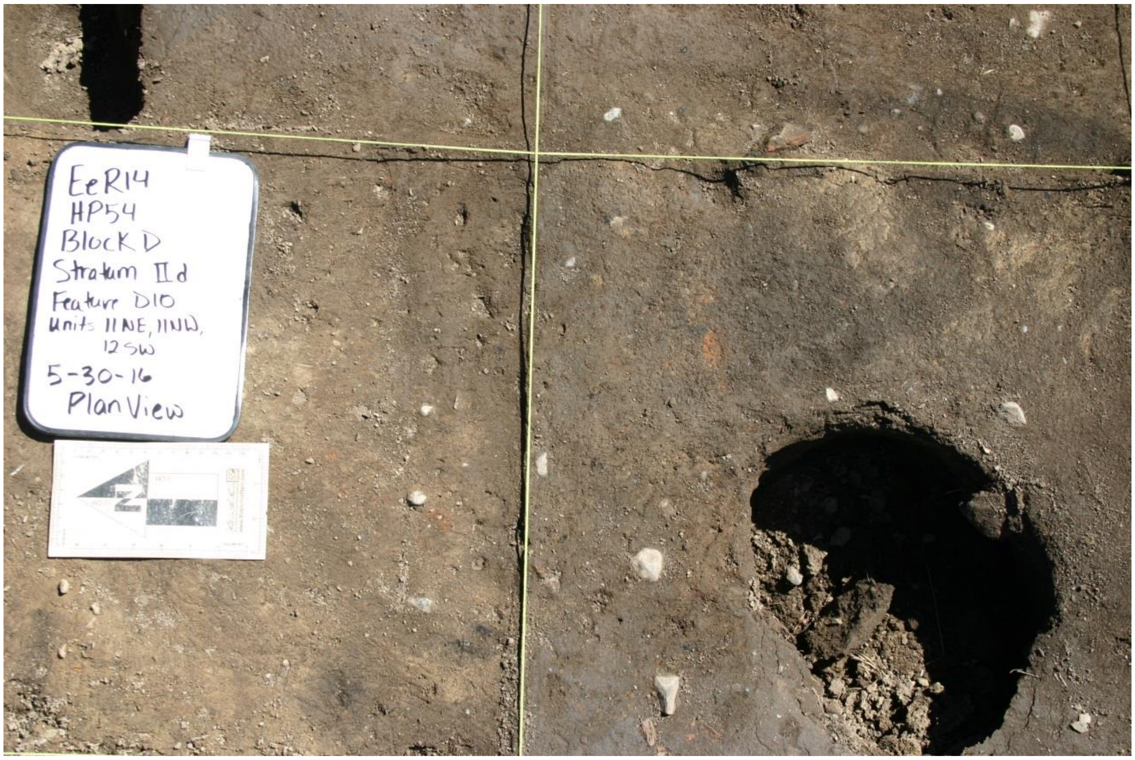
Features D8 and D9, IIe floor, Block D (field designation of IId is incorrect)



Feature C7, IIh floor, Block C

Feature A7, IIk floor, Block A

Feature A6, IIk floor, Block A



Feature D10, IIe floor, Block D (field label of IId is incorrect)

Feature C6, IIh floor, Block C

Feature D11 surface, IIe floor, Block D (field label of IId is incorrect)

Feature C8, IIh floor, Block C

Feature A8, IIk floor, Block A

Feature C6, IIh floor, Block C

Feature C6 base, IIh floor, Block C

Plan View, IIl floor, Block A

Detail plan view, IIl floor, Block A

Feature A9, IIl floor, Block A (field label of IIk is incorrect)

Feature D11a, IIe floor, Block D (field label of IId is incorrect)

Features D18 (2014), D11b, and D11c (the latter is field labelled D11), IId floor, Block D (field label of IIc is incorrect)

Feature C9, IIh floor, Block C

Feature C9 near base, IIh floor, Block C

Feature D11c partially excavated showing bedded sediments in profiles, IIe floor, Block D

Feature C11, IIh floor, Block C

Feature C10, IIh floor, Block C

Feature A10, IIl floor, Block A

Feature C13 base, IIh floor, Block C

Feature C28 (2014) near base, IIg floor, Block C (note large grinding slab)

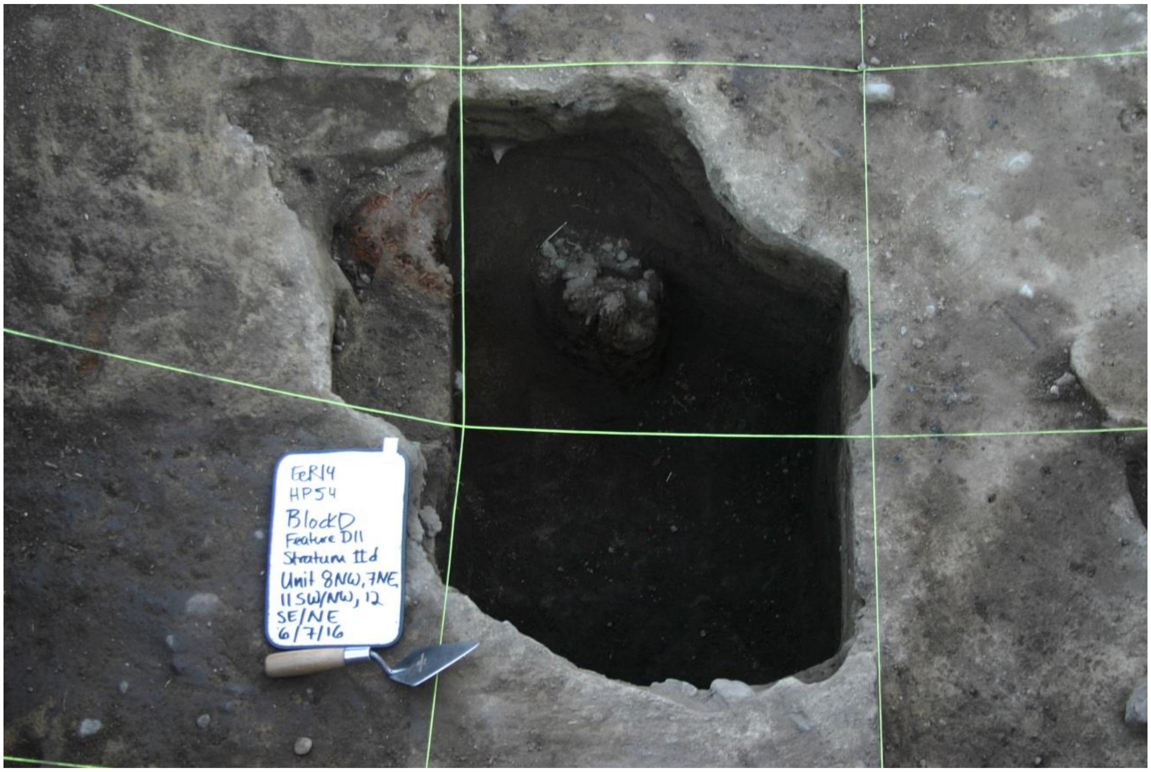
Feature C12, IIi floor, Block C

Block C North, IIi floor, plan view

Feature C14, IIi floor, Block C

Feature C3 layer 1 surface, floor IIh Level 3 (partially excavated on west side), Block C

Feature C3 layer 1 surface, floor IIh Level 3 (partially excavated on west side), Block C



Feature D11c (north and south ends not fully excavated), IIe floor (field label IId is incorrect), Block D; Note Features D11b and D18 (2014) intact wooden posts embedded within D11c.

Feature A11, IIl floor, Block A

Feature C3, Layer 3; IIh Level 3 floor, Block C

Feature C3 layer 1 base, IIh level 3 floor, Block C

Feature C3 Layer 3 base, IIh level 3 floor, Block C


IIm floor, plan view, Block A

IIm floor oblique plan view, Block A

IIb floor, plan view, south Block D (field designation of IIa is incorrect)

IIj floor, plan view, north Block C

Feature C16, IIi floor, Block C

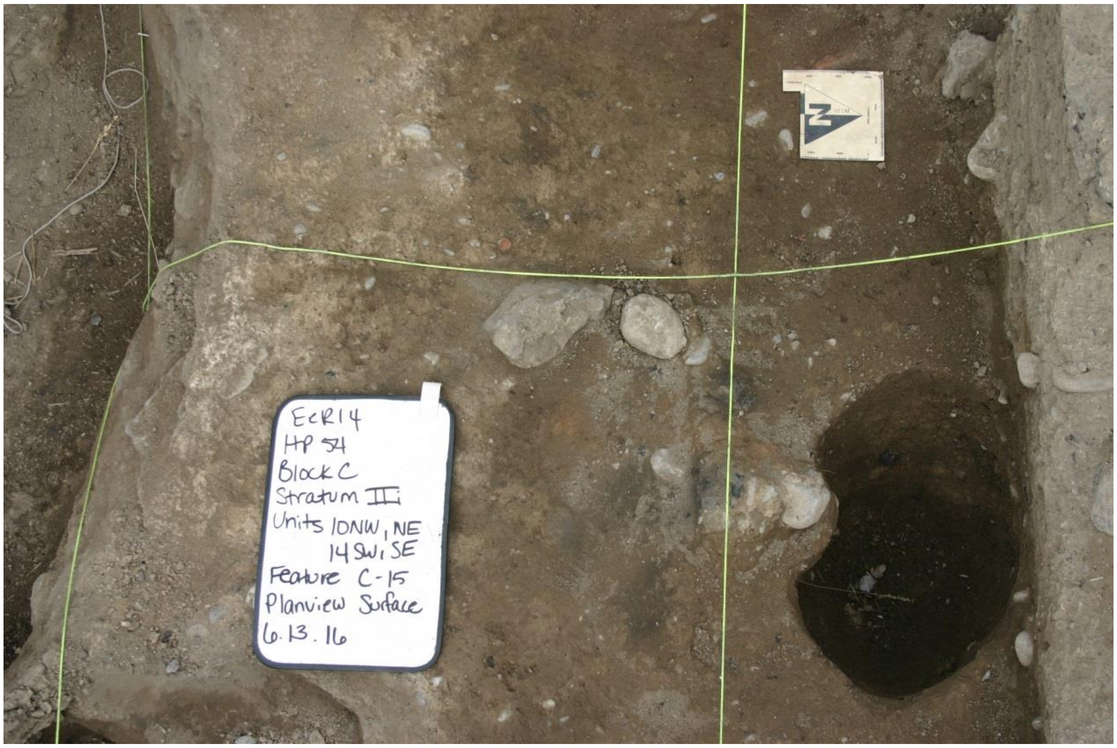
IIi floor, portions of units 7 and 11, Block C

IIC floor, Block D south (field designation of IIb is incorrect)

