REPORT OF THE 2014 UNIVERSITY OF MONTANA INVESTIGATIONS AT THE BRIDGE RIVER SITE (EeRl4): HOUSEPIT 54 DURING THE BRIDGE RIVER 2 AND 3 PERIODS

Edited By

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Conducted in Collaboration with the Bridge River Band (Xwisten) and the St'át'imc Nation

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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 Xwisten 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 current grant were opened in 2012 and focused on the final occupation associated with the Canadian Fur Trade period. Excavations in 2013 and 2014 permitted us to initiate the process of examining the deeper floors. As documented in this report we now believe the house accumulated at least 15 floors spanning the period of ca. 1000 to 1400 cal. B.P. This introduction reviews project background and goals 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 an estimated 15 well preserved floors separated in part by up to seven burned roofs. Dating of these floors spans the critical period of ca. 1400-1200 years ago. 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 rise and fall 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 to date research has not demonstrated a detailed understanding of the cumulative effects of decisions made across generations within individual houses. New 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

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).

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 recently completed 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.

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.

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 have been initiated to 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.

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).

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 will be an expanded geochemical assessment of variability in the dominant raw material source, dacite, made possible through x-ray fluorescence analysis to be conducted by Dr. Nathan Goodale. Sourcing will be conducted with an Innov-X Delta portable XRF instrument and control samples will be analyzed at Goodale's new XRF facility at Hamilton College, New York. This research has now been initiated, though final results are not yet available. 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. These studies permit us to examine how technological organization varied within and between floors.

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.

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).

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, new 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. Older households such as Housepit 54 do not appear to have been quite as successful. However, even 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 will 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 be used to reveal variability in household socio-economic and political practices (as outlined above).

Report Contents

This report includes chapters reviewing outcomes of project research stemming from the 2013 (Prentiss 2014) and 2014 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 and 2014 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 and 2014. Chapter five provides general conclusions. The report concludes with the following appendices: Appendix A (Photographs and Maps), Appendix B (Lithic Artifact Typology), Appendix C (Paleoethnobotanical report), Appendix D (Geochemical analysis report), Appendix E (Ancient DNA report), Appendix F (Isotopes report), Appendix G (GIS maps), and Appendix H (wooden tools photos and descriptions).

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Chapter Two

Archaeology of Housepit 54: Bridge River 2 and 3 Floors and Roofs Excavated in 2014

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In this chapter we seek to accomplish several goals. We introduce the archaeology of Housepit 54 in its larger context of the Bridge River site and the Middle Fraser Canyon. Then we provide an overview of the 2014 excavations with a focus on excavation and data collection methods. Finally, we 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-IIj 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 (Xwisten) 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. (1996a) 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 2013).

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 Housepit (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 2013). The 2013 and 2014 field seasons focused on the deeper floors, more specifically, the IIa through IIj sequence. Several even deeper floors were identified from examinations of 2008 trench stratigraphy. However, these could not be examined during 2014.

The 2014 Archaeological Investigations at Housepit 54: Excavation Methods

The 2014 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 six 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 one 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. Dana Lepofsky. A .25 litre sample was taken in the SE (2) quad for geochemical analysis at Hamilton College, as directed by Dr. Nathan Goodale. Collection of sediments for extraction of genetic materials was discontinued in 2014 due to lack of success in previous years. 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.

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
XVII	BR 3 Rim-like fill in depression within Block D
Va	Final BR 3 Roof
IIa	Final identifiable BR 3 Floor
IIb	BR 3 Floor
IIc	BR 3 Floor
Vb	BR 3 Roof (Vb/Blocks A/C and Vb/Block B represent two distinct roofs)
IId	BR 3 Floor
Vb3	BR 3 roof
IIe	BR 3 Floor
IIf	BR 2 Floor
IIg	BR 2 Floor
Vc	BR 2 Roof
IIh	BR 2 Floor
IIi	BR 2 Floor
IIj	BR 2 Floor
Vd	Possible Sub-housepit roof currently pre-dating BR 1

Stratigraphy

Sediments from Housepit 54 consisted of multiple floors and roofs and are described by excavation block. Plan and profile maps can be located in Appendix A. The 2014 field season continued the process begun in 2013 of exposing floors dating to BR 3 times and earlier. Also as before, excavation depths varied by block. Significantly, the floor sequence in Block B extended only to IIe suggesting that it was it this part that the house expanded to its full size. This section reviews sediment data and provides data on excavated volumes and fire-cracked rock counts by block, stratum, unit, and quad.

Block A

Excavations in Block A succeeded in completing floors IIg through IIj, exposing the surface of IIk (Tables 2.2-2.5). One thin roof deposit (Vc) was also excavated. As was recognized in upper floors excavated in 2013, these deeper floors tend to have relatively high clay and silt content and moderate to small percentages of clasts in higher size ranges. These data suggest that formation processes regarding the creation of floors stayed relatively consistent over time. Indeed, roof sediments were little different from floors at HP 54. Birch bark rolls are rare in these deeper sediments, but are most common in roof deposits as was typical of more recent roofs (Prentiss 2013).

Table 2.2. Block A Sediment Summary (percentages).

Stratum IIg	Unit 6	7	8	10	11	12	14	15	16
Cobbles	2	0	1	0	0	5	0	0	1
Pebbles	10	5	7	11	10	6	7	9	9
Gravels	13	15	10	15	15	14	18	18	19
Sands	23	30	23	24	20	20	24	26	21
Silts	22	30	29	20	15	20	28	27	20
Clays	30	28	30	30	40	35	23	30	30

Stratum Vc	Unit 6	7	8	10	11	12	14	15	16
Cobbles	2	1	3	2	1	0	4	1	0
Pebbles	9	11	2	7	9	8	9	4	5
Gravels	14	17	15	15	17	12	12	16	10
Sands	23	26	24	25	18	25	15	16	23
Silts	29	28	26	30	31	27	33	27	32
Clays	23	17	23	21	24	28	27	36	20

Stratum IIh	Unit 6	7	8	10	11	12	14	15	16
Cobbles	2	0	0	0	1	0	0	0	0
Pebbles	10	10	6	10	13	13	10	9	5
Gravels	16	15	11	17	15	15	20	14	13
Sands	37	35	26	30	17	23	18	20	22
Silts	18	15	20	21	18	16	25	22	25
Clays	17	25	37	23	36	33	27	35	35

Stratum IIi	Unit 6	7	8	10	11	12	14	15	16
Cobbles	2		1	1	1	1	0	2	0
Pebbles	10		14	10	17	10	10	9	9
Gravels	15		18	15	16	20	10	17	11
Sands	18		22	31	14	16	20	8	21
Silts	24		30	28	25	26	40	19	24
Clays	31		15	15	27	27	20	45	35

Stratum IIj	Unit								
	6	7	8	10	11	12	14	15	16
Cobbles	1			1	1	0	0	0	0
Pebbles	10			13	11	8	5	8	17
Gravels	8			19	16	17	10	11	15
Sands	10			23	14	10	35	11	13
Silts	30			23	22	22	30	22	20
Clays	41			21	36	43	20	48	35

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

				Stratum	
Unit	IIg	Vc	IIh	IIi	IIj	IIk
6						
(1)	11					
(2)	20	67	14	6	2	
(3)	2	4	14	4	8	
(4)	11	19	18	15	9	1
7						
(1)	11	33				
8						
(1)	66	108		7		
(2)	14	23	3	1		
(3)						
(4)	8	5	3	3		
10						
(1)	11	11	28	18	7	
(2)	1	2	9	4	2	
(3)	12	3	11	28	6	
(4)	4	17	25	12	11	
11						
(1)	6	7	10	10		
(2)		5	14	5	3	
(3)	6	38	10	21	28	
(4)	4	47	19	53		
12						
(1)				3		
(2)	3	7	5	4	3	
(3)	7	5	40		8	
(4)		7	7	3		
14						

(1)	9	7	7		
(2)	23	10			
(3)	7	1	22	2	5
(4)	14				
15					
(1)	7	24	14	38	
(2)	8	9	4		2
(3)	8	9	10	13	5
(4)	3	1	9	1	1
16					
(1)	8	3	2		2
(2)	5	5	3	3	
(3)	5	1	22	1	5
(4)	3	1		3	

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

			Stratum			
Unit	IIg	Vc	IIh	IIi	IIj	IIk
6						
(1)	.002					
(2)	.025	.03	.016	.01	.01	
(3)	.01	.006	.003	.004	.003	
(4)	.003	.01	.004	.003	.007	.002
7						
(1)	.006	.01	.008			
8						
(1)	.03	.05	.005	.02		
(2)	.01	.01	.005	.005		
(3)						
(4)	.01		.009	.008	.001	
10						
(1)	.01	.03	.04	.02	.01	
(2)	.001	.002	.013	.02	.003	
(3)	.004	.02	.016	.02	.005	
(4)	.008	.02	.015	.002	.01	
11						
(1)	.0006	.005	.007	.005	.003	
(2)	.0004	.001	.003			
(3)	.005	.02	.015	.02	.03	
(4)	.005	.02	.018	.02		
12						
(1)						

(2)	.003	.008	.001	.007	.02	
(3)	.02	.01	.018	.02	.008	
(4)	.006	.006	.085	.006	.003	
14						
(1)	.01	.02				
(2)	.02	.005				
(3)	.02	.02	.013	.007	.003	
(4)	.008	.005				
15						
(1)	.01	.02	.008	.02		
(2)	.01	.003	.02	.02	.013	
(3)	.01	.005	.01	.02	.01	
(4)	.02	.005	.005	.03	.012	
16						
(1)	.01	.005	.018	.005	.01	
(2)	.02	.005	.01			
(3)	.02	.004	.004	.005		.005
(4)	.01	.003	.003			

Table 2.5. Block A Birch Bark Rolls

	IIg	Vc	IIh	IIi	IIj	IIk
6		1				
7						
8						
10		1				
11						
12						
14	1	1				
15						
16						

Block B

Block B was completed during 2014 as its deepest floor was IIb. Three strata were excavated in 2014 including IId, Vb3, and IIe (Tables 2.6-2.8). As elsewhere all sediments were dominated by clay-sized clasts. Roof Vb3 was generally thin and did not cover the entire block. Floor IIe was particularly distinctive given the presence of a large number of cache pits, post holes, and hearths. No birch bark rolls were recovered in Block B.

Table 2.6. Block B Sediment Summary (percentages).

Stratum IId	Unit									
	5	6	7	9	10	11	12	14	15	16
Cobbles	0	0	0	0	1	1		0	1	0
Pebbles	1	2	1	2	3	2		1	2	1
Gravels	3	5	10	8	7	8		5	5	3
Sands	1	2	4	2	2	3		2	3	1
Silts	30	50	35	30	37	27		18	29	28
Clays	65	41	50	58	57	59		74	60	67

Stratum Vb3	Unit									
	5	6	7	9	10	11	12	14	15	16
Cobbles	1	0	0	1	0					
Pebbles	3	2	2	2	3					
Gravels	5	6	7	3	7					
Sands	1	1	3	2	4					
Silts	41	50	45	44	42					
Clays	49	41	43	48	44					

Stratum IIe	Unit									
	5	6	7	9	10	11	12	14	15	16
Cobbles			0	1	1	0	0	0	1	1
Pebbles			1	2	3	1	4	5	3	5
Gravels			7	10	13	9	14	14	11	11
Sands			6	2	4	6	11	8	7	8
Silts			51	40	44	43	47	34	32	31
Clays			35	45	40	41	24	39	46	44

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

	Stratum		
Unit	IId	Vb3	IIe
5			
(1)		63	
(2)	9	42	
(3)	7	51	

(4)	32	59	
6			
(1)	3	3	
(2)	2	23	
(3)	6	46	
(4)	6	29	
7			
(1)		44	
(2)			
(3)	1	5	
(4)			
9			
(1)	6	16	12
(2)	10	13	13
(3)	7	4	22
(4)	12	7	34
10			
(1)	5	4	
(2)		2	5
(3)	12		11
(4)	4		10
11			
(1)	2		1
(2)	38		
(3)			
(4)	24		
12			
(1)			
(2)			
(3)			2
(4)			3
14			
(1)	2		7
(2)			8
(3)	3		1
(4)			
15			
(1)	14		
(2)	3		2
(3)			
(4)			
16			
(1)	3		18
(2)	5		6
(3)	3		3
(4)			2

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

Unit	IId	Vb3	IIe
5			
(1)	.001	.05	
(2)	.008	.04	
(3)	.004	.01	
(4)	.01	.06	
6			
(1)	.01		
(2)	.008		
(3)	.005	.02	
(4)	.003	.02	
7			
(1)	.008		
(2)	.007		
(3)	.001	.001	
(4)			
9			
(1)	.009	.009	.006
(2)	.008	.01	.002
(3)	.003	.001	.01
(4)	.01	.003	.02
10			
(1)	.008	.008	
(2)	.005		.003
(3)	.02		.003
(4)			.01
11			
(1)	.002		
(2)			
(3)			
(4)	.009		
12			
(1)			
(2)			
(3)			
(4)			.008
14			
(1)	.003		.008
(2)	.01		.005
(3)	.003		.006
(4)	.005		.005

15		
(1)	.003	.001
(2)	.005	.005
(3)		
(4)	.005	
16		
(1)	.003	.005
(2)	.001	.003
(3)	.006	.005
(4)	.001	.001

Block C

Block C completed final remnants of floor IId and focused on floors IIe, IIf, and IIg (Tables 2.9-2.11). Floors were clay-dominated as elsewhere in HP 54. There were extensive numbers of features, scattered charcoal, and fire-cracked rock throughout much of the Block C floors. Once consequence of this pattern was a rise in pebble and cobble sized clasts compared to floors in other blocks. No birch bark rolls were recovered.

Table 2.9. Block C Sediment Summary (percentages).

Stratum IId	Unit									
	2	6	7	9	10	11	12	13	14	15	16
Cobbles		0								5	
Pebbles		2								20	
Gravels		10								30	
Sands		20								25	
Silts		28								5	
Clays		40								15	

Stratum IIe	Unit										
	2	6	7	9	10	11	12	13	14	15	16
Cobbles	1	3	1	7	2	1	0	10	9	1	5
Pebbles	4	7	13	15	15	11	5	10	16	21	21
Gravels	10	12	14	15	18	14	5	25	31	28	25
Sands	21	15	16	20	22	21	25	15	20	25	21
Silts	22	18	23	13	15	21	25	5	4	16	9
Clays	47	45	33	29	29	32	40	35	21	9	19

Stratum IIf	Unit									
	2	6	7	9	10	11	12	13	14	15	16
Cobbles	1	2	1	0	4	1	1	3	0	0	
Pebbles	6	8	6	17	15	16	6	10	13	14	
Gravels	17	13	15	13	13	17	9	17	13	18	
Sands	14	23	19	10	21	21	23	18	20	18	
Silts	22	17	22	18	20	16	27	12	23	22	
Clays	40	40	37	42	27	29	34	40	31	28	

Stratum IIg	Unit										
	2	6	7	9	10	11	12	13	14	15	16
Cobbles	2	9	0	1	2	3	0	0			
Pebbles	11	8	7	14	10	7	15	10			
Gravels	13	15	7	10	10	15	25	10			
Sands	15	16	8	10	18	16	20	20			
Silts	21	31	30	15	18	23	12	20			
Clays	38	21	48	50	40	36	28	40			

Table 2.10. Block C fire-cracked rock data (1=SW, 2=SE, 3=NW, 4=NE Quads).

	Stratum			
Unit	IId	IIe	IIf	IIg
2				
(1)	5	14	25	5
(2)	1	27	33	15
(3)	10	31	5	8
(4)		19	28	4
6				
(1)	5		21	44
(2)		38	26	27
(3)			26	
(4)		6	18	3
7				
(1)		32	38	5
(2)		39	63	8
(3)		46	34	22
(4)		47	36	22
9				
(1)				
(2)		20		

(3)				
(4)		38	4	16
10				
(1)		4		
(2)		11	32	
(3)		19	8	4
(4)		14	31	7
11				
(1)		12	44	3
(2)		41	91	11
(3)		15	20	14
(4)		15	24	4
12				
(1)				
(2)		48	48	13
(3)	5	6	18	
(4)		6	20	
13				
(1)				
(2)		50	48	13
(3)				
(4)				
14				
(1)		31	42	14
(2)		26	61	31
(3)		4	8	
(4)		22	21	
15				
(1)		30	29	3
(2)		39	10	2
(3)		35	18	3
(4)	41	55	22	4
16				
(1)		57	24	
(2)		14	16	
(3)		43	12	
(4)		18	12	

Table 2.11. Block C excavation volumes in cubic meters (1=SW, 2=SE, 3=NW, 4=NE Quads).

Unit	IId	IIe	IIf	IIg
2				
(1)	.005	.006	.01	.006
(2)	.01	.004	.008	.016
(3)	.02	.008	.02	.008

(4)	.02	.053	.02	.025
6				
(1)	.01		.01	.02
(2)		.008	.006	.01
(3)			.008	
(4)		.009	.01	.003
7				
(1)		.01	.02	.01
(2)		.01	.004	.01
(3)		.008	.02	.03
(4)		.01	.03	.01
9				
(1)				
(2)				
(3)				
(4)		.01	.02	.01
10				
(1)				
(2)		.006	.01	
(3)		.007	.007	.02
(4)		.004	.02	.007
11				
(1)		.005	.01	.02
(2)		.005	.02	.01
(3)		.003	.008	.003
(4)		.01	.004	.006
12				
(1)				
(2)				
(3)	.008	.008	.02	
(4)		.008	.01	
13				
(1)				
(2)		.02	.005	.002
(3)				
(4)				
14				
(1)		.009	.02	.002
(2)		.02	.03	.006
(3)		.003	.008	
(4)		.01	.008	.009
15				
(1)		.02	.02	.01
(2)		.02	.01	.005
(3)		.02	.02	.01
(4)	.008	.02	.02	.005

16			
(1)		.009	.03
(2)		.009	.01
(3)			.03
(4)		.01	.01

Block D

Excavations in Block D examined the final BR 3 roof (VA and three subsequent floors (IIa to IIc). Block D excavations also sought to define the boundary between the intrusive Stratum XVII pit and the occupation floors. As is illustrated in plan and profile maps (Appendix A), the stratum XVII pit was excavated after the collapse of the Va roof but before the final BR 3 occupation of HP 54. This conclusion is clear from sediments excavated in 2012 (Prentiss 2013) where a lobe of rim was deposited over Va and XVII upon which was placed a hearth dated 1047+/-31 (1052-922 calibrated date at two sigmas) (Prentiss 2014). The Stratum XVII pit appears to cover nearly the entire western half of Block D and is filled with rim-like fill containing large quantities of fire-cracked rock and variable counts of lithic artifacts and faunal remains. It is not clear how deep it extends though it clearly is deeper than the IIc floor. Given that it post-dates the Va roof but predates the rim-top hearth (Feature D2 from 2012) we can confidently place its date at ca. 900-1250 cal. B.P. thus marking some important event in the final stages of the HP 54 occupation sequence. We recognized several variants of the XVII sediments: XVIIa is lighter and more roof-like; XVIIb is very dark and organic; XVIIc is very dense light-colored clay. Birch bark rolls were comparatively common in Va sediments fitting the previously identified pattern suggesting that birch bark scraps were typically discarded on roofs.

Table 2.12. Block D Sediment Summary (percentages).

Stratum Va		Unit							
	7	8	10	11	12	13	14	15	16
Cobbles	2	3	1	2	1	0		2	2
Pebbles	4	9	2	6	5	1		6	4
Gravels	11	15	10	10	13	0		6	12
Sands	14	7	14	21	20	37		22	20
Silts	36	26	37	28	27	17		27	27
Clays	33	40	36	33	34	45		37	35

Stratum IIa		Unit							
	7	8	10	11	12	13	14	15	16
Cobbles	1	0	0	0				1	0
Pebbles	2	4	2	3				5	8
Gravels	17	8	12	11				9	15

Sands	17	10	20	17				14	9
Silts	33	30	30	29				30	19
Clays	30	48	36	40				41	49

Stratum IIb		Unit							
	7	8	10	11	12	13	14	15	16
Cobbles	0	0	0	0				0	0
Pebbles	3	3	4	3				4	4
Gravels	8	15	9	9				12	10
Sands	23	9	7	23				6	15
Silts	30	36	40	30				22	31
Clays	36	37	43	35				56	40

Stratum IIc		Unit							
	7	8	10	11	12	13	14	15	16
Cobbles	0	1	0	0				0	0
Pebbles	3	4	2	3				2	6
Gravels	7	13	9	10				10	9
Sands	12	7	14	13				18	12
Silts	34	34	35	34				30	33
Clays	44	41	40	40				40	40

Stratum XVII		Unit							
	7	8	10	11	12	13	14	15	16
Cobbles			1						
Pebbles			7						
Gravels			10						
Sands			22						
Silts			28						
Clays			32						

Stratum XVIIa		Unit							
	7	8	10	11	12	13	14	15	16
Cobbles							4		
Pebbles							7		
Gravels							18		
Sands							24		
Silts							23		
Clays							24		

Stratum XVIIb		Unit

	7	8	10	11	12	13	14	15	16
Cobbles							1		
Pebbles							4		
Gravels							15		
Sands							22		
Silts							27		
Clays							31		

Stratum XVIIc		Unit							
	7	8	10	11	12	13	14	15	16
Cobbles							4		
Pebbles							7		
Gravels							11		
Sands							16		
Silts							23		
Clays							39		

Table 2.13. Block D fire-cracked rock data (1=SW, 2=SE, 3=NW, 4=NE Quads).

					Stratum			
Unit	Va	IIa	IIb	IIc	XVIIa	XVIIb	XVIIc	XVII
7								
(1)								
(2)								
(3)	9	1	18	4				
(4)	173	5	5	11				
8								
(1)								
(2)								
(3)	214	3		25				
(4)	31	11		2				
10								
(1)								
(2)	5					19		8
(3)								
(4)	4				6	10		39
11								
(1)	8	10		7				5
(2)	119			9				
(3)	65	5	9	11				
(4)	41	9	6	33				
12								

(1)	71	5	1	3					
(2)	44	4	3	15					
(3)	93	16	6	45					
(4)	53	1	11	4					
13									
(1)									
(2)									
(3)	3								
(4)									
14									
(1)					123	114	24		
(2)	28				15	26			
(3)									
(4)	1								
15									
(1)	48	12	19	15					
(2)	117	20	16	14					
(3)	13	7							2
(4)	42	15	12	16					
16									
(1)	80		28	7					
(2)	36	7	15	13					
(3)	104	1	16	16					
(4)	63			4					

Table 2.13. Block D excavation volumes in cubic meters (1=SW, 2=SE, 3=NW, 4=NE Quads).

Unit	Va	IIa	IIb	IIc	XVIIa	XVIIb	XVIIc	XVII
7								
(1)								
(2)								
(3)	.08	.02	.008	.01				
(4)	.06	.008	.008	.01				
8								
(1)								
(2)								
(3)	.06	.01	.02	.01				
(4)	.022		.004					
10								
(1)								
(2)	.016					.006		.01
(3)								
(4)	.003				.009			.02
11								

(1)		.04	.013		.02				.01
(2)		.07			.02				
(3)		.04	.03	.003	.005				
(4)		.05	.028	.003	.02				
12									
(1)		.05	.013	.003	.03				
(2)		.02	.01	.001	.009				
(3)		.062	.02	.005	.03				
(4)		.02	.006	.006	.01				
13									
(1)									
(2)									
(3)		.003							
(4)		.003							
14									
(1)						.046	.054	.008	
(2)		.016				.003	.007		
(3)		.008							
(4)		.01	.003						
15									
(1)		.02	.08	.005	.005				
(2)		.04	.025	.005	.005				
(3)		.02	.02	.01	.001				.008
(4)		.07	.01	.003	.02				
16									
(1)		.05	.02	.02	.008				
(2)		.03	.015	.01	.01				
(3)		.07	.02	.01	.007				
(4)		.04	.004	.003	.003				

Table 2.14. Block D Birch Bark Rolls.

	Va	IIa	IIb	IIc	XVIIa	XVIIb	XVIIc	XVII
7								
8								
9								
10								
11								
12	3							
13	1							
14								
15	3							
16		1						

Fire-Cracked Rock Distributions and Household Demography

Following the 2013 field season we initiated a study of variability in demographics between HP 54 floors. This is an important component of the HP 54 project as it is critical that we be able to understand relationships between population size, household economies, and social change. Prentiss et al. (2012, 2014) have now provided data to suggest that demography likely played a major role in socio-economic and political change at Bridge River during the BR 1-3 periods. In brief, 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). Housepit 54 data will permit us to conduct this type of study eventually across 12 to 14 floors spanning the Bridge River 2 and 3 periods.

In order to initiate the research process we need to measure variability in household occupation density. In previous research (Prentiss et al. 2007, 2012) we have used fire-cracked rock density as a proxy for occupation density assuming that with more people came more cooking, and thus more FCR. Predictions for greater lesser occupation numbers can be tested with alternative measures including densities of artifacts and food remains. They can also be further assessed with demographic projections drawn from floor size and numbers of hearth features. I calculated FCR densities for each floor (Table 2.15). One alternate version of the calculation was used for floor IIa given the possibility of oversampled FCR due to bioturbation and mixing with Fur Trade sediments at a highly level (Stratum II). In this case I reduced counts from IIa in 13 and 14 of Block B (Prentiss 2014). FCR density for all floors is presented in Table 2.15, although I point out that not all floors are fully sampled. Floors IId and IIe are missing materials from Block D. Floors IIh-IIj only derive from Block A. We consider data from IIa-IIc and IIf-IIg to be most highly reliable. Graphic depictions of these data (Figures 2.1 and 2.2) illustrate a pattern by which we recognizing rising FCR density through IIe, followed by a trough during IId and IIc and then another rise during IIb and IIa. The pattern is interesting in

Table. 2.15. Summary FCR and Volume data.

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	254	308	1256	976	623	323	258	105

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
	3338	1438	1217	996	1399	1229	623	323	258	105
Alt.[1]	2782	1438	1217	996	1399	1229	623	323	258	105

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	.233	.249	.468	.516	.6	.375	.297	.161

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
	1.650	.908	1.004	.8	.7341	.7207	.6	.375	.297	.161

FCR/Volume (2013 and 2014 data)

	IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj
	2023	1584	1212	1245	1906	1705	1038	861	869	652
Alt.[1]	1686	1584	1212	1245	1906	1705	1038	861	869	652

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

that it corresponds to the point whereby HP 54 doubled in size (IIe) and may suggest that household expansion was due to rising numbers of occupants. This is interesting as it is at this time (early BR 3) that the entire village underwent rapid growth. The trough in IId and IIc may correspond to the effects of the Malthusian ceiling also recognized village-wide (Prentiss et al. 2014) though this will need to be tested with artifact, faunal, and floral data. The short period of subsequent growth is interesting. One possibility here is that as the village began to feel adverse effects of a subsistence crisis, less well-of households were abandoned. This process is evident in data from Keatley Creek (Prentiss et al. 2003, 2007). Housepit 54 may actually have demographically benefitted for a short via recruitment of persons during this time. This hypothesis too will require further testing.

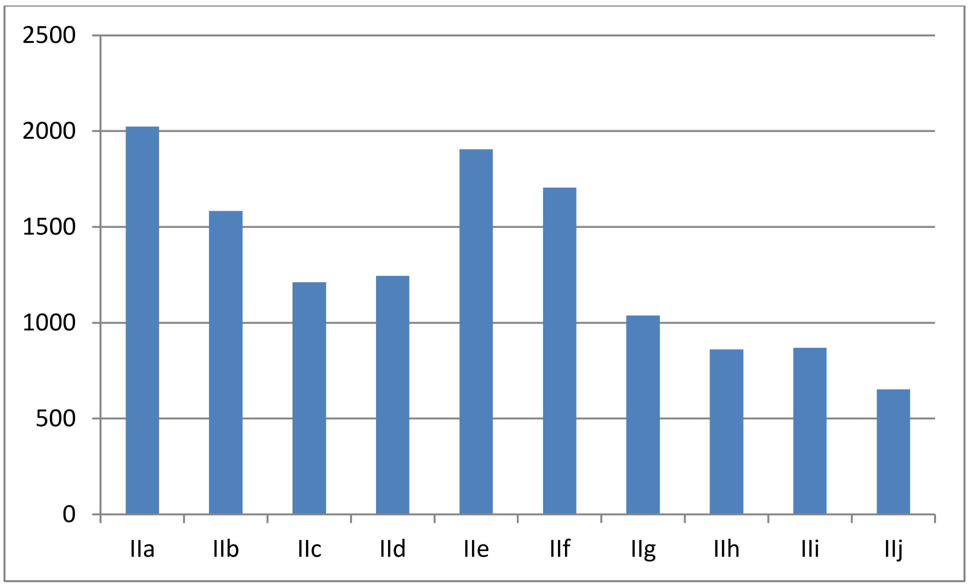

Figure 2.1. Plot of FCR density for all floors.

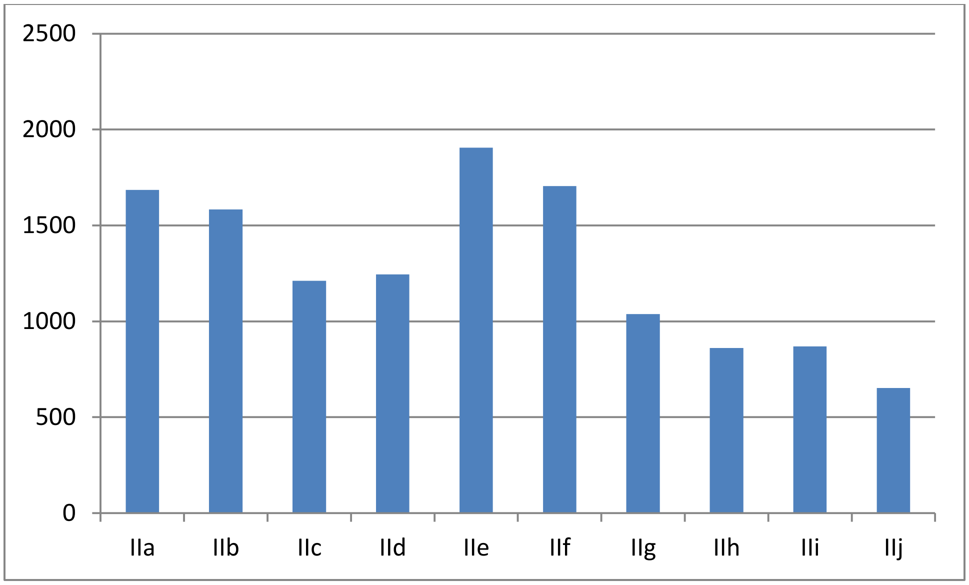

Figure 2.2. Alternative plot of FCR density with 50% reduction of FCR count from Block B, units 9, 10, 13, and 14 in IIa.

We can explore household demography further with two additional measures. One approach is to multiply floor area by some measure of space per person. Hayden et al. (1996b) predict that space in British Columbia interior housepits can range from 2.8 to 3.8 square meters per person. We can use the mean (3.3 m^2) to predict on a crude level potential population density in HP 54 (Table 2.16; Figure 2.3). Results suggest a potential doubling of population at floor IIe.

Table 2.16. Population estimate linking person area to house size (this assumes the BR 2 hours was rectangular in shape and at 32 m^2 approximately ½ the size of the BR 3 house 64 m^2). Person space is estimated drawing upon data from Hayden et al. (1996).

Period	Floors	2.8 m	3.8 m	Mean
BR3	IIa-IIe	22.9	16.8	19.85
BR1/2	IIf-IIj	11.5	8.4	9.95

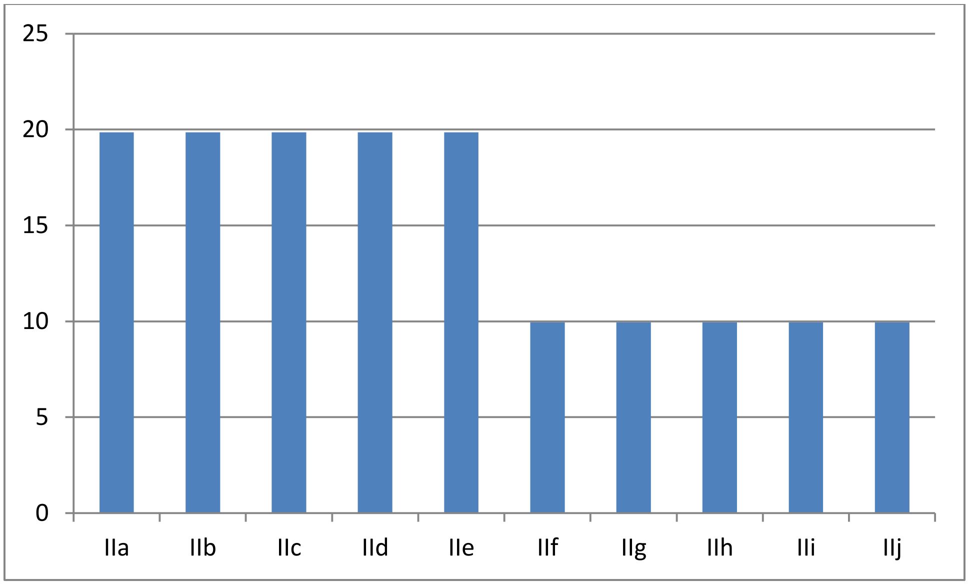

Figure 2.3. Baseline population density estimate based upon mean square meters (3.3 drawn from range of 2.8-3.8) per person (Hayden et al. 1996b) multiplied by approximate floor area for BR 3 (IIa-IIe; 64 m^2) and BR 1 and 2 (IIf-IIj; 32 m^2) floors.

We can also predict household demographics by assuming that contiguous hearth groups represent family units occupying particular spaces on house floors (Hayden 1997). Then if we again draw from Hayden et al. (1996) and assume that an average hearth group was five persons we can make predictions regarding floor demographics. Hearth groups were defined on the basis of single hearths or sets of hearths (see Features below) separated from others by at least one meter. Table 2.17 and Figure 2.4 provide outcomes only for those floors where excavation has occurred in all blocks. Although incomplete, results corroborate the patterns recognized in the analysis of FCR volumes. It is also interesting that these data match those of Figure 2.3 in predicting a maximum population of 20 persons. Further, comparison to baseline population estimates suggest that floors IIg and IIf may have been significantly over-populated while that of IIc was comparatively under-populated.

Table 2.17. Summary of hearth features and discontiguous hearth clusters by floor

	Number of Hearths	Hearth Clusters	Hearth Clusters x 5 persons[1]
IIa	6	4	20
IIb	4	4	20
IIc	3	3	15
IId	3	3	
IIe	6	3	
IIf	3	3	15
IIg	5	3	15
IIh	6	3	
IIi	1	1	
IIj	2	2	

[1]Five persons as representative of average family per hearth group from Hayden et al. (1996b). Figures only reflect floors with sampling of all relevant blocks. HP 54 at and below IIf is only found in Blocks A and C.

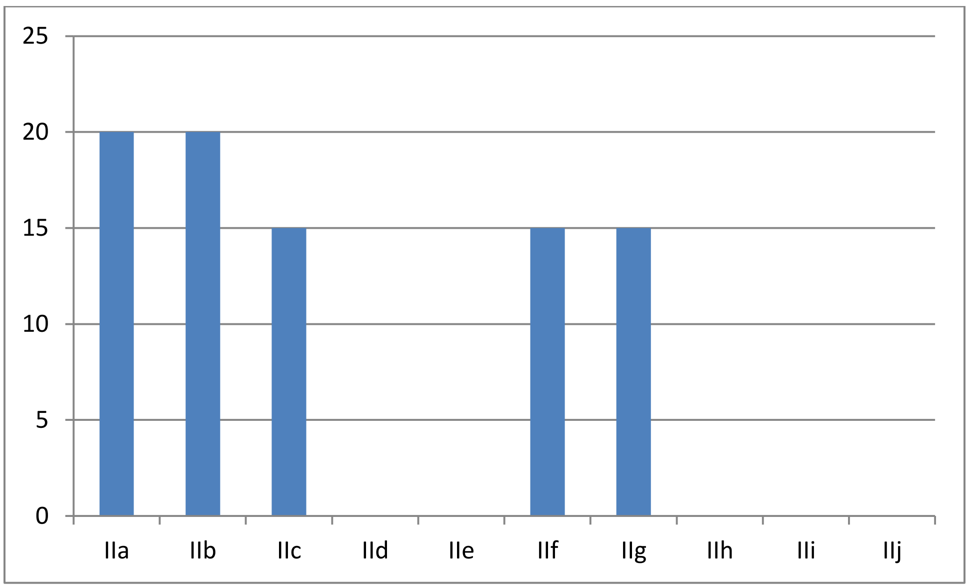

Figure 2.4. Population estimate drawn from number of hearth clusters multiplied against 5 persons (Hayden et al. 1996b). Compare to FCR distributions. IId, IIe, IIh, IIi, and IIj are not fully excavated and thus are excluded.

Features

A total of 80 features were excavated at Housepit 54 in 2014 (Tables 2.18-2.21; Appendix A). A total of 23 features were mapped and excavated in Block A. Floor IIg included two cache pits, one basin-shaped hearth, and one post hole. Feature A1 is a deep bell-shaped pit that was partially excavated during the 2008 field season. Sediments were homogeneous and lacked obvious micro-bedding. Cultural materials in the form of artifacts and faunal remains were relatively limited (compare FCR counts with F. A5). Floor IIh had eight features that included five hearths, two post holes and one large bell shaped pit. Hearths ranged from very thin burned deposits to a deeper oven-like feature. The bell shaped pit was spatially large but relatively shallow compared with F. A1. However, it contained extensive cultural materials including large numbers of FCR and faunal remains. Sediments were relatively homogeneous. Floor IIi produced five features including one hearth, three small post-holes, and one deep cylindrical pit. The hearth was relatively shallow as were the post-holes. Indeed, the very small post-holes are most likely places that held thin bench or scaffolding posts. Only a limited portion of the pit feature was excavated and thus relatively little can be said. Floor IIj contained three hearths, one post hole and one cylindrical pit. Much of the latter feature remains in the north balk of Block A. Sediments were relatively homogeneous and FCR counts were limited.

Table 2.18. Features excavated in 2014 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
A17[7]	DBS	16	21	10	9	21	22	301,298[7]	299	IIf
A1[1]	DBS	2	8	17	23	23	27	432,378[2]	70	IIg
A2	BH	NA						2300[3]	NA	IIg
A3	PH	0	4	7	26	33	30	1502	2	IIg
A4	BH	8	19	11	17	24	21	3430[3]	43	IIh
A5	DBS	1	13	17	15	29	25	375,689	742	IIh
A6	OH	0[4]	15	12	13	30	35	18,000[4]	5	IIh
A7	SPH	NA						22,670	NA	IIh
A8	BH	NA						2156	NA	IIh
A9	SH	NA						5150	NA	IIh
A10	SPH	NA						198	NA	IIh
A11	SHH	23	10	7	18	15	27	15,386	65	IIh
A12	BH	7	23	5	13	20	32	15,870	31	IIi
A13	DCP	0[5]	5	20	15	40	15	17,003	2[5]	IIg
A14	SPH	NA						785	NA	IIi
A15	SPH	NA						308	NA	IIi
A16	SPH	NA						79	NA	IIi

A17	DCP	NA						12,600	NA	IIi
A19	BH	NA						318[6]	NA	IIj
A20	BH	3	12	15	15	20	35	11,023	5	IIj
A21	PH	NA						769	NA	IIj
A22	BH	2	15	20	30	20	13	15,087[6]	8	IIj
A23	DCP	1	9	16	25	30	15	13,420[6]	15	IIj

[1]This is Feature 6b (AA3) from 2008 field season.
[2]This is total estimated volume. Excavated volume in 2014 is approximately 50% of the total or 216,189 cm^3
[3]Excavated volume estimate (about 50% of feature estimated to be unexcavated in balk).
[4]All count and percentage data based upon Level Two. Level One fully collected for flotation. Relevant volume for quantifying FCR count would thus be approximately 9000 cm^3.
[5]Feature A13 is bisected by the east balk in Block A. The estimated volume is for what was actually excavated. Depth is estimated at 30 cm. However, future excavations will need to confirm this as the pit could extend deeper into IIk or further. Sediment and FCR data derive only from the second 10 cm. level.
[6]Actual excavated volume (estimate). Some portion of feature unexcavated in balk.
[7]A17 in this context is from the 2013 field season. Excavations were completed in 2014. These are the final data. Volume is 50% of estimated total volume 602,595 cm^3.

Eleven features were excavated in Block B (Table 2.19). All were found on floor IIe. Two hearths were excavated, both in the northeastern portion of the block. One was a broad and shallow feature while the other was deeper and more oven-like. Five post holes were excavated. Two of these were actually conjoined pairs perhaps resulting from shifting posts into slightly different positions. Four new cache pits were identified and excavated. An older cache pit (2008 AA2 F.6) excavated in 2008 was identified and a narrow sequence of sediments was excavated from its margin. F. B3 is a bell shaped pit with rocky homogeneous fill. F. B15 is another bell shaped pit with distinctive micro-bedded fill. F. B14 is potentially the largest cache pit found so far at Housepit 54. Two quads were opened to sample this feature and the bulk remains unexcavated. Sediments are micro-bedded and include an apparent stack of rocks enclosing a collection of coprolites likely attributable to dogs.

Table 2.19. Features excavated in 2014 at Housepit 54, Block B. (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
B2	SHH	0	2	11	16	42	29	33,912[7]	11	IIe
B3	DBS	1	3	8	2	39	47	228,906[1]	457	IIe
B6	SHPH[4]	NA						236	NA	IIe

B7	DBS	0	1	10	3	40	46	NA[3]	8	IIe
B9	SPH	NA						1017	NA	IIe
B10	PH	NA						1120	NA	IIe
B11	PH[4]	1	5	12	4	45	35	7065	22	IIe
B12	OH	1	5	11	9	50	24	7920[8]	5	IIe
B13	PH	NA						NA	NA	IIe
B14	DBS	1[5]	5	17	7	25	45	1,907,550[6]	173	IIe
B15	DBS	1	2	11	12	45	29	401,920[2]	9	IIe

[1]This is estimated total volume. Actual excavated volume of unconsolidated fill is estimated to be 114,453.
[2]This is estimated total volume. Actual excavated volume of bedded fill is estimated to be 200,960.
[3]Only a very small percentage of this feature was excavated given its position in Block B. Thus the sediment percentages are based only upon level one and it is not possible to estimate volume.
[4]This is a pair of postholes. Volume is combined for both.
[5]Cache pit was test excavated in 11 levels. All levels had highly consistent sediment profile. This is an example from level one. Strata in this pit were distinctly micro-bedded similar to FB15. Bottom was not reached – thus actual volume is likely higher.
[6]This is estimated total volume. Actual excavated was 524,880. Approximately 50% of the feature appears to be within Block B. Estimated volume for that portion of the feature is 953,775.
[7]This is estimated total volume. Actual excavated volume is approximately 16,956.
[8]This is excavated volume. It is impossible to estimate actual volume.

Floors within Block C (Table 2.20) included the highest density of features yet recorded in Housepit 54 primarily due to the frequent presence of small post-holes on floors IIf and IIg. A linear depression with extensive charcoal and oxidation found in IId within units 9, 14, and 15 was excavated in 2013. At the time it was thought to be a remnant roof deposit, at the time identified as stratum Vb. Investigations in 2014 of lower floors revealed the greater likelihood that this is an atypical heath feature operated along the northwest edge of Housepit 54. Thus, the feature would now be designated as F. C15 (2013). Floor IIe included only one post hole and two hearths. The hearths are shallow and expansive, associated with large cobbles protruding from the floor below, perhaps demarcating space. Similar to that of IId, they parallel the northwest wall of the house on the north side of Block C. Floor IIf included hearths on the north and south sides of Block C. The edge of a deep cache pit was also exposed in the southwest corner of the block. Other features consisted of 14 small post-holes, most of which are placed parallel the wall on the north end of the block. We suggest that these reflect posts associated with benches and/or scaffolding for storage. A row of large cobbles run parallel to the post holes. Floor IIg has a similar pattern of hearths at the north and south ends of the block. Feature C12 is a very large hearth covering a yet to be excavated hearth on floor IIh. A smaller hearth lies to the north of this feature. Three additional hearths are found in a cluster at the south end of the block. One of these (C7) contained two partially burned wooden shafts consistent with an inference that they might have been used as foreshafts on arrows. There was also one large collared post hole as would have held a major roof support post. The hole was filled with rock, some of which were fragments of lithic tools. At the base of the feature was a large flat cobble, positioned horizontally, that we presume would have provided a base for the roof post. Six other features on this floor were small post holes arranged similarly to those of IIf.

Table 2.20. Features excavated in 2014 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, 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). All estimated volume reflects what was actually excavated.

Feature					Sediments			Estimated	FCR	
#	Type	Cob.	Peb.	Grav.	Sand	Silt	Clay	Vol. (cm^3)	Count	Stratum
C1	SHH	6	19	19	23	12	21	38,151	172	IIe
C2	BH	1	4	10	20	25	40	13,248	13	IId
C3	SHH	NA						24,000	NA	IIf
C4	PH	NA						3052	NA	IIe
C5	BH	NA						21,600	NA	IIe
C6	CPH	NA						199	NA	IIf
C7	BH	1	5	15	23	23	35	16,611	24	IIg
C8	SPH	NA						137	NA	IIf
C9	SPH	NA						283	NA	IIf
C10	SPH	NA						190	NA	IIf
C11	SPH	NA						157	NA	IIf
C12	SHH	4	13	14	15	25	29	59,400	82	IIg
C13	SPH	NA						519	NA	IIf
C14	SPH	NA						166	NA	IIf
C15	SPH	NA						1816	NA	IIf
C16	SPH	NA						319	NA	IIf
C17	SPH	NA						137	NA	IIf
C18	SPH	NA						118	NA	IIf
C19	SPH	NA						137	NA	IIf
C20	SPH	NA						285	NA	IIf
C21	SPH	NA						423	NA	IIg
C22	SPH	NA						98	NA	IIg
C23	BH	0	2	18	30	15	35	7257	7	IIf
C24	SPH	NA						79	NA	IIf
C25	SPH	NA						98	NA	IIf
C26	DCP	0	10	20	15	33	22	11,719	28	IIf
C27	BH	6	11	15	17	31	20	68,299	64	IIg
C28	CPH	4	17	15	22	20	22	294,257	124	IIg
C29	SPH	NA						198	NA	IIg
C30	SPH	NA						198	NA	IIg
C31	BH	10	5	10	25	25	20	15,930	17	IIg
C32	SPH	NA						923	NA	IIg
C33	PH	0	7	12	10	27	44	3772	2	IIg

Excavations of Block D identified 13 features (Table 2.21). Floor IIa only included one feature a preserved wooden house post on the north end of the block. The house post was shaped in a square cross-section form and stabilized at its base by cobbles. Floor IIb included a shallow basin-shaped hearth, a post-hole, and a deep bell-shaped cache pit. The cache pit shows some evidence for micro-stratification including one layer dense with ochre (hematite). Floor IIc included a shallow hearth, six post-holes of various dimensions, and deep bell-shaped pit (F. D10). The latter was not fully excavated, though appears to be a cache pit filled with refuse similar to Feature D8 on IIb. Features D8 and D10 overlap and are associated with post-holes in the northeastern corner of the block.

Table 2.21. Features excavated in 2014 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, 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
D1	P	NA						NA[1]	NA	IIa
D4	BH	0	0	5	5	30	60	3150	6	IIb
D5	SPH	NA[4]						510		IIb
D6	SPH	NA[4]						502		IIb
D7	PH	NA						396	NA	IIb
D8	DBS	1	5	13	15	34	32	211,584[3]	366	IIb
D10	DBS	0	4	8	15	30	43	66,332[2]	28	IIc
D11	PH	NA						398	NA	IId
D12	SPH	NA						508	NA	IIc
D13	SPH	NA						330	NA	IIc
D14	SPH	NA						67	NA	IIc
D15	SPH	NA						94	NA	IIc
D16	PH	0	0	5	5	30	60	2826	0	IIc
D17	SH	NA						481	NA	IIc
D18	PH	0	10	20	5	25	40	10,485	16	IIc

[1]Wooden house post, square shape in plan view.
[2]Excavation of this cache pit is not complete. This volume reflects only what was excavated in 2014.
[3]This is estimated actual excavated volume. Total volume is estimated to be 423,168.
[4]Features D5 and D6 were filled with semi-decomposed wood that appears to reflect preserved post.

Radiocarbon Dating

We report on 18 new radiocarbon dates from Housepit 54 (Table 2.22). With the exception of one roof date (sample #514 from 2014) and one piece of birch bark (#368-2014), all dates were derived from charcoal collected in situ from hearth features. We calibrated the dates using standard Gaussian distributions and Bayesian posterior probabilities (Figure 2.5). 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). Figure 2.5 illustrates results of all calibrations and Bayesian modeling on floors. In the future we expect to formally test for outliers within these data as is possible using OxCal 4.2. However, for now we simply review the outcomes of calibration and modeling via examination of the plots in Figure 2.5. Calibrations and Bayesian modeling suggest a most likely occupation range at 1150-1350 cal. B.P. Several dates appear to be outliers within the distribution. Both dates from floor IIi seem to be too old when compared to dates from floors directly above and below. Date 351(2014) from IIg appears to be too young when compared to the other IIg date and the floors above and below. For now, if we can assume that the IIj to IIa floor sequence spans ca. 1150-1350 cal. B.P. this implies an approximate 200 year period in which floors IIj through IIa accumulated. Put differently, it means about 20 years or approximately one generation per floor.

Table 2.22. Radiocarbon data for floors excavated in 2013 and 2014.

Sample ID	Block	Unit(s)	Strat.	Feature	Date (uncalibrated)
141(2014)	C	11,12,15,16	IIa	C3(2014)	1212+/-23
217(2014)	D	11	IIa	D4(2014)	1220+/-26
292(2013)	B	14,15	IIb	B8(2013)	1295+/-28
174(2013)	C	15	IIb	C5(2013)	1199+/-26
344(2013)	B	6	IIc	B9(2013)	1273+/-26
197(2013)	A	15	IId	A11(2013)	1339+/-23
205(2014)	B	16	IIe	B12(2014)	1268+/-25
50(2014)	C	2,6	IIe	C2(2014)	1391+/-26
233(2013)	A	6	IIe	A13(2013)	1204+/-18
406(2013)	A	15	IIf	A18(2013)	1400+/-22
351(2014)	C	2	IIg	C27 (2014)	1010+/-26
45(2014)	A	8	IIg	A2(2014)	1228+/-22
144(2014)	A	8	IIh	A6(2014)	1348+/-25
330(2014)	A	11	IIi	A12(2014)	2257+/-31
368 (2014)	A	12	IIi	Birchbark	2188+/-27
461(2014)	A	16	IIj	A20(2014)	1646+/-23
460(2014)	A	10	IIj	A22 (2014)	1299+/-27

514(2014)	A	10	Vd	roof deposit	2022+/-22

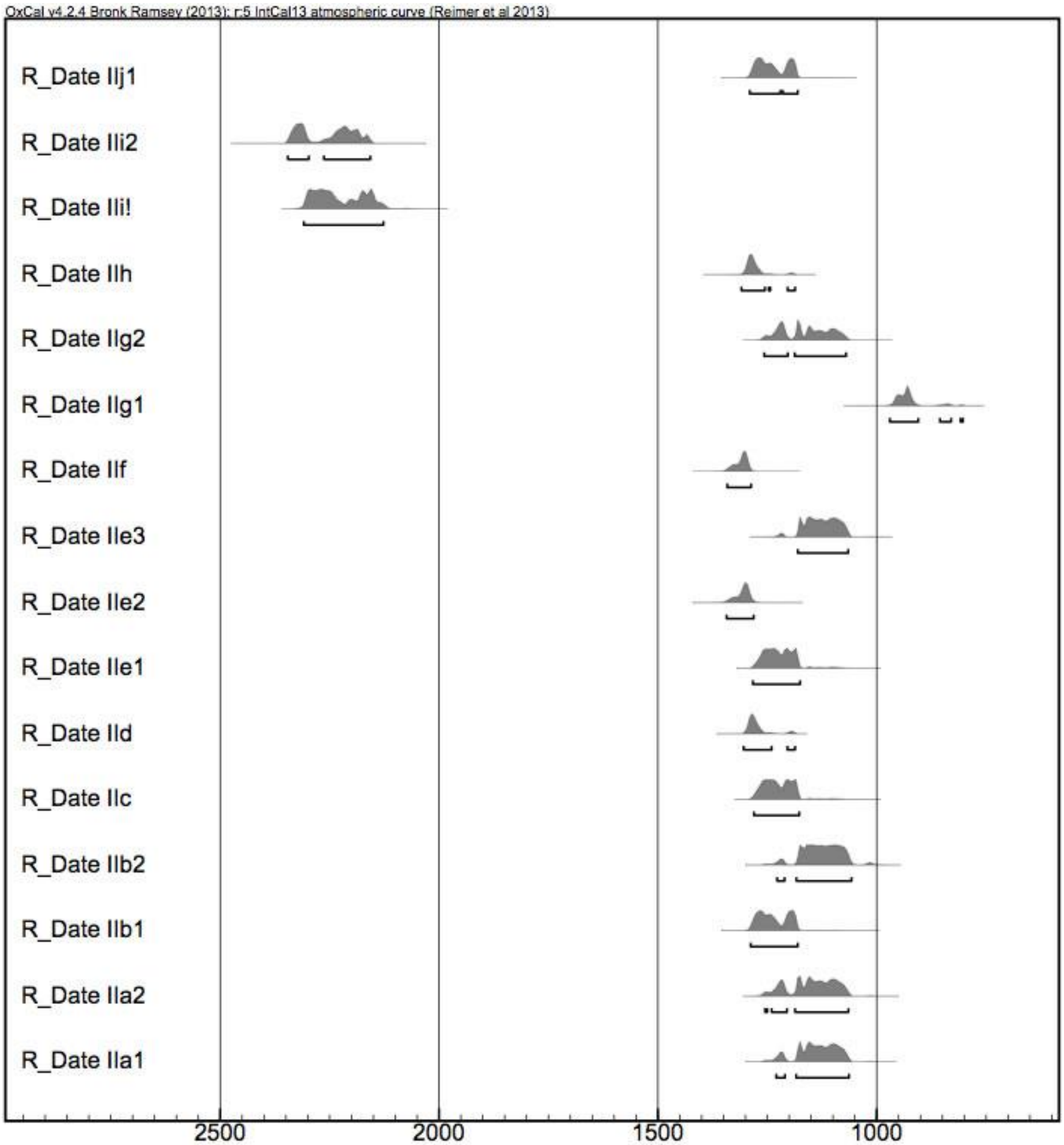

Figure 2.5. Calibrated dates of HP 54 floors illustrating 99% (lower bar) confidence interval and Bayesian posterior probabilities (upper contours).

Spatial Distribution of Features on Floors

We initiated a study of spatial organization on floors with data from the 2013 field season (Prentiss 2014). We expand upon that discussion here making use of features excavated in 2014 (Appendix A). Excavations of Block D increased our understanding of spatial arrangements of features on floors IIa to IIc. No features other than a house post were found in IIa within Block D. Given abundant lithic materials in this area, but relatively few faunal remains it raises the possibility that the northeastern portion of IIa was dedicated to special activities. This is in contrast with feature arrangements in other blocks that are more suggestive of hearth-based domestic activity areas. Features in floor IIb in Block D include a hearth and a deep cache pit implying the presence of a hearth centered activity area. If this is the case then there are such arrangements in all four blocks. Floor IIc also included a hearth and cache pit arrangement in Block D implying a similar activity structure to that of Blocks A and C. Block A on IIc may reflect a special activity area though artifacts suggest a normal domestic work space (Chapter Three, this report). Hearth-centered activity areas are found in Blocks A and C on floor IId. The commonality between the IIc and IId floors is the prominent presence of a large grinding slab that appears to have been used during both floors along with Floor IIb. The distribution of features on floor IIe is complex. Block A has a hearth-centered activity area in its southwest corner. Block C has three hearth-associated activity areas. Block B features a semi-circular arrangement of cache pits. Within this arrangement of cache pits is a cluster of small post-holes raising the possibility of a platform or bench associated with the cache pits. This may have been similar to wooden coverings over cache pits at the Meier site on the Lower Columbia River as described by Smith (2006). The largest of those cache pits (F. B14), apparently went out of use during the life-span of floor IIe as a large hearth feature was created on top of the upper-most cache pit sediments. Thus the history of the activities in Block B on IIe is complex and implies the possibility that this area was for most of the life span of IIe a designated household storage zone. However, as cache pits were filled it transitioned to space for other household activities.

Floors from IIf down are only found in Blocks A and C, suggesting that the house was approximately 50% smaller and possibly shaped closer to a rectangular fashion. Floor IIf in Block A includes a large hearth and two substantial cache pits. Hearths are also found in the northeast and southwest portions of Block C along with a very large quantity of fire-cracked rock. The distribution of these features and associated materials suggests the possibility of three domestic activity areas with storage facilities along the southern wall of the house. Floor IIg also includes three hearth-centered activity areas that also include a very large cache pit on its southern border, thus implying a similar degree of population packing as that of IIf. Floors IIh, IIi, and IIj have, so far, only been excavated in Block A. Floor IIh has a complex array of features including six hearths and a very large cache pit. Given the number of hearth features and the variation in their morphology it suggests that the history of IIh in this area is complex. While it is possible that more than one domestic group co-habited in this space, it is equally likely that some hearths were used for specialized forms of cooking or for special household events. Feature A8 is deep and horizontally expansive. Given the feature's association with abundant faunal remains, it suggests that it could have been used for one or more specialized meat –roasting events. Feature A6 is a deep, vertical-walled roasting feature whose function is less clear. The IIi and IIj floors are similar in that both feature nearly super-imposed hearth and cache pit associations implying simple domestic activity areas in each case.

Conclusions

The 2014 archaeological investigations of Housepit 54 expanded our understanding the occupational history of this ancient house. Excavations exposed new portions of floors spanning IIa to IIj along with roof material including Va, Vb3, and Vc. Examination of deeper strata as exposed in the 2008 trenches suggest that there may be at least four to five additional floors and perhaps two or more additional roofs in Blocks A and C. We also confirmed the presence of the XVII stratum, a midden-like sediment filling what appears to be a deep pit covering much of the west side of Block D, and apparently excavated immediately after the collapse of the Va roof, approximately 1100-1200 years ago. Dating of the IIa to IIj sequence most strongly suggest an occupation period of ca. 1350-1150 cal. B.P. However several much older outlier dates in deeper strata hint at either older occupations or contamination from old wood or other materials. A total of eighty new features were excavated including an array of post-holes, cache pits, and hearths. Spatial arrangements suggest a consistent pattern of domestic activity areas placed around the margins of the house floors on the IIe to IIa strata. Arrangements of such activity areas on the deeper floors may have been different, at least less obviously arranged around the peripheries of each floor. Further excavations in Blocks A and C will be necessary to fully define these spatial arrangements. Analyses of fire-cracked rock and feature distributions suggests that household populations may have increased dramatically during floors IIg to IIe, then dropped off dramatically during IId and IIC before increasing somewhat in IIB and IIa. One implication of these data is that the doubling of the house in physical size at IIe was a response to internal demographic pressure. The subsequent demographic trough coincides with the demographic crisis recognized village-wide (Prentiss et al. 2014). Late growth could indicate that the household maintained a productive economy for several generations despite troubles elsewhere in the village.

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Chapter Three

Lithic Tools and Debitage

(Anna Marie Prentiss and Thomas A Foor)

Introduction

This chapter describes the 9796 lithic artifacts (8887 flakes and 909 tools and cores) recovered and analyzed to date from Housepit 54 during the 2013 and 2014 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

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

Tables 3.1 and 3.2 provide summaries of lithic tool data as organized by major tool classes across Housepit 54 floors and roofs. Roof data (Va, Vc, Vb3) reflect results of 2014 excavations only. 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.

Table 3.1. Summary lithic tool data for Housepit 54 floors by Block. Tool codes correspond to tools listed on continuation next page.

	Block A							Block B				
	IIa	b	c	d	e	f	g	IIa	b	c	d	e
FK	1	0	2	1	0	1	3	2	0	2	3	1
SB	0	0	0	0	0	2	0	0	0	0	0	2
PP	2	2	4	1	3	0	2	1	2	2	0	1
CP	1	0	0	0	2	0	0	0	0	0	1	1
FS	2	0	4	3	1	0	7	6	2	3	3	5
ES	2	0	0	0	1	0	2	0	0	0	0	1
SS	2	1	3	0	2	1	6	2	3	0	2	7
SK	0	0	0	0	0	0	1	1	0	1	1	0
DPB	0	0	1	1	0	1	5	2	1	2	0	1
P	0	1	1	0	2	1	1	2	0	2	0	1
P	2	0	2	1	0	0	3	1	0	2	2	1
ND	0	0	0	0	0	1	0	2	0	0	0	0
A	1	0	0	0	0	3	1	0	0	0	0	0
GS	0	0	0	0	0	0	0	0	0	0	0	1
A	0	0	1	0	1	1	3	6	0	0	1	8
FC	1	0	0	0	0	0	1	1	0	0	1	1
BC	4	2	4	3	8	1	7	8	4	5	2	3
B	0	0	0	0	0	0	0	0	0	0	0	1
S	2	2	0	2	0	1	7	0	0	1	1	1
P	0	0	0	0	0	0	0	0	0	1	0	0
H	0	2	0	0	0	0	0	0	0	0	0	3
UF	0	0	2	0	0	4	10	7	0	2	3	9
SV	0	0	0	0	0	1	1	0	0	0	0	0
SS	0	0	0	0	0	0	0	0	0	0	0	1
OSS	1	0	0	0	0	0	0	1	0	0	0	1
ML	0	0	0	0	0	0	0	0	0	0	0	1
MN	0	0	0	0	0	0	0	2	0	0	0	0
PO	0	0	0	0	0	0	1	1	0	0	0	1

Table 3.1 continued.

	Block C							Block D		
	IIa	b	c	d	e	f	g	IIa	b	c
Flake Knife	0	2	0	2	3	6	0	8	3	1
Stage Biface	0	0	0	0	1	4	2	0	1	0
Projectile Point	2	2	4	5	6	3	3	5	3	4
Crude Point	1	0	0	2	2	0	0	0	2	3
Flake Scraper	1	1	2	6	3	6	1	7	5	5
End Scraper	1	0	1	1	1	4	0	0	0	1
Slate Scraper	3	0	2	5	5	6	3	4	7	1
Slate knife	0	0	0	1	1	1	3	1	1	0
Drill/Perforator/Burin	0	1	0	2	4	4	3	4	2	1
Piercer	0	0	1	0	2	2	0	1	1	1
Pieces Esquillee	0	1	1	4	2	2	2	4	4	3
Notch/denticulate	0	0	0	1	2	1	1	1	1	2
Adze	0	0	0	1	0	1	0	1	0	0
Groundstone Slab	0	0	0	0	0	0	15	0	0	0
Abrader	0	2	2	4	2	6	19	0	1	2
Freehand Core	0	1	0	1	1	2	3	1	3	0
Bipolar Core	4	4	2	12	7	5	5	7	6	6
Bead	0	0	0	1	3	1	0	0	0	0
Slate Reject	1	3	7	3	2	1	6	3	2	0
Pipe	0	0	0	1	0	0	1	1	2	1
Hammerstone	0	0	2	0	1	2	1	0	0	1
Used Flake	2	2	1	3	9	12	4	7	7	11
Stone Vessel	0	0	0	0	0	0	2	1	0	0
Sandstone saw	0	0	1	0	0	0	0	0	0	0
Ornaments/sculptures	0	0	0	0	1	0	0	0	0	0
Maul	1	0	0	0	0	1	0	0	0	0
Mano	0	0	0	0	0	1	1	1	0	0
Polished objects	0	0	0	0	0	2	1	1	0	1

Table 3.2. Lithic tool data for deep floors in Block A and roof sediments excavated in 2014.

	Block A			Block D	Block A	Block B
	IIh	i	j	Va	Vc	Vb3
Flake Knife	1			1		
Stage Biface	3	1		1		
Projectile Point	1					
Crude Point						
Flake Scraper	2	1		2		
End Scraper						
Slate Scraper	11	1	1	4		
Slate knife				1		
Drill/Perforator/Burin	1			1		
Piercer	1	1		1		
Pieces Esquillee	2			1		
Notch/denticulate				2		
Adze	1			1		
Groundstone Slab			2	1		
Abrader		4	10	4	1	1
Freehand Core	6	1	1			
Bipolar Core	15			1		
Bead				2		
Slate Reject	5			1		
Pipe						
Hammerstone	2	1	2	1		
Used Flake	13	2	2	4		
Stone Vessel	1		1			
Sandstone saw				1		
Ornaments/sculptures	1	2				
Maul					1	
Mano						
Polished objects						

In order to facilitate multivariate statistical analysis, the data set from Table 3.1 was reorganized somewhat. The primary distinction was combining groundstone slabs, manos and mauls and also combining beads with vessels, saws, sculptures, and ornaments. This permitted us to retain some low count artifact classes in the analysis.

Lithic raw material distributions for floors IIa through IIg are summarized in Tables 3.3 and 3.4. Cherts include a range of opaque micro- and cryptocrystalline silicates that could derive from multiple sources (see Rousseau 2000). Similar 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). Igneous intrusives include grades of granites and diorite both found locally in secondary source deposits. 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. Dacite, coarse dacite, and basalt are combined the most common source materials and can be found in lag deposits in most Mid-Fraser river valleys. They are also known from several bedrock sources east of the Fraser Canyon (Rousseau 2000). Slate occurs in bedrock contexts in the Bridge River valley and is not well known to have been used outside of this context. Obsidian is non-local and has not yet been sourced at 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).

Table 3.3. Raw material summary data used in multivariate analysis (floors IIa-IIg).

	Dacite	Slate	Coarse Dacite	Obsidian	Pisolite	Basalt	Green Chert	Chert	Jasper	Chalcedony	Igneous Intrusives	Quartzite
A												
IIa	161	13	13	0	1	1	1	4	4	2	1	1
IIb	115	37	13	0	2	0	1	1	0	4	2	2
IIc	250	52	17	4	2	0	3	6	6	8	0	0
IId	205	27	5	0	0	0	0	3	3	3	0	1
IIe	129	27	7	1	1	2	0	3	0	2	0	1
IIf	292	50	24	0	3	1	1	9	5	11	3	2
IIg	275	90	1	0	6	3	3	7	7	8	4	4
B												
IIa	221	28	14	4	1	2	0	3	4	4	4	1
IIb	157	24	4	0	0	0	0	6	1	2	0	0
IIc	219	23	4	3	1	0	1	3	2	2	0	1
IId	190	51	7	3	2	4	0	3	0	1	0	1
IIe	484	75	43	1	5	22	2	7	10	12	14	11
C												
IIa	256	36	11	2	3	2	2	3	1	10	0	1
IIb	237	39	11	1	8	0	2	5	6	6	8	0
IIc	195	56	11	1	5	0	0	4	2	9	4	1
IId	482	60	27	1	3	1	1	13	7	13	2	7
IIe	418	106	36	2	4	10	4	11	4	10	5	2
IIf	352	85	31	4	6	2	3	10	5	8	3	6
IIg	151	35	9	2	2	12	1	6	2	6	6	10
D												
IIa	407	74	45	11	2	14	1	1	5	9	5	1
IIb	394	80	52	3	3	20	5	5	10	6	7	1
IIc	595	49	36	3	3	15	2	13	19	11	5	13

Table 3.4. Lithic raw materials with generally low counts (floors IIa-IIg; SS=silicified shale; CB=Coarse basalt; N=nephrite; C=copper; St=steatite; S=sandstone; C=conglomerate; A=andesite; M=mica; SW=silicified wood; QC=quartz crystal; G=greenstone; R=Rhyolite; MR=metamorphosed rock).

A	SS	CB	N	C	St	SS	C
IIa	2						
B							
C							
D							
E	1	1		1			
F	1	2			1		2
G	1		1		2	4	2
B							
IIa	1	1					
B	1	3					
C	2	2			1		
D					1	2	1
E	2	1	1	1	3	7	6
C							
IIa		2					
B							
C	3	2				1	1
D	1	1			2	1	
E		2			6		
F		1	2		1		1
G	1	1			1	30	3
D							
IIa	1				2	2	
B	1				2		2
C	2	1	1			2	1

Table 3.4. continued.

	A	M	SW	QC	G	R	MR
A							
IIa							
B							
C					2		
D				1			
E		1					1
F							
G				1			
B							
IIa							3
B							1
C							
D				2			
E	2				5		3
C							
IIa							2
B				1	1		
C			1				
D						1	2
E							2
F				1			
G				1		2	4
D							
IIa				1	1	1	9
B	3		1	1			3
C	4						

Analyses

Lithic artifacts can be used to help answer a wide variety of questions. The analyses discussed in the following section provide an initial look at several underlying dimensions of occupational variation visible through data derived from stone tools and debitage. Questions addressed include the following: Did the pattern of occupation on each floor remain consistent from the standpoints of length of stay and repeat visits during a given cycle? Did the nature of activities conducted during those occupations vary in significant ways? Does estimated demographic signature (population size per floor) predict variability in density and diversity of lithic artifact debris? Is there evidence for inter-activity area variability in the nature of basic functional activities and accumulation of goods? Do these patterns offer implications for better understanding the socio-political and demographic history of Housepit 54? All analyses reported here emphasize data from floors IIa through IIg. The deeper floors (IIh-IIj have not yet been adequately sampled to be appropriate for such study.

Occupational Intensity

A common concern of archaeologists working on deeply stratified sites with many occupation layers is the degree to which occupations varied in terms of longevity of stay(s) and repeat visits, collectively, occupational intensity. An elegant approach to assessing occupational intensity has been developed by Paleolithic archaeologists (e.g. Kuhn and Clark 2015) wherein for each occupation stratum tool-flake ratios are plotted against artifact density with the assumption that layers with lower density assemblages featuring higher tool-flake ratios will reflect more frequent short-term stays while those with higher density artifacts and lower tool-flake ratios represent less frequent but longer stays.

Middle Fraser Canyon pithouses were traditionally occupied during winter (Teit 1900, 1906). However, length of stay could vary with the length of given winters and the extent that food stores remained available for consumption during late winter by household inhabitants (Alexander 1992). It is also known that winter houses could be used during other seasons as a base for local foraging, as a stop-over for families moving between warm season foraging and fishing places or by those otherwise incapable of making long treks into the mountains or into the depths of Fraser Canyon for fishing (Alexander 1992). We can imagine that variability in the intensity by which houses were used could be informative regarding economic aspects of annual cycles. For example, we could expect that sustained warmer-dryer cycles could also be associated with weakness in productivity and predictability in salmon runs (Prentiss et al. 2011) and likely shorter stays within houses. In contrast, colder and wetter cycles could be associated with better salmon access and potentially longer winter stays.

Archaeologists working in the Middle Fraser villages have generally assumed winter occupation patterns (Hayden 1997; Prentiss and Kuijt 2012) in the ancient houses but have not typically attempted to assess actual variability in actual occupation intensity. The Housepit 54 data provide adequate data to explore the degree to which cultural materials accumulated on each floor. This can be accomplished by plotting the tool-flake ratio against artifact density for floors IIa-IIg (Table 3.5; Figure 3.1). Results suggest that with one important exception, artifact density does not correlate well with tool-flake ratio. While some floors have relatively high density lithic artifacts (IIe for example) and others have quite low scores (IIa), tool-flake ratio varies little. This implies that extent of lithic reduction activities do not play a major role in rates by which tools were discarded. Put differently, tool use and discard remained approximately proportional to rates of lithic reduction implying consistency in organizational approach to activities despite some variability in likely length of stay. Ultimately this means that for most floors the rates of re-visits/reoccupations was low and varied little. One major exception is the IIg floor where artifact density is relatively low and the tool-flake ratio is extremely high. The primary underlying cause of this signature is the high density of fragmentary groundstone items (especially slabs and abraders). The high counts of these items does not appear to be artificially inflated by excessive breakage of one or a few items as each appears to be a distinct tool. The statistical signature implies that IIg was the location of repeated shorter-term visits, which given the groundstone artifact frequencies, clearly involved production and use of these items. We can gain further insight into occupation patterns by examining inter-floor activity variation from the standpoint of variability in the presence of select artifact classes

Table 3.5. Tool/Flake ratio data

	N Tools	N Debitage	Total N	Tool/Flake	Artifact Density
IIa	151	1275	1426	.12	864
b	104	1214	1318	.09	1452
c	123	1556	1679	.08	1672
d	90	1058	1148	.09	1435
e	133	1382	1515	.095	2064
f	82	868	950	.09	1318
g	142	560	702	.25	1170

Tool/flake ratio to artifact density r=-.416, p=.353;
Tool/flake ratio to artifact density (excluding IIg) r=-.639, p=.172

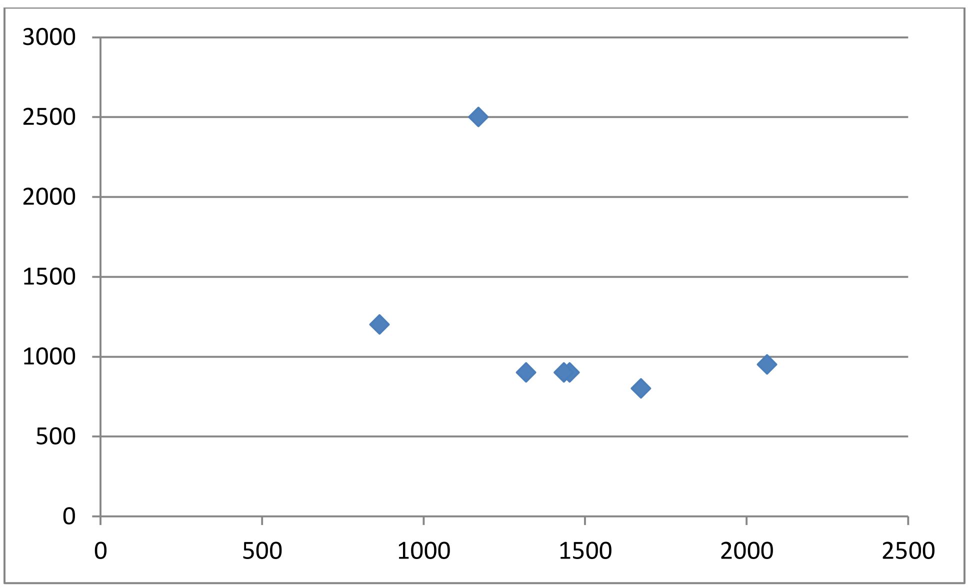

Figure 3.1. Tool/Flake ratio (Y axis) by artifact density (x axis).

Deposition of Artifact Classes

Kuhn and Clark (2015) suggest that results of tool-flake ratio analysis can be further explored by assessing variability in the density of major artifact classes between occupation strata. Logically if all activities were being conducted at the same rate and leading to equal rates of tool discard then the only factor affecting accumulation rates would be sediment accumulation rate. In contrast if different activities were conducted at different rates leading to variability in tool discard we might expect to see that reflected in tool density distributions. Collectively, if all classes are of low variability between floors then we can conclude that activities and the basic nature of occupations differed little between floors. High variability between artifact classes in contrast could point to occupational variation.

We tested for inter-artifact class variation using procedures outlined by Kuhn and Clark (2015). This required calculation of the coefficient of variation (CV) statistic for each artifact class on a between-floor basis. High scores represent high variation between floors; low represents low inter-floor variation. Assessment of significant differentiation between artifact classes was accomplished by plotting confidence intervals at the standard 95% (or at the .05 significance threshold) for each CV associated with an artifact class. Artifact classes were chosen due to their frequency and the fact that they represent a broad array of household activities (Table 3.6).

Results (Table 3.6; Figure 3.2) indicate a generally low degree of variation (compare to scores in Kuhn and Clark [2015:12] from Tabun Cave) suggesting that despite some variation each artifact class is consistently represented between each floor. Then examination of confidence intervals suggests a high degree of consistency between artifact classes is quite high. The slate scraper range is comparatively high while the groundstone range is low enough that it does not overlap with other classes. The latter is interesting given the strong groundstone presence on IIg. Overall it signals that the dominant signature is stability between floors despite occasional clusters of items as in the pit on the IIg floor in Block C, where the bulk of groundstone for that floor was recovered. Our next concern is whether demographic or number of estimated occupants on each floor significantly affected artifact discard rates and activity diversity.

Table 3.6. Calculation of coefficient of variation (CV) and 95% Confidence Interval (CI) data. CV and CI are calculated using artifact density data (SD = standard deviation; Deb=Debitage; LCI=Low Confidence Interval; UCI=Upper Confidence Interval).

Artifact Data							
	Flake Scrapers	Slate Scrapers	Drills/ Perforators	Bifaces/ Points	Groundstone	Cores	Deb
IIa	17	11	7	13	9	26	1275
B	6	11	6	13	3	20	1214
C	13	6	8	20	5	17	1566
D	8	7	4	11	6	19	1058
E	7	14	7	18	9	19	1382
F	5	7	5	11	7	8	868
G	8	10	4	8	38	17	560
Artifact Density data							
IIa	10.3	6.7	4.2	7.9	5.4	15.8	772.7
B	6.6	12.1	6.6	14.3	3.3	22	1337
C	13	6	8	20	5	17	1560
D	10	8.8	5	13.8	7.5	23.8	1322.5
E	9.5	19.1	9.5	24.5	12.2	25.9	1882.6
F	6.9	9.7	6.9	15.3	9.71	11.1	1204.4
G	13.3	16.7	6.7	13.3	63.3	28.3	933.3

Table 3.6. Continued.

SD	2.63	4.98	1.77	5.29	21.42	6.13	371.81
Mean	9.9	11.3	6.7	15.6	15.2	20.56	1287.5
CV	.27	.44	.26	.34	.14	.3	.2888
LCI	.225	.361	.212	.296	.1085	.265	.284
UCI	.323	.567	.337	.398	.202	.341	.293

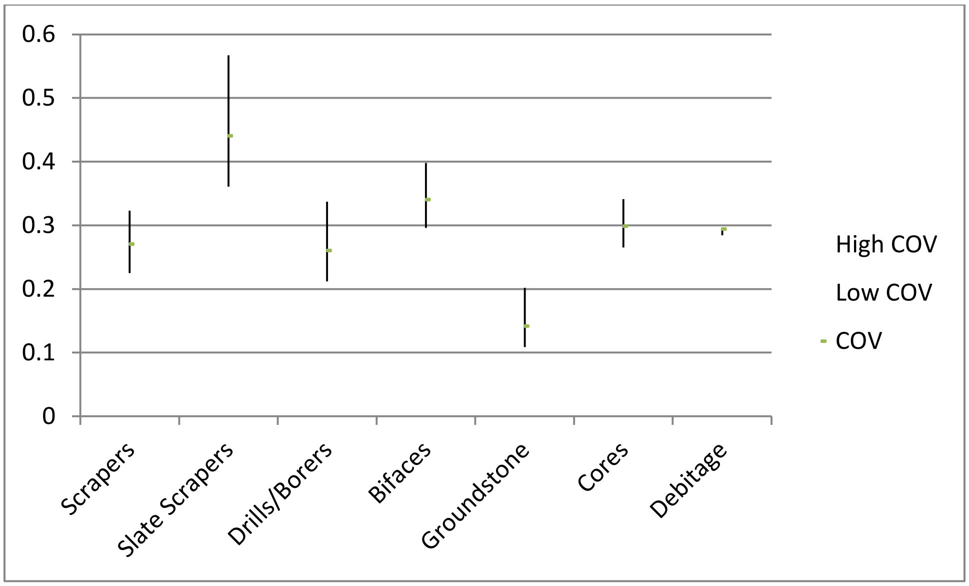

Figure 3.2. Plot of Coefficient of Variation and Confidence Interval (95%) data.