Feature A13, IIm floor, Block A

Feature C4, IIi floor, Block C

Feature A12, IIm floor, Block A



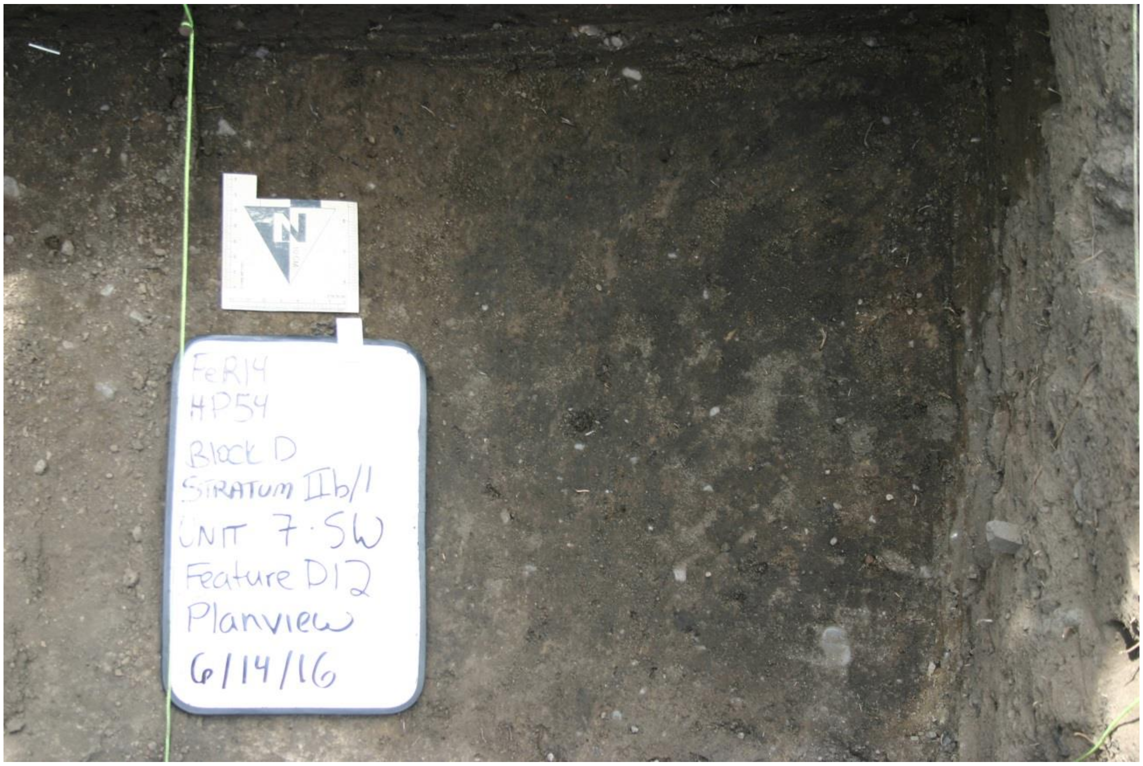
Feature C15, IIj floor, Block C (field designation of IIi is incorrect)

IIk floor, plan view, Block C north

Feature D13, IIc floor, Block D (field designation of IIb is incorrect)

Feature C17 surface, IIi floor, Block C

Feature C17 base, IIi floor, Block C



Feature D12, IIc floor, Block D (field designation of IIb is incorrect)

Features D12 and D14, respectively from floors IIc and IId, Block D (field designations of IIb and IIc are incorrect)

Feature D15 (antler tines and slate tools), IIc floor, Block D (field designation of IIb is incorrect).

Feature D15 base (antler billet), IIc floor, Block D (field designation of IIb is incorrect)

Feature C18 surface, IIj floor, Block C

IIj floor, plan view, Block C east

Feature A12 base, IIm floor, Block A

Feature C18, IIj floor, Block C

IId floor, plan view, Block D south (field designation of IIc is incorrect)

Feature C19, IIk floor, Block C

Feature A15, IIm floor, Block A

Feature D16, IId floor, Block D (IIc field designation is incorrect)

IIl floor, plan view, Block C north

IIl floor, oblique view, Block C north

Feature C20 base, IIk floor, Block C

Feature A14 base, IIm floor, Block A

IIk floor, plan view, Block C east

Features D16a and D16b, IId floor, Block D (field designation of IIc is incorrect)

Features D17, 18, 19, 20, 21, and 22; IIe floor, Block D (field designation of IId is incorrect)

Feature A17 surface, IIm floor, Block A

Feature A17 base (note in situ corner-notched projectile point), IIm floor, Block A

Feature C21, IIj floor, Block C

Feature D16, IId floor, Block D (field designation of IIc is incorrect)

Feature A16 base, IIm floor, Block A

IIb floor, plan view, southwest Block D (field designation of IIa is incorrect)

IIl floor base/surface Stratum IV substrate, plan view, Block C north

IIc floor, plan view, Block D southwest (field designation of IIb is incorrect)

Feature A18 base, IIm floor, Block A

IIj floor, partially excavated cluster of cobbles, Block C northeast

Feature C23 base, IIj floor, Block C

IIk floor, plan view, Block C south

Feature C5 surface, IIk floor, Block C

Feature C5 partially excavated, IIk floor, Block C

Feature C5 partially excavated, IIk floor, Block C

Feature C5, completed excavation (a portion of south and east sides of feature not excavated), IIk floor, Block C

IIn floor, plan view, Block A

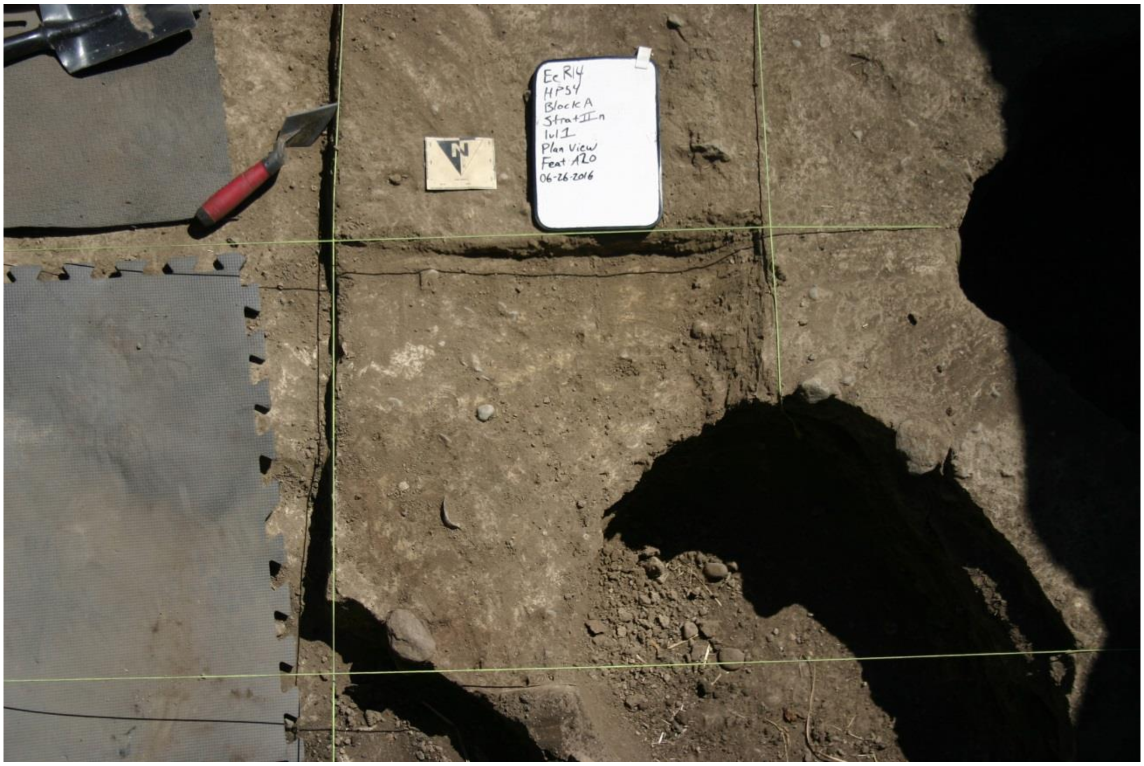
IIn floor, oblique view, Block A

IIe floor surface, plan view, southwest Block D (field designation IId is incorrect)

Feature D25, IIe floor, Block D (Field designations D24 and IId are incorrect)

Feature D25 near base, plan view, IIe floor, Block D (field designation IId is incorrect)

Feature D25 base, plan view, IIe floor, Block D (field designation IId is incorrect)



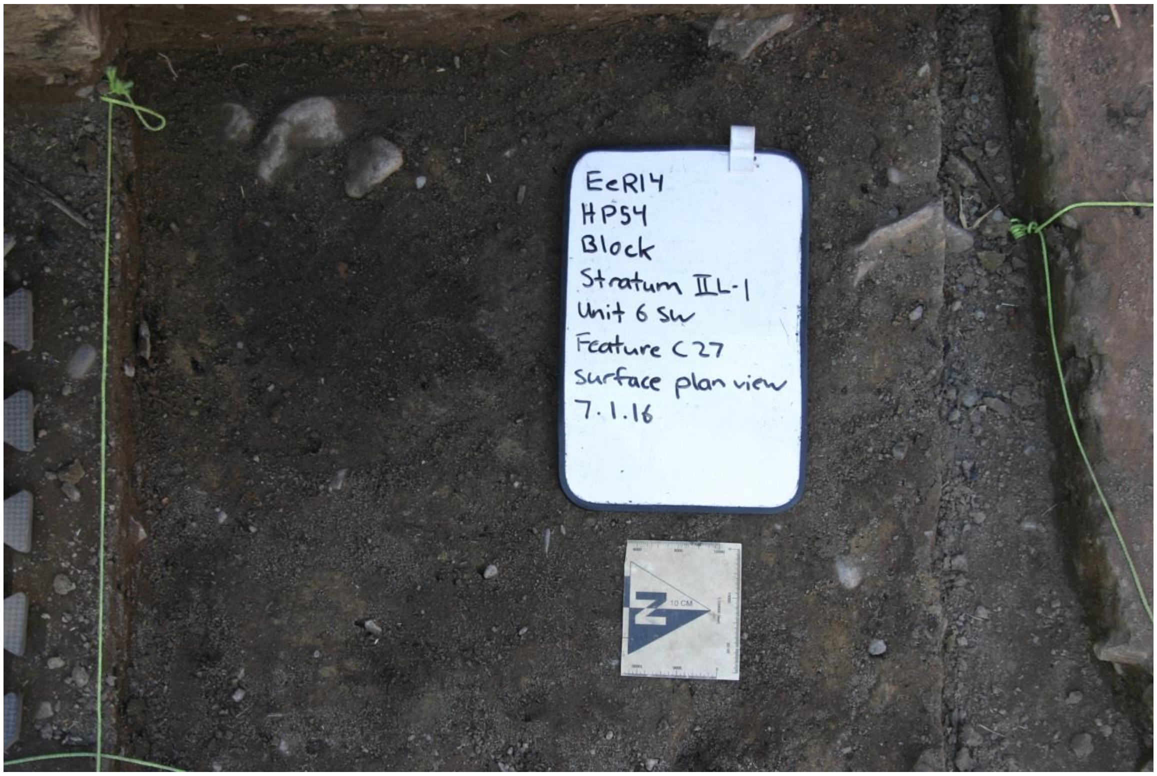
Feature D20, IIn floor, Block A

Feature A21, IIn floor, Block A

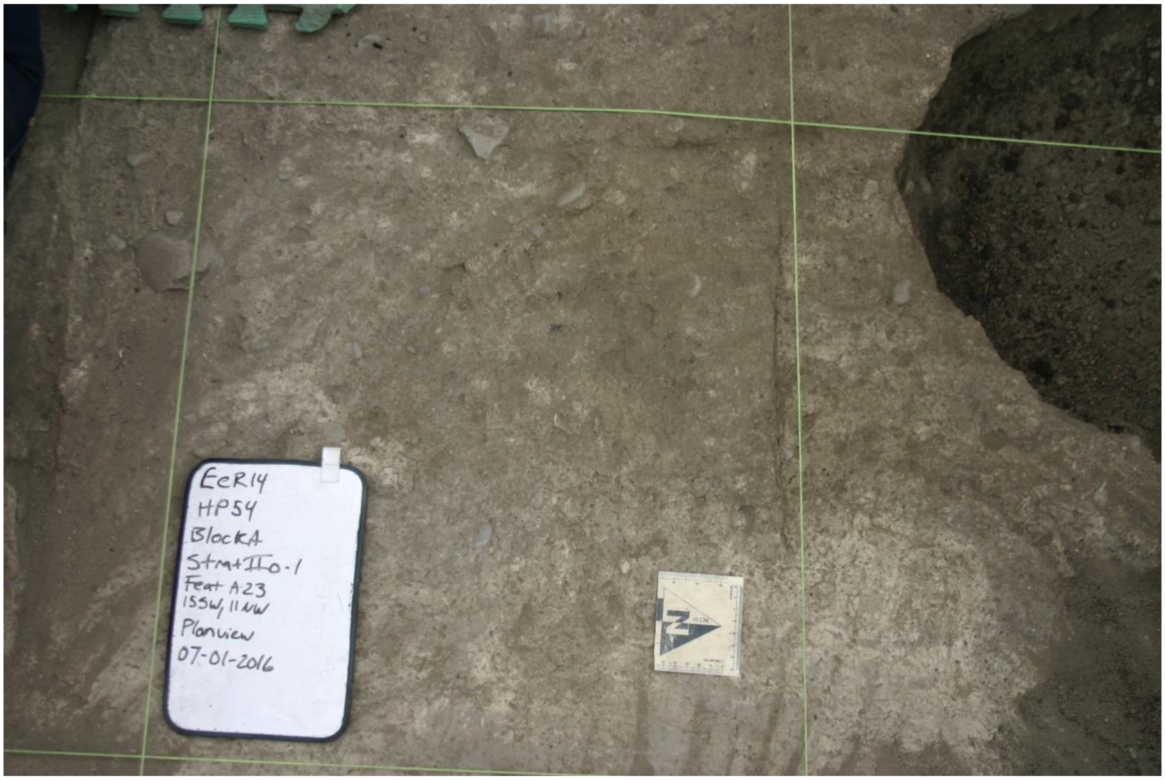
Feature C26 base, IIl floor, Block C

Feature C25, IIl floor, Block C

Feature A22, IIn floor, Block A

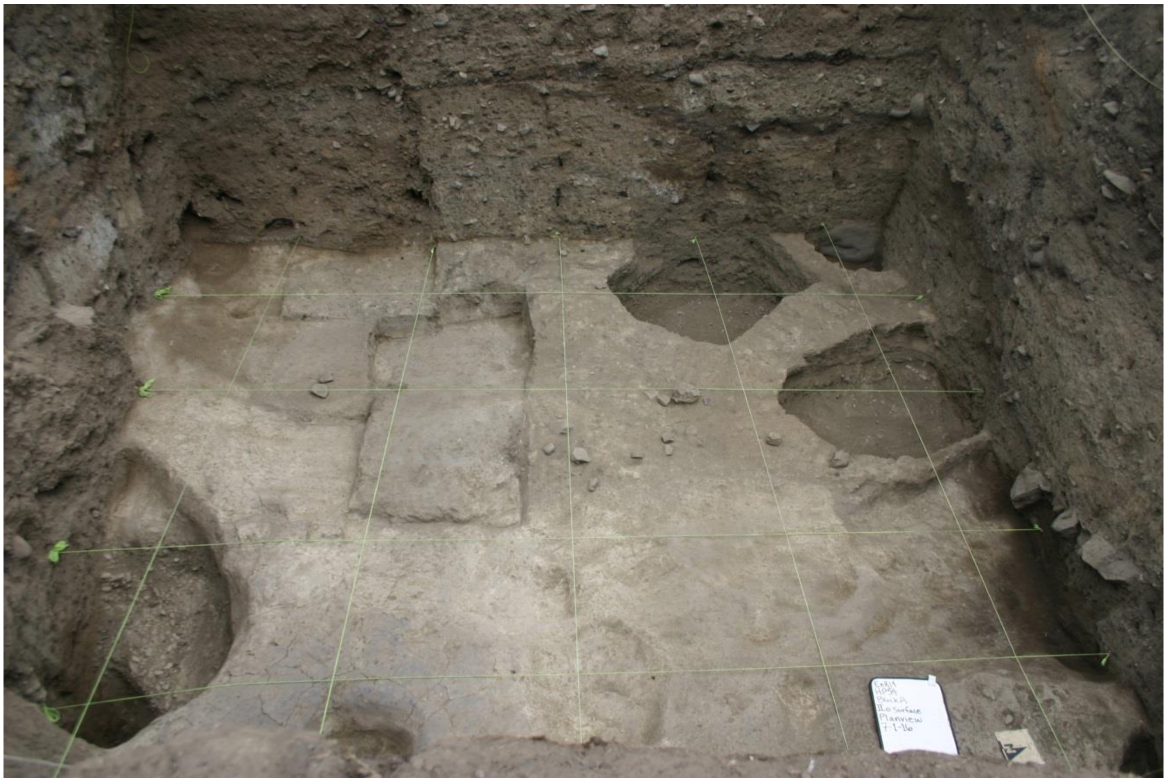


Feature C27, IIl floor, Block C



Feature A23, IIo floor, Block A

IIo floor, plan view, Block A



IIo floor, oblique view, Block A

IIl base/Stratum IV surface north Block C; IIK/FC5 east Block C; Surface IIl south Block C

Features D14, 17, 18, 19, 20, 21, 22, 27, 28, 30; IIe floor, Block D (field designation IId is incorrect)

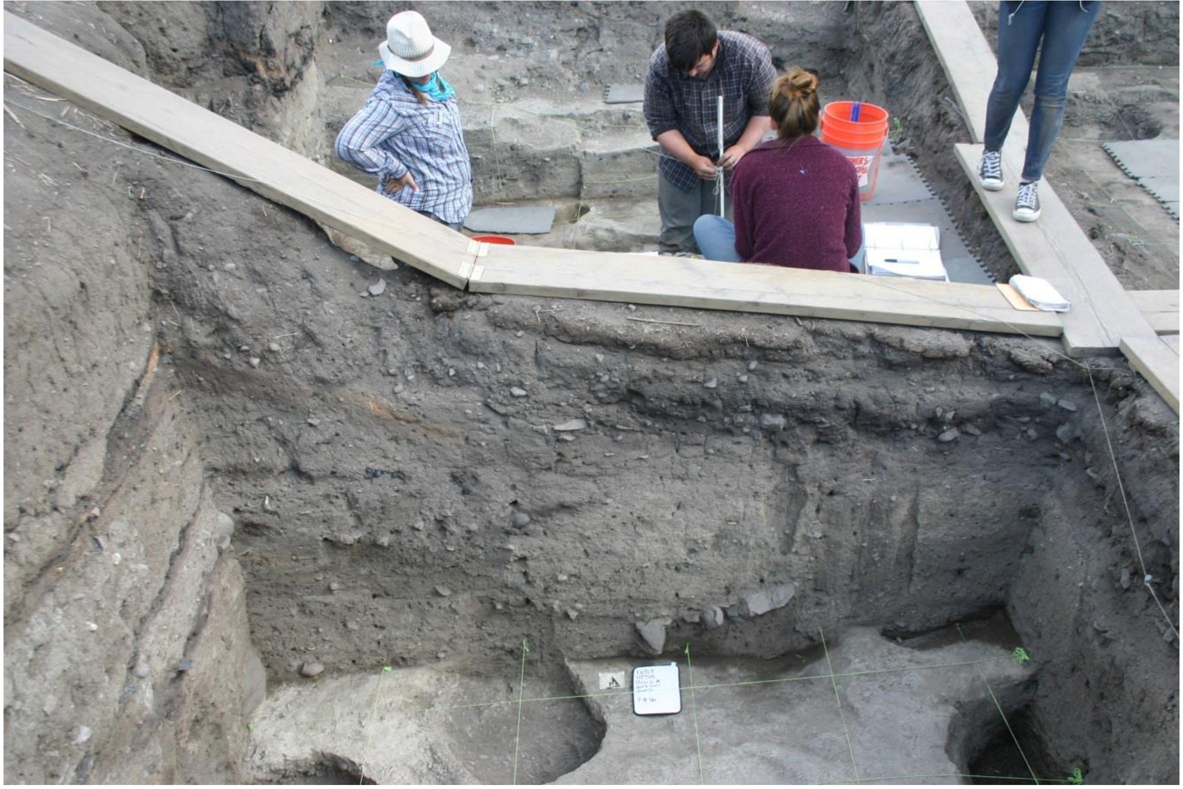
IIo floor base/Stratum IV substrate surface, plan view, Block A


IIl base/Stratum IV substrate surface; 2008 trench, Feature C5 partially excavated.


IIe floor base/Stratum IV substrate surface, plan view, Block D

Block A, east wall profile

Block A south wall profile



Block A north wall profile


Block A west wall profile


Block C, west wall profiles

Block C west wall (north end) profile

Block C west wall (north end) profile (closeup)

Block C west wall (south end) profile

Block C south walls profile


Block D east wall profile.