Household Demography and Artifact Diversity and Density

Previous research in the Mid-Fraser villages has shown that fire-cracked rock densities provide good relative estimates of household population density (Prentiss et al. 2007, 2012; Chapter Two, this report). A logical question to ask is whether number of occupants affected densities and diversity of lithic artifacts. An alternative hypothesis to demography driven artifact density and diversity is that demography had little to do with lithic assemblage variability. We can conduct preliminary tests of these hypotheses by calculating correlation coefficients between three measures of lithic tool diversity, tool density (TD), artifact density (AD), number of tools (N), and fire-cracked rock density (FD) on an inter-floor basis. The three measures of diversity include richness (R), simply a count of number of tool types per floor; the Shannon index (H), a general measure of diversity incorporating richness and evenness, and Shannon evenness (H/H_{max}), a measure of evenness between artifact classes. These measures have been effectively used in previous studies in the Mid-Fraser to examine shifts in technological organization and subsistence over time (Prentiss et al. 2007).

As shown in Table 3.7, Pearson r correlation coefficients were calculated between all measures with significance levels set at .05. Under these conditions, the only significant correlations found were between all diversity measures and number of artifacts. This finding is not surprising given that diversity and number of specimens are generally correlated (Grayson 1984). It is interesting however, that neither artifact diversity nor density correlate with FCR density implying that household demography, at least as measured with FCR densities, plays little role in structuring lithic assemblages. This implies that tool density and diversity are probably more strongly affected by length of stay than number of occupants. We have yet to examine variation in technological behavior or activity variation on an intra-floor basis. We pursue this in the next sections.

Table 3.7. Tool diversity data and correlation coefficients (FCR density data drawn from Chapter Two, this report): Richness (R), Shannon Diversity (H), Shannon Evenness (H/Hmax), Tool Count (N), Tool Density (TD), Artifact Density (AD), FCR Density (FD).

	R	H	H/Hmax	N	TD	AD	FD
IIa	56	3.97	.99	151	92	864	1686
b	37	3.41	.94	104	115	1452	1584
c	40	3.56	.97	123	123	1672	1212
d	38	3.19	.88	90	113	1435	1245
e	52	3.71	.94	133	181	2064	1906
f	41	3.22	.87	82	114	1318	1705
g	46	3.53	.93	142	237	1170	1038

Correlations between diversity measures and N tools, Tool Density, and Artifact Density:

R-N	r=.791, p=.034*
H-N	r=.914, p=.004**
H/Hmax-N	r=.829, p=.021*
R-TD	r=.192, p=.681
H-TD	r=.070, p=.881
H/Hmax-TD	r=.-.036, p=.939
R-AD	r=-.182, p=.695
H-AD	r=-.156, p=.738
H/Hmax-AD	r=-.112, p=.811
R-FD	r=.417, p=.352
H-FD	r=.300, p=.513
H/Hmax-FD	r=.062, p=.895
AD-FD	r=-.249, p=.591
TD-FD	r=-.336, p=.461

*significant at .05
**significant at .01

Technological Behavior on an Intra- and Inter-floor Basis

The tests in Table 3.7 focus exclusively on tool variability and thus ignore evidence for variation in tool production and maintenance behavior. So far we have learned that despite some variability in occupation length and corresponding artifact density per floor that tool production and discard was remarkably consistent. We can further test this outcome by examining lithic debitage or production debris left over from making chipped stone tools. As noted by Andrefsky (2005), a good approach to quickly identifying technological variation in debitage is to make use of a technological sensitive typological approach to flake classification. While this approach can be biased given that large proportions of a given assemblage will be unidentifiable fragments and that flake types can be misidentified (Sullivan and Rozen 1985), careful construction of a typology can still provide valid outcomes that can be cross-checked by alternative approaches to analysis. In this study we defined three major flake classes from within a subset of flakes with fracture initiations and platforms present (proximal, complete or split flakes [e.g. Prentiss 1998]). Freehand core reduction flakes have low width-thickness ratios, high dorsal platform angles, generally wide platforms, and often cone initiations and often some dorsal cortex. Biface reduction flakes typically have high width-thickness ratios, high dorsal platform angles, small platforms compared to maximum flake width, typically bend initiations, and limited to no dorsal cortex. Retouch flakes can have many of the same characteristics of biface reduction flakes but will also have frequent cone initiations and variable dorsal platform angles. A major distinction between retouch and either biface or core reduction flakes is in flake size. Retouch flakes are under 4 cm^2; other types are larger. "R" billet flakes as defined by Hayden and Hutchings (1989) are classified as biface reduction flakes. Bipolar reduction flakes are present in the debitage assemblage. However, there identification as distinct types by lab analysts has been too inconsistent for use in statistical analysis.

Tables 3.8 to 3.10 provide summary data on distributions of dacite and select non-dacite flake classes. Alternative raw materials (to dacite) were chosen on the basis of flake frequencies. Despite the large number of raw material types present in Housepit 54 assemblages, most occur in quite limited numbers (Tables 3.3 and 3.4). A perusal of the summary data by block and floor as well as by total floor suggests a very high degree of consistency with all block and floor assemblages dominated by small retouch flakes. This appears to support French's (2013) argument that cores were rarely transported to Housepit 54. Instead, flakes were more typically produced in field contexts and transported into houses where they underwent further modification to produce the wide range of flake-based tool forms present. French's argument was specific to the Fur Trade occupation (floor II and roof V). However, these data suggest that her conclusions is likely correct for the earlier floors as well. This is further supported by the very low frequencies of freehand cores present in each floor (Tables 3.1 and 3.2). In general this conclusion seems to support Kuhn's (1994) model for efficient field transport of lithic material. Finally, these data suggest that lithic reduction behavior varied little between areas on each floor between floors, and between raw materials. This does not mean that the specific degree of retouch intensity might not have varied between artifacts of different raw material types as we know that it did to some degree on the Fur Trade floor and roof (Hocking 2013). However, this is a question that will require future investigations.

Table 3.8. Debitage variability as measured using technological flake types for dacite.

Block/ Floor	Freehand C. Reduction	Biface Reduction	Small Retouch	Total	Biface/Total	Retouch/Total
A IIa	7	12	35	54	22.2	64.8
B	4	8	23	35	22.9	65.7
C	4	12	32	48	25	66.7
D	3	9	41	53	16.9	77
E	3	13	27	43	30.2	62.8
F	6	12	66	84	14.2	78.6
G	5	12	35	52	23.1	67.3
B IIa	9	26	38	73	35.6	52.1
B	3	9	24	36	25	66.7
C	2	16	34	52	30.8	65.4
D	1	6	26	33	18.2	78.8
E	9	14	69	92	15.2	75
C IIa	7	6	56	69	8.7	81.2
B	1	5	48	54	9.3	88.9
C	6	8	44	57	14	77.2
D	8	27	73	108	25	67.6
E	10	19	59	88	21.6	67
F	5	13	60	78	16.7	76.9
G	0	6	22	28	21.4	78.6
D IIa	7	22	99	128	17.2	73.3
B	12	15	108	135	11.1	80
C	6	19	161	186	10.2	86.6

Table 3.9. Summary Debitage Data (Dacite)

Floor	Core	Biface	Retouch	Total	Biface/Total	Retouch/Total	Core/Total
IIA	30	66	228	324	20.4	70.4	9.2
B	29	37	203	269	13.8	75.5	10.7
C	18	55	271	344	16	78.8	5.2
D	12	42	140	194	21.6	72.2	6.2
E	22	46	155	223	20.6	69.5	9.9
F	11	25	126	162	15.4	77.8	6.8
G	5	18	57	80	22.5	71.3	6.3

Table 3.10. Debitage variability as measured using technological flake types for select non-dacite raw materials.

	Core Reduction	Biface Reduction	Retouch	Total	Retouch/Total
Chalcedony					
IIa	1	1	7	9	77.7
B		2	7	9	77.7
C	2		9	11	82
D			6	6	100
E	1	2	2	5	40
F	1		1	2	50
G			3	3	100
Pisolite					
IIa	1		3	4	75
B			5	5	100
C			2	2	100
D			2	2	100
E				0	0
F			1	1	100
G	1			1	0
Jasper					
IIa	1	1	8	10	80
B			3	3	100
C				0	0
D			1	1	100
E			3	3	100
F			1	1	100
G			1	1	100
Coarse Dacite					
IIa	5	3	16	24	66.7
B	4		11	15	73.3
C	1	1	14	16	87.5
D		2	8	10	80
E	2	1	6	9	66.7
F	0	0	12	12	100
G			1	1	100

Intra- and Inter-floor Variability in Raw Materials

The next study examines both intra- and inter-floor variability in the use of lithic raw materials. It permits us to explore general patterns of raw material use and it allows us to consider the sociality of raw material use on individual floors. We explore variability in raw materials using multivariate analysis, more specifically principal components analysis (PCA). PCA permits us to examine the underlying structure of a complex data set (Table 3.3) by extracting "components" that describe the dominant underlying patterns. We used a standard component significance level of 1.0 and a loadings significance level of .5. We rotated the components using a Varimax rotation designed to maximize variability to help us to recognize patterns. We also calculated coefficient theta (Greene and Carmines 1980) is an additional test regarding the consistency of measurements (raw material patterns) between blocks and floors. Theta is a multivariate measure of reliability that requires data from a PCA (number of variables and highest eigenvalue).

The PCA of raw material variation drew from data in Table 3.4 and resulted in extraction of three significant components (Table 3.11). The eigenvalue score of 6.21 permitted calculation of a theta score of .9156 meaning that lithic raw material use patterns are quite consistent between blocks and floors. This pattern of strong consistency is reflected clearly in the un-rotated component loadings in which nearly every raw material type loads significantly on component one (Table 3.12). However, there is also some additional underlying variability that can be explored with rotated component loadings and component scores (Table 3.13 and Figures 3.3 and 3.4). Rotated component loadings (Table 3.13) illustrate three distinct patterns associated with the three significant components. Component one recognizes significant co-associations between dacite, basalt, cherts, jaspers, chalcedonies, and quartzite. While present on all floors and in all blocks, this combination is most strongly (positive component scores above 1.0) represented in block and floors B IIe, C IId, and D IIc. One interpretation of this pattern is that these are most preferred materials for making standard chipped stone tools on the Housepit 54 floors. Component two recognizes co-associations between slate, pisolite, green chert, and chalcedony, which are best represented on block and floors A IIg, C IIb, C IIe, C IIf, and D IIb. These materials are unique from a physical and technological standpoint (slate) and from an appearance standpoint. Pisolites are nearly always heat altered and present a bright pink speckled appearance. Green chert is the local Bridge River/Yalakom chert and is unique with its lime to olive green color. Chalcedonies are translucent cherts that can grade from colorless/clear to yellows to browns. It may be that these materials were accorded special treatment by HP 54 occupants with select families accumulating and using somewhat more than others. Component three identifies coarse dacite, obsidian, and basalt. Given that coarse dacite and basalt appear at significant or near significant levels on other components, we suggest that component three is most important for its recognition of obsidian distributions that are best represented on block and floors D IIa and IIb. Given the collection of strong component scores on Block D IIa, b, and c it is worth further considering the possibility that this portion of the floor may have been associated with capacity to obtain or affect access to select high quality raw material types to a higher degree than other household groups.

Table 3.11. Initial statistics for PCA analysis of raw material data.

Total Variance Explained

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.210	51.749	51.749	3.712	30.935	30.935
2	1.591	13.254	65.004	2.990	24.913	55.848
3	1.315	10.955	75.958	2.413	20.110	75.958

Extraction Method: Principal Component Analysis.

Table 3.12. Un-rotated component matrix for PCA of raw material data.

Component Matrix[a]

	Component		
	1	2	3
Dacite	.915	.026	-.184
Slate	.760	.081	.490
Coarse Dacite	.834	.406	-.040
Obsidian	.263	.803	.001
Pisolite	.563	-.346	.581
Basalt	.751	.417	-.252
Green Chert	.674	.055	.476
Chert	.667	-.563	-.136
Jasper	.810	-.100	-.308
Chalcedony	.794	-.228	.063
Igneous Intrusives	.735	.064	.020
Quartzite	.653	-.306	-.542

Extraction Method: Principal Component Analysis.
a. 3 components extracted.

Table 3.13. Rotated component matrix for PCA of raw material data.

Rotated Component Matrix[a]

	Component		
	1	2	3
Dacite	.733	.383	.431
Slate	.201	.818	.337
Coarse Dacite	.438	.385	.722
Obsidian	-.142	.016	.833
Pisolite	.183	.849	-.140
Basalt	.503	.166	.722
Green Chert	.161	.762	.279
Chert	.771	.378	-.208
Jasper	.786	.245	.289
Chalcedony	.605	.552	.124
Igneous Intrusives	.471	.433	.366
Quartzite	.900	.004	.063

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]
a. Rotation converged in 5 iterations.

Table 3.14. Component scores for PCA analysis of raw material data.

	Component		
	1	2	3
A IIa	-.25007	-1.01283	-.48054
B	-.82171	-.33960	-.44770
C	-.60097	.38612	.15158
D	-.25396	-1.24048	-.51907
E	-.66449	-1.04034	-.35048
F	.46628	.26832	-.82591
G	-.09171	1.64042	-1.14899
B IIa	-.39117	-1.04913	.50735
B	-.31719	-1.16885	-.76947
C	-.67983	-.93298	-.01906
D	-.93543	-.62132	.13938
E	1.84663	.45005	.90496
C IIa	-.63520	.22501	-.28861
B	-.55419	1.38825	-.89301
C	-.51640	.55623	-.76801
D	1.59015	.09803	-.87556
E	-.01828	1.83758	.28725
F	.07220	1.42819	-.10364
G	.72216	-.95914	-.06040
D IIa	-.84138	-.18799	3.20517
B	-.18998	1.05742	1.91332
C	3.06454	-.78298	.44144

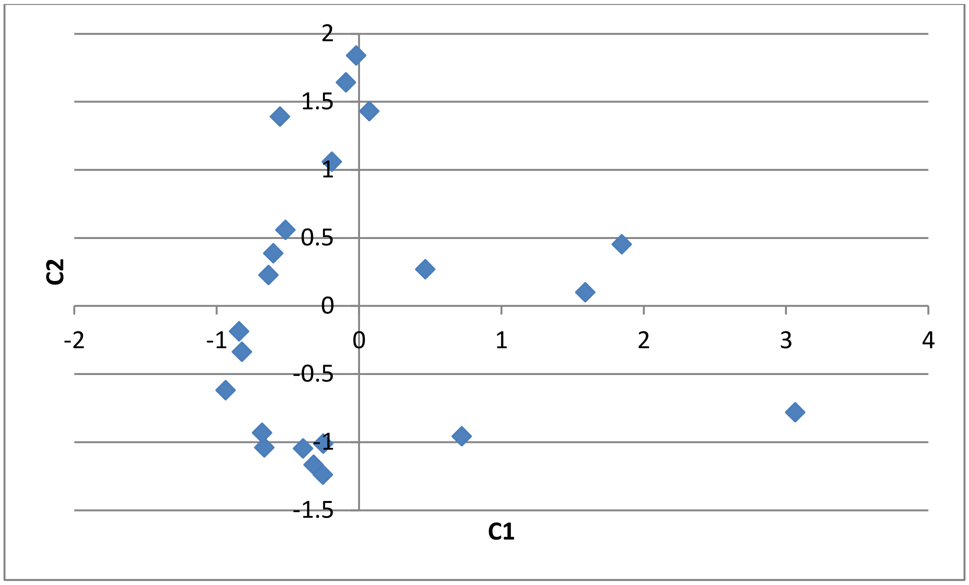

Figure 3.3 Plot of raw material component scores (X axis = C1; Y axis=C2).

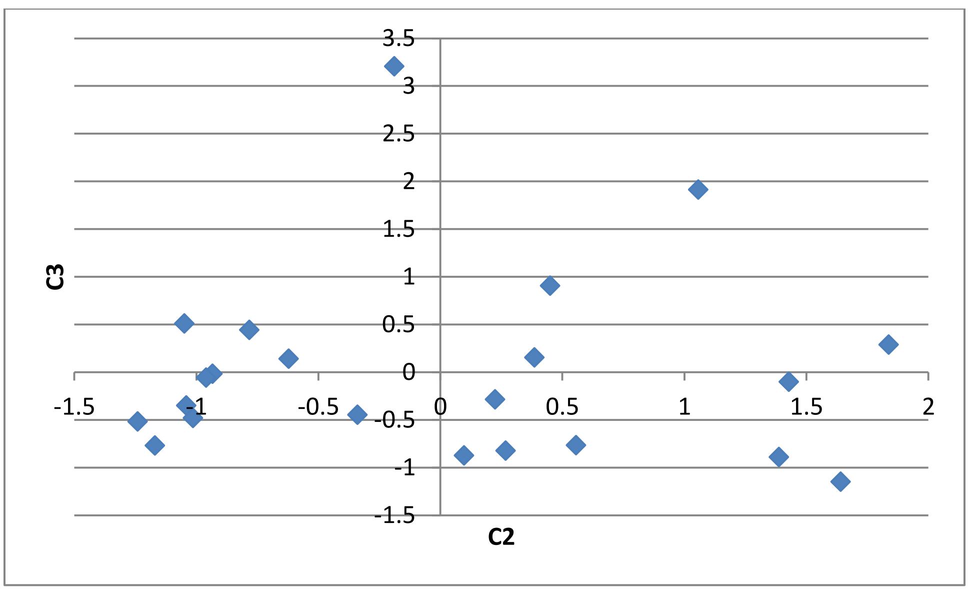

Figure 3.4. Plot of raw material component scores (X axis=C2; Y axis=C3).

Measures of Material Wealth Distinctions on Floors IIa-IIc and IIf-IIg

Block D has not been excavated beyond the IIc floor and thus it is impossible to fully examine intra-floor relationships between this point for the BR 3 period at Housepit 54 (we do approximately complete BR 2 floor data from IIf and IIg). However, we do have adequate data to explore the possibility that some form of social distinctions could have emerged at least by the IIc occupation. Previous research has demonstrated that inter-household wealth distinction at Bridge River and nearby Keatley Creek had developed by ca. 1300 cal. B.P. (Prentiss et al. 2007, 2012, 2014, 2015). While Hayden (1997; see also Lepofsky et al. 1996) recognizes intra-household social distinctions dated ca. 1000 years ago at Keatley Creek drawing from a range of data, this form of analysis has not yet been possible at Bridge River. However, with nearly full floor data from several floors in Housepit 54 we can begin to examine evidence for degrees of variability in concentration of material goods that imply access to trade connections, production and use of ornamental goods, and creation of gear for high-return subsistence activities (i.e. hunting). In order to develop a preliminary assessment of patterns we chose four classes of items that proved sensitive for study of wealth-based inequality in the past (Prentiss et al. 2012) and for which adequate data existed in this study. Non-local raw material density measures the degree to which a group could access via trade or direct ability (or permission) to collect in the field context distinctive raw materials not available in the Bridge River valley (Obsidian, Jasper, Yellow Chalcedony, and Pisolite). Ornamental raw materials come from local and non-local sources (nephrite, steatite, copper, and obsidian) and were used to create a variety of ornamental goods with value beyond simple functional utility, whether nephrite adzes (Morin 2015), obsidian tools and zoomorphic eccentrics (Hayden and Schulting 1996), or copper and steatite beads and pendants. Finally, bifaces in the form of bifacial projectile points and formal knives were stone tools critical to transported hunting gear (Prentiss et al. 2007). Success in hunting was one pathway for gaining social recognition and standing within traditional Mid-Fraser communities (Romanoff 1992). Table 3.15 (see also Figures 3.5-3.8) provides data on densities of all four artifact classes. It is clear that in nearly every case other than those associated with floors IIf and IIg, floors from Block D contain by far the most abundant items. This raises the possibility that of the domestic groups living on these late floors in Housepit 54, those of Block D maintained consistently highest access to non-local goods, ornamental material and goods, and stone hunting gear. This raises more questions about how the inhabitants of this block interacted with others within the house and this can be explored in a preliminary fashion with multivariate analysis of tool types in the next section.

Table 3.15. Summary data on densities of select raw materials and tool classes by block (A-D) and floor (IIa-IIc, IIf-IIg). Data were not sufficient to examine ornamental object, ornamental raw material, and biface density on IIf and IIg.

Non-local raw material density

	A	B	C	D
IIa	14.1	19.3	22.2	53.5
IIb	7.4	5.2	47.2	133.9
IIc	49.7	35.1	30.6	124.5
IIf	92.8		44.6	
IIg	64.2		53.8	

Ornamental raw material density

	A	B	C	D
IIa	0	9.6	5.6	36.6
IIb	0	0	3.1	31.5
IIc	16.6	5.8	2.8	17.2

Ornamental object density

	A	B	C	D
IIa	2.4	1.9	0	5.6
IIb	0	0	0	15.7
IIc	0	5.8	2.8	4.3

Biface Density

	A	B	C	D
IIa	7.06	1.92	9.4	14.08
IIb	7.41	10.36	6.29	55.12
IIc	16.57	11.69	11.14	25.75

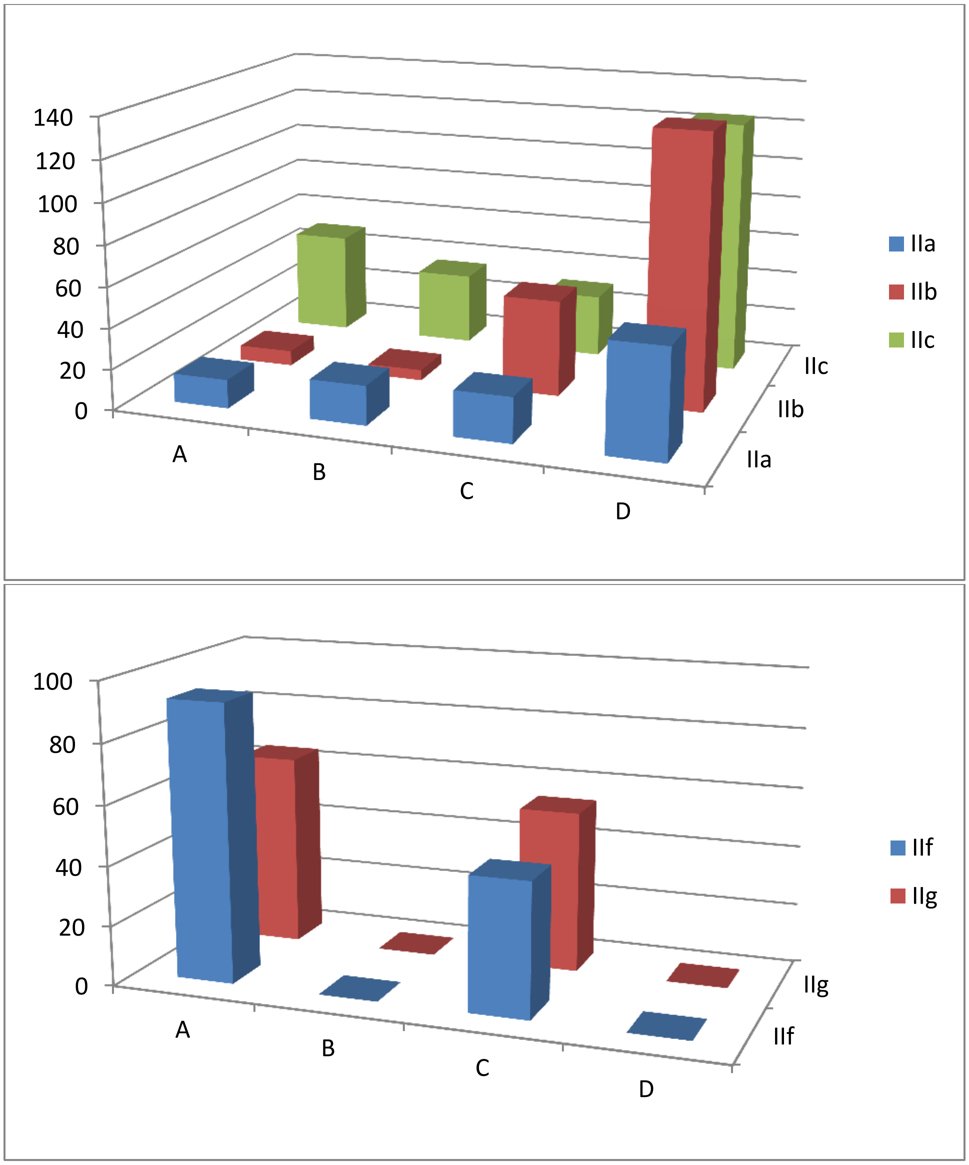

Figure 3.5. Non-local raw materials (Upper IIa-IIc; Lower IIf-IIg).

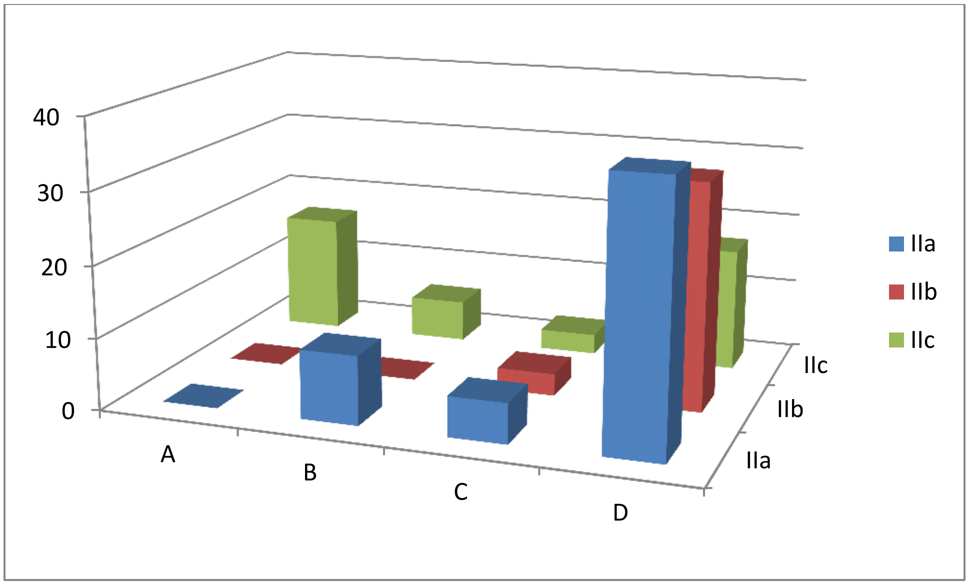

Figure 3.6. Ornamental raw material density.

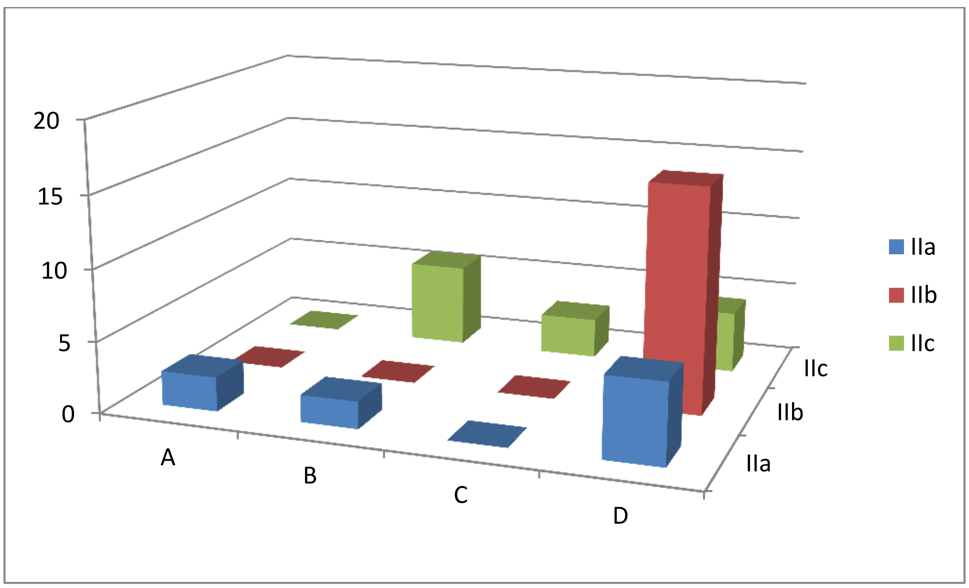

Figure 3.7. Ornamental object density.

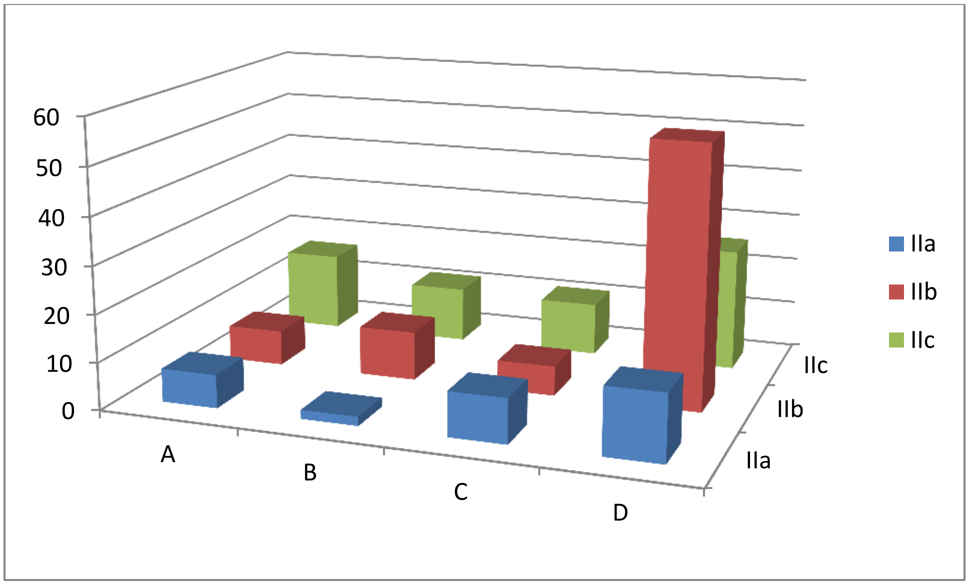

Figure 3.8. Biface density.

Measures of Activity Variability on Floors IIa-IIc and IIf-IIg

We developed a principal components analysis (PCA) from tool class data provided in Table 3.3. The purpose of this study was two-fold: First, to seek to identify co-associated sets of tools that could help to define the nature of normal work activities; second, to assess the likelihood that artifacts in each reflect consistently reflect domestic activity areas; and finally, to examine the degree to which those work activities were shared between block areas on floors IIa-IIc and IIf-IIg. Pacific Northwest archaeologists have generally examined social relationships on house floors by establishing the nature of activity areas, whether linked to a normal suite of domestic work as might be associated with family groups living in particular house spaces or special activity zones (e.g. Grier 2006; Hayden 1997; Samuels 2006). Once domestic activity areas have been defined it has been possible in some cases to examine variability in artifact classes between domestic areas considered associated with symbolic meaning (Grier 2006), prestige (Hayden 1998), or wealth (Coupland 2006) to identify within-house social status relationships.

Thus far in our studies of lithic artifact variability on the Housepit 54 floors, we have recognized consistency in both raw materials and lithic reduction behavior between block areas and floors raising the distinct possibility that all block areas on all floors represent similar domestic activity areas. We also recognized that there is also some interesting underlying variability between areas as measured with densities of non-local materials, ornamental raw materials, ornaments, and bifaces. We have not yet explored variability between block areas from the standpoint of entire suites of lithic tools. The following analysis seeks to accomplish this goal while providing data to test for consistency between areas with coefficient theta and then developing an approach to assessing degree of shared labor drawing on an analysis of variation in component scores

PCA analysis of the data from Table 3.3 resulted in extraction of five significant components (Table 3.16). Most variables loaded significantly on component one on the unrotated solution (Table (3.17). Drawing on the eigenvalue score of 6.234, we calculated a coefficient theta score of .89 suggesting that despite some variability in tool representation, the overall pattern is one of consistency between tool assemblages from all excavated blocks on floors IIa to IIg. Given similar consistency in lithic reduction behavior, raw material distributions, and feature types (see Chapter Two, this report), these results confirm the high likelihood that block areas actually do represent domestic activity zones positioned around the perimeters of the house floors. This permits us now to explore in greater depth evidence for relationships between inhabitants of each area.

Table 3.16. Initial statistics for PCA of tool classes.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% Variance	Cum. %
1	6.234	34.633	34.633	6.234	34.633	34.633
2	2.930	16.279	50.912	2.930	16.279	50.912
3	2.076	11.535	62.447	2.076	11.535	62.447
4	1.492	8.289	70.736	1.492	8.289	70.736
5	1.129	6.274	77.010	1.129	6.274	77.010
6	.946	5.258	82.268			
7	.822	4.564	86.832			
8	.617	3.430	90.262			
9	.565	3.140	93.402			
10	.375	2.081	95.483			
11	.305	1.692	97.175			
12	.185	1.026	98.201			
13	.114	.632	98.832			
14	.103	.570	99.402			
15	.051	.281	99.683			
16	.034	.188	99.871			
17	.015	.084	99.956			
18	.008	.044	100.000			
				Rotation Sums of Squared Loadings		
1				3.983	22.13	22.13
2				3.287	18.26	40.39
3				2.889	16.05	58.44
4				2.515	13.972	70.413
5				1.519	8.996	79.409

Table 3.17. Component loadings for PCA of tool classes.

Component Matrix[a]

	Component				
	1	2	3	4	5
Uniface or biface knife	.647	-.368	-.299	-.384	.149
stage biface	.433	.441	-.556	.308	.271
Point	.543	-.247	.407	.160	-.314
crude point on flake	.273	-.304	.357	.672	-.139
flake scraper	.751	-.406	-.090	-.244	.102
end scraper	.446	-.124	-.543	.308	-.109
slate scraper	.778	-.001	-.153	.290	.026
drill/perforator/burin	.861	.024	-.079	-.323	.111
Piercer	.262	-.042	.663	-.032	.626
Pieces esquille and adze	.789	-.306	.111	-.358	-.166
Notch/Denticulate	.596	-.136	.120	.256	-.363
Groundstone slabs/manos/mauls	.212	.862	.247	-.101	-.082
Abraders	.320	.833	.308	-.016	.058
Core	.654	.478	-.041	-.019	-.191
Bipolar Core	.609	-.337	.574	.035	.086
Bead/vessels/saws/ornaments/sculptures	.558	.405	.037	.303	.268
chipped, sawed, ground, polished items	.454	.454	.067	-.346	-.415
Used Flake	.799	-.061	-.306	.110	.180

The rotated component matrix provides insight into likely associations between tool classes reflecting particular activity sets (Table 3.18). Component one includes high (above .5) loadings on unifacial and bifacial knives, flake scrapers, drills/perforators/burins, pieces esquillee and adzes and used flakes. We interpret these to reflect primarily wood-working activities as might be associated with manufacturing such items as nets, traps, hafts, furniture, and architectural items. Unifacial and bifacial knives in this context were likely used for whittling purposes and tangentially for cutting hide and plant material associated with these activities. Component two loads at significant levels on groundstone slabs/manos/mauls, abraders, freehand cores, and chipped/sawed/ground/polished items (primarily slate) and appears to reflect contexts where broken grinding and abrading stones, exhausted cores, and byproducts of slate tool manufacture were discarded. Component three loads at significant levels on stage bifaces, end scrapers, slate scrapers, beads/vessels/saws/ornaments/sculptures, and used flakes. We interpret this artifact set to primarily reflect hide processing activities associated with loss or discard of ornaments and fragmentary vessels. Stage bifaces are more formally shaped knife-like items and could, in this context, reflect women's gear used in hide work in contrast to less formalized knives used in contexts of wood-working, possibly more often used by men. Used flakes load at significant levels on components one and three suggesting that these general tools were useful for more than one activity. Component four includes significant loadings on projectile points, crude projectile points, notches/denticulates, and bipolar cores. If notches and denticulates were primarily tools for planing narrow shafts then the association with both classes of projectile points implies the production of darts and arrows. Crude projectile points could reflect either adult expediently made tools or perhaps more likely an association of adult makers with novices learning the craft in context. Bipolar cores appear at nearly a significant level on component one and are also significant on component five. We consider these items important as a byproduct of flake production but not part of any formal tool kit. Component five has significant loadings on small piercers and bipolar cores. Given the broad use of bipolar cores we consider piercers the more interesting item here. Piercers are generally considered tools for punching small holes in softer material such as leather and if so would be part of sewing kits. However, some piercers also include rotary wear from drilling into tougher material such as antler or wood. Given their statistically unique distributions it is possible that these tools had multiple uses or some particular use that is not well defined at this point.

We generated component scores in order to study variability in the performance of these activity sets across the floors of Housepit 54 (Table 3.19; Figures 3.9-3.11). Component scores measure the degree to which each case (block within a given floor) contributes positively or negatively to each component. Thus, a set of block areas could either correlate positively or negatively with a given component reflecting variation in the evidence for performance of that activity. The following is a summary of component score outcomes for scores at 1.0+ levels in either positive or negative dimensions:

IIa: positive on C1 wood working in Block D and negative in Block on C4 weapons and Block C on C1 wood working;
IIb: positive score on C4 weapons in Block D;
IIc: positive score on C4 weapons in Block D; negative on Block C for C4 weapons;
IId: positive scores on C4 weapons and C5 piercers in Block C;
IIe: positive scores on C5 piercers in Block A, positive on C3 hide working in Block B; positive in C3 hide working, C4 weapons, and
C5 piercers in Block C; negative in C1 wood-working in Block A;
IIf: C1woodworking and C3 hide working positive in Block C; C4 weapons negative in Block A;
IIg: CI wood working positive on Block A; C2 groundstone positive on Block C.

Some interesting trends include the strong positive scores on component four (weapons) from various blocks in floors IIe-IIb. Component one wood-working seems most prominent on Floors IIg, IIf and IIa. Our next step is to examine the degree to which activities were shared in common across all floors versus segregated to particular areas.

In order to assess the degree to which work was shared between domestic groups within Housepit 54, we calculated coefficient of variation (COV) scores on the component scores for each floor. The goal here was to assess the degree to which the scores varied between floors on each component. This was accomplished for floors IIa-IIc by creating a simple distance matrix in which differences between all component scores for each floor and block were used as raw data for calculation of mean, standard deviation, and coefficient of variation scores. Since floors IIf and IIg only have two block areas the distance matrix approach would not work. In its place we simply calculated mean and standard deviations directly from the component scores and then used absolute values of the means to calculate the coefficient of variation. Results between the two approaches are comparable given that both measure variability in component scores.

Figures 3.12 and 3.13 illustrate variability in outcomes across floors IIa-IIc and IIf-IIg for components one through four. Floors IId and IIe were excluded as we do not yet have the portions of these floors from Block D. Results (Table 3.20) on individual components do not illustrate extreme variation though the COV score on Component 2 groundstone items is very low on floor IIc. We calculated summary COV data (Table 3.21) from the component-specific COV data that reflects a more obvious pattern of change (Figure 3.14). We recognize a trend upward to IIf and a subsequent decline to low scores in IIa and IIb. One possible interpretation could be that intra-household task specialization was on the rise through IIf and declined thereafter. If this was the case it could mean that inter-family cooperation in domestic tasks peaked around IIf (and perhaps also in IIe) while degree of cooperation in domestic work declined during the rest of the BR 3 floor occupations. If this was the case then we could also expect that valued goods might become more concentrated in select portions of the house if conditions had grown at all competitive. This is exactly the pattern recognize as illustrated in Figures 3.5-3.9 where on floors IIa-IIb Block D concentrates non-local raw materials and ornamental raw materials. The pattern is less distinct on deeper floors though much further testing is necessary once expanded house floor come available in the future.

Table 3.18. Rotated component loadings for PCA of tool classes.

	Component				
	1	2	3	4	5
Uniface or biface knife	.868	-.122	.211	-.029	-.009
stage biface	.052	.235	.875	-.171	-.077
Point	.301	.122	-.057	.728	.078
crude point on flake	-.153	-.188	.179	.805	.161
flake scraper	.838	-.085	.196	.223	.101
end scraper	.255	-.134	.603	.189	-.365
slate scraper	.396	.148	.609	.403	.022
drill/perforator/burin	.799	.331	.302	.095	.129
Piercer	.142	.067	-.049	.131	.926
Pieces esquille and adze	.852	.157	-.031	.364	.023
Notch/Denticulate	.281	.152	.187	.656	-.130
Groundstone slabs/manos/mauls	-.157	.902	.084	-.077	.120
Abraders	-.125	.874	.190	-.012	.281
Core	.286	.663	.358	.189	-.093
Bipolar Core	.446	.036	-.067	.612	.495
Bead/vessels/saws/ornaments/sculptures	.063	.399	.595	.171	.306
chipped, sawed, ground, polished items	.324	.735	-.059	.088	-.229
Used Flake	.570	.067	.643	.191	.043

Rotation Method: Varimax with Kaiser Normalization.

Table 3.19. Component scores for PCA of tool classes (highlighted scores are at 1.0+ in positive or negative dimension).

1	2	3	4	5	Floor
-.65098	-.30505	-.02429	.26237	**-1.10028**	A IIa
-.82496	-.25217	-.77561	-.61957	-.11176	B
.15904	-.59257	-.65065	-.34581	.35761	C
-.18880	-.30750	-.87906	-.94112	-.65900	D
-1.34477	-.92356	-.18226	.85083	**1.37713**	E
-.91560	-.49687	.89064	**-1.65318**	.43862	F
2.12353	.64259	-.15757	-.10680	-.56131	G
.61120	.03806	-.14965	**-1.01574**	**1.97492**	B IIa
-.81207	-.40621	-.45709	.42175	-.92061	B
.35992	-.55929	-.87311	**-1.00896**	**1.25318**	C
.05827	-.26030	-.35562	-.79850	-.78537	D
-.73334	.00504	**2.36260**	-.58802	.98391	E
-1.15853	-.56848	-.02858	.18059	-.73169	C IIa
-.14651	.14077	-.87838	-.77179	-.00154	B
-.54031	.77535	-.73428	.14092	**-1.64040**	C
.66084	.00434	-.61566	**1.90382**	**1.22315**	D
-.00475	.17520	**1.19879**	**1.76702**	**1.10447**	E
1.40632	-.55477	**2.76820**	-.57486	-1.44345	F
-.76894	**4.06463**	.15346	-.14399	.20001	G
2.48314	-.00644	-.83948	-.14664	.18321	D IIa
.36039	.10968	.34147	**1.50914**	-.28975	B
-.13309	-.72244	-.11390	**1.67853**	-.85106	C

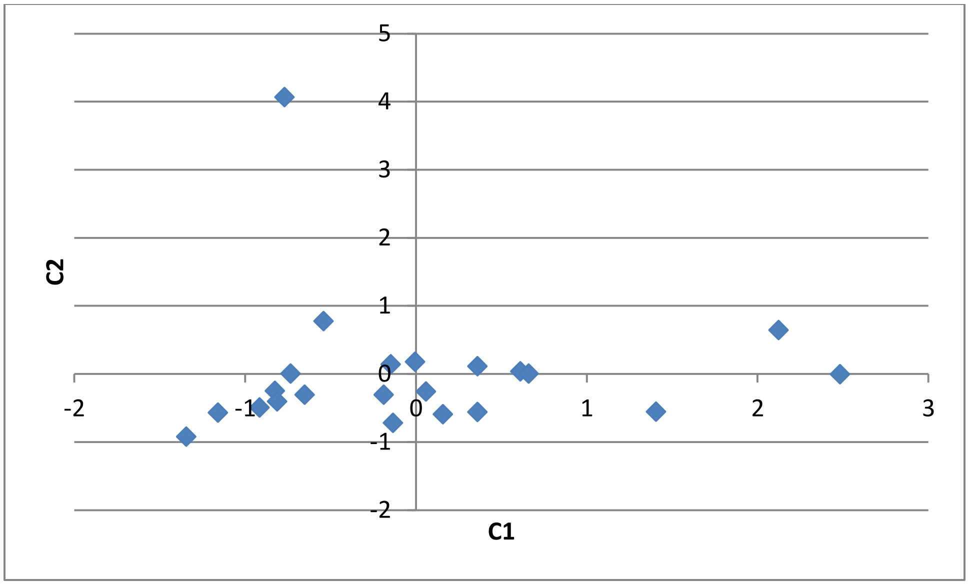

Figure 3.9. Plot of Component scores C1/C2 from PCA of tool classes.

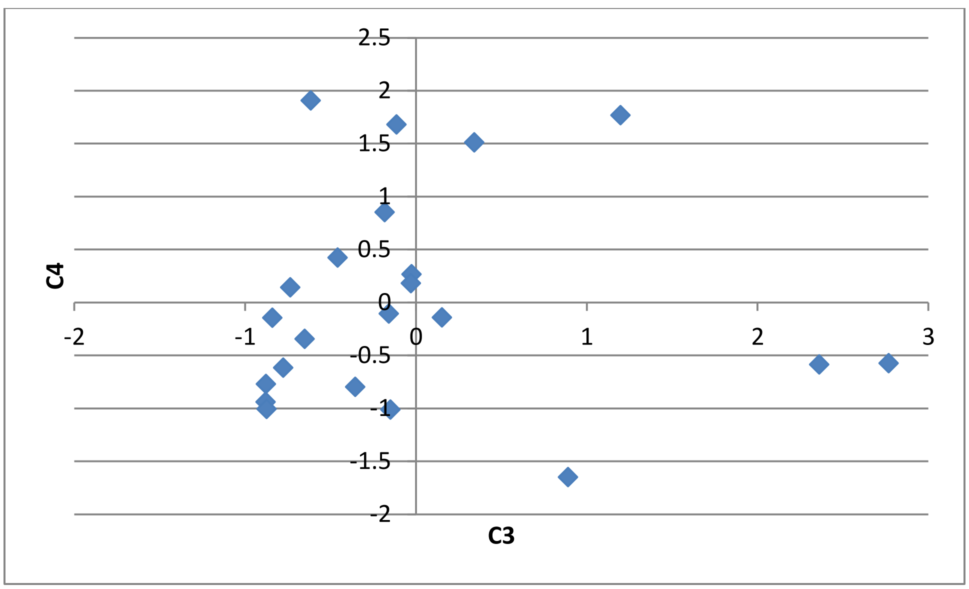

Figure 3.10. Plot of Component scores C3/C4 from PCA of tool classes.

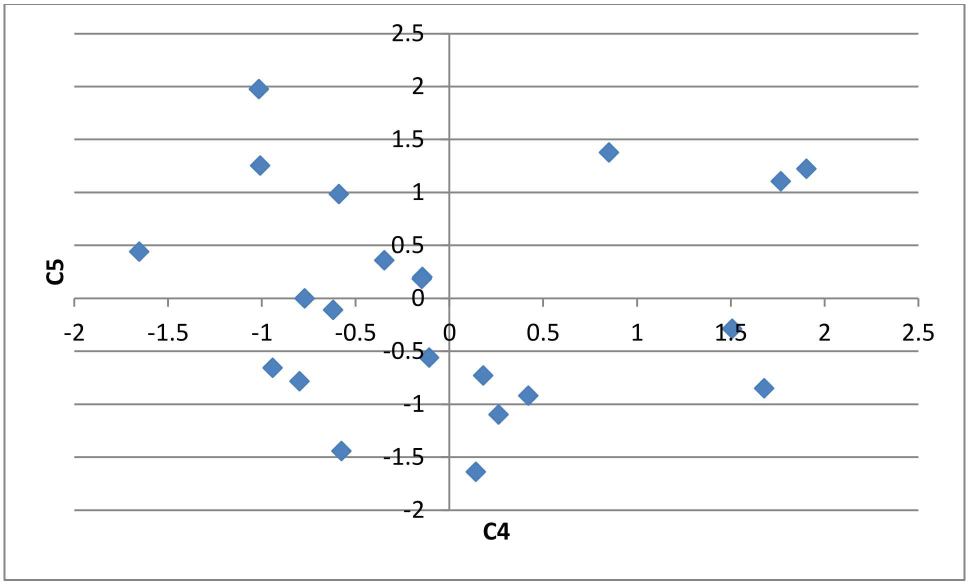

Figure 3.11. Plot of Component scores C4/C5 from PCA of tool classes.

Table 3.20. Baseline COV data by floor and component.

IIa	Var.	SD	mean	N	COV
C1	1.36724	1.16929	2.03267	6	0.5733
C2	0.04285	0.20699	0.35304	6	0.5863
C3	0.4608	0.34891	0.42777	6	0.8156
C4	0.24295	0.4929	0.69359	6	0.7107

IIb	Var.	SD	mean	N	COV
C1	0.19395	0.4404	0.7036	6	0.6259
C2	0.17366	0.41673	0.50934	6	0.8182
C3	0.20512	0.4529	0.66301	6	0.6831
C4	0.61733	0.78596	.1.31402	6	0.5981

IIc	Var.	SD	mean	N	COV
C1	0.06825	0.26125	0.4988	6	0.5238
C2	0.4234	0.65069	0.51363	6	0.1267
C3	0.07958	0.2821	0.39257	6	0.7186
C4	0.7004	0.83693	1.42487	6	0.5874

IIf	Var.	SD	mean	N	COV
C1		1.6485	0.24536	2	0.6719
C2		0.0409	0.52582	2	0.7778
C3		1.32764	1.82942	2	0.7257
C4		0.76249	1.11402	2	0.6844

IIg	Var.	SD	mean	N	COV
C1		2.04529	0.6773	2	0.302
C2		2.41975	2.35361	2	0.1028
C3		0.04837	0.00205	2	0.236
C4		0.0263	0.12539	2	0.2097

Table 3.21. COV data by components and floors (upper) and by floors (lower).

COV data for components and floors

	IIa	IIb	IIc	IIf	IIg
C1	0.5733	0.6259	0.5238	0.6719	0.302
C2	0.5863	0.8182	0.1267	0.7778	0.1028
C3	0.8156	0.6831	0.7186	0.7257	0.236
C4	0.7107	0.5981	0.5874	0.6844	0.2097

Summary COV data

	All Components
IIa	0.1702
IIb	0.1436
IIc	0.5211
IIf	0.6684
IIg	0.3897

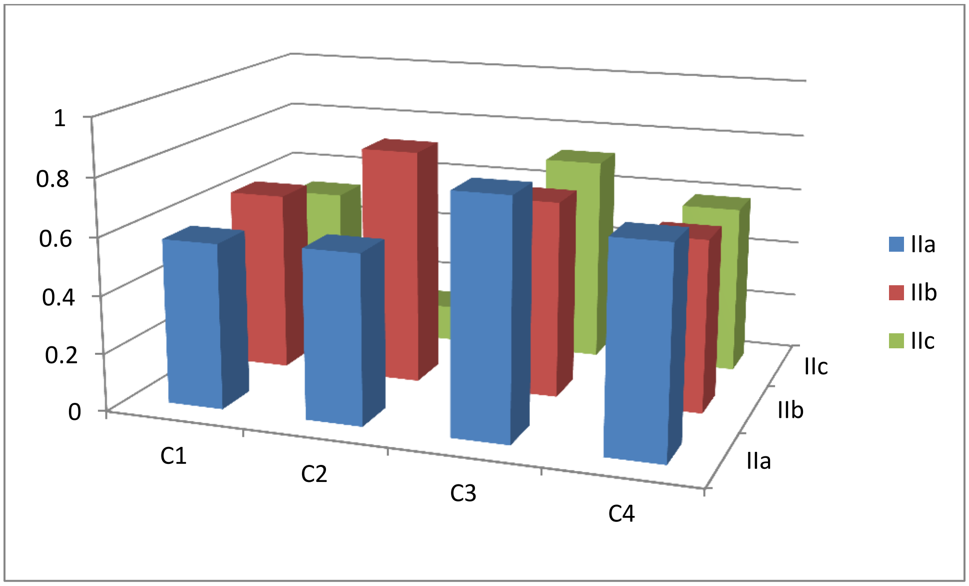

Figure 3.12. Coefficient of variation scores calculated on distance matrix derived from component scores (Table 3.20) for floors IIa to IIc.

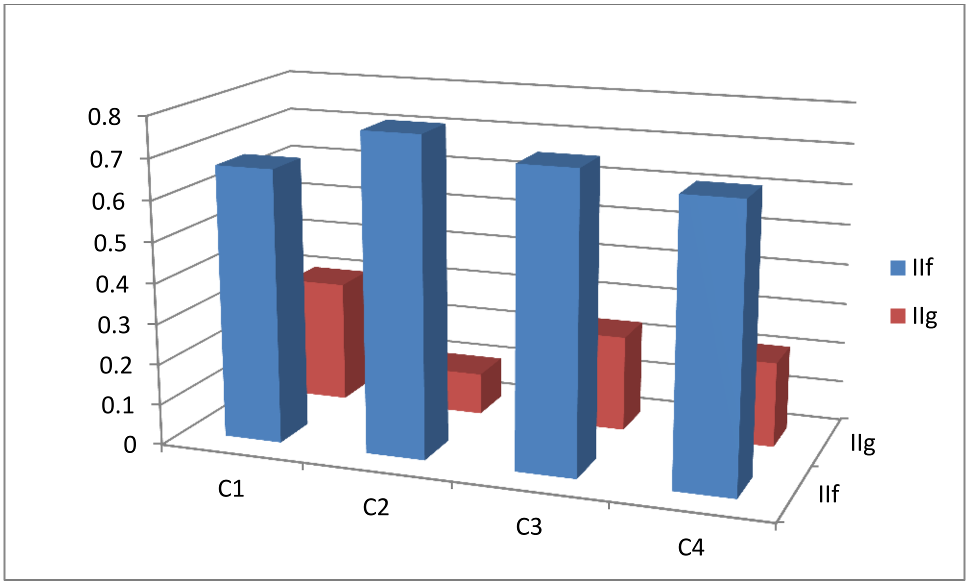

Figure 3.13. Coefficient of variation scores calculated on component scores (Table 3.20) for floors IIf and IIg.

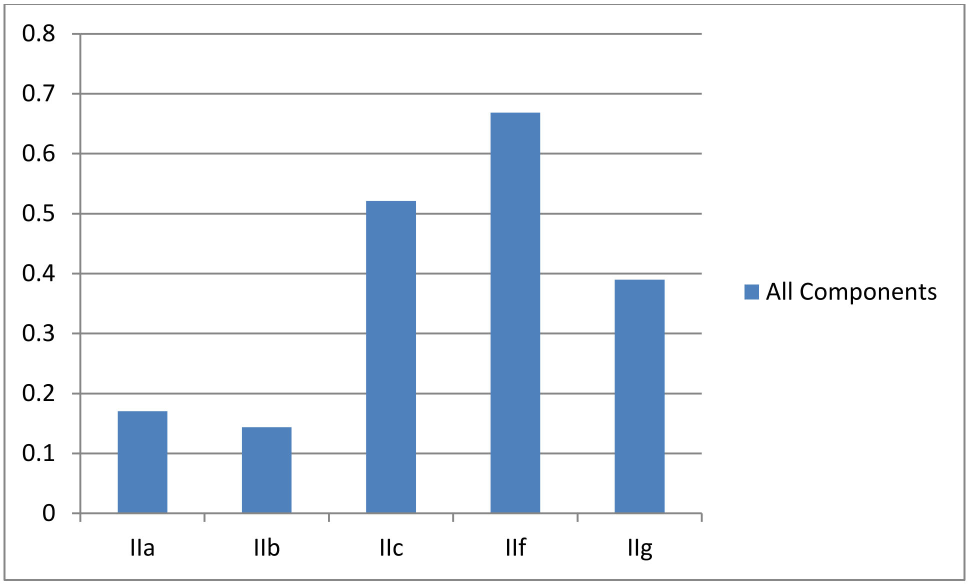

Figure 3.14. Summary COV scores for floors IIa-IIc and IIf-IIg.

Conclusions

Our analysis of lithic artifacts revealed a number of potentially significant insights into the history of occupations on the ancient floors of Housepit 54. Several independent approaches to measuring intra- and inter-floor variability suggested a high degree of consistency implying that a similar suite of activities were performed in each area and on each floor of the house.

These activities include a range of actions on dense material (likely wood but probably also antler and bone), hide working, weapons manufacture, and various actions on groundstone tools. The latter activities could have included (but not limited to…) food preparation and tool manufacture (e.g. grinding bone tools). Lithic raw materials appear to have been transported from a wide range of sources. Procurement and transport strategies appear to have been consistent between raw materials and between floors. It appears that toolstone was often transported primarily as flakes or even somewhat formed tools. Occasionally toolstone was transported in the form of small cores, though that pattern was primarily associated with use of cobbles from local sources. Further research will be necessary to work out details regarding variability in the degree to which raw material was worked depending upon distance from source. Once within the house, primary lithic reduction activities consisted of tool modification and maintenance and to a lesser degree biface manufacture and core reduction. The presence of sawed, ground, and polished stone tools also implies a more diverse range of production activities.

Analysis of tool form variability supported the argument that each floor was occupied by domestic groups (e.g. families) arranged around the perimeter of the house and leaving consistent evidence for a range of domestic activities. These data permitted us to further assess the possibility of variability in the degree to which labor was shared. Analysis of COV data suggested that there was some underlying diversity in the spatial position of activities on the older floors (particularly IIf) but that by floor IIb there was little variability meaning that domestic units conducted virtually identical activities throughout the house. Assessment of the accumulation of select items that might have been perceived as valuables (non-local materials, ornamental materials, ornaments) revealed consistent clustering particularly on the IIb and IIa floors in Block D implying the possibility that patterns of resource sharing had changed by the final occupation floors of Housepit 54. If this conclusion holds up under further testing it means that the pattern of inter-household inequality in access to material goods (Prentiss et al. 2012, 2014) may also have developed within houses during the BR 3 period. This may offer implications for how we understand the nature of changing social organization during the late BR 2 and the BR 3 periods at the Bridge River site.

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Chapter Four
Faunal and Osteological Analysis

(Matthew J. Walsh and Emilia Tifental)

Introduction

This chapter details the animal bone remains recovered during the 2014 excavations at Housepit 54 (HP54) of the Bridge River Site (EeRl4) in the Middle Fraser River Canyon of south-central British Columbia. These excavations revealed the remnants of multiple occupation and roof deposits, all of which contained assortments of faunal remains, the majority of which belonged to salmon (*Oncorhynchus* spp.) and a collection of terrestrial mammals such as deer, bighorn sheep, beaver, and canids, among others. This chapter will provide descriptions of the remains recovered during the 2014 excavation along with a synthesis of faunal remains recovered by the combined 2013 and 2014 excavations in strata where the 2014 work took up where the 2013 work left off. Results will be presented by strata and by excavation block. Some occupation strata consist of multiple floors. Strata span from the Bridge River 2 (BR2) period thru to the end of the Bridge River 3 (BR3) period and date from roughly 1350 B.P. to 1150 B.P. This range is representative of a period when the winter pithouse village experienced growths and declines, both in numbers of pithouses and associated features as well as overall human populations, culminating in the abandonment of the village after the final BR 3 occupation (see Chapter Two).

Subsistence at Bridge River

Subsistence at Bridge River during the BR3 Period consisted of a transhumant cycle of relatively mobile, but localized, logistical foraging during warmer months for hunting and gaining access to plant foods, and sedentism from late fall to spring during periods when migrating salmon moved through the nearby Fraser Canyon and throughout the Fraser-Bridge River watershed. Salmon was the key stored food resource for much of the winter, while plant foods such as preserved berries, nuts, and dried geophytes, along with deer and other terrestrial mammal prey rounded out the diet. During times of stress, such as possible in late winter and early spring before the first spring run Chinook (*Oncorhynchus tshawytscha*) moved into the region, food sources may have expanded to include smaller terrestrial mammals and potentially less-desirable, but locally accessible foods, including domesticated dogs and the powdered spines of dried salmon. Such foods were often incorporated in to soups and mixed with dried meat, plants, and berries to extend their nutritional range (see Bouchard and Kennedy 1978: 71).

Late-Holocene subsistence in the Middle Fraser Canyon relied considerably on the acquisition and mass storage of salmon for much of the year, particularly for use during the winter. Salmonids in the area consist of Chinook (*Oncorhynchus tshawytascha*), Sockeye (*O. nerka*), Pink (*O. gorbuscha*), and Coho (*O. kisutch*), as well as rainbow and cutthroat trout (*O. mykiss* and *O. clarki*), and a variety of char (*Salvelinus Malma*). Of these, Chinook and Sockeye are (and appear to have been in the past) by far the most abundant anadromous populations to make their way into the Canyon, while Pinks appear only every other year, but are relatively abundant when present, and Coho are by far the least common. Other anadromous fishes in the vicinity include the Pacific lamprey (*Lampetra tridentate*) and white sturgeon (*Acipensur* *transmontanus*). Resident freshwater fish include various suckerfish (*Catostomus* spp.), northern squawfish (*Ptychocheilus oregonensis*), peamouth (*Meilocheilus caurinus*), mountain whitefish (*Prosopium williamsoni*), burbot (*Lota lota*), lake trout (*Salvelinus namaycush*), and two sub-species of sculpin (*Cottus cognatus* and *C. alueticus).*

Salmon were acquired in numerous ways depending on the nature of the sub-species being sought and the prevailing river conditions. Dip nets (or, bag-nets), set-nets, and float nets were typical, as was the use of single, double, and even triple-pronged fishing-spears. Fishing hooks made from bone, wood, or the thorns of River Hawthorn (*Crataegus rivularis*) were also employed. The construction of dams and fish weirs was a common strategy for concentrating large numbers of fish in creeks and lake inlets/outlets (Teit 1906: 227). Wherever, and by whatever means possible, fish were collected throughout the year. For instance, in late winter large numbers of relatively small Kokanee (land-locked Sockeye salmon), referred to as "floaters", die and float to the surface of local lakes where they were collected in great quantities by indigenous peoples (Bouchard and Kennedy 1978: 28).

A wide variety of terrestrial mammals inhabit the Bridge River watershed and surrounding areas. Teit (1909: 77) records that indigenous people in the Mid-Fraser exploited numerous animals, consisting principally of "deer, elk, caribou, marmot, sheep, hare, beaver, grouse, bear, moose, duck, goose, crane, squirrel, [and] porcupine." Some members of this list are (and presumably were) specific to particular regions within the Upper Lillooet's hunting grounds or where of greater- or lesser-importance within the subsistence strategy. For example, moose and caribou inhabit the far northern extents of traditional St'át'imc hunting ranges, and while mountain goat (*Oreamnos americana*) was available to some degree in many accessible areas, it was looked upon, for whatever reason, as a less-desirable food option (Teit 1909: 77). Particular to the Upper Lillooet hunting areas were mule deer (*Odocoileus hemionus*), mountain-goat, bighorn sheep (*Ovis canadensis*), and black bear (*Ursus americanus*), in addition to smaller prey like hoary marmot, beaver, rabbit, rock-rabbit, squirrel, and porcupine, and less-commonly sought prey such as panther, lynx, and coyote.

At HP54, the faunal assemblage reflects these observations and greater regional generalities. Both salmon and medium- to large-sized mammals (particularly artiodactyls) are ubiquitous at all levels of the assemblage. Smaller mammals are uncommon, as are the remains of shellfish – the presence of the former in the assemblages is most likely the result of introduction by burrowing and natural deposition and taphonomy, while the latter likely came into the pithouse as tools or raw materials rather than as contributions to the diet.

Salmon remains represented in the assemblage to date are nearly all of the vertebral variety. Though difficult to preserve due to greater fat content, elements from salmon heads are not uncommon in faunal assemblages from elsewhere in the area (Smith *et al*. 2014), and their nutritional utility should not be overlooked. Salmon heads were often boiled at or near the catch site and the abundant oil that resulted from the process was skimmed from the surface of this brew and stored in great quantities for later use (Bouchard and Kennedy 1978: 67; Teit 1906: 224). Further analysis of salmon cranial parts to sub-cranial parts may further elucidate differential part utility of salmon. Later faunal analyses of the (yet-to-be) completed HP54 assemblage may include such a study, which is beyond the scope of this report, as it represents an incomplete record of the total animal bone assemblage.

The vast majority of mammal bones are recovered are those of medium- to large-sized mammals and are fragmented to a high degree. Much of the evident fragmentation occurred prior to the original discard and deposition of the bones, usually an indication of purposeful breaking and crushing for the extraction of bone marrow and bone grease – both high in calories and excellent sources of fat. The greater frequency of cortical (outer) bone to cancellous (inner, spongy) bone is also an indicator of processing for fat extraction purposes, as spongy bone (common to the larger, thicker proximal and distal portions of long bones) is high in bone grease but must be considerably broken up in order to efficiently extract it through boiling (Binford 1978: 32; Church and Lyman 2003).

Faunal Analysis

The analysis of faunal materials recovered during the 2014 field season were undertaken following widely accepted methods outlined in the corpus of relevant literature (e.g. Cannon 1987; Gilbert 1980; Gilbert *et al*. 1981; Grayson 1984; Lyman 1994; 2008; Reitz and Wing 2008). Faunal materials were recorded and point-provenienced *in situ* whenever possible before collection. All other materials collected in the field were screened through 1/8th-inch mesh on-site. Additional materials were recovered from the heavy fractions of soil flotation samples collected in the field and processed in the lab. All analyses took place in laboratory facilities at the Department of Anthropology at University of Montana, Missoula. All materials were analyzed and identified with the aid of the vertebrate collection housed at the Phillip L. Wright Zoological Museum and Montana Comparative Skeletal Collection at the University of Montana. Canid specimens are identified and described in the chapter in reference to size as compared with type specimens. However, to date, ancient DNA testing (Appendix E) has only confirmed the presence of *Canis lupus familiaris* or domesticated dog. Wherever possible, specimens were identified to the most distinctive taxonomic level that could be positively ascertained. Specimens were appraised to determine taxon (generally to Class, Genus, and/or Species), element, side (right/left), end (proximal/distal), area (anterior/posterior; lateral/medial; epiphyseal; and particular element features if distinguishable), size range (small/medium/large/medium-large), age range of the individual at death (juvenile/sub-adult/adult/mature), and material type (cortical or cancellous bone/enamel/antler).

Other observations were recorded regarding fracture type (irregular/transverse/spiral), (dis)coloration, natural or anthropogenic modification, presence or absence of heat alteration (blackened/burned/calcined). All specimens were recorded by relative size (in millimeters, e.g. 1-9mm, 10-19mm, 20-29mm, 30-39mm, and so on…) (Table). Size designations were based on the relative size of the animal to which a specimen could be attributed to, *not* the size of the specimen itself (which is recorded as "Size Range"). Size ranges include: small (rodents to rabbit-sized), medium (beaver/fisher- to dog-sized), and large (deer-sized and larger, such as mountain sheep or black bear). Due to the fragmentary nature of most of the specimens an accurate distinction could not be made between fragments belonging to medium- or large-sized animals, in which case the relative size is recorded as medium-large. Among fish specimens, relative size was determined differently than that of mammals, in that fish vertebrae were designated "small" if trout-sized, "medium" if Sockeye-sized, and "large" if Chinook-sized, or in the case of overly-fragmentary specimens, relative size was recorded as "indeterminate". Weight for all samples was recorded for identifiable specimens on a per-specimen basis and bulk weights were taken for all other specimens for each bag based on relative size categories of fragments (i.e. All unidentifiable fragmentary samples measuring 0-9mm from a particular bag would be weighed together, as would all unidentifiable fragmentary samples measuring 10-19mm, and so on).

Other characteristics recorded were anthropogenic modification, including: cut marks, chop marks, incising, polish, scraping/scratching and abrasion, as well as chipping and flaking resulting from percussion, and the effects of heat-alteration. Human modification of bone can be used to infer a variety of behaviors regarding the use of bone in food preparation and other everyday tasks (Reitz and Wing 2008). Cuts and chopping marks can be indicators of field dressing and butchery, and their position can provide insights into how animals were disarticulated. Polishing, scraping, and abrasion are often indicative of use as tools, and use-wear patterns can illustrate how bone tools were utilized for specific tasks such as grinding, abrasion, hide-scraping, or other such use. Chipping and flaking of bone is often the result of purposeful splintering by hard hammer percussion during the process of breakage involved in marrow extraction or reduction for rendering bone grease. In addition, spiral fractures are often the result of percussive force and the twisting of bone associated with marrow extraction (Binford 1978; 1981). Burned bone (and the severity of the heat-alteration present) can be an indicator of how food was prepared for consumption, how close it was to a heat source, and how hot the source may have been. For instance, partially blackened or charred bone may indicate close proximity to fire for a relatively short time, as in the roasting of meat on a spit, while bone that has been completely calcined (white or bluish-white) indicates that the bone was exposed to exceptionally high heat for an extended period of time, perhaps having been discarded directly into the embers of a cooking fire used repeatedly and/or for a lengthy cooking session (see Shipman *et al*. 1984).

Animal modification, such as gnaw marks resulting from carnassial chewing and grinding and the puncture marks (often associated with canid dentition) are also recorded. Gnawing and puncture marks on specimens within the pithouse assemblage may indicate the presence of domesticated dogs. Natural and taphonomic processes such as root-etching, discoloration, and weathering/exfoliation were recorded based on observations of general attrition as compared to the overall condition of comparative specimens that have little or no damage. Taphonomic condition of specimens is based on Behrensmeyer's (1978) categories of weathering severity from 0 to 5, with "0" being virtually pristine, unweathered, osseous material, and "5" being severely deteriorated, crumbling remains. The results of the weathering analysis were highly consistent across the assemblage. While the majority of bone is fragmentary, the overall surface of cortical bone is generally well-preserved, with 99% of specimens falling within Stages 1 and 2, indicating that the overall assemblage had little to no exposure to drastic weathering conditions, likely the result of deposition inside the house.

Summary of Faunal Remains

The previously-documented faunal assemblage from the 2013 field season at Housepit 54 consisted of 5015 specimens from multiple strata from the BR3 occupation Period. Strata included: Va (the terminal BR3 roof deposit), IIa (terminal BR3 floor), IIb and IIc (distinctive BR3 floors), Vb (BR3 occupation roof), IId, IIe, and IIf (all respective of probable BR3 occupation floors). The Vb roof deposits represent two distinct roofs (designated as Vb1 and Vb2), Vb1 overlaying Stratum IIb in Block B, and Vb2 overlaying Stratum IId in Blocks A and C – all described in detail in the previous 2013 report.

The 2014 field season led to the collection of 13,608 faunal specimens from occupation floors as well as 1376 specimens from roof deposits. Most specimens across the assemblage are highly fragmentary and non-identifiable to any valuably specific taxonomic categories. The faunas assessed span the entirety of the BR2 and BR3 periods at Housepit 54. What follows is a description of the faunal assemblage by floor, starting with materials from the earliest exposed floor to date – IIk, followed by the earliest identified BR2 floor (Stratum IIj) and working forward in time to the final occupation of BR3 (IIa). Roof deposits are described in their own section following those of the occupation floors.

The strata assemblages described here combine materials recovered from 2013 and 2014 excavations where they overlapped, making the descriptions and numerical values given here the comprehensive representation of the strata described. The materials from Stratum IIk are not included in any analytical assessment, given the limited attention thus far devoted to the excavation of that stratum.

FLOOR DEPOSITS

STRATUM IIk

Faunal materials from Stratum IIk consisted of just eight specimens from one level.

Level One

Faunal remains from Stratum IIk all came from large-sized mammal(s). These included one fragment of bone from an unidentifiable element from an indeterminate large mammal. Other remains included: one lumbar vertebra fragment with cut marks, and one fragment from a sacrum, also with cut marks, both compared favorably to bighorn sheep (*O. canadensis*). Two specimens were from vertebral elements from Roosevelt elk (*Cervus canadensis roosevelti*): one lumbar vertebra fragments with a portion of the anterior articular process, and one cut-marked fragment from a sacral vertebra. Other remains compared favorably to mule deer (*O. hemionus*), including one complete 1st phalanx with cut marks, one sheered fragment from a pelvis, and another section from a pelvis with a portion of the acetabulum, also with cut marks. These remains strongly suggest that elk, mule deer and bighorn sheep were butchered at some point during the occupation of this stratum.

The presence of sheering and/or cut marks on all but two of the specimens from IIk suggests evidence of butchery of an elk and deer/sheep-sized ungulate(s). The majority of axial elements present also indicate that the posterior portion of the animal(s) was in use, consistent with the removal of the backstrap and hindlimb haunches – both parts with high meat utility value (Binford 1978; Lyman 1985). Additionally, the position of cut marks on both the phalanx and acetabulum section of the pelvis are consistent with cut marks inferred to be from hide-removal and hindlimb disarticulation, respectively (Pavao-Zuckerman 2007).

STRATUM IIj

Stratum IIj probably represents the initial occupation of the pithouse as it would be structured for generations. The people living their lives on this floor were likely egalitarian hunter-gather-fishers with access to a variety of marine and terrestrial animals and plants.

Faunal materials from Stratum IIj consisted of 179 specimens from two levels and three features (A-19/2, A-22/1, and A-23/2).

Level One

Level one contained the majority of animal remains. Of these, five were fragments of indeterminable mammal origin. Other Level one mammalian faunal materials were: one transverse process section of a lumbar vertebra from a bighorn sheep (*O. canadensis*), eight specimens were from mule deer (*O. hemionus*) including: two fragments of metatarsal, one fragment from the acetabulum of the left pubis, two thoracic vertebrae fragments, both from the anterior section of the vertebral body, three lumbar vertebral fragments, one a section of the anterior articular process, one a posterior body fragment, and the other a section of the dorsal spinous process. Other large animal bones included a diaphyseal fragment of a tibia, consistent with deer/sheep-sized artiodactyl, and one similarly-sized but indistinguishable diaphyseal fragment from a long bone. One diaphyseal fragment of a dog (*Canidae* spp.) rib was identifiable. Four other medium-sized mammal bone fragments could not be further identified. 33 specimens of heavily fragmentary (1-9mm) bone of unidentifiable medium- to large-bodied mammal were recovered. Of these, two fragments were consistent with being cranial in origin, but otherwise indistinguishable to taxon. A single element from a small mammal was present. This was one whole 2nd phalange from a squirrel, likely a North American Red Squirrel (*Tamiasciurus hudsonicus*).

Fish bone from Level one consisted of 59 specimens. Of these, one specimen was an indeterminate vertebral fragment of unknown origin; 34 were from sockeye (*O. nerka*), and three were trout-sized, consistent with rainbow trout (*O. mykiss*). Of the sockeye remains, there were two atlas vertebrae, seven thoracic vertebrae, six pre-caudal vertebrae, five caudal vertebra, and 16 indistinguishable vertebral fragments. Other sockeye elements included: 16 rays/spines/ribs, and four cranial bone fragments, one from the sub-orbital section of the circumorbital series of lateral skull bones (Cannon 1987: 32). Trout bones consisted of one fragmentary and one whole thoracic vertebra, and one fragmentary pre-caudal vertebra.

Level Two

Mammal remains from Level two consisted of one fragment from the posterior articular process of a mule deer lumbar vertebra and two indeterminate bone fragments of indeterminate medium-sized mammal. Fish remains were all from sockeye salmon and consist of: one indeterminable bone fragment – likely cranial, four cranial bone fragments, one fragmental and three complete thoracic vertebrae, two fragmentary caudal vertebrae, two undeterminable vertebra fragments, and two rays/spines/ribs.

Feature A-19/2

Feature A-19 was a relatively sparse basin-shaped hearth. Remains from Feature A-19/2 consisted of five bone fragments from the proximal portion of a right ulna, including a portion of the semi-lunar notch. This compared favorably to mule deer.

Feature A-22/1

Feature A-22 was another basin-shaped hearth. Mammal remains from Feature A-22/1 consisted of one diaphyseal long bone fragment from an indeterminate large mammal and 22 fragments of indistinguishable element from medium- to large-sized mammal. Fish remains consisted of 11 sockeye specimens, including: five indeterminate cranial fragments, four thoracic vertebrae, one pre-caudal vertebra, and one ray/spine/rib. Four indeterminable trout-sized vertebrae were also present.

Feature A-23/2

Feature A-23 was a deep, cylindrical pit that, despite its depth, contained relatively few faunal materials. Remains from Feature A-23/2 consisted of only three specimens. These included: one proximal fragment from a left 1st phalanx of a medium-sized *Canid*, one diaphyseal fragment of a long bone from an indeterminate medium- to large-sized mammal, and one ray/spine/rib from a medium-sized salmonid, most likely sockeye.

Table 4.1. Stratum IIj Faunal Assemblage.

Taxon	Stratum IIj Taxon by Block						
	A Level 1	A Level 2	Stratum IIj Assemblage	Feat A-19/2	Feat A-22/1	Feat A-23/2	IIj Total
Osteichthyes	**44**	**13**	**57**	**0**	**14**	**0**	**71**
Salmonidae	0	0	**0**	0	0	0	**0**
c.f. *Oncorhynchus nerka*	40	13	**53**	0	10	0	**63**
c.f. *Oncorhynchus tshawytscha*	0	0	**0**	0	0	0	**0**
c.f. *Salmonid* (trout-sized)	3	0	**3**	0	4	0	**7**
Indeterminate	1	0	**1**	0	0	0	**1**
Mammalia	**55**	**3**	**58**	**1**	**23**	**2**	**84**
Small	1	0	**1**	0	0	0	**1**
Medium	5	2	**7**	0	0	1	**8**
Small-Medium	0	0	**0**	0	0	0	**0**
Large	11	1	**12**	1	1	0	**14**
Medium-Large	33	0	**33**	0	22	1	**56**
Undeterminate	5	0	**5**	0	0	0	**5**
Artiodactyla	**9**	**1**	**10**	**1**	**0**	**0**	**11**
Indeterminate *Cervidae /Artiodactyl*	0	0	**0**	0	0	0	**0**
Odocoileus hemionus	8	1	**9**	1	0	0	**10**
Ovis canadensis	1	0	**1**	0	0	0	**1**
Carnivora	**1**	**0**	**1**	**0**	**0**	**1**	**2**
Ursus americanus	0	0	**0**	0	0	0	**0**
U. arctos	0	0	**0**	0	0	0	**0**
***Canis* sp.**	**1**	**0**	**1**	**0**	**0**	**1**	**2**
Canis sp. (c.f. *Canis latrans*)	1	0	**1**	0	0	1	**2**
Rodentia	**1**	**0**	**1**	**0**	**0**	**0**	**1**
Castor canadensis	0	0	**0**	0	0	0	**0**
Ondatra zibethicaus	0	0	**0**	0	0	0	**0**
Erethizon dorsatum	0	0	**0**	0	0	0	**0**
***Scuriudae* sp.**	1	0	**1**	0	0	0	**1**
Sciuridae (c.f. Tamiasciurus hudsonicus)	1	0	**1**	0	0	0	**1**
Aves	0	0	**0**	0	0	0	**0**
Falconiformes (c.f. Buteo sp.)	0	0	**0**	0	0	0	**0**
c.f. Phasianidae sp.	0	0	**0**	0	0	0	**0**
Phasianidae sp. (c.f. Dendragapus fuliginosus)	0	0	**0**	0	0	0	**0**
Phasianidae sp. (c.f. Lagopus leucura)	0	0	**0**	0	0	0	**0**
Bivalvia	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ostreidae spp.	0	0	**0**	0	0	0	**0**
Unidentifiable	**0**	**0**	**0**	**0**	**0**	**0**	**0**

STRATUM IIi

Faunal materials from Stratum IIi consisted of 190 specimens from two levels and a single feature (A-11).

Level One

Level one contained the vast majority of remains, accounting for all but three specimens of fragmentary large mammal bone. Level one faunal materials consist of: one specimen of a long bone fragment of from an unidentifiable medium-sized Avian; 70 specimens from mammals: 12 fragments of which are of indeterminable origin, twelve are from large-bodied animals, five from medium, four from small, 12 from medium/large, and 25 from small/medium animals. Of the remains designated to large-sized mammals, one is a fragment of a left calcaneus of an adult artiodactyl that exhibits multiple parallel cut-marks, one is a whole left astragalus of a mule deer (*Odocoileus hemionus*), one is a fragment of the left pubic synthesis of a sub-adult artiodactyls, three are proximal rib fragments and one is a diaphyseal rib fragment all of which compare favorably to mule deer, one is a proximal rib fragment that compares favorably to both mountain sheep (*Ovis canadensis*) and mule deer. Other remains include one fragmentary vertebral spine from a thoracic vertebra of a mule deer, one fragmentary vertebral body from a thoracic vertebra of a mule deer, and one is a fragment from an indistinguishable vertebra, also likely from a mule deer. Medium-sized mammal remains consist of two fragmentary cranial elements of unknown origin, one unidentifiable fragment, and one fragmentary incisor that compares favorably to that of a beaver (*Castor canadensis*). Of remains designated as those of medium- to large-sized mammal, 11 are of indeterminable origin; one is a fragmentary section of the acetabulum from the pelvis of an indeterminate animal. Small mammal remains consist of one indeterminable fragment, one diaphyseal long bone fragment of indeterminate designation, and two proximal fragments of a femur and humerus, respectively, each from a small rodent (possibly *Mus*, *Peromyscus*, or *Microtus* spp.) too deteriorated to positively identify to species. Of specimens designated from small- to medium-sized mammal, 24 are unidentifiable fragments, and one is a cranial fragment of indeterminate animal origin.

122 specimens are the complete and fragmentary bones from bony fishes (*Osteichthyes* spp.), most of which are morphologically most similar to the remains of sockeye salmon (*Oncorhynchus nerka*). However, five specimens are unidentifiable. Sockeye remains consist of four positively unidentifiable fragments, two unidentifiable vertebral fragments, three caudal vertebrae, 13 fragmentary and one complete pre-caudal vertebra, 12 fragmentary and seven complete thoracic vertebrae, eight fragmentary ribs/spines/rays, 12 fragments of cranial elements including one hyoid mandibular and one mandibular arch quadrate.

Level Two

Faunal materials from Level two consist of three specimens from mule deer: one fragmentary transverse process from a lumbar vertebra, and two pelvic acetabulum fragments.

Feature A-11

Feature A-11 was a shallow hearth from Level one that contained 18 fragments of a scapula from a single sub-adult mule deer.

Table 4.2. Stratum IIi Faunal Assemblage.

Taxon		Stratum Iii Taxon by Block			
	A Level 1	A Level 2	Stratum Iii Assemblage	Feat A-11	Iii Total
Osteichthyes	**114**	**0**	**114**	**0**	**114**
Salmonidae	0	0	**0**	0	**0**
c.f. *Oncorhynchus nerka*	110	0	**110**	0	**110**
c.f. *Oncorhynchus tshawytscha*	0	0	**0**	0	**0**
c.f. *Salmonid* (trout-sized)	0	0	**0**	0	**0**
Indeterminate	4	0	**4**	0	**4**
Mammalia	**70**	**3**	**73**	**2**	**75**
Small	4	0	**4**	0	**4**
Medium	5	0	**5**	0	**5**
Small-Medium	25	0	**25**	0	**25**
Large	12	3	**15**	2	**17**
Medium-Large	12	0	**12**	0	**12**
Undeterminate	12	0	**12**	0	**12**
Artiodactyla	**11**	**3**	**14**	**2**	**16**
Indeterminate *Cervidae /Artiodactyl*	1	0	**1**	0	**1**
Odocoileus hemionus	9	3	**12**	2	**14**
Ovis canadensis	1	0	**1**	0	**1**
Carnivora	**0**	**0**	**0**	**0**	**0**
Ursus americanus	0	0	**0**	0	**0**
U. arctos	0	0	**0**	0	**0**
***Canis* sp.**	**0**	**0**	**0**	**0**	**0**
Canis sp. (c.f. *Canis lupus*)	0	0	**0**	0	**0**
Rodentia	**4**	**0**	**4**	**0**	**4**
Castor canadensis	1	0	**1**	0	**1**
Ondatra zibethicaus	0	0	**0**	0	**0**
c.f. Peromyscus maniculatus	3	0	**3**	0	**3**
Erethizon dorsatum	0	0	**0**	0	**0**
***Scuriudae* sp.**	0	0	**0**	0	**0**
Aves	1	0	1	0	**1**
Falconiformes (c.f. Buteo sp.)	0	0	**0**	0	**0**
c.f. Phasianidae sp.	0	0	**0**	0	**0**
Phasianidae sp. (c.f. Dendragapus fuliginosus)	0	0	**0**	0	**0**
Phasianidae sp. (c.f. Lagopus leucura)	0	0	**0**	0	**0**
Bivalvia	**0**	**0**	**0**	**0**	**0**
Ostreidae spp.	0	0	**0**	0	**0**
Unidentifiable	**0**	**0**	**0**	**0**	**0**

STRATUM IIh

Faunal materials from Stratum IIh consisted of 421 specimens from two levels and two features (A-5 and A-13). Feature A-5 consisted of five intra-feature arbitrary 10cm levels, and was split between a "North" section and a "Central" section.

Level One

Level one contained 34 specimens, 24 from mammals and 10 from fish. Mammal bone consisted of 13 unidentifiable fragments from indeterminate taxa and two enamel fragments from teeth that compared favorably to *Cervidae* spp. of indeterminate size. One fragment of crania and one vertebra fragment from an indeterminate large mammal and one indeterminate fragment of medium- to large-sized mammal bone were also recovered. Other mammal bone included one anterior articular process section of a lumbar vertebra from a bighorn sheep (*O. canadensis*), one fragmentary section of the epiphyseal plate of a vertebral body from a mule deer (*O. hemionus*), along with two thoracic vertebra fragments from mule deer - one a vertebral epiphysis and the other an anterior portion of the vertebral body. Medium mammal bone consisted of one whole caudal vertebra and one whole lumbar vertebra, both from beaver (*C. canadensis*).

Fish bone consisted of 10 specimens. These included: three thoracic vertebrae, one caudal vertebra, three undistinguishable vertebra, and three rays/spines/ribs, all fragmentary.

Level Two

Level two contained 387 specimens, including those from features. Not counting specimens from features this number drops to 65. Of those 65, 39 are from mammals and 26 are from fish.

Mammal bone specimens included: one vertebral fragment from an indeterminate large taxa; one cervical vertebra fragment, two lumbar vertebrae fragments, one thoracic vertebra fragment, and one vertebral body fragment from an indeterminable vertebral element, all from mule deer. Additional mule deer specimens included one cranial fragment, two mandible fragments, and a portion of a pubis. Two proximal dog (*Canidae* spp.) rib fragments were identified, as was a single fragment of a beaver incisor. Other mammal specimens were comprised of 23 taxonomically indeterminate medium- to large-sized mammal bone fragments and two small- to medium-sized mammal bone fragments, one of which was a portion of diaphyseal long bone of indistinguishable element.

Fish specimens numbered 24 from sockeye (*O. nerka*) and one from trout (*O. mykiss*). Of sockeye elements, there were: one indeterminable fragment (likely cranial), one cranial bone fragment, 12 thoracic vertebrae, one pre-caudal vertebra, three caudal vertebrae (including one ultimate vertebra), one ray/spine/rib, and six indeterminate vertebrae, the majority of all of which were in fragmentary condition. Trout-sized specimens included one whole thoracic vertebra and one unidentifiable vertebral fragment.

Feature A-5 Central

Feature A-5 was a deep, bell-shaped pit that contained a large amount of fire-cracked rock (n=742). The Level two faunal contents of the central portion of Feature A-5 consisted of:

18 mammal bones of indistinguishable size or species, one anterior articular process portion of a lumbar vertebra from a mule deer, as well as a proximal rib (head) fragment from a mule deer, and a labial fragment of tooth enamel from a *Cervidae* spp. consistent with a deer-sized animal. A single thoracic vertebra from a bighorn sheep was also identified. Other mammal specimens included: a fragment of thoracic vertebra from a beaver, a cervical vertebra fragment from a medium- to large-sized *Canid* that compared favorably to grey wolf (*Canis lupus)*, and a proximal rib portion (head) from a smaller dog, consistent with coyote (*Canis latrans)* in size.

Fish remains in Level two of the central portion of Feature A-5 were relatively abundant, but the majority fall within the less-informative rays/spines/ribs category (n=152). Other specimens include: 26 heavily decayed/weathered cranial bone fragments, five fragmentary and four complete thoracic vertebrae, 18 caudal vertebrae including 13 ultimate vertebrae, three Hypurals (also from the caudal section), and eight indeterminate fragmentary vertebrae. All specimens are consistent with sockeye salmon. The relatively high frequency of cranial bones and ultimate caudal vertebrae and Hypurals to thoracic elements in Feature A-5 Level two suggests that multiple (n=13) fish tails and possibly a fish head(s) were deposited in Feature A-5.

Level three of Feature A-5 Central contained five indeterminate mammal bone fragments, and one fragment of a thoracic vertebra of a medium mammal. Fish remains consisted of two fragmentary thoracic vertebrae and two unidentifiable fragmentary vertebra fragments, both from sockeye.

Level five of Feature A-5 Central contained five fragmentary mammal bone specimens of indeterminate origin or size category, one unidentifiable diaphyseal fragment from a medium- to large-sized mammal long bone, as well as one posterior epiphyseal vertebral plate and one anterior epiphyseal plate, both fragmentary, and both from a medium-sized *Canid* spp. Fish remains consisted of one fragmentary and two complete thoracic vertebrae, three indistinguishable fragmentary vertebrae, and two rays/spines/ribs, all from sockeye.

Feature A-5 North

Level two of the north portion of Feature A-5 contained one unidentifiable cranial bone fragment consistent in size with those of sockeye, and one whole thoracic vertebra and two whole pre-caudal vertebrae also of sockeye. One complete pre-caudal vertebra from a Chinook salmon (*O. tshawytscha*) and one complete thoracic vertebra from a trout-sized salmonid were also present.

Level four of the north portion of Feature A-5 contained two indeterminate mammal bone fragments, two unidentifiable fragments from medium- to large-sized mammals, one unidentifiable diaphyseal long bone fragment from a medium- to large-sized mammal, and one diaphyseal long bone fragment from an indeterminate large mammal, as well as one distal fragment from the right radius of a mule deer, one distal phalange fragment, also from mule deer, and one right tarsal fragment from a bighorn sheep. Fish bone included a fragmentary Supracleithrum (part of the pectoral girdle directly behind and adjacent to cranial bones), five pre-caudal vertebrae, five caudal vertebrae, five indistinguishable fragmentary vertebrae, and three rays/spines/ribs, all fragmentary.

Level four of Feature A-5 contained three mammal bone fragments of indeterminable size-category or taxon, five unidentifiable fragments from medium- to large-sized mammal, one left rib body fragment from a beaver, and one atlas vertebra fragment from a medium-sized dog. Fish remains comprised one cranial bone fragment, one thoracic vertebra fragment, two pre-caudal vertebrae fragments, one indeterminate vertebra fragment, and five rays/spines/ribs, all from sockeye.

Feature A-13
Feature A-13 was a deep, cylindrical pit that contained a single diaphyseal fragment from the right humerus of a mule deer.

Table 4.3. Stratum IIh Faunal Assemblage.

STRATUM IIg

Taxon		Stratum IIh Taxon by Block								
	A Level 1	A Level 2	C Levels 1&2	Stratum IIh Assemblage	Feat A-5 Level 2	Feat A-5 Level 3	Feat A-5 Level 4	Feat A-5 Level 5	Feat A-13	IIh Total
Osteichthyes	**5**	**25**	**2**	**32**	**70**	**4**	**22**	**6**	**0**	**134**
Salmonidae	0	0	0	**0**	0	0	0	0	0	**0**
c.f. *Oncorhynchus nerka*	5	23	2	**30**	69	4	22	6	0	**131**
c.f. *Oncorhynchus tshawytscha*	0	0	0	**0**	1	0	0	0	0	**1**
c.f. *Salmonid* (trout-sized)	0	2	0	**2**	1	0	0	0	0	**3**
Indeterminate				**0**	0	0	0	0	0	**0**
Mammalia	**24**	**38**	**0**	**62**	**24**	**6**	**19**	**8**	**1**	**120**
Small	0	0	0	**0**	0	0	0	0	0	**0**
Medium	2	3	0	**5**	3	1	3	2	0	**14**
Small-Medium	0	1	0	**1**	0	0	0	0	0	**1**
Large	6	11	0	**17**	4	0	3	0	1	**25**
Medium-Large	1	23	0	**24**	0	0	8	1	0	**33**
Undeterminate	15	0	0	**15**	18	5	5	5	0	**48**
Artiodactyla	**4**	**10**	**0**	**14**	**4**	**0**	**2**	**0**	**1**	**21**
Indeterminate *Cervidae /Artiodactyl*	0	0	0	**0**	1	0	0	0	0	**1**
Odocoileus hemionus	3	10	0	**13**	2	0	2	0	1	**18**
Ovis canadensis	1	0	0	**1**	1	0	0	0	0	**2**
Carnivora	**0**	**2**	**0**	**2**	**2**	**0**	**1**	**2**	**0**	**7**
Ursus americanus	0	0	0	**0**	0	0	0	0	0	**0**
U. arctos	0	0	0	**0**	0	0	0	0	0	**0**
***Canis* sp.**	**0**	**2**	**0**	**2**	**2**	**0**	**1**	**2**	**0**	**7**
Canis sp. (c.f. *Canis lupus*)	0	0	0	**0**	1	0	0	0	0	**1**
Rodentia	**2**	**1**	**0**	**3**	**1**	**0**	**2**	**0**	**0**	**6**
Castor canadensis	2	1	0	**3**	1	0	2	0	0	**6**
Ondatra zibethicaus	0	0	0	**0**	0	0	0	0	0	**0**
Peromyscus maniculatus	0	0	0	**0**	0	0	0	0	0	**0**
Erethizon dorsatum	0	0	0	**0**	0	0	0	0	0	**0**
***Scuriudae* sp.**	0	0	0	**0**	0	0	0	0	0	**0**
Aves	0	0	0	**0**	0	0	0	0	0	**0**
Falconiformes (c.f. Buteo sp.)	0	0	0	**0**	0	0	0	0	0	**0**
c.f. Phasianidae sp.	0	0	0	**0**	0	0	0	0	0	**0**
Phasianidae sp. (c.f. Dendragapus fuliginosus)	0	0	0	**0**	0	0	0	0	0	**0**
Phasianidae sp. (c.f. Lagopus leucura)	0	0	0	**0**	0	0	0	0	0	**0**
Bivalvia	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ostreidae spp.	0	0	0	**0**	0	0	0	0	0	**0**
Unidentifiable	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Faunal materials from Stratum IIg consisted of 576 specimens from two levels and seven features (A-1, C-7, C-12, C-27, C-28, C-31, and C-33). Feature A-1 consisted of seven intra-feature levels.

Level One

Level one contained 374 specimens, 223 from mammals, 147 from fish, and four from birds. Unidentifiable mammal bone consisted of 64 fragments from animals of indeterminate size and taxa. Of mammal bone from large-sized animals, 30 could not be assigned to a particular taxon, but one fragment was identified as that from a cranium, while another was a long bone fragment; three were enamel fragments from indistinguishable *Cervidae*. One horn core from a mountain goat (*Oreamnos america*) was identified. 21 specimens were identified as mule deer (*O. hemionus*) or compared favorably. All deer bones identified were highly fragmentary and all less than 60mm in greatest dimension. Identifiable deer elements consisted of: one anterior articular process from a cervical vertebra, one dewclaw, one diaphyseal femur fragment, one distal humerus, one fragment from the ischium section of a (c.f.) right pelvis, three fragments from the pubis section of a right pelvis, one anterior body of a lumbar vertebra, one anterior section of a left mandible, one distal 1st phalange, one proximal rib (with articular head facet), one lateral portion of a scaphoid, two diaphyseal tibia fragments, one posterior epiphyseal plate from an indeterminate vertebra, and a body fragment from an indeterminate vertebra. 83 specimens were unidentifiable beyond belonging to indeterminate medium- to large-sized mammals. One of those specimens was identified as a cranial fragment and another was diaphyseal long bone. Six specimens were from medium-bodied mammals. These included one complete right femur from a beaver (*C. canadensis*), one distal fragment of a right femur of another beaver, two fragmentary beaver incisors, and one rib fragment that compared favorably to medium-sized dog (*C. latrans*), as well as one unidentifiable bone fragment. 14 unidentifiable bone fragments came from small- to medium-sized mammals. One of these specimens was a cranial fragment and another was from the diaphyseal portion of an indistinguishable long bone.

Fish bone consisted of 147 specimens. One of these was a fragment of a Chinook (*O. tshawytscha*) vertebra. Eight specimens were cranial bone fragments from indeterminate species but were consistent in size and structure to sockeye (*O. nerka*) cranial elements. All other specimens were from sockeye. These included: 30 rays/spines/ribs, 30 cranial bones including one fragmentary ceratobranchial (a segment of the Branchial Arch), one quadrate (part of the Mandibular Arch), and one fragmentary basipterygium (part of the Pelvic Girdle), ten thoracic vertebrae, three pre-caudal vertebrae, eight caudal vertebrae, and 57 highly fragmentary vertebrae of unknown designation.

Bird bone specimens from Level one consisted of one fragmented coracoid, one diaphyseal portion of a tibiotarsus, and two indeterminate diaphyseal fragments from long bones, all consistent with grouse-sized members of the *Phaseanidae* family, particularly the Sooty Grouse (*Dendragapus fuliginosus*) common to the mountainous terrain of British Columbia's Coast Range.

Level Two

Faunal remains from Level two consisted of only three specimens: one anterior articular process fragment from a cervical vertebra of a mule deer, one indeterminate fragment from a medium- to large-sized mammal, and one pre-caudal vertebra from a sockeye salmon.

Feature A-1 Level 1

Feature A-1 was a deep, bell-shaped pit containing homogenous soils and no obvious layering or stratification of sediments. As such, it was excavated in arbitrary 10-centimeter levels. Level one of Feature A-1 contained five faunal specimens. These included one mammal bone fragment from an indeterminate mammal of indeterminate size, one fragment from a large but otherwise indeterminate mammal, and two bone fragments from a medium- to large-sized mammal. One pre-caudal vertebra from a sockeye salmon was also present.

Feature A-1 Level 2

Level two of Feature A-1 contained 14 mammal bones and five fish bones. Mammal bone included eight unidentifiable fragments from animal(s) of indeterminate size or taxon, three unidentifiable fragments from indeterminate large-sized mammal, and one fragment from a medium- to large-sized individual. Fish bone consisted of three thoracic vertebrae, one pre-caudal vertebrae, and one right scapula (from the Collar section of the fish head) – all from sockeye salmon.

Feature A-1 Level 3

Level three of Feature A-1 contained no faunal remains.

Feature A-1 Level 4

Level four of Feature A-1 contained 33 specimens: 22 from mammal and 11 from fish. Mammal bone consisted of: 17 fragmentary specimens of indeterminate element from unidentifiable size or taxon, one unidentifiable fragment from a medium- to large-sized animal, and one similarly unidentifiable specimen from a small- to medium-sized mammal. Identifiable mammal bones consisted of: one fragmentary diaphyseal section of a deer femur, one proximal fragment of a left deer ulna, and one incomplete carpal from a deer/sheep-sized artiodactyl. Fish remains consisted of: four incomplete thoracic vertebrae and seven rays/spines/ribs, all from sockeye salmon.

Feature A-1 Level 5

Level five of Feature A-1 contained one incomplete thoracic vertebra from a sockeye salmon.

Feature A-1 Level 6

Level six of Feature A-1 contained 11 specimens. Eight of these were from mammal – two fragments from indeterminate element, size, or taxon, and six fragments from unidentifiable element from medium- to large-sized mammal(s). Fish bone consisted of two incomplete thoracic vertebrae and one unidentifiable vertebra, all from sockeye salmon.

Feature A-1 Level 7

Level seven of Feature A-1 contained five specimens. These included one proximal fragment of a deer 1st phalange, and one thoracic vertebra, one caudal vertebra, and two rays/spines/ribs from sockeye salmon.

Feature C-7

Feature C-7 was a basin-shaped hearth. It contained a large collared post-hole indentation that likely housed one of the major roof support beams. It also contained 27 mammal bone fragments and eight fragmentary sockeye vertebrae. Mammal bones consisted of six unidentifiable pieces of bone from indeterminate mammal, one fragment from a large-bodied mammal of unknown distinction (18 pcs), and two fragments from a medium- to large-sized undeterminable mammal. One diaphyseal rib fragment from a deer was also present. Fish bones were limited to three caudal vertebrae and five highly fragmentary vertebrae of unknown position.

Feature C-12

Feature C-12 was a relatively shallow but spatially-expansive hearth that covered much of the central portion of Block C. It contained 25 faunal specimens. These included 23 fragments of bone that compared favorably to diaphyseal long bone material from an indeterminable medium- to large-sized mammal(s), and a single thoracic vertebra from a sockeye salmon. The fourth specimen was a thick (9mm), irregularly-shaped and fractured segment of crania. Originally collected as a piece of faunal bone, the dense nature of the specimen and the shape and patterning of a suture present now suggest that it was likely part of the posterior of a human (*Homo sapiens*) skull. Not enough of the suture was present to accurately determine if it marked the Lambdoidal or Sagittal suture, but certainly placed the segment to the posterior of the skull. The fragment could not be positively identified as human when compared to a series of human skulls housed at the University of Montana's Physical and Forensic Anthropology Lab. Fusing of the sutures, thickness of the cranial surface, and surface structure of the specimen suggest it came from a mature individual. Fracturing of the specimen was irregular with no signs of perimortem trauma. This item was returned to the Bridge River Band for reburial.

Feature C-27

Feature C-27 was a basin-shaped hearth that contained 34 mammal bone specimens and four fish bones. These included: 14 indeterminate fragmentary specimens from undeterminable mammal bone, one fragment from a large-sized mammal, three similarly indistinguishable specimens from medium- to large-sized mammal, and 11 specimens from small- to medium-sized mammal. Identifiable mammal specimens included five fragments that compared favorably to deer: one proximal portion of a right metacarpal, one fragmentary tarsal, one fragment of a pubis, and two fragments from the distal end of a radius. Fish bones recovered were: one caudal vertebra, and three rays/spines/ribs, all incomplete and consistent with sockeye salmon.

Feature C-28

Feature C-28 was a collared post-hole that contained ten specimens: nine of mammal bone and one of fish. The mammal bone assemblage consisted of one fragment that was unidentifiable to taxon or size, three indeterminate fragments from medium- to large-sized mammal, and four fragments of diaphyseal long bone from small- to medium-sized mammal. On fragment of tooth enamel from a *Cervid* was also present, consistent with a deer/sheep-sized animal. The single fish bone was an indeterminate cranial bone fragment consistent in size and structure to sockeye salmon.

Feature C-31

Feature C-31 was a basin-shaped hearth that contained five specimens, two from mammal and three from fish. Mammal bone consisted of one fragmentary specimen from an indeterminate large-bodied animal, and one diaphyseal segment of a deer rib. Fish bone consisted of one incomplete thoracic vertebra, one fragmentary vertebra of indistinguishable position, and one ray/spine/rib.

Feature C-33

Feature C-33 was a post-hole that contained nine specimens, three from mammal and six from fish. Mammal bones were limited to three indeterminate fragments of bone from medium- to large-sized mammal. Fish bones consisted of five incomplete sockeye vertebrae of undeterminable position and a single ray/spine/rib.

Taxon		Stratum IIg Taxon by Block																		
	A	B	C	D	Level 2 (Block A only)	Stratum IIg Levels 1&2	Feat A-1 Level 1	Feat A-1 Level 2	Feat A-1 Level 3	Feat A-1 Level 4	Feat A-1 Level 5	Feat A-1 Level 6	Feat A-1 Level 7	Feat C-7	Feat C-12	Feat C-27	Feat C-28	Feat C-31	Feat C-33	IIg Total
Osteichthyes	**6**	**0**	**111**	**0**	**1**	**118**	**1**	**5**	**0**	**1**	**1**	**3**	**2**	**8**	**1**	**1**	**1**	**2**	**5**	**149**
Salmonidae	0	0	0	0	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
c.f. *Oncorhynchus nerka*	6	0	102	0	1	**109**	1	**5**	**0**	1	0	3	2	8	1	1	0	2	5	**138**
c.f. *Oncorhynchus tshawytscha*	0	0	1	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
c.f. *Salmonid* (trout-sized)	0	0	0	0	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Indeterminate	0	0	8	0	0	**8**	0	0	0	0	1	0	0	0	0	0	1	0	0	**10**
Mammalia	**52**	**0**	**171**	**0**	**2**	**225**	**4**	**12**	**0**	**21**	**4**	**8**	**1**	**27**	**25**	**34**	**9**	**2**	**3**	**375**
Small	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Medium	2	0	4	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**
Small-Medium	0	0	14	0	0	14	0	0	0	1	0	0	0	0	0	11	1	0	0	**27**
Large	18	0	37	0	1	56	2	3	0	2	3	0	1	19	1	6	1	2	0	**96**
Medium-Large	27	0	56	0	1	84	2	1	0	1	1	6	0	2	24	3	3	0	3	**130**
Undeterminate	5	0	60	0	0	65	1	8	0	17	0	2	0	6	0	14	1	0	0	**114**
Artiodactyla	**6**	**0**	**19**	**0**	**1**	**26**	**1**	**0**	**0**	**2**	**2**	**0**	**1**	**0**	**0**	**5**	**0**	**1**	**0**	**38**
Indeterminate *Cervidae/Artiodactyl*	0	0	1	0	0	**1**	1	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Odocoileus hemionus	6	0	17	0	1	**24**	0	0	0	2	1	0	1	0	0	5	0	1	0	**34**
Ovis canadensis	0	0	0	0	0	**0**	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**
Oreamnos americanos	0	0	1	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Carnivora	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Ursus americanus	0	0	0	0	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
U. arctos	0	0	0	0	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
***Canis* sp.**	**0**	**0**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Rodentia	**2**	**0**	**2**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
Castor canadensis	2	0	2	0	0	**4**	0	0	0	0	0	0	0	0	0	0	0	0	0	**4**
Ondatra zibethicaus	0	0	0	0	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Peromyscus maniculatus	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**
Erethizon dorsatum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
***Scuriudae* sp.**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Aves	**0**	**0**	**4**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
c.f. Phasianidae sp.	0	0	4	0	0	**4**	0	0	0	0	0	0	0	0	0	0	0	0	0	**4**
Bivalvia	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ostreidae spp.	0	0	0	0	0	**0**	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Unidentifiable	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table 4.4 . Stratum IIg Faunal Assemblage.

STRATUM IIf

Stratum IIf represents the floor of the house as it was utilized during the final phase of the Bridge River 2 Period. At this time the village probably consisted of only 15 or so occupied pithouses, most of which were concentrated in a roughly U-shaped configuration at the northern end of the village. The people living on this floor may have participated in a social institution that their ancestors had not – the initial stages of hierarchical social inequality. Certainly, later incarnation of the Housepit 54 household were emerged in a world where social standing played a part in everyday decision-making. It also appears that many pithouses were not continuously occupied throughout the life of the village, so new houses weren't simply being added to the tally of existing houses, but instead there was what appears to be a conscious decision to physically manufacture new homes and not just reoccupy previously abandoned ones.

Faunal materials from Stratum IIf consisted of 1522 specimens from one level and five features (A-17, C-1, C-7, C-23, and C-26).

Level One

Level one contained 542 mammal bone specimens, 978 fish bone specimens, and two bird bone specimens.

Mammal bone consisted of eight fragments from unidentifiable elements from indeterminate taxon or size category, 118 specimens were from unidentifiable large-sized mammals, 39 of which were diaphyseal fragments from unidentifiable long bone elements. 270 specimens were fragments from unidentifiable elements of indeterminate medium- to large-sized mammals, at least 18 of which were from diaphyseal long bone. 43 specimens were from similarly undistinguishable medium-sized animals, 11 of which were diaphyseal long bone sections. One specimen was a vertebra fragment from an unidentifiable small mammal. Identifiable element fragments that could not be determined to genera or species included: one diaphyseal portion of a metatarsal from a large ungulate, one rib fragment from a large mammal, one vertebra fragment from a large mammal; four cranial fragments, one sesamoid, and four tooth enamel fragments, all from medium- to large-sized mammals; one proximal femur fragment, two rib fragments, and one proximal tibia fragment, all from medium-sized mammal(s).

Identifiable specimens from large-sized mammals consisted of 24 *Cervidae* tooth fragments including two incisors and one molar that compared favorably to those of mule deer, but may be from any similarly-sized animal with selenodont dentition. Four fragments of indeterminate deer/sheep-sized artiodactyl vertebrae were identified, along with one diaphyseal metatarsal fragment and a single selenodont tooth fragment. Deer (*O. hemionus*) remains consisted of: two calcaneus fragments, one carpal fragment, one diaphyseal humerus fragment, one diaphyseal fragment from an indeterminate long bone that compared favorably to deer, one posterior articular process fragment from a lumbar vertebra, one body fragment from a lumbar vertebra, two diaphyseal fragments from a metapodial, one distal fragment of a metacarpal; eight metatarsal fragments including four diaphyseal portions, one proximal fragment and one distal fragment, two fragments of pelvis both including sections of the acetabulum, four distal phalange fragments, three rib fragments, and one left tibia fragment.

Eight identifiable specimens were from medium-sized mammals, including: one complete caudal vertebra, one fragment from a cervical vertebra, one fragment from a lumbar vertebra, one fragment of articular facet (Glenoid fossa) from a scapula, and one diaphyseal tibia fragment, all from beaver (*C. canadensis*). One ulna compared favorably to medium-sized rodent, but could not be identified to particular species, and as such could be from beaver, muskrat (*Ondatra zibethicus*), Hoary or Yellow-bellied marmot (*Marmota* spp.), or similar-sized *Rodentia* endemic to south-central British Columbia. Two dog (c.f. *C. latrans*) bone specimens consisted of one rib fragment, and one fragment of a thoracic vertebra.

The fish bone assemblage from IIf Level one contained 12 specimens from indeterminate taxa, including two thoracic vertebrae fragments, and eight rays/spines/ribs consistent in size and structure to medium-sized bony fish – probably salmon. Other specimens from medium-sized *Osteichthyes* included: two coracoids, one caudal vertebra, ten cranial elements, three unidentifiable elements (likely cranial), two thoracic vertebrae, 46 incomplete vertebrae of undeterminable position, and 56 rays/spines/ribs – all fragmentary. 687 specimens were identified as sockeye salmon (*O. nerka*). These included 127 cranial elements or element fragments including 91 indeterminate specimens, two angulars, three Basipterygiums, two coracoids, two hyomandibulars, four mesocoracoids, two opercles, six pre-opercles, two scapula, two supracleithrums, and three urohyals. Sockeye vertebrae consisted of eight atlas vertebrae (MNI=8), 131 thoracic vertebrae, 47 pre-caudal vertebrae, 18 caudal vertebrae, and 60 incomplete vertebrae of undeterminable position. 305 rays/spines/ribs compared consistently with sockeye or medium-sized salmon.

Nine specimens were from Chinook salmon (*O. tshawytscha*), including one cranial bone fragment, two pre-caudal vertebrae, three incomplete vertebrae, and three rays/spines/ribs.

Fish specimens from trout-sized fish consisted of three pre-caudal vertebrae, ten thoracic vertebrae, and two incomplete vertebrae – all compared favorably to rainbow trout (*O. mykiss*). Two fragmentary caudal vertebrae were consistent in structure and morphology to small-sized salmonid, but could not be positively differentiated to sub-species.

One branchial element compared favorably to that of Pacific cod (*Gadidae* spp.) – the only positively identifiable non-salmonid specimen in the assemblage.

Two avian bone specimens were recovered. These were a proximal and a diaphyseal fragment, both from the ulna of a medium-sized bird that compared favorably to a member of the *Phasianidae* family, most likely from one of three possible species, either Spruce grouse (*Falcipennis canadensis*), Dusky grouse (*Dendragapus obscurus*), or Sooty grouse (*Dendragapus fuliginosus*).

Feature A-17

In Stratum IIf, Feature A-17 was a deep, bell-shaped pit that contained a high amount of fire-cracked rock (n=266). Feature A-17 also contained two mammal bone specimens and three fish bone specimens. Mammal bone consisted of one mandible fragment from a mule deer, and one distal fragment of a medium-sized dog radius (c.f. *C. latrans*).

Fish bone consisted of three sockeye vertebrae – one a thoracic and two incomplete and of undeterminable position.

Feature C-1

Feature C-1 was a post-hole that contained six mammal bone fragments. These consisted of two fragments of tibia that compared favorably to medium- to large-sized dog (c.f. *C. lupus*), and four indeterminate fragments from undistinguishable elements from medium- to large-sized mammal(s), at least one of which was from the diaphyseal portion of a long bone.

Feature C-7

Feature C-7 was a basin-shaped hearth that contained eight unidentifiable fragments from indeterminate medium- to large-sized mammal, including one bone flake from a long bone diaphysis.

Of the fish bone from Feature C-7, 127 specimens were from salmon. These included two cranial bone fragments, one complete pre-caudal vertebra and one complete thoracic vertebra, and 123 rays/spine/ribs, all from medium-sized fish comparable to sockeye. One complete thoracic vertebra from a trout-sized salmonid (*O. mykiss*) was also recovered.

Feature C-23

Feature C-23 was another basin-shaped hearth. This one contained 15 specimens, all of mammal bone. Three specimens were from undeterminable elements from unknown large mammal(s), one from diaphyseal long bone. Eight specimens were fragments from diaphyseal long bone of indeterminate medium- to large-sized mammal. Identifiable specimens consisted of two distal fragments from an artiodactyl metapodial, one fragmentary femoral head portion of the femur of a mule deer, and one complete sesamoid, also from mule deer.

Feature C-26

Feature C-26 was a deep cylindrical pit that contained five mammal bone specimens: one diaphyseal long bone fragment from a medium-sized dog, two proximal fragments of metapodial from a medium-sized dog that compared favorably to domestic dog (*C. familiaris*), and two unidentifiable bone fragments from medium- to large-sized mammal(s).

Table 4.5. Stratum IIf Faunal Assemblage.

Taxon	Stratum IIf Taxon by Block									
	A	Feat A-17	B	C	Feat C-1	Feat C-7	Feat C-23	Feat C-26	D	Stratum IIf Assemblage
Osteichthyes	**71**	**3**	**0**	**409**	**0**	**5**	**0**	**0**	**0**	**488**
Salmonidae	0	0	0	0	0	0	0	0	0	**0**
c.f. *Oncorhynchus nerka*	32	3	0	348	0	4	0	0	0	**387**
c.f. *Oncorhynchus tshawytscha*	0	0	0	6	0	0	0	0	0	**6**
c.f. *Salmonid* (trout-sized)	3	0	0	15	0	1	0	0	0	**19**
Indeterminate	36	0	0	39	0	0	0	0	0	**75**
Gadidae spp.	0	0	0	1	0	0	0	0	0	**1**
Mammalia	**91**	**2**	**0**	**413**	**6**	**8**	**15**	**5**	**2**	**542**
Small	0	0	0	1	0	0	0	0	0	**1**
Medium	2	1	0	51	2	0	0	3	0	**59**
Small-Medium	0	0	0	0	0	0	0	0	0	**0**
Large	88	1	0	82	0	0	6	0	2	**179**
Medium-Large	1	0	0	271	4	8	8	2	0	**294**
Undeterminate	0	0	0	8	0	0	3	0	0	**11**
Artiodactyla	**28**	**1**	**0**	**26**	**0**	**0**	**3**	**4**	**2**	**64**
Indeterminate *Cervidae/Artiodactyl*	20	0	0	4	0	0	1	0	1	**26**
Odocoileus hemionus	8	1	0	22	0	0	2	4	1	**38**
Ovis canadensis	0	0	0	0	0	0	0	0	0	**0**
Carnivora	**0**	**1**	**0**	**2**	**1**	**0**	**0**	**3**	**0**	**7**
Ursus americanus	0	0	0	0	0	0	0	0	0	**0**
U. arctos	0	0	0	0	0	0	0	0	0	**0**
***Canis* sp.**	**0**	**1**	**0**	**2**	**1**	**0**	**0**	**3**	**0**	**7**
Canis sp. (c.f. *Canis latrans*)	0	1	0	2	0	0	0	1	0	**4**
Canis sp. (c.f. *Canis lupus*)	0	0	0	0	1	0	0	0	0	**1**
Canis sp. (c.f. *Canis lupus familiaris*)0	0	0	0	0	0	0	0	2	0	**2**
Rodentia	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**	**9**
Castor canadensis	0	0	0	8	0	0	0	0	0	**8**
Ondatra zibethicaus	0	0	0	0	0	0	0	0	0	**0**
Peromyscus maniculatus	0	0	0	0	0	0	0	0	0	**0**
Erethizon dorsatum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
***Scuriudae* sp.**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Aves	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**2**
c.f. Phasianidae sp.	0	0	0	2	0	0	0	0	0	**2**
Bivalvia	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ostreidae spp.	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Unidentifiable	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

STRATUM IIe

Stratum IIe represents the initial occupation of the Bridge River 3 Period. The transition from Bridge River 2 to Bridge River 3 was not likely a memorable (or even that noticeable) event as it unfolded, but it marked the beginning of a period of growth in the village and surrounding areas that would have a profound impact on the local environment, economy, and social interaction (Prentiss and Kuijt 2013). Later incarnations of the household living in

Housepit 54 would experience times during which the village nearly doubled in size (and assumedly population) and in which increasing status differentiation between families (perhaps even within households) is thought to have led to increasing competition for local resources and access to resources that ultimately played a role in the abandonment of the village, as for some, access to basic needs became uncertain (Prentiss *et al* 2008; Prentiss *et al* 2014).

Faunal materials from Stratum IIe consisted of 775 specimens from four levels and ten features (A-12, B-1, B-3, B-5, B-6, B-14, B-15, B-16, C-1, and C-3).

Level One

Level one contained 203 mammal bone specimens, 219 fish bone specimens, and four avian specimens.

Mammal bone consisted of 5 fragments of unidentifiable elements from indeterminate taxon or size category, 18 unidentifiable specimens were from unknown large-sized mammals. 109 specimens were fragments of indeterminate elements from unidentifiable medium-to large-sized mammals. 27 specimens were fragments of unknown elements from medium-sized mammals, two were similarly unidentifiable element fragments from indeterminate small- to medium-sized mammals, and two were remains of small members of the *Rodentia* Family – a cranial fragment and an incisor – neither identifiable to taxon.

Identifiable large mammal specimens consisted of one complete selenodont molar and one enamel fragment from a deer/sheep-sized *Cervidae* sp., one carpal fragment, one fragment from the head portion of a humerus, two vertebra fragments and one fragmentary vertebral plate, and five diaphyseal long bone fragments – all that compared favorably to artiodactyl but could not be determined to genera or species. Other identifiable remains consisted of one proximal portion of a bighorn sheep (*O. canadensis*) tibia; two fragments from the anterior articular process of cervical vertebrae, one relatively intact proximal-diaphyseal portion of a femur, one distal portion of a femur including a section of the distal condyle, one humerus fragment, one diaphyseal portion of humerus in 13 refitted fragments, one metapodial fragment, one diaphyseal tibia fragment, and four diaphyseal fragments from unidentifiable long bone(s) – all from mule deer (*O. hemionus*).

Three specimens from medium-sized mammal(s) were identified. These consisted of on diaphyseal fragment from a beaver (*C. canadensis*) humerus, one articular facet (Glenoid fossa) section of a right beaver scapula, and one distal epiphyseal portion of a dog (c.f. *Canis familiaris*) tibia.

Fish bone from Level one of Stratum IIe consisted of 61 specimens from indeterminate taxa, but consistent in size and bone structure with medium-sized *Salmonidae* spp, likely sockeye salmon (*O. nerka*); of these, 12 were incomplete vertebrae of undistinguishable type, four were fragmentary cranial elements of unidentifiable designation, and 42 were rays/spines/ribs. 155 specimens were identified as coming from Sockeye salmon, including: 26 unidentifiable cranial bone fragments, 23 thoracic vertebrae, 14 pre-caudal vertebrae, five caudal vertebrae, 16 fragmented or incomplete vertebrae, one penultimate vertebra, and 70 rays/spines/ribs. Two specimens were from trout-sized salmonids (*O. mykiss*). These consisted of one thoracic vertebra and one incomplete, indeterminate vertebra. One incomplete vertebra was consistent in size and centrum-body structure with that of Chinook salmon (*O. tshawytscha*).

Bird bone consisted of one complete carpometacarpus and one proximal fragment of a carpometacarpus, one digit element, and one phalanx – all compared favorably to medium-sized avian from the *Phasianidae* Family, probably Sooty Grouse (*Dendragapus fuliginosus*) or given the relative size of the specimens, but possibly from a similarly-sized Willow ptarmigan (*L. lagopus*) as well.

Level Two

Level two contained a single faunal specimen – a fragment of undistinguishable bone from a medium- to large-sized mammal of undeterminable taxon.

Level Three

Level three did not contain any faunal remains.

Level Four

Level for contained four caudal vertebrae from a single Sockeye salmon.

Feature A-12

Feature A-12 was a shallow bowl-shaped indentation that contained six mammal bones and 45 sockeye salmon bones and one trout bone. The three mammal bone specimens were all fragments from unidentifiable element(s) from medium -sized mammal.

Fish bones consisted of one unidentifiable cranial bone fragment, one atlas vertebra, five thoracic vertebrae, two pre-caudal vertebrae, two caudal vertebrae, 32 incomplete vertebrae of undeterminable position, and two rays/spines/ribs – all from sockeye salmon. Four incomplete vertebrae from trout-sized salmonid were also identified but could not be determined to vertebral type.

Feature B-1

Feature B-1 was an ephemeral surface hearth that contained six fragmentary mammal bone specimens from undeterminable element(s) from unknown medium- to large-sized mammal(s).

Feature B-3

Feature B-3 was a bell-shaped pit composed of gravelly/rocky sediments throughout. It contained 23 fragmentary mammal bone specimens and 12 salmon bone specimens. Mammal bone consisted of: one metacarpal fragment from an indistinguishable artiodactyl, six fragments of bone from large-sized mammal(s), 15 specimens from medium- to large-sized mammal bones, and one vertebra fragment from a undeterminable medium-sized mammal.

Fish bone consisted of one cranial element – a ceratobranchial, two thoracic vertebrae, one pre-caudal vertebra, three incomplete and undeterminable vertebrae, and five rays/spines/ribs – all from Sockeye salmon.

Feature B-3, Level Two

Level two of Feature B-3 contained nine mammal bone specimens, all fragmentary pieces from undistinguishable elements from medium- to large-sized mammal(s).

Fish remains from Feature B-3, Level two consisted of: one cranial element – a mandible fragment, one thoracic vertebra, two caudal vertebrae, and two incomplete vertebrae – all from Sockeye salmon.

Feature B-3, Level 3

Level two of Feature B-3 contained ten mammal bone specimens. These included: one undistinguishable fragment from a large-sized mammal, seven long bone fragments from undeterminable medium- to large-sized mammal(s), one unidentifiable fragment from a small- to large-sized mammal, and one diaphyseal humerus fragment from a beaver.

Fish remains from Level two of Feature B-3 consisted of two undistinguishable cranial bone fragments, three thoracic vertebrae, one caudal vertebra, and six rays/spines/ribs – all attributed to Sockeye salmon.

Feature B-5

Feature B-5 was a shallow hearth that produced only a single faunal specimen – one thoracic vertebra from a Sockeye salmon.

Feature B-6

Feature B-6 was a post-hole that contained two faunal specimens. These consisted of one bone fragment from an undistinguishable element from an indeterminate medium- to large-sized mammal, and one unidentifiable fragment from a Sockeye salmon cranial bone.

Feature B-14

Feature B-14 was a large, micro-bedded cache pit that contained 49 mammal bone specimens and 139 fish bone specimens. The mammal bone assemblage contained two completely unidentifiable fragments; eight fragments from unknown elements from indeterminate large-sized mammal(s); 21 fragmentary specimens of bone from indeterminate medium- to large-sized mammal, including one section of cranial bone; and three fragmentary specimens from indeterminable small- to medium-sized mammal. Identifiable specimens included: one diaphyseal fragment of a mule deer metatarsal, one diaphyseal fragment of a beaver humerus, one nearly complete tibia that compared favorably to that of a canyon mouse (*Peromyscus crinitus*), one complete femur that compared favorably to that of *Neotominae* sp. (most likely wood rat - *Neotoma cinerea*), one complete humerus from an undistinguishable *Peromyscus* sp. (likely the common deer mouse - *P. maniculatus*), one complete mandible from a western jumping mouse (*Zapus princeps kootenayensis*), and one partially-intact crania and eight cervical vertebrae from one individual *Neotominae* sp., possibly from the same individual as the femur listed above.

Fish bone from Feature B-14 was all attributed to Sockeye salmon and contained 25 cranial elements, including one Basipterygium, three ceratobranchials, one coracoid, one symplectic, and 19 unidentifiable cranial bone fragments. Other specimens included 26 thoracic vertebrae, seven pre-caudal vertebrae, nine caudal vertebrae, 14 incomplete vertebra of undeterminable position, and 58 rays/spines/ribs.

The faunal assemblage from this feature suggests that it may have been filled with refuse, as it included dog coprolites and micro-bedded sediments that could have resulted from the sweeping up of floor debris. The rodent species richness (identifiable species n=4) suggests the presence of owl pellets (Andrews 1990), further supporting the possibility that this feature was used to “clean up” the pithouse space, possibly upon the return of inhabitants to the pithouse after summer hunting-foraging activities, or after a more extended abandonment.

Feature B-15

Feature B-15 was another micro-bedded bell-shaped pit. Unlike Feature B-14, it produced only two specimens – one tooth enamel fragment likely from a molar or pre-molar of a deer/sheep-sized *Cervidae* sp. and one unidentifiable fragment of bone from a medium-sized mammal.

Feature C-1

Feature C-1 was a shallow hearth with a relatively high density of fire-cracked rock for such a feature. The animal bone assemblage from Feature C-1 consisted of: one unidentifiable fragment of bone from a large-sized mammal, one similarly unidentifiable diaphyseal long bone fragment from a medium- to large-sized mammal, and one spiral-fractured distal portion of radius from a mule deer.

Fish bone from C-1 consisted of five pre-caudal vertebrae, four incomplete vertebrae of unknowable position, and four rays/spines/ribs – all identified as being from Sockeye salmon.

Feature C-3

Feature C-3 was another shallow hearth that contained only three specimens – one fragment from the dorsal spinous process of a bighorn sheep, one spiral-fractured proximal portion of a mule deer humerus, and one caudal vertebra from a Sockeye salmon.

Table 4.6. Stratum IIe Faunal Assemblage.

Taxon	Stratum IIe Taxon by Block												
	A	Feat A-12	B	Feat B-1	Feat B-3	Feat B-5	Feat B-6	Feat B-14	Feat B-15	C	Feat C-1	D	Stratum IIe Assemblage
Osteichthyes	**38**	**47**	**10**	**0**	**20**	**1**	**1**	**81**	**0**	**65**	**9**	**0**	**272**
Salmonidae	0	0	0	0	0	0	0	0	0	0	0	0	**0**
c.f. Oncorhynchus nerka	18	47	10	0	19	1	1	81	0	62	9	0	**248**
c.f. Oncorhynchus tshawytscha	0	0	0	0	0	0	0	0	0	0	0	0	**0**
c.f. Salmonid (trout-sized)	2	0	0	0	1	0	0	0	0	0	0	0	**3**
Indeterminate	18	0	0	0	0	0	0	0	0	3	0	0	**21**
Mammalia	**37**	**6**	**19**	**6**	**44**	**0**	**1**	**47**	**2**	**146**	**3**	**1**	**312**
Small	1	0	0	0	0	0	0	13	0	1	0	0	**15**
Medium	24	6	0	0	2	0	0	1	1	6	0	0	**40**
Small-Medium	0	0	0	0	1	0	0	3	0	0	0	0	**4**
Large	5	0	4	0	10	0	0	9	0	46	2	0	**76**
Medium-Large	7	0	15	6	31	0	1	21	1	87	1	1	**171**
Indeterminate	0	0	0	0	0	0	0	2	0	5	0	0	**7**
Artiodactyla	**0**	**0**	**4**	**0**	**3**	**0**	**0**	**1**	**1**	**31**	**1**	**0**	**41**
Indeterminate *Cervidae/Artiodactyl*	0	0	2	0	1	0	0	0	1	9	0	0	**13**
Odocoileus hemionus	0	0	1	0	1	0	0	1	0	22	1	0	**26**
Ovis canadensis	0	0	1	0	1	0	0	0	0	0	0	0	**2**
Carnivora	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**
Ursus americanus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
U. arctos	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Canis sp.	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Canis sp. *(* c.f. *Canis latrans)*	0	0	0	0	0	0	0	0	0	1	0	0	**1**
Canis sp. *(* c.f. *Canis lupus)*	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Canis sp. *(* c.f. *Canis lupus familiaris)*	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Rodentia	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**14**	**0**	**3**	**0**	**0**	**18**
Castor canadensis	0	0	0	0	1	0	0	1	0	2	0	0	**4**
Ondatra zibethicaus	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Peromyscus maniculatus	0	0	0	0	0	0	0	1	0	1	0	0	**2**
Peromyscus crinitus (c.f.)	0	0	0	0	0	0	0	1	0	0	0	0	**1**
Neotominae spp.	0	0	0	0	0	0	0	1	0	0	0	0	**1**
Zapus princeps	0	0	0	0	0	0	0	1	0	0	0	0	**1**
Erethizon dorsatum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Scuriudae sp.	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Aves	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**4**
c.f. *Phasianidae* sp.	0	0	0	0	0	0	0	0	0	4	0	0	**4**
Bivalvia	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ostreidae spp.	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Unidentifiable	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**

STRATUM IId

Faunal materials from Stratum IId consisted of 636 specimens from two levels and three features (A-17, C-2, and D-11).

Level One

Level one contained 275 mammal specimens, 296 fish bone specimens, and 19 fragmentary pieces of shellfish.

Mammal bone consisted of 15 fragments of unidentifiable elements from indeterminate taxon or size category, 69 specimens were from large-sized mammals, of which 57 were unidentifiable fragments, 24 of which were diaphyseal segments from unidentifiable long bone elements. 70 specimens were fragments of indeterminate elements from unidentifiable medium-to large-sized mammals. 97 specimens were fragments of unknown elements from medium-sized mammals, four were similarly unidentifiable element fragments from indeterminate small-to medium-sized mammals, and eight were unidentifiable remains of small members of the *Rodentia* family.

Identifiable large mammal specimens consisted of one diaphyseal fragment of an artiodactyl metatarsal consistent in size with that of deer/sheep, two lumbar vertebra fragments from a mule deer (*O. hemionus*), one diaphyseal femur fragment, three radius fragments (one diaphyseal), and three diaphyseal tibia fragments – all from mule deer. One atlas vertebra fragment from a brown bear (*U. arctos*) was also recovered.

Nine medium-sized mammal bones were identified. These include: three rib fragments and an ulna fragment from beaver (*C. Canadensis*), four *Canid* specimens including one vertebral body fragment, one fragmentary section of the posterior articular facet of a cervical vertebra, one diaphyseal tibia fragment, and one carnassial tooth – all consistent with medium-sized dog (c.f. *C. latrans*). One fragment from a muskrat (*Ondatra zibethicus*) cranium was also identified.

Small mammal remains include one relatively tiny incisor (c.f. *Peromyscus* spp.) and one phalanx, one deer mouse (*Peromyscus maniculatus*) mandible, and one indeterminate cranial fragment.

Fish bone from Level 1 consisted of 38 specimens from indeterminate taxa, but consistent in size and bone structure with medium-sized *Salmonidae* spp, likely sockeye salmon (*O. nerka*). 245 specimens were identified as coming from sockeye salmon, including: one atlas vertebra, 35 thoracic vertebrae, four pre-caudal vertebrae, 33 caudal vertebrae, 72 heavily fragmented, incomplete or otherwise indeterminate vertebrae, two Hypural, one Ultimate caudal vertebra, and one Penultimate vertebra (all from the tail section), eight fragmentary cranial bones including one basipterygium, one branchiostegal ray, one coracoid, and one scapula, and 78 rays/spines/ribs. Four specimens were from trout-sized salmonids (*O. mykiss*). These consisted of three incomplete thoracic vertebrae and one indeterminate vertebra. One ray/spine/rib was significantly large as to be consistent with Chinook salmon (*O. tshawytscha*).

Shellfish from Level one consisted of 19 heavily weathered shell fragments of Mollusk consistent in shape, composition, and color with True Oysters of the family *Ostreidae* spp.

Four small (<19mm), severely fragmented weathered specimens were too deteriorated to be identified to any particular taxonomic designation.

Level Two

Level two contained relatively few faunal remains. These included six fragments from indeterminate vertebral elements from large-sized mammal(s): one small section of a vertebral fin, and five fragments around the anterior transverse process portions of lumbar vertebra from deer/sheep-sized artiodactyl.

Fish bone consisted of ten specimens. Three of these were unidentifiable cranial bone fragments that compared favorably to sockeye-sized *Salmonidae* but could not be positively identified. Additional specimens were six caudal vertebrae and one unidentifiable incomplete vertebra, both from sockeye salmon.

Feature A-17

Feature A-17 was a deep pit that ultimately expanded out into a bell-shape at its deepest extent. In Stratum IId it contained eight mammal bones and three sockeye salmon bones. Three specimens were fragments from unidentifiable element(s) of medium- to large-sized mammal, and one fragment was of indeterminate medium mammal bone. Identifiable mammal bone included three diaphyseal long bone fragments from deer/sheep-sized artiodactyl and one fragment of a deer lumbar vertebra.

Fish bones consisted of two sockeye caudal vertebrae and one thoracic vertebra, also from sockeye. All three were fragmentary.

Feature C-2

Feature C-2 was a post-hole that contained six mammal bone specimens and eight fish bone specimens. Mammal bone consisted of one indeterminate fragment from a large-sized mammal and five similarly indeterminate fragments from a medium- to large-sized mammal, two of which compared favorably to cranial bone but could not be positively compared to any of the comparative samples available.

Fish bone consisted of one unidentifiable cranial bone fragment, one incomplete vertebra fragment of undeterminable position, and one ray/spine/ray – all from sockeye salmon.

Feature D-11

Feature D-11 was another post-hole that contained a single faunal specimen – one diaphyseal fragment from an indeterminate large mammal long bone.

Table 4.7. Stratum IId Faunal Assemblage.

Taxon		Stratum IId Taxon by Block							
	A	B	C	D	Stratum IId Assemblage	Feat A-17	Feat C-2	Feat D-11	IId Total
Osteichthyes	**18**	**27**	**169**	**10**	**224**	**3**	**8**	**0**	**235**
Salmonidae	0	0	13	0	**13**	0	0	0	**13**
c.f. *Oncorhynchus nerka*	11	27	128	9	**175**	3	3	0	**181**
c.f. *Oncorhynchus tshawytscha*	0	0	1	0	**1**	0	0	0	**1**
c.f. *Salmonid* (trout-sized)	1	0	2	1	**4**	0	0	0	**4**
Indeterminate	6	0	25	0	**31**	0	5	0	**36**
Mammalia	**50**	**19**	**186**	**8**	**263**	**8**	**6**	**1**	**278**
Small	0	0	12	0	**12**	0	0	0	**12**
Medium	19	2	81	1	**103**	1	0	0	**104**
Small-Medium	4	0	0	0	**4**	0	0	0	**4**
Large	13	5	47	4	**69**	0	1	1	**71**
Medium-Large	12	12	14	3	**41**	1	5	0	**47**
Undeterminate	2	0	8	0	**10**	0	0	0	**10**
Artiodactyla	**4**	**0**	**6**	**1**	**11**	**4**	**0**	**0**	**15**
Indeterminate *Cervidae /Artiodactyl*	0	0	1	0	**1**	3	0	0	**4**
Odocoileus hemionus	4	0	5	1	**10**	1	0	0	**11**
Ovis canadensis	0	0	0	0	**0**	0	0	0	**0**
Carnivora	**2**	**0**	**2**	**1**	**5**	**0**	**0**	**0**	**5**
Ursus americanus	0	0	0	0	**0**	0	0	0	**0**
U. arctos	0	0	1	0	**1**	0	0	0	**1**
***Canis* sp.**	**2**	**0**	**1**	**1**	**4**	**0**	**0**	**0**	**4**
Rodentia	**2**	**0**	**7**	**0**	**9**	**0**	**0**	**0**	**9**
Castor canadensis	0	0	2	0	**2**	0	0	0	**2**
Ondatra zibethicaus	2	0	0	0	**2**	0	0	0	**2**
Peromyscus maniculatus	0	0	1	0	**1**	0	0	0	**1**
Erethizon dorsatum	0	0	0	0	**0**	0	0	0	**0**
***Scuriudae* sp.**	0	0	0	0	**0**	0	0	0	**0**
Aves	0	0	0	0	**0**	0	0	0	**0**
Falconiformes c.f. Buteo sp.	0	0	0	0	**0**	0	0	0	**0**
c.f. Phasianidae sp.	0	0	0	0	**0**	0	0	0	**0**
Phasianidae sp. (c.f. Dendragapus fuliginosus)	0	0	0	0	**0**	0	0	0	**0**
Phasianidae sp. (c.f. Lagopus leucura)	0	0	0	0	**0**	0	0	0	**0**
Bivalvia	**0**	**0**	**19**	**0**	**19**	**0**	**0**	**0**	**19**
Ostreidae spp.	0	0	19	0	**19**	0	0	0	**19**
Unidentifiable	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

STRATUM IIc

Faunal materials from Stratum IIc consisted of 1458 specimens from one level and four features (B-14, D-6, D-10, and D-13).

Level One

Level one contained 548 mammal specimens, 708 fish bone specimens, three bird specimens, and one piece of shellfish.

Mammal bone consisted of 27 fragments of unidentifiable elements from indeterminate taxon or size category. 282 specimens were from unidentifiable elements from indeterminate large-sized mammals, of which 154 were diaphyseal long bone fragments. 116 specimens were fragments of indeterminate elements from unidentifiable medium-to large-sized mammals, 22 of which were diaphyseal long bone fragments. 53 specimens were fragments of unknown elements from medium-sized mammals, and seven specimens were unidentifiable element fragments from indeterminate small- to medium-sized mammals.

Identifiable large mammal specimens consisted of one pubis fragment, seven rib fragments, and three vertebra fragments, one a portion of the anterior transverse process of a lumbar vertebra, and all from artiodactyl(s) consistent in size with deer/sheep but not positively identifiable. One lumbar vertebra fragment, two rib fragments, one rib fragment, and three tibia fragments including a portion of the Tibial tuberosity, compared favorably to mule deer (*O. hemionus*). Positively identifiable deer remains included: one tarsal, one carpal, one cranial section with a portion of the tympanic bulla, one diaphyseal fibula, one distal right humerus with a portion of the posterior section of the olecranon fossa, one section of a left mandible including the 2nd premolar aveolar process, one proximal section of a left metatarsal, one diaphyseal portion of a metatarsal, one radial carpal, one diaphyseal radius, one body section of a thoracic vertebra, one diaphyseal tibia, one anterior vertebral body, one vertebral spinous process, and one indeterminate vertebral section – all fragments. Whole deer elements included one left trapezoid magnum and one uniciform. Two tooth fragments closely matched mule deer in the comparative collection and were designated as being from a *Cervid*, but due to the close similarity in dentition between medium-sized artiodactyls, the specimens could also be from a sheep/goat (*Ovis/Aries*) member of the *Caprinae* subfamily of *Bovids*.

Five medium-sized mammal bones were identifiable. These included one vertebra fragment, a section of the superior crest of an illium, and a rib fragment – all consistent with medium-sized dog (c.f. *C. latrans*). One incisor and one fragment of a vertebral body were also identified - both from beaver (*C. canadensis*).

Small mammal remains included a single fragment of a proximal tibia designated as coming from an indeterminate mammal, but of comparable size to that of small muskrat (*Ondatra zibethicus*), squirrel (*Sciuridae* spp.), or fisher (*Martes pennant*i).

Fish bone from Level 1 consisted of 84 specimens from indeterminate taxa, all of which was consistent in size and bone structure with medium-sized *Salmonidae* spp, likely sockeye salmon (*O. nerka*). 616 specimens were identified as coming from sockeye salmon. These included: one Atlas vertebra, two basipterygium, one caudal Epural bone, one coracoid, one hypobranchial, two mesocoracoids, one scapula, 42 unidentifiable cranial element fragments, 55 thoracic vertebrae, 22 pre-caudal vertebrae, 32 caudal vertebrae, and 45 incomplete or indistinguishable vertebrae. Seven specimens were from trout-sized salmonids (*O. mykiss*). These consisted of six thoracic vertebrae and one caudal vertebra. One basipterygium was from Chinook salmon (*O. tschawytscha*).

Shellfish from Level one consisted of a single heavily weathered shell fragment consistent in shape, composition, and color with True Oysters of the family *Ostreidae* spp.

Feature B-14

In Stratum IIc, Feature B-14 contained only four sockeye bones: two pre-caudal vertebrae and two incomplete vertebrae of unidentifiable position. As detailed in proceeding strata, this feature turned out to be one of the largest cache pits excavated at Housepit 54 and turned out to contain a unique assemblage of animal remains, including a variety of bones from diverse species, but also coprolites, probably from domesticated dogs.

Feature D-6

Feature D-6 had only three specimens: one complete and two fragmentary thoracic vertebrae from sockeye salmon.

Feature D-10

Feature D-10 was a deep, bell-shaped pit that contained 190 faunal specimens. As with similar pits elsewhere in the housepit, it appears to have been a cache pit that was ultimately filled with refuse. 19 specimens from this feature were from unidentifiable elements from mammals of indistinguishable size or taxon, ten were similarly unidentifiable fragments from large-sized mammal(s), 16 were from medium- to large-sized mammals, and 13 from medium-sized mammals.

Identifiable specimens from large-sized mammals included: one lumbar vertebra fragment with a section of the posterior arch from a bighorn sheep (*Ovis canadensis*), and one posterior diaphyseal section of a mule deer radius with the ulna articular oblique line present. Medium mammal specimens consisted of one proximal fragment of a dog rib with articular head surface, one proximal fragment of a left ulna with semi-lunar notch present, and one proximal radius fragment with articular rim of head present – both also from medium dog. Two cranial fragments from a medium mammal were also recovered, as was a body fragment from a thoracic vertebra of unknown designation.

Fish bone from Feature D-10 consisted of 130 specimens. Of these, one specimen was deteriorated to such as degree as to be unidentifiable beyond *Osteichthyes* (bony fishes) species. Ten cranial bone fragments from sockeye were present, including one scapula. Additional sockeye bones included: 18 thoracic vertebrae, two pre-caudal vertebrae, eight caudal vertebrae, 22 incomplete vertebrae of indeterminable position, and 64 rays/spines/ribs.

One bird bone specimen was recovered in Feature D-10. This was a fragment of synsacrum that compared favorably to that of a bird in the *Phaseanidae* family, most likely Sooty Grouse (*Dendragapus fuliginosus*).

Feature D-13

Feature D-13 was a small post-hole that had only two specimens in it: one unidentifiable bone fragment from a small- to medium-sized mammal and one incomplete thoracic vertebra from a sockeye salmon.

Table 4.8. Stratum IIc Faunal Assemblage.

Taxon	Stratum IIc Level 1 Taxon by Block									
	A	B	C	D	Stratum IIc Level 1	Feat B-14	Feat D-6	Feat D-10	Feat D-13	IIc Total
Osteichthyes	**12**	**2**	**243**	**147**	**404**	**4**	**3**	**66**	**1**	**478**
Salmonidae	11	0	0	0	**11**	0	0	5	0	16
c.f. *Oncorhynchus nerka*	1	0	171	142	**314**	4	3	58	1	380
c.f. *Oncorhynchus tshawytscha*	0	0	0	0	**0**	0	0	0	0	0
c.f. *Salmonid* (trout-sized)	0	1	0	5	**6**	0	0	0	0	6
Indeterminate	0	1	72	0	**73**	0	0	3	0	76
Mammalia	**51**	**48**	**290**	**150**	**539**	**0**	**0**	**64**	**1**	**604**
Small	0	0	0	1	**1**	0	0	0	0	1
Medium	3	7	40	11	**61**	0	0	17	0	78
Small-Medium	0	0	1	6	**7**	0	0	0	1	8
Large	5	40	238	55	**338**	0	0	12	0	350
Medium-Large	28	1	11	77	**117**	0	0	16	0	133
Undeterminate	15	0	0	0	**15**	0	0	19	0	34
Artiodactyla	**2**	**1**	**28**	**13**	**44**	**0**	**0**	**2**	**0**	**46**
Indeterminate *Cervidae /Artiodactyl*	0	0	0	2	**2**	0	0	0	0	2
Odocoileus hemionus	2	1	26	10	**39**	0	0	1	0	40
Ovis canadensis	0	0	2	1	**3**	0	0	1	0	4
Carnivora	**0**	**0**	**1**	**2**	**3**	**0**	**0**	**3**	**0**	**6**
Ursus americanus	0	0	0	0	0	0	0	0	0	**0**
U. arctos	0	0	0	0	0	0	0	0	0	**0**
Canis sp.	**0**	**0**	**1**	**2**	3	0	0	3	0	**6**
Rodentia	**1**	**0**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**2**
Castor canadensis	1	0	1	0	**2**	0	0	0	0	2
Ondatra zibethicaus	0	0	0	0	**0**	0	0	0	0	0
Peromyscus maniculatus	0	0	0	0	**0**	0	0	0	0	0
Erethizon dorsatum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
***Scuriudae* sp.**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Aves	**1**	**0**	**0**	**1**	**2**	**0**	**0**	**0**	**0**	**3**
Falconiformes c.f. *Buteo* sp.	1	0	0	0	**1**	0	0	0	**0**	**1**
c.f. *Phasianidae* sp.	0	0	0	1	**1**	0	0	1	**0**	**2**
Phasianidae sp. (c.f. *Dendragapus fuliginosus*)	0	0	0	0	**0**	0	0	0	**0**	**0**
Phasianidae sp. (c.f. *Lagopus leucura*)	0	0	0	0	**0**	0	0	0	**0**	**0**
Bivalvia	**0**	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**
Ostreidae spp.	0	0	0	1	**1**	0	0	0	**0**	**1**
Unidentifiable	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

STRATUM IIb

Faunal materials from Stratum IIb consisted of 4390 specimens from one level and three features (A-5, D-4, and D-8). The assemblage contained 725 mammal specimens, 3651 fish specimens, nine bird specimens, and five taxonomically unidentifiable specimens. Although the fish specimen count is relatively high comparatively, 2400 of the fish specimens fall into the somewhat anomalous category of "rays/spines/ribs" and offer little to no diagnostic or interpretive data regarding numbers of fish present or human predation strategies (Colley 1990: 212).

Level One

Mammal bone specimens from Level one included 34 fragmentary specimens from indeterminate elements from unidentifiable mammal(s), 99 similarly unidentifiable element fragments were from large-sized mammal (78 of which were fragments from diaphyseal long bone), 256 from medium- to large-sized mammal, 51 from medium-sized mammal, 13 from small- to medium-sized mammal, and two from small mammal.

Identifiable large mammal remains included one posterior fragment of a lumbar vertebra including a section of the superior articular process, one mandible fragment, and one proximal fragment of a femoral head, all from unidentifiable large-sized animal(s). 144 specimens were identified as deer (*O. hemionus*) or compared most favorably to deer. These included: one complete carpal bone, one fragmentary carpal, one fragment of a cervical vertebra, one radius fragment, one diaphyseal fragment of a tibia, ten cranial fragments, one fragmentary dew claw, one diaphyseal fragment and four distal-epiphyseal fragments of femur, one lumbar vertebra fragment, one proximal fragment of a left metacarpal, one diaphyseal fragment of a left metatarsal, one proximal and diaphyseal fragment of a metatarsal, one proximal phalanx fragment, one distal fragment of a 2nd phalanx, one distal fragment of a left radius, five diaphyseal fragments of a right radius, one diaphyseal radius fragment, 20 rib fragments, one superior section of a sacrum, one fragment of a thoracic vertebra, one fragmentary anterior crest section of a tibia, six fragments of unidentifiable vertebral body, and one nearly-complete left scapula. Five *Cervid* teeth were identified, one fragment and four complete or nearly complete specimens: one right 1st incisor, one pre-molar, and two incomplete premolars – all from deer/sheep-sized animal(s). Three other enamel fragments were also likely those of *Cervidae* given surface structure and color, but were too fragmentary to be positively identified.

Identifiable medium-sized mammal bone consisted of: one proximal rib fragment, one proximal-epiphyseal humerus fragment, one posterior fragment of a lumbar vertebra including a section of the transverse process, one left metacarpal, and one fragment of the dorsal spine of a thoracic vertebra – all from medium-sized dog (c.f. *C. latrans*). One diaphyseal long bone fragment from a beaver (*C. canadensis*) was identified, as were one left mandible fragment, one fragment of mandible including the base of the ascending ramus, one fragment of the anterior articular process from a thoracic vertebra, and one fragmentary incisor – all from beaver.

Identifiable small mammal remains consisted of one phalanx, one vertebral body fragment, and one diaphyseal long bone fragment, all from undeterminable species, and all from individual(s) of roughly muskrat-size. One tiny rodent (c.f. deer mouse – *Peromyscus* sp.) proximal left ulna with a section of the semi-lunar notch was also identified.

Avian faunas from Level one consisted of six specimens, including one diaphyseal long bone fragment of unknown element from a medium (grouse-sized) bird, one right carpometacarpus and one right phalanx from a member of the *Phasianidae* family, likely Sooty Grouse (*Dendragapus fuliginosus*), two bone fragments from indeterminate elements from a small-sized bird, as well as one complete coracoid, also from a small bird (c.f. White-tailed Ptarmigan - *Lagopus leucura*).

Fish remains from Level one included four entirely unidentifiable specimens from *Osteichthyes* spp., and 101 specimens from medium-sized bony fish of undeterminable species, including 81 incomplete vertebra fragments, one coracoid and 12 unidentifiable cranial bone fragments, and seven rays/spines/ribs. Sockeye (*O. nerka*) remains consisted of 2177 specimens, including 17 positively-identifiable elements: two basipterygiums, one branchial arch, two branchiostegal rays, two cleithrums, three coracoids, one ectopterygoid, one hypobranchial, one frontal, one maxilla, one mesocoracoid, one opercle, one parasphenoid, six scapulas, one suboperlce, one supracleithrum, one symplectic, and one urohyal. Other sockeye specimens included 98 thoracic vertebrae, 31 pre-caudal vertebrae, 74 caudal vertebrae, 184 incomplete vertebrae, two expanded Haemal spines, and 1602 rays/spines/ribs.

Salmon bones that could not be positively identified to sockeye but were consistent in size, morphology, and structure to medium-sized *Salmonidae* spp. included 782 specimens: 34 cranial bone fragments including 11 identifiable elements: three branchial arches, two branchiostegal rays, three mandibular arches, one mesocoracoid, one Otic region element, and one parasphenoid. Other identifiable elements consisted of 67 thoracic vertebrae, 22 pre-caudal vertebrae, and four caudal vertebrae, 142 incomplete vertebrae of undeterminable position, one Ultimate vertebra, three penultimate vertebrae, three extended Haemal spines, two neural arch fragments, and 503 rays/spines/ribs.

Small Salmonid bones included: one thoracic vertebra and one incomplete vertebra from unidentifiable small *Salmonidae* sp. Identifiable trout-sized (*O. mykiss*) specimens consisted of five identifiable cranial bones: one basipterygium, three hypobranchials, and one scapula, as well as five thoracic vertebrae, two pre-caudal vertebrae, two caudal vertebrae, 22 incomplete vertebrae of unknown position, as well as one tooth.

Feature A-5

Feature A-5 was a deep, bell-shaped pit that may have initially been used as a cache pit, but was ultimately used to store or discard fire-cracked rocks. The pit contained four mammal bones from medium- to large-sized animals. Three of these were fragments from unidentifiable elements and one was a fragment of a lumbar vertebra. Fish bone consisted of seven specimens from sockeye salmon. These included one cranial bone – a mandibular arch, two thoracic vertebrae, two pre-caudal vertebrae, one incomplete vertebra of undeterminable position, and one ray/spine/rib.

Feature D-4

Feature D-4 was a basin-shaped hearth that contained 82 faunal specimens. Mammal bone consisted of six fragments from indistinguishable elements from large-sized mammal(s) and three similarly indeterminate fragments from medium- to large-sized mammal. Fish bone consisted of 70 specimens, all consistent with sockeye salmon. These included one sphenotic – a cranial element from the Otic region of the lateral skull, two thoracic vertebrae, one pre-caudal vertebra, and 69 rays/spines/ribs.

Feature D-8

Feature D-8 was a deep, bell-shaped pit likely used to discard fire-cracked rock, given an extremely high relative frequency of those materials. The feature also contained a relatively high number of faunal remains: 591 specimens in all. Of this, 120 specimens were of mammal bone, 462 were fish, three were from bird, and three were weathered to such a degree as to be unassignable to any taxonomic category.

Mammal bone specimens in Feature D-8 consisted of 18 fragmentary specimens from indeterminate elements from indeterminate size or taxon, 22 specimens from indeterminate large mammal, 43 from indeterminate medium- to large-sized mammal, 5 from indeterminate medium mammal, and two from unidentifiable small- to medium-sized mammal. Identifiable specimens from large mammal(s) included: one fragment of cranium from an unspecifiable deer/sheep-sized artiodactyl, one proximal fragment of an artiodactyl femur, eight diaphyseal long bone fragments of indeterminate artiodactyl, three artiodactyl rib fragments, and one diaphyseal tibia fragment, also from artiodactyl. Other large-sized animal bone specimens consisted of one diaphyseal fragment of a deer (*O. hemionus*) metatarsal, one rib fragment, one diaphyseal fragment from a right tibia, one distal epiphyseal fragment of a tibia, one diaphyseal humerus fragment, and one vertebra fragment - all from deer. Identifiable medium-sized mammal remains consisted of one wing fragment from a lumbar vertebra from a dog (c.f. *C. latrans*), and one *Canid* tooth, along with one proximal fragment of a beaver (*C. canadensis*) metacarpal and one fragmentary incisor. One complete rodent radius was also recovered but could not be positively identified to species.

Fish bone specimens consisted of 19 unidentifiable fragments from indeterminate species, but consistent in size and bone structure with medium salmonid, likely from cranial bones. Identifiable specimens included 66 cranial bone specimens, including: three basipterygiums, one branchial arch, one cleithrum, one postcleithrum, one collar, two coracoids, one mesocoracoid, one preopercle, one prootic, and one urohyal as well as 53 cranial bone fragments that could not be identified to element, all consistent with sockeye salmon. Other sockeye remains included 41 thoracic vertebrae, 14 pre-caudal vertebrae, 31 caudal vertebrae, 42 incomplete or fragmentary vertebrae, one expanded Haemel spine (tail element), and 206 rays/spines/ribs. Three vertebrae were trout-sized (c.f. *O. mykiss*), including two thoracic vertebrae and one incomplete vertebra of undeterminable position. Two Chinook salmon (*O. tschawytscha*) elements were identified – both right cleithrum specimens.

Bird bone specimens consisted of one diaphyseal fragment from a long bone from a medium-sized bird and one proximal fragment of a tibiotarsus from a medium-sized bird, both consistent in size with grouse-sized avian. One complete left carpometacarpus from a Sooty Grouse (*Dendragapus fuliginosus*) was also recovered.

Table 4.9. Stratum IIb Faunal Assemblage.