Block D north wall profile

Completed Housepit 54 excavation

Appendix B
Lithic Artifact Typology for 2016

Lithic Artifact Typology

2016 Field Season

Unifacially Retouched Artifacts

1	miscellaneous
50	Unifacial blade tool
71	Used flake on a break
88	Dufour bladelet
143	Scraper retouch flake
148	Flake with polish sheen
150	Single scraper
151	Unifacial perforator
152	Unifacial borer/drill
153	Small piercer
154	notch
156	Alternate scraper
157	Miscellaneous uniface
158	Key shaped uniface
159	Unifacial knife
160	Unifacial denticulate
162	End scraper
163	Inverse scraper
164	Double scraper
165	Convergent scraper
180	Used flake
183	Spall tool
184	Retouched spall tool
188	Retouched backed tool
232	Stemmed scraper

255	Abruptly retouched truncation on a flake
279	Hafted unifacial knife w/some bifacial chipping on haft
302	End Scraper on snapped Kamloops projectile point
307	Used margin of a tabular core
310	Pieces esquillee with unifacial or bifacial stem

Bifacial artifacts

2	Miscellaneous biface
4	Biface retouch flake with use-wear
6	Biface fragment
130	Bifacial knife
131	Stage 4 biface
132	Bifacial perforator
133	Bifacial borer/drill
135	Distal tip of a biface
139	Fan tailed biface
140	Knife-like biface
141	Scraper-like biface
145	Piece esquillees
192	Stage 2 biface
193	Stage 3 biface
225	Tang knife
240	Chipped wedge tool on angular slate or shale
258	Hafted knife on a spall
262	Side notched bifacial drill

286	Steep retouched truncation on a biface
291	Bifacial knife retouch flake
299	Key-shaped biface
286	Steep retouched Truncation on a biface
316	Knife-like biface on side-notched concave base drill
317	Corner notched concave base bifacial

Points

19	Late plateau point
35	Point tip
36	Point fragment
99	Misc. point
101	Lochnore point
102	Lehman point
109	Side-notch point no base
110	Kamloops side-notched point concave base
111	Kamloops side-notched point straight base
112	Kamloops side- notched point convex base
113	Kamloops multi-notched point
114	Kamloops stemmed
115	Plateau corner-notched point concave base
116	Plateau corner-notched straight base
117	Plateau corner-notched point convex base
118	Plateau corner-notched point no base
119	Plateau basally-notched point straight base
120	Shuswap base
121	265huswap contracted stem slight shoulders
122	265huswap contracted stem pronounced shoulders
123	265huswap parallel stem slight shoulders
124	265huswap parallel stem pronounced shoulders
125	Shuswap corner removed concave base
126	Shuswap corner-removed eared
127	Shuswap stemmed single basal notch

128	Shuswap shallow side-notched straight basal margin
129	Shuswap shallow side-notched concave basal margin
134	Preform
136	Plateau preform
137	Kamloops preform
229	Shuswap 10: stem/eared with concave base
231	Ground/sawed slate projectile point
236	Limestone or marble projectile point
237	El Khiam style point: side notched point on a triangular blade-like flake
244	Small triangular point
245	Large straight to concave base side-notch point
251	Slate side-notched point with a straight base
254	Large square stemmed dart point
256	Kamloops split base corner notched
285	Unifacial point preform
289	Lame a crête
292	Notched flake w/distal impact fracture
295	Plateau corner-notched point w/base missing
301	Crude projectile point (shape of point chipped on flake)
303	Kamloops corner-notched projectile point with base mising
314	Ground steatite stemmed projectile point

Groundstone

185	Wedge-shaped bifacial adze
190	hammerstone
200	Misc. groundstone
201	abrader
202	Sandstone saw
203	Ground slate
204	Steatite tubular pipe
205	Abrader/saw
206	Anvil stone
207	Abraded cobble or block
208	Abraded cobble spall
209	Ornamental ground nephrite
211	Groundstone mortar
218	celt
219	Groundstone maul
220	Ground slate piercer/borer with chipped edges
222	Slate scraper
226	Sawed gouge
228	Groundstone adze on a natural break
230	Slate knife
233	Nephrite adze
234	Burnishing/polishing stone
235	metate
238	Groundstone spike
239	Small stone bowl
241	Sawed adze
242	Ochre grinding stone

246	Slate knife with bored hole
250	Ground nephrite scraper
257	Ground slate adze, without cutting/sawing
259	Groundstone cube
260	mano
261	Groundstone effigy
263	Ground slate chopper
264	Adze perform
265	Shallow ground slate bowl
266	Sawed scraper on an igneous spall
267	Miscellaneous groundstone base, possible effigy or bowl
268	Nephrite adze core
276	Hafted slate with blunt edge and parallel striations, most likely mate scraper
277	Incised tool
278	Slate knife retouch flake
280	Chipped slate
281	Sawed slate
282	Slate chopper
283	Steatite tubular pipe manufacture reject
284	Chipped adze
293	Ground nephrite adze preform
294	Chipped stone chopper
296	Nephrite polished scraper
297	Scraper on a flake derived from a hand maul
298	Polished steatite fragment
300	Small groundstone disk

304	Slate Scraper retouch flake
305	Incised or pecked image on ground surface
306	Polished nephrite fragment
308	Polished metamorphic rock
309	Sawed and/or chipped metamorphic rock
312	Slate drill
315	Stone vessel shard
319	Preformed FCR: core-like rock
320	Hand maul on un-preformed cobble

Ornaments

210	ochre
212	Mica ornament
214	Stone bead
215	Stone pendant or eccentric
216	Ground or sculpted ornament
217	Copper artifact
243	Sawed/sliced bead
252	Copper bead
253	Copper pendant
287	Spindle whorl preform
288	Spindle whorl
290	Ornament/pendant blank
311	Bead core
313	Bead blank

Other

213	Misc. metal artifact
223	Burin spall tool
224	burin
227	Sawed stone disk
247	Misc. drilled artifact
248	Misc. sawed stone
249	Painted stone tool
269	Glass beads
270	Misc. glass
271	Window glass
272	Iron projectile point

273	Other historic period beads
274	Horseshoe
275	nail

Cores

146	Bipolar core
147	Microblade
149	Microblade core
182	Core rejuvenation flake
186	Multidirectional core
187	Small flake core
189	Unidirectional core
221	Slate core

Size

XSM	Extra small	1 cm square
SM	Small	4 cm square
M	medium	16 cm square
L	Large	64 cm square
XL	Extra large	Greater than 64 cm square

SRT

N/O	Nonorientable
M/D	Medial-distal
S	Split
P	Proximal

C	complete

Cortex

T	Tertiary
S	Secondary
P	Primary

Fracture Initiation

C	Cone
B	Bend
W	Wedge

Flake types

ESR	Early stage reduction
TF	Thinning flake
RBF	R billet flake
RF	Retouch flake
BF	Bipolar flake
NF	Notching flake
B	Blade
CRF	Core rejuvenation flake

Retouch

0	Invasive
1	Semi-abrupt
2	abrupt
3	Scalar
4	Step
5	hinge

Use-wear

0a	Polish
0b	Rounding
1a	Perpendicular striations
1b	Parallel striations
1c	Oblique striations
2a	Scalar/step chipping
2b	Oblique/perp. chipping
2c	Oblique chipping
3a	crushing
3b	Grinding
3c	Blunting
4	Sawing
5	Gouging/boring
6	Notched
7a	drilled
7b	incised
8	Pecked
9	Battering

Material

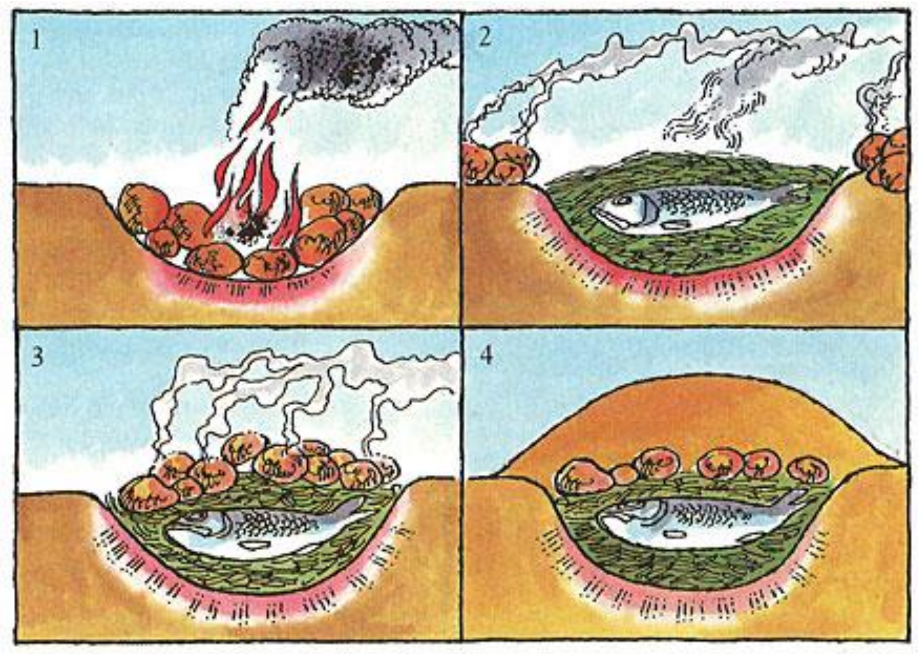
1	Dacite
2	Slate
3	Silicified shale
4	Coarse dacite
5	Obsidian
6	Pisolite
7	Coarse basalt

8	Nephrite
9	Copper
10	Ortho-quartzite
11	Basalt
12	Steatite/soapstone
13	Chert (green)
14	Chert
15	Jasper
16	Jasper (hat creek)
17	Chalcedony
18	Chalcedony (yellow)
19	Igneous intrusive
20	Granite/diorite
21	White marble
22	Green siltstone
23	Sandstone
24	Graphite
25	Conglomerate
26	Andesite
27	Vesicular basalt
28	Phyolite
29	Limestone
30	Mica- black
31	Porphyry
32	Silicified wood
34	Schist
35	Misc.

36	Serpententite/serpentine
37	Gray vitric tuff
38	Gypsum
39	Mudstone
40	Galena
41	Quartz crystal
42	Metal/iron
43	Glass
44	Quartzite
45	Other greenstone metamorphics
46	Rhyolite
47	metamorphosed
48	Gneiss
49	Shale
50	Silicified bone
51	Ochre (hematite)
52	Silicified sandstone

Appendix C
Paleoethnobotanical Report

Palaeoethnobotanical Analysis of the Bridge River 2 & 3 Occupations of Housepit 54 at the Bridge River site, Southwestern British Columbia



Pit-cooking @ www.murrayriver.com.au

Natasha Lyons, PhD

ursus-heritage.ca

natasha@ursus-heritage.ca

Prepared for: Anna Prentiss, University of Montana

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Introduction

This report summarizes the analysis of 45 archaeobotanical samples from the Bridge River 2 and 3 period occupations of Housepit 54 at the Bridge River site (EeRl-4). This analysis has two primary threads. In the first, I investigate spatial and temporal archaeobotanical patterns within this series of Housepit 54 house floors. Floors II o—II I and associated occupations represent the Bridge River 2 period (ca.1300-1400 cal. BP), and floors II h—II e represent the slightly later Bridge River 3 period (ca. 1200-1300 cal. BP). I ask what the plant macroremains can tell us about site formation, cultural practices, and how Housepit 54 residents were using the site and its environs? Our expectations are that that 'burn' features (hearths, earth ovens, and other cooking features) will produce a greater density of plant macroremains than other feature types, and that the longest occupied floors and associated features will exhibit the greatest diversity.