Taxon	Stratum IIb Taxon by Block (Combined 2013-2014)								
	A	B	C	D	Stratum IIb Level 1	Feat. A-5	Feat D-4	Feat D-8	IIb Total
Osteichthyes	**71**	**1**	**1226**	**325**	1623	**6**	**4**	**247**	**1880**
Salmonidae	61	0	612	0	**673**	0	0	0	**673**
c.f. *Oncorhynchus nerka*	0	0	507	295	**802**	6	4	223	**1035**
c.f. *Oncorhynchus tshawytscha*	0	0	1	1	**2**	0	0	2	**4**
c.f. *Salmonid* (trout-sized)	8	0	2	28	**38**	0	0	3	**41**
Indeterminate	2	1	104	1	**108**	0	0	19	**127**
Mammalia	**99**	**53**	**204**	**232**	588	**4**	**9**	**120**	**721**
Small	4	0	0	3	**12**	0	0	1	**13**
Medium	7	0	49	11	**67**	0	0	10	**77**
Small-Medium	3	0	2	8	**13**	0	0	2	**15**
Large	9	53	48	81	**191**	0	6	22	**219**
Medium-Large	72	0	96	108	**276**	4	3	46	**329**
Undeterminate	4	0	9	21	**34**	0	0	19	**53**
Artiodactyla	**7**	**9**	**20**	**53**	89	**0**	**0**		**89**
Indeterminate *Cervidae/Artiodactyl*	0	0	0	3	**3**	0	0	14	**17**
Odocoileus hemionus	7	9	20	50	**86**	0	0	6	**92**
Ovis canadensis	0	0	0	0	**0**	0	0	0	**0**
Carnivora	**1**	**0**	**1**	**4**	**6**	**0**	**0**	**2**	**8**
Ursus americanus	0	0	0	0	**0**	0	0	0	**0**
U. arctos	0	0	0	0	**0**	0	0	0	**0**
***Canis* sp.**	**1**	**0**	**1**	**4**	**6**	**0**	**0**	**2**	**8**
Rodentia	**2**	**0**	**2**	**4**	**8**	**0**	**0**	**3**	**11**
Castor canadensis	2	0	1	2	**5**	0	0	2	**7**
Ondatra zibethicaus	0	0	0	0	**0**	0	0	0	**0**
Peromyscus maniculatus	0	0	0	1	**1**	0	0	0	**1**
Erethizon dorsatum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
									0
***Scuriudae* sp.**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Aves	**0**	**0**	**0**	**3**	**5**	**0**	**0**	**3**	**8**
c.f. Phasianidae sp.	0	0	0	2	**2**	0	0	2	**4**
Phasianidae sp. (c.f. Dendragapus fuliginosus)	0	0	0	0	**0**	0	0	1	**1**
Phasianidae sp. (c.f. Lagopus leucura)	3	0	0	0	**3**	0	0	0	**3**
Bivalvia	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Ostreidae spp.	**0**	**0**	**0**	**0**	**0**	0	0	0	**0**
Unidentifiable	**0**	**0**	**1**	**1**	**2**	**0**	**0**	**3**	**5**

STRATUM IIa

Stratum IIa is the final floor of the Bridge River Period 3 occupation. Theoretically, it represents the last activities undertaken at the house prior to the abandonment of the village and the subsequent hiatus of occupations that lasted hundreds of years leading up to the reoccupation of the village during Bridge River 4.

Faunal materials from Stratum IIa consisted of 3461 specimens from five levels. The assemblage contained 805 mammal specimens, 2650 fish specimens, six bird specimens, and just one taxonomically unidentifiable specimen(from level four). Although the fish specimen count is relatively high comparatively, 1806 of the fish specimens fall into the somewhat anomalous category of "rays/spines/ribs" and offer little to no diagnostic or interpretive data regarding numbers of fish present or human predation strategies (Colley 1990: 212).

Level One

Mammal bone from Level one consisted of 560 mostly fragmentary specimens. Of these, 98 were from indeterminate elements from unidentifiable mammal(s), one was a cranial bone fragment from an indeterminate mammal and one was a vertebral body fragment of unidentifiable position, size category or taxon. 36 were similarly unidentifiable element fragments from large-sized mammal(s), 280 were from medium- to large-sized mammal, nine were from indeterminate medium-sized mammal, ten were from small-to medium-sized mammal, and 6 were fragmentary unidentifiable specimens of indistinguishable small mammal bone.

Identifiable large mammal remains included two cervical vertebrae fragments, two indeterminate diaphyseal long bone fragments, one scapula fragment, one vertebral body fragment of unknown position, and one vertebral epiphysis, all from deer/sheep-sized artiodactyl. Three cranial fragments, one diaphyseal rib fragment, two vertebrae fragments and two tooth fragments from large-sized mammals were also identified. The tooth fragments are consistent with *Cervidae* of deer/sheep-size, but were too fragmentary to be accurately identified beyond that distinction. 56 specimens of mule deer (*O. hemionus*) were positively identified, including: one cervical vertebra, two diaphyseal femur fragments, one posterior diaphyseal fragment of a right humerus, three diaphyseal fragments of unidentifiable long bone, one fragment from a lumbar vertebra, two mandible fragments – one from the right side, the other indeterminable, one diaphyseal fragment of a metacarpal, one lateral-anterior fragment of the proximal end of a metacarpal, one diaphyseal fragment of a left metatarsal, one diaphyseal fragment of an un-sided metatarsal, two diaphyseal fragments of right metatarsal, one 2nd phalanx, one fragment of the right pubis, eight phalanges (including three complete elements), one distal fragment of a left radius, one diaphyseal fragment of a radius, one distal fragment of an un-sided radius, fourteen rib fragments, one thoracic vertebra fragment, four diaphyseal tibia fragments – one a proximal portion of a left element, three tooth fragments (compared exceptionally well to selenodont dentition of multiple comparative collection mule deer, but may be from another deer/sheep-sized *Cervid*), two vertebra fragments of unknown position, and one complete dew claw (vestigial metapodial). One distal condyle from a metacarpal and one proximal fragment of a metatarsal, both from bighorn sheep (*O. canadensis*) were also identified.

Identifiable medium- to large-sized mammal bone consisted of a fragment from the posterior epiphyseal surface of a cervical vertebra, one fragment from the anterior body of an indeterminate vertebra, seven other indeterminate vertebra fragments, one diaphyseal fragment from a tibia, one rib fragment, for *Cervidae* tooth fragments consistent with deer/sheep-sized individuals, and at least 29 fragments of diaphyseal long bone.

Faunal specimens identified from medium-sized mammals consisted of one proximal fragment from the epiphyseal surface of a tibia, one fragment from a lumbar vertebra, two thoracic vertebrae fragments, and one diaphyseal fragment from a right ulna, all from medium-sized dog (c.f. *C. latrans*). Identifiable beaver (*C. Canadensis*) remains consisted of one cranial fragment, three fragmentary incisors, one mandible fragment, one rib fragment and two complete ribs, one tibia fragment and one fragment of a vertebral articular surface – possibly from a lumbar vertebra. Other specimens included: one rib fragment of unknown origin and one undiagnostic tooth enamel fragment that could not be apportioned to any taxonomic class beyond likely coming from a medium mammal.

Identifiable bones attributed to small- to medium-sized mammals included nine fragmentary specimens, four of which exhibit features consistent with vertebral morphology, such as pedicle-articular process sections, but could not be positively identified to particular vertebral elements or to taxon.

Avian faunas from Level one consisted of six specimens, including two specimens from a medium (grouse-sized) bird, one right carpometacarpus and one incomplete tibiotarsus fragment, both compared favorably to a member of the *Phasianidae* family, likely Sooty Grouse (*Dendragapus fuliginosus*). Two specimens compared favorably to White-tailed Ptarmigan (*Lagopus leucura*) and articulated with one another. These were one complete left carpometacarpus and one complete left 1st phalanx. Another unidentifiable specimen was consistent with diaphyseal long bone of small-sized bird, but could not be positively compared. One incomplete fragment of a carpometacarpus from a small- to medium-sized bird was also recovered but could not be positively identified.

Fish remains from Level one of stratum IIa included one specimen that could not be identified beyond that of the Class *Osteichthyes* (bony fish), and one, similarly anomalous vertebra fragment. Other specimens included one indeterminate cranial bone from a medium-sized bony fish and 23 rays/spines/ribs also consistent in size with medium-sized fish. Remains identified to Salmonidae of indeterminate size included 52 specimens, comprised of one branchial arch and eight unidentifiable cranial bone fragments, seven thoracic vertebrae, ten pre-caudal vertebrae, six caudal vertebrae, ten incomplete vertebrae of indeterminate position, one expanded Haemal spine, two neural spines, and seven rays/spines/ribs.

Sockeye salmon (*O. nerka*) made up the bulk of the fish assemblage of IIa. Identifiable specimens included: one angular, one cerato-branchial, four branchial arches, one circumorbital bone, four collars, three coracoids, one frontal, nine hyoid arches, one mandibular arch, four opercles, one orbital, four pectoral girdles, five pelvic girdles, one postcleithrum, one quadrate, three scapulas, on suborbital, 361 unidentifiable fragmentary cranial bones, and nine indeterminate element fragments consistent with cranial bone structure. Identifiable vertebral specimens consisted of 50 thoracic vertebrae, 20 pre-caudal vertebrae, 35 caudal vertebrae, and 163 incomplete vertebrae of indistinguishable position. Other sockeye elements included one expanded Haemal spine, and 1672 rays/spines/ribs.

Small "trout-sized" fish remains consisted of one caudal vertebra from an indeterminate small-bodied *Osteichthyes*, three cranial bone fragments from small *Salmonidae* (c.f. *O. mykiss*), and ten thoracic vertebrae, one pre-caudal vertebra, four incomplete vertebra of unknown position, and one ray/spine/rib – all consistent with rainbow trout (*O. mykiss*).

Chinook salmon (*O. tshawytscha*) specimens in Level one consisted of ten pre-caudal vertebrae and three fragmentary vertebrae of indistinguishable position.

Level Two

Level two contained 192 mammal and 91 fish specimens.

Mammal bone specimens consisted of 12 entirely indeterminate specimens, ten indeterminate specimens from large-sized mammal(s), including nine diaphyseal long bone fragments. Two enamel fragments from *Cervidae* teeth were identified, and were consistent in general thickness and shape with deer/sheep-sized individuals, but could not be positively designated beyond the *Cervid* classification. Deer (*O. hemionus*) specimens included: one femur fragment, one lateral fragment of a distal condyle from a metatarsal, one undesignated vertebra body fragment, and one diaphyseal long bone fragment.

Medium- to large-sized mammal bone consisted of 163 specimens. These included: one fragment that compared favorably to a posterior section of a scapula, and 110 fragments of diaphyseal long bone.

One fragmentary specimen was from a diaphyseal portion of long bone from an indeterminate small-sized mammal.

Fish remains from Level two consisted of: two thoracic vertebrae and two incomplete vertebrae from unidentifiable *Salmonidae* spp., one thoracic vertebra from a Chinook salmon, seven cranial bone specimens from sockeye, including one branchial arch, one mandible, and five unidentifiable cranial bone fragments, one thoracic vertebra, one pre-caudal vertebra, two incomplete vertebra of unknown position, and 53 rays/spines/ribs. Trout-sized specimens consisted of three thoracic vertebrae consistent with rainbow trout.

Level Three

Level three contained only 22 faunal specimens. These included: four unidentifiable mammal bone fragments from indeterminate size or taxon, one diaphyseal long bone fragment from an unknown large mammal, seven diaphyseal long bone fragments from indeterminate medium- to large-sized mammal(s), and seven indeterminate element fragments from medium- to large-sized mammal.

Fish bone consisted of two incomplete vertebrae specimens from *Salmonidae* spp. of unknown size, and one incomplete vertebra from a small *Salmonid*.

Level Four

Level four contained one specimen that could not be identified to any taxonomic category due to deterioration/weathering. Nine specimens were unidentifiable fragments from indeterminate mammal(s). Two specimens were from deer, both diaphyseal fragments from metapodials. 20 fragments were from medium- to large-sized mammals, at least one of which was that of diaphyseal long bone. One specimen was from a fragment of bone from an indeterminate small mammal.

Fish specimens from Level four consisted of one fragmentary cranial element (epural bone) from an indeterminate medium-sized bony fish and six unidentifiable fragments of similar designation. Specimens identified to medium *Salmonidae* spp. included one mandibular arch, three thoracic vertebrae, one caudal vertebra, two ultimate vertebrae, six incomplete vertebrae of undeterminable position, 41 rays/spines/ribs, and five unidentifiable fragments consistent in structure with cranial bone fragments.

12 Chinook pre-caudal vertebrae were also identified from Level four.

Level Five

Level Five contained two mammal bone specimens from indeterminate element or taxon, one of which was from a small-sized animal. Two incomplete vertebrae were from *Salmonidae* spp. of indeterminable size, and one incomplete vertebra was consistent with that of rainbow trout.

Table 4.10. Stratum IIa Faunal Assemblage.

Stratum IIa Level 1 Taxon by Block														
	2013 A	2014 A	2013 B	2014 B	2013 C	2014 C	2013 D	2014 D	Stratum IIa Level 1 Total	Level 2	Level 3	Level 4	Level 5	Total IIa
Osteichthyes	33	30	9	2	157	52	12	689	984	28	3	37	3	1055
Salmonidae	33	18	7	0	100	26	0	0	184	4	2	18	2	210
c.f. *Oncorhynchus nerka*	0	0	0	0	25	13	1	682	721	20	0	1	0	742
c.f. *Oncorhynchus tshawytscha*	0	0	0	0	23	10	0	3	36	1	0	12	0	49
c.f. *Salmonid* (trout-sized)	0	12	1	1	1	2	1	4	22	3	1	0	1	27
Indeterminate	0	0	1	1	8	1	10	0	21	0	0	6	0	27
Mammalia	64	57	236	49	140	113	17	340	1016	192	19	31	2	1260
Small	0	0	1	0	3	1	0	5	10	1	0	1	1	13
Medium	1	2	0	0	4	5	0	20	32	0	0	0	0	32
Small-Medium	2	2	0	0	0	0	0	8	12	0	0	0	0	12
Large	15	12	17	17	18	23	9	57	168	16	1	2	0	187
Medium-Large	44	39	80	25	93	73	8	164	526	163	14	20	0	723
Undeterminate	2	2	138	7	22	11	0	83	265	12	4	8	1	290
Artiodactyla	13	12	4	6	10	20	0	35	100	6	0	2	0	108
Indeterminate *Artiodactyl*	0	1	0	1	0	0	0	13	15	2	0	0	0	17
Odocoileus hemionus	0	1	0	1	0	0	0	13	15	4	0	2	0	21
Ovis canadensis	0	1	0	1	0	0	0	13	15	0	0	0	0	15
Carnivora	0	0	0	0	1	1	0	4	6	0	0	0	0	6
Ursus americanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U. arctos	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***Canis* sp.**	0	0	0	0	1	1	0	4	6	0	0	0	0	6
Rodentia	0	0	0	0	0	0	0	10	10	0	0	0	0	10
Castor canadensis	0	0	0	0	0	0	0	10	10	0	0	0	0	10
Ondatra zibethicaus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peromyscus maniculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erethizon dorsatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***Scuriudae* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aves	0	0	0	0	0	0	0	6	6	0	0	0	0	6
Phasianidae sp. (c.f. Dendragapus fuliginosus)	0	0	0	0	0	0	0	2	2	0	0	0	0	2
Phasianidae sp. (c.f. Lagopus leucura)	0	0	0	0	0	0	0	2	2	0	0	0	0	2
Bivalvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ostreidae spp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unidentifiable	0	0	0	0	1	0	0	0	1	0	0	1	0	2

ROOF DEPOSITS

Roof deposits generally consist of a matrix of mixed sediments and other organic and inorganic materials. In all cases at Housepit 54, these deposits have been altered by fire, presumably as the roofs themselves were razed as a precursor to pithouse reconstruction about every 20-25 years. Most roof deposits contain relatively large amounts of artifacts and animal remains that were discarded from the interior of the house onto the roof during the life of the pithouse. Because these remains are associated with both initial roof construction, consisting of the layering and building up of wood beams, various sediments, sod, and other organic materials, as well as countless subsequent depositional events such as refuse disposal, materials recovered from roof contexts cannot be positively associated to exact interior occupation floor levels, features, or activity areas so are therefore considered only generally concomitant with whatever stratum they directly overlay. For these reasons, roof deposits are described separately from the occupational strata that they once housed. Their description is included here because (as will be discussed later) their contents may contribute valuable information regarding assemblage structure between strata.

STRATUM Vc

Stratum Vc represents the remains of a roof deposit from between occupations midway through BR2, between Strata IIh and IIg.

Faunal materials from roof Stratum Vc consisted of 201 specimens from a single level. The assemblage contained 106 mammal bone specimens and 95 fish specimens.

Level One

The mammal bone assemblage from Stratum Vc contained 41 unidentifiable fragmentary specimens from large-sized animal(s). Identifiable specimens from large-sized mammals included 16 fragments of diaphyseal long bone consistent with those of artiodactyls, including three fragments of metatarsal. Other identifiable remains were those of mule deer (*O. hemionus*) and consisted of: one complete cuniform, two complete pisiforms, one sesamoid, one complete 1st phalanx, two proximal phalange fragments that could not be identified to position, one diaphyseal fragment of a right radius, one rib fragment, one diaphyseal fragment of a tibia, and one selenodont molar consistent with mule deer samples, but potentially from any similarly-sized *Cervidae* spp. with selenodont dentition.

Specimens from medium- to large-sized mammals consisted of 27 unidentifiable fragments from indistinguishable elements, although 11 of which were fragments from diaphyseal portions of long bones.

Fish specimens consisted of one cranial element fragment from an undistinguishable medium-sized bony fish, three specimens from Chinook salmon (*O. tshawytscha*) – one cranial bone fragment, one pre-caudal vertebra, and one Haemel spine (a caudal portion), 90 sockeye (*O. nerka*) specimens, and one incomplete thoracic vertebra from a rainbow trout (*O. mykiss*). Sockeye specimens consisted of one cranial bone – a Branchial arch, 43 thoracic vertebrae, 34 pre-caudal vertebrae, one caudal vertebra, one ultimate vertebra, one incomplete vertebra of unknowable position, and nine rays/spines/ribs.

STRATUM Vb

Stratum Vb actually represents deposits from two roofing events, one from Blocks A and C, and one, seemingly a sub-roof overlaying a portion of Block B, both constructed midway through BR3, between Strata IId and IIc. Because these roofs overlay the same occupation floor (Stratum IId) they have been combined for the purposes of this analysis.

Faunal materials from roof Stratum Vb consisted of 178 specimens from one level and two features (B-3 and D-8). The assemblage contained 135 mammal bone specimens and 43 fish specimens.

Level One

The mammal bone assemblage from Stratum Vb contained six specimens from undistinguishable elements from individuals of unknown size or taxon. Specimens from large-sized mammals included 60 fragments from undeterminable elements, 46 of which were diaphyseal portions of long bones. Other specimens from large-sized mammals included one fragment of a metapodial from an undistinguishable artiodactyl, one proximal fragment of a radius and two diaphyseal fragments from a tibia – both from bighorn sheep (*O. canadensis*); one diaphyseal fragment compared favorably to the right metapodial of a mule deer (*O. hemionus*), and other identifiable deer remains consisted of one dew claw, three metatarsal fragments, two radius fragments – one a distal portion of a right radius, one diaphyseal tibia fragment, one selenodont deer premolar (which could possibly be from a similarly-dentitioned *Cervidae* genera of deer/sheep-size, but compared favorably to mule deer in the comparative collection), one rib fragment, and one diaphyseal fragment from a long bone not positively identifiable to specific element but consistent in size, bone structure, and diameter to those of mule deer.

Specimens from medium- to large-sized mammals consisted of 40 fragmentary pieces of bone, all unidentifiable to specific element, but 25 of which were diaphyseal portions of long bone.

Medium-sized mammal bone consisted of only five specimens, two of which were undeterminable to element or taxon. Two specimens were from beaver (*C. canadensis*) – one rib fragment and one incisor. The right portion of a porcupine (*Erethizon dorsatum*) mandible was also identified.

One specimen was from an undistinguishable element from an undeterminable small- to medium-sized mammal, and one specimen of small-sized mammal remains compared favorably to the lower incisor of a muskrat (*Ondatra zibethicus*), but could possibly be from a large squirrel (*Sciuridae* spp.) or Yellow-bellied marmot (*Marmota flaviventris*).

Fish bone specimens from the Vb roof deposit consisted of nine incomplete vertebra fragments from *Salmonidae* spp. of undeterminable size range, but likely consistent with medium-sized fish (i.e. sockeye). These included one thoracic vertebra, one pre-caudal vertebra, and seven vertebrae too fragmented to identify to position. Five sockeye (O. nerka) vertebrae were identified, including one thoracic vertebra and four pre-caudal vertebrae.

Feature B-3

Feature B-3 contained four bone specimens: two fragments of undeterminable elements from large-sized mammal(s), one a diaphyseal portion of a long bone; and two entirely unidentifiable fragments from medium- to large-sized mammal(s).

Feature D-8

Feature D-8 contained two mammal bone specimens and 29 fish bone specimens. The mammal bone specimens were both diaphyseal long bone fragments from undeterminable elements from large-sized animals. The fish bone specimens were all from sockeye salmon, and consisted of: 17 cranial bone fragments, one a pectoral girdle, but the others too fragmentary to identify to element, and 12 rays/spines/ribs.

STRATUM Va

Stratum Va represents the final roof at Bridge River during the BR3 period – marking the last roof burned down over the last floor (IIa) seemingly immediately prior to village abandonment.

Faunal materials from roof Stratum Va consisted of 985 specimens from four levels. The assemblage contained 723 mammal bone specimens, 273 fish specimens, 11 bird specimens, and 15 taxonomically unidentifiable specimens.

Level One

Mammal bone from Level one consisted of 570 fragmentary specimens (no complete mammal bone was recovered). Of these, 35 were from indeterminate elements from unidentifiable mammal(s). 154 specimens were similarly unidentifiable element fragments from large-sized mammal (although, three specimens were identified that compared favorably to specific elements of mule deer (*O. hemionus*): one metatarsal, one rib, and one diaphyseal tibia – all fragments). 285 were from medium- to large-sized mammal; 40 were from indeterminate medium-sized mammal, one was from small-to medium-sized mammal, and one specimen was from an indistinguishable small mammal bone.

Identifiable bone specimens from large mammals included one calcaneus, one lumbar vertebra, and one rib, all fragments and all from indeterminate deer/sheep-sized artiodactyl. Two specimens came from bighorn sheep (*O. canadensis*). These consisted of one radius fragment and one ulna fragment with cut marks. 42 fragmentary specimens were identified as mule deer. These included: one 1st phalanx, one 2nd phalanx, and one 3rd phalanx (all from different spatial contexts, although the 1st and 2nd phalanx do come from adjacent Units in Block A and thus could be from the same individual). Other deer specimens consisted of: one epiphyseal articular process from an undeterminable long bone, three rib fragments, one diaphyseal femur fragment, two humerus fragments (both with spiral fractures and one with flake scars and some evidence of polishing), one metacarpal fragment, six metatarsal fragments, one fragment from an indeterminable metapodial, one phalanx fragment, one radius fragment, four fragments of tibia, one diaphyseal ulna fragment, two indeterminable vertebra fragments, and 14 diaphyseal long bone fragments from unknown elements. One fragment of a selenodont tooth from a deer/sheep-sized *Cervidae* was also recovered.

Identifiable bone attributed to medium- to large-sized mammal(s) consisted of one rib fragment and one vertebra fragment, both from undeterminable taxon.

Identifiable specimens from medium-sized mammals consisted of one tibia fragment, one rib fragment, and one incisor from beaver (*C. canadensis*). One fragment compared favorably to a dog (c.f. *C. latrans*) ulna, and one carnassial tooth was also from dog. Other identifiable fragments consisted of one 1st phalanx, and one section of vertebral epiphysis, neither of which could be identified to taxon.

Specimens from small- to medium-sized mammal and small-sized mammal consisted of a single fragment from indeterminable origin from each.

Avian faunas from Level one consisted of 12 specimens, including five crania fragments, one fragmentary mandible, and three pelvis fragments, all from a medium (grouse-sized) bird that compared favorably to a member of the *Phasianidae* family, likely Sooty Grouse (*Dendragapus fuliginosus*) or Dusky Grouse (*Dendragapus obscurus*). One incomplete occipital bone was from a smaller bird – possibly a Ptarmigan (*Lagopus* spp.), Band-tailed Pigeon (*Patagionas fasciata*) or similar slightly smaller-sized avian. Two specimens could not be positively identified, but one was determined to be a diaphyseal fragment from a long bone, probably an ulna or lower section of a tibiotarsus, and possessed four un-decorative perpendicular cut marks and had also been polished.

Fish remains from Level one of stratum Va included 36 specimens from indeterminate medium-sized *Osteichthyes* (bony fishes) including 34 fragmentary vertebra of undeterminable position, one ray/spine/rib, and one unidentifiable element fragment (likely cranial); five specimens from *Salmonidae* spp. of indeterminable size included one fragmentary Branchial arch, one caudal vertebra, one ray/spine/rib, and two unidentifiable fragments. 31 specimens were from medium-sized *Salmonidae* spp. (likely Sockeye or Pink, but also potentially in the size range of steelhead, Coho, or Chum salmon). These consisted of: four thoracic vertebra, six pre-caudal vertebrae, 19 incomplete vertebrae of undeterminable position, and one ray/spine/rib. One fragment could not be positively identified beyond that of bony fish.

Sockeye (*O. nerka*) remains consisted of 81 specimens. These included: 14 thoracic vertebrae, three pre-caudal vertebrae, 11 caudal vertebrae, and 51 incomplete vertebrae of undeterminable position.

Four specimens were from Chinook salmon (*O. tshawytscha*). These consisted of three fragmentary vertebrae and one caudal vertebra.

Remains from small-sized fish included two thoracic vertebrae that could not be positively identified to specific taxon beyond coming from bony fishes. 19 specimens were from rainbow trout (*O. mykiss*), including: nine thoracic vertebrae, three caudal vertebrae, and seven incomplete vertebrae of indistinguishable position. Other small fish remains included 13 thoracic vertebrae, five caudal vertebrae, five incomplete vertebrae of undeterminable position, and one ray/spine/rib.

Levels One and Two

The transition between Level one and Level two in Unit 14 of Block C was difficult to distinguish, resulting in four bone specimens having been collected as from Level 1/2. For purposes of this analysis, these specimens have been included in the Level one count outside this description (Tables and subsequent Figures). These specimens consisted of: one spiral-fractured fragment that compared favorably to the humerus of a black bear (*Ursus americanus*), one vertebra fragment from an undistinguishable medium-sized mammal, one diaphyseal long bone fragment from an indeterminable large-sized mammal, and one caudal vertebra from a small salmonid.

Level Two

Level two contained 157 specimens: 128 from mammals and 29 from bony fishes.

The Level two mammal bone assemblage contained three fragmentary specimens that could not be distinguished to size or taxon. Bone fragments attributed to large-sized mammals consisted of 30 specimens from indeterminable element or taxon (including one metacarpal/metatarsal fragment). Other specimens from large-sized mammals consisted of: two diaphyseal tibia fragments, one right humerus fragment with multiple perpendicular cut marks, one radius fragment, one rib fragment, and one undeterminable vertebra fragment. One fragment of a cervical vertebra from an indistinguishable artiodactyl was also identified.

Medium- to large-sized mammal bone specimens consisted of 72 fragments from undeterminable element or taxon. Medium-sized mammal bone consisted of one fragment of a dog humerus, and eight unidentifiable bone fragments, two of which appeared to be cranial.

Mammal bone from small-sized animals consisted of two unidentifiable fragments and two fragmentary rodent humerii, both from mouse-sized individual(s).

The fish bone assemblage from Level two contained: six incomplete specimens from *Salmonidae* spp. of undeterminable size, including two thoracic vertebrae, two caudal vertebrae, one ray/spine/rib, and one undistinguishable fragment (likely from a cranial element). Five incomplete vertebrae were from medium-sized bony fish of undistinguishable taxon. Eight specimens were from sockeye salmon, including: one thoracic vertebra, four caudal vertebrae, and three incomplete vertebrae of unknowable position.

Level 2 fish bone specimens from small-sized fish included: one entirely unidentifiable fragment (possibly cranial), eight specimens consistent with small-bodied *Salmonidae* spp. (likely rainbow trout but potentially Mountain whitefish [*Prosopium williamsoni*], or char [*Salvelinus* spp.]) or other similarly-sized salmonids, including three thoracic vertebrae, two caudal vertebrae, one undeterminable vertebra, one unidentifiable fragment, and one ray/spine/rib. One rainbow trout thoracic vertebra was also identified.

Level Three

The Level three faunal assemblage from stratum Va contained 26 specimens. These consisted of: three unidentifiable fragments from large-sized mammal(s); four deer bone specimens including one incomplete phalanx fragment and one incomplete 3rd phalanx fragment and two unidentifiable diaphyseal long bone fragments; ten unidentifiable fragments of bone from medium- to large-sized mammal(s); four fragmentary specimens from medium-sized mammals, including two from beaver – the 1st and 2nd phalanges (these articulate and are likely from the same individual); one humerus fragment from a indeterminate mouse-sized mammal; and four specimens from a small-sized *Salmonidae* spp., including one thoracic vertebra and three unidentifiable fragments (likely from cranial elements).

Level Four

A single unidentifiable fragment from a trout-sized *Salmonidae* spp. was recovered from Level four.

TOTAL ASSEMBLAGE

Stratum	IIa	IIb	IIc	IId	IIe	IIf	IIg	IIh	IIi	IIj	Total *
Taxon											
Osteichthyes	**1055**	**1880**	**478**	**235**	**272**	**488**	**149**	**134**	**114**	**71**	**4876**
Salmonidae	210	673	16	13	0	0	0	0	0	0	912
c.f. *Oncorhynchus nerka*	742	1035	380	181	248	387	138	131	110	63	3415
c.f. *Oncorhynchus tshawytscha*	49	4	0	1	0	6	1	1	0	0	62
c.f. *Salmonid* (trout-sized)	27	41	6	4	3	19	0	3	0	7	110
Indeterminate	27	127	76	36	54	75	10	0	4	1	410
c.f. Gadidae	0	0	0	0	0	1	0	0	0	0	1
Mammalia	**1260**	**721**	**604**	**278**	**306**	**542**	**375**	**120**	**75**	**84**	**4365**
Small	13	13	1	12	15	1	0	0	4	1	60
Medium	32	77	78	104	40	59	6	14	5	8	423
Small-Medium	12	15	8	4	4	0	27	1	25	0	96
Large	187	219	350	71	76	179	96	25	17	14	1234
Medium-Large	723	329	133	47	171	294	130	33	12	56	1928
Indeterminate	290	53	34	10	7	11	114	48	12	5	584
Artiodactyla	**108**	**89**	**46**	**15**	**41**	**64**	**38**	**21**	**16**	**11**	**449**
Indeterminate *Cervidae/Artiodc*	12	17	2	4	13	26	2	1	1	0	78
Odocoileus hemionus	21	92	40	11	26	38	34	18	14	10	304
Ovis canadensis	15	0	4	0	2	0	1	2	1	1	26
Oreamnos americana	0	0	0	0	0	0	1	0	0	0	1
Carnivora	**6**	**8**	**6**	**5**	**1**	**7**	**1**	**7**	**0**	**2**	**43**
Ursus americanus	0	0	**0**	0	0	0	0	0	0	0	0
U. arctos	0	0	**0**	1	0	0	0	0	0	0	1
Canis sp.	6	10	**6**	4	1	7	1	7	0	2	44
Martes sp.	0	0	0	0	0	0	0	0	0	0	0
Rodentia	**10**	**11**	**2**	**9**	**18**	**9**	**4**	**6**	**4**	**1**	**74**
Castor canadensis	10	7	2	**2**	4	8	4	6	1	0	44
Ondatra zibethicaus	0	0	0	**2**	0	0	0	0	0	0	2
Peromyscus spp.	0	3	0	**1**	4	0	0	0	3	0	11
Indeterminate	0	1	0	4	0	0	0	0	0	1	6
Erethizon dorsatum	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
***Scuriudae* sp.**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Aves	**6**	**8**	**3**	**0**	**4**	**2**	**4**	**0**	**1**	**0**	**28**
Phasianidae spp.	4	8	2	0	1	2	4	0	0	0	21
Falconiformes spp.	0	0	1	0	0	0	0	0	0	0	1
Indeterminate	2	0	0	0	3	0	0	0	1	0	6
Bivalvia	**0**	**0**	**1**	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**20**
Ostreidae spp.	0	0	1	19	0	0	0	0	0	0	20
Unidentifiable	**2**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**7**

* Total Analytical assemblage - rays/spines/ribs of Osteichthyes are not included.

Table 4.11. Animal Taxa by Stratum and Total Numbers of Faunal Specimens by Strata.

STRATA XVI & XVII

A full analysis of rim deposits (Strata XVI and XVII) at Housepit 54 has not yet been undertaken. This is because excavations of rim strata are as yet incomplete. Further excavations will be detailed in subsequent reports as the rim depostis are further explored. The following discussion touches on a possible direction to take future rim analyses in order to answer questions regarding waste discard and taphonomic processes leading to bone distributions.

Prentiss et al (2002: 722) describe that "winter housepits can be exceedingly complex from a stratigraphic standpoint… housepits typically have a final occupation floor and associated collapsed roof, surrounded by a ring of rim-midden deposits chronicling cycles of occupation, temporary abandonment, and reoccupation." Hayden (1997: 30) suggests that lenses of rim deposit "vary dramatically" from compositions of organic material to roof-like and "essentially… sterile underlying till." These rim-middens represent instances of re-digging of the house pit after a period of abandonment, cleaning, or razing in which detritus from the floors of the structure were scooped out, achieving the dual purpose of making the pit itself deeper and certainly less-cluttered, but also building up the rim surrounding the pit creating a crater-like appearance. Materials from the rim were also redeposited onto the outer roof during the final phases of construction, presumably to provide "additional insulation" (Hayden 2000: 11). Faunal materials recovered from this jumbled context are often left out during analysis due to their lack of stratigraphic integrity.

At Housepit 54 the amount of axial bone specimens in the rim deposits is far less than that recovered from stratigraphic floors[1], and significantly less relative to the distributions recovered during 2013 from the earliest cache/storage features related to the earliest occupation levels of the house (i.e. Strata IIj, IIi, IIh; see Tables 4.12, 4.13, and 4.14 below).

Table 4.12. Rim Deposit Bone Frequencies of Axial Elements (2012 Data).

STP_XVI_Axial Specimens	**Rib**	**Vertebra**	**Innominate**	**Cranial/Mandibular**	**Tooth**
Medium Mammal	1	0	0	0	0
Large Mammal	0	0	0	4	4
Medium-Large Mammal	0	0	0	22	0
Artiodactyl	1	0	0	0	6
Odocoileus sp.	2	1	3	0	3
Canid	1	2	0	0	0
Carnivora	2	0	0	0	0
Castor canadensis	2	0	0	0	0
Martes pennanti	0	0	0	1	0
Total	**9**	**3**	**3**	**27**	**13**

[1] http://www.cas.umt.edu/grants/bridgeRiver/data/default.php

Table 4.13. Initial Rim Deposit Bone Frequencies (2012 data).

Diaphyseal+Long Bone	Axial Bone
401	42
Diaphyseal+Long Bone Index	0.9051
Axial Bone Index	0.094808
Mammal Specimens	1354
Fish Specimens	437
Fish Index	0.243997
Mammal Index	0.756002

Table 4.14. Rim Deposit Bone Frequencies and Relative Indices (2012 Data).

M-L Mammal Whole Elements	M-L Mammal Diaphyseal Fragments	M-L Mammal Fragments	∑ Diaphyseal Fragments /(∑Diaphyseal+∑Frags)
39	362	703	0.339906
Whole Element Index	Diaphyseal Fragment Index	Fragment Index	∑ Fragments /(∑Diaphyseal+∑Frags)
0.035326	0.327898	0.636775	0.6629

Theoretically, faunal remains from the rim should consist of materials similar to those of floor deposits, as the rim consists of a mixture of surface materials removed from previous floors presumably having accumulated from earlier instances of butchery activities within the house. Much more mammal bone than fish bone was deposited in the rim at HP54. The vast majority of osseous materials from the rim are bone fragments from medium- to large-sized mammals, roughly 1/3 of which are those from medium-large-mammal long bone shafts (diaphyseal). Greater amounts of diaphyseal long bone than axial bones were deposited on floors (and likewise from floors onto rim and possibly roof) as opposed to that deposited into early storage/cache pits. Identifiable element fragments from the rim include nearly all the major fore- and hind-limb bones, including: scapula, radius, ulna, tibia, metapodials, metatarsals, various tarsals, carpals, and phalanges, but not the humerus or femur (these elements would likely have seen the most fragmenting for marrow extraction, or alternatively may have been removed entirely along with the prime sections of meat that surround them if consumption or processing of these high-utiliy parts was done outside the house). It is possible that the higher frequency of axial elements in internal pits stems from earlier stages of discard of those elements during processing. As medium and large bodied carcasses were dismantled, axial parts might be set aside (say for bone grease boiling or for use in a stew) while long bones remained under attention for further breaking down (e.g. for marrow extraction). The diaphyseal fragments of exceedingly processed long bones might then remain in greater frequency on the floor, while whole or fragmentary axial parts could be discarded into refuse pits upon their exhaustion. This might explain a dearth of axial materials having made it into rim deposits while remaining in relatively greater frequency elsewhere. Further rim deposit assessments may illuminate various discard practices, but more data is needed.

Relative Abundance Indices

Relative abundance indices have become common in zooarchaeological analyses, largely due to their utility in providing easily interpretable results from a variety of taxonomic values. Frank Bayham's (1979) initial use of relative abundance indices successfully illustrated how archaeological patterns of abundance in one taxon may actually be indicative of declines in another. Works in the mid-1990s by Jack Broughton (1994a, 1994b, 1995) and Joel Janetski (1997) refined this method as a staple analytical tool for assessing resource depression, intensification, and subsistence change within archaeological research. Subsequent studies have further developed the application of various relative abundance indices for use in archaeological investigations (see Butler 2000, 2001; Dean 2001; Grayson and Delpech 1998; Lyman 2003a, 2003b, 2004; Nagaoka 2001; Stiner et al. 1999).

Generating relative abundance indices between various faunas (or taxonomic classes) from different strata makes it possible to track changes in the frequencies of animal resources relative to other animal resources over time. All relative abundance indices are determined using the following basic equation:

$\sum A / \sum (A+B)$

where $\sum A$ = NISP of the taxon for which the index is meant to provide a relative abundance of; and B is the NISP of the taxon (or taxa) against which A will be weighed.

We generated relative abundance indices on a number of scales based on both identifiable taxa and relative taxonomic categories across strata in order to assess temporal patterns in prey acquisition over time. For example, at the most taxonomically-specific level, identifiable animal remains at Housepit 54 are most commonly represented by two genera/species: Sockeye salmon and artiodactyls (most commonly deer). Thus, a floor-by-floor Artiodactyl index was calculated as:

$\sum$Artiodactyls / $\sum$ (Artiodactyls + Sockeye) (see results in Table 4.15)

Table 4.15. Artiodactyl Relative Abundance Index for NISP Artiodactyl vs. Sockeye.

Artiodactyl Index by Stratum			
Strata	**Sockeye NISP**	**Artiodactyl NISP**	**Artiodactyl Index**
Stratum IIa	742	108	0.127058824
Stratum IIb	1035	89	0.079181495
Stratum IIc	380	46	0.107981221
Stratum IId	181	15	0.076530612
Stratum IIe	248	41	0.141868512
Stratum IIf	387	64	0.141906874
Stratum IIg	138	38	0.215909091
Stratum IIh	131	21	0.138157895
Stratum IIi	110	16	0.126984127
Stratum IIj	63	11	0.148648649

These results illustrate variability in the amounts of identifiable artiodactyl remains to those of Sockeye at Housepit 54 over time (Figure 4.12). According to these results artiodactyls make up a significantly low proportion of the Housepit 54 faunal assemblage, although they are by far the most identifiable mammalian class represented. As a measure of relative dietary contributions, the inverse of the Artiodactyl Index – the Sockeye Index (simply the inverse of the values presented in the "Artiodactyl Index" column of Table 4.12) suggests that salmon were disproportionately important to the prehistoric diet at Housepit 54 across strata, averaging nearly 90% of the relative contributions between the two categories.

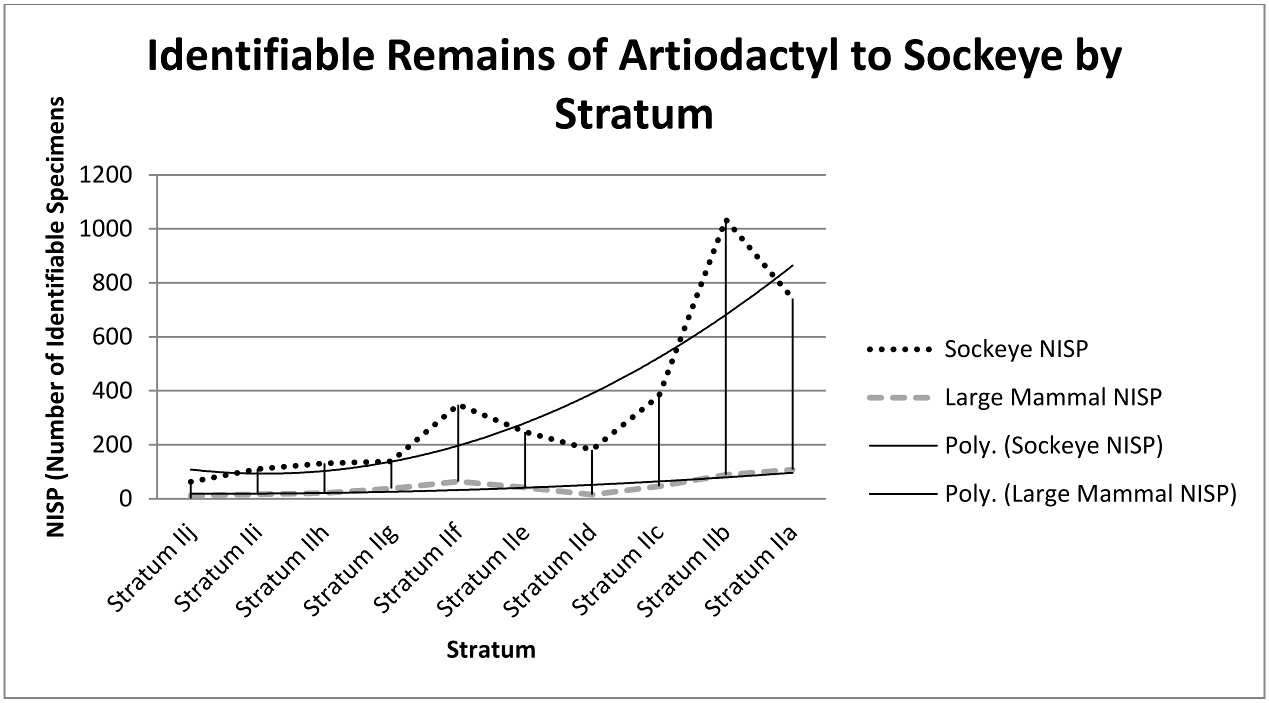

Figure 4.1. Sockeye (sockeye/sockeye+artiodactyl) and Artiodactyl (identified as large mammal in figure) (artiodactyl/artiodactyl+sockeye) indices by Stratum.

Further, these results show distinct increases in Sockeye over time during mid- to late-BR3 and very little increase in artiodactyls (Figure 4.1). Ultimately, the Artiodactyl Index suggests a decline in artiodactyls over time (Figure 4.2) based solely on the Artiodactyl Index values, but this is likely due to an inordinate amount of large mammal bone (that most likely belongs to artiodactyls) that is too fragmentary to positively identify.

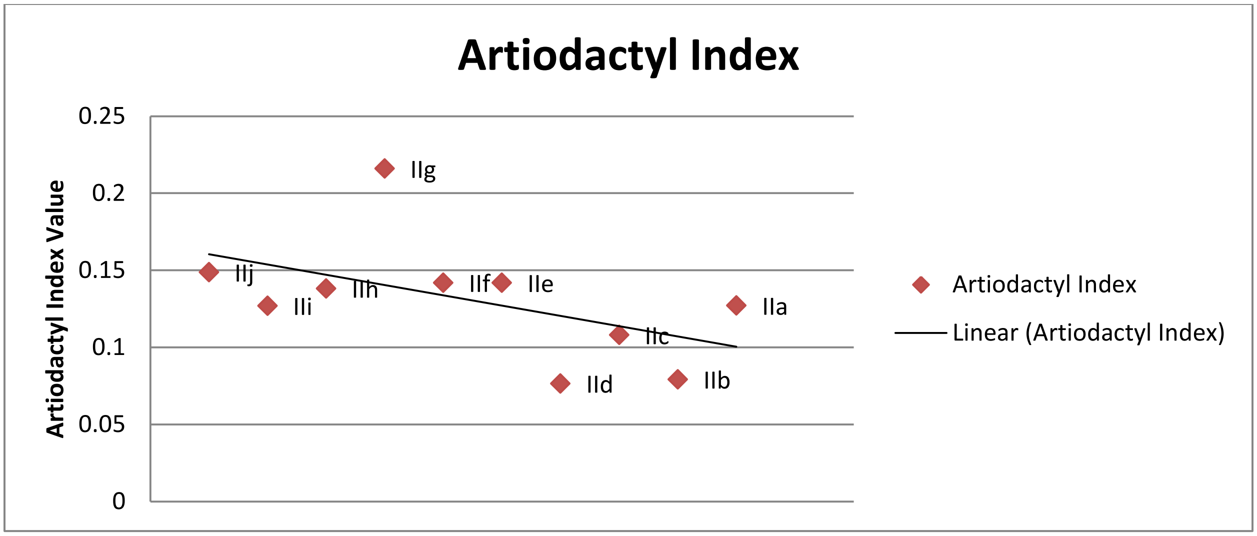

Figure 4.2. Artiodactyl Index Values Over Time Based on Table 4.12.

Clearly, based solely on the general numbers of specimens recovered, relying on NISP based specifically on genera/species provides an unrealistic picture of the probable dietary range enacted at Housepit 54. This is largely due to the fact that mammal bone specimens in the assemblage are fragmented to such a degree as to cause intact or mostly-intact fish bones to be positively identified at a much greater rate. Thus, it is necessary to examine patterns in the assemblage at a more generalized but more illustrative scale that takes into account the available evidence of terrestrial mammal predation as well as that of fish accumulation.

To achieve a more generalized representation we calculated relative abundance indices for two very broad resource categories: marine resources and terrestrial resources. This generated two gross relative abundance indices – one for fish and one for mammals – both based on relative size categories. The fish index was produced using NISP based on relative size following Huber et al.'s (2011) findings that salmonid archaeofaunas can be identified to three basic size categories: small (trout-sized), medium (Sockeye[2]-sized), and large (Chinook-sized). Because medium-sized fish are very clearly the most abundant size category throughout the assemblage, the general fish index was calculated as:

∑Medium-sized Fish / ∑ (Medium-sized + Trout-sized + Chinook-sized Fish) (see results in Table 4.16 and Figure 4.3)

[2] Huber et al.'s (2011) findings indicate that two basic medium-sized categories exist among Pacific salmonids. These include one category that consists of Pink and Sockeye, and another category that consists of Chum, Coho, and Steelhead. For simplicity, both of these medium-sized categories are combined here into a single "Sockeye-sized" or "Medium-sized" category.

Table 4.16. Medium-sized Fish Index.

Medium-sized Fish Index			
Strata	**All Fish NISP**	**Medium-sized Fish NISP**	**Medium-sized Fish Index**
Stratum IIa	818	742	0.907090465
Stratum IIb	1080	1035	0.958333333
Stratum IIc	386	380	0.984455959
Stratum IId	186	181	0.97311828
Stratum IIe	251	248	0.988047809
Stratum IIf	412	387	0.939320388
Stratum IIg	139	138	0.992805755
Stratum IIh	135	131	0.97037037
Stratum IIi	110	110	1
Stratum IIj	70	63	0.9

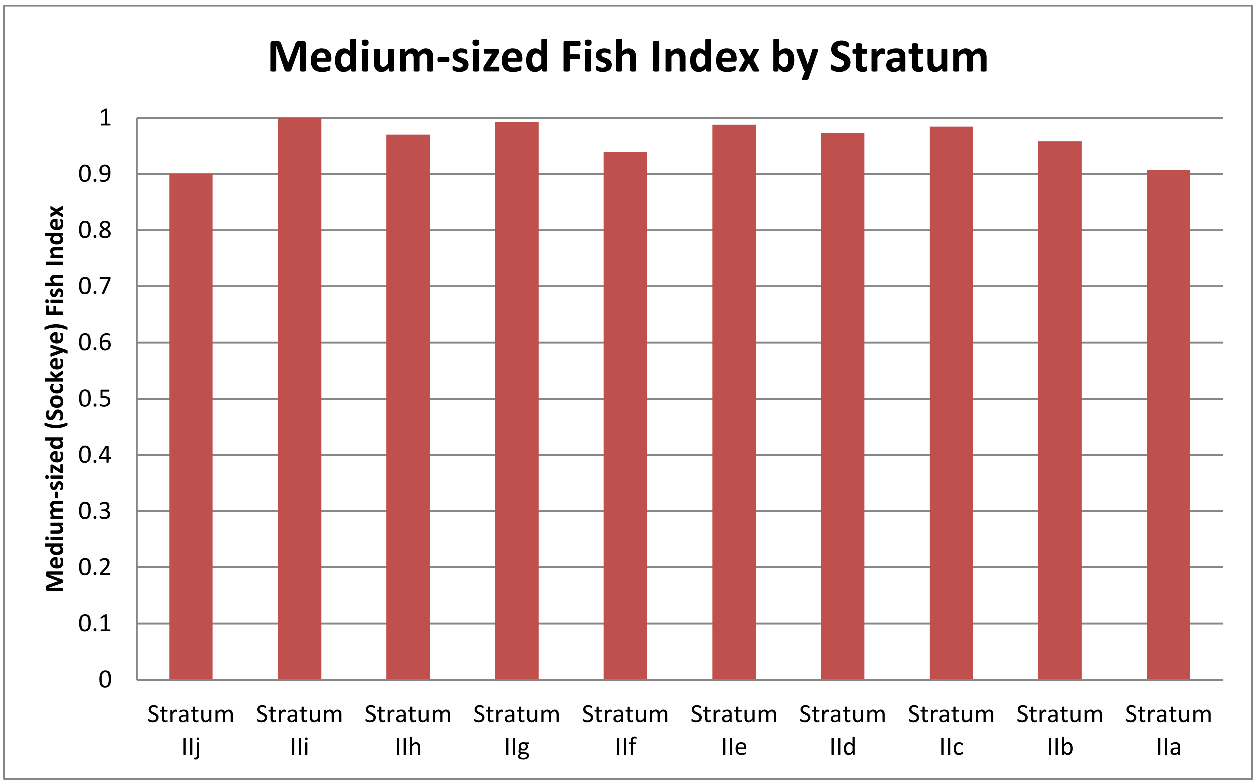

Figure 4.3. Medium-sized Fish Index by Stratum based on Medium-sized Fish Index in Table 4.16.

The mammal index was generated similarly, but with additional categories representing greater variability in terrestrial mammal bone morphology: small-, small- to medium-, medium-, medium- to large-, and large-sized mammals as described in the discussion on Methods. As with the fish bone assemblage, among the mammal bone specimens bones attributed to animals within two size categories are by far the most common – those belonging to medium- to large-sized animals and those from large-sized animals. Because bones attributed to medium- to large-sized animals is a somewhat indefinite category that invariably includes bones belonging to both medium- and large-bodied animals, we generated a relative abundance index based solely on large-sized mammals and one inclusive of medium- to large-sized and large-sized mammals. These are (respectively) calculated as:

∑Large-sized Mammals / ∑ (Small+Small-Medium+Medium+Medium-Large+Large Mammals) (Table 4.17)

and

∑Med-Lrg+Lrg-sized Mammals / ∑ (Small+Small-Medium+Medium+Medium-Large+Large Mammals) (Table 4.18 and Figure 4.4)

Table 4.17. Large-sized Mammal Index.

Large Mammal Index			
Strata	**All Mammals NISP**	**Large Mammal NISP**	**Large Mammal Index**
Stratum IIa	967	187	0.193381593
Stratum IIb	653	219	0.335375191
Stratum IIc	570	350	0.614035088
Stratum IId	238	71	0.298319328
Stratum IIe	306	76	0.248366013
Stratum IIf	533	179	0.335834897
Stratum IIg	259	96	0.370656371
Stratum IIh	73	25	0.342465753
Stratum IIi	63	17	0.26984127
Stratum IIj	79	14	0.17721519

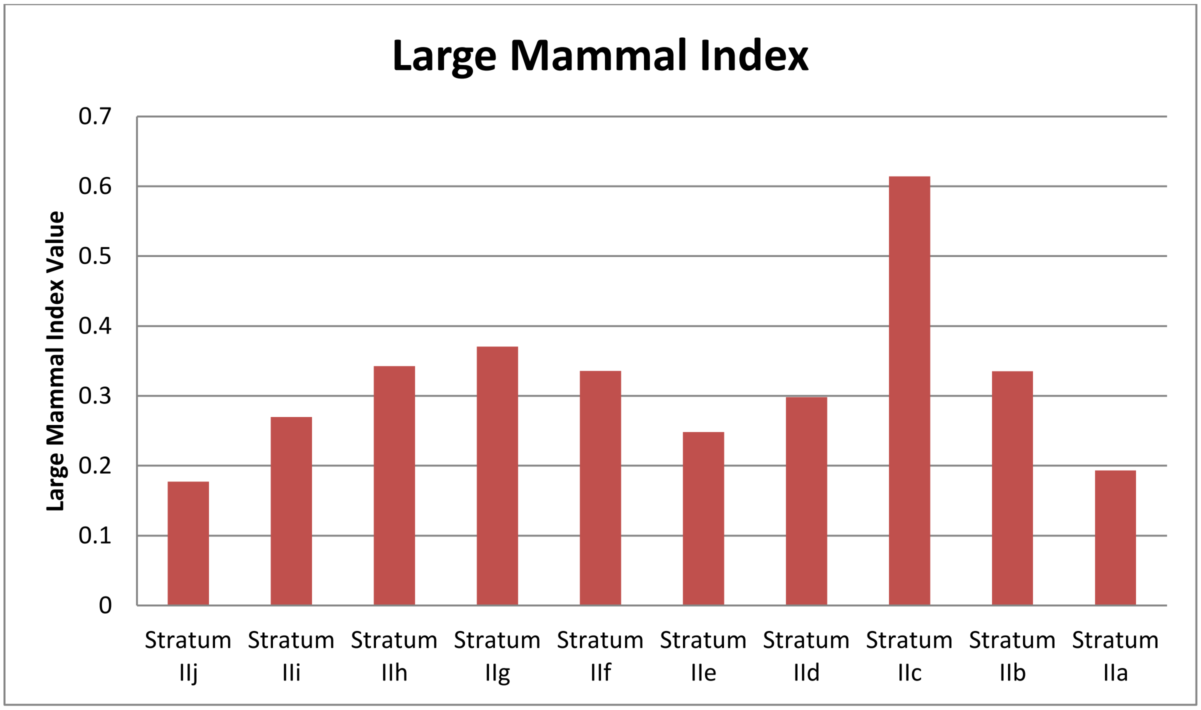

Figure 4.4. Large Mammal Index by Stratum based on results in Table 4.17

Table 4.18. Medium- to Large- *and* Large-sized Mammal Index.

Med-Large Mammal Index Strata	All Mammals NISP	Med-Large Mammal NISP	Med-Large Mammal Index
Stratum IIa	967	910	0.941054809
Stratum IIb	653	548	0.839203675
Stratum IIc	570	483	0.847368421
Stratum IId	238	118	0.495798319
Stratum IIe	306	247	0.807189542
Stratum IIf	533	473	0.887429644
Stratum IIg	259	226	0.872586873
Stratum IIh	73	58	0.794520548
Stratum IIi	63	29	0.46031746
Stratum IIj	79	70	0.886075949

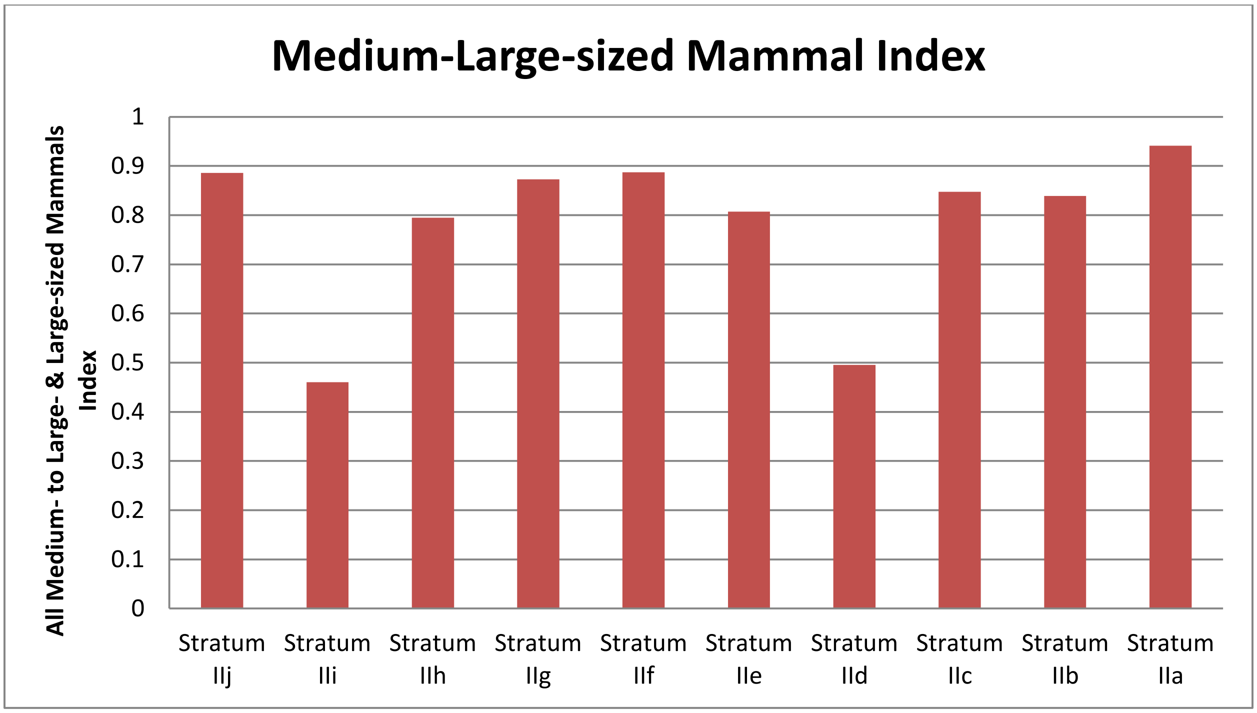

Figure 4.5. Medium- to Large- *and* Large-sized Mammal Index based on results in Table 4.18.

The results of these various indices offer a number of conclusions about size-based taxonomic variability within the assemblage. First, clearly “Medium” or “Sockeye-sized” salmon dominate the fish bone assemblage across all strata (Table 4.16). Second, Medium- to Large- and Large-sized mammals dominates much of the mammal bone assemblage, even though much of that assemblage cannot be positively identified beyond size category. Strata IIi and IId both show greater size variability in terrestrial faunas, IIi exhibiting a higher amount of unidentifiable bone from medium-sized mammals, and IId having a greater amount of bone attributed to small- to medium-sized mammals. Nevertheless, the overall trend is one in which a significant amount of bone can be attributed to larger terrestrial mammals, suggesting that hunting (of whatever large-bodied animals) was a common undertaking and played a substantial role in subsistence practice at Housepit 54.

With this in mind, what can be said of the relative abundances between the two most basic taxonomic categories of subsistence resources represented within the pithouse? At the most general level, diet at Housepit 54 can be observed to have consisted primarily of terrestrial animals and fish (notwithstanding a considerable contribution from wild plants, berries, and geophytes that is beyond the scope of this analysis). Thus, a floor-by-floor Mammal/Fish index for terrestrial mammals vs. fish+mammal was calculated (Table 4.19).

Table 4.19. Mammal/Fish+mammal Relative Abundance Index.

Mammal Index by Stratum			
Strata	**Fish NISP**	**Mammals NISP**	**Mammal Index**
Stratum IIj	71	84	0.541935484
Stratum IIi	114	75	0.396825397
Stratum IIh	134	120	0.472440945
Stratum IIg	149	375	0.715648855
Stratum IIf	488	542	0.526213592
Stratum IIe	272	306	0.529411765
Stratum IId	235	278	0.541910331
Stratum IIc	478	604	0.558225508
Stratum IIb	1880	721	0.277201077
Stratum IIa	1055	1260	0.544276458

Charted out, these results illustrate variability in the amounts of terrestrial mammals vs. fish consumed at Housepit 54 over time and show a far more complex relationship between terrestrial and marine resource contributions to the diet (Figure 4.6).

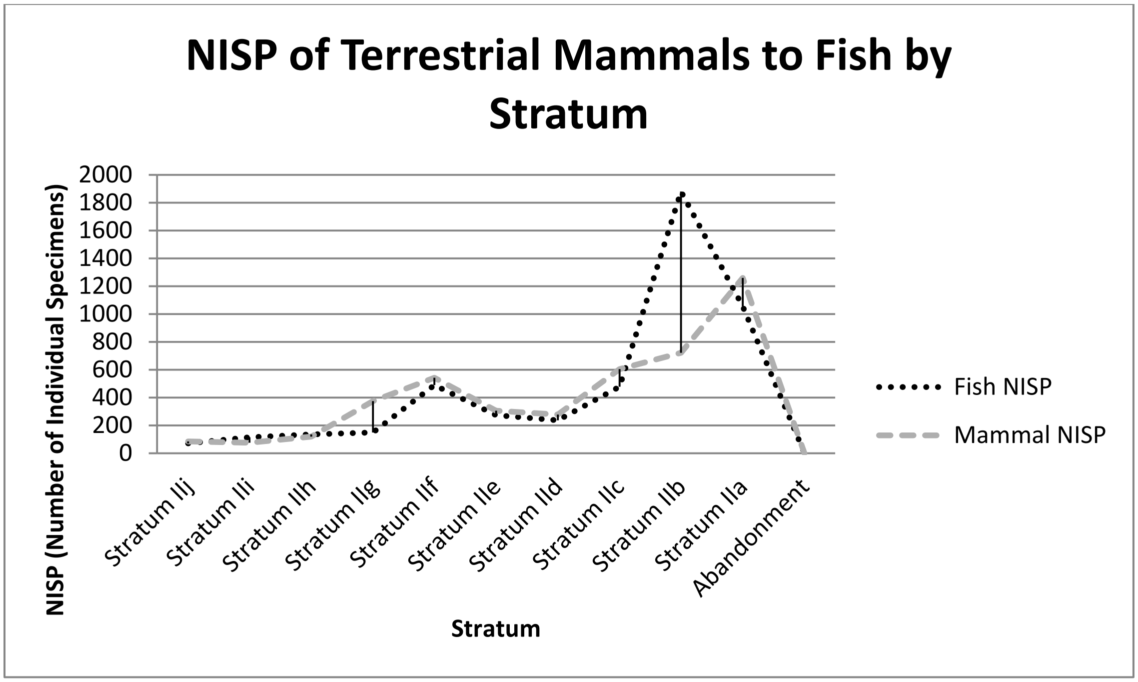

Figure 4.6. NISP of Terrestrial Mammals to Fish+mammal and fish to fish+mammal, from the data presented in Table 4.19.

At this most general of taxonomic levels the relative mammal index indicates that the portion of animal proteins consumed at Housepit 54 consisted of, on average, about 50% terrestrial mammals and 50% fish (Avg. of the above Mammal/Fish Index = 0.5104 or ~ 51%), considerably different than if we look solely at specimens positively identifiable to genera/species. Overall, this represents a balanced contribution between terrestrial animals and fish. Clearly, the relative contributions fluctuated, as is also clear from the Mammal/Fish Index. As this includes fragmentary mammal bone specimens, it may indicate simply a greater degree of bone processing taking place during IIf and IIb-IIa resulting in higher counts of fragmented bone. A summary of subsistence trends based on the Mammal/Fish Index may be considered as follows: house occupations during IIj practiced a well-balanced mammal-to-fish ratio in the diet. During IIi fish became more prevalent but not drastically so. During IIh the diet once again evened-out to a relatively equal distribution between mammals and fish. During IIg terrestrial mammals became prevalent and, as we have seen from the distribution of identified elements from this occupation period, high-utility appendicular elements were commonly brought into the pithouse, suggesting the transport of these valuable parts from outside the immediate local vicinity, possibly in response to local resource depression (Broughton 1994b). During IIf the dietary ratio again appears to even-out even as overall numbers of animal remains increases fairly dramatically, suggesting a notable increase in the amounts of animals brought into the house; this provides for the possibility that during this stratum the household itself increased in number, necessitating the acquisition of greater numbers of animals, both mammal and fish. During IIe the overall numbers of animal remains decreases from that of the previous IIf occupation but nevertheless remains significantly higher than those of the early- and mid-BR2 strata. Interestingly, the difference in the Mammal/Fish ratio between IIf and IIe is only 0.00319 regardless of a considerable difference in overall NISP numbers – strongly suggesting that the subsistence strategy in place during the BR2-BR3 transition was extremely consistent. This presents the possibility that the transition occurred during a time of developing social cohesion, or at least of increasing persistence in subsistence practices from one incarnation of the house structure to another. Faunal remains from strata IId and IIc continue the trend of increased remains overall (both double) and slightly greater frequency of mammal remains to those of fish. However, the relative abundance of mammals to fish remains close to 50-50, showing the clear importance of both resources to the local diet during these periods. During IIb - the penultimate occupation stratum – mammal bone frequencies continue to increase but evidence of fish remains skyrocket to nearly 400% that of the previous stratum. Since relative numbers of faunal remains are a direct indicator of a community's most basic dietary needs (Reitz and Wing 2008: 6), an increase of such magnitude suggests that population densities, at the pithouse level at least, increased dramatically during the later occupations of BR3, likely fully realized during the occupations of the Stratum IIb floor.

The general picture of IIb subsistence practices is one in which large amounts of mammals and relatively vast amounts of fish were required to meet the over-wintering needs of pithouse occupants. Also, fragmentation of mammal bone intensified during this time (see below), resulting in an increase in fragmentary specimens and a decrease in overall fragment size – both suggesting greater degrees of bone processing. At this time fish came to dominate the dietary protein consumed within the housepit, eclipsing mammal by nearly 3 times. This fairly sudden and extreme reliance on fish suggests a major event for life at Housepit 54 and likely the entire village. Given that mammal remains also continue to rise in frequency this event does not appear to represent any significant catastrophe within local biotic regimes, but instead appears to be a simple matter of increasing numbers and increasing needs. It is at this time that residents of the village likely had to struggle to keep up with growing economic demands on local food resources.

A striking contrast occurs between the IIb and IIa strata. While overall numbers of both mammals and fish continue to be present well beyond those of all earlier strata, fish remains drop by nearly half and mammal remains nearly double between IIb and IIa. Due to this reversal in relative abundances, mammal and fish come close to evening-out during IIa although the NISP for each is greater than at any other incarnation of the pithouse (apart from the greater numbers of fish remains in IIb from IIa). As in IIb, artiodactyl element distributions during IIa suggest that complete or nearly complete animals were being brought into the pithouse *and* that this was occurring at greater frequency than any other time in the history of the house. We know that the village was abandoned after this occupation, sometime around 1150 BP (Prentiss et al. 2012; Prentiss and Kuijt 2012), so it is conceivable that this pattern is indicative of some causal factor(s) leading to village abandonment. The apparent decline in fish and increase in mammals, considered with the relatively high amounts of remains from both during this final occupation suggest that a fish-specialized subsistence strategy undertaken during IIb was perhaps not enough to support the growing population. To cope with this a strategy equally dependent on both terrestrial and marine resources appears to have been re-established, but was not enough (or too little, too late) to have supported the greater population effectively toward the end of BR3.

Bone Attrition: Fragment Size and Heat Alteration

Mammal Bone Fragmentation

One way of inferring processes of intensive use of animal bones is by looking at the degree of attrition visited on bones during processing – particularly to the degree that bone has been broken down in order to extract nutrients. Bone from the Housepit 54 assemblage – especially the mammal bone assemblage – is highly fragmented. Frequently, zooarchaeologists assess fragmentary assemblages by developing ratios between NISP and Minimum Number of Individuals (MNI) or NISP and Minimum Number of Elements (MNE) (Klein and Cruz-Uribe 1984). Both ratios (NISP:MNI and NISP:MNE) may effectively allow for the determination of what *proportion* of an assemblage is fragmented and to what degree, and what *elements* are fragmented and to what degree, respectively. Both offer a quantitative assessment of what elements may have been particularly singled out for more intensive purposes (such as marrow and bone grease processing) or to what extent taphonomic processes may have altered bone composition, especially that of larger elements that, as they break apart, may still be identifiable. However, when the extent of fragmentation is to such a degree that MNI and/or MNE cannot positively be calculated beyond n=1, as is the case with the Housepit 54 faunas, these ratios become analytically unproductive. Lyman (1994) addressed this issue with the term "intensity of fragmentation" – a measure that recognizes that smaller fragments may in fact be fragments of fragments. This creates a dilemma regarding what useful information can be gleaned from intensely fragmented assemblages where large percentages of faunal remains have been broken up into indistinguishably small parts. For the Housepit 54 assemblage, where 3825 of the 4365 mammalian faunal specimens is a fragment and 80.73% of those fragments are less-than 2cm in their greatest dimension, what can we say that is analytically valuable about the treatment of bone at the site?

Clearly, it is difficult to come to any definitive conclusions based on the amount of destruction visited on bones at Housepit 54, but it is possible to surmise some behaviors that may have led to such attrition. Table 4.13 provides data on the fragmentation of mammal bone from each floor. Fragmentation, while often part of the taphonomic process leading to bone deposition, is also often associated with the processing of long bones for marrow. Yellen (1976: 28) notes that among the !Kung that "… longbones (*sic*) are then carefully broken into fragments and the marrow is removed and set aside. The bone fragments then are placed in the pot with the other meat and water, a stew is made." Binford (1978: 147) refers to such fragments as "marrow splinters". Given the small size of the vast majority of bone fragments (Figure 4.13) and their accumulation on the occupation floors, it is highly likely that marrow processing (or at least the actual breaking of the bones) occurred within the pithouse. Binford (1978: 155) notes that despite the daily cleaning of processing areas "small chips (<1.3cm in length) remain in fair numbers although larger splinters and articulator ends are commonly removed to a dump." In the case of pithouse life, larger splinters and such were likely discarded on the roof or perhaps at some short distance from the pithouse so as not to attract pests.

One helpful way of illustrating the degree to which mammal bone is fragmented in the Housepit 54 assemblage is by looking at bone fragmentation indices. These show the relative frequency of extremely-fragmented mammal bone specimens (size category 1 - specimens sized 1-9mm and size categories 1 and 2 encompassing specimens in the size range 1-19mm, respectively) compared to the range of fragmented specimens for each floor. The results show that on average 48% of all bone fragments fall below one centimeter in greatest dimension and over 80% (avg.) is similarly less-than two centimeters in greatest dimension. This provides evidence for mammal bone fragmentation across the Housepit 54 assemblage, suggesting that bone fragmentation was not only a common occurrence throughout the life of the pithouse but also that bone fragmentation was practiced to such extremes as to regularly reduce bone to nearly-constituent size categories. Of particularly note is the higher degree of Category 1-sized fragmentation during IId-IIc, suggesting that mammal bone processing was intensified during this pivotal phase of population growth.

Table 4.20. Bone Fragment Size Category Indices by Floor showing the relative abundances of the two smallest fragment categories.

Strata	Size2 (10-19mm)	Size1 (1-9mm)	All Fragments	Frag. Size Category 1 Index	Frag. Size Categories 1 & 2 Index
IIj	14	62	85	0.729411765	0.894117647
IIi	15	33	63	0.523809524	0.761904762
IIh	21	23	72	0.319444444	0.611111111
IIg	302	267	662	0.403323263	0.859516616
IIf	171	227	499	0.45490982	0.79759519
IIe	119	111	292	0.380136986	0.787671233
IId	73	148	270	0.548148148	0.818518519
IIc	152	327	562	0.581850534	0.852313167
IIb	234	317	660	0.48030303	0.834848485
IIa	302	266	660	0.403030303	0.860606061

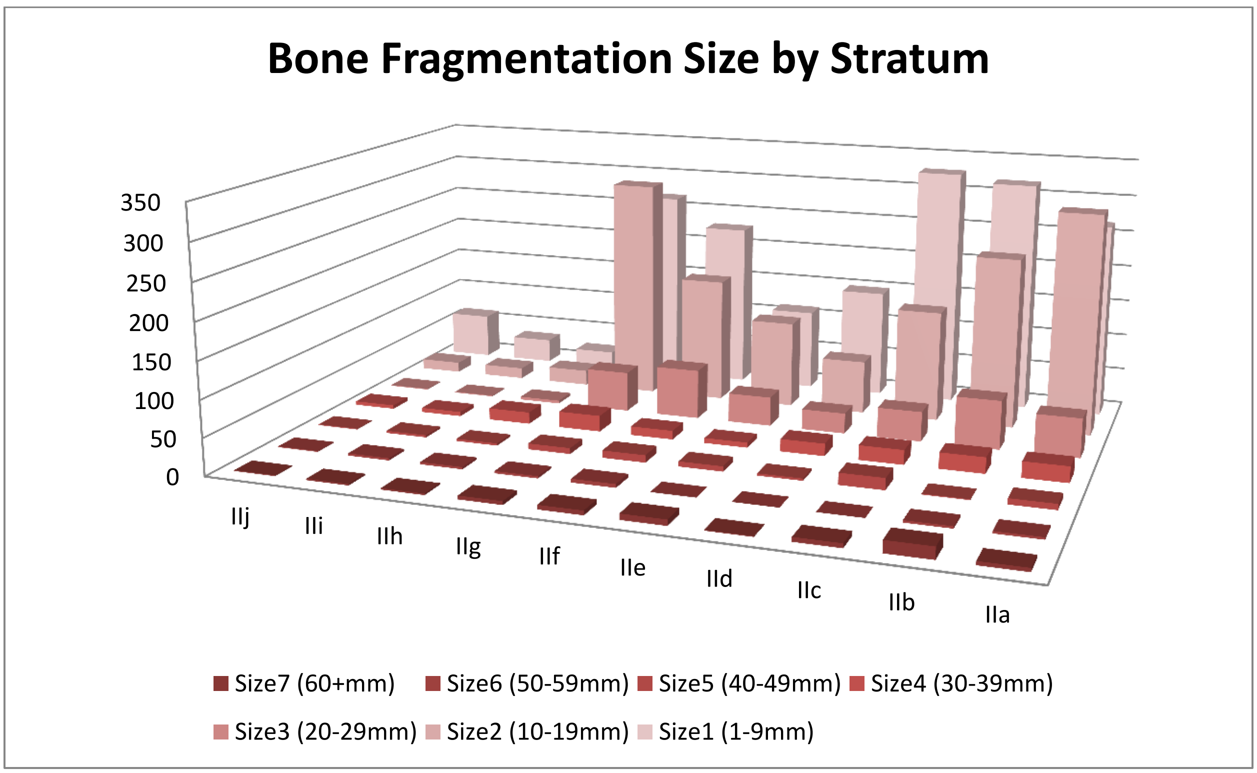

Figure 4.7. Bone Fragmentation Size by Stratum for Floors IIj-IIa.

While cut marks are evident on numerous samples from the Housepit 54 mammal bone assemblage, in almost all cases the fragments on which they are present are too small to positively identify to element or taxon, thus they do not provide a clear picture of butchery techniques in use at the location. Lyman (1978) has suggested that carcass disarticulation elsewhere in the Interior northwest may have involved little or no cutting of either tissue or bone, but rather was accomplished almost entirely by processes of bone breakage. If such were the case - even in part at Bridge River, it may help explain the extensive degree to which bones in the assemblage have been fragmented.

Nevertheless, it appears that within Housepit 54, processing of animal remains was a task commonly undertaken inside the house and was likely facilitated by both cutting of muscle and connective tissue and bone breakage to varying degrees. At the assemblage level, just over 83.24% of bone fragment specimens are less than 19mm in their greatest dimension and nearly half of those (46.56%) fall within the 1-9mm category. Clearly, bone attrition within the overall assemblage was extremely high.

The BR2 floors (IIj-IIf) do exhibit less overall fragmentation than subsequent BR3 floors, with the final occupation of BR2 showing increasingly reductive fragmentation of bone. However, this may be a result of sample size and the areas from which current mammal bone samples were acquired, since to date IIi, IIj, and IIh in situ samples come exclusively from Block A. The first BR3 floors (IIe and IId) appear to show a reduction in the degree of bone fragmentation from the immediately previous occupations, but this is merely a reduction of relative sample size, as the percentage of highly fragmentary specimens from both floors is still around 80%.

Ultimately, the degree to which bone was fragmented within Housepit 54 elucidates a subsistence strategy that appears more-or-less common throughout occupations. Namely, that animal bone was processed extensively, regardless of other conditions. This suggests a possible degree of heritability in processing strategies, as the practice persisted through every occupation.

Heat Alteration

In general, the degree of heat alteration among animal bones in an assemblage may be an indicator of to what degree various bones have been exposed to direct heat sources such as fire, charcoal, heated rocks, etc. This has the potential of illuminating variability in cooking practices used for different animals or parts of animals. Among the Housepit 54 archaeofaunas, heat-alteration is not entirely uncommon but the degree of bone fragmentation makes it impossible to infer cooking strategies based on taxonomy or element. Further, the degree to which bone fragments have been exposed to heat-altering agents does not appear to correlate with any particular pattern of heat-related attrition. Rather, the number of specimens per stratum that exhibit heat-alteration is strongly correlated with assemblage sample size (R-value = 0.8141; P-value = 0.004147, significant at <0.01). This suggests that evidence of heat-alteration of bone in the assemblage (thus far) is not a good indicator of variability in human behavior, but is rather a product of sampling bias (see Table 4.18 and Figure 4.8). The only notable anomaly to this trend appears during IId in which 17% of the animal bone assemblage exhibits some form of heat alteration, much of which is complete calcination. Given that calcination usually results from relatively long-term exposure to extreme heat, it may be that bone fragments during this stratum in particular may have been swept more often into active fires or hearth spaces in general.

Table 4.21. Number of Bone Specimens Exhibiting Heat-Alteration.

Stratum	Burned	Calcined	Total Heat-Altered
IIj	1	0	1
IIi	2	0	2
IIh	10	1	11
IIg	0	4	4
IIf	6	22	28
IIe	2	19	21
IId	15	75	90
IIc	15	48	63
IIb	48	57	105
IIa	35	64	99

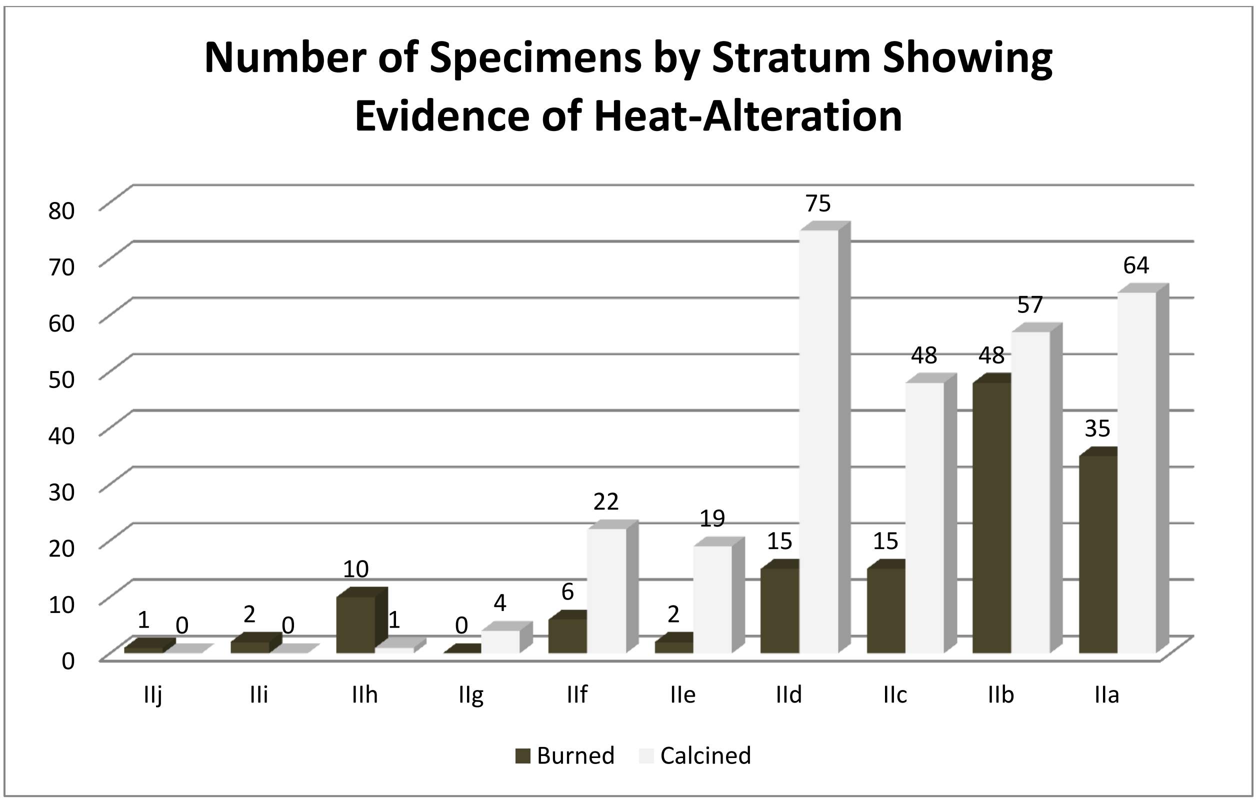

Figure 4.8. Number of Bone Specimens Exhibiting Heat-Alteration.

Bone Tools and Modified Bone

Modified bones in the assemblage are relatively rare when compared to the frequency of stone tools and other cultural materials (such as FCR) (see Table 4.22). This is likely due to preservation considerations as well as use/wear attrition leading to the destruction or wear-down of many bone tools prior to deposition. Other examples of commonly modified bone consist of specimens (see below) with cutmarks (Figure 4.9), polishing or abrasion (Figure 4.10), evidence of shearing (Figure 4.11), and bone flakes and specimens with flake scars (Figure 4.12).

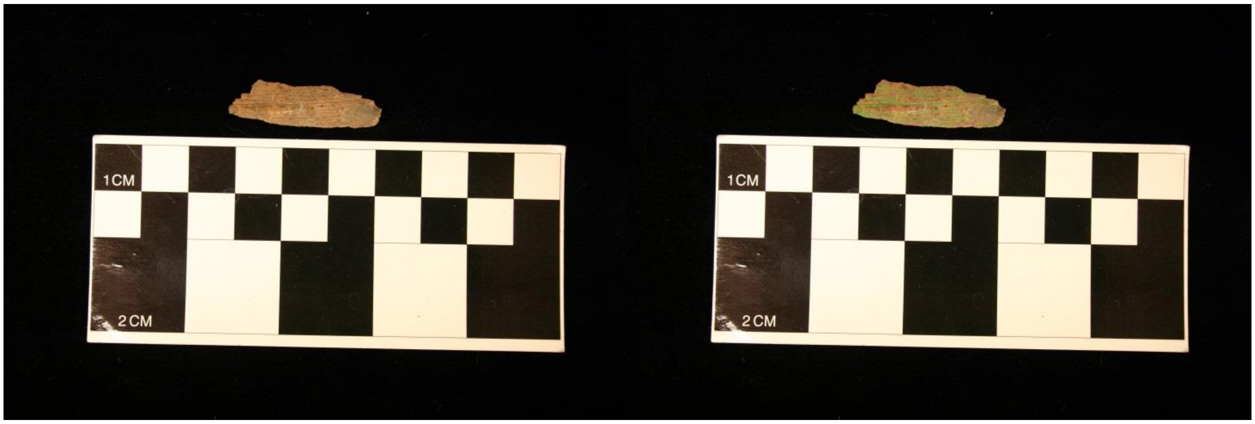

Figure 4.9. Bone fragment with cutmarks (left) and with green lines added to image to accentuate cutmarks (right).

Figure 4.10. Bone fragment exhibiting polishing.

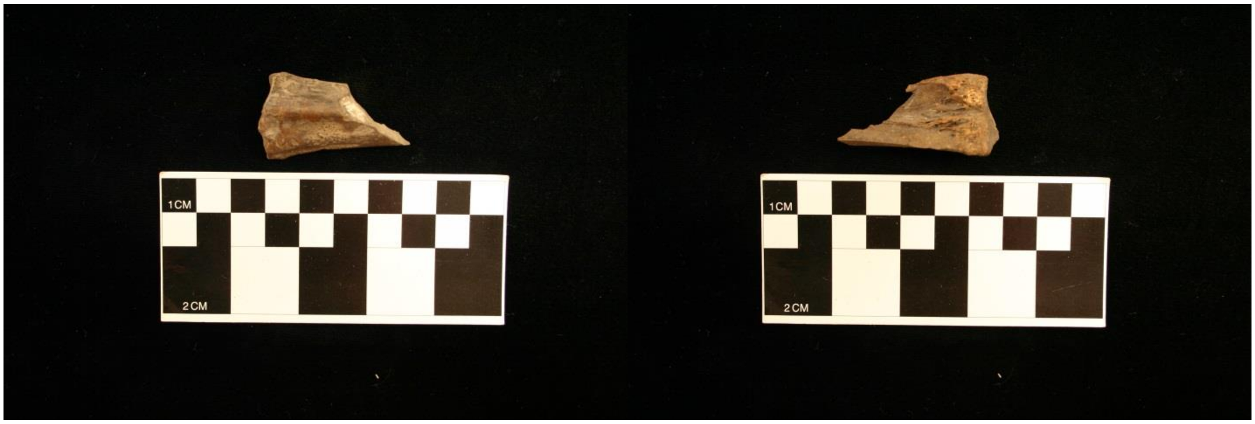

Figure 4.11. Distal long bone fragment with sheering and oblique fracture.

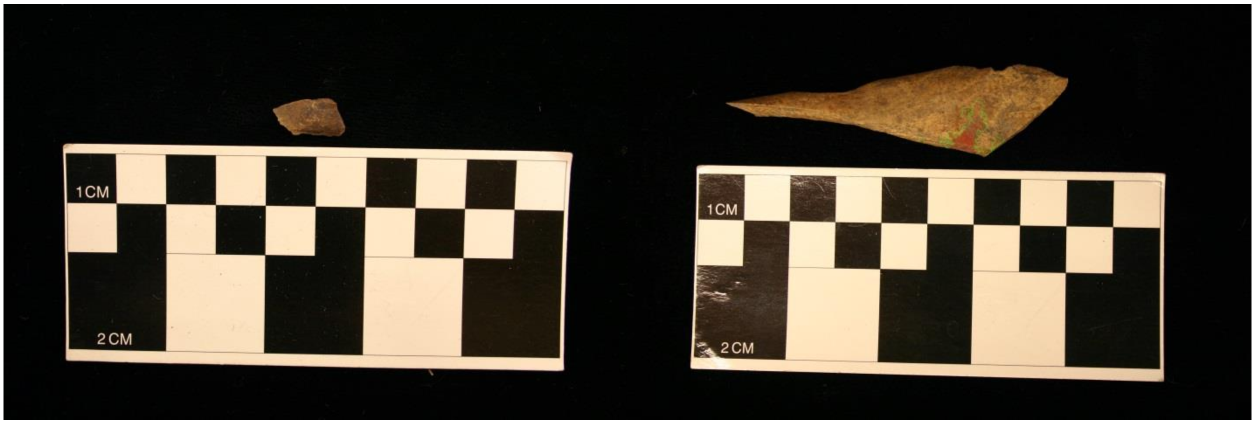

Figure 4.12. Bone flake (left) and long bone fragment with multiple flake scars (right). Note red ochre on right sample (ochre is outlined in green to show coverage.

Table 4.22. Numbers of modified bone specimens. Many of the 'Formal Tools' possess characterists that would place them within multiple categories - e.g. exhibiting both polishing *and* flake scars *and* cutmarks – where this is the case additional characterists are not included so as to avoid redundancy.

Strata	**Formal Tools**	**Cutmarks**	**Polish/Abrasion**	**Shearing**	**Bone Flake**	**Flake Scars**
IIj	1	1	3	0	0	0
IIi	0	2	1	0	0	0
IIh	0	1	2	0	0	5
IIg	1	10	1	0	2	16
IIf	1	1	4	1	9	0
IIe	4	4	4	6	10	1
IId	1	7	0	0	1	1
IIc	1	4	8	0	6	5
IIb	1	7	5	4	9	3
IIa	3	11	18	1	14	9
Total	13	48	46	12	51	40

Formal bone tools – those whose purpose can be identified or at least inferred from their form – include such items as: awls/points, incised objects, beads, possible scrapers, and at least one fragment of a decorated drinking-tube (Figure 4.22), and one carved figurine (Figure 4.23 and 4.24). The following images and descriptions of modified bone artifacts provide a representative range of tools and bone implements from Housepit 54. These examples are given in Figures 4.13 thru 4.24.

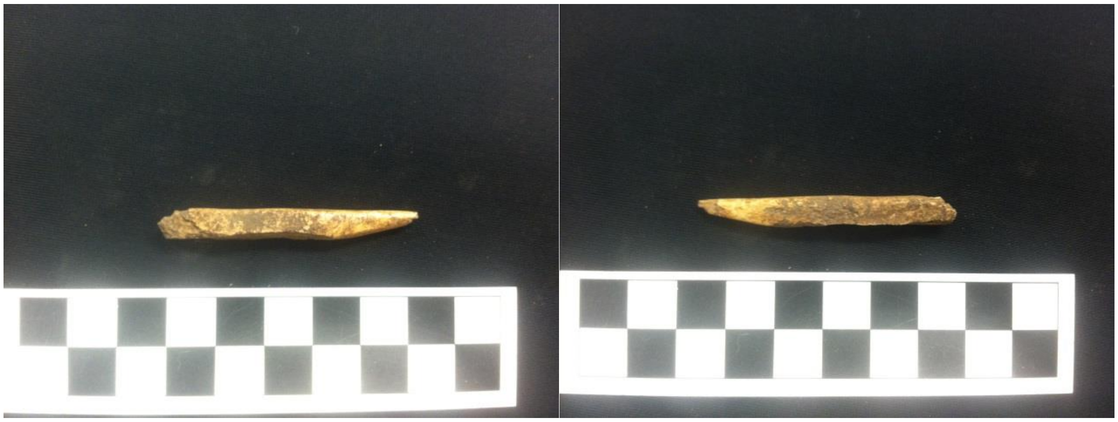

Figure 4.13. Fragment of polished bone point with evidence of carnassial gnawing (right). Specimen from Level 1 of Stratum Va in the NE Quadrant of Unit 6 of Block D; 2014 Bag #334.

Figure 4.14. Antler point with prismatic triangular cross-section tapering to a conical cross-section. Possibly a socketed projectile point. Specimen from Level 1 of Stratum Va in the NE Quadrant of Unit 8 of Block D; 2014 Bag #892.

Figure 4.15. Two fragments of a polished bone point – possibly an awl. Close-up (right) shows extensive incisions running perpendicular to the length as well as fine oblique abrasions. Specimen from Level 3 of Stratum Va in the NE Quadrant of Unit 7 of Block D; 2014 Bag #919.

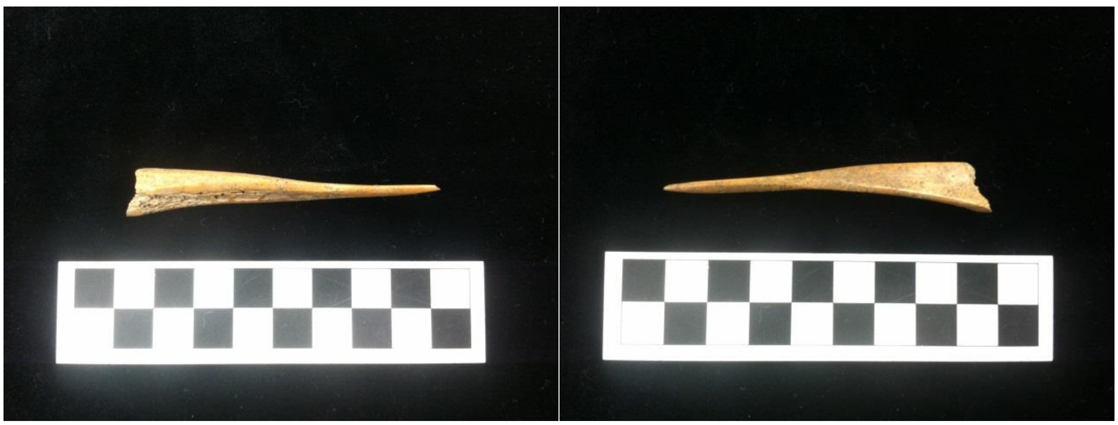

Figure 4.16. Polished bone point – likely an awl. Specimen from Level 4 of Feature B-14 in the NE Quadrant of Unit 11 of Block B; 2014 Bag #836.

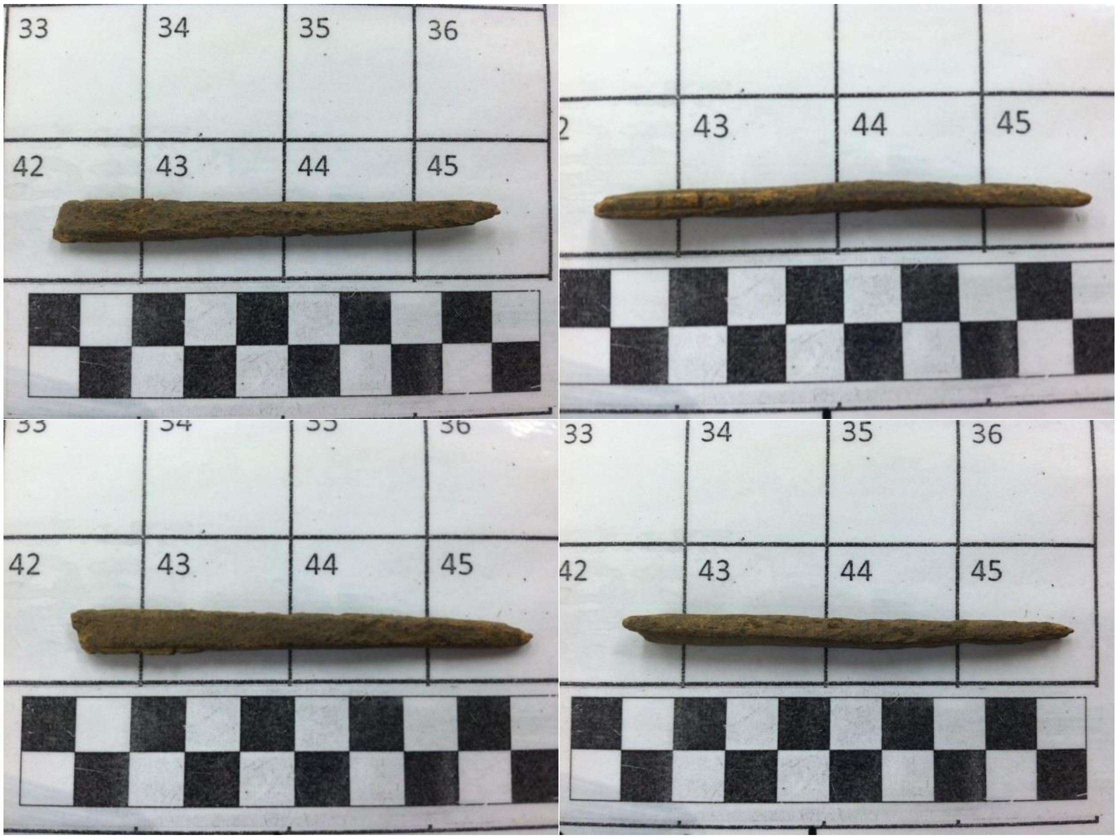

Figure 4.17. Point (possibly an awl or similar impliment) with four incisions running perpendicular to the length set inside two incisions running parallel to the length. Note pitting/possible gnawing (bottom left image). Specimen from Level 1 of Stratum IIb in the SW Quadrant of Unit 15 of Block D; 2014 Bag #1066.

Figure 4.18. Long bone fragment with multiple sets of grouped incisions (close-up at bottom). Specimen from Feature A-17 of Level 4 of Stratum IId in the NW Quadrant of Unit 6 of Block A; 2013 Bag #390.

Figure 4.19. Bird bone bead. Specimen from Level 1 of Stratum Va in the NE Quadrant of Unit 16 of Block D; 2014 Bag #333.

Figure 4.20. Possible bone scraper on spiral-fractured long bone fragment. Note multiple flake scars and edge abrasion in close-up photos (bottom). Specimen from Level 1 of Stratum Va in the SW Quadrant of Unit 5 of Block C; 2014 Bag #22.

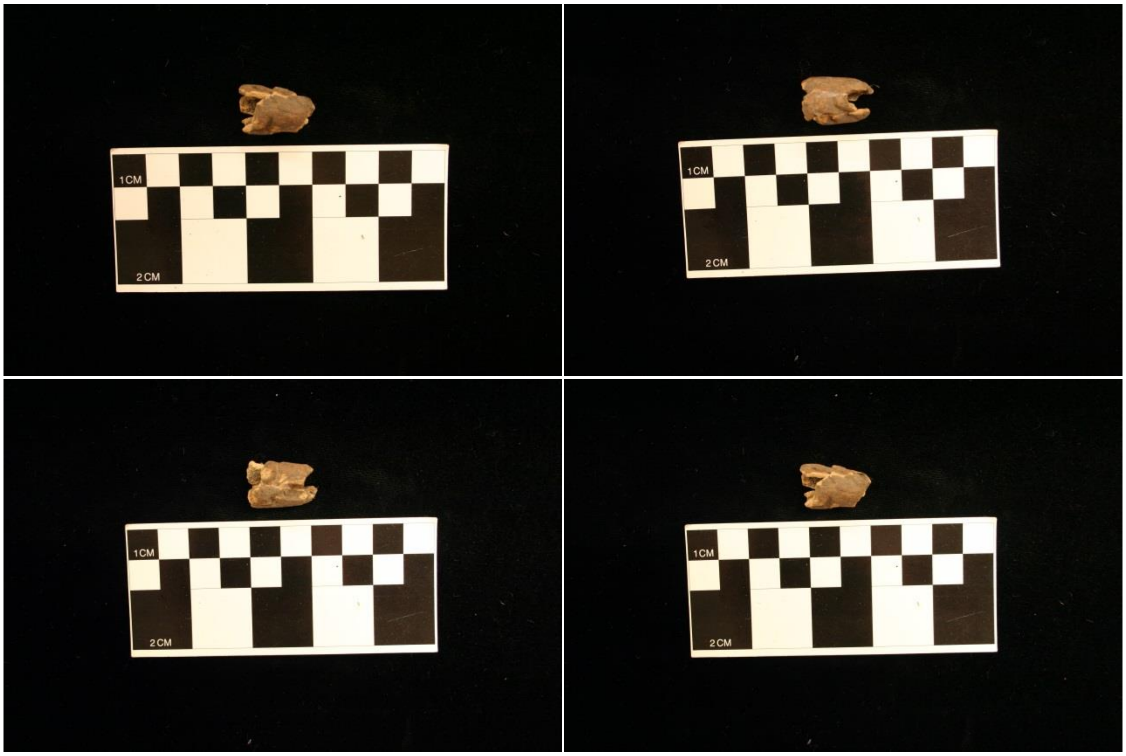

Figure 4.21. Ornately-carved, hollow cylindrical bone fragment (recovered in three pieces) – possibly from a decorated drinking-tube (Teit 1906: 264). Specimen from Level 1 of Stratum Va in the SE Quadrant of Unit 15 of Block D; 2014 Bag # 102.

Figure 4.22. Overview of intricately detailed bone figurine found at the surface of a bell-shaped pit composed of gravels and rocky sediments and the fragmentary remains of bones from medium- and large-sized mammals (including identifiable remains of artiodactyl and beaver) as well as various bones from Sockeye salmon. The figurine depicts (assumed) a male figure with what appears to be a phallus and testes prominently displayed. With the feet reattached the figure stands with arms at his sides, leaning forward at a roughly 150° obtuse angle. Nine lines down the arm, perpendicular to the length of the arm, suggest a long-sleeved tunic with some form of decoration. The fingers of both hands are clearly defined. Faint lines across the back at the mid-waist suggest a belt of some sort. Also, note that the figure appears to either be wearing breeches extending down to the knee or ankle depending on what the double carved lines at these areas was meant to suggest. Or, it is possible that the figure is naked from the waist-down and wearing bands around just below the knee and at the ankles. The figure is apparently wearing no footwear, as the toes appear to be shown. The specimen has been gnawed on, likely by a dog – probably the cause of the missing head. Specimen from Level 1 (surface) of Feature B-3 of Stratum IIe in the SW Quadrant of Unit 9 of Block B; 2014.

Figure 4.23. Directional views of bone figurine from Level 1 (surface) of Feature B-3 of Stratum IIe in the SW Quadrant of Unit 9 of Block B; 2014.

Overall, modified bone and bone tool preservation provides a glimpse of the range of tools and modified bone impliments used at Housepit 54 over time. Decoration on bone is most commonly limited to incised hash-marks or lines and groups of lines, usually perpendicular to the longest length of the implement (as in Figure 4.18). The clear exceptions to this are the intricately carved bone tube fragment and the anthropomorphic figurine. The discovery of these two artifacts in particular suggests that carving and intricate decoration may have been both common and elaborate, but that many impliments exhibiting such decoration have simply not preserved into the archaeological record at Housepit 54.

Spatial Distribution

Finally, density of animal bone by excavation Unit by Stratum are provided in Figures 4.23-4.31. These figures were generated using ESRI ArcMap GIS software version 10.3.1 and illustrate the density of terrestrial mammal remains by size category (red shades) and the density of salmon remains by size-category (blue shades) for all excavated strata. Strata are presented from the most-excavated to the least-excavated, beginning with Stratum IIa to Stratum IIj. Stratum IIk is not represented, as apart from very limited subsurface recovery, that stratum has not yet been investigated.

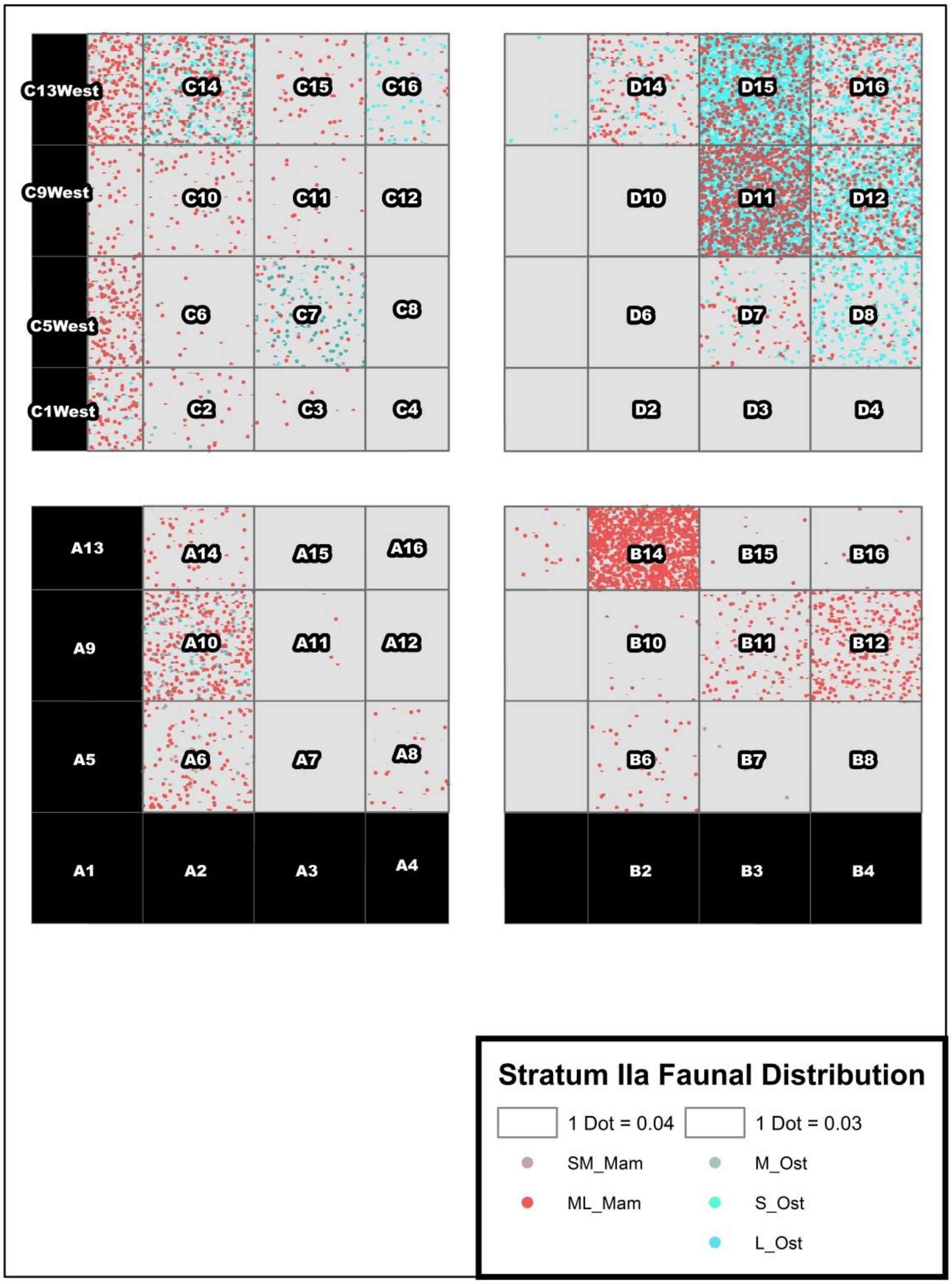

Figure 4.24. Stratum IIa Faunal Assemblage Distribution by Unit.

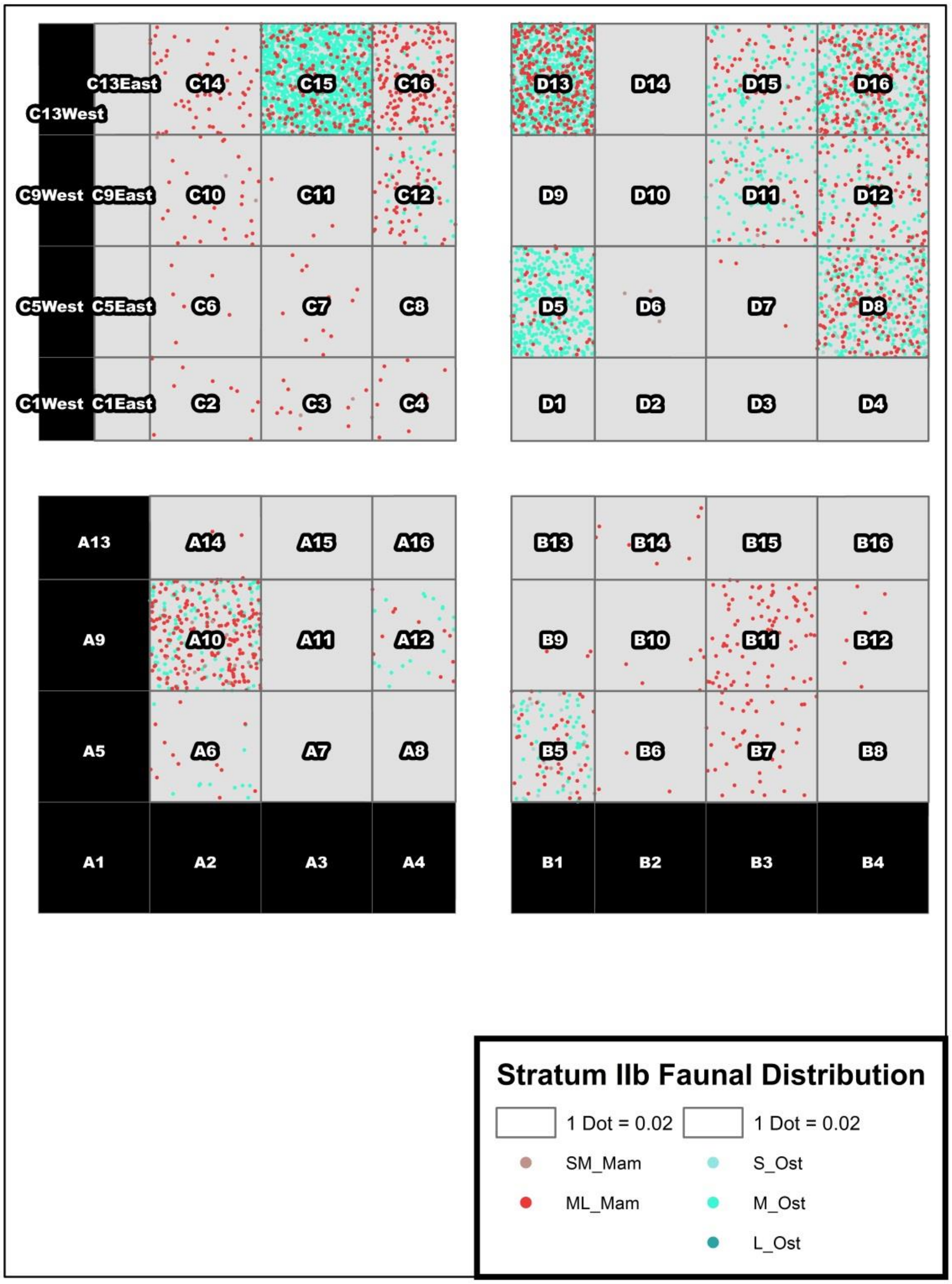

Figure 4.25. Stratum IIb Faunal Assemblage Distribution by Unit.

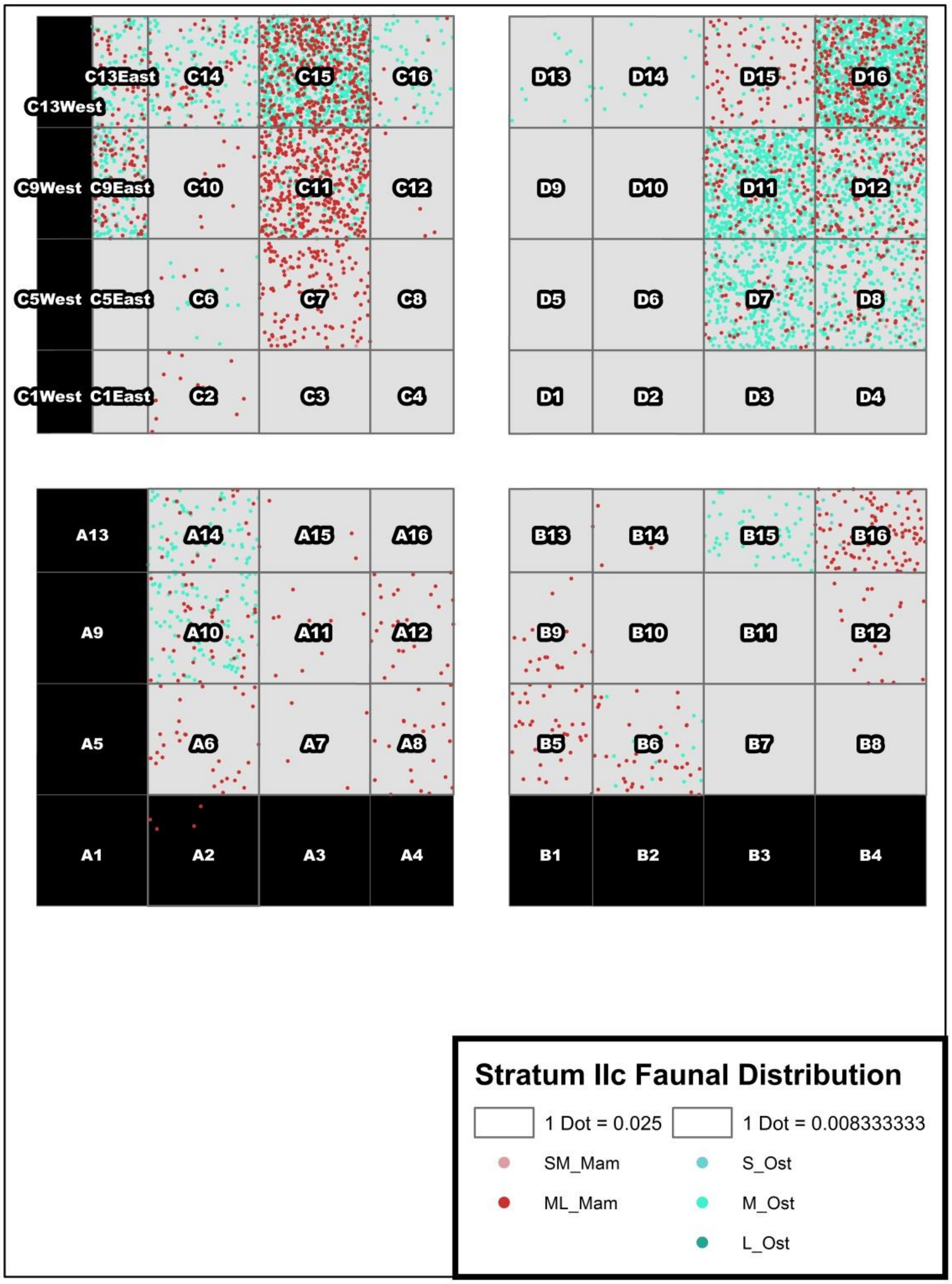

Figure 4.26. Stratum IIc Faunal Assemblage Distribution by Unit.

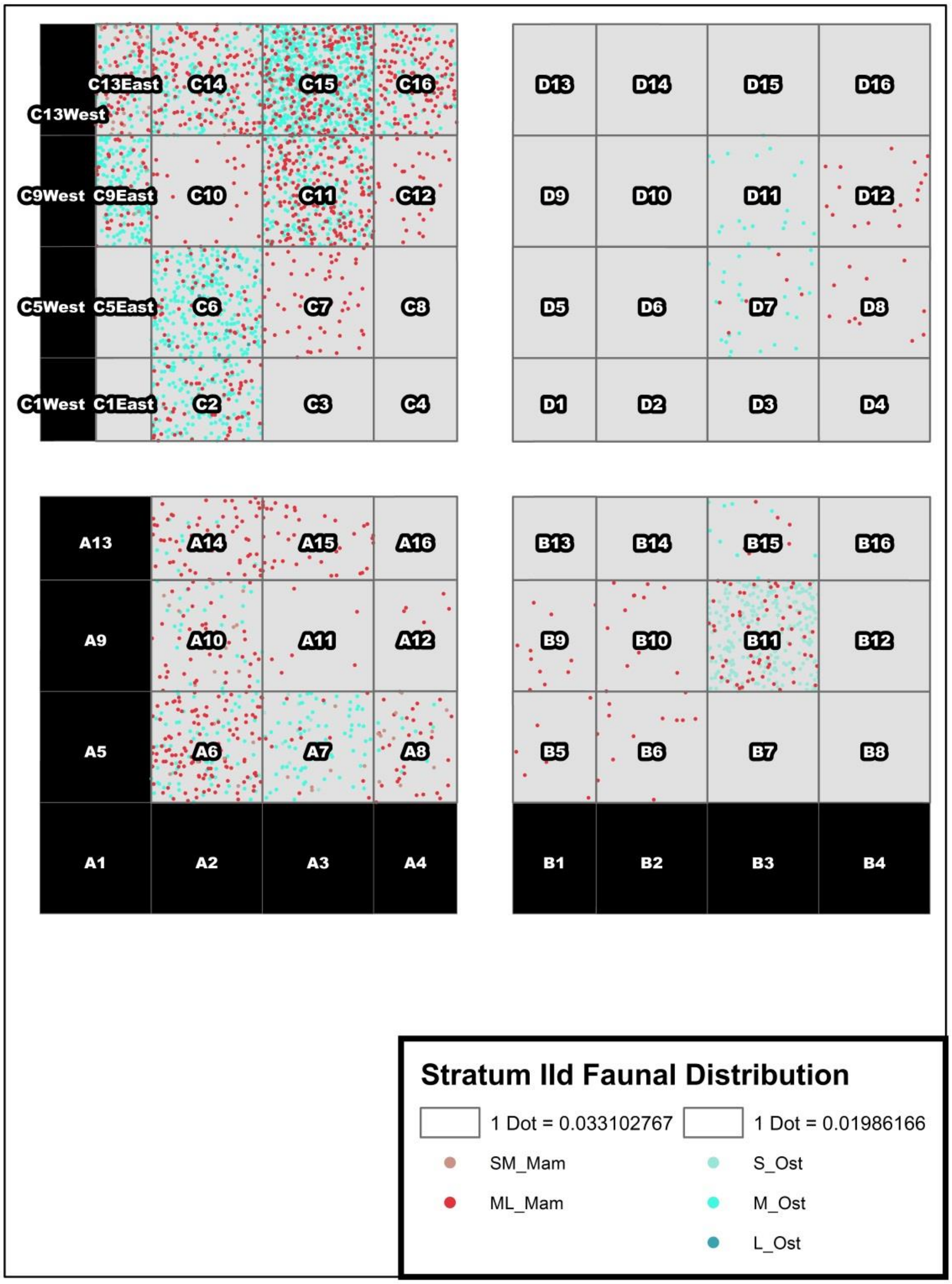

Figure 4.27. Stratum IId Faunal Assemblage Distribution by Unit.

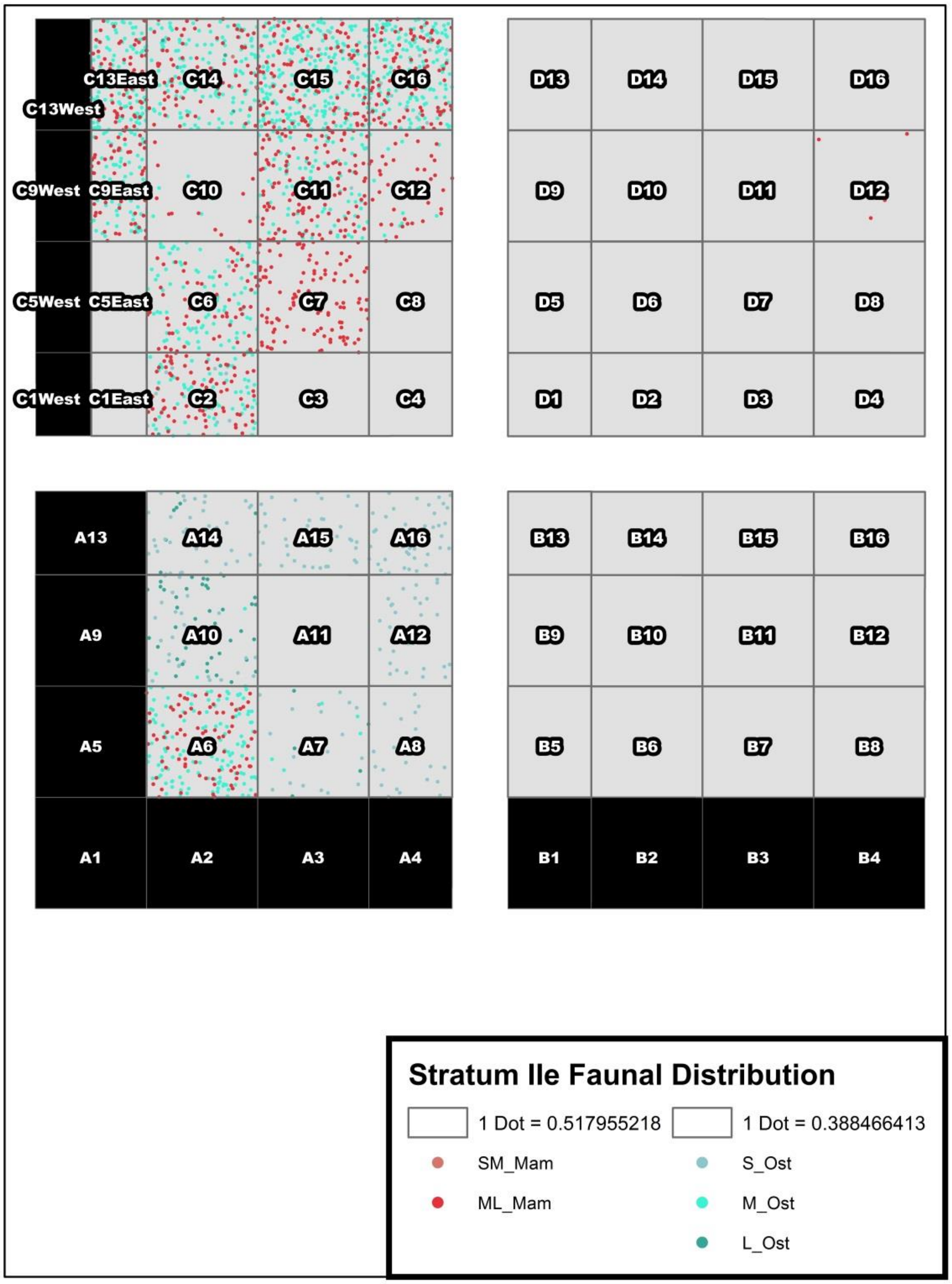

Figure 4.28. Stratum IIe Faunal Assemblage Distribution by Unit.

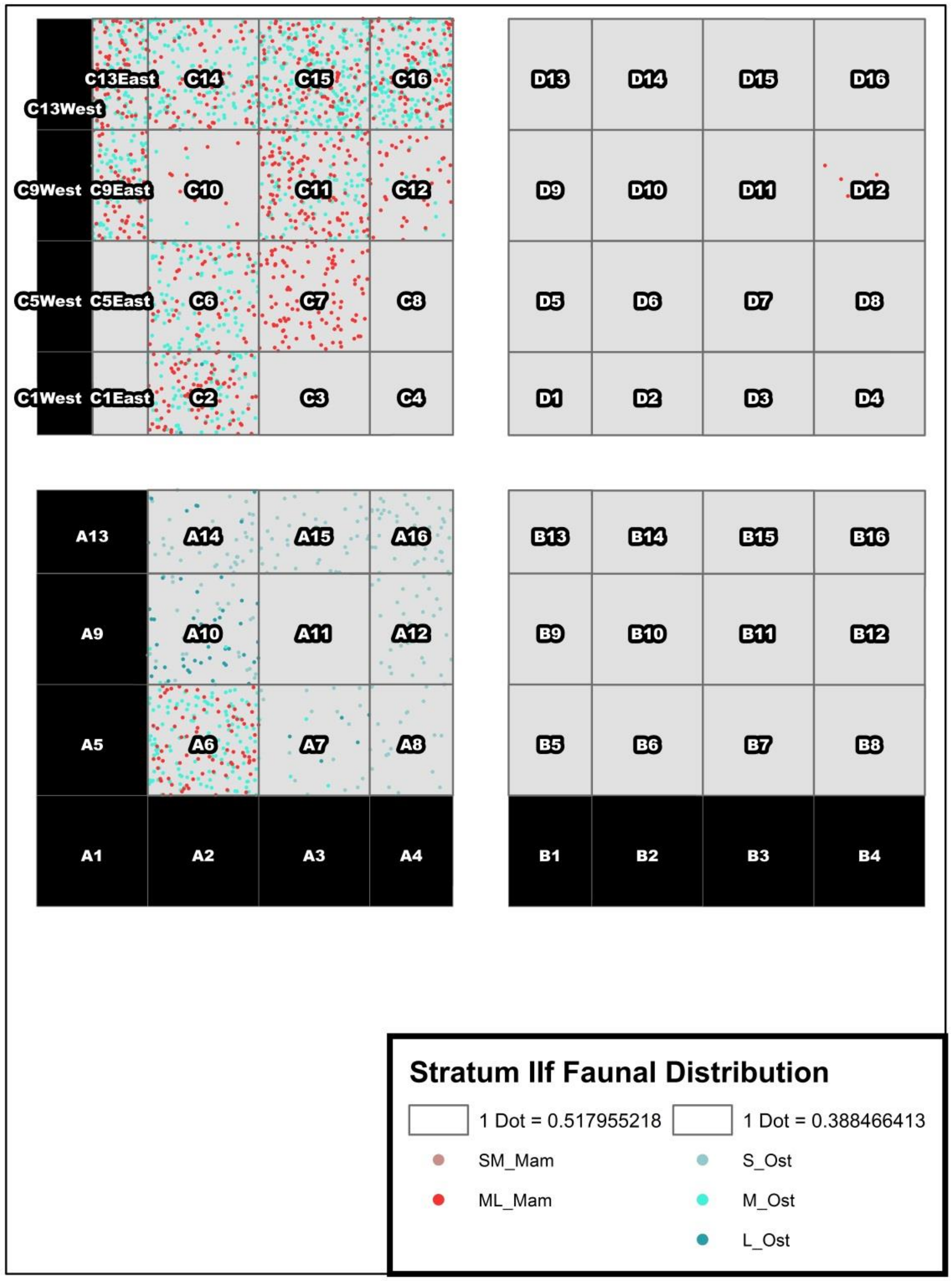

Figure 4.29. Stratum IIf Faunal Assemblage Distribution by Unit.

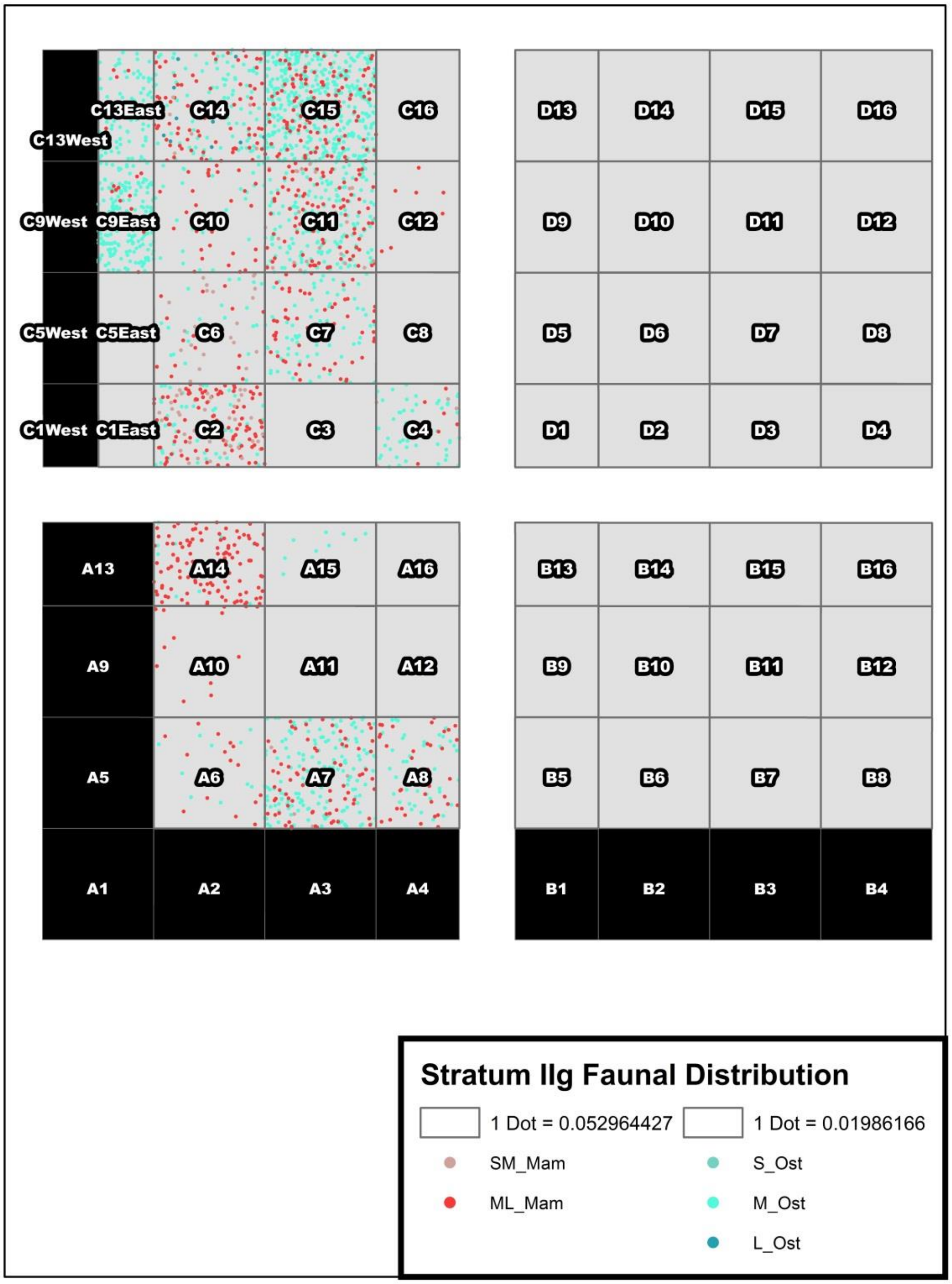

Figure 4.30. Stratum IIg Faunal Assemblage Distribution by Unit.

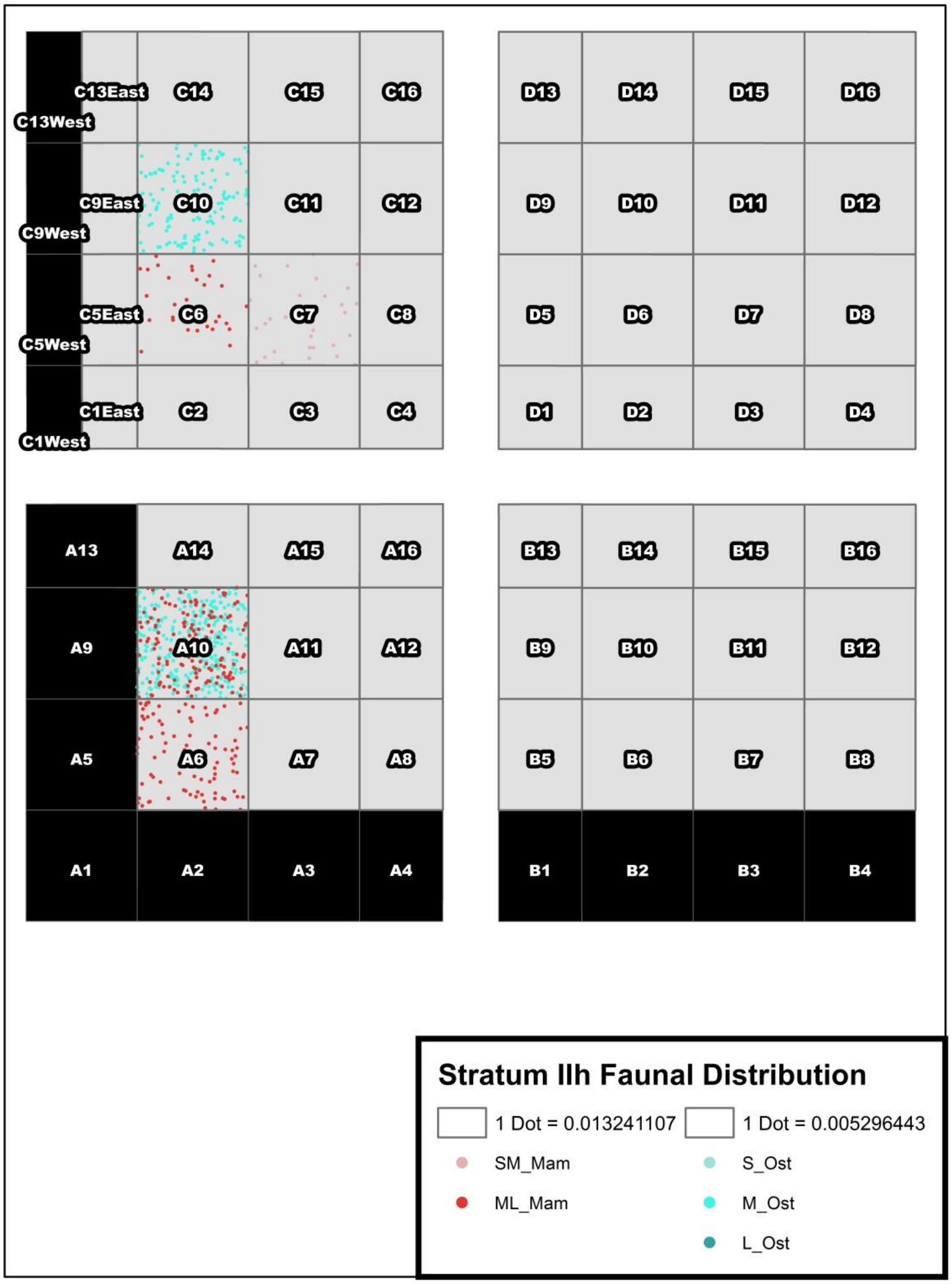

Figure 4.31. Stratum IIh Faunal Assemblage Distribution by Unit.

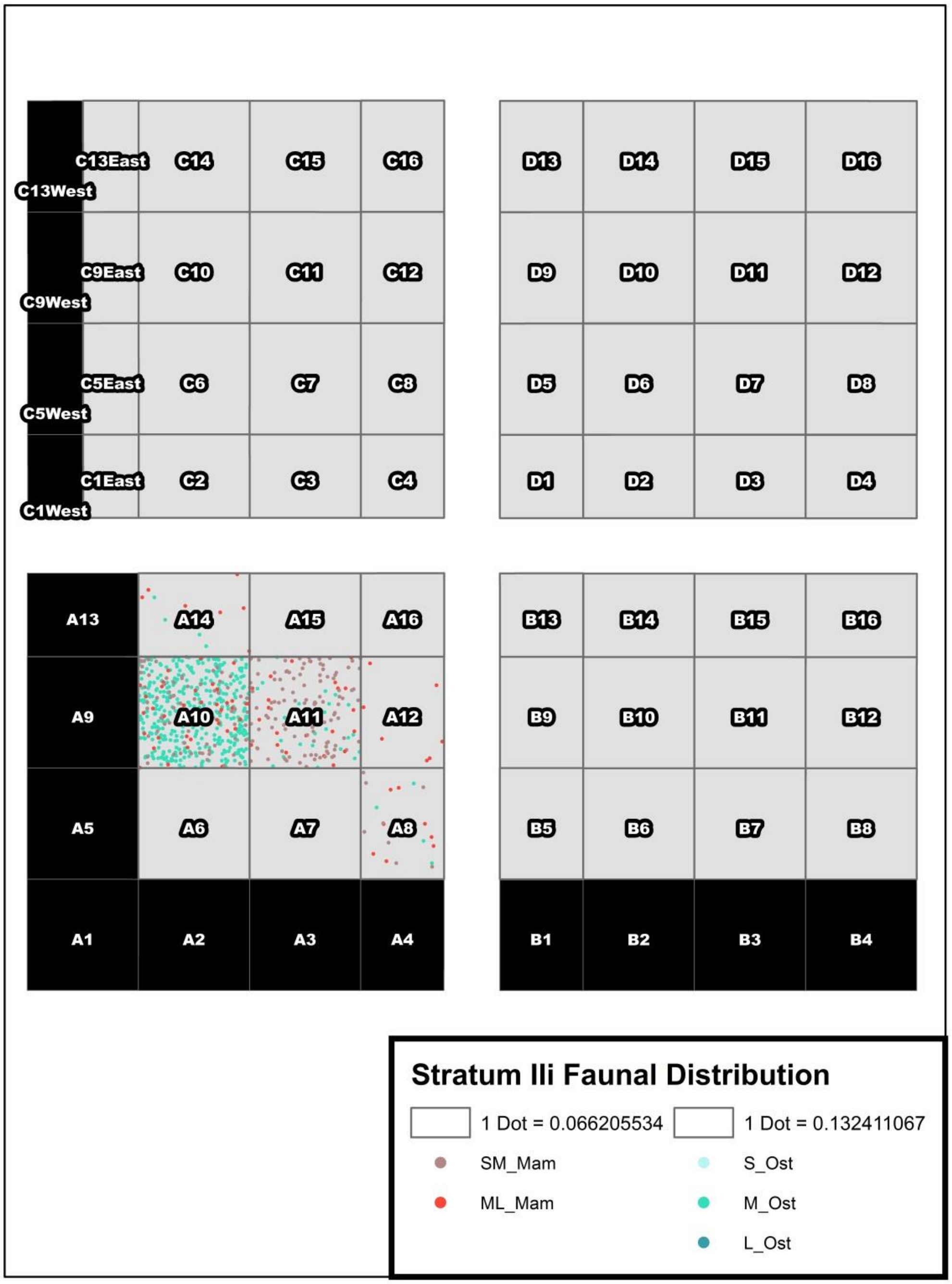

Figure 4.32. Stratum IIi Faunal Assemblage Distribution by Unit.

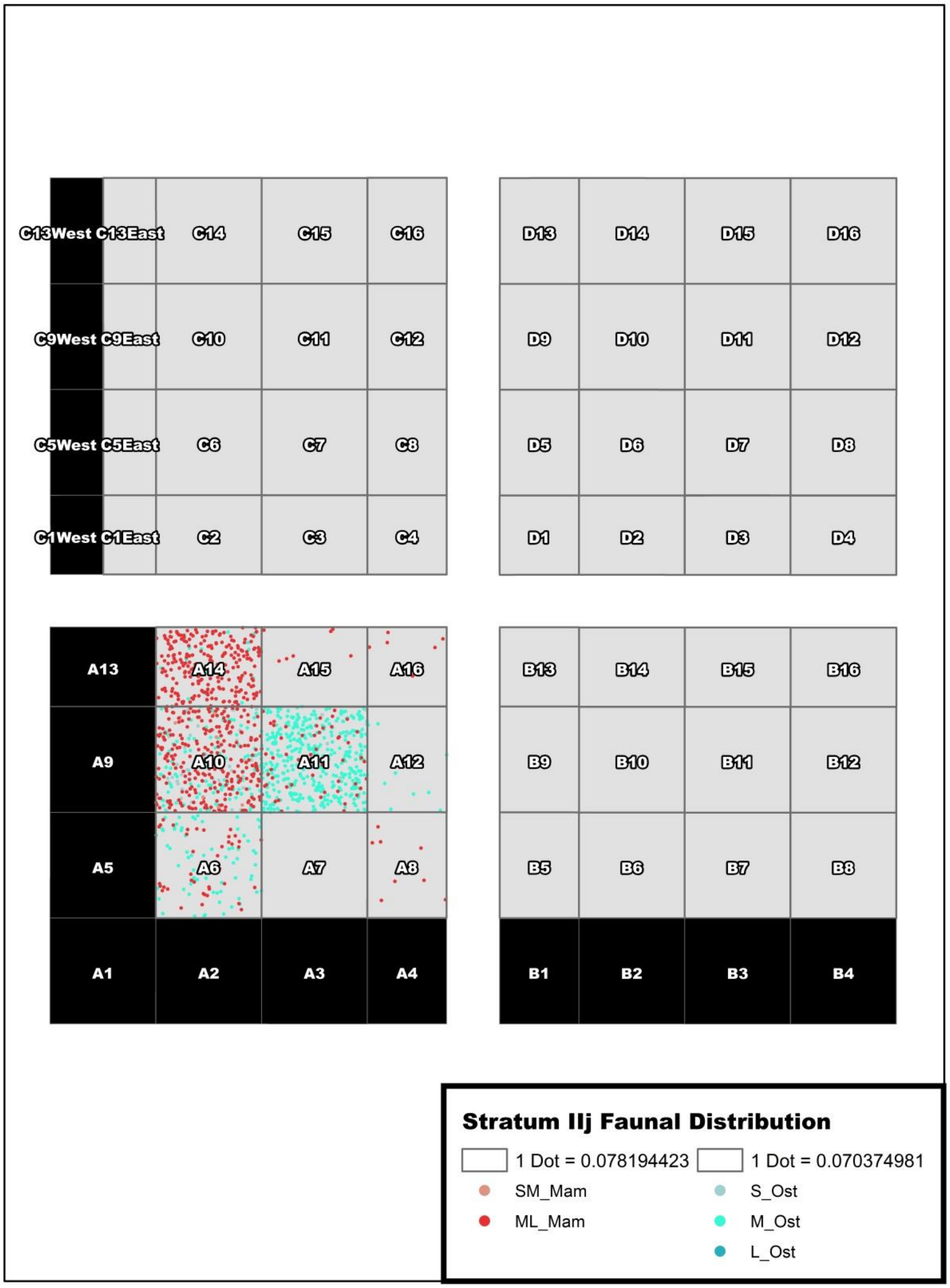

Figure 4.33. Stratum IIj Faunal Assemblage Distribution by Unit.

Conclusions

The 2014 excavation at Housepit 54 generated numerous faunal specimens (representing no less than 23 taxa, including: three identifiable varieties of salmonids and one unidentifiable non-salmonid; four ungulates including deer, bighorn sheep, mountain goat, and Roosevelt elk (IIk); both black bear and brown bear; various canids including domestic dogs and possibly multiple wild sub-species; at least seven rodent species including two medium fur-bearing species (beaver and muskrat), as well as porcupine, squirrel, and multiple small-tiny-sized species; at least two bird Genera including *Galliformes* and *Falconiformes*, with identifiable aves of the *Phasianidae* Familyincluding grouse and ptarmigan; and one type of *mollusk*.

Acknowledgments

Much of this analysis would not have been possible without the generous donations of time and effort by a number of people, particularly Dr. Lisa M. Smith, whose familiarity with identifying faunal remains from the Bridge River drainage was insightful, and Paul Hendricks at the Philip L. Wright Zoological Museum for access to, and assistance with, the animal bone comparative collection. In addition, a host of student volunteers made these analyses possible (in alphabetical order): Anna Arnn, Emilyn Bauer, Sarah Howerton, Ali Johnson, Corey Johnson, Elizabeth Lynch, Tanner Marsh, Matthew McKee, Dougless Skinner, Douglas Sullenburger, Lydia Sykora, Morgan Thurman, James Verzuh, and Corwin Yellow-Kidney.

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Chapter Five

Conclusions

(Anna Marie Prentiss)

The 2014 investigations at Housepit 54 within the Bridge River site permitted us to expose and collect data from ten floors spanning the Bridge River (BR) 2 to 3 periods. Significant excavation progress was achieved in all excavation blocks. Block A was excavated down to the surface of floor IIk. Artifacts and faunal remains on the surface of IIk were collected but the floor was not otherwise excavated. Examination of the strata within the original test trench from 2008 suggests that there are likely an additional five more floors in the Block A area. The deepest of those floors (e.g. IIm-IIo) appear to be complete smaller housepits or "subhousepits" (Prentiss et al. 2003). Block B was fully excavated though it only extended down to stratum IIe. The shallow nature of Block B raises the strong possibility that floors at IIf to IIl represent a much smaller housepit, perhaps somewhat rectangular in shape. Block C excavations focused on floors IIe-IIg. We expect deeper strata in Block C to extend at least through IIl. Stratum IIh was exposed and surface materials collected. Sediments were not excavated however. Block D was opened and partially completed. A significant portion of floors IIa-IIc were excavated and floor IId was exposed and surface materials collected. Block D is not expected to have floors below IIe. The stratum XVII deposit was also test excavated. Stratum XVII represents midden-like fill within a pit-like feature extending across nearly 50% of the western half of Block D. As is evident from the Block D north wall profile (Appendix A) the Stratum XVII pit was cut through the Stratum Va roof deposits (dated ca. 1200 B.P.) but are partially buried by Stratum III rim dated via charcoal from a hearth (Feature D2 [2012]) on its surface to ca. 1050 B.P. (Prentiss 2014). Thus, the Stratum XVII cut and fill event likely postdates the IIa floor and its associated Va roof but pre-dates the upper Stratum III deposit on the north side of Block D. We do not yet understand the purpose or logic of the event that led to this stratum. Excavations (inclusive of all strata) revealed 81 features including hearths of various configurations, cache pits, and a multitude of post-holes. A large number of lithic artifacts (8887 flakes, 909 tools and cores, total of 9796) were recovered and analyzed for this report. A significant quantity of faunal (total Number of Individual Specimens [NISP]: 14,984) and floral (486 seeds and 5453 pine needles) remains were also recovered. Additional data were collected for geochemical analysis. This chapter provides a brief summary of results and conclusions.

Eighteen new radiocarbon dates were run by DirectAMS on charcoal samples primarily derived from hearth features on floors (16 of 18; one date was on birch bark from a floor [IIi] and another on wood charcoal from a deeply buried possible roof [Vd in Block A]). The new dates were subject to Bayesian modeling to estimate most likely probabilities of occupation dates. Results suggest a very tight sequence spanning stratum IIa centered on ca. 1150-1200 cal. B.P. to IIj at ca. 1300-1350 cal. B.P. This suggests an occupation span for these ten floors of about 200 years or approximately 20 years per floor cycle. Given that there are about five deeper floors than IIj it suggests that the initial floors could date to at least ca. 1450 cal. B.P. or about mid-way through the BR 2 period. Given the effectively doubling in size of Housepit 54 between the IIf and IIe floors, growth of the house matches village-wide growth at the BR2 to 3 transitional boundary at ca. 1300 cal. Examination of variability in fire-cracked rock and in hearth features revealed the likelihood of two times of high occupation density (IIg-IIe and IIa-IIb) along with a distinctive occupation trough in IIc and IId.

Examination of feature distributions across the IIa to IIe floors allows us to recognize both continuity and variation. With only occasional exceptions (IIc in Block A, IIa in Block D) there are hearth features with each block. If hearths were primarily used for cooking purposes as is suggested by faunal and floral data then an implication is each block on each floor represents space for domestic activities such as food preparation. Cache pit features are much less consistent on the IIa to IIe floors. Floor IIe has a semi-circular arrangement of deep cache pits filled with household refuse. Post-holes adjacent to these features raise the possibility that they had been covered by a wooden platform or bench perhaps similar to that of cache pits in Chinookan houses (Smith 2006). So far no other cache pits have been found elsewhere in the house (IIe in Block D has not yet been excavated however). Cache pits are virtually nonexistent on floors IId and IIc (shallow pit is present in IIc within Block D) which matches projections from analysis of fire-cracked rock that these floors represent low points in household occupation density. Cache pits are again present on IIb, located in Blocks A and D. Then, small pits were also found on IIa in Block A. Overall, it would appear that pit storage was inconsistently practiced thus raising the possibility that storage sometimes was dominated by above-ground strategies that could have included bags and boxes on platforms and benches and/or outdoor facilities.

Floors from IIf to IIi were created within a house that appears to have been more of a rectangular shape and about half the size of that associated with IIa-IIe. Distributions of hearth and cache pit features are relatively consistent between floors. We have nearly complete floor data on IIf and IIg and it is evident that hearth features were constructed and used in the north, central and southern portions of the house as reflected in Blocks A and C. The north end of the house appears to have accumulated the greatest quantity of debris associated with hearth use inclusive of feature material and FCR. Hearths also accumulated around a boulder in approximate center of the house. One of these (C7 on IIg) included a significant quantity of bone, two projectile points and two possible arrow foreshaft blanks (Appendix H). Hearths are highly abundant on floors IIh-IIj in Block A. We do not yet know how this compares to the same floors in Block C. Cache pits are consistently in the southern end of the house (Block A or southern margin of Block C). Some of them are of significant size (e.g. A1 on IIg and A5 on IIh). It is interesting that when the house expanded at the advent of IIe, cache pits remained on the south side of the house despite a shift to the east into our Block B.

Evidence for roof posts is also quite inconsistent. Maps in Appendix A make it clear that there is evidence for posts of various sizes that were likely associated with roof support. However we do not have strong evidence for postholes consistently associated with a standard four post-roof support as might be expected in Mid-Fraser houses. It may be that as was the case for the Fur Trade floor at Housepit 54 (Prentiss 2013), major roof supports were sometimes simply placed on the floor surface (Alexander 2000). Small post-holes are found on all floors and typically along or near the margins. Particularly strong examples of this are found on the north side of floors IIf and g (north Block C) where rows of very small post-holes appear to reflect repeatedly constructed benches or platforms along the margin of the floor and adjacent to hearth features.

A major focus of lithic artifact studies was to test hypotheses about intra- and inter-floor occupation patterns. Study of feature distributions suggested some degree of consistency between blocks, particularly as indicated by hearth features. This implied the possibility of repeated domestic activity zones as might be inhabited by family groups. A counter hypothesis is that some floor areas could represent special activity areas for goods manufacture, cooking, or simply socializing as was evident on Stratum II, the fur trade floor (Prentiss 2013). Several tests were conducted emphasizing inter-floor variation and then inter-block variation. Analysis of inter-floor variation relied on two approaches, tool flake ratios plotted against total lithic density and confidence intervals on coefficient of variation scores calculated on an inter-floor basis for multiple tool classes. Results suggested a highly consistent pattern between floors such that regardless of artifact density occupants deposited about the same tool to flake ratio. One exception was floor IIg which was characterized by an unusually high tool/flake ratio resulting from a very dense cluster of discarded groundstone tool fragments, most of which were placed within a pit interpreted as a collared post-hole (Feature C28). The other test (coefficient of variation and confidence intervals on specific tools) also supported an argument that there is relatively little variation in major activity classes between floors. Thus from this standpoint, all examined floors (IIa to IIg in this study) reflect residential household occupations.

Analysis of variability between activity areas was approached using debitage types, lithic raw material, and tool variability (visual representation of these patterns can be explored in maps shown in Appendix G). Examination of variation on debitage revealed a consistent pattern between all Blocks and floors of tool maintenance and lesser quantities of biface reduction and core reduction debris. No particular Block or floor was revealed to have a particularly unique pattern. Lithic raw material consistency was tested using a principle components analysis and coefficient theta (a reliability statistic). Outcomes of this analysis revealed a pattern of high consistency whereby all raw materials co-associated in approximately equal numbers across all blocks. A similar outcome was achieved with regard to lithic tool variability. Thus, from these standpoints, the excavated block areas of each floor represent redundant activity zones with representation of virtually all raw materials and tool classes as might be expected of domestic activity areas. Given that each block area of each floor represents at least one domestic activity zone, this opens the possibility of assessing intra-floor social ranking as measured from a material wealth standpoint. Examination of variability in densities of non-local goods, ornamental goods, ornamental raw materials, and bifaces revealed concentrations of each within Block D particularly during the IIa-IIb occupations. This raises the possibility that immediately prior to household abandonment some degree of intra-household wealth distinctions could have emerged as might be typical of ranked communalistic groups (e.g. Coupland et al. 2009).

A final question concerned the degree to which intra-floor wealth distinctions were associated with variability in intra-household cooperation in major work categories (weapons refurbishing, wood working, groundstone tool production and discard, hide working, sewing). To assess this we calculated coefficient of variation (CV) indices on component scores from the tool form principal component analysis. Then we calculated CVs on the component specific CVs as a measure of overall shared work. Results revealed high summary CV scores for floors IIg-IIc and very low scores on IIa-IIb. We interpreted that to mean that work was potentially shared to a higher degree in the older floors and less-so on the late floors. If accurate this effectively means that by IIa and IIb each of the domestic units was essentially self-contained and little cooperation in labor happened around the house. Put differently, this suggests that wealth-based inequality was correlated with declining cooperation in household work.

Extensive analyses were conducted of the large faunal assemblage. These included assessments of taphonomic processes and assemblage composition as measured from the standpoints of variability in taxa and element frequencies. Results were very intriguing particularly in reference to demographic patterns and occupational history. Household subsistence was dominated by sockeye salmon and to a lesser degree, deer, followed to a far lesser degree by other items. This reflects a stable subsistence cycle much like that described in the ethnographies of the St'át'imc (Hayden 1992; Prentiss and Kuijt 2012; Teit 1906). Despite consistency in those relationships we could also recognize variability in predation and consumption patterns correlated with demographic history. Salmon elements peak at IIf, drop into a trough during IId-IIc, and then peak again during IIb before dropping precipitously. Ungulate bone follows a similar pattern with a peak in IIf, a similar IId-IIc trough, and a late peak in IIa. Data on processing intensity as measured with a fragmentation index suggests that most intensive bone processing as might be associated with bone grease manufacture occurred during IId-IIc. Walsh (2015) also examined element frequencies to explore variability in field processing and transport of deer parts. Data reflect high axial part representation during IIi-IIe, low axial representation in IId-IIc and a return to higher axial part counts in IIb-IIa. Appendicular parts are consistently present throughout all floors. Low axial counts and high frequencies of appendicular parts can reflect the effects of higher rates of more intensive field processing as if often associated with long distance transport decisions (Broughton 1994). Hunting trips to more distant locales can be the result of low encounter rates for local prey populations as can result from localized over–predation. The combination of low ungulate frequencies, high bone processing, and nearly non-existent axial element counts for IId-IIc imply the possibility that access to local deer and other ungulate species was very limited. This is a pattern that has been recognized village-wide for this time and generally associated with a process of gradual village de-population (Prentiss et al. 2014). The rise in deer numbers, reduced bone processing intensity, and axial parts during IIb-IIa could reflect a lessening of pressure on local ungulate populations and increased opportunities for the remaining households of which Housepit 54 was one. Overall it would appear that household demographic measures track those of major faunal animal food sources. Twice population density rose with increasing access to fish and ungulates and twice household numbers dropped after game numbers peaked and declined. The second decline likely led to the abandonment of the house. An additional implication is that subsistence stress during IId-IIc may have altered existing social arrangements thus triggering that IIb-IIa reduction in cooperation and heightened wealth-based inequality. One possibility to consider is that in a time of declining household numbers around the village, select houses might have taken in individuals and families as a means for maintaining household viability. If that was the case at Housepit 54, it could also have resulted in a pattern of social inequality as suggested by Prentiss et al. (2007) for a similar process at Keatley Creek.

Isotopic analysis (Appendix F) of a sample of faunal remains revealed two isotopic clusters. One group included a variety of terrestrial mammals (deer, elk, sheep, and wolf). The other set included salmon and dog remains. Diaz (Appendix F, this report) draws a distinction between *Canis familiaris* (domesticated dog) and *Canis latrans* (coyote) and speculates that domesticated dogs may have acquired their isotopic link to salmon via interaction with human's while coyotes gained the same by scavenging salmon from native fishing sites. However, the only difference among these bones is size and drawing from the isotopic similarity and aDNA results (Appendix E) it would appear that all canid remains (other than wolf) represent *Canis familiaris*. Given the presence of salmon DNA (Appendix E) and the strong isotope signature in the bones it would appear that Housepit 54 dogs dined primarily upon salmon. This replicates outcomes from previous coprolite studies associated with materials recovered at Housepit 24 in 2008. This pattern is also reflected in analysis of pollen from dog coprolites which consist of typical local windblown taxa and thus not special plant foods (Vandy Bowyer, personal communication, 2015). If domesticated dog diets mirror that of humans then this is further evidence that the human diet at Bridge River was dominated by salmon. Ancient DNA analysis resulted in identification of mtDNA haplotype DHap2 for all coprolite and canid bone samples. DHap2 is a locally unique breed with close ties to other Northwest Coast and Interior along with East Asian dog populations. Research into variability in dog genealogy and diet at Bridge River using ancient DNA is ongoing.

Botanical remains are dominated by seeds of three species commonly known as Saskatoon, Kinnikinnick, and what we consider to be most likely blue elderberry. Representation of these items is remarkably consistent between floors and represents a repeated annual cycle of berry harvesting for use during winter occupations as described in ethnographies (Turner 1992, 2014). There has not been enough variability in these remains to test ideas about change in subsistence or social relationships. Data collection and analysis of spatial variability in plant remains is ongoing with results not yet available for presentation.

The 2013 and 2014 field seasons revealed ten distinctive house floors with intact distributions of features, artifacts, and food remains. Examination of trenches excavated in 2008 reveal the presence of approximately five additional deeper floors and one to two buried roof deposits. The deepest floors could represent progressively smaller houses. If this is confirmed it suggests that Housepit 54 grew from earlier and now more deeply buried structures. One fascinating implication of this finding considered in light of excavation outcomes elsewhere in the village (e.g. Prentiss et al. 2008, 2012) is that the core area of the Bridge River site consists entirely of accumulated anthropogenic sediments containing a potentially large though unknown number of deeply buried housepits or "subhousepits." Accumulation of sediments, for example, those of Housepit 54 happened as a byproduct of repeated creation and occupation of pithouses by groups of a variety of sizes. Growth of Housepit 54 parallels growth of the entire village (Prentiss et al. 2012, 2014). Change on social dynamics within Housepit 54 also appears to parallel socio-economic and political change in the wider village that includes population packing and emergent inequality. Yet, when viewed from the perspective of a single household we gain a more nuanced perspective on this process. Housepit 54 actually developed two periods of high demographic density. The first coincided with the doubling of house size (floors IIf to IIe) but also with an apparent short-lived peak in salmon and ungulate productivity. The second peak (floors IIb to IIa) comes just before the house was abandoned and also coincides with what appears to be a short-lived boom in access to salmon but also a return to accessible ungulate populations. The rise in ungulates could be linked to declining overall numbers of human predators as it was at this time that the wider village was being depopulated. The demographic trough between IIe and IIb appears to reflect the Malthusian ceiling experienced across the wider village. Consequently, it is probably this critical period that triggered the social shifts associated with what appears to be more competitive and less cooperative relationships between groups residing within Housepit 54 immediately prior to abandonment.

Demographic growth and household expansion during IIf-IIe appears to have been a cooperative process undertaken during a period of economic growth at the Bridge River 2 to 3 transition. During this time nearly every BR 2 house was abandoned and approximately twice that many new houses established in more formalized geometric arrangements. Housepit 54's growth was clearly part of that process. Prentiss and Williams (2014) have argued that the BR 2 to 3 reorganization reflects a significant socio-political shift from village specific clans to multi-village clans with overlapping territorial jurisdictions. Such a political change could have created new avenues for social ranking to develop across multiple scales (village, neighborhood, house, and household domestic area). However, in a cooperative society structured around broad sharing of goods it may have taken a socio-demographic crisis to force the kind of competitiveness and material-based inequality we recognize potentially on all scales during mid- to later BR 3 times. If confirmed by further research there are significant lessons in this history regarding the role of cooperation in the maintenance and sustainability of human groups.

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Appendices

Appendix A

Photographs and Maps

Block A, Stratum IIg, Plan View (photo taken at close of 2013 field season).

Feature A2, Basin-shaped hearth, Stratum IIg, surface plan view.

Feature A2, Basin shaped hearth, Stratum IIg, excavated plan view.

Block A, Stratum Vc plan view

Block A, Stratum IIh, plan view.

Block A, Feature A3, post-hole, Stratum IIg, excavated plan view.

Block A, Feature A4 Basin shaped hearth, Stratum IIh, excavated plan view.

Block A, Feature A5, Cache pit, excavated (level 1) plan view.