In the second thread of this analysis, I compare roasting features from the Bridge River site to those from other archaeological sites in the southern interior of British Columbia. Roasting features, also known as earth ovens, have been used by First Nations Peoples since the late Holocene to cook food for both immediate consumption and winter storage (Figure 1). Across southern British Columbia, earth ovens built by Salish communities in upland meadows and villages were part of carefully coordinated, multi-layered annual patterns of movement across the landscape to harvest and produce food. In this poster, we compare archaeobotanical data from clusters of earth ovens located in four village and three upland contexts (Figure 2), asking what differences can be inferred from their contents. Our expectation is that we will see evidence for more generalized public consumption in village contexts and a more specialized focus on plant food production in upland contexts.

This report is organized as follows. In the methods, I describe the processing and analysis of archaeobotanical samples, followed by a consideration of ancient plant use and preservation. In the results, I present a small-scale quantitative analysis of the diversity, distribution and density of plant macroremains within Housepit 54 floors and in roasting features at Bridge River and across the region. In the discussion, I look first at the overall patterning of plant macroremains in Bridge River 2 and 3 occupations, in order to interpret the plant use activities of ancient residents, use of local environments, and the implications of patterning across time and space for ancient St'át'imc plant use. I then consider the patterning of plant macroremains between village and upland contexts at a regional scale with a view to understanding patterns of movement, harvest, and production across the landscape.

A note on terms is in order here. Palaeoethnobotany is the study of past human-plant interactions, while archaeobotany refers to the analysis of archaeological plant remains (Hastorf and Popper 1988:2). These terms are often used interchangeably in the literature. Plant macroremains are those visible to the naked eye, while microremains require high level magnification (Pearsall 2000:6-9). This analysis deals with macroremains such as seeds, charcoal, buds, leaves, stems, and the like; plant microremains take the form of starches, pollen, and phytoliths.

Methods

Forty-five archaeobotanical samples representing 99.65 litres of sediment were analysed from features associated with a series of floors occupied during the Bridge River 2 period and Bridge River 3 periods (Appendix 1, Table 1). In the field, samples were systematically collected from floor and feature contexts directly from trowel to bag and labeled for processing. Samples analysed range from 0.25 to 3.0 litres.

Block A samples represent features associated with floors IIk—IIo, including basin-shaped (n=5 samples) and surface hearths (n=3) and a deep cylindrical pit (n=3). Five samples were analysed from feature A8, collected in the 2014 season at Bridge River, that appear to be associated with the IIh roasting pit complex in Block C. Block C samples focus on features associated with floors IIh and IIk, including 12 samples from features C1 and C3 in strat IIh. This floor contained a massive concentration of oven-like hearths that may constitute an indoor roasting complex. Additional samples from Block C include those from a series of basin-shaped hearths (n=8) within IIh that slightly post-date the roasting complex and a deep bell-shaped pit in IIk (n=2). Block D samples are from features associated with the IIe floor, including a shallow hearth (n=2) and two deep bell-shaped pits, D20 (n=4) and D25 (n=1).

The roasting pit analysis is a combination of data analysed from the oven-like hearths in floor IIh of Housepit 54 (this report) and from ten roasting pits scattered throughout the Bridge River village that were analysed by Ali Dietz (2005), as well as data compiled from other sites in the mid-Fraser region (Appendices 2 & 3). Ovens located on the peripheries of other villages include DhRl 78 on the Harrison River (Lyons and Ritchie 2017), EeRb 140 on the south Thompson River (Wollestonecroft 2000, 2002), and Keatley Creek (EeRl 7) in the mid-Fraser Canyon (Hayden and Mossop Cousins 2004). Upland contexts include White Rock Springs (EeRj 226) in the upper Hat Creek Valley (Nicolaides 2010), EaRj-83 on upper Kwoiek Creek (Angelbeck n.d.; Lyons 2013), and a cluster of sites near Cache Creek (EeRi) (Peacock 2013). All sites date to the late pre-contact period (<2500 bp) and are within traditional Interior Salish territory, except DhRl 78, which sits at the eastern edge of Coast Salish territory, bordering the interior. Sample sizes vary but are generally adequate to permit cross-site comparison (Table 2); the Keatley Creek data only permits ubiquity analysis.

All sediment samples were floated using a modified bucket flotation system in the field by University of Montana crew. Samples were measured and recorded and then placed into a bucket with a pouring spout and floated into a series of nested geological screens. The light fraction was poured off into the 1.0 and 0.425 mm screens, and the heavy fraction into the 1.0 mm screen. The majority of sediments are largely silty with some clay, but botanicals generally floated with little impediment. Light (modern and charred botanicals, some micro-fauna) and heavy (lithics, fauna and sediment) fractions, once separated, were removed to lined drying racks and labelled. Dry samples were split into like-sized fractions (2.0mm, 1.0mm, 0.425mm, and catch), weighed, and placed in labelled ziploc bags for storage and analysis.

Standard palaeoethnobotanical techniques were used in the sorting and identification of all macroremains (Pearsall 2000). Samples were sorted into their constituent parts under a dissecting microscope (10-40x resolution). Larger fractions were sorted in their entirety, while the 1.0 and 0.425mm fractions were sub-sampled in samples where macroremains were either sparse or highly redundant. Plant macroremains recovered include charcoal, needles, seeds, coniferous and deciduous buds, fruit tissue, and modern littermat components (Appendix 1, 2). Plant remains were identified using the Ursus comparative collection, as well as published and digital sources (BC Eflora 2008; Cappers 2006; Hitchcock and Cronquist 1973; Martin and Barkley 1961; Montgomery 1977). Fish vertebrae, micro-fauna and insect carapaces were found in a number of samples (Appendix 1). Macroremains were generally quantified by count; seed fragments are tabulated as ½ to combat the inflation of seed totals. Only charred components are considered archaeological in this analysis. Identifications were made to the highest level of confidence: a 'cf.' denotes a probable designation and a '?' a possible designation.

Ancient Plant Use & Preservation

The Middle Fraser region, which is the territory and homeland of the St'át'imc people, is an arid mountainous region cut through with rapidly descending streams and rivers. The lower elevation river terraces and valleys generally lie within the Ponderosa Pine Bunchgrass biogeoclimatic zone, the montane forests and parklands within the Interior Douglas-fir and Montane Spruce zones, and the Engelmann Spruce-Subalpine Fir zone at higher altitudes (Meidinger and Pojar 1991). Alexander (1992) has described the vegetation ecology of these successive ecozones alongside the plants used for foods and technologies by historic St'át'imc communities in each, their periods of availability, and traditional methods of harvesting, processing, and use. The picture that emerges is an annual cycle that rested on careful decision-making, multi-layered scheduling, and sophisticated knowledge of the properties and applications of many hundreds of plant species (as well as other resources).

The traditional diet of the St'át'imc, and their Interior Salish neighbours, relied heavily on salmon, ungulates, berries and 'root' foods. A wide variety of fruits, mostly berries, were harvested throughout the growing season on river terraces, most importantly Saskatoon berries (*Amelanchier alnifolia*) and soapberries (*Shepherdia canadensis*), and in montane meadows, huckleberries and blueberries (*Vaccinium* spp.). Different root foods were harvested in the spring and fall in montane meadows. These resources were carefully managed through practices such as selective harvesting, aerating, mulching, and burning for enhanced productivity (Lepofsky and Peacock 2004; Peacock 1998; Turner and Peacock 2005). Turner (1992: 440-461) has mapped and described the ethnographic use of primary food plants among the St'át'imc, including spring beauty (*Claytonia lanceolata*), balsamroot (*Balsamorhiza sagittata*), nodding onion (*Allium cernuum*), Saskatoon berry, black mountain huckleberry (*Vaccinium membranaceum*), cow parsnip (*Heracleum lanatum*), and whitebark pine seeds (*Pinus albicaulis*).

Plants also formed a primary medium for the manufacture of a suite of hunting, gathering, and domestic technologies. A wide variety of containers were made of birchbark (*Betula* spp.), spruce roots (*Picea* spp.), and cedar roots (*Thuja plicata*), the latter obtained through trade (Teit 1906:205). Baskets were often decorated with dark red cherry bark (*Prunus* spp.). Indian hemp (*Apocynum cannabinum*) was widely used to make fibre, cordage and netting, and avidly sought by neighbouring groups in trade (Turner 1992). Various kinds of mats and open-work bags were woven of bulrushes (*Scirpus acutus*) (Teit 1906:208-9).

Plants and their products were clearly ubiquitous in all contexts of traditional Aboriginal Peoples' lives. In winter houses, like Housepit 54, they formed the primary beams and posts, were used as boxes for storage, mats and space dividers, cooking baskets and utensils, and also dried and otherwise cured as food stores, spices, and medicines. The Fur Trade period floor of Housepit 54 had a single central hearth positioned near the base of the ladder surrounded by communal areas in the south and north central parts of the floor, which were likely used for carving, flaking, weaving, sewing and other manufactures (Prentiss 2017). In the winter, the central hearth may have only been lit during cooking times (cf. Alexander 2000); the house kept warm from body heat and a deep insulation of snow. Sleeping benches occupied the northeast and northwest perimeters of the floor, and the winter goods of individual families likely hung from the rafters and were stored in boxes and baskets.

The preservation of ancient plant remains within the archaeological record of the mid-Fraser must be assessed through a consideration of both natural and cultural site formation processes within each occupation (Minnis 1981; Pearsall 2000). The charred plant remains that usually compose the archaeobotanical record in the Pacific Northwest are not subject to natural attrition through decay and microbial activity that uncharred plants are, though they are subject to trampling and other mechanical processes on deposits (Lepofsky 2004). Only charred plant macroremains are considered archaeological at assemblages from Bridge River and the mid-Fraser region. Excavators determined that mixing and bioturbation in the BR 2 and 3 occupations of Housepit 54 are generally low and overall deposit integrity is quite good.

Results. Analysis of Plant Macroremains from the Bridge River 2 & 3 Occupations of Housepit 54

Fourteen plant taxa from nine botanical families were identified in the archaeobotanical assemblages from the Bridge River 2 and 3 occupations of Housepit 54, including eleven deciduous taxa and two coniferous taxa (Table 1; Appendix 1, 2). Primary food plants, in this assemblage, include Saskatoon berry, kinnikinnick, and a taxon that is probably blue elderberry. Primary technological plants include Douglas-fir and pine, likely both Ponderosa and lodgepole. In the following results, I present a small-scale quantitative analysis of the archaeobotanical assemblages from organized by floor (strat), and examining the ubiquity, diversity, and density of plant macroremains.