Block A, Feature A5, Cache pit, excavated (level 2) plan view.

Block A, Feature A5, Cache pit, excavated (level 5) plan view.

Block A, Feature A6, Oven-like hearth, Stratum IIh, excavated plan view

Block A, Feature A6, post-hole, Stratum IIh, excavated plan view

Block A, Feature A8, Basin shaped hearth, Stratum IIh, surface plan view

Block A, Feature A8, Basin shaped hearth, Stratum IIh, partially excavated plan view

Block A, Feature A8, Basin shaped hearth, Stratum IIh, fully excavated plan view (Feature A5 in foreground).

Block A, Feature A9, Surface hearth, Stratum IIh, surface plan view.

Block A, Feature A10, Small post-hole, Stratum IIh, excavated plan view.

Block A, Feature A11, Shallow hearth, Stratum IIh, surface plan view.

Block A, Stratum IIi, Plan view.

Block A, Feature A12, Basin shaped hearth, Stratum IIi, Excavated plan view.

Block A, Features 13 (Deep Cylindrical pit, partially excavated Stratum IIg), 14, and 15 (both small post-holes and fully excavated, Stratum IIi), plan views.

Block A, Feature 13 Deep Cylindrical pit, Stratum IIg, excavated plan view.

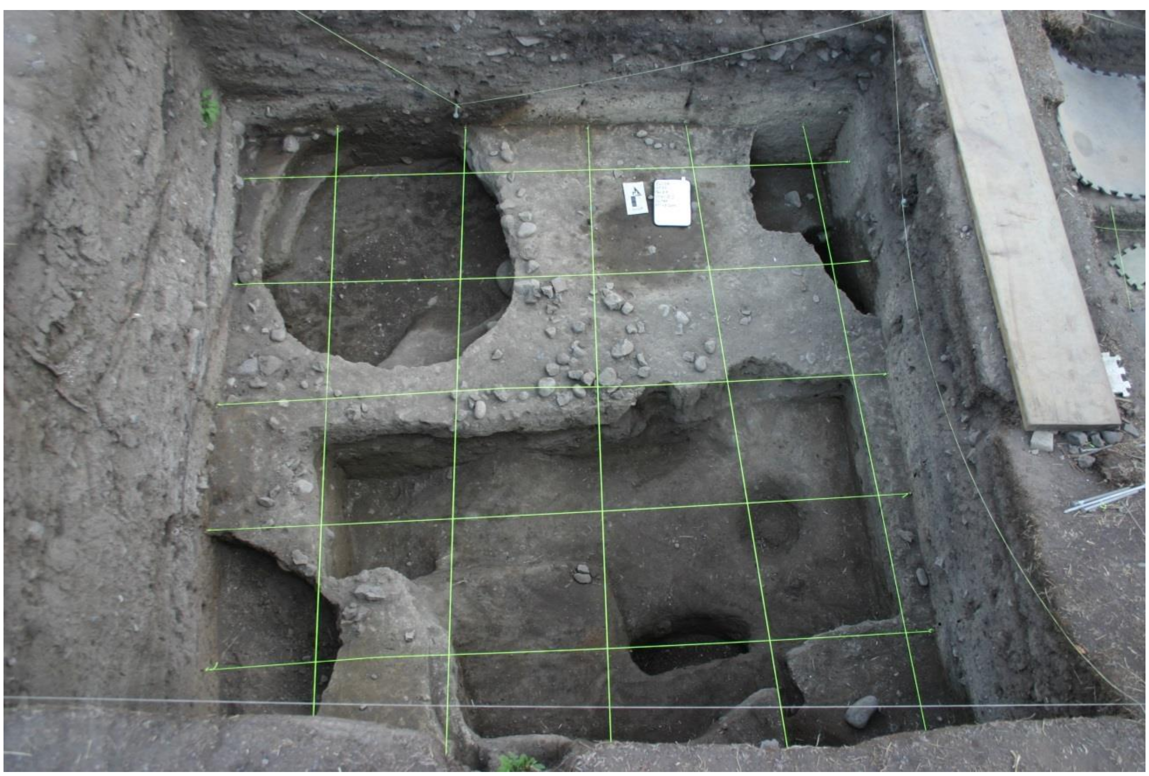
Block A, Features 13 (stratum IIg) and 17 (Stratum IIi), both deep cylindrical pits, excavated plan views.

Block A, Feature A17 (2013), Stratum IIf, birch bark near base of deep bell-shaped pit.

Block A, Feature A17 (2013), Stratum IIf, birch bark near base of deep bell-shaped pit.

Block A, Feature A17 (2013), Stratum IIf, birch bark near base of deep bell-shaped pit.

Block A, Feature A17 (2013), Stratum IIf, birch bark at base of deep bell-shaped pit.


Block A, Stratum IIj, Plan view.

Block A, Stratum IIj, Plan view (close-up)

Block A, Features A19 (Basin shaped hearth, surface), A20 (basin shaped hearth), and A21(post hole, surface), Stratum IIj, plan views.

Block A, Feature A19, Deep cylindrical pit, Stratum IIj, excavated plan view.

Block A, Feature A20, Basin shaped hearth, Stratum IIj, Surface Plan view.

Block A, Feature A20, Basin shaped hearth, Stratum IIj, Excavated Plan view.

Block A, Feature A22, Basin shaped hearth, Stratum IIj, Surface Plan view.

Block A, Feature A22, Basin shaped hearth, Stratum IIj, Excavated Plan view.


Block A, Stratum IIk, Plan view.

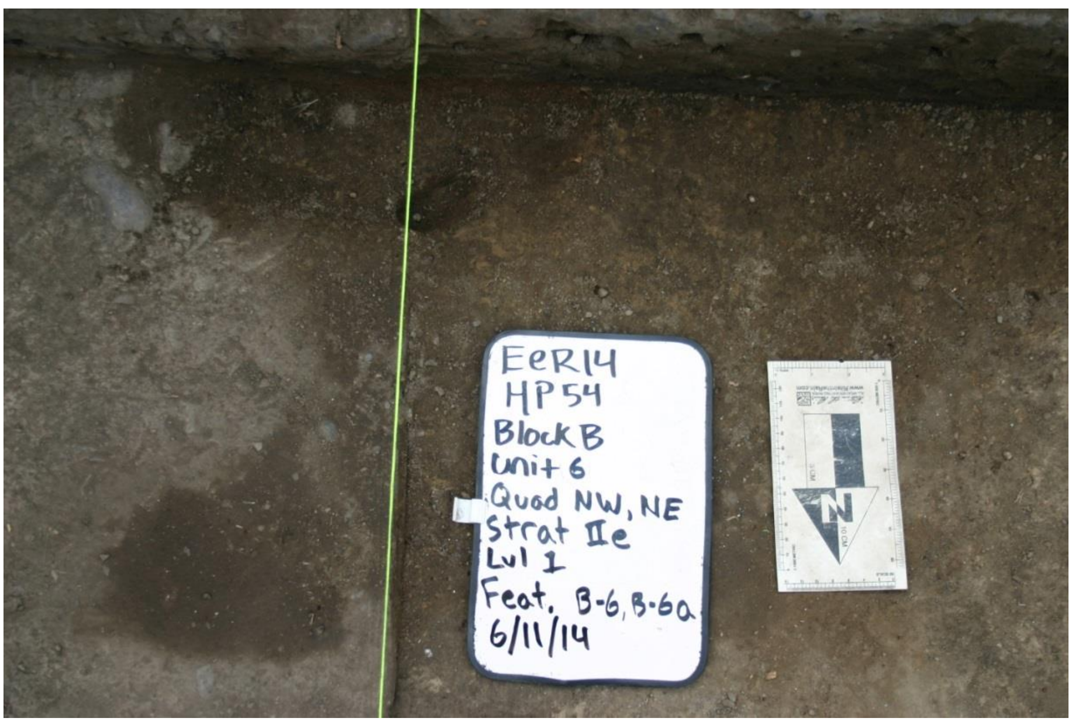
Block B, large grinding slab on Stratum IId (used during IIc, IIb, abd IIa).


Block B, Stratum Vb3 plan view.

Block B, Stratum Vb3, burned roof material.


Block B, Stratum IIe, Plan view.

Block B, Feature B3, Deep bell-shaped pit. Stratum IIe, excavated plan view.



Block B, Feature B6, Shallow post-hole, Stratum IIe, Surface plan view.

Block B, Feature B7, Deep Bell-shaped pit (limited portion), Excavated plan view.

Block B, Features B10 (small post-hole excavated plan view left) and Feature B15 (Deep bell-shaped pit surface plan view right), Stratum IIe.

Block B, Feature B10 (double small post-hole), Stratum IIe, Excavated plan view.

Block B, Feature B9 (double small post-hole), Stratum IIe, Excavated plan view.

Block B, Feature B12, Oven-like hearth, Stratum IIe, Excavated plan view.

Block B, Feature B13, Post-hole, Stratum IIe, Excavated plan view.

Block B, Feature B14, Deep Bell-shaped pit, Stratum IIe, Close up of rock pile in pit containing coprolites.

Block B, Feature B14, Deep Bell-shaped pit, Stratum IIe, Profile showing bedded strata and rock cluster with coprolites.

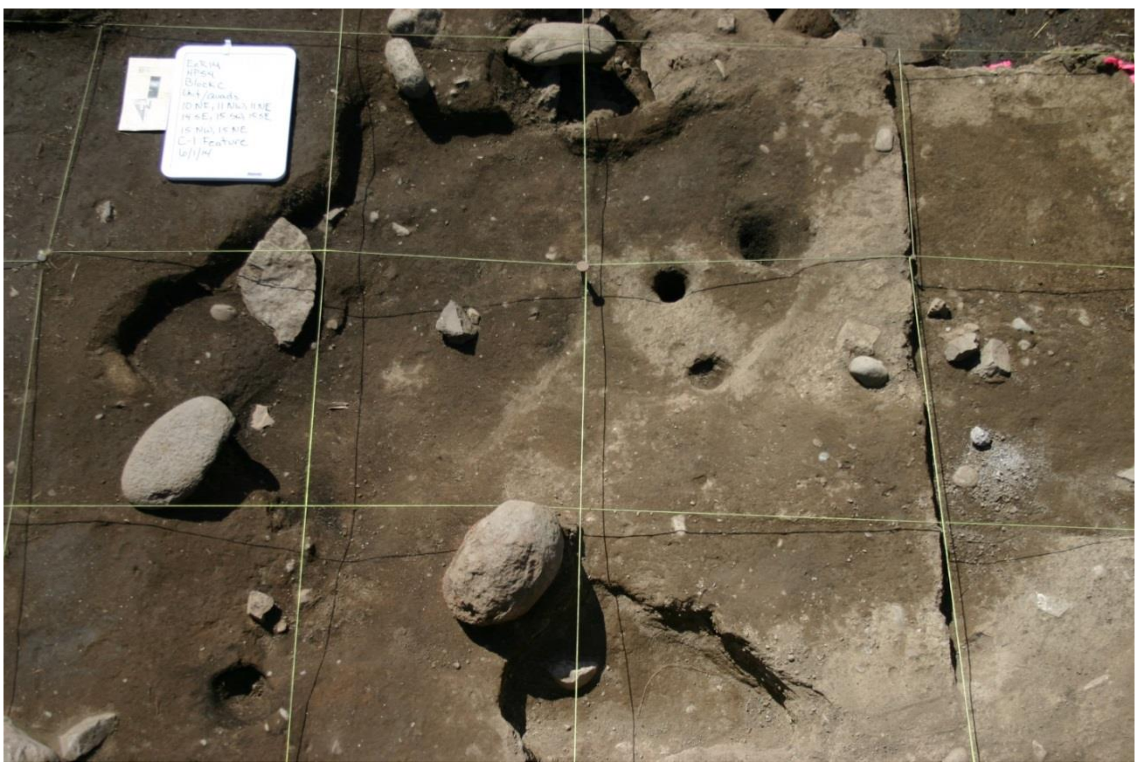
Block B, Feature B14, Deep Bell-shaped pit, Stratum IIe, Plan view, test excavation (feature was not fully excavated)

Block B, Feature B15, Deep bell-shaped pit, Stratum IIe, Excavated plan view.


Block B, Stratum IIe, excavated plan view.

Block C, Stratum IIe plan view at close of 2013 field season.

Block C, Feature C1, Shallow hearth, Stratum IIe, Surface Plan View.


Block C, Feature C1, Shallow hearth, Stratum IIe, Excavated Plan View.

Block C, Feature C1, Shallow hearth, Stratum IIe, Excavated Plan View.

Block C, Feature C2, Basin-shaped hearth, Stratum IIe, Excavated plan view.

Block C, Stratum IIf, Plan View.

Block C, Feature C3, Shallow hearth, Surface Plan View.

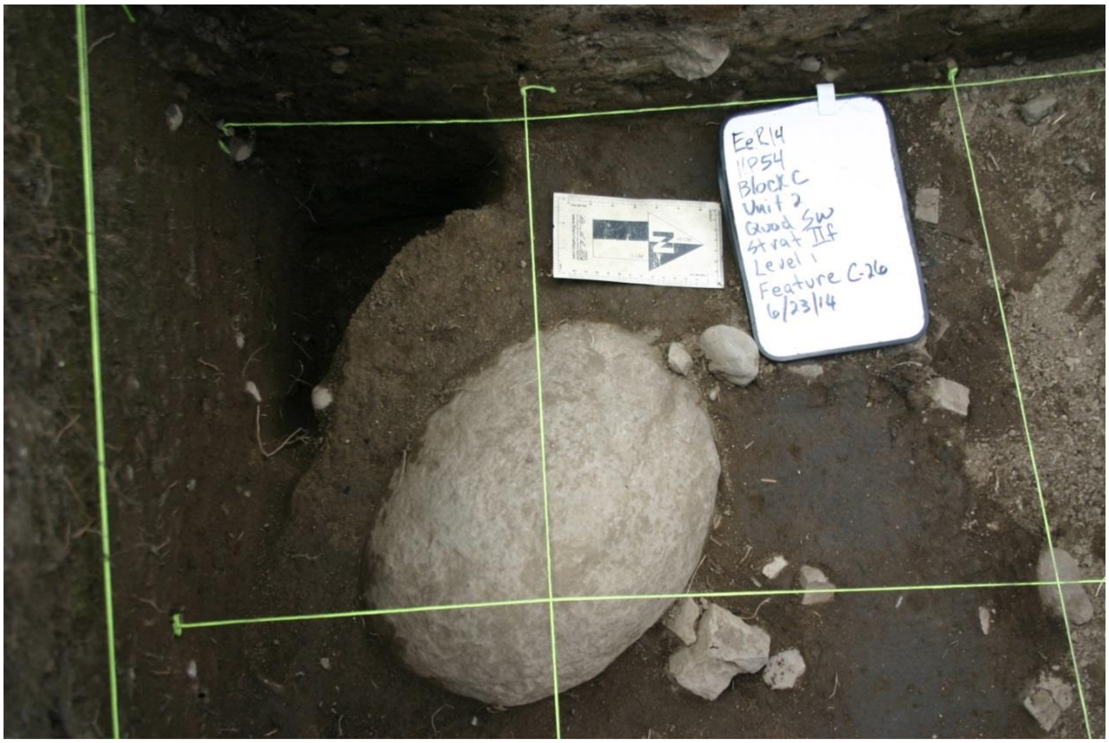
Block C, Feature C4, Post hole, Stratum IIf, Excavated plan view.

Block C, Feature C6, Collared post-hole (small), Stratum IIf, Excavated plan view.

Block C, Feature C10 (and others), Small post-hole, Stratum IIf, Excavated plan view.

Block C, Feature C21 (and others), Small post-hole, Stratum IIf, Excavated plan view.

Block C, Feature C22 (and others), Small post-hole, Stratum IIf, Excavated plan view.



Block C, Feature C26, Deep cylindrical pit, Stratum IIf, Excavated plan view.

Block C. Stratum IIg, Plan View.

Block C, Feature C7, Basin-shaped hearth, Surface plan view. Note wooden shafts embedded in feature. Stratigraphic designation should be IIg.

Block C, Feature C7, Basin-shaped hearth, Stratum IIg, Excavated plan view.


Block C, Feature C12, Shallow hearth, Stratum IIg, Excavated plan view.

Block C, Feature C23, Basin-shaped hearth, Stratum IIg, Surface plan view.

Block C, Feature C23, Basin-shaped hearth, Stratum IIg, Excavated plan view.

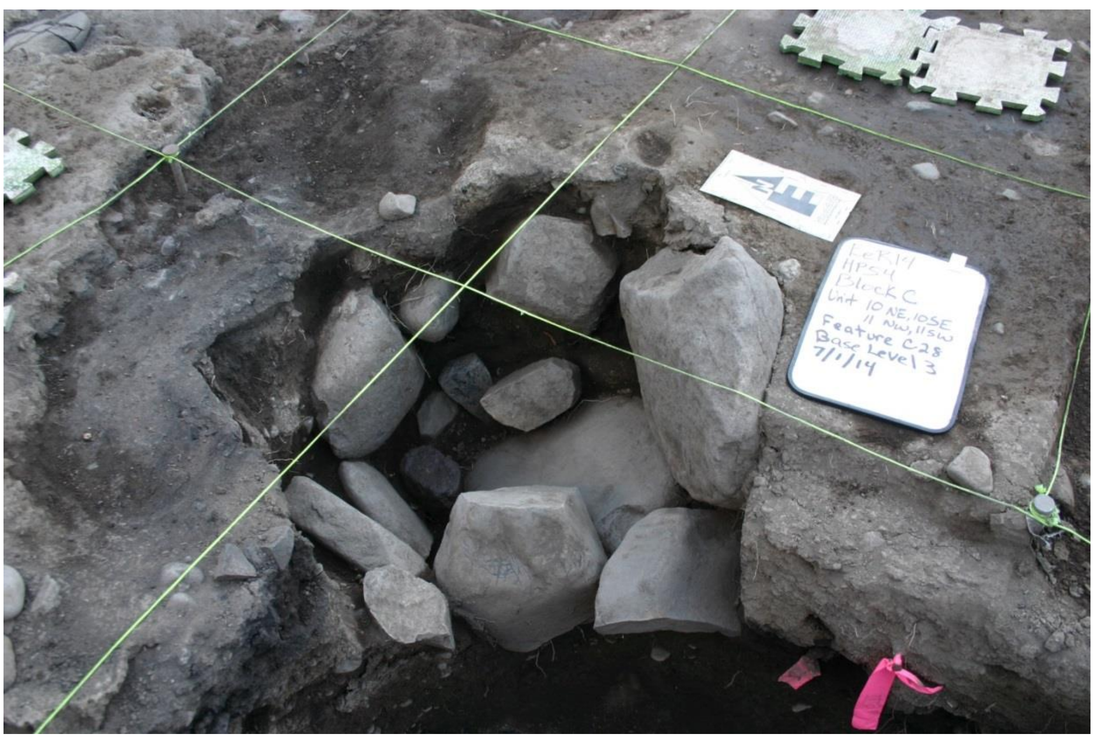
Block C, Feature C27, Basin-shaped hearth, Stratum IIg, Surface plan view.

Block C, Feature C27, Basin-shaped hearth, Stratum IIg, Partially excavated plan view.

Block C, Feature C27, Basin-shaped hearth, Stratum IIg, Excavated plan view.

Block C, Feature C28, Collared post-hole, Stratum IIg, Partially excavated (Level one) plan view.

Block C, Feature C28, Collared post-hole, Stratum IIg, Partially excavated (Level one) plan view.



Block C, Feature C28, Collared post-hole, Stratum IIg, Partially excavated (Level three) plan view.

Block C, Feature C28, Collared post-hole, Stratum IIg, Partially excavated (Level four - base) plan view.

Block C, Feature C28, Collared post-hole, refit cobbles from fill within feature.

Block C, Features 29 and 30, Small post-holes, Stratum IIg, Excavated plan view.

Block C, Feature C31, basin-shaped hearth, Stratum IIg, Partially excavated plan view.

Block C, Feature C31, basin-shaped hearth, Stratum IIg, Excavated plan view.

Block C, Feature C32, Small post-hole, Stratum IIg, Excavated plan view.

Block C, Feature C33, Post-hole, Excavated plan view.


Block C, Stratum IIh, Plan View.

Block C, Stratum IIh, Close-up Plan view.

Block D, Stratum Va, Burned roof beams.

Block D, Stratum IIa, Plan view.

Block D, Stratum IIa, faunal element in situ on floor, Plan view.

Block D, Feature D1, Collared post, Stratum IIa, Plan View.

Block D, Stratum IIa, Fish bones in situ on floor, Plan view.


Block D, Stratum IIb, Plan view.

Block D, Feature D4, Basin-shaped hearth, Stratum IIb, Surface plan view.

Block D, Feature D4, Basin-shaped hearth, Stratum IIb, Excavated plan view.

Block D, Features D5 and D6, Small post-holes, Stratum IIb, Excavated plan view.

Block D, Feature D7, Post-hole, Stratum IIb, Excavated plan view.

Block D, Feature D8, Deep Bell-shaped pit, Stratum IIb, Excavated Plan View.


Block D, Stratum IIc, Plan view.

Block D, Feature D10, Deep Bell-shaped pit, Stratum IIc, Partially excavated plan view.

Block D, Feature D11, Post-hole, Stratum IId, Excavated plan view.

Block D, Features D12 and D13, Small post-holes, Stratum IIc, Excavated plan views.

Block D, Feature D16, Post-hole, Stratum IIc, Excavated plan view.

Block D, Feature D18, Post-hole (note wood [post remnant] inside), Stratum IIc, Partially excavated plan view.

Block D, Feature D18, Post-hole (contains some wood from original post), Stratum IIc, Excavated plan view.


Block D, Stratum IId, Plan view.


Block A, West wall profile.


Block A, North wall profile.


Block A, East wall profile.


Block B, South wall profile.


Block B, East wall profile.


Block B, North wall profile.


Block B, West wall profile.


Block C, West wall (north section) profile.


Block C, North wall profile.

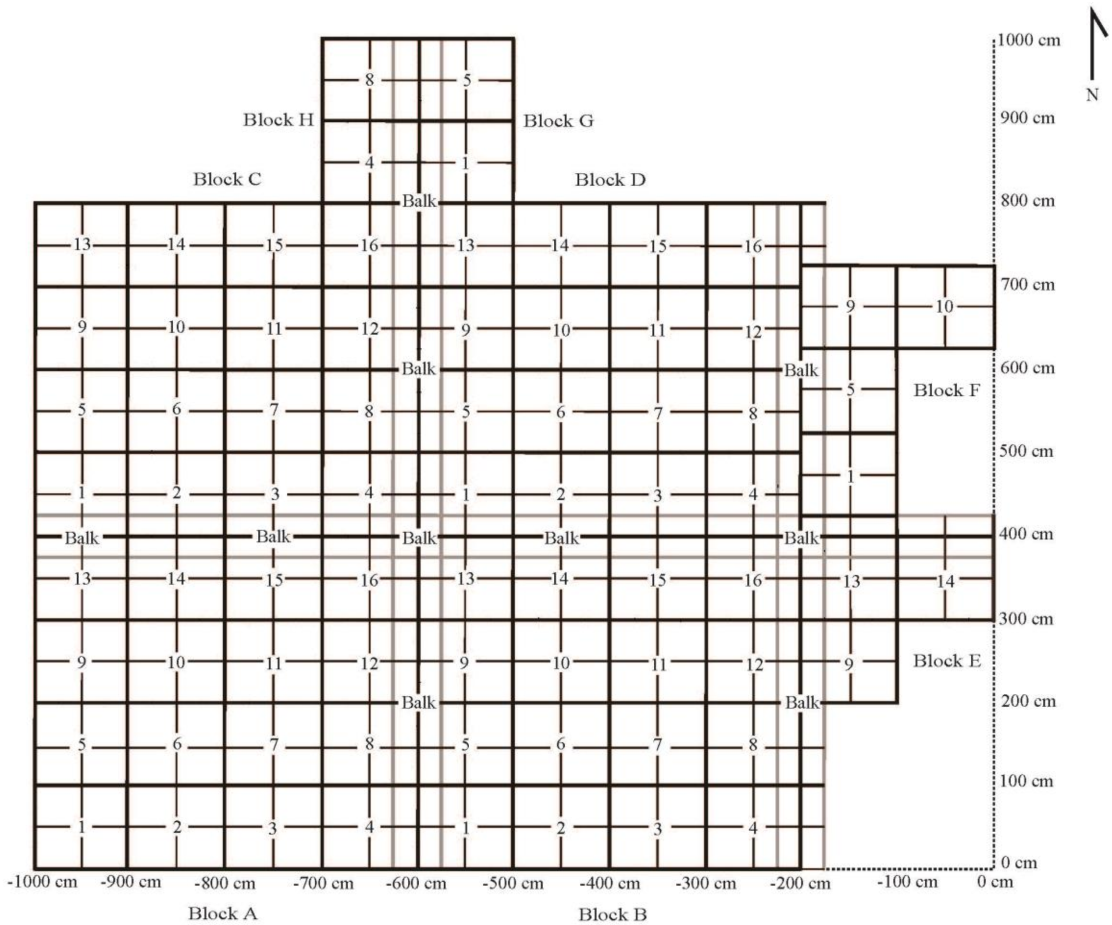

Block D, North wall profile,

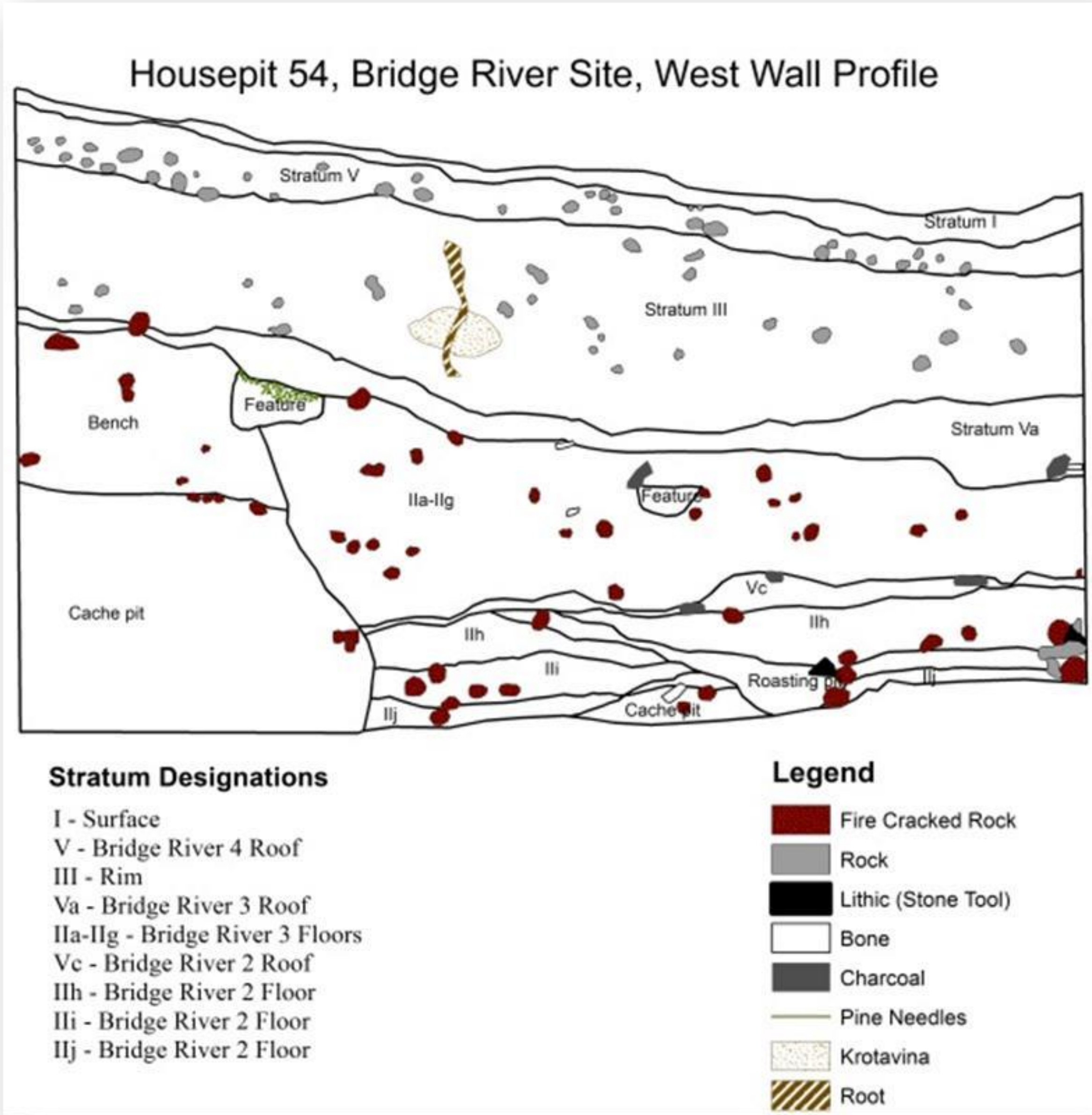

Block D, East wall profile.


Housepit 54 completed 2014 excavation. View facing north on site grid.

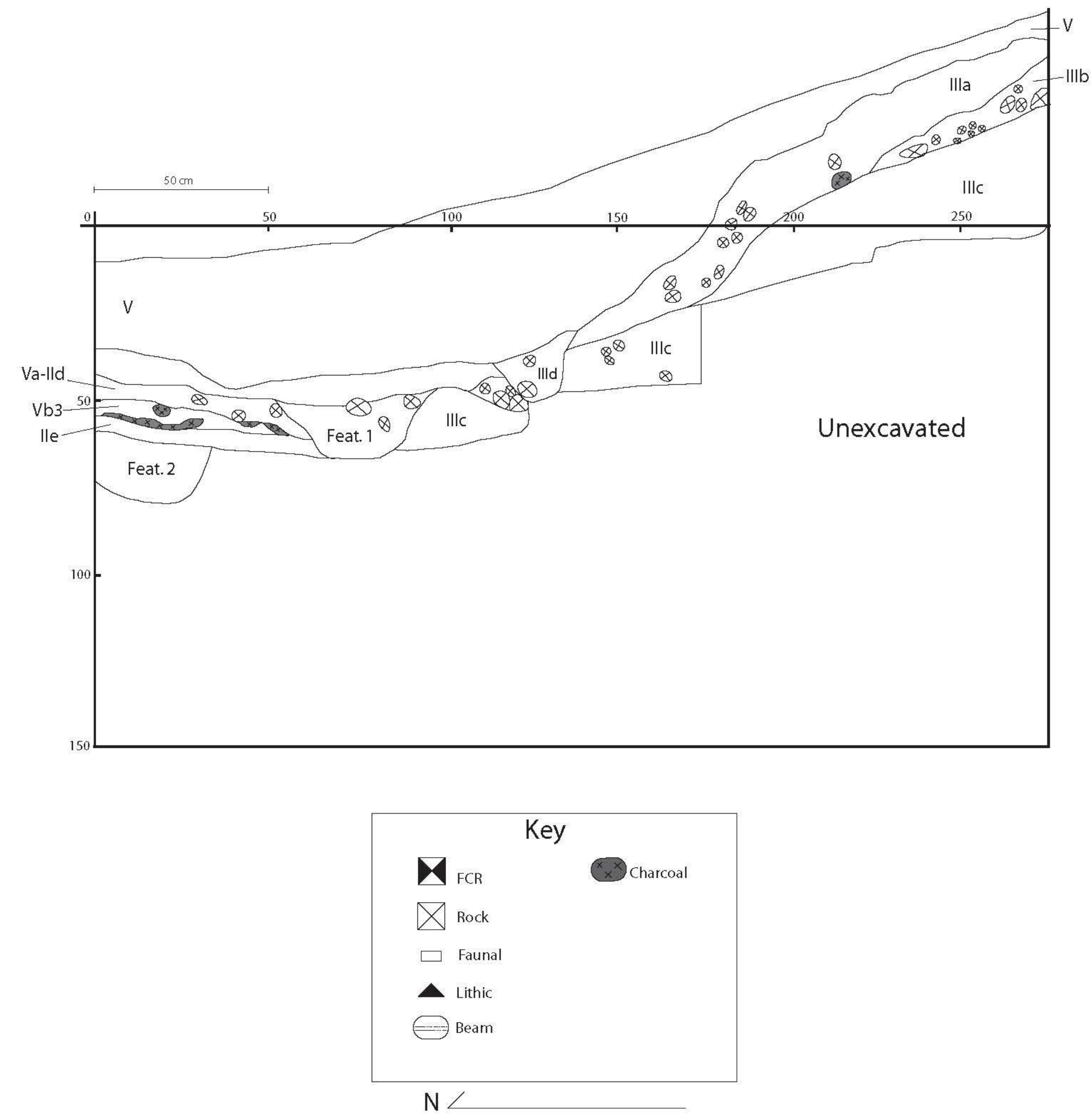

Housepit 54, Completed 2014 excavation, View facing southeast on site grid.


Housepit 54, Completed 2014 excavation, View facing south-southwest on site grid.

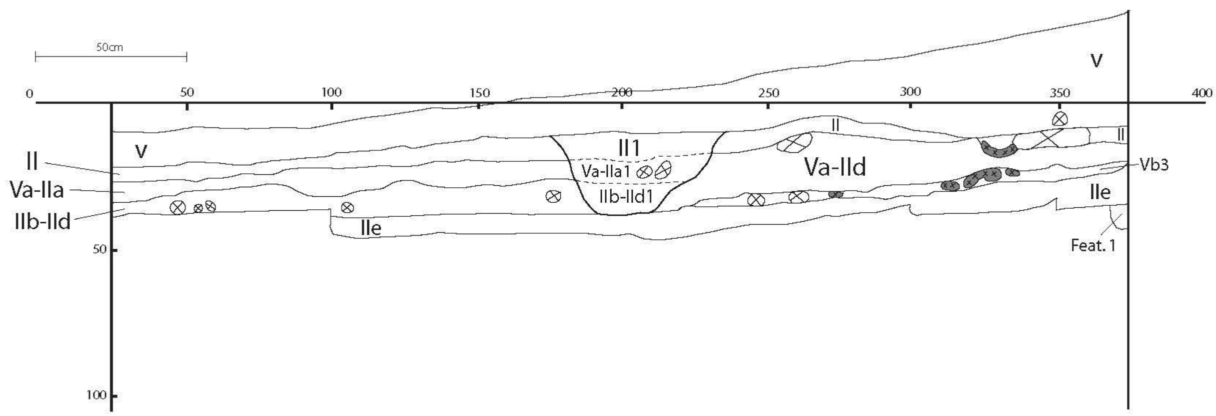

N
1000 cm
900 cm
800 cm
700 cm
600 cm
500 cm
400 cm
300 cm
200 cm
100 cm
0 cm
-1000 cm
-900 cm
-800 cm
-700 cm
-600 cm
-500 cm
-400 cm
-300 cm
-200 cm
-100 cm
0 cm
Block A
Block B
Block C
Block D
Block E
Block F
Block G
Block H
Balk

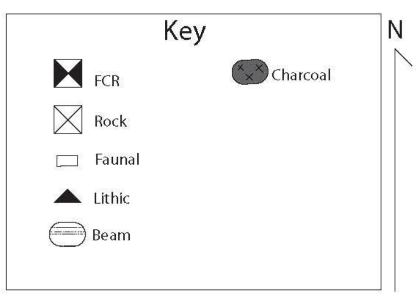

Housepit 54, Bridge River Site, West Wall Profile
Stratum V
Stratum I
Stratum III
Bench
Feature
Stratum Va
IIa-IIg
Feature
Vc
Cache pit
IIh
IIh
IIi
Roasting pit
IIj
IIj
Cache pit
Stratum Designations
I - Surface
V - Bridge River 4 Roof
III - Rim
Va - Bridge River 3 Roof
IIa-IIg - Bridge River 3 Floors
Vc - Bridge River 2 Roof
IIh - Bridge River 2 Floor
IIi - Bridge River 2 Floor
IIj - Bridge River 2 Floor
Legend
Fire Cracked Rock
Rock
Lithic (Stone Tool)
Bone
Charcoal
Pine Needles
Krotavina
Root

Block B East Wall Profile

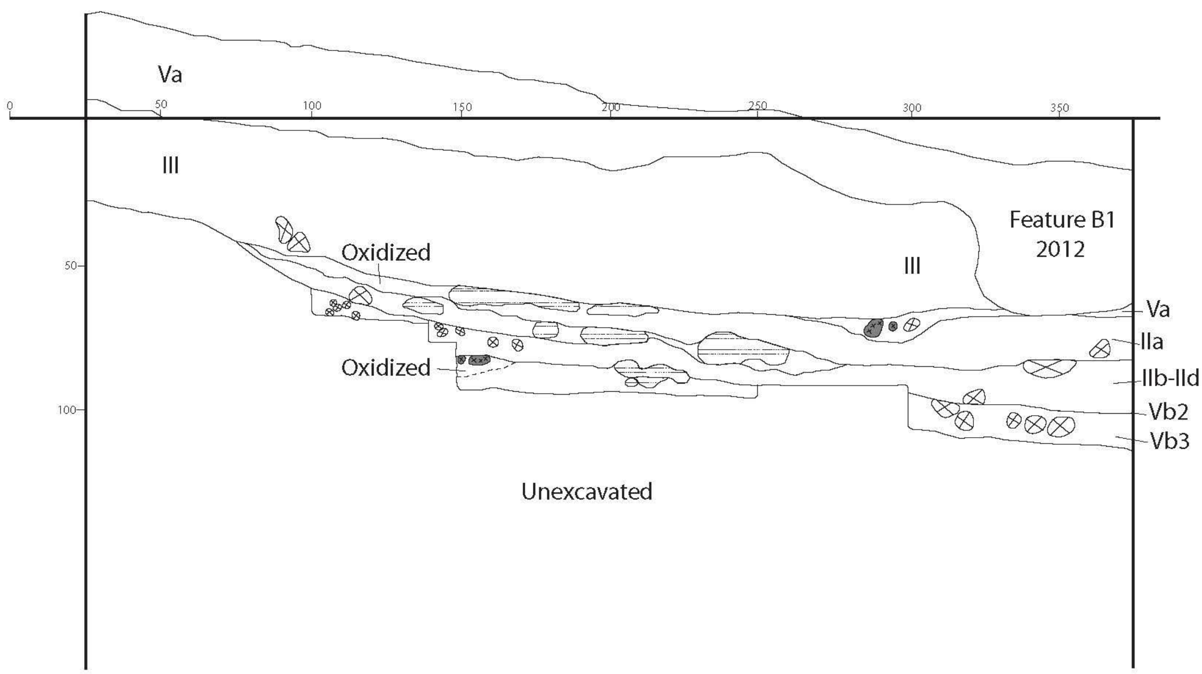


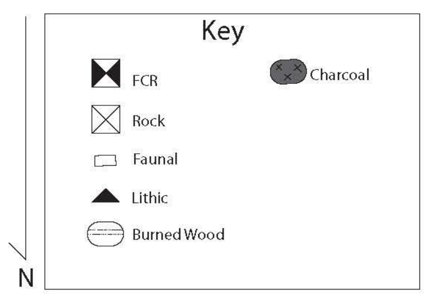
Block B North Wall Profile



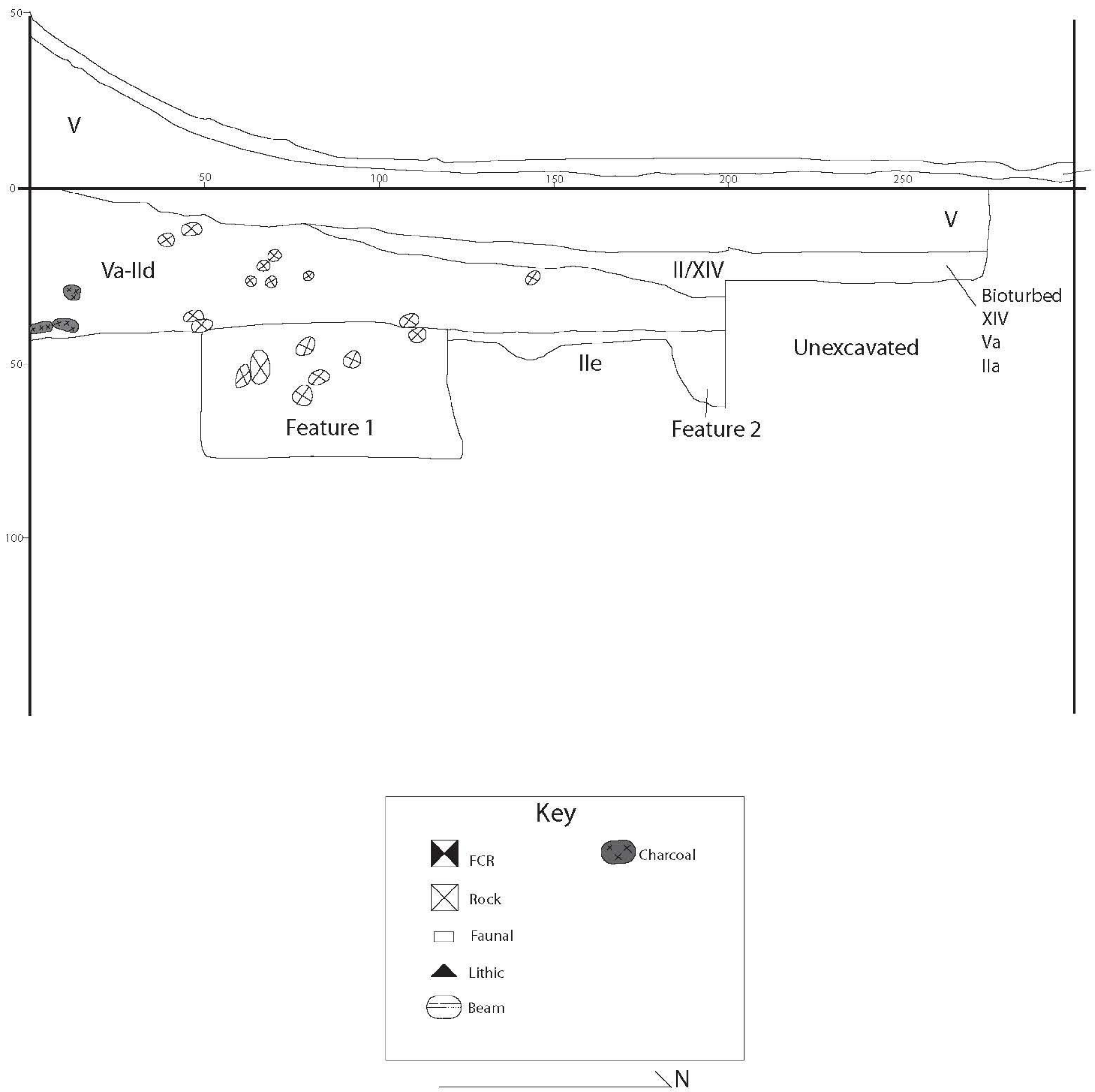


Block B South Wall Profile

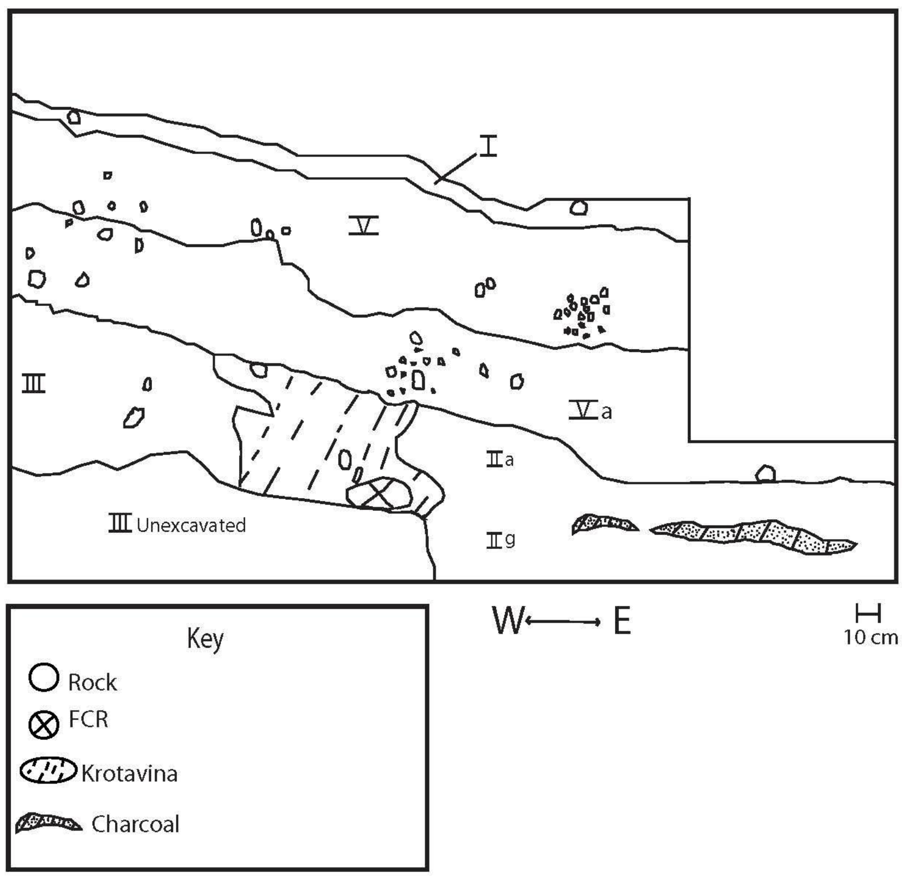




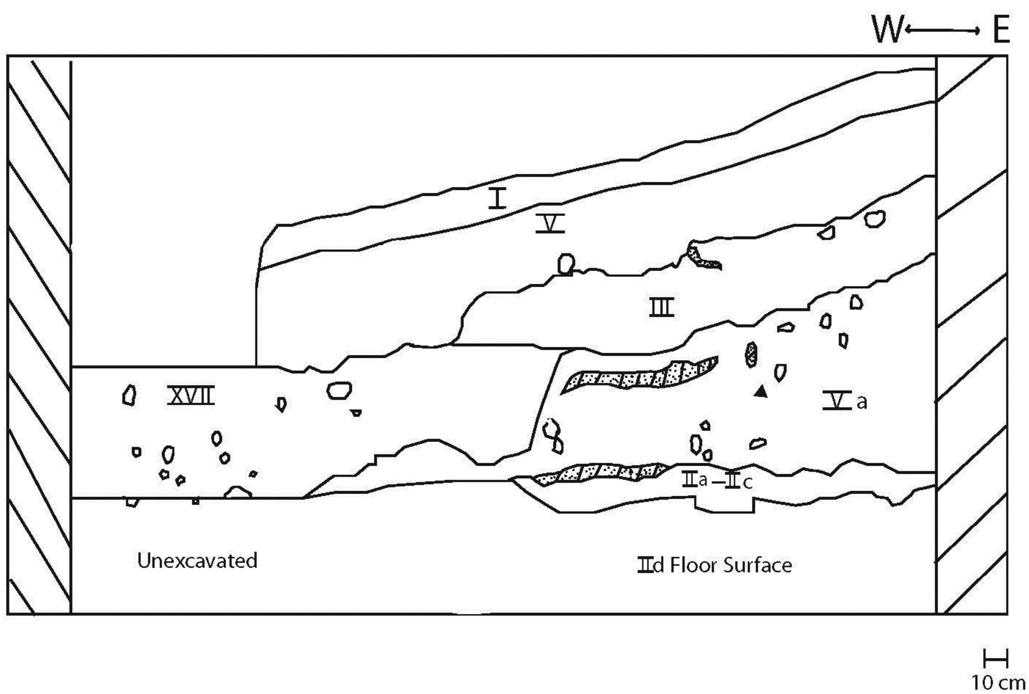
Block B West Wall Profile

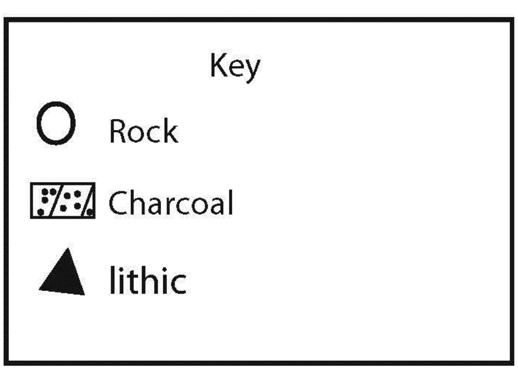


HP54
Block C
N Wall

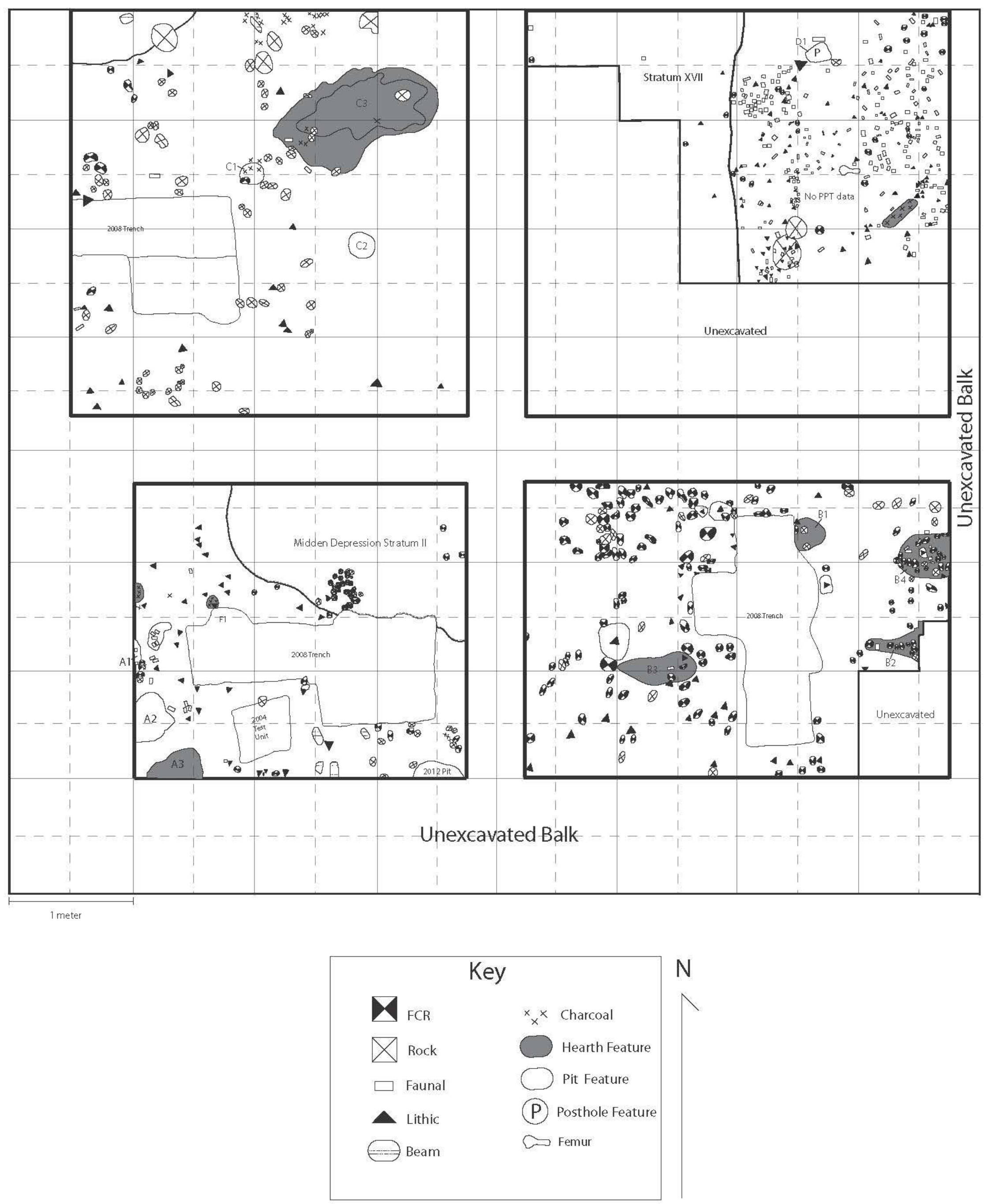


HP54
Block D
N Wall





Stratum IIa


C3
C1
C2
2008 Trench
Stratum XVII
D1
P
No PPT data
Unexcavated
Unexcavated Balk
Midden Depression Stratum II
F1
2008 Trench
A1
A2
A3
2004 Test Unit
2012 Pit
B1
B4
2008 Trench
B3
B2
Unexcavated
Unexcavated Balk
1 meter
Key
FCR
Rock
Faunal
Lithic
Beam
Charcoal
Hearth Feature
Pit Feature
Posthole Feature
Femur
N

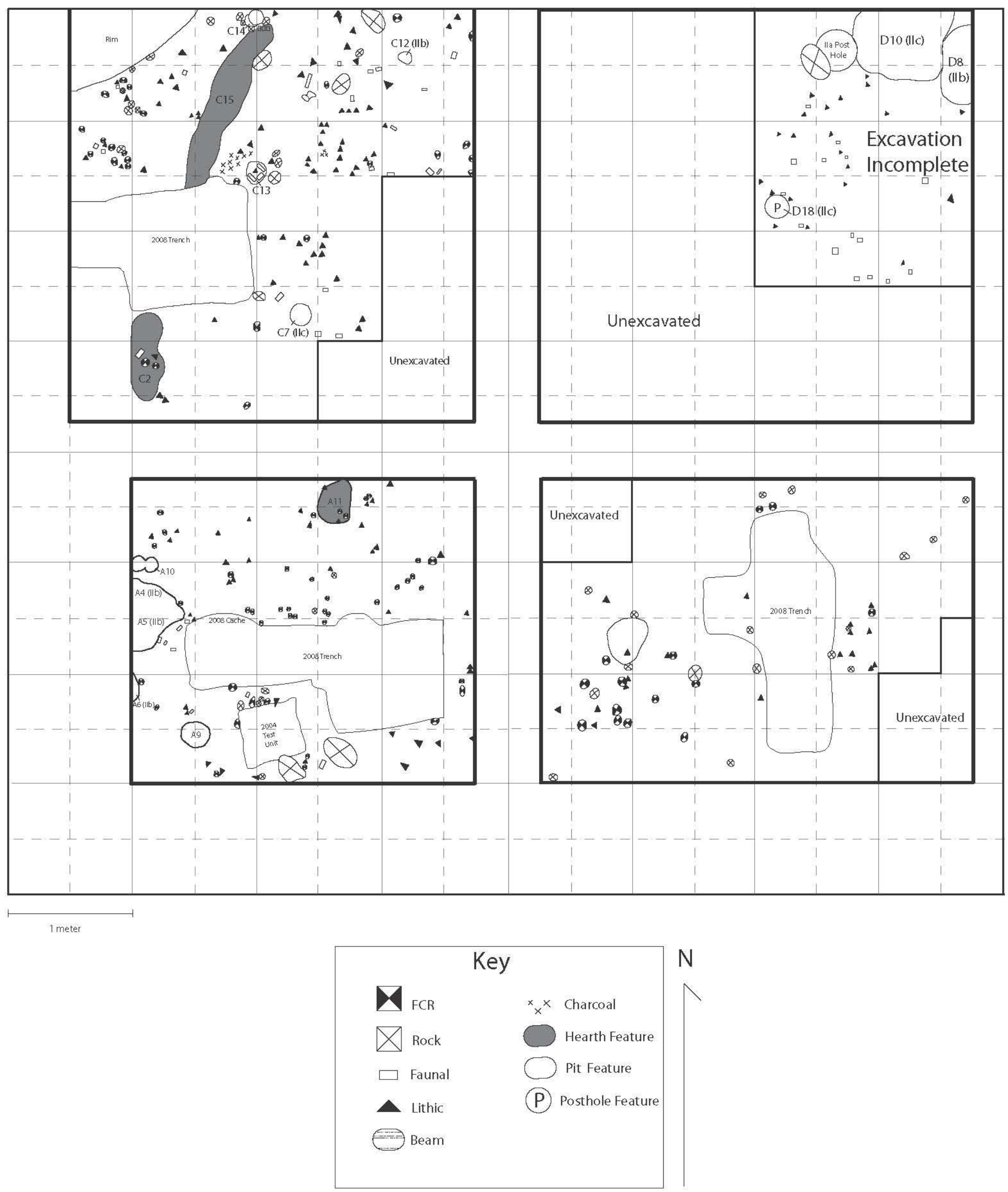
Stratum IIb


C6
C4
C12
C5
2008 Trench
C2 (IIa)
Stratum XVII
D7
D6
D5
D1 (IIA)
D8
D4
Unexcavated
Unexcavated
B6
Balk
2008 Trench
B5
Balk
Unexcavated
1 meter
Key
FCR
Rock
Faunal
Lithic
Beam
Charcoal
Hearth Feature
Pit Feature
Posthole Feature
Ash Layer
N

Stratum IIc

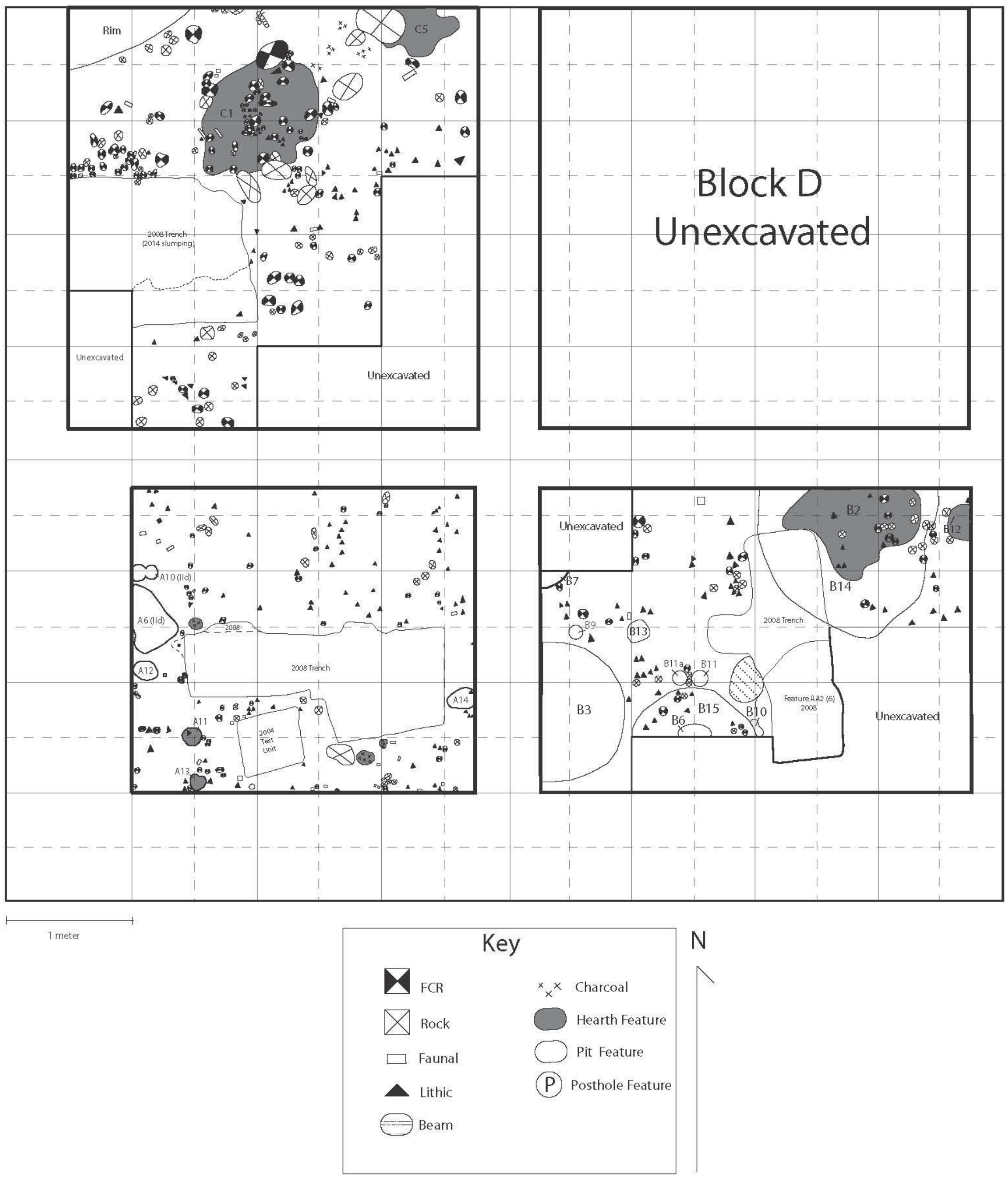
C6 (IIb)
C11
C8
C1 (IIa)
2008 Trench
C2 (IIa)
C7
Stratum XVII
IIa Post Hole
D10
D8 (IIb)
P
D17
D18
Unexcavated
A4 (IIb)
A5 (IIb)
F1
2008 Trench
A6 (IIb)
2004 Test Unit
2012 Pit
Unexcavated
2008 Trench
B7
Unexcavated
Key
FCR
Rock
Faunal
Lithic
Beam
Charcoal
Hearth Feature
Pit Feature
Posthole Feature
N

Stratum IId

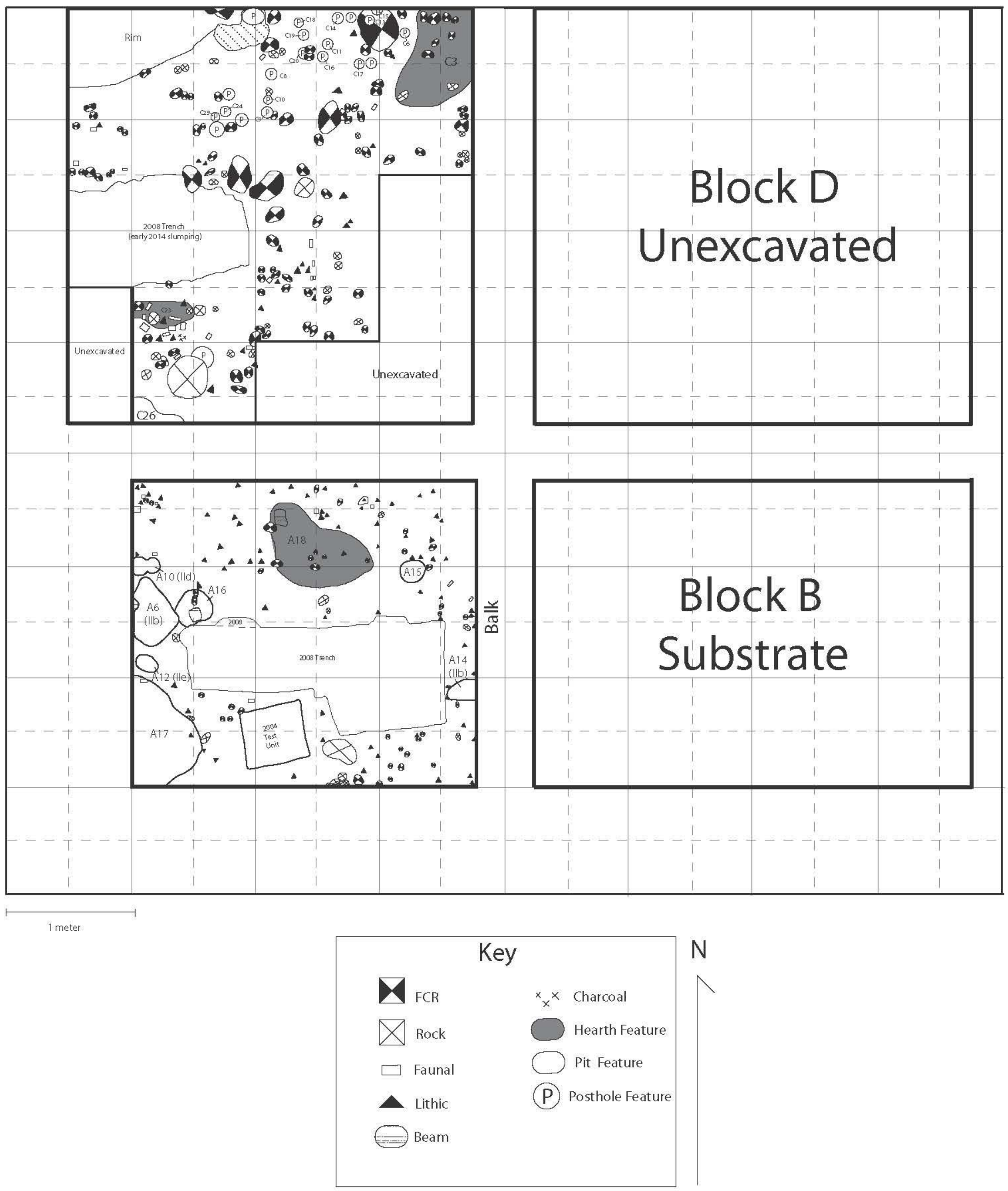


Rim
C14
C12 (IIb)
C15
C13
2008 Trench
C7 (IIc)
C2
Unexcavated
IIa Post Hole
D10 (IIc)
D8 (IIb)
Excavation Incomplete
D18 (IIc)
Unexcavated
A11
A10
A4 (IIb)
A5 (IIb)
2008 Cache
2008 Trench
A6 (IIb)
A9
2004 Test Unit
Unexcavated
2008 Trench
Unexcavated
1 meter
Key
FCR
Rock
Faunal
Lithic
Beam
Charcoal
Hearth Feature
Pit Feature
Posthole Feature
N

Stratum IIe

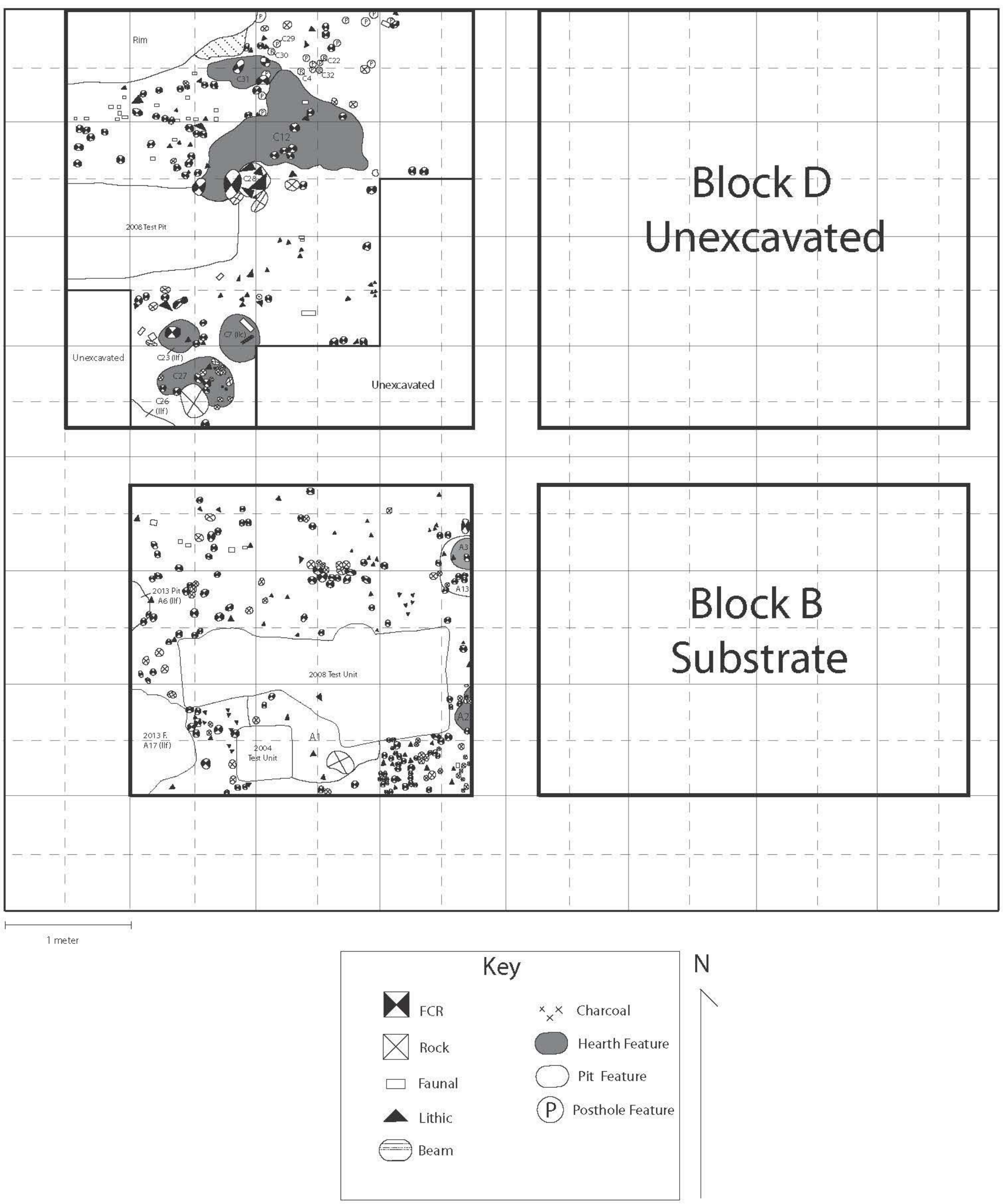

Rim
C1
C5
2008 Trench
(2014 slumping)
Unexcavated
Unexcavated
Block D
Unexcavated
A10 (IId)
A6 (IId)
A12
A11
A13
A14
2008
2008 Trench
2004
Test
Unit
Unexcavated
B2
B12
B14
B7
B9
B13
2008 Trench
B11a
B11
B3
B15
B6
B10
Feature AA2 (6)
2008
Unexcavated
1 meter
Key
FCR
Rock
Faunal
Lithic
Beam
Charcoal
Hearth Feature
Pit Feature
Posthole Feature
P
N

Stratum IIf



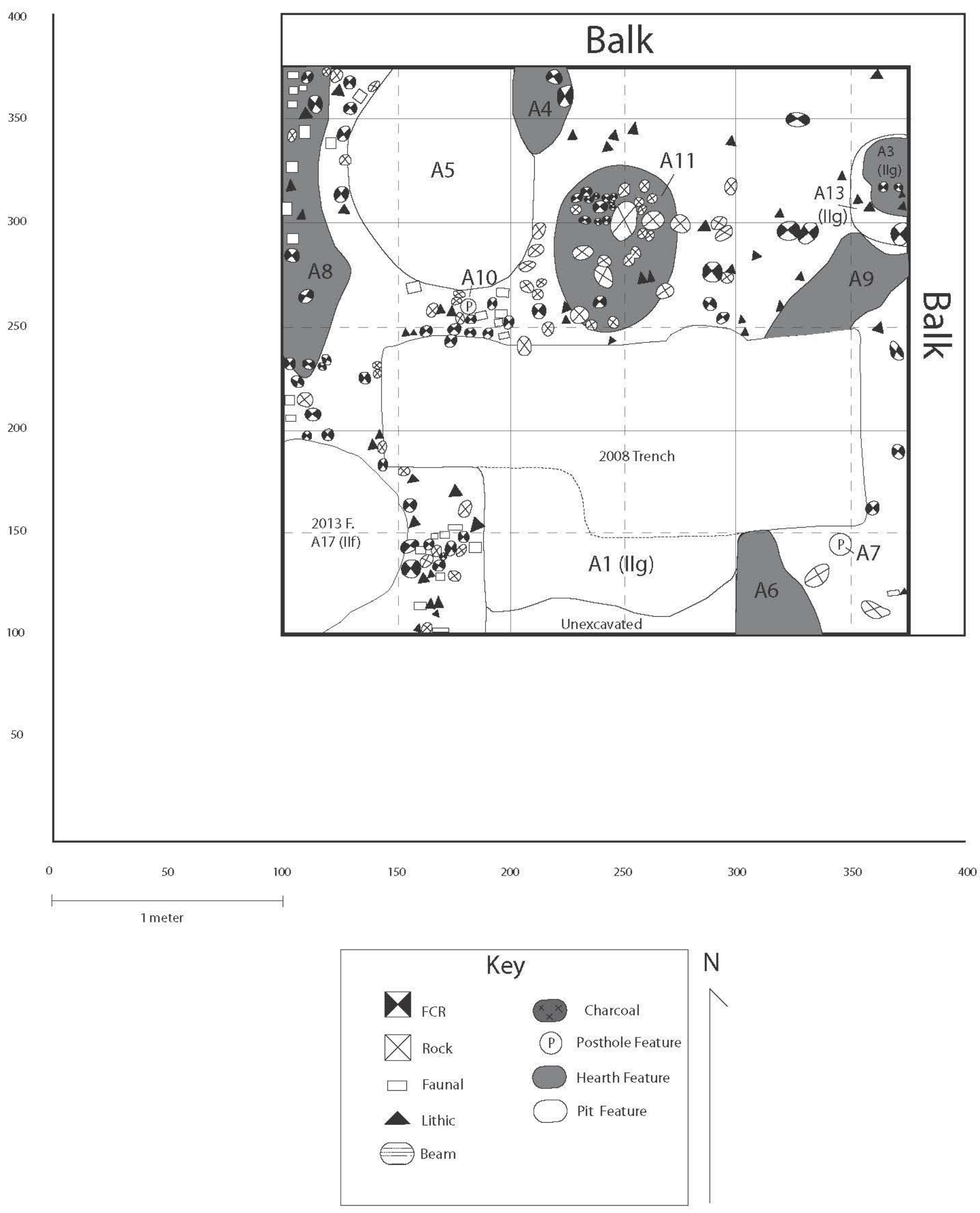
Rim
2008 Trench
(early 2014 slumping)
Unexcavated
Unexcavated
C26
Block D
Unexcavated
A18
A15
A10 (IId)
A16
A6
(IIb)
2008
2008 Trench
A14
(IIb)
A12 (IIe)
A17
2004
Test
Unit
Balk
Block B
Substrate
1 meter
Key
FCR
Rock
Faunal
Lithic
Beam
Charcoal
Hearth Feature
Pit Feature
Posthole Feature
N

Stratum IIg

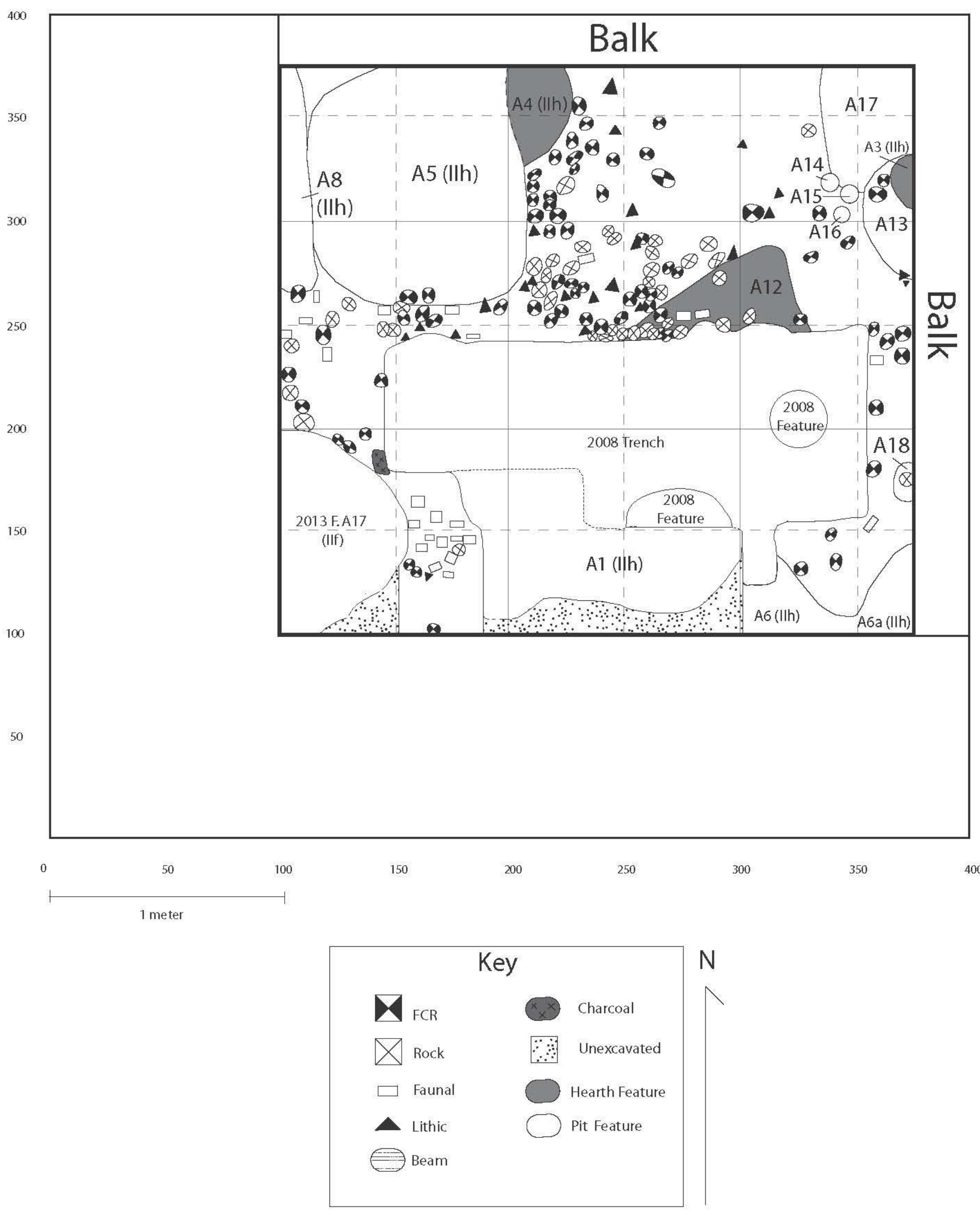


Rim
C29
C30
C22
C32
C31
C12
C28
2008 Test Pit
Unexcavated
C23 (IIf)
C7 (IIk)
C27
C26 (IIf)
Unexcavated
Block D Unexcavated
2013 Pit A6 (IIf)
A3
A13
2008 Test Unit
2013 F. A17 (IIf)
2004 Test Unit
A1
A2
Block B Substrate
1 meter
Key
FCR
Rock
Faunal
Lithic
Beam
Charcoal
Hearth Feature
Pit Feature
Posthole Feature
N

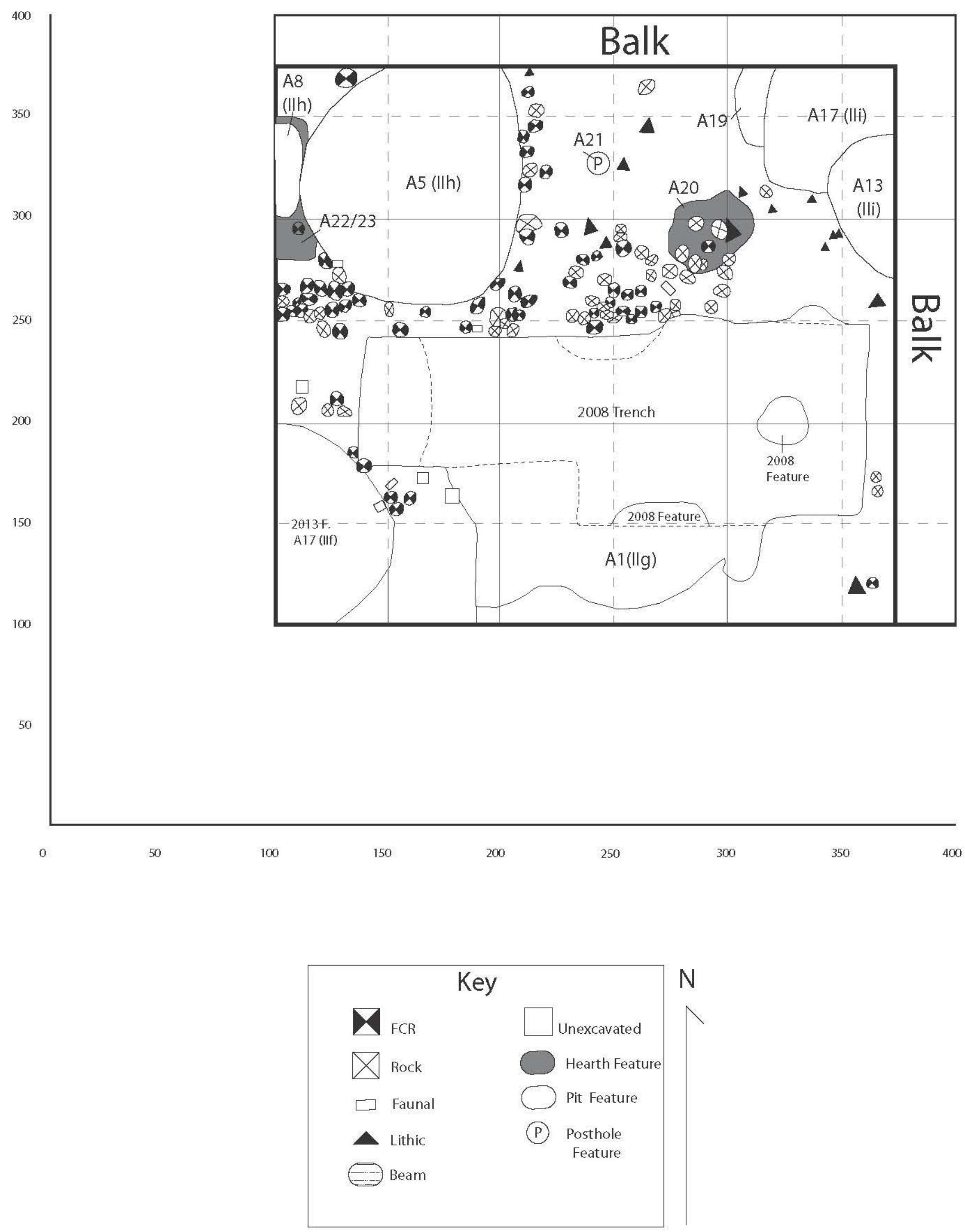
Block A Stratum IIh Level 1



Block A Stratum IIi Level 1



Block A Stratum IIj Level 1



Appendix B

Lithic Typology

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	Bifaical 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	274huswap contracted stem slight shoulders
122	274huswap contracted stem pronounced shoulders
123	274huswap parallel stem slight shoulders
124	274huswap 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 crete
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	abrador
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 slate
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

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

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
3a	crushing
3b	Grinding
3c	Blunting
4	Sawing
5	Gouging/borering
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	metomorphosed
48	Gneiss
49	Shale
50	Silicified bone

Appendix C

Paleoethnobotany Reports

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

Blue Elderberries

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With a Contribution by Naoko Endo

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Prepared for: Anna Prentiss, University of Montana

July 2015

Ursus
Heritage Consulting

Introduction

This report summarizes the analysis of sixty-five archaeobotanical samples representing 103 litres of sediment collected from the Bridge River 2 and 3 period occupations of Housepit 54 at the Bridge River site (EeRl-4). In this analysis, we investigate archaeobotanical patterns within this series of occupations at Housepit 54 representing two consecutive time periods. These occupations include five floors and associated occupations dating to the Bridge River 3 period (ca. 1200-1300 cal. BP), and five additional floors dating to the slightly earlier Bridge River 2 period (ca.1300-1400 cal. BP).

The goals of this study are to examine and compare archaeobotanical assemblages diachronically through the floor sequence and spatially across housepit occupations, where sampling permits. The questions guiding this study include: what are the commonalities and differences within and between occupations? What can the plant macroremains can tell us about ancient environment, site formation, cultural practices, and how Housepit 54 residents were using the site and its environs?

Based on these questions and earlier archaeobotanical studies at Bridge River and the wider region, we formulated general archaeobotanical expectations for the Bridge River 2 and 3 period assemblages presented in this analysis. First, we expect that hearths and other cooking features will produce more plant macroremains than other feature types. Second, we expect more food seeds in hearths and cooking features than in other contexts. Third, we expect greater ubiquity and diversity of plant macroremains in hearths and other cooking features. Finally, we expect the longest occupied floors will exhibit the greatest diversity.

This report is organized as follows. The methods describe the processing and analysis of 65 archaeobotanical samples. The results present a small-scale quantitative analysis looking at the diversity, distribution and density of plant macroremains. In the discussion, we look 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.

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

Sixty-five archaeobotanical samples were collected from ten occupation floors comprising the Bridge River 2 period (ca.1300-1400 cal. BP) and Bridge River 3 (ca. 1200-1300 cal. BP) periods (n=5 for each occupation period). These samples were systematically collected from floor, hearth, earth oven, post hole, cache pit, and other featural contexts. Samples were collected directly from trowel to bag and labeled for processing; they range from 0.5 to 2.75 litres (Appendix 1).

The primary sampling goal for the archaeobotanical analysis was to determine the nature and breadth of plant use activities within and between these occupational contexts. Samples were primarily chosen from features, the majority being hearths, earth ovens, and cache pits. Of 65 samples, this included 34 samples from the upper BR 3 floors and 31 samples from the deeper BR 2 floors in Housepit 54 (Table 1). Due to limited macroremain frequencies, finely stratified floors and their associated occupations were grouped together for analysis: floors IIa-IId and IIe represent two groupings from the upper floor sequence; floors IIf-IIg and IIh-IIj represent two groupings from the deeper floors.

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 by Naoko Endo in the sorting and identification of all macroremains (Pearsall 2000). Samples were sorted into their constituent parts under a dissecting microscope (10-40x resolution). All fractions were sorted in their entirety, except the catch, which is generally too small to recover identifiable macroremains. Plant macroremains recovered include charcoal, needles, seeds, birch bark, cone parts, fruit tissue, and modern littermat components (Appendix 1). Plant remains were identified using Dana Lepofsky's comparative collection at SFU, as well as published and digital sources (BC Eflora 2008; Cappers 2006; Hitchcock and Cronquist 1973; Martin and Barkley 1961; Montgomery 1977). Additional data checks were completed using the Ursus comparative collection. Fish bone and insect carapaces were found in a number of samples (Appendix 1). Macroremains were generally quantified by count; birch bark and charcoal were quantified by weight (Appendix 1). 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.

Table 1. Sampling Strategy for Archaeobotanical Analysis of Bridge River 2 & 3 Occupations of Housepit 54

	Big House - BR 3					**Smaller House - BR 2**					**N. Samples**
	II a	**II b**	**II c**	**II d**	**II e**	**II f**	**II g**	**II h**	**II i**	**II j**	**by block**
Block A	28, 49						28	303, 178	342, 355	473, 476	
	38						36	291, 421	356, 388	468	
							56	133, 167	357		
								290, 132			
								386, 215			
								148			25
Block B	34, 73		376, 354	39	168, 237		410				
	138		356		239, 354						
					296, 130						
					131, 127						
					195						
					116, 278						
					399, 267						**21**
Block C	137, 123		216, 209		54	254	371, 469				
					114	299	315, 362				

							316, 210				**14**
Block D		413, 415									
		417, 442									
		361									**5**
N. Samples	**8**	**5**	**5**	**1**	**15**	**2**	**10**	**11**	**5**	**3**	**65**
by floor				N=19	N=15		N=12			N=19	
N. by House					**34**					**31**	

The preservation of ancient plant remains 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 Bridge River. Excavators determined that mixing and bioturbation 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 at Bridge River

Thirteen plant taxa from nine botanical families were identified in the archaeobotanical assemblages from the Bridge River 2 and 3 occupations of Housepit 54, including nine deciduous taxa and four coniferous taxa (Table 2; Appendix 1). These taxa take the form of charred seeds, needles, charcoal, birch bark, plant tissue, and cone parts. Primary food plants, in this assemblage, include Saskatoon berry, kinnikinnick, raspberry genus, and a taxon that is probably blue elderberry. Primary technology plants include bulrush, birch bark, Ponderosa pine, Douglas-fir, and possibly Western hemlock. The following results present a small-scale quantitative analysis of the archaeobotanical assemblages from these consecutive occupations, focusing on the diversity, abundance, and density of plant macroremains.

Table 2. Archaeobotanical Assemblages from Bridge River 2 & 3 occupations of Housepit 54

Taxon	**Common name**	**Frequency by site**				**Totals**
Occupation period (No. litres sampled)		**BR 3 (19.85)**	**BR 3 (31)**	**BR 2 (22.5)**	**BR 2 (30)**	
Strats		**II a-d**	**II e**	**II f-g**	**II h-j**	
Seeds[2]						
Amelanchier alnifolia	Saskatoon berry	6	10	21	9	46
Arctostaphylos uva-ursi	Kinnikinnick, bearberry	62	54	58	39	213
Chenopodium sp.	Chenopod	15	16	7	10	48
Galium sp.	Bedstraw	10	1	4	27	42

Poaceae	Grass family	10	4	1	11	26
Rubus sp.	Raspberry genus	1	0	1	3	5
cf. Sambucus cerulea	Blue elderberry	21	5	16	46	88
Scirpus sp.	Bulrush	1	0	1	0	2
Unidentified seeds		5	0	1	10	16
Totals		**131**	**90**	**110**	**155**	**486**
Needles						
Abies sp.	True fir	0	0	2	18	20
Pinus ponderosa	Ponderosa pine	394	20	120	196	730
Pseudotsuga menziesii	Douglas-fir	890	99	509	1192	2690
cf. Tsuga sp.	Hemlock	658	86	125	771	1640
Unidentified		105	36	75	157	373
Totals		**2047**	**241**	**831**	**2334**	**5453**
Birchbark (grams)		0.03 g	0.18 g	0.22 g	1.84 g	

1. See Appendix 1 for a complete inventory of plant macroremains recovered.
2. The generic term 'seed' is used here to represent all botanical fruits such as achenes, drupes, nutlets, capsules etc.

Plant Resource Diversity

Diversity, measured as the number of identified taxa (NIT), is very steady across all occupations of the Bridge River 2 and 3 periods. Figure 1 shows the very consistent measures for both seed and needle diversity across four occupation groupings (II a-d and II e represent BR 3; II f-g and II h-j represent BR 2). Since the specific plant taxa represented within each occupation also exhibit remarkable consistency, explored below, this reflects the use of the same set of resources across time and between the two Bridge River periods.

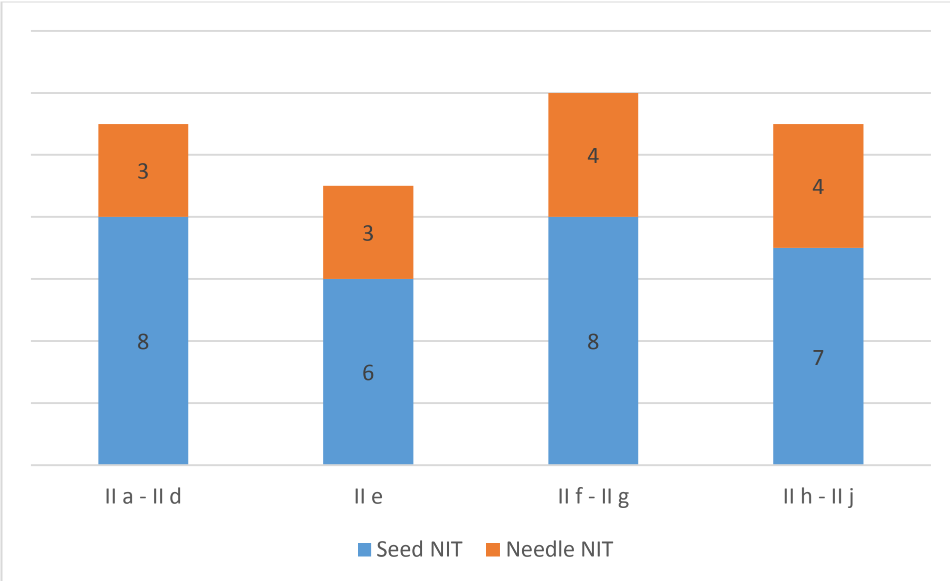

Figure 1. Seed & Needle Diversity across Housepit 54 occupations

Distribution & Ubiquity of Primary Food Plants

Kinnikinnick, Saskatoon, and what is likely blue elderberry are the most abundant and ubiquitous resources across all occupations of Bridge River 2 and 3 (Figures 2, 3). While overall frequencies are not overly high (cf. Lyons in press), these three edible resources comprise ~71% of all seeds (n=486 total). All three of these plants were likely harvested and processed en masse for winter use by Housepit 54 residents.

Kinnikinnick, also known as bearberry, is the most dominant seed in terms of both proportion and ubiquity (both nearing 50%). The leaves of this plant 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 low lying 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.

Saskatoon berry, in the past and present, is among the most significant plant foods of St'át'imc and other Interior Salish communities. Its representation in Bridge River 2 and 3 occupations is considerably lower than kinnikinnick, comprising about 10% of the assemblages proportionally and 30% of contexts by ubiquity (Figures 2, 3). 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).

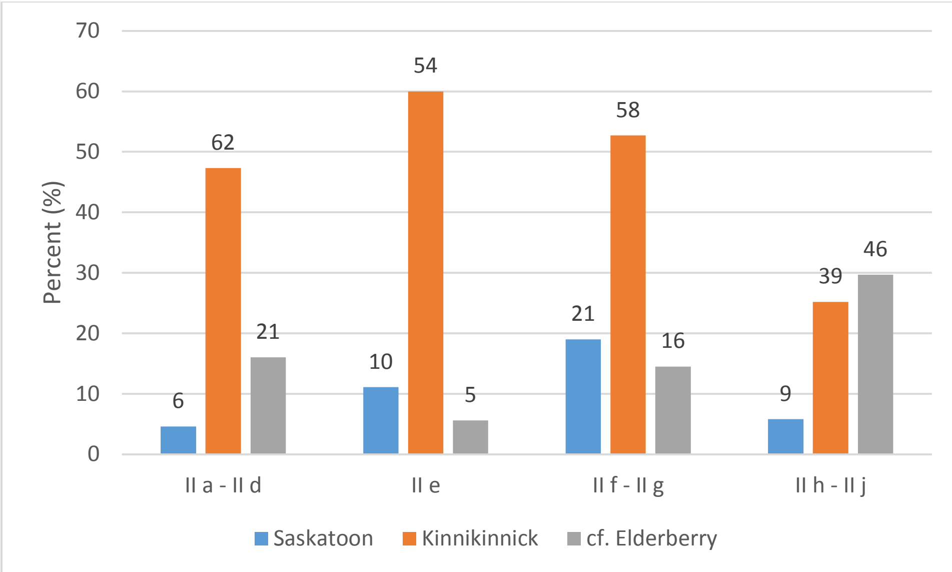

Figure 2. Percent (%) distribution of 3 top food plants in Housepit 54 occupations (data labels are seed frequencies [n] for each occupation).

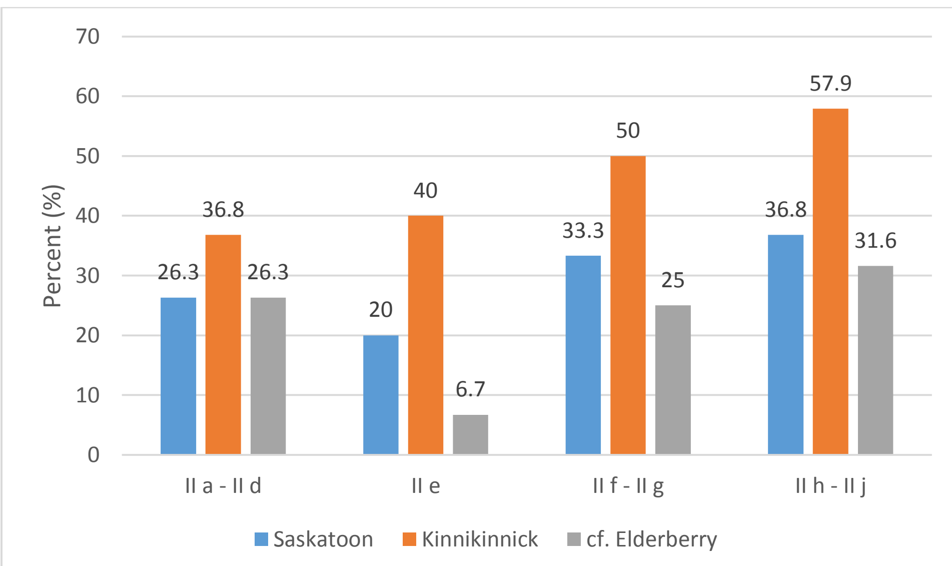

Figure 3. Ubiquity of top 3 food plants across Housepit 54 occupations (data labels are ubiquity measures, or percent presence across contexts in each occupation)

The possible blue elderberries represent about 16% of all seeds and are found in 20% of contexts. 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 (Figure 4). 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. in press). Ancient DNA studies are planned to delve further into this question.

Figure 4. Possible blue elderberry (cf. *Sambucus cerulea*) seeds from Bridge River

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.

The very consistent distributions of plant foods within and between Bridge River 2 and 3 occupations suggests that these resources are not concentrated in particular locations (eg. cooking, storage contexts) but are spread spatially, especially kinnikinnick.

Seed & Charcoal Density

Density of plant macroremains can often inform about how domestic spaces are used. The Bridge River 2 and 3 occupations exhibit the greatest seed and charcoal densities in cooking contexts across all occupation groupings (Figure 5), as represented by hearths and earth ovens. Cache pit densities are lower and more variable, possibly indicating that they were a locus where floor refuse accumulated. Cache pits also contain the vast majority of charred needles, which could signify refuse or lining. Floors and postholes have the lowest density of all macroremains (and postholes have no seeds at all).

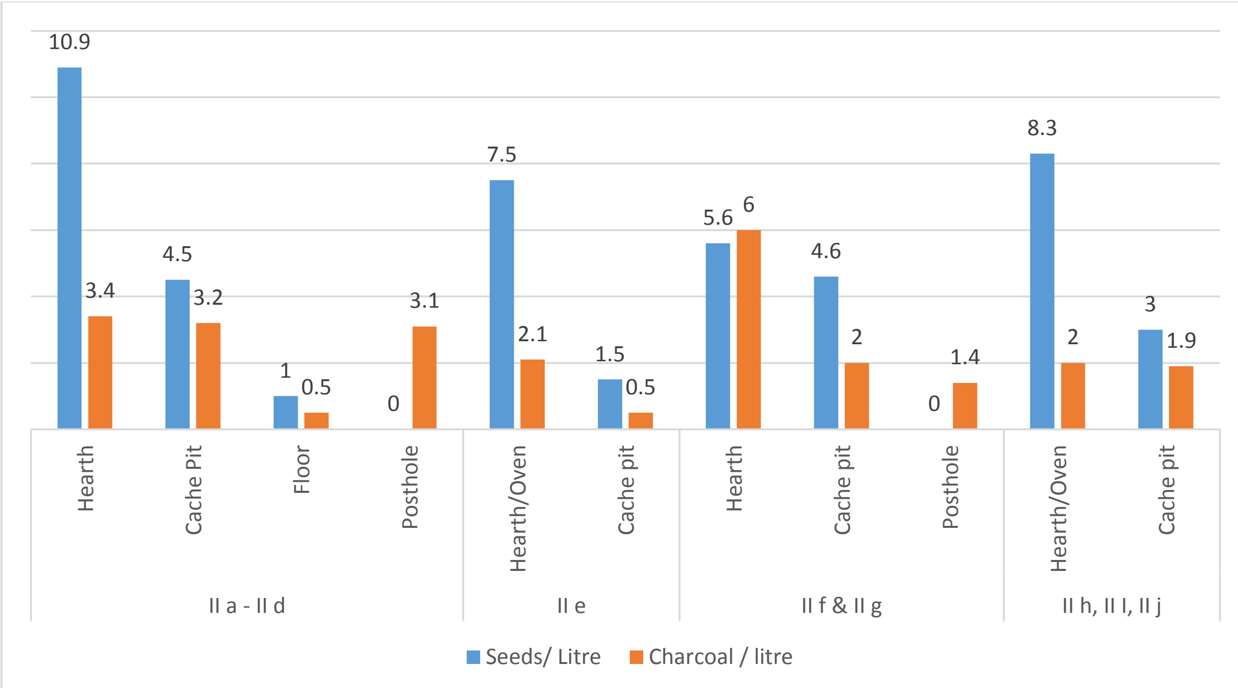

Figure 5. Seed and Charcoal Density across Bridge River 2 & 3 occupations in Housepit 54

One outlier is the shallow bowl feature in floor IIa of the Bridge River 3 occupation, with 11.86 grams/litre of charcoal (not pictured in Figure 4 because it swamps the data). This context has seed density (6.0 seeds/litre) on par with the hearth and oven features. The function of this context is unknown, but this data suggests that it may have either been associated with cooking, or alternately, could have served as a lowlying collector of debris from the IIa floor.

The overall density patterning makes sense from a site formation perspective (cf. Lepofsky 2000). Seed and charcoal density indicate that cooking contexts accumulated the majority of seed and charcoal refuse, though these density figures are not overly high. Cache pits displayed more variability in densities; they may have both stored plant materials and collected them unintentionally, but the latter looks more prevalent. Floors were routinely swept clean and refuse dumped elsewhere (refuse likely also accumulated in out of the way places, such as pits, under benches, and floor margins). Finally, it appears that postholes were likely occupied by posts, and thus generally inaccessible to rubbish.

Discussion

Patterning in the plant assemblages from Bridge River 2 and 3 occupations lead to interpretations of the plant use activities of ancient residents, their use of local environments, and the nature of the annual plant round practiced by ancient St'át'imc living in Housepit 54. The overall picture gained from the archaeobotanical assemblage of the Bridge River 2 and 3 occupation sequence at Housepit 54 is of considerable continuity (Table 2; Figures 1-3, 5). The Housepit 54 plant assemblage reflects local collecting practices emphasizing mid-summer (Saskatoon, raspberry genus, blue elderberry, grasses) through fall (kinnikinnick, bulrushes) harvesting, and potentially some use of kinnikinnick and blue elderberry in the winter months. The strong presence of kinnikinnick reflects its manifold cultural uses as well as its year-round availability. 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; Lyons et al. in press). 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 daily and cumulative practices of ancient St’át’imc residents at Bridge River are evident in the plant macroremains. Three dominant 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 moderate seed and charcoal densities (cf. Lyons in press), 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. Such practices were shared by multiple families and transmitted between generations, creating a very stable regimen of plant harvesting, consumption, use, and disposal. Further research within and beyond the Bridge River village will help to generate additional insights into plant use activities, harvesting strategies, storage and refuse practices conducted by ancient St’át’imc across the landscape throughout their annual cycle.

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Bridge River Archaeological Project 2014: Archaeobotanical Analysis

(Naoko Endo)

This report presents the results of archaeobotanical analysis of bulk samples collected from the house floor sequence (Stratum IIa to IIj) of Housepit 54 at Bridge River (EeRl-4), near Lillooet, British Columbia. These are analysed using flotation, microscopic examination, and comparison to reference collections housed at Simon Fraser University. The analysis of these samples is focused on recovery of smaller macroremains such as seeds and conifer needles.

Methods:

Fifty two 1.7 litres (average) flotation samples associated with various features at EeRl-4 were chosen for analysis. All samples were processed by flotation using 'garbage can' technique (Pearsall 1989) at the site by the students of University of Montana during the summer field season of 2014. After air drying, the light fraction samples, which formed the basis of the archaeobotanical analysis, were placed into labeled plastic bags and transported to Simon Fraser University, and the heavy fraction samples (composed of bones, pebbles etc.) were bagged separately for further analysis. Standard archaeobotanical techniques were used in the sorting and identification of macroremains. Light fractions were weighed, and then screened through a series of stacked sieves with mesh sizes of 4.0 mm, 2.0 mm, 1.0 mm, .425 mm and .250 mm. Each of the five fractions was weighed and sorted independently. In this study, the contents of the coarser sieves (4.0mm and 2.0mm) were sorted in their entirety into the components of archaeological significance: seeds, floral parts, needles, wood charcoal, bark fragments, cone parts, unidentifiable plant remains, bone fragments, and lithics (if any are found). I also sorted for insects or its parts. All the fractions captured in finer sieves(1.00mm, 0.425mm and .250mm) were sorted exclusively for seeds and needles. In order to facilitate the sorting process, only the 2.00 and 0.250mm mesh sieves were used for sorting when the total weight of a light fraction sample was less than 20g. All of the sieved samples were then examined under a dissecting microscope with a magnification range of 6-40x. Charcoal weights are estimated per sample from the combined weight of the 4.0 and 2.0mm fractions.

Identifications are primarily based on the visible characteristics of the seed morphology: form and structure; however, some seeds can be positively identified only by examining the internal morphology of the true seed. Seed identifications were made with the aid of several reference manuals on seed identification (Martin and Barkley 1961; Montgomery 1977). Plant remains from EeRl-4 were examined side-by-side with modern specimens from comparative collections housed at Dr. Dana Lepofsky's palaeoethnobotany laboratory at the Archaeology Department of Simon Fraser University. I would like to express my continued appreciation to Dana for the extensive use of her facilities and collections at the university.

Results:

A list of the archaeobotanical macroremains recovered from EeRl-4 is presented in Table 1. The most solid identifications are indicated by the genus of family name with no other symbols indicated. When a family name is listed with no genus, the specimen could only be identified to the family level based upon its characteristics, such as general shape, size and surface textures. Archaeological epithelial tissues, which likely represent the remains of charred root foods or fruit 'skins' are not identifiable beyond this general category, thus they are noted as present/absent (represented by an "X" in Table 1). Unidentifiable seeds are fragments do not have diagnostic features that indicate their identity, given the use of a binocular microscope. Also, samples with an asterisk(*) symbol indicate that one quarter of the sample was sorted exclusively for conifer needles and the number recovered was simply multiply by four to get an estimate number.

Quantifications of plant remains are mostly made as counts, rather than weight, because many of the plant remains are small seeds of negligible weight. These taxa are lost when weights were used to display the samples. Following Lepofsky et al. (1996), conifer needle counts represent the total number of fragments. Charcoal is represented by weight, however, as is standardized in archaeobotanical reports due to the high number and size range of fragments (Pearsall 1989). In addition to quantification, all remains were also assigned a ubiquity measure (see Table1). Ubiquity measures the percentage of taxon presence across a group of samples regardless of its abundance in each context. Presence values provide a measure of comparison within an assemblage that to a certain extent controls for the differential preservation of species (Popper 1988).

With the exception of a few flotation samples which yielded no botanical remains, a total of 13 taxa representing 8 plant families were identified, in the form of seeds, needles, and other macrobotanical remains. Of the 383 seeds recovered, 372 have been identified and are classified into 8 known taxa. Fleshy berries are represented by the seeds of Saskatoon, kinniknnick, raspberry, and elderberry. Other herbaceous species identified from seeds are: sedges, chenopod, bedstraw, and Grass family. Ponderosa pine is represented by needles and bundle bases. Douglas-fir is represented by needles, stems, buds, and cone scales. Paper birch is represented by its bark fragments and a 'roll'.

The following is a list of the charred plant remains recovered from Housepit 54, organized by family. Ethnobotanical and environmental data on species are provided when available. Plants are identified by both their Latin and English common names. Ethnobotanical information comes from Turner (1979, 1997) and Parish et al. (1996). Habitat information comes from Hitchcock and Cronquist (1961, 1973), and Turner (1997).

Plant Inventory:

Gymnosperms

Pinaceae (Pine family)

Abies amabilis (Pacific silver fir) --- Pacific silver fir is represented by few charred needles recovered from several samples of cache pits. These were identified by their unique notched tips on the end. It grows in moist to moderately dry coniferous forests of the Western Hemlock zone.

Pinus ponderosa (Ponderosa pine) ---This species is represented by charred needle parts. *P. ponderosa* is the second most common taxon among the identified needles. Most of the needles were found in cache pits. Ponderosa pines are common throughout the dry interior country. It grows in open forests in well-drained soils throughout the hot, dry valleys at low elevations. Many Interior natives used the wood, bark, and cones to produce quick, hot, smokeless fires, and needles were used as floor coverings and bedding, to line and insulate storage pits and food caches, and as tinder. It is also a good self-pruner and thus easy to harvest.

Pseudotsuga menziesii var. glauca (Interior Douglas-fir) --- Douglas fir is represented by an abundance of needles and its occasional cone parts in the samples associated with cache pit features, and it suggests that this tree was regularly harvested to line with. They are also an excellent fuel source as its wood burns hot like Ponderosa pine, and it is reported ethnographically to be a preferred wood for pit cooking. Douglas-fir wood is also heavy, strong and durable. It was used among Interior groups to make poles, shafts, spears, smoking racks, dipnet frames and fish traps. The boughs of Douglas-fir were widely used by Interior peoples for floor coverings, bedding in camps and pit houses, and on drying racks. The fragrant boughs were also used in ceremonial functions such as mourning, sweat baths, and initiation rites.

Tsuga heterophylla (Western Hemlock) --- Western hemlock is represented by needles in the samples, and it was the second most abundant taxon among the needles. The boughs were used in similar manner to Douglas-fir for bedding and shelter by Interior groups.

Monocotyledons

Cyperaceae (Sedge family)

Scirpus sp. (Bulrush) --- Only one seed from this taxon was recovered from a single sample from Housepit 54. The hard-stemmed bulrush (*S. acutus*) and soft-stemmed bulrush (*S. validus*) are sometimes considered as subspecies of *S. lacustris*. The tall, slender, green stems bear small spikelets of brown flowers near their top. Tule is usually a plant of marshes, muddy shores and shallow water, but there are species which can be found in the dry Interior Douglas-fir zone as well.

Dicotyledons

Betulaceae (Birch family)

Betula papyrifera (Paper birch) --- Paper birch is represented in the assemblage by fragments and a bark roll which was recovered from a single sample. Paper birch was highly valued by the Interior peoples for its bark which was used for a variety of technological purposes especially for making containers of many types. It grows throughout the dry Interior, in the more moist habitats of the Interior Douglas-fir zone.

Caprifoliaceae (Honeysuckle Family)

Sambucus cerulean (Blue elderberry) --- These are small concave seeds that have wedge shape like an orange and roughly 1.2mm x 0.5mm x 0.5mm in size. They are usually bloated and without their seed coats thus they look 'naked'. I have called these seeds in the past of my reports as Ericaceae; however, based on the personal communication with Dr. Natasha Lyons from Ursus Consulting Inc., it is concluded that these are probably Blue elderberry. It was also suggested that the extreme wear has to do with the seeds being either spat out when eaten or removed when the juice was used to marinate fish for flavor. Blue elderberry grows in valley bottoms and on open dry slopes from sea level to moderate elevations. They were collected in the late summer.

Chenopodiaceae (Goosefoot family)

Chenopodium sp. --- This taxon is represented by charred seeds. Chenopods are weedy herbaceous plants which grow in disturbed habitats. I have not been able to identify these specimens to the species level. The charred specimens are small seeds, generally about 0.5mm in size. They are much smaller than *C. album*, an introduced species, but are morphologically the same. Because chenopods are a weedy species and are easily introduced into the archeological record, their prehistoric use is not clear in the Interior BC. However, aboriginal peoples of eastern North America cultivated similar species indigenous to this continent for their greens and seeds.

Ericaceae (Heather family)

Arctostaphlos uva-ursi (Kinnikinnick) --- Most of the charred Kinnikinnick seeds were recovered from hearth features and found in half of the entire samples. This low, trialing evergreen shrub is a common plant throughout the dry slopes and in dry forest clearings of the Interior. The berries were eaten by many Interior groups. They were usually boiled or eaten with fish oil because they are so dry. They grow from April to June and were usually harvested around September then stored until needed. The berries could be picked even during the winter as they stayed on branches. The leaves and young stems were also used to make tea. The Lillooet sometimes used the roots to make temporary pipes.

Rosaceae (Rose family)

Amelanchier alnifolia (Saskatoon) ---Saskatoon seeds were the second most abundant in the samples. The fruit of this shrub was a highly valued among the Interior people, and was gathered from mid to late summer depending on the locality and variety. Saskatoons were the most popular and widely used berry for central and southern native groups, and they were a common trading item between the Interior and the Coast. Berries were eaten fresh or dried in cakes or like raisins for storage. In most of the Interior Salish groups, the wood was the major arrow making material. Saskatoon and maple sticks were boiled together to make a medicinal drink for women following childbirth. The Lillooet people placed a grid of green Saskatoon sticks at the bottom of birch-bark cooking baskets to prevent them from being burned through by hot rocks. Saskatoons are a common and widespread deciduous shrub distributed throughout the Interior of British Columbia at low to mid elevations in dry open hillsides and slopes.

Rubus sp. (Raspberry) ---Four *Rubus* seeds were found in hearths and a cache pit. The genus *Rubus* includes shrubs that are found in low to alpine elevations in moist soils, and all have very edible fruits. *R.spectabilis* (salmonberry) is found in abundance in the area and *R.parviforus* (thimbleberry) is also found in the area, though not as commonly as salmonberry. Salmonberries thrive in moist to wet sites and in disturbed areas at low to upper elevations. Although it may have been consumed in abundance by local groups, the method of deposition was probably by incidental charring during in season consumption of these fruits.

Poaceae (Grass family)

The identification beyond the family level is not possible here because the grass family is among the largest of the flowering plant families, and also because wild grass seeds are very similar to each other so that the distinction between types is difficult. Since grasses are common components of human-disturbed environments, these grains may have been brought back to site attached to other economic plants and charred accidentally.

Rubiaceae (Bedstraw Family)

Galium sp. (bedstraw) --- Several charred specimens of bedstraw were recovered from a hearth feature along with a few other samples from cache pits. Two species of *Galium* grow in the Interior: *G. boreale* and *G. triflorum*. They both grow in a wide range of more moist habitats. There is no ethnographically recorded use for this plant.

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Appendix D

Sediment Geochemistry Report

Report on geochemistry methodology and interpreting anthropogenic sediments at Bridge River, British Columbia

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Abstract

Previous research utilizing energy dispersive x-ray fluorescence (EDXRF) spectroscopy and isotope ratio mass spectroscopy (IRMS) identified geochemical patterns in Housepit 54 sediments that are likely attributable to human occupation (Goodale et al. In Press, 2014, 2013, Hill 2014; Hill et al. 2013, 2014). In this study we conduct additional geological analysis of Housepit 54 sediments in order to more fully understand the observed geochemical variation and how different laboratory methodologies and sample preparation techniques affect data quality. In addition to grain size analysis, detailed mineralogical analysis of fourteen sediment samples from a single occupation level was conducted using scanning electron microscopy with energy dispersive x-ray spectroscopy (SEM / EDS). Our data indicate that while the observed geochemical variation in Housepit 54 sediments is likely the result of the complex interaction of both natural geological and human processes, sample preparation techniques determine the quality of the data collected, thereby affecting data interpretation.

Anthropogenic sediments form as a result of natural, physical, and chemical processes as well as human cultural influence. Activities such as food preparation, flint knapping, and waste disposal could potentially influence the geochemical signature of sediments. This project seeks to re-ne methodology for analysis of anthropogenic sediments in order to better understand their formation. Building on work by Goodale et al. In Press, 2014, 2013, Hill 2014; Hill et al. 2013, 2014, in this report we present the analysis of 14 anthropogenic sediment samples from Housepit 54 at Bridge River using EAIRMS, EDXRF, and SEM/EDS. The sediment samples were prepared using different methodologies, and demonstrate produce different analytical results.

Figure 1. Figure 1. Unprepared samples counterclockwise from top left - 132, 164, 230, and 497 (control). Each sample has different physical properties, such as color and texture, determined by the mineralogical and biochemical composition of the sediments.

Stable Isotope Analysis (EA-IRMS)

Mass spectrometers analyze isotope ratios by ionizing gasses freed from sample material through ignition, and then separating the ions based on mass. Carbon can be of an organic or an inorganic origin. Organic and inorganic carbon will have different isotope ratios because they were formed by different chemical and physical processes.

Sample Preparation

Method 1: Bulk Carbon (Ignited) - Hill et al. (2014) oven-heated sieved samples at 500°C to burn off organic material. The samples were then pulverized using a SPEX 8510 Shatterbox with tungsten carbide ring mill. Samples were then placed into Costech tin capsules and loaded onto the Costech Combustion System.

Method 2a: Organic Carbon - Sediment samples were bathed in a dilute hydrochloric acid solution to remove inorganic carbon (in carbonate minerals) from the sediment. Samples were then weighed into Costech 4x6 mm tin capsules and loaded into a Costech Elemental Combustion System.

Method 2b: Inorganic Carbon - Sediment samples were bathed in hydrogen peroxide, centrifuged, and rinsed with deionized water and isopropyl alcohol. Samples were then oven dried at 120°C, weighed, and then placed into Thermo Scientific 15x45 mm threaded vials and sealed using Thermo Scientific Teflon/silicone septa.

Carbon Isotope Results

Stable isotope ratio analysis (both Gas Source and EA-IRMS) allows for understanding of the source and formation processes of natural compounds, as some processes favor heavier isotopes over lighter isotopes. Isotope data are reported as ratios, and normalized to a known value as it is difficult to measure isotopes in absolute abundance.

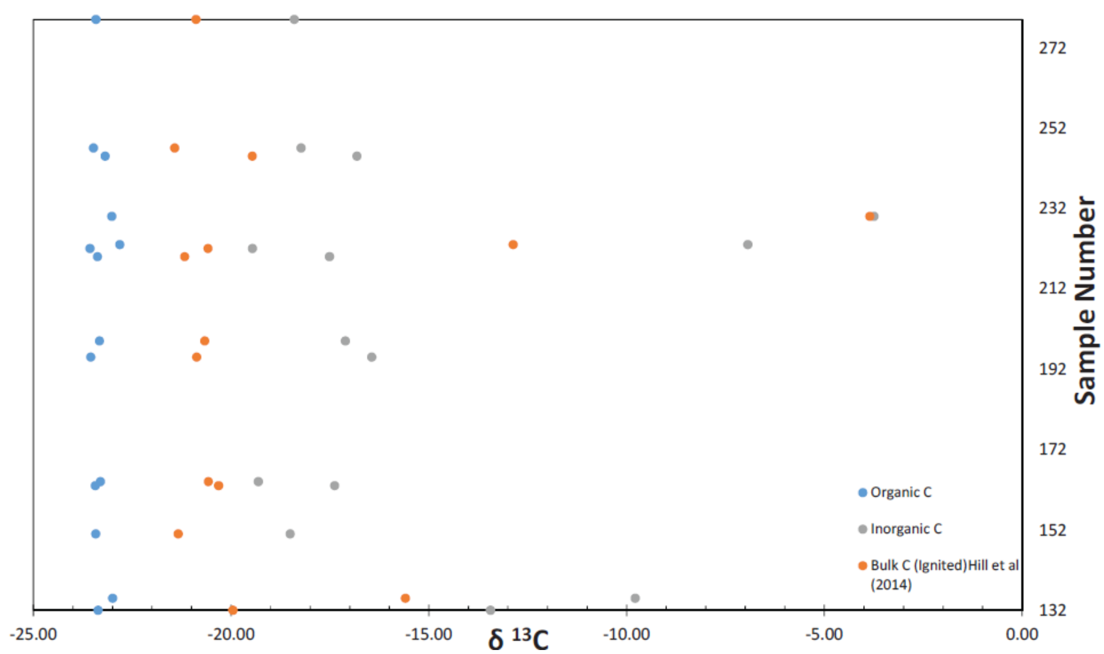

Figure 2. $\delta^{13}C$ values of the Bridge River Sediments. Hill et al. 2014 samples listed as "Bulk Ignited" have values midway between the organic and inorganic carbon isotope ratio values.

The results of our study demonstrate that Hill et al. 's(2014) analysis of ignited sediment samples mixed the organic and inorganic carbon isotope signatures. Hill et al.'s (2014) methodology resulted in isotope values between our organic EA data and the inorganic gas bench data, despite the samples having been heated to 500°C. This demonstrates that igniting the samples prior to analysis does not entirely remove the organic carbon from the sediment. Some of the organic matter likely remained in the sample as ash, allowing for a mixed isotope signal. Separating the organic and inorganic carbon isotope signals allows for better isotope analysis as it illuminates the origin of the different compounds present in the sediment.

Energy Dispersive X-Ray Fluorescence Analysis

Energy Dispersive X-Ray Fluorescence is an efficient way to analyze the chemical composition of natural materials. EDXRF can be used to concurrently determine the abundance of major elements (Ca, P, Fe) and minor/trace elements (Sr, Rb). The Premium Delta Olympus portable XRF analyzer uses three beams, each running for 100 seconds, to identify elements by atomic weight. Beams 1 and 2 use a voltage of 40kV and beam 3 uses a voltage of 15kV. The instrument has a modified fundamental parameters calibration based on international sediment powder standards.

Sample Preparation

Samples were dried on a hot plate set to 100°C. The dry samples were then disaggregated using a pestle and mortar. Roots, charcoal, and large rock fragments were removed with tweezers. Dry, sieved samples were then measured into SPEX CertiPrep 31mm X-Cell Sample Cups and covered using a 4 micron thick ULTRALENE circular film.

EDXRF Results

In the graphs below (Fig. 3), we have plotted Hill et al.'s (2014) data against ours in order to compare the results of the different sample preparation methods. There is little difference in values for calcium, showing that burning off organics has little effect on the major element signature of the anthropogenic sediments. There is a systematic bias in the strontium data, with higher values obtained in all but one of the ignited samples. Most of the data points are likely within range of one standard deviation between the different methodologies.

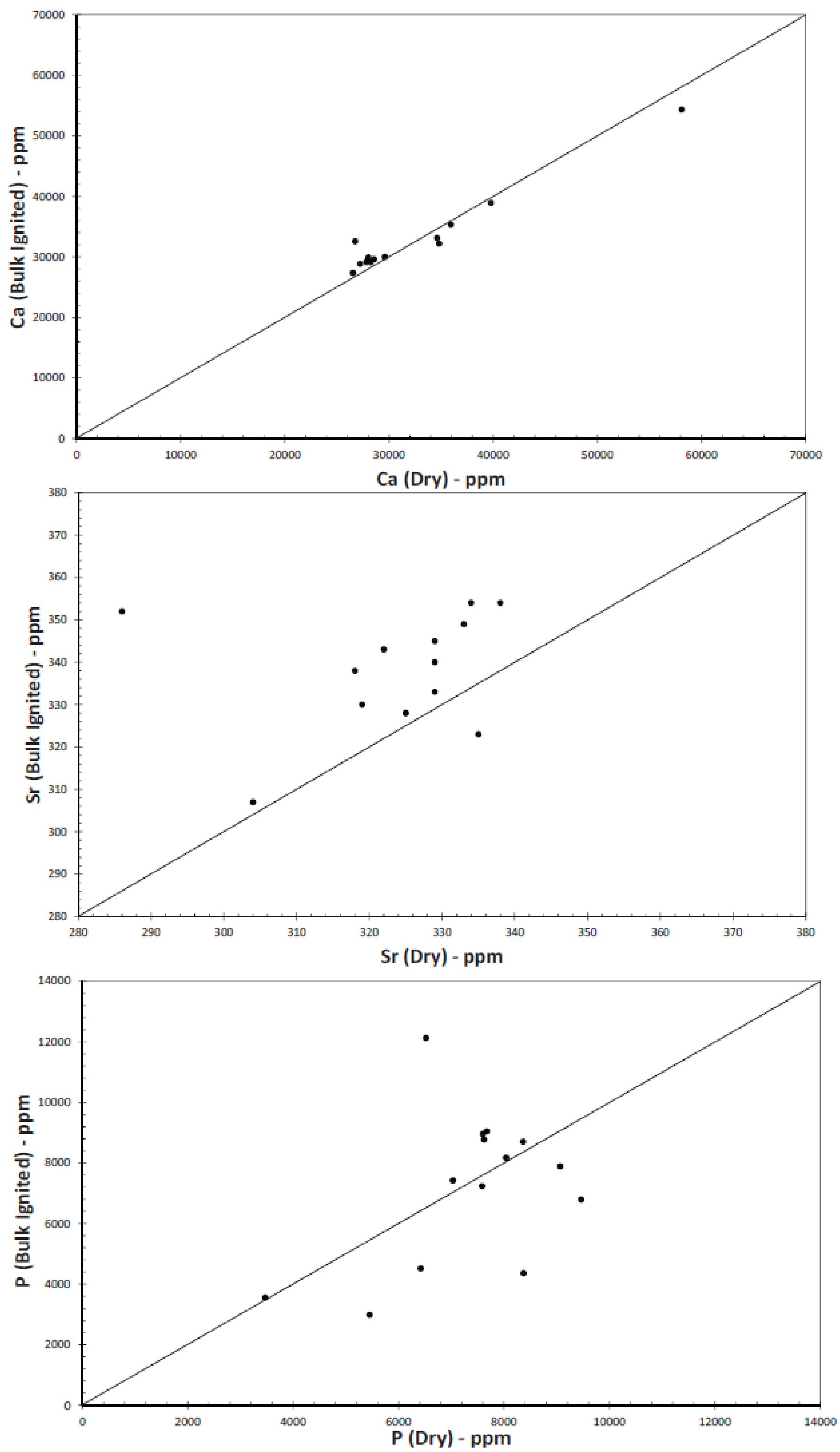

Figure 3. a - Measured calcium content has a nearly one to one relationship. b - Most of the ignited samples lie above the one to one line, indicating a systematic bias. c - Phosphorus varies more than other minor elements.

The scattered data for phosphorus can possibly be explained by the uneven distribution of bone in the samples. Because Hill et al. pulverized samples, phosphorus distribution in their samples was relatively homogeneous, while the distribution of bone fragments varied in our samples. Although bone is composed of calcium phosphate, phosphorus is likely disproportionately affected by bone distribution. There could also be an issue with instrument level of detection for phosphorus.

SEM/EDS Analysis

Scanning electron microscopes bombard electron beams at objects and use the electron signals and x-ray signals given o to determine the composition and topography of the object. In the images to the left, materials composed of heavier elements register as brighter colors.

Sample Preparation

Due to the time necessary for SEM analysis, we selected four samples that represented the range of colors, textures, and grain sizes of the Bridge River sediment samples. We poured each sample into a silicone mold and mixed them with an epoxy resin. After hardening, we polished the epoxy capsules until the sediments were visible on the surface. To achieve this, we used silicon carbide grits of 120, 400, 800, and 1200 mesh.

SEM/EDS Results

As visible in Figures 4a and 4b, these sediments are poorly sorted. Grain size varies from sub-micron up to 3mm in diameter. Many of the smaller minerals make up large intermixed clumps, while some of the larger particles are rock fragments. The sub-rounded to angular clasts indicate that most of the sediment was locally derived. The bone fragments show that some cultural processes likely influenced the sediment geochemistry. Charcoal is also common in these samples, likely contributing to the organic carbon isotope signature.

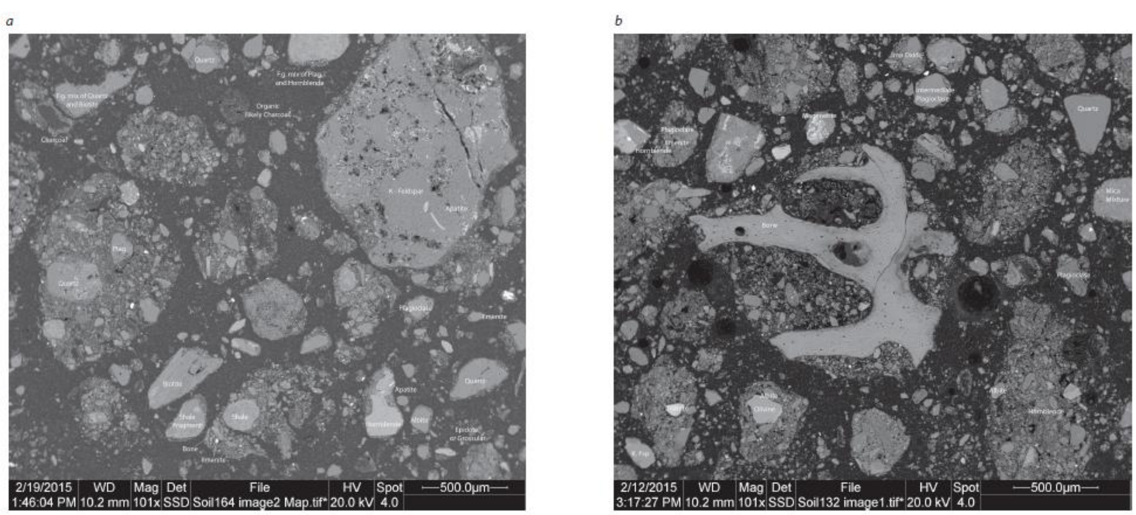

Figure 4. a - Sample 164 is unsorted and contains mostly micas, feldspars, and quartz. b - Sample 132 has a large bone fragment, explaining the sample's elevated phosphorus.

Discussion/Conclusions

The purpose of this project was to investigate the methodologies of anthropogenic sediment analysis. EDXRF has already been established as a good tool for determining the chemical composition of sediments and artifacts. However, meticulous and extensive excavation would be required for on-site portable XRF analysis, as excavation itself can mix soils, increasing the difficulty in interpreting results.

Isotopic analysis of anthropogenic sediments is still very experimental. This study shows the importance of using proper sampling and lab methodologies to distinguish the relative role of organic and inorganic materials in the overall isotopic and chemical signature of the sediment. More context is necessary to better grasp the effect of human cultural processes on anthropogenic sediments.

Acknowledgments

The archaeological excavations at the Bridge River Village Housepit 54 are funded by the National Endowment for the Humanities and the University of Montana. Geochemistry research presented here was made possible through the Dean of Faculty, Anthropology Department, and Geosciences Department at Hamilton College.

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Appendix E

Ancient DNA Report

aDNA LAB REPORT
(2015-11)

Ancient DNA Analysis of Archaeological Canid Remains from Housepit 54 at the Bridge River Site.

Ancient DNA Laboratory
Simon Fraser University

Project Conducted by Antonia Rodrigues

Project Supervised by Dongya Yang

November 2015

SUMMARY: Ancient DNA analysis was conducted on ten canid coprolites and ten canid skeletal samples recovered from Housepit 54 at the Bridge River archaeological site. Canid mitochondrial DNA (mtDNA) sequences were obtained for sixteen of the twenty samples, with all but one generating the full targeted fragment of DNA for analyses. All fifteen samples were identified as dog (*Canis lupus familiaris);* the partial fragment generated from the sixteenth sample could not distinguish between *Canis lupus* and *Canis lupus familiaris* but ruled out *Canis latrans*. One control-region mtDNA haplotype was identified: DHap2. This mtDNA haplotype is phylogenetically similar to those found in some modern Asian dogs, as well as some pre-columbian North American archaeological samples.

Salmonid mitochondrial DNA (mtDNA) sequences were also recovered from all ten coprolite samples. While one sequence was identified as chinook salmon (*Oncorhynchus tshawytscha),* sockeye salmon *(O. nerka)* sequences were obtained from nine of the ten coprolites, confirming that dogs at Bridge River had access to sockeye salmon.

ORIGIN: The archaeological coprolites and skeletal remains were collected from Housepit 54 at the Bridge River site (EeRl-4) in British Columbia.

DATE: The APD coprolite sample was provided to Dongya Yang in September 2010. The BR coprolite samples were provided to Dongya Yang in July 2014. The skeletal samples were provided to Dongya Yang in August 2015.

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MATERIAL: All samples were randomly selected and grouped into a number of sets and recorded with lab numbers (APDx or BRx) to be processed in different DNA extractions. The renumbering and regrouping were used to create a mechanism to more sensitively detect any potential systematic contamination in the lab. The weight of individual samples extracted ranges from 0.093-0.704 g (Table 1).

Table 1: Sample information for archaeological samples recovered from Housepit 54 at the Bridge River site.

Lab Code	Bag#-ID#	Element	BR Period	Estimated Date Range (cal BP)	Weight Extracted (g)
APD5	734-	Coprolite	-	1100-1800	0.270
BR1	376-	Coprolite	-	1200-1400	0.251
BR2	349-	Coprolite	-	1200-1400	0.248
BR3	348-	Coprolite	-	1200-1400	0.282
BR4	381-	Coprolite	-	1200-1400	0.294
BR5	324-	Coprolite	-	1200-1400	0.248
BR6	326-	Coprolite	-	1200-1400	0.222
BR7	377-	Coprolite	-	1200-1400	0.275
BR8	325-	Coprolite	-	1200-1400	0.210
BR9	375-	Coprolite	-	1200-1400	0.247
BR10	1361-1	Ulna	BR3	1300-1200	0.238
BR11	712-1	Tooth	BR3	1300-1200	0.093
BR15	1400-2	1^{st} metatarsal	BR2	1400	0.242
BR16	343-1	Fibula	BR3	1300-1200	0.300
BR18	500-15	Maxillary molar	BR2	1600-1300	0.543
BR19	576-4	Tooth	-	-	0.183
BR21	555-14	Tibia	BR3	1300-1200	0.686
BR22	384-1	Ulna	BR3	1300-1200	0.312
BR23	557-13	Cervical vertebrae	BR2	1500-1300	0.704
BR24	494-13	Thoracic vertebrae	BR2	1600-1300	0.276

DNA EXTRACTION: Sample preparation and DNA extraction was conducted in the dedicated Ancient DNA laboratory at Simon Fraser University. Samples were chemically decontaminated through submersion in sodium hypochlorite, 1N HCl and 1N NaOH, followed by UV irradiation for 60 min. The samples were crushed into powder and incubated overnight in a lysis buffer (0.5 M EDTA pH 8.0; 0.25% SDS; 0.5 mg/mL proteinase K) in a rotating hybridization oven at 50°C. Samples were then centrifuged and 2 mL of supernatant from each sample was concentrated to 100 µL using Amicon Ultra-4 Centrifugal Filter Devices (10 KD, 4mL, Millipore). Concentrated extracts were purified using QIAquick spin columns (QIAGEN, Hilden, Germany) based on the method developed by Yang et al. (1998); 100 µL of DNA from each sample was eluted from QIAquick column for PCR amplification.

PCR SETUP: PCR amplifications were performed on an Eppendorf™ Mastercycler Personal Thermocycler using a 30 µL reaction volume containing 1.5X Applied Biosystems™ Buffer, 0.3 µM of each primer, 2 mM MgCl2, 0.2 mM dNTP, 1.0 mg/mL BSA, 3.0 µL DNA sample and 2.5 U AmpliTaq Gold (Applied Biosystems). The PCR reactions targeted two overlapping fragments of *Canis* mtDNA control region to produce a final 345bp fragment. Five uL of PCR product from each sample were separated on a 2% agarose gel, and visualized using SYBR Green™ (Clare Chemical Research Co.USA), on a dark reader. Additionally, all coprolite samples were also amplified using salmon specific primer. PCR reactions co-amplified a salmonid D-loop fragment (249bp) and cytochrome b fragment (168bp) in a single PCR reaction using previously published protocols (Yang and Speller 2006). The results of the PCR amplifications can be found in Table 2.

SEQUENCING: All successfully amplified samples were sent to Eurofins MWG Operon (Huntsville, AL) for sequencing. The obtained sequences were compared to Genbank sequences through the BLAST application to determine their closest match, and to ensure that they did not match with any other unexpected species or sequences. Sample sequences were visually edited and base pair ambiguities were examined using ChromasPro software (www.technelysium.com.au). Sequences were truncated to 301bp once primer sequences were removed. Multiple alignments of the ancient sequences and published canid reference sequences were conducted using ClustalW (Thompson, et al. 1994), through BioEdit (www.mbio.ncsu.edu/BioEdit/bioedit.html) and phylogenetic analysis was conducted using Mega 6.0 software (Tamura et al. 2013).

RESULTS: According to lab protocols, a species identification and haplotype is assigned to a sample only if it matches identically or very closely with published reference sequences, and if no other evidence, including reproducibility tests or additional sequencing of the same sample indicated a different species or base pair ambiguities. All PCR reactions yielded sequences which matched identically with some Genbank BLAST *C. l. familiaris* reference sequences (see the Appendix 1 Phylogenetic tree for accession numbers).

Table 2: PCR amplification, species identification, and haplotype results.

Lab Code	Element	*Canis* DNA amplified?	Species ID	Haplotype	SalmonDNA amplified?	Species ID
APD5	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR1	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR2	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O. tshawytscha*
BR3	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR4	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR5	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR6	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR7	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR8	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR9	Coprolite	Yes (2/2)	*C.lupus familiaris*	DHap2	Yes	*O.nerka*
BR10	Ulna	No	-	-	-	-
BR11	Tooth	Yes (2/2)	*C.lupus familiaris*	DHap2	-	-
BR15	1st metatarsal	No	-	-	-	-
BR16	Fibula	Yes (1/2)	*C.lupus OR C.lupus familiaris*	-	-	-
BR18	Maxillary molar	Yes (2/2)	*C.lupus familiaris*	DHap2	-	-
BR19	Tooth	Yes (2/2)	*C.lupus familiaris*	DHap2	-	-
BR21	Tibia	No	-	-	-	-
BR22	Ulna	No	-	-	-	-
BR23	Cervical vertebrae	Yes (2/2)	*C.lupus familaris*	DHap2	-	-
BR24	Thoracic vertebrae	Yes (2/2)	*C.lupus familaris*	DHap2	-	-

Note: Two overlapping fragments of *Canis* mtDNA were targeted for amplification; (1/2) indicates only 1 of the 2 fragments were successful while (2/2) indicates both fragments were successfully amplified.

Canid mtDNA sequences were obtained for sixteen of the twenty samples, with all but one generating the full targeted fragment of DNA for analyses. All fifteen samples were identified as *Canis lupus familiaris;* the partial fragment generated from the sixteenth sample could not distinguish between *Canis lupus* and *Canis lupus familiaris* but ruled out *Canis latrans*. One canid mtDNA haplotype was identified in the fifteen successful Bridge River samples: DHap2 (Table 2). When phylogenetically compared to other modern dog haplotypes (Savolainen *et al.* 2002), haplotype DHap2 is most closely related to the primary East Asian dog clade (Clade A). Although Clade A haplotypes are also currently found in European, African, Indian, and American dogs, the East Asian Clade A haplotypes are the most ancestral (Salolainen *et al*. 2002). Pre-columbian dogs in the Americas also seem to be derived from Clade A (Leonard *et al*. 2002).

The ancient haplotype DHap2 identified in this study has not yet been identified in ancient Northwest Coast or Interior dogs. However, this haplotype differs by only a single base pair from *C. l. familiaris* HapF (Figure 5), also observed at the nearby site Keatley Creek (EeRl-7) (Barta 2006, 'HapF').

Mitochondrial sequences matching sockeye salmon (*Oncorhynchus nerka*) were recovered from nine of the ten coprolite samples; one sequence was identified as chinook salmon (*O. tshawytscha*) indicating that the majority of dogs at Bridge River had access to sockeye salmon. To further investigate the diet of dogs at the Bridge River site, we have begun working on whole genome analysis of the coprolite samples, followed by next-generation-sequencing on an Illumina MiSeq platform in order to further investigate other dietary components, as well as the potential for obtaining host nuclear DNA from the coprolites.

CONTAMINATION CONTROLS:

The dedicated ancient DNA laboratory at SFU follows strict contamination control protocols such as: the separation of the pre-PCR and post-PCR work spaces; the use of ancient DNA dedicated equipment including clothing, equipment and reagents and the analysis of negative controls alongside the ancient DNA samples. Ancient DNA amplicons and sequences are scrutinized to ensure that they follow expected amplification and phylogenetic patterns.

The contamination controls undertaken in this study were successful at eliminating any systematic contamination as no PCR amplification was observed in blank extracts and PCR negative controls.

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Appendix 1: Phylogenetic tree displaying the relationships between obtained haplotypes and some modern *Canis* haplotypes (Savolainen et al. 2002). Accession numbers and haplotypes are listed for Genbank samples. The tree (NJ with Kimura 2-parameter) was composed using Mega6 software (Tamura et al. 2013) with coyote (*Canis latrans*) as the outgroup. The numbers at the nodes indicate those bootstrap values above 50% after 2000 replications. The green squares indicates the haplotype recovered in this study (DHap2), as well as another *Canis* haplotype identified at the Bridge River site from salmon bone analysis (DHap1; unpublished). Blue circles represent haplotypes recovered from ancient NW Coast and Plateau dog remains (Barta 2006).

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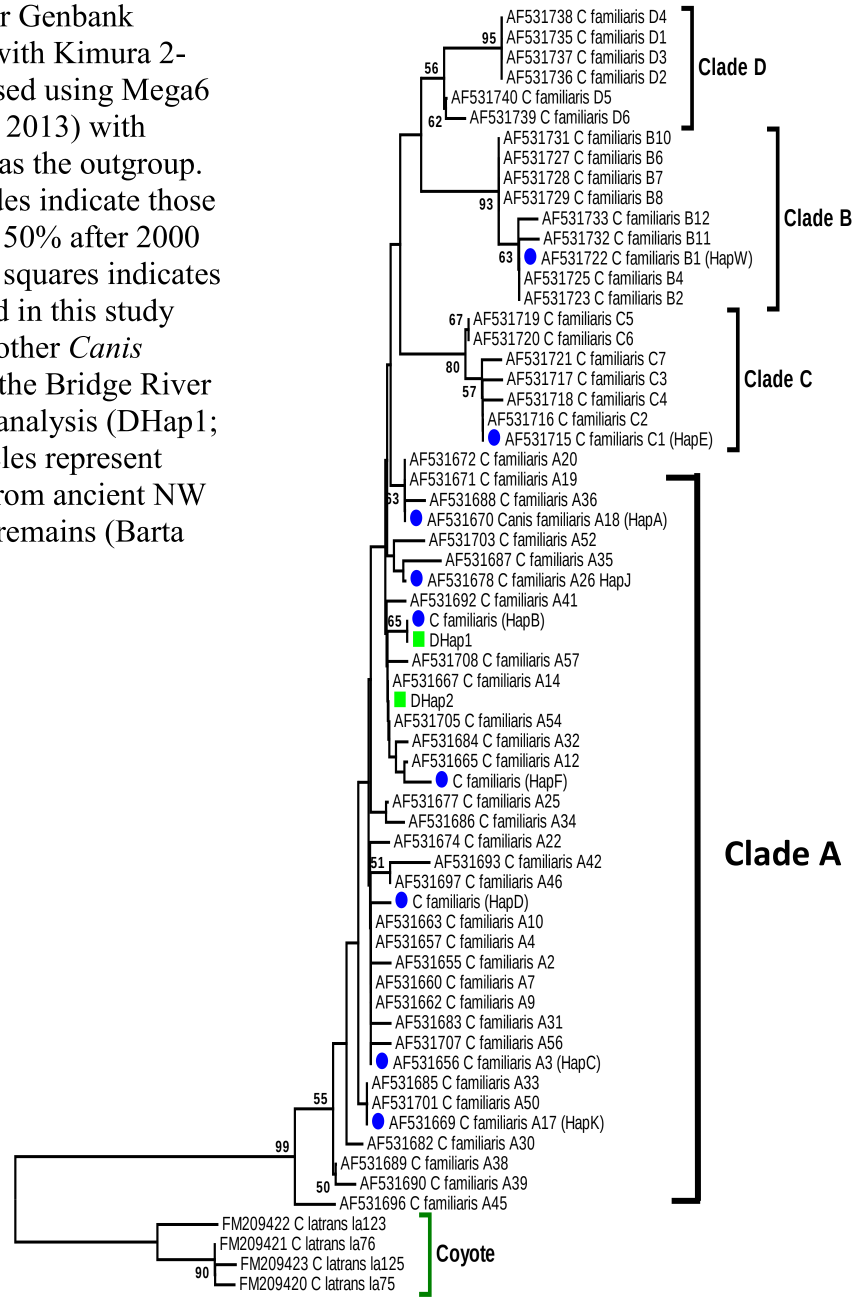

Appendix F

Isotopes Report

Bridge River Archaeological Project: Stable Isotope Analysis Report

Alejandra Diaz, MPhil, University of British Columbia

Introduction

This report presents the results of stable isotope analysis conducted on faunal material excavated during the 2013 and 2014 field seasons of the Bridge River Archaeological Project at Bridge River, near Lillooet, British Columbia. 62 samples collected from House Pit 54, mainly representing Stratum II (BR 4 floor), make up the analyzed material. The goal of this analysis was twofold; to determine an isotopically derived environmental baseline in order to contribute to our paleoenvironmental understanding of the Late period in the Mid-Fraser region and also to understand patterns and differences between subsistence based faunal remains, such as salmon and deer, and those with potentially non-subsistence prey uses and socioeconomic roles, such as dogs and other canids.

Stable Isotope Analysis in Archaeology

Stable isotope analysis has been used widely to reconstruct prehistoric diet (van der Merwe and Vogel 1978; O'Connell and Hedges 1999; Privat et al. 2002) and investigate potential mobility patterns of prehistoric populations (Hedges 2003; Dupras and Schwarcz 2001). Differences in the natural abundance of stable isotopes are reported as the ratio of the heavier to the lighter isotope, relative to a standard as follows: δsample(‰) = (Rsample/Rstandard – 1) x 1000 (Ambrose 1993), where R is the ratio of the heavier to the lighter isotope. It is the selection for or against one of these isotopic elements during food uptake in an organism, in relation to the standard it is measured against, that gives us meaningful data contributing to palaeodiet and mobility (Chisholm 1989; Ambrose 1993; O'Connell and Hedges 1999).

Analyses involving carbon have generally been used to study the relationship between the consumer and its diet in terrestrial environments, foraging behaviour (browsing versus grazing), the incorporation of maize and other C_4 plants in prehistoric diets (van der Merwe and Vogel, 1978) and in environments with C_3 plants, the contribution of isotopically-enriched marine versus terrestrial protein (Chisholm et al. 1983). In terms of samples dating to the Holocene, generally including those from British Columbia, values averaging -20‰ indicate the consumption of protein from terrestrial C3 plants, including that from flesh or milk of animals eating C3 plants, and values averaging -12‰ indicate the consumption of marine sourced protein, or that from C4 pathway plants (Schoeninger and DeNiro 1984).

$\delta^{15}N$ values reflect the amount of animal protein ingested by a consumer relative to the standard for nitrogen, which is atmospheric N_2 (AIR) (Ambrose 1993). Generally, plants are assumed to have an average $\delta^{15}N$ value of 3‰, herbivores consuming those plants have values of 6‰, and carnivores consuming those animals will have values of 9‰. $\delta^{15}N$ values are influenced by climatic and physiological factors relating to both plant and animal $\delta^{15}N$ levels (Hedges and Reynard 2007; Lee-Thorp 2008). Carbon and Nitrogen stable isotope analyses have been completed for this project, with Sulphur isotope analysis currently underway.

Methods

Sample preparation and all isotope measurements were conducted at the Archaeology Isotope Laboratory in the Lab of Archaeology, University of British Columbia. Bone sub-samples between 50 and 800mg, depending on available sample material, were cut from samples using a diamond surface Dremel cut wheel and abraded using a dental burr to remove adhering surface residues. Bone collagen was extracted using a modified Longin method (Richard and Hedges 1999) with the addition of an ultrafiltration step (Brown et al. 1988). Briefly, samples were soaked in 0.5M hydrochloric acid (HCl) at 4°C until bone was completely demineralized. The remaining "collagen" was then gelatinized in pH3 HCl at 75°C for 48 hours. Solubilized collagen was then filtered using 60-90µm Ezee® filters and centrifuged and purified with 30kDA ultrafilters in order to remove low molecular weight contaminants. Purified gelatins were the then frozen and lyophilized in a freeze dryer for 48hours.

Carbon and Nitrogen isotope analyses were conducted on .5 ±.1mg of collagen using an Elementar vario MICRO cube elemental analyzer coupled to an Isoprime™ mass spectrometer in continuous-flow mode. All reported carbon and nitrogen isotope values are averages based on duplicate runs and are reported in 'permil' (‰). All isotopic composition measurements have been calibrated to international references distributed by the U.S. Geological Survey (USGS), the National Institute of Standards and Technology (NIST, earlier as the National Bureau of Standards – NBS), and the International Atomic Energy Agency (IAEA). Stable carbon and nitrogen isotope values were calibrated to Vienna Pee Dee Belemite (VPDB) and atmospheric air (AIR), using standards USGS40 and USGS41, respectively (Coplen 2011). Based on standards, the instrumental error was better than ±0.2 ‰ for δ^{15}N and ±0.1‰ for δ^{13}C. Stable isotope values were considered acceptable if collagen yield was above 2%, elemental percentages for carbon and nitrogen values were above 18% and 6%, respectively, and carbon to nitrogen (C:N) ratios were between 2.9 and 3.6 (DeNiro 1985; Van Klinken 1999).

Results and Discussion

Stable carbon and nitrogen isotope ratios along with associated collagen criteria data are presented in Table 1 and Figure 1. Mean taxa specific δ^{13}C and δ^{15}N values are presented in Table 2 and Figure 2. Data fall quite clearly into 3 clusters; those characterized by relatively high δ^{13}C and high δ^{15}N values, indicative of considerable, but not exclusive marine-based protein consumption, and including Canid species exclusively (dogs (n=3), *Canis spp.* (n=4), and a coyote (n=1)); those characterized by moderately high δ^{13}C and δ^{13}N values, made up exclusively of salmonids (sockeye (n=3) and salmon species (n=7)); and samples characterized by relatively depleted δ^{13}C and low δ^{13}N values, made up of terrestrial mammals, including some Canid species.

Canids

The mean δ^{13}C and δ^{15}N values obtained for *C. familiaris,* -15.8 ± .2‰ and 13.6 ±.15‰, respectively, certainly indicate a considerable contribution of marine-based protein in their diet, however, both values preclude a purely marine oriented diet, based on generalized marine-based isotopic signatures, which state higher δ^{13}C and δ^{15}N values. One explanation is the potential contribution of human feces to dog diet (Cannon et al. 1999; Katzenberg 1989). Excretion of ^{14}N after food consumption that results in feces relatively enriched in ^{14}N may account for lower δ^{15}N values in animals, such as dogs, eating it. A second explanation and one currently being researched as part of the Bridge River Archaeological Project relates to isotopic values identified as marine-based in the first place.

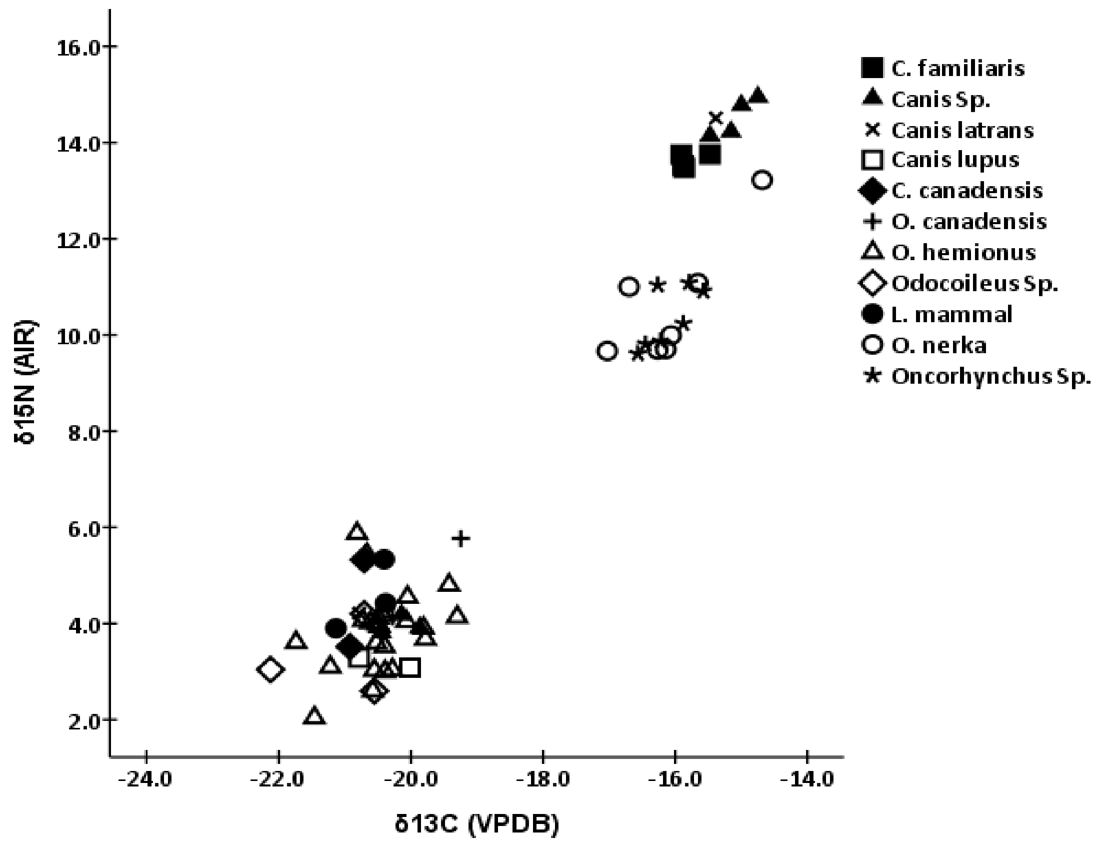

Figure 1. $\delta^{13}C$ and $\delta^{15}N$ values of Bridge River fauna

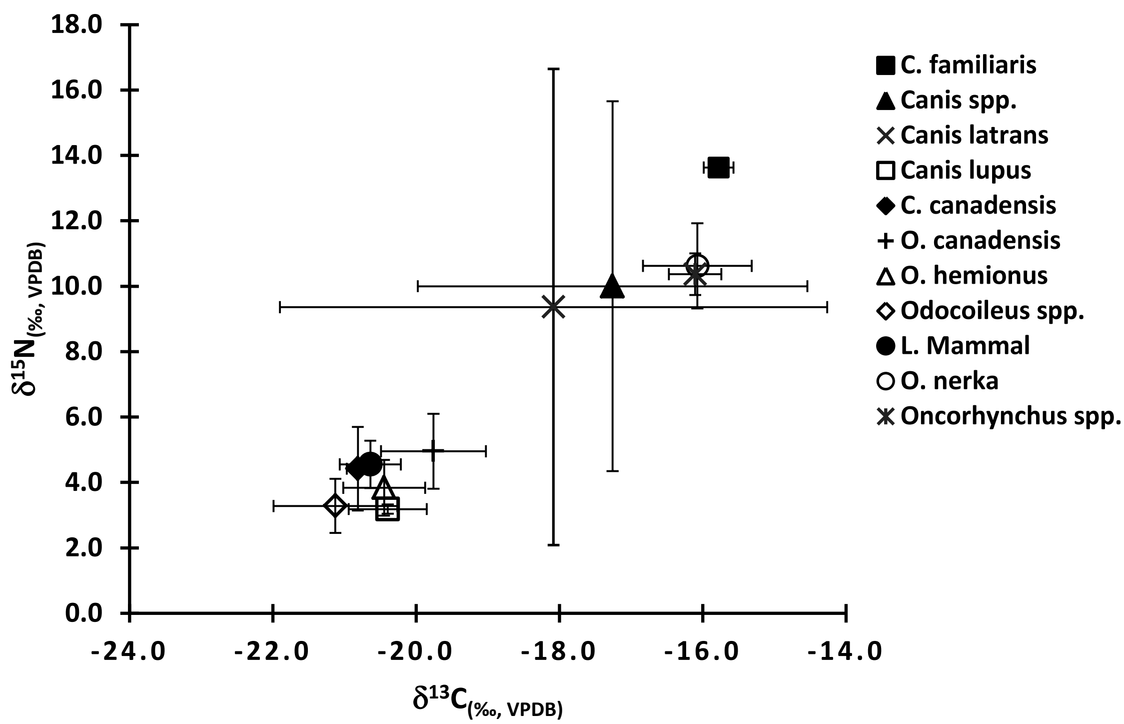

Figure 2. Mean $\delta^{13}C$ and $\delta^{15}N$ values of Bridge River fauna

Lab No.	Cat No.	Species	Element	Block/Area	Stratum	δ13C ‰	δ15N ‰	%Coll	%C	%N	C:N
2856	289	*C. familiaris*	Metacarpal	C	IIb	-15.47	13.76	10.9	42.31	15.68	3.15
2857	319	*Canis*	Humerus fragment	C	IIc	-19.87	3.91	6.1	42.63	14.43	3.45
2859	50.1	*L. mammal*	Shaft fragment	A	IIa	-21.14	3.90	6.0	41.83	16.08	3.05
2860	79	*L. mammal*	Shaft fragment	C	IIa	-20.38	4.42	7.4	43.03	15.44	3.25
2862	283	*L. mammal*	Mandible	C	IIb	-20.41	5.34	9.0	41.10	15.33	3.15
2863	60.1	*O. hemionus*	3rd phalange	C	Va	-20.05	4.55	4.1	42.24	14.66	3.40
2864	241.1	*O. hemionus*	Scaphoid	C	IIb	-20.48	3.94	6.7	41.40	14.23	3.40
2866	320	*O. hemionus*	3rd phalange	A	IId/IIe	-20.67	5.44	11.1	42.40	14.97	3.35
2867	322	*O. hemionus*	Vertebra	A	IIe	-20.39	3.00	6.6	42.83	14.81	3.35
2868	672	*O. hemionus*	Femur	C	IId	-19.81	3.91	7.6	42.74	16.28	3.10
2876	241.2	*Oncorhynchus*	Vertebra	C	IIb	-15.79	11.09	9.5	42.09	15.93	3.10
2877	199	*Oncorhynchus*	Vertebra	C	IIb	-15.58	10.91	3.3	40.49	14.17	3.35
2878	205	*Oncorhynchus*	Vertebra	-	IIb	-15.88	10.24	4.3	40.97	14.74	3.26
2879	539	*Oncorhynchus*	Vertebra	A	IIf	-16.22	9.87	3.6	41.44	14.38	3.37
2880	329.2	*Oncorhynchus*	Vertebra	A	IId	-16.27	11.04	2.4	34.33	12.27	3.27
2882	314	*Oncorhynchus*	Vertebra	A	IId	-16.45	9.81	2.8	40.48	14.23	3.35
9708	424	*O. nerka*	Thoracic vertebra	D	IIa	-16.27	9.69	6.1	39.08	14.38	3.17
9710	1373	*O. nerka*	Thoracic vertebra	D	IIc	-16.14	9.70	4.2	39.38	14.36	3.20
9711	1447	*O. nerka*	Thoracic vertebra	D	IIc	-16.70	11.00	4.1	39.03	14.04	3.24
9712	1250	*O. nerka*	Pre-caudal vertebra	D	IIc	-17.03	9.66	3.1	37.52	13.01	3.36
9719	110	*O. nerka*	Thoracic vertebra	A	IIg	-16.06	9.99	5.3	40.29	14.92	3.15
9722	1203	*O. nerka*	Thoracic vertebra	A	IIi	-14.68	13.22	2.4	39.12	14.46	3.16
9723	1405.1	*O. nerka*	Thoracic vertebra	A	IIj	-15.66	11.08	2.9	39.62	14.54	3.18
9733	1193	*O. canadensis*	Tarsal	D	IIc	-20.28	4.14	3.4	40.37	14.19	3.32
9734	865	*O. canadensis*	Vertebra	A	IIh	-19.24	5.77	10.3	42.62	15.42	3.22
9735	800	*O. hemionus*	Femur	D	IIa	-21.46	2.04	7.7	38.54	13.97	3.21
9736	145	*O. hemionus*	Tibia	D	IIa	-21.74	3.61	8.4	42.09	14.92	3.29
9737	805	*O. hemionus*	Radius	D	IIb	-21.22	3.09	2.0	36.27	12.83	3.30
9738	1061	*O. hemionus*	Tibia	D	IIb	-20.61	4.02	9.6	42.58	15.38	3.23
9739	1183	*O. hemionus*	Trapezoid Magnus	D	IIc	-20.40	3.52	15.8	42.63	15.47	3.21
9740	1370	*O. hemionus*	Metatarsal	D	IIc	-20.82	5.88	7.0	42.04	14.96	3.28

Table 1. Stable carbon and nitrogen isotope and associated collagen integrity data from faunal remains collected from HP 54

Lab No.	Cat No.	Species	Element	Block/Area	Stratum	δ13C ‰	δ15N ‰	%Coll	%C	%N	C:N
9741	49	*O. hemionus*	Pubis	A	IId	-19.42	4.80	5.8	42.10	15.16	3.24
9742	888	*O. hemionus*	Ulna	B	IIe	-20.58	2.60	5.4	42.05	14.65	3.35
9743	44	*O. hemionus*	Thoracic vertebra	C	IIe	-20.52	3.59	6.0	40.54	14.30	3.31
9744	394	*O. hemionus*	Phalange	C	IIf	-20.56	3.03	11.1	42.04	15.22	3.22
9745	1342	*O. hemionus*	Tibia	C	IIg	-20.73	4.07	10.5	42.34	15.32	3.22
9748	871	*O. hemionus*	Lumbar vertebra	A	IIh	-19.30	4.14	11.5	42.60	15.51	3.20
9749	878	*O. hemionus*	Astragalus	A	IIi	-20.28	3.03	8.5	42.47	15.21	3.26
9751	1335	*O. hemionus*	Pubis	A	IIj	-20.51	3.99	7.8	42.04	14.88	3.30
9752	1336	*O. hemionus*	Lumbar vertebra	A	IIj	-20.50	4.12	5.4	40.35	14.24	3.31
9754	553	*C. canadensis*	Caudal vertebra	C	IIf	-20.71	5.33	7.6	41.81	14.66	3.33
9755	840	*C. canadensis*	Vertebra	A	IIh	-20.92	3.52	7.5	41.52	14.32	3.38
9756	490.1	*Oncorhynchus*	Thoracic vertebra	3	IId	-16.57	9.61	8.0	39.86	13.76	3.38
9758	328	*O. hemionus*	Lumbar vertebra	3	IId	-20.43	4.17	10.7	42.16	15.02	3.28
9761	104	*O. hemionus*	Lumbar vertebra	1	IIb	-19.78	3.67	9.3	41.57	14.49	3.35
9763	404	*O. hemionus*	Metatarsal	3	IIa	-20.07	4.04	9.4	42.03	14.94	3.28
9766	77	*Odocoileus*	humerus	1	II	-22.12	3.04	11.3	42.20	14.52	3.39
9767	32	*Odocoileus*	premaxilla	3	II	-20.55	2.60	12.7	43.31	15.24	3.32
9768	202	*Odocoileus*	scaphoid	1	II	-20.71	4.20	5.2	42.68	14.99	3.32
10046	384	*Canis lupus*	Ulna	D	IIa	-20.01	3.08	8.9	41.27	14.82	3.25
10047	1361	*Canis spp*	Ulna	D	IIc	-20.45	3.81	15.7	40.97	14.84	3.22
10048	343	*Canis latrans*	Fibula	B	IIe	-15.39	14.51	12.0	42.17	14.95	3.29
10049	555	*Canis latrans*	Tibia	C	IIf	-20.78	4.21	17.4	40.85	14.60	3.26
10050	557.13	*C. familiaris*	Cervical vertebra	A	IIh	-15.88	13.53	10.3	41.19	14.69	3.27
10051	557.14	*C. familiaris*	Axis	A	IIh	-15.86	13.47	10.8	40.84	14.67	3.25
10052	494	*C. familiaris*	Thoracic vertebra	A	IIh	-15.91	13.75	11.0	40.44	14.53	3.25
10053	1400	*Canis lupus*	Metatarsal I	A	IIj	-20.78	3.29	2.5	39.10	13.54	3.37
10054	332	*Canis*	Caudal vertebra	1	IIa	-15.16	14.23	8.2	40.56	14.56	3.25
10055	489	*Canis*	Metatarsal	3	IId	-15.47	14.14	6.8	42.08	15.00	3.27
10056	323	*Canis*	Tibia	3	IId	-20.14	4.18	10.1	40.93	14.78	3.23
10057	632	*Canis*	Calcaneous	3	II	-15.00	14.78	11.0	41.85	14.96	3.26
10058	443	*Canis*	Calcaneous	3	II	-14.75	14.95	13.3	41.35	14.95	3.23

Table 1 continued

Taxon	*n*	Mean δ13C ‰	SD δ13C ‰	Mean δ15N ‰	SD δ15N ‰
C. familiaris	2	-15.781	.206	13.627	.147
Canis Sp.	4	-17.261	2.718	10.000	5.651
Canis latrans	7	-18.084	3.817	9.361	7.282
Canis lupus	2	-20.399	.544	3.184	.144
C. canadensis	2	-20.816	.153	4.421	1.280
O. canadensis	3	-19.761	.731	4.955	1.149
O. hemionus	2	-20.449	.571	3.837	.857
Odocoileus Sp.	23	-21.129	.866	3.279	.827
L. mammal	7	-20.642	.428	4.552	.726
O. nerka	3	-16.077	.758	10.622	1.300
Oncorhynchus Sp.	7	-16.108	.366	10.367	.634

Table 2. Mean stable carbon and nitrogen isotope values with 1 standard deviation

Results of isotopic analysis on archaeological salmon remains from Bridge River indicate that 'baseline' values do not have a completely marine signature as has been seen in other ecological foodwebs, indicating various inputs of non-marine signals (see below). If salmon did comprise a significant portion of dog diet at the site, which is very likely, their values may reflect variable and less typically 'marine' isotopic signatures of these anadromous species.