Table 1. Overview of Archaeobotanical Assemblages from BR 2 & 3 floors from Housepit 54 with diversity, density, and ubiquity measures

CONTEXT					SEEDS (N)														NEEDLES (N)							
Strat	Block	No. Samples	Features	Total volume (L)	*Amelanchier alnifolia*	*Arctostaphylos uva-ursi*	*Chenopodium* spp.	*?Crataegus douglasii*	*Galium* sp.	*Hordeum spp.*	Labiatae	Poaceae	Rosaceae	*Rosa* spp.	*? Sambucus cerulea*	*Sorbus sitchensis*	Unidentified	TOTAL	Abies spp.	*Pinus* spp.	*Pseudotsuga menziesii*	TOTAL	Diversity (NIT)	Seed Density (Seeds/L)	Micro-fauna	Fish vertebrae
II e	D	7	D12, D20, D25	14.8		5	19										1	25			44	44	**3**	**1.69**	xx	12
II h	C	12	C1, C3	32.5	1.5	1	2					1	1		1		4.5	10	2	39	32	73	**9**	**0.31**	9	30
II h	A	5	A8	7.9	2	73	6.5	1	1		24.5	4			341.5		3.5	457		52	72.5	124.5	**10**	**57.8**	X	
II h	C	5	C6, C10, C11	10.5			2			2				1			5	5				0	**3**	**0.29**		
II I, j	C	3	C17, C18	5	1	1.5	1											3.5		2	1	3	**5**	**0.7**		
II k	A, C	5	C5, A7, A8, A9	11.3		10.0	1								1.5		1	14			87	87	**4**	**1.24**	32+	
II l	A	1	A10	0.5																		0	**0**	**0**		
II m	A	4	A14, A15	10.5		1.5	11					2		1		1.0		16.5		51	281	332	**6**	**1.57**	13+	12
II n	A	2	A21, A22	3.5	1	0.5												1.5		1	1	2	**4**	**0.43**	12+	
II o	A	1	A23	1.75															2	145	518.5	665.5	**0**	**0**	15	
UBIQUITY (% Presence):					**13**	**36**	**33**	**2.2**	**2.2**	**4.4**	**6.7**	**11**	**2.2**	**4.4**	**22**	**4.4**		**532.5**	**4.4**	**38**	**60**	**665.5**			**51**	**15.6**

Ubiquity of Plant Macroremains

Ubiquity is the percent presence of a specific taxon across contexts. It is a useful measure because it is a value of how common a plant is while bypassing the vagaries of preservation. In Figure 1, I present the most ubiquitous plant macroremains in the Housepit 54 assemblage, including food plants, weedy species, and coniferous needles (see Table 1 for all ubiquity measures).

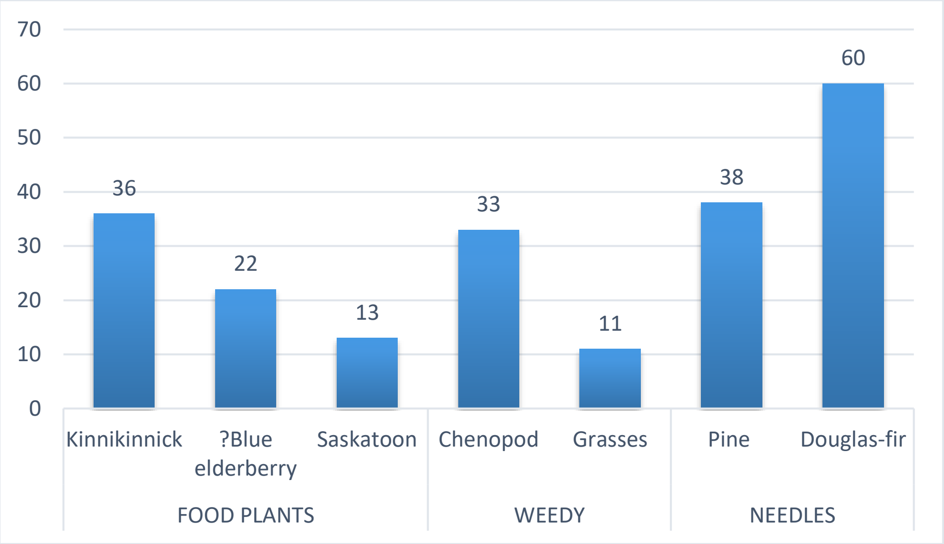

Figure 1. Ubiquitous plant macroremains in the BR 2 and 3 occupations (data labels represent percent presence across contexts in each occupation)

Kinnikinnick is common of all food plants, found in over a third of contexts. This is followed by what is possibly blue elderberry, which clusters in the roasting pits, and Saskatoons, whose distribution is scattered and seemingly random. The ubiquity of kinnikinnick may relate to its many uses. The leaves of kinnikinnick, also known as bearberry, were widely used as an indigenous tobacco and as a medicinal tea (Turner 1997:112). The berries could also be consumed; as with other edibles some berry patches reportedly had more flavor than others. The harvested berries were fried in salmon or bear fat, or cooked in meat stews, for consumption (Turner 1997:111). The abundance of these berries in the Bridge River sequence suggests that it is primarily this latter use that we are seeing. Kinnikinnick is a lowlying evergreen shrub, and the berries stay on the branch through the winter. While St'át'imc peoples are not reported to have consumed this berry ethnographically, it seems as though it was a popular (or necessary) winter food used by their ancestors.

The possible blue elderberries are found in 22% of contexts, clustering particularly in the A8 roasting pit associated with the II h floor. These seeds, measuring approximately 2.0 x 0.75 mm, have the general elongated shape of elderberries, but their seed coats are heavily charred and abraded and the seeds are often collapsed inwards. These measurements are smaller than freshly charred, modern blue and red elderberries. These tentatively identified seeds are found archaeologically in abundance at the Bridge River, Keatley Creek, and Kwoiek Creek sites along the mid-Fraser (Lyons 2003, 2013; Lyons et al. 2017). Ancient DNA studies are in progress at the University of Montana to delve further into this question.

Today, blue elderberries are found in patches in St'át'imc territory (Marie Barney, Kim North, pers. comm. 2014). Both red and blue elderberries are found in neighbouring In-shuck-ch or Lower Stl'atl'imc territory (Farquarson 2006:10). Blue elderberry was considered a famine food by some interior First Nation communities (Turner and Davis 1993:186), while others considered them highly edible. Some groups harvested the berries in mid to late summer and pit-cooked to preserve them for winter use (Turner 1997:140); others waited until the fall to harvest the berries after the frost, and some marked the bushes to retrieve clusters of berries under the snow in winter (Kuhnlein and Turner 1991). It is possible that we are seeing several modes of harvest at Bridge River.

Saskatoon berry, in the past and present, is among the most significant plant foods of St'át'imc and other Interior Salish communities. Its ubiquity in Bridge River 2 and 3 occupations is considerably lower than kinnikinnick is 13% (Figure 1). Saskatoon bushes ripen through the early to mid-summer and are sought and harvested en masse at the best locations and dried for winter consumption (Turner 1997:140). They are found archaeobotanically in abundance in sites throughout the mid-Fraser (Lyons 2003, 2013).

Chenopods and grasses are the most ubiquitous of weedy seeds; both are known as 'camp followers'. Douglas-fir needles are the most common of all macroremains, found in 60% of sampled contexts, followed by pine needles, at 38%. Needles are found particularly in pits, and may have been used to line these features.

Micro-fauna and fish vertebrae were found in many samples (Table 3, Appendix 1). Micro-fauna were found in just over half of samples, in both pits and hearths, though little fauna was found in the II h processing features. Fish vertebrae were recovered from 15.6% of contexts, again, in both cooking and storage features.

Plant Resource Diversity

Diversity is measured as the number of identified taxa (NIT). Diversity measures can the breadth of plant use within an occupation or activity area. In Figure 2, I present diversity measures for successive BR 2 and 3 floors. All diversity measures are very low to low except the II h roasting pits, which are in the moderate range (Lyons 2017). It is uncertain why plant diversity is generally so low across contexts but may relate to both site formation and the spatial organization of plant use activities and processing tasks within Housepit 54 and across the site; this question is pursed further in the discussion.

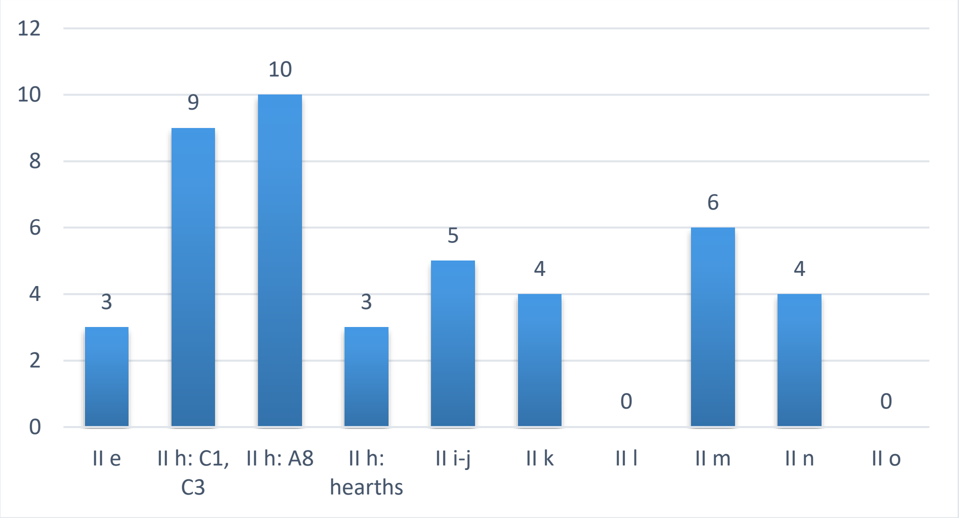

Figure 2. Plant Diversity across BR 2 and 3 Floors

Seed & Charcoal Density

Density reflects the intensity of use of different contexts or occupations and can often inform about how domestic spaces are socioeconomically configured. Seed was calculated as a measure of identified seeds per litre for each floor (Figure 3), and charcoal density is reflected by the weight of given samples, which are largely composed of charcoal (Appendix 1, 2).

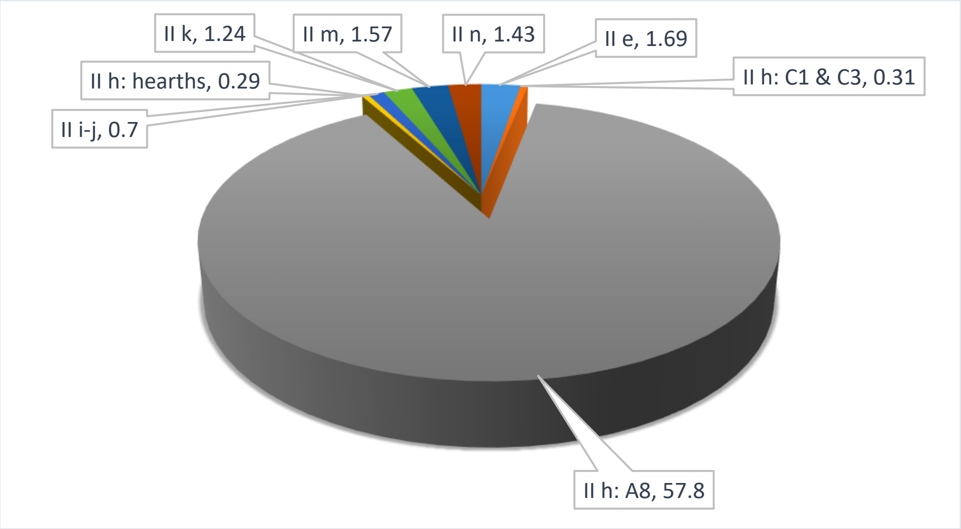

Figure 3. Seed density measures for the BR 2 and 3 floors

The II h floor was sampled intensively and the seed density results presented in Figure 3 are divided into the roasting features C1 and C3 together, feature A8 on its own, and a series of basin-shaped hearths in II h that slightly post-date the roasting complex. Floors II l and II o are excluded from the chart because they lacked seeds. Seed densities are very low across contexts (Lyons 2017) with the exception of the roasting pit samples in A8, associated with floor II h. Plant processing was clearly being conducted in this pit, focused on what is probably blue elderberry followed by kinnikinnick. Mint seeds are also relatively abundant in the A8 processing feature, and was possibly added as a flavouring (cf. Nicolaides 2010).

Charcoal densities are relatively comparable between feature types with the exception of the samples from the roasting complex (Appendix 1, 2). These samples are dense with charcoal and clearly, intensive burning happened here. While flora shows moderate diversity in the features, as indicated above, seed density is low in the C1 and C3 features and very high in the A8 feature. Fauna is present in just under half these samples but in low abundance. At this point, it is uncertain what they were processing in the C1 and C3 features, though the lack of flora may relate to taphonomy, as explored in the discussion.

Results. Comparison of Plant Macroremains from Roasting Feature Complexes at Village & Upland Contexts in the Mid-Fraser Region

This section of the results is a comparison of roasting features from the Bridge River site to those from other archaeological sites across southern British Columbia. Earth ovens were traditionally used by Salish peoples to pit-cook both flora and fauna. Earth oven complexes are found in many upland valleys of the BC southern Interior where root foods grow in abundance; these montane prairies were managed through traditional techniques such as aerating, burning, and selective harvesting (Turner and Peacock 2005). Root resources such as balsamroot (*Balsamhoriza sagitatta*), desert-parsley (*Lomatium* *macrocarpum*), and Nodding onion (*Allium cernuum*) were the focus of intensive processing in family-owned earth ovens (Peacock 1998).

Data was compiled from roasting pits at nine sites across southern BC, including two contexts from Bridge River (Figure 4; Table 2; Appendices 2 & 3). The Bridge River roasting pits include the complex within strat IIh of Housepit 54 (this report) as well as ten ovens from the periphery of the Bridge River village (Allie Dietz 2005). Ovens located on the peripheries of other villages include DhRl 78 on the Harrison River (Lyons and Ritchie 2017), EeRb 140 on the south Thompson River (Wollestonecroft 2000, 2002), and Keatley Creek (EeRl 7) in the mid-Fraser Canyon (Hayden and Mossop Cousins 2004). Upland contexts include White Rock Springs (EeRj 226) in the upper Hat Creek Valley (Nicolaides 2010), EaRj-83 on upper Kwoiek Creek (Angelbeck n.d.; Lyons 2013), and a cluster of sites near Cache Creek (EeRi) (Peacock 2013). All sites date to the late pre-contact period (<2500 bp) and are within traditional Interior Salish territory, except DhRl 78, which sits at the eastern edge of Coast Salish territory, bordering the interior.

In the analysis below, ubiquity is calculated as percent presence across sites. Diversity is measured as the number of identified taxa (NIT) and includes all macroremains except charcoal. Density as parts per litre using identified and edible plant parts (seeds, hazelnut shell, and bulb parts based on ethnobotanical knowledge.

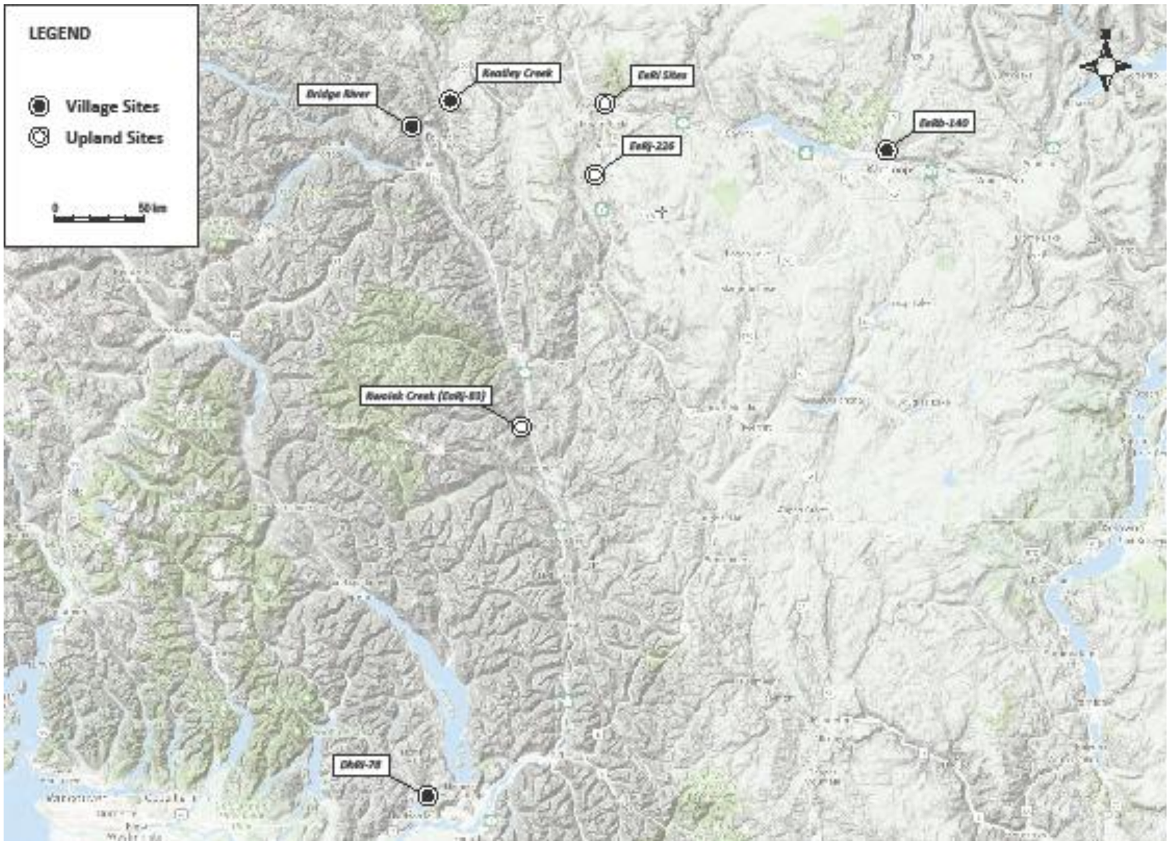

Figure 4. Earth oven complexes at village and upland sites across southern British Columbia (Courtesy: Bill Angelbeck)

In Table 2, I present a ubiquity analysis of root foods, fleshy fruits, and fauna recovered from earth ovens at the nine sites. Sample sizes vary but are generally adequate to permit cross-site comparison; sample volumes were not reported for Keatley Creek (Hayden and Mossop Cousins 2004). Root foods were identified in all but one site, but generally only as 'plant tissue', a designation that recognizes the amorphous internal structure of root foods but does not identify beyond this broad category. The exceptions include a huge quantity of camas (*Camassia* spp.) bulbs and tissues from DhRl-78 on the Harrison River (Lyons and Ritchie 2017), desert parsley at Keatley Creek, and wild onion at Keatley Creek (Hayden and Mossop Cousins 2004), EeRb-140 (Wollestoncroft 2000), and White Rock Springs (Nicolaides 2010; Peacock pers. comm.).

Fleshy fruits constitute the most ubiquitous plant taxa in regional earth oven assemblages. They were often processed en masse in earth ovens and used as flavouring for other foods (Nicolaides 2010; Teit 1900). Elderberry and Saskatoon are the most ubiquitous fruits, found in 62.5% of regional earth oven assemblages, followed by kinnikinnick and raspberry taxa (*Rubus* spp.) in 37.5%, and finally blueberry (*Vaccinium* spp.) and wild cherry (*Prunus* spp.) in 25% (Table 2).

Table 2. Ubiquity of root foods, fleshy fruits, and fauna across contexts

Context				Root foods				Fleshy fruits						Fauna
		No. ovens	Volume (L)	Camas	Desert-parsley	Wild onion	Unidentified	Blueberry	?Elderberry	Kinnikinnick	Raspberry	Saskatoon	Wild cherry	Micro-fauna & fish bone
Village Contexts	*BR: Housepit 54*	3	34.4				T		S	S		S		F
	BR: Periphery	10	31.4				T	S	S			S		F
	Keatley: Periphery	8			T	B	B,T		S		S			F
	DhRl 78: Periphery	4	36.0	B, T			B,T		S			S	S	F
	EeRb 140: Periphery	1	75.0			T	T	S	S		S	S,T	S	F
Upland Contexts	*Kwoiek Creek*	1	4.0				T			S				F
	White Rock Springs	3	35.0			B	T			S	S			
	Cache Creek	5	17.0									S		
Ubiquity (% Presence)				12.5	12.5	37.5	87.5	25	62.5	37.5	37.5	62.5	25	75

B=bulb part; T=tissue; S=seed; F=fauna

Plant Food Processing in Village Contexts

Overall plant diversity of plant taxa is generally higher in village than upland contexts, while the diversity of edible species is more limited in both (Figure 5). The densities of edible resources are moderate to high in all village contexts (Figure 6). Abundant resources in village assemblages include: what is probably blue elderberry (?*Sambucus cerulea*) in both earth oven complexes at Bridge River (>70%); Saskatoons at EeRb 140 (>45%), in addition to a broad spectrum of secondary resources; and camas at DhRl 78 (>95%), an edible root food. While the edible plant taxa in village contexts are generally dominated by fleshy fruits, remnants of root foods are found in most and faunal remains in all assemblages (Table 2).

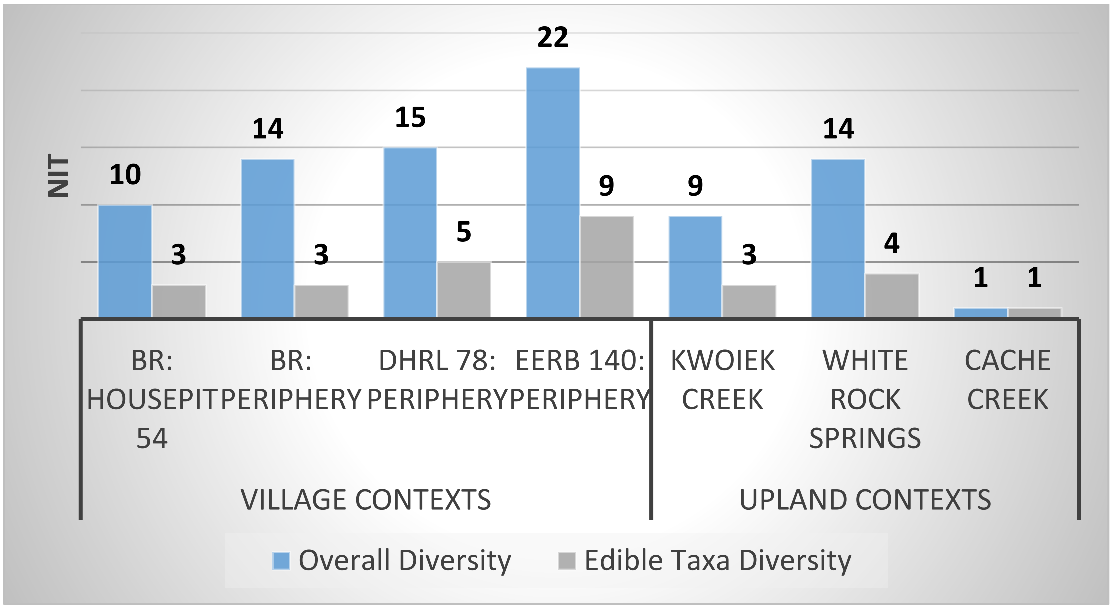

Figure 5. Diversity of overall vs. edible plant taxa across contexts.

Plant Food Processing in Upland Contexts

Plant resources in upland earth ovens have relatively low edible diversities, extremely low densities, and little to no fauna (Figures 5 & 6). While these ovens are situated in historically managed meadows where root foods flourish, evidence is sparse. A single wild onion bulb (*Allium* spp.) was identified at White Rock Springs, and unidentified tissues that may be fragmented root foods are common. It is not likely that fleshy fruits were processed for food in these ovens but instead used as flavouring and/or the branches added as matting (Table 2).

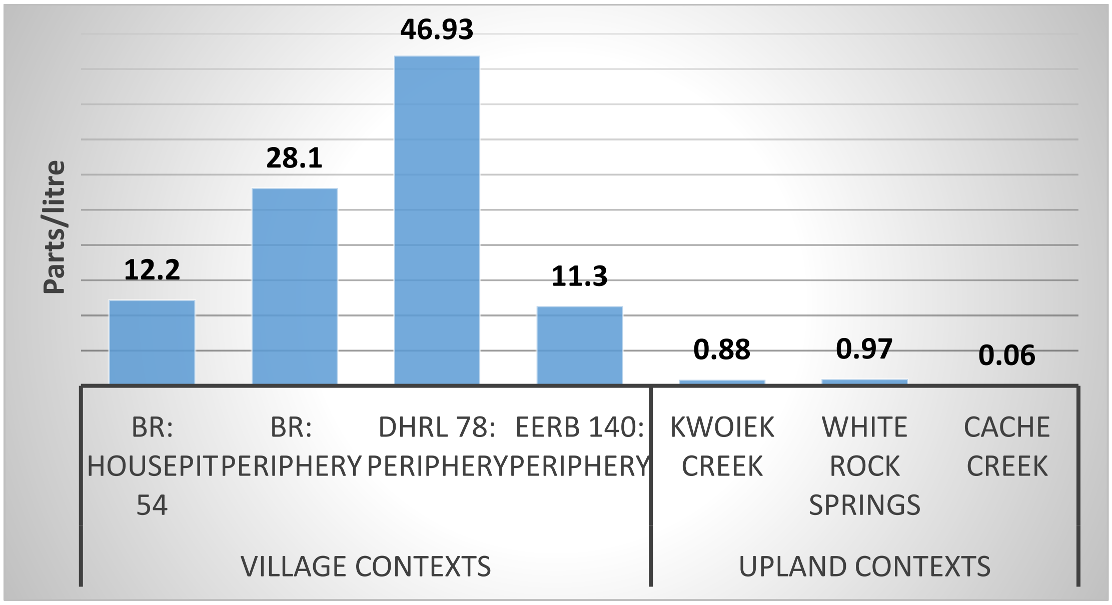

Figure 6. Combined density of seeds, hazelnut shell, and bulb parts

Our indices show that edible plant macroremains in village roasting features across southern British Columbia are somewhat more diverse and far denser than their upland counterparts. Some Salish villagers processed large and varied harvests of fleshy fruits in their earth ovens (eg., EeRb-140), others focused on root foods (eg., DhRl-78), and all cooked fauna. Sparse edible macroremains and little to no fauna in upland earth ovens leaves us to infer that root food production was the focus of these ovens based on historical and ecological knowledge. Our results support the contention that earth ovens in village contexts were used in more ways and potentially by a wider array of cooks, and more tentatively, that ovens in upland contexts had more specialized uses.

Discussion

This discussion is divided into two nested two parts. I look first at the overall patterning of plant macroremains in Bridge River 2 and 3 occupations, in order to interpret the plant use activities of ancient residents, use of local environments, and the implications of patterning across time and space for ancient St'át'imc plant use. I then consider the plant macroremains found in roasting pit assemblages between village and upland contexts at a regional scale with a view to understanding patterns of movement, harvest, and production across the landscape.

The very sparse distribution of plant macroremains in the Bridge River 2 and 3 occupations analysed here suggests that these resources—and the activities that produced them--are generally concentrated in particular locations within Housepit 54, in the Bridge River village, and beyond. As explored below, taphonomy also plays a key role in how plant remains preserve. The archaeobotanical assemblages represented here show that plant processing activities were clearly happening in particular earth ovens such as A8 and those analysed by Dietz (2005). What is possibly blue elderberry was being processed in both A8 and the village-edge complex. Micro-fauna was found highly fragmented in both of these contexts, likely a result of the long bones being crushed for grease extraction (Kusmer 2000).

In contrast to the elderberry pattern, kinnikinnick is highly ubiquitous across all deposits in Housepit 54 and across the site but not concentrated in any one place. Saskatoon has a less abundant and equally random distribution. The kinnikinnick pattern likely relates to its use as both food (berries) and tobacco (leaves); the berries stay on the branch through the winter and thus the seeds would nearly always be collected—either intentionally or not—with other parts of the plant. The distribution of Saskatoon is more difficult to understand, but perhaps it was being processed off-site, along with upland fruits such as black mountain huckleberry (*Vaccinium membranaceum*) and root foods such as spring beauty (Turner 1992). Edible plant foods are not generally found in storage pits, whereas micro-fauna are, suggesting that plant foods may have been stored in boxes and baskets above-ground (cf. Alexander 1992).

The overall picture gained from the archaeobotanical assemblage of the Bridge River 2 and 3 occupation sequence at Housepit 54 is of considerable continuity and stability (Lyons et al 2017). The Housepit 54 plant assemblage reflects local collecting practices emphasizing mid-summer (Saskatoon, cf. blue elderberry, grasses) through early fall (kinnikinnick, wild rose) harvesting, and potentially some use of kinnikinnick and blue elderberry in the winter months. Bridge River families were largely harvesting plants within nearby grasslands, river terraces and valleys, and going farther afield to montane forests for Douglas-fir (cf. Alexander 1992). The focus on locally accessible resources fits with the expectation that the Bridge River community was harvesting a succession of plant parts in vicinity of their village (cf. Turner 1992).

The most abundant plant food resources—including kinnikinnick, Saskatoon, and possibly blue elderberry—show both cultural preferences of Housepit 54 residents and preservation biases incurred by the archaeological record. Particular cultural practices can be inferred by archaeobotanical patterns. Based on generally low seed and low to moderate charcoal densities, residents likely processed resources outdoors during the warm season rather than indoors; they likely used above-ground storage for plant foods rather than cache pits within pithouses; and, they likely cleaned floors routinely and hearths to a lesser degree, depositing their refuse outdoors (Lyons et al 2017). Such practices were shared by multiple families and transmitted between generations, creating a very stable regimen of plant harvesting, consumption, use, and disposal.

Taphonomic processes can be inferred in the Housepit 54 roasting complex. Despite ample sampling, there is a general absence of both flora and fauna in in the II h features C1 and C3 but a huge volume of charcoal. Douglas-fir and pine bark were both being used as fuel in these features, and radial cracks in the Douglas-fir specimens in C3 suggest that it was dried before use, a common ethnographic practice (Carney 2016:87; Dawson 1891:20; Teit 1900:236; Théry-Parisot and Henry 2012:386; Turner et al. 1990:109). Douglas-fir in particular is a hot burner with the potential to incinerate rather than preserve plant remains. Hot burners were preferred fuels in roasting features at other sites, such as redcedar (*Thuja plicata*) at DhRl 78, in the wetter belt of the Upper Fraser Valley, and Douglas-fir (*Pseudotsuga menziesii*) wood and bark at all of the interior sites discussed in this analysis. Remnants of matting—used to insulate and protect plant foods—were also recovered from ovens at several of the sites presented here, including horsetails (*Equisetum* spp.) and raspberry (*Rubus* spp.) branches at DhRl 78, grasses at EeRb 140, and conifer branches with needles attached at EeRj 226.

In the regional picture, our expectation was that we would see evidence for more generalized public consumption in earth oven complexes within village contexts and a more specialized focus on plant food production in upland complexes. This expectation is partially met in the data presented. First, a more generalized approach to cooking and processing can be gauged through the diversity of taxa cooked in an earth oven. The diversity of edible plant foods is higher in some village contexts, such as EeRb-140 (NIT=9), but oven complexes from other village and upland sites have lower edible diversity measures (NIT 3>5), suggesting a focus on particular resources (Figure 5). For instance, at Bridge River, the focus is on possible blue elderberries, while at DhRl-78 the focus is on the root food camas. Two significant differences exist between the village and upland roasting complexes. Namely, the density of edible plant macroremains is an order of magnitude higher in village contexts and fauna was cooked in all village oven complexes and only one of three upland complexes (Table 2; Figure 6). The higher relative densities indicates a higher intensity of use of the village features sampled; the presence of fauna suggests a more general and perhaps more flexible set of cooking and processing practices associated with the village ovens. Plant foods may have at times been cooked in tandem with fish and game, and potentially used as flavourings; at other times, they may have been cooked independently within the same ovens (cf. Alexander 1992; Nicolaides 2010).

We are left with some answers and many questions concerning patterns of movement, harvest, and production of plant resources by ancient Salish peoples. We infer that root food production was the primary use of the upland earth oven complexes analysed here based on historical and ecological knowledge (Dawson 1891; Teit 1900, 1906; Turner 2014). In a similar vein, although the data is largely negative, we assume that the bulk of berry processing occurred away from mid-Fraser villages (also see

Lepofsky et al 2005; Mack and McClure 2002). Moving forward, we know that very large sediment volumes are required to find edible plant taxa in earth ovens in all contexts, that microremain analysis (e.g., phytoliths, starch) may prove useful in discovering what was cooked in these ovens, and that combining large and small scale data sets is imperative for unearthing the original socioeconomic patterns of food production by Salish communities across the landscape.

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