Looking at the other canid species that cluster with domestic dog samples, 4 samples identified only to *Canis*, have the highest $\delta^{15}N$ (mean 14.5 ±.4‰) and the coyote has a $\delta^{15}N$ value of 14.8‰. Coyotes are versatile and opportunistic omnivores at times benefitting from marine (Rose and Polis 1998) and anthropogenic (Fedriani et al. 2001) food sources. In this case, riverine food consumption either through scavenging or other means is a likely explanation for the isotopic signatures observed in this individual. The 4 canids very likely represent *C. familiaris*. $\delta^{13}C$ values for all canid species in this cluster indicate significant contributions of marine or riverine-derived protein in their diets, though as observed in the $\delta^{15}N$ values, the mean

Salmonids

Mean sockeye salmon $\delta^{13}C$ values plot very closely to salmonid values (-16.08 ±.8‰ versus -16.11 ±.4‰) with both reflecting a somewhat derived isotope marine signature. Mean $\delta^{15}N$ values track similarly (10.62 ±1.2‰ versus 10.37 ±.6‰), with the exception of an *O. nerka* specimen having seemingly elevated nitrogen values. As previously mentioned, the deviation among all salmonids from a completely marine based isotopic signature likely indicates various inputs of non-marine diet. The five species of salmon that spawn in the Fraser basin have variable life cycles, typically spawning at different ages and at different adult sizes (Quinn 2004) which is similarly be paralleled by variation in their isotopic signatures. Isotopic research on the five species of Pacific salmon has demonstrated three isotopically distinctive subgroups based on general salmonid dietary trends (Satterfield and Finney 2002); pink, chum, and sockeye salmon, low trophic level consumers (zooplankton) have low $\delta^{13}C$ and $\delta^{15}N$ values; coho salmon, with some chum and sockeye comprise the group with intermediate $\delta^{13}C$ and $\delta^{15}N$ values; and chinook salmon have the highest $\delta^{13}C$ and $\delta^{15}N$ values, likely attributable to the species consuming higher proportions of fish. Orchard and Szpak (2012:25) note, however, that these values, derived from muscle tissue, are not comparable to archaeological assemblages, which are represented by bone and remodels very differently than muscle, and would not reflect the slower remodelling rate at which bone and bone collagen develops. Other isotopic studies have similarly demonstrated, albeit based on limited datasets, that there is indeed variability across species and age groups (Schoeninger and DeNiro 1984). While clustering together, these salmon specimens could be reflecting more locally determined signatures, given their life histories and time spent travelling up the Fraser to the Mid-Fraser region.

Terrestrial Fauna

The final cluster of isotopic values, characterized by relatively depleted $\delta^{13}C$ and low $\delta^{13}N$ values, is made up exclusively of terrestrial fauna and non-*C. familiaris* canid species. Mean $\delta^{13}C$ and $\delta^{15}N$ values are typical of terrestrial values reported for temperate environments, with the total mean $\delta^{13}C$ and $\delta^{15}N$ values for all fauna represented by the cluster (-20.48 ±.6‰ and 3.92±.9‰) representative of the individual species. Often regarded as the baseline faunal data with which to compare human and socioeconomically regarded fauna, these terrestrial values provide us with an ideal set of values to compare our domesticated dog sample.

Conclusions and Future Directions

Results from the stable isotope analysis of 2013 and 2014 Bridge River fauna suggest locally determined isotopic signatures that deviate somewhat from the traditionally referred to generalized $\delta^{13}C$ and $\delta^{15}N$ values of temperate climates. While locally oriented isotopic studies have become more popular in archaeological and especially ecological literature, this is among the first for British Columbia archaeological data. That it combines potential new paleoenvironmental data with socioeconomically mediated archaeological inquiry is unique beyond the study region. *C. familiaris* diet demonstrates significant isotopic differences from non-domesticated canids and indicates the temporally and socially far-reaching relationship this species has with its human counterpart. Salmonids interestingly display somewhat, but not entirely marine derived isotopic signatures, an area of study that warrants further investigation.

Future goals of this component of the Bridge River Archaeological Project include testing salmonid isotopic values in light of this apparent variability and expanding the isotopic suite to include $\delta^{34}S$ analyses. Isotopic differences of $\delta^{34}S$ in marine and non-marine environments allows one to distinguish between marine and non-marine consumers, which would permit more in depth analyses and interpretation of both aquatic and terrestrial isotopic values. Similarly, sulphur isotope ratios will be used to determine regionally-dependent $\delta^{34}S$ and interpret these values within the context of both human and resource mobility within the study area. Preliminary sulphur isotope analysis of Bridge River fauna indicates both temporal and spatial differences at the individual and site-specific level.

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Appendix G

GIS Maps

(Kristen D. Barnett)

GIS Maps

The creation of GIS maps is an essential part of the Housepit 54 project. GIS maps permit us to visually assess spatial patterns in artifacts, faunal remains and other items, an essential part of developing a comprehensive understanding of occupational variation within individual floors in Housepit 54. This report provides a first set of maps of the floors for which we have substantial representation (IIa-IIg). A more complete study of spatial variability on HP 54 floors will be developed once the excavation is completed in 2016.

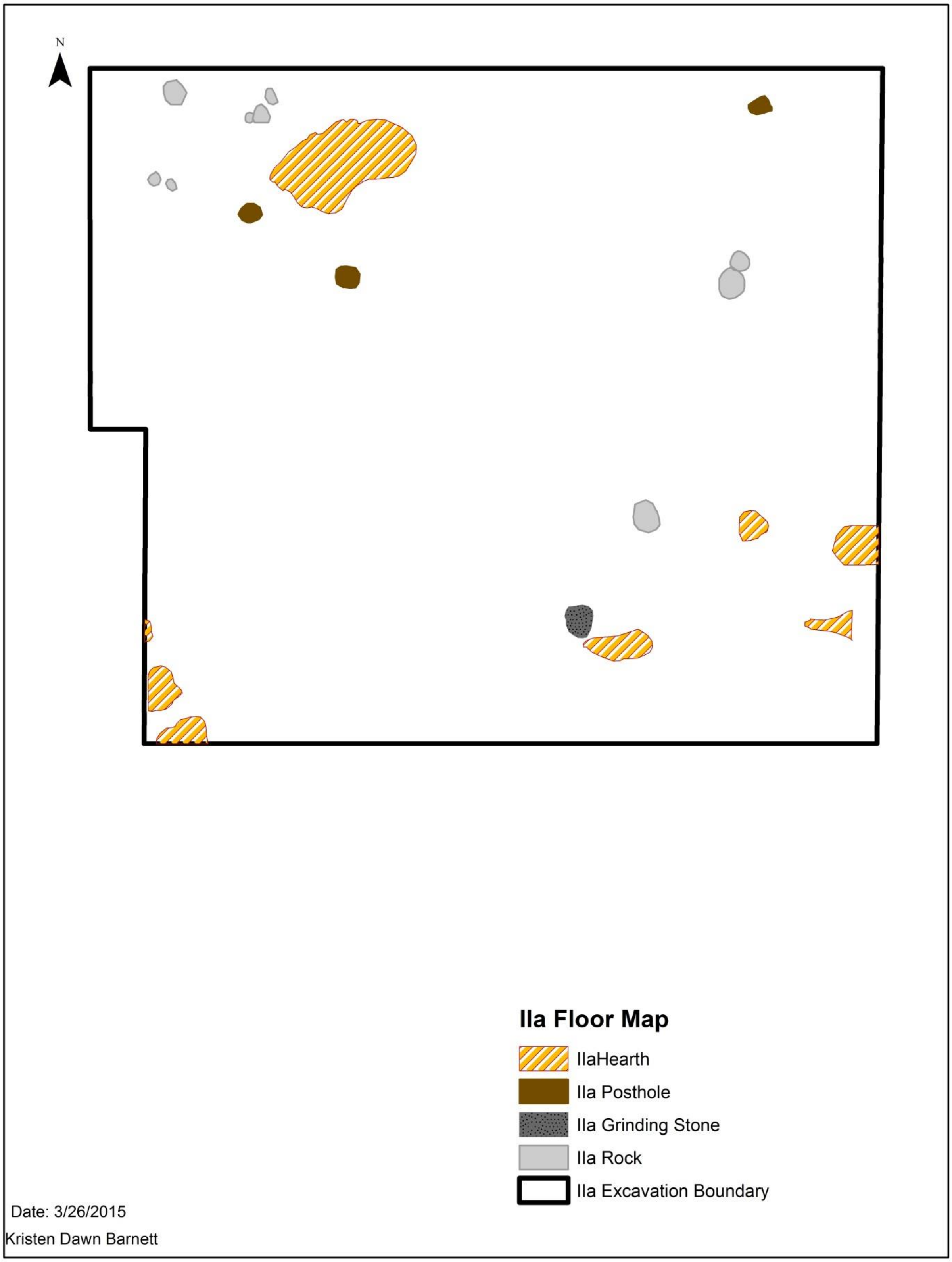
Methods

Each data set was entered into an excel spreadsheet by specific x, y, and z coordinates corresponding to the grid imposed on the site while in the field. Lithic artifacts were entered as one line per artifact with the corresponding codes attached to the line item. FCR were entered by unit and quad with a total count per area in one line. Each of these categories created its own layer in ArcMap.

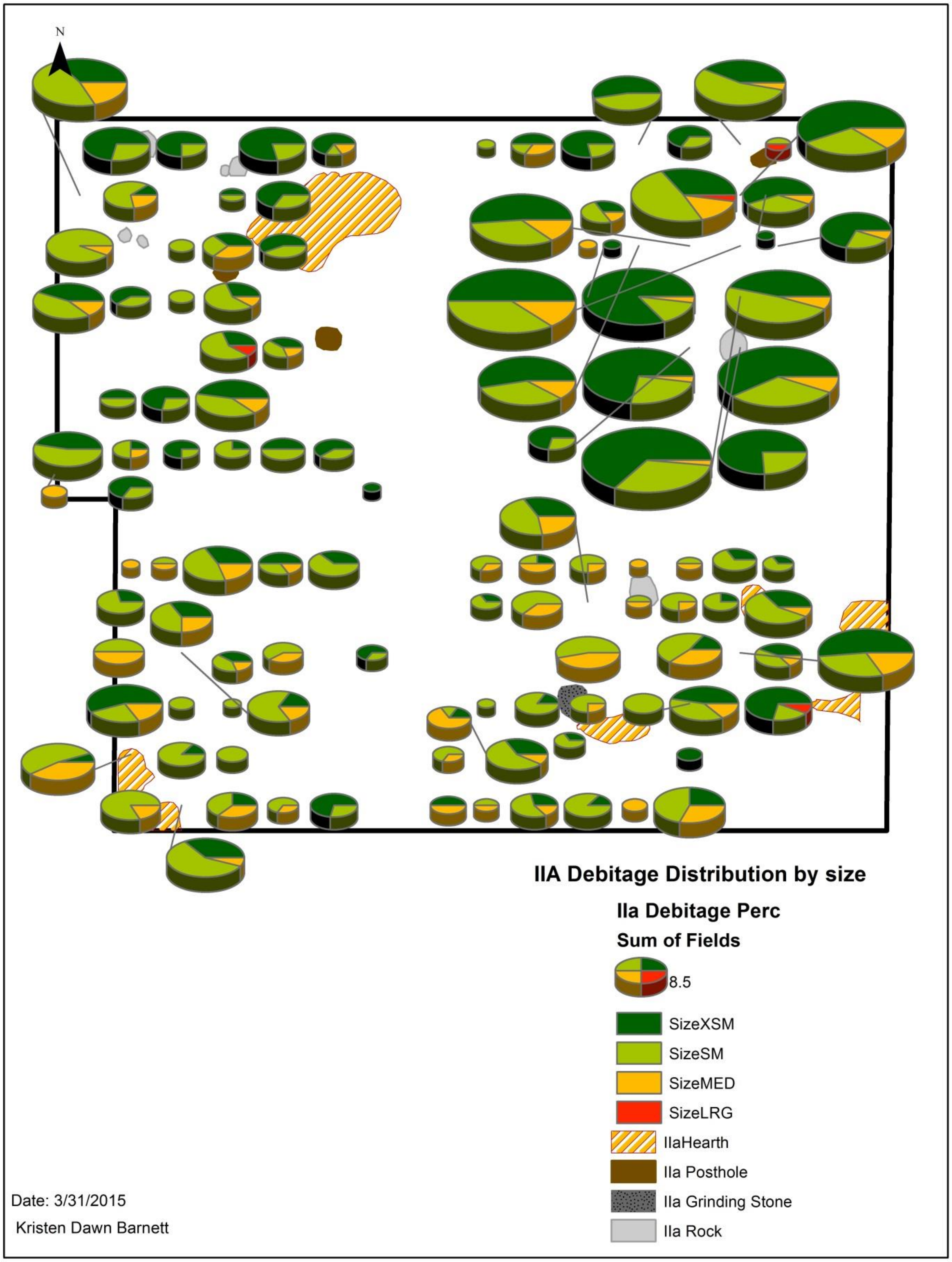
A base layer fishnet was created in ArcMap representing the grid while an additional layer for the house floor was created identifying non-variable features such as hearths, cache pits, and post holes.

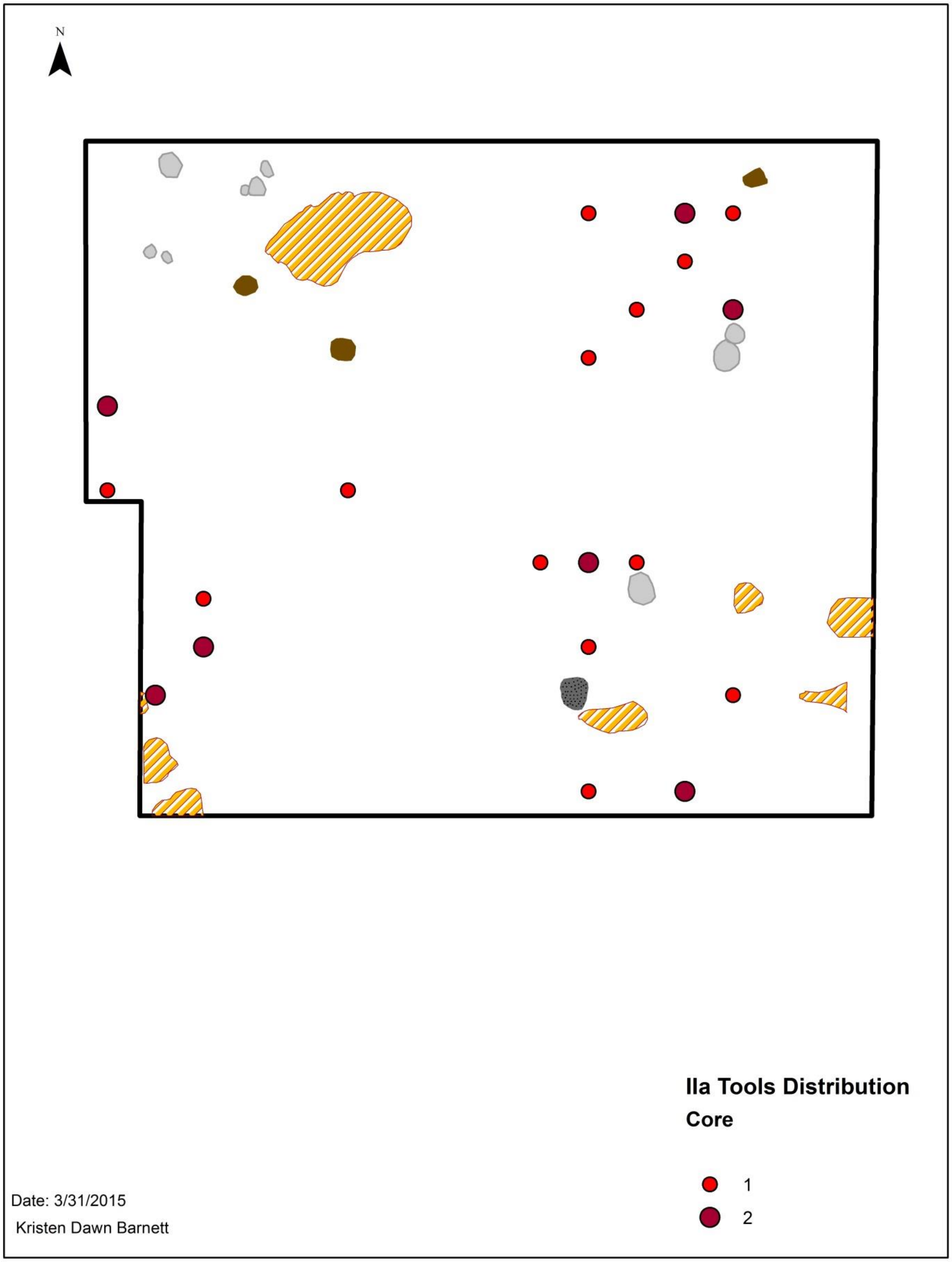
Raster files (density maps) were created using Quantum GIS, an online shareware program. Once created they were saved as tif files and imported back into ArcMap serving as independent layers that could interact with additional queries. Once reconstructed, we removed the grid layer from the house.

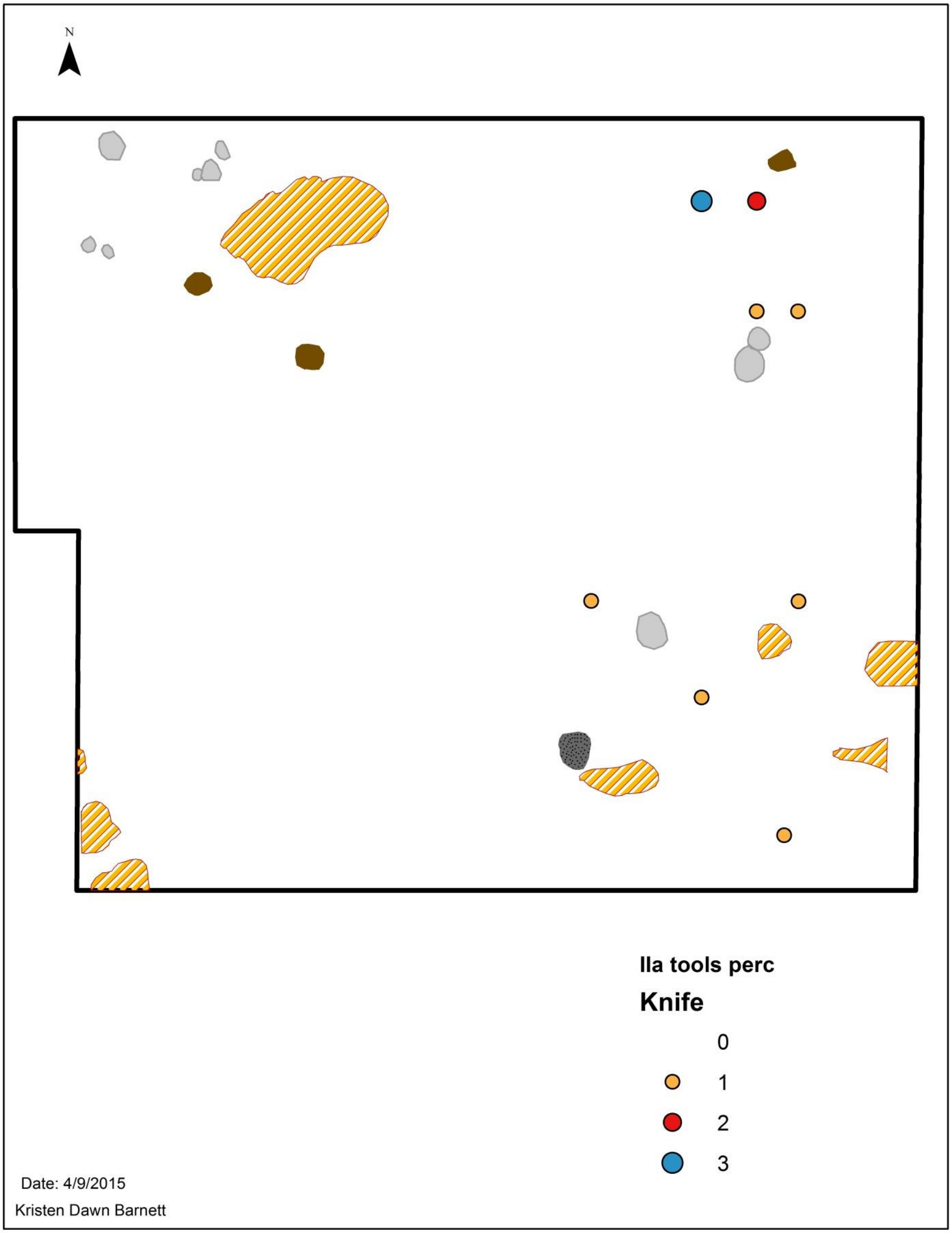
Maps were developed to depict variability in artifacts and faunal remains. These included those depicting simply density of items but also those illustrating variability in artifact and faunal types. Analyses and interpretation of spatial variability has just been initiated as of this writing. Thus, this sample of maps illustrates an ongoing process of research. Some will be adjusted following the 2016 field season at Housepit 54. In particular, we expect additional data for strata IIa-IIe for Block D.

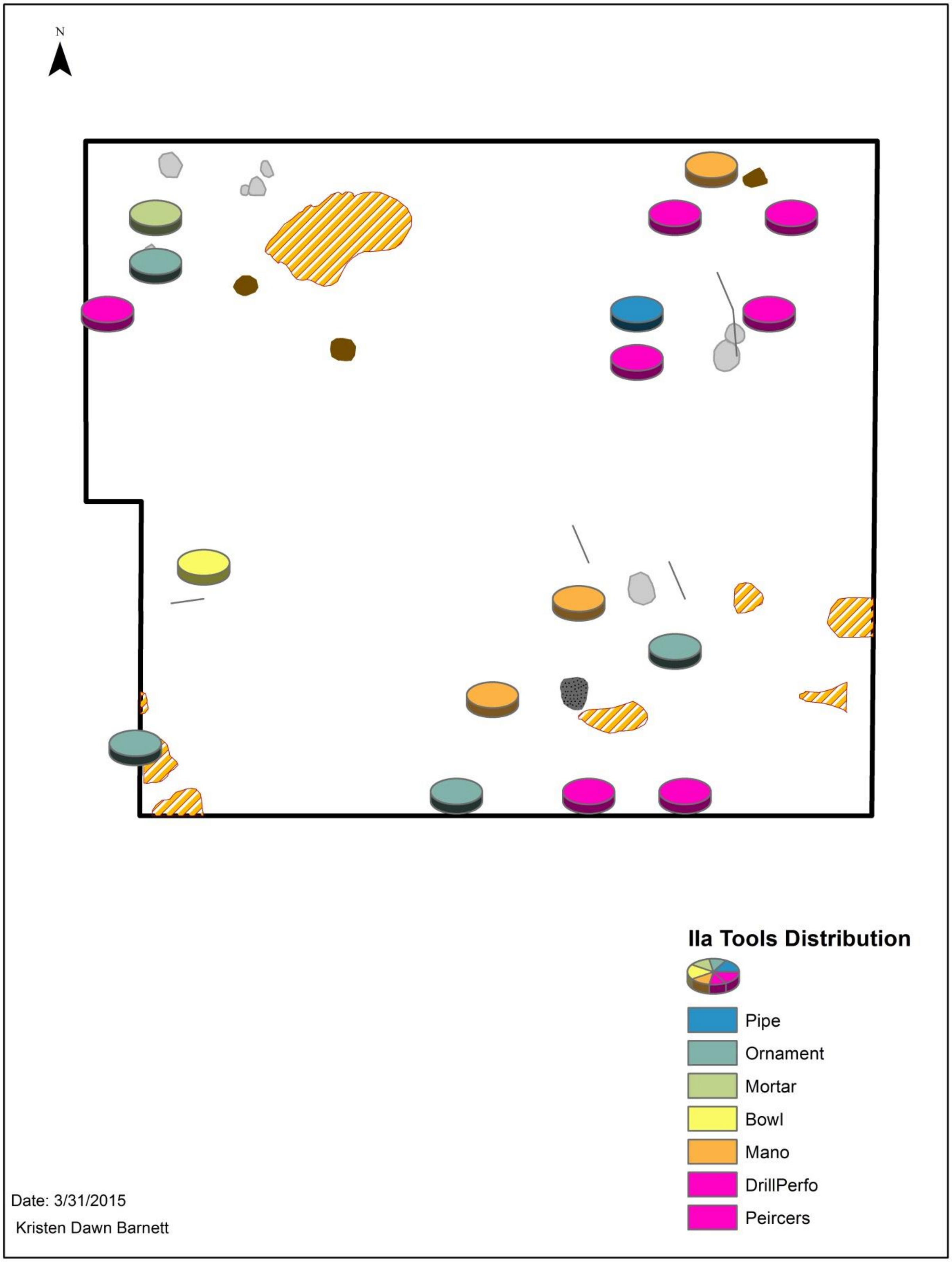

N
IIa Floor Map
IIaHearth
IIa Posthole
IIa Grinding Stone
IIa Rock
IIa Excavation Boundary
Date: 3/26/2015
Kristen Dawn Barnett

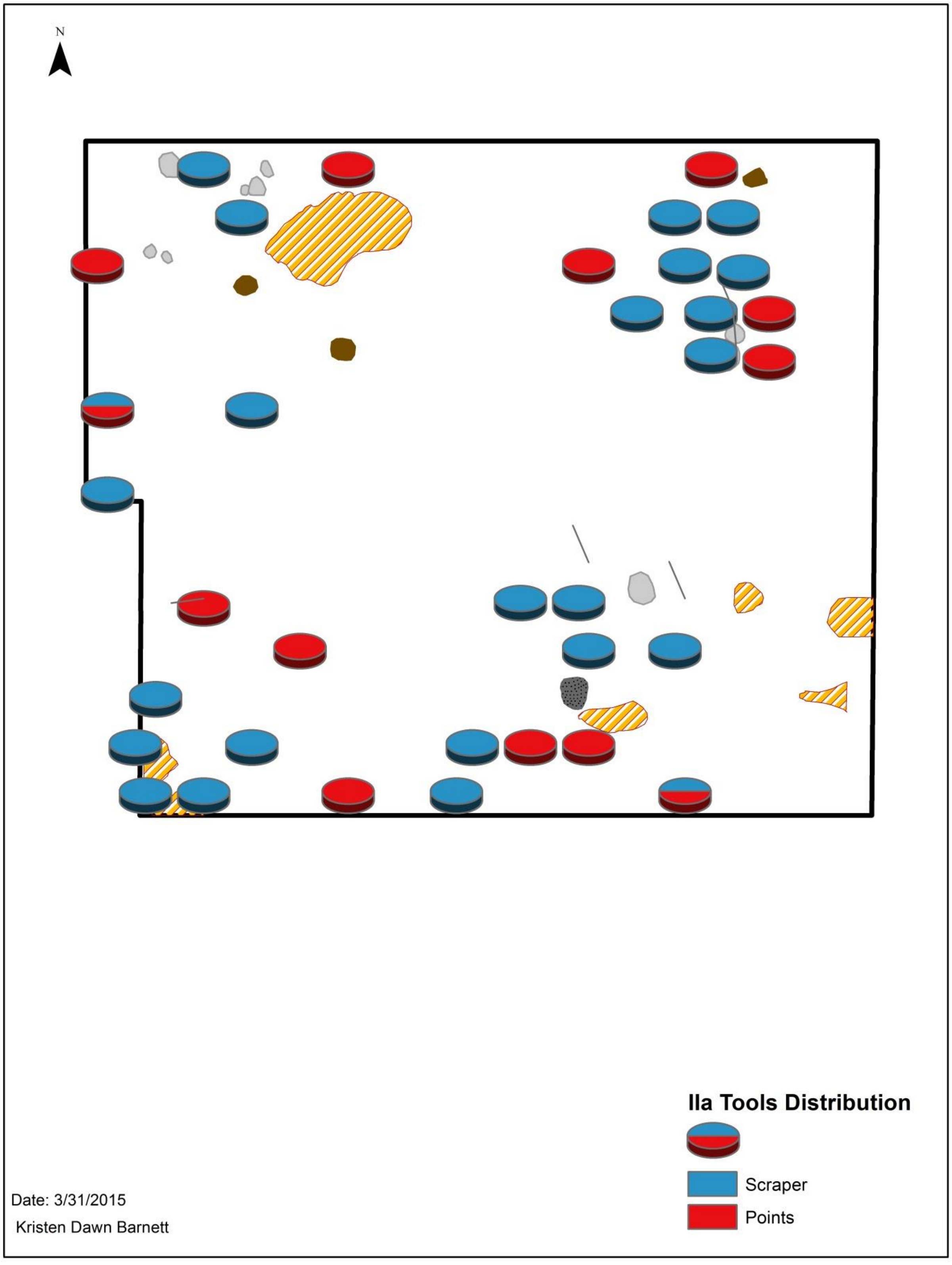

N
Legend
IIa Debitage Distribution
Total Count
1-4
1-10
11-19
20-40
40-67

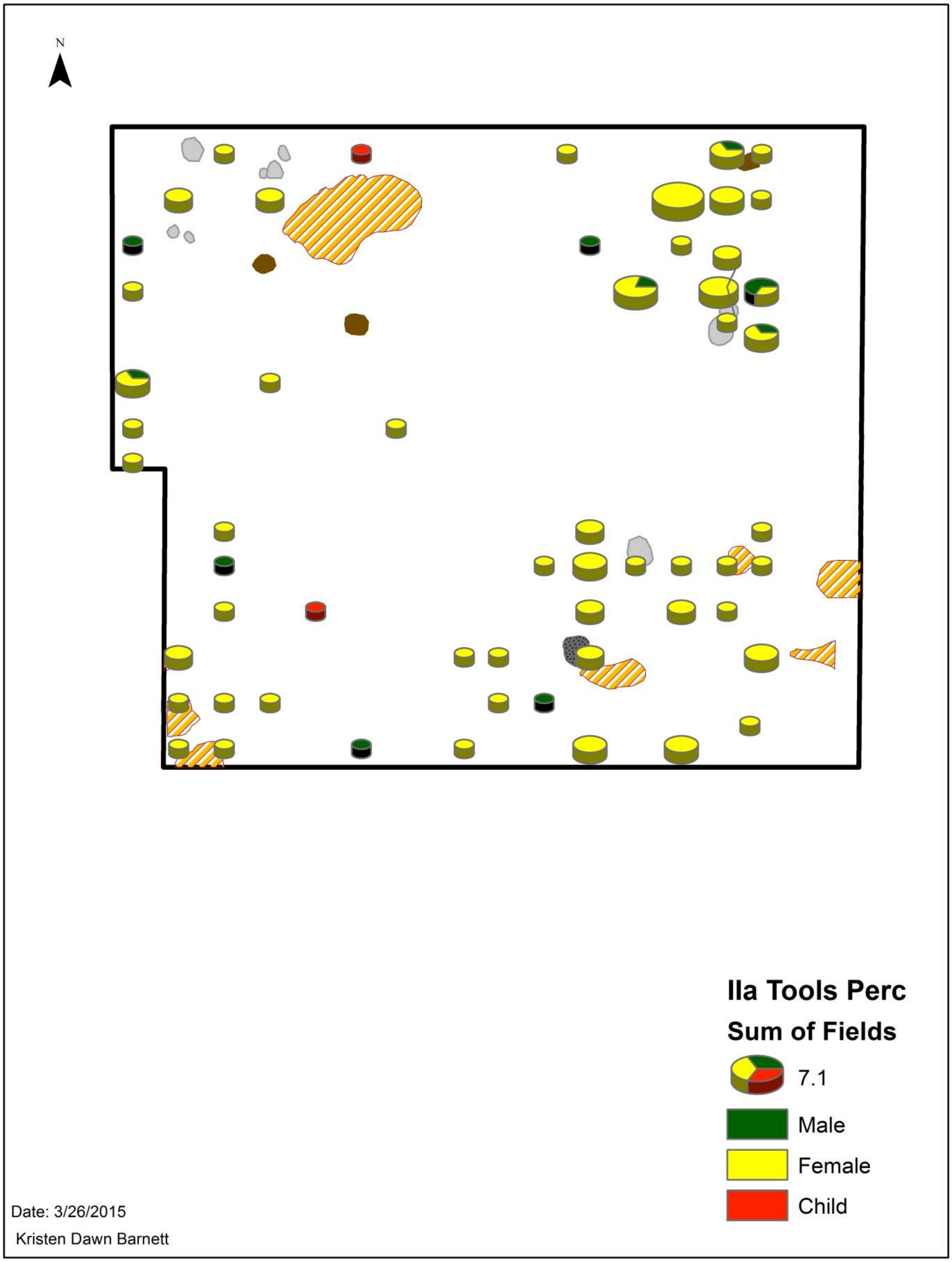

N
IIA Debitage Distribution by size
IIa Debitage Perc
Sum of Fields
8.5
SizeXSM
SizeSM
SizeMED
SizeLRG
IIaHearth
IIa Posthole
IIa Grinding Stone
IIa Rock
Date: 3/31/2015
Kristen Dawn Barnett

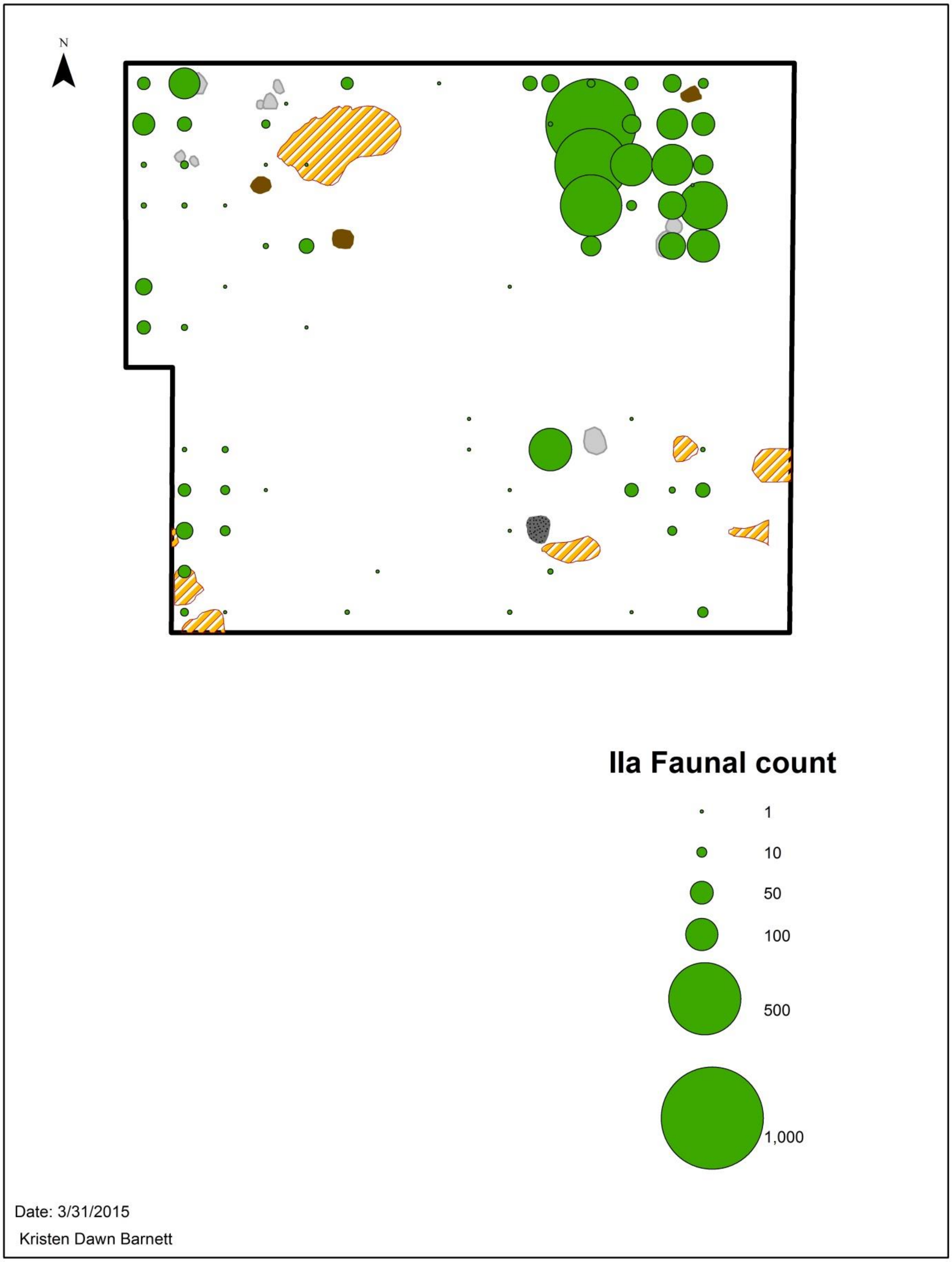

N
IIa Tools Distribution
Core
1
2
Date: 3/31/2015
Kristen Dawn Barnett

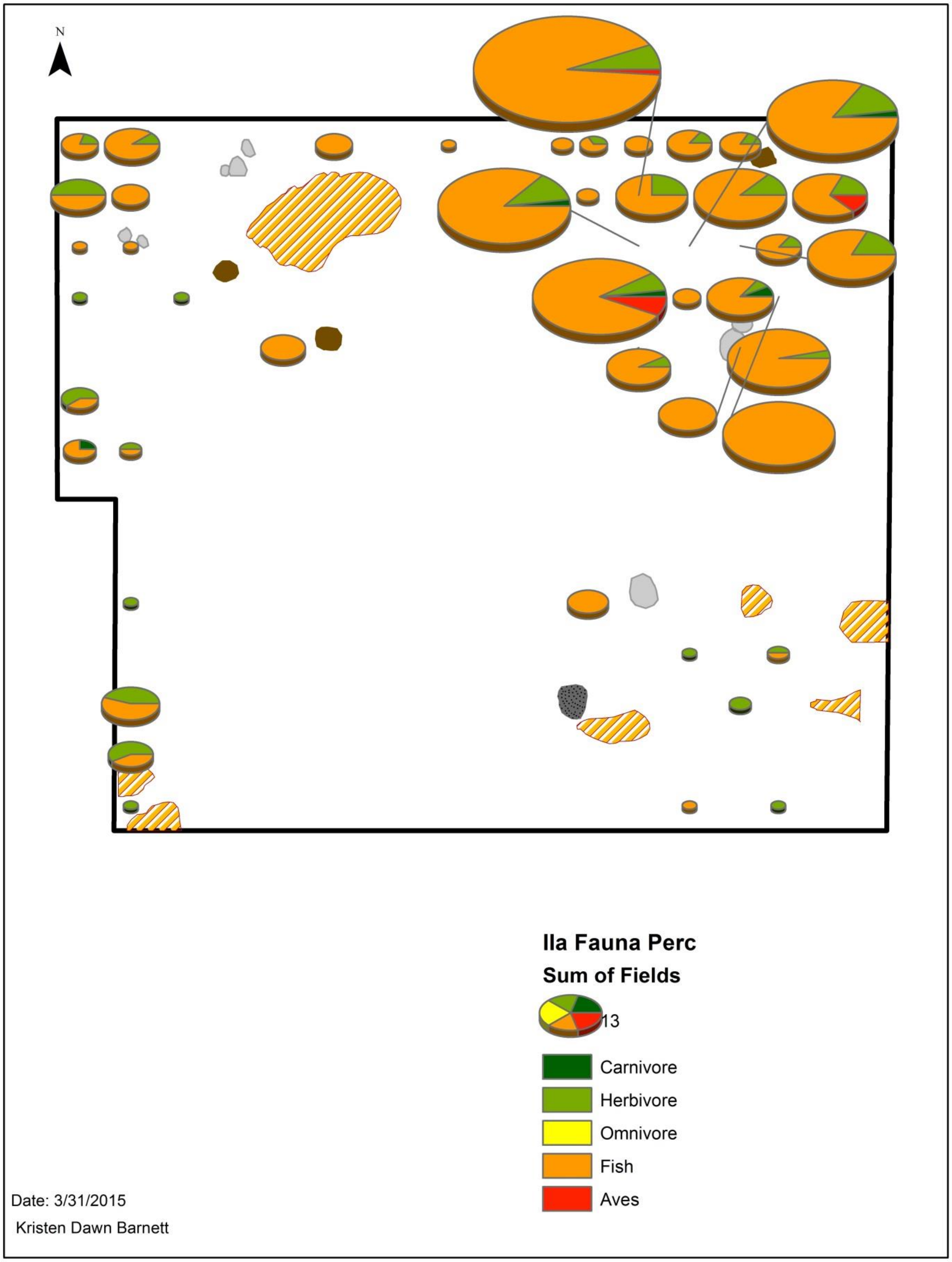

N
IIa tools perc
Knife
0
1
2
3
Date: 4/9/2015
Kristen Dawn Barnett

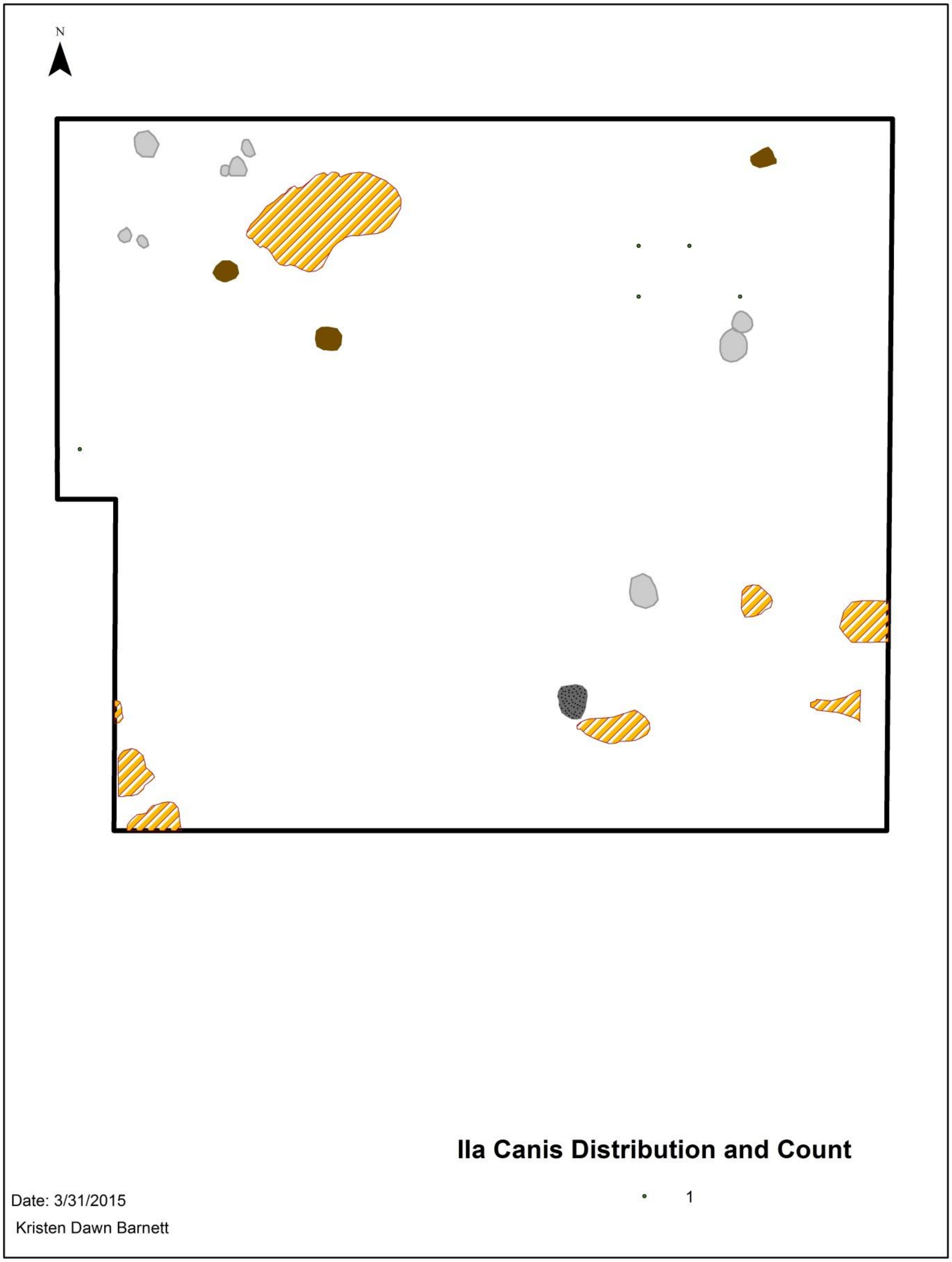

N
IIa Tools Distribution
Pipe
Ornament
Mortar
Bowl
Mano
DrillPerfo
Peircers
Date: 3/31/2015
Kristen Dawn Barnett

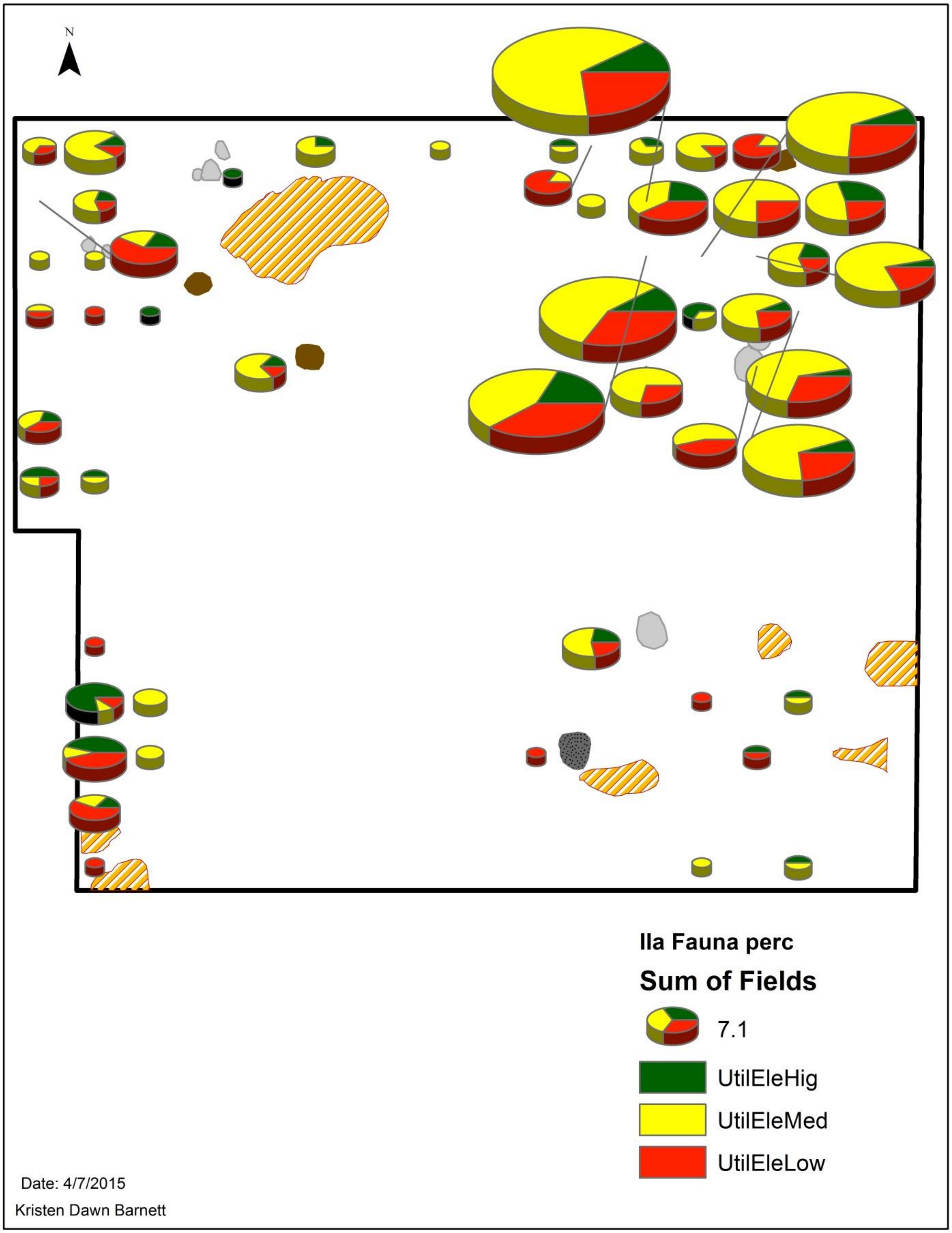

N
IIa Tools Distribution
Scraper
Points
Date: 3/31/2015
Kristen Dawn Barnett

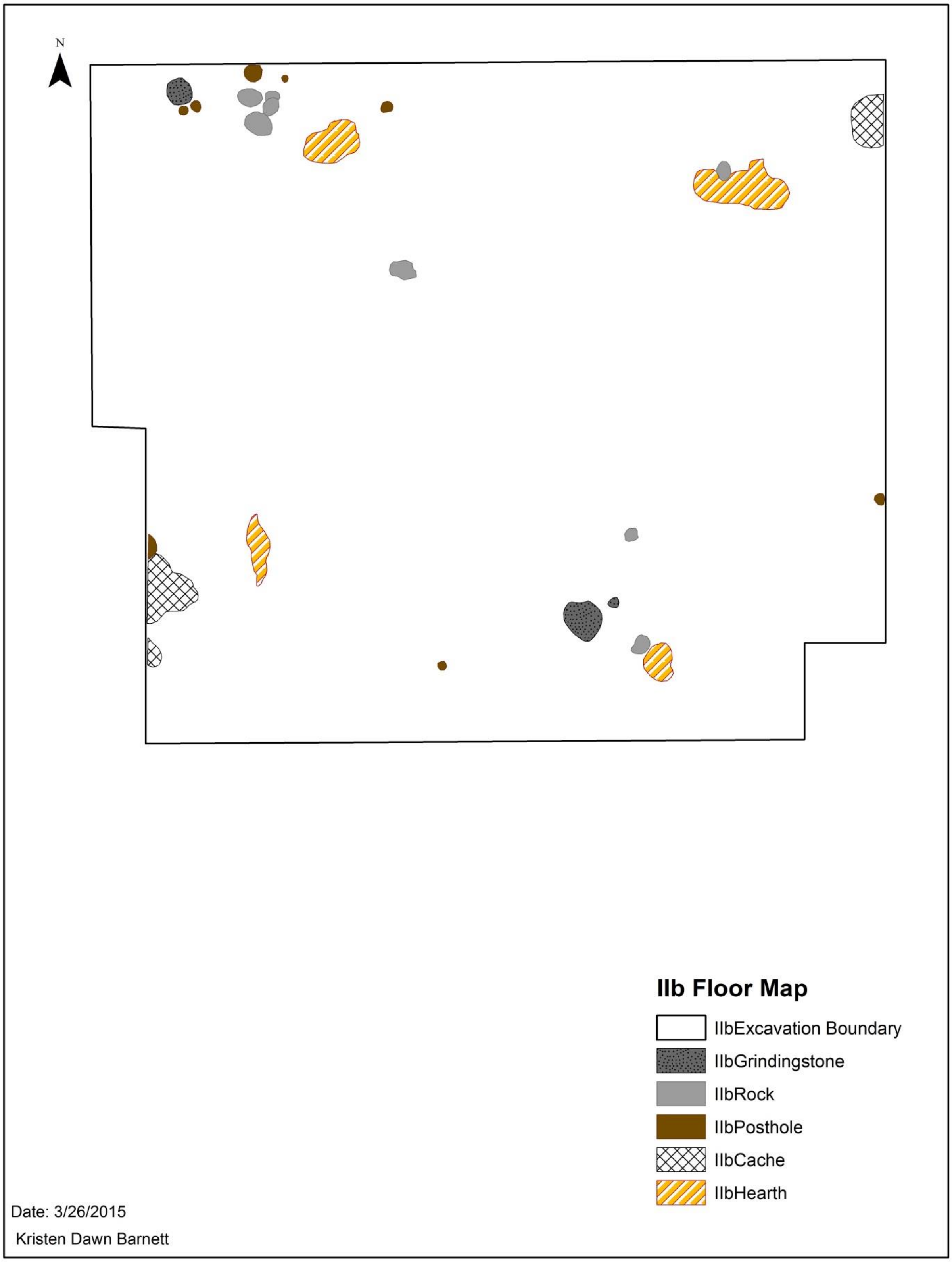

N
IIa Tools Perc
Sum of Fields
7.1
Male
Female
Child
Date: 3/26/2015
Kristen Dawn Barnett

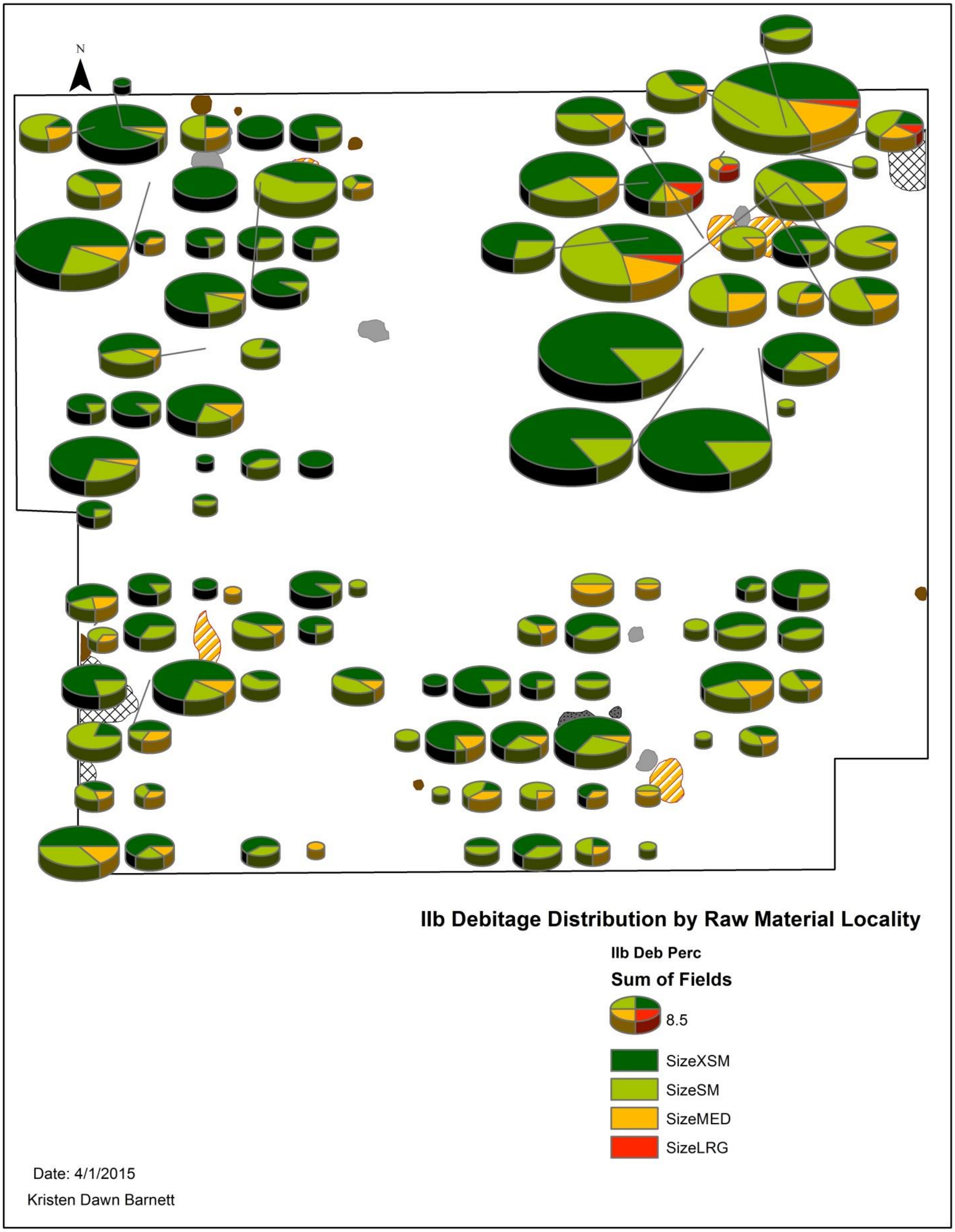

N
IIa Faunal count
1
10
50
100
500
1,000
Date: 3/31/2015
Kristen Dawn Barnett

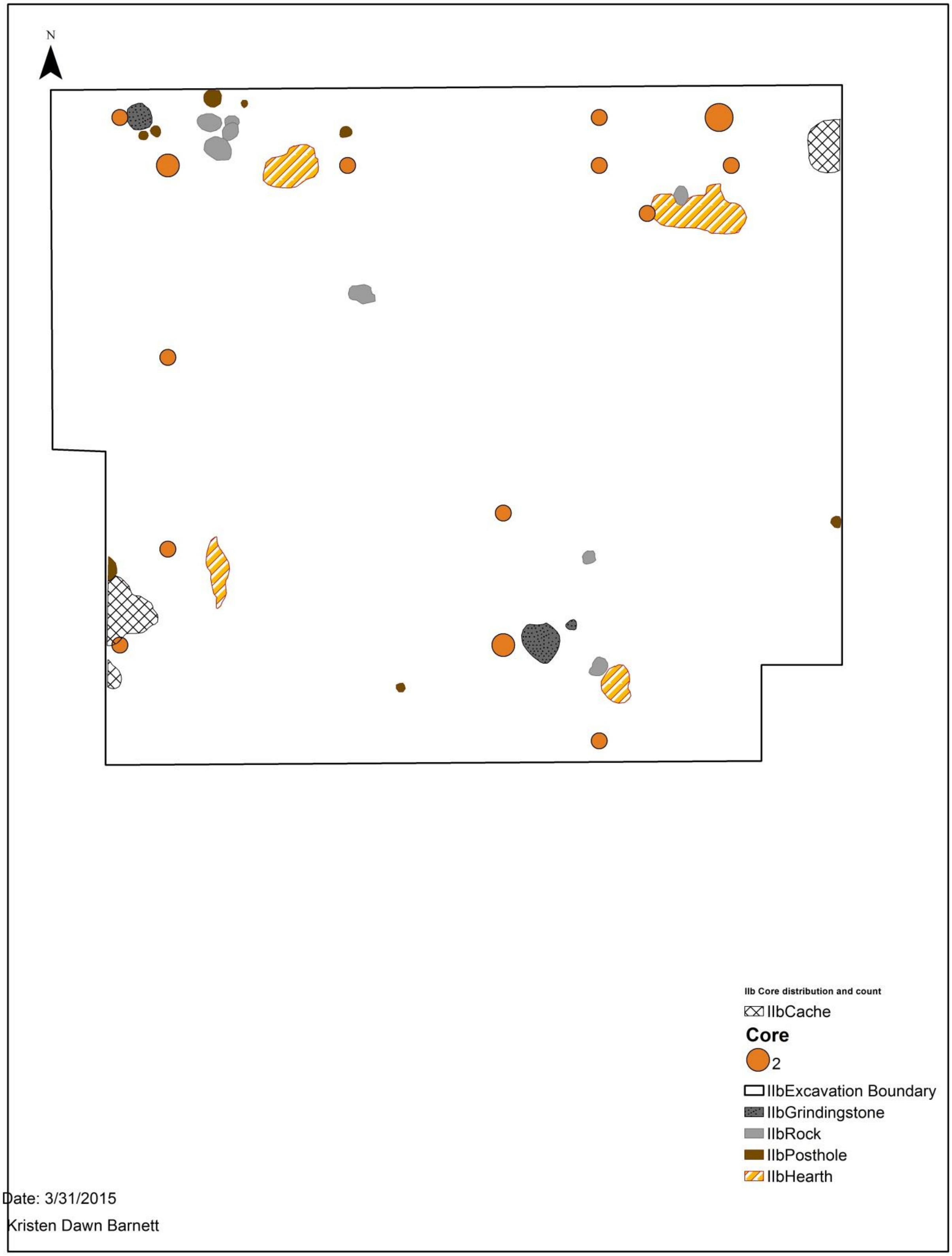

N
Ila Fauna Perc
Sum of Fields
13
Carnivore
Herbivore
Omnivore
Fish
Aves
Date: 3/31/2015
Kristen Dawn Barnett

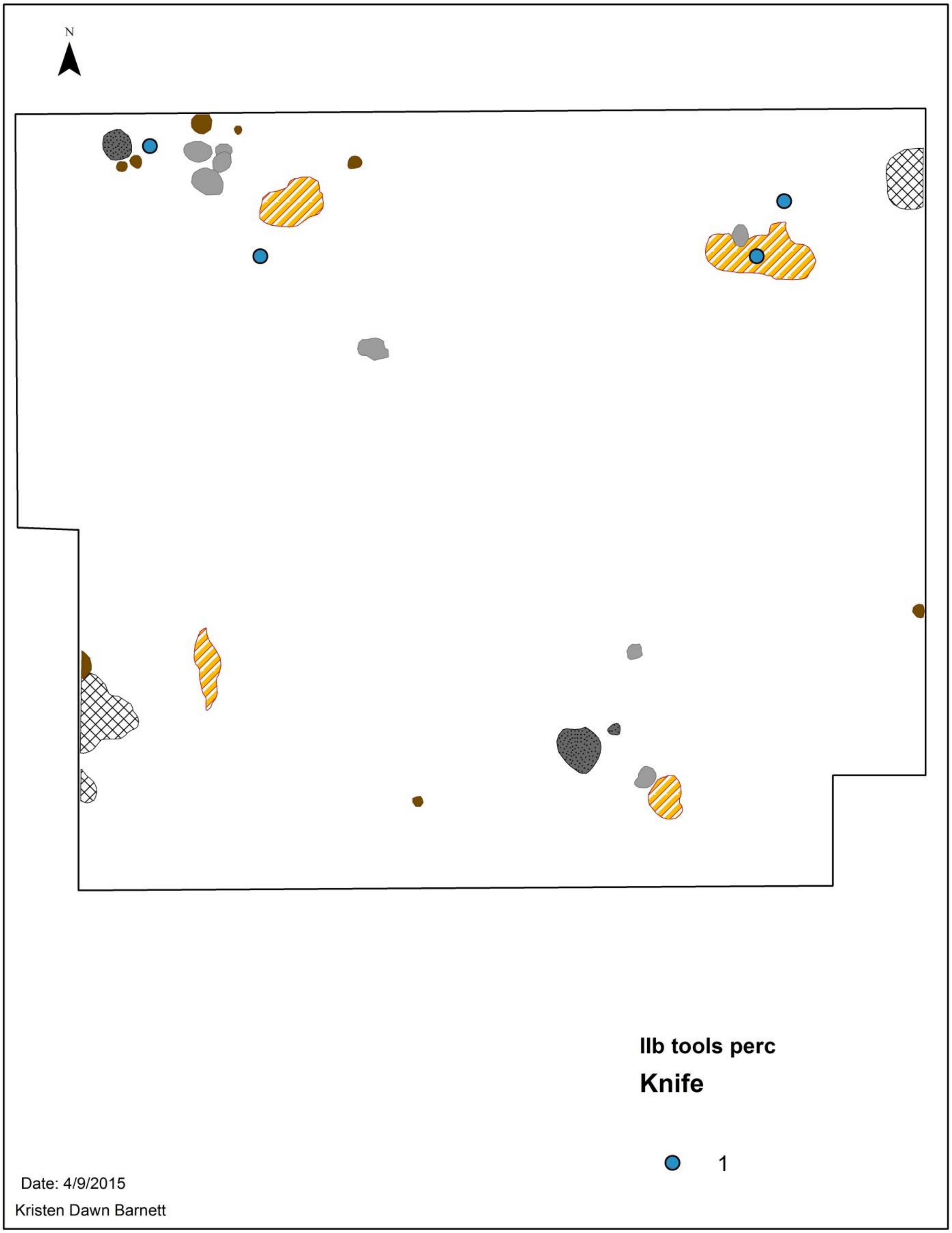

N
IIa Canis Distribution and Count
1
Date: 3/31/2015
Kristen Dawn Barnett

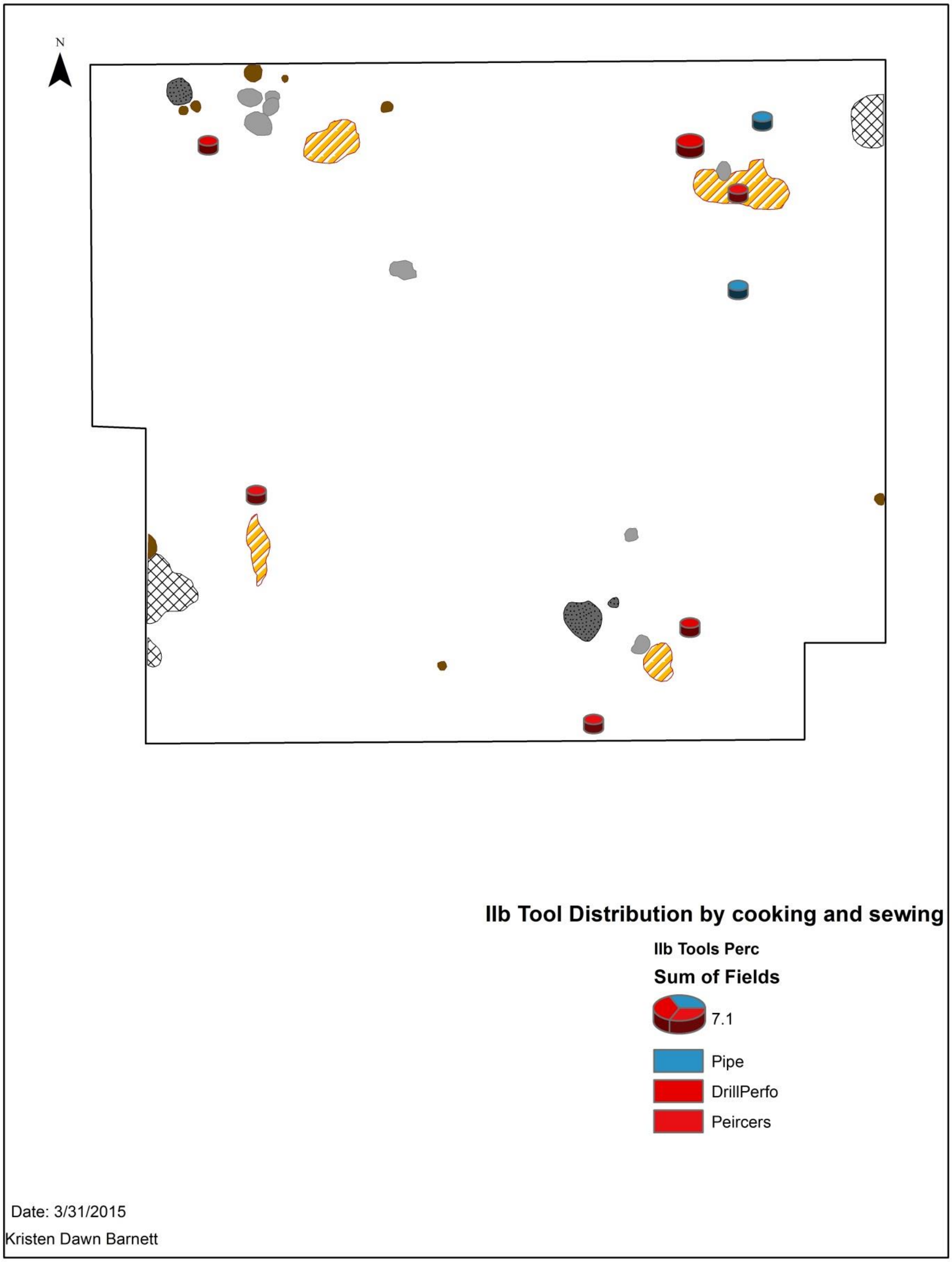

N
IIa Fauna perc
Sum of Fields
7.1
UtilEleHig
UtilEleMed
UtilEleLow
Date: 4/7/2015
Kristen Dawn Barnett

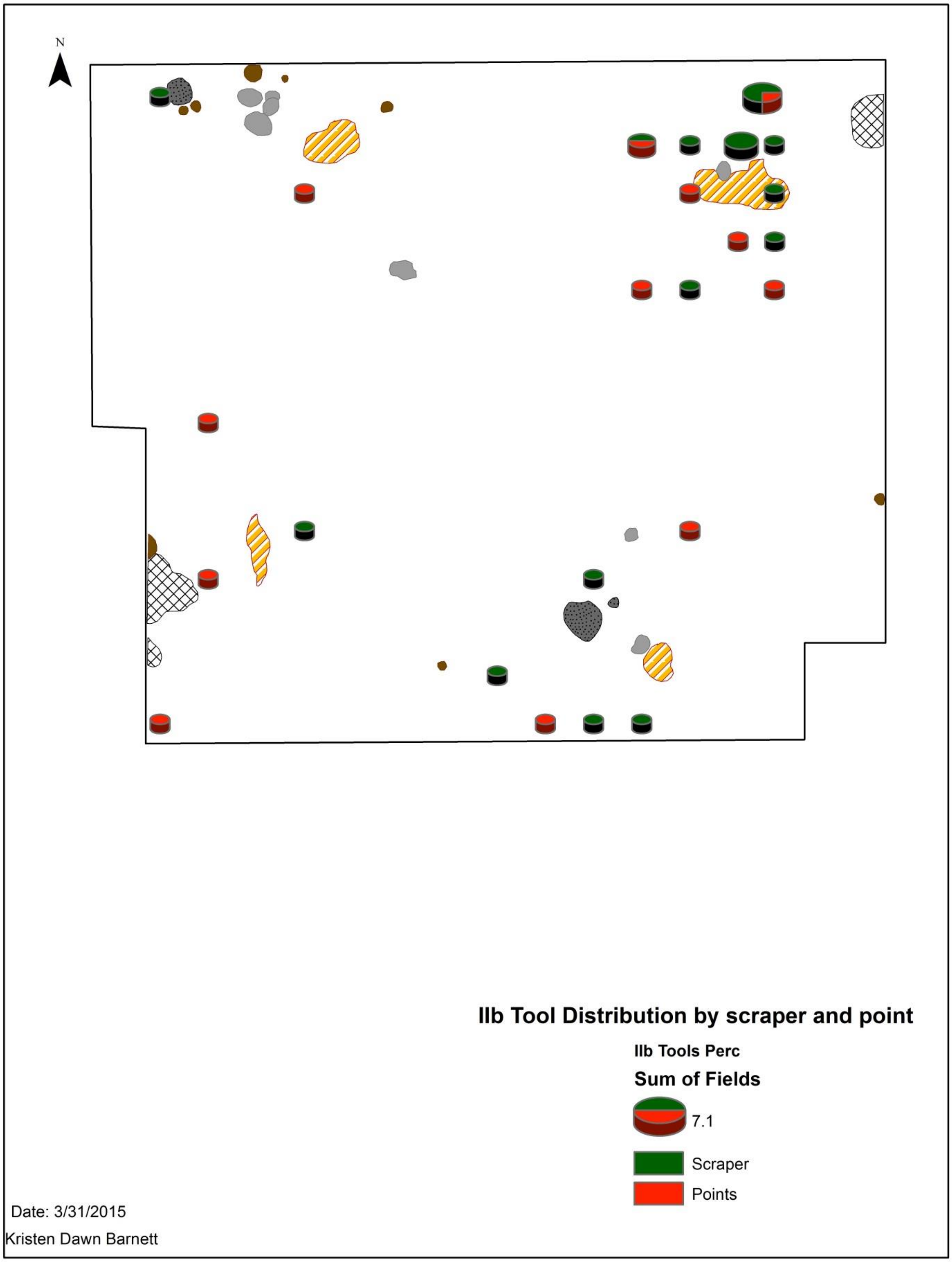

N
IIb Floor Map
IIbExcavation Boundary
IIbGrindingstone
IIbRock
IIbPosthole
IIbCache
IIbHearth
Date: 3/26/2015
Kristen Dawn Barnett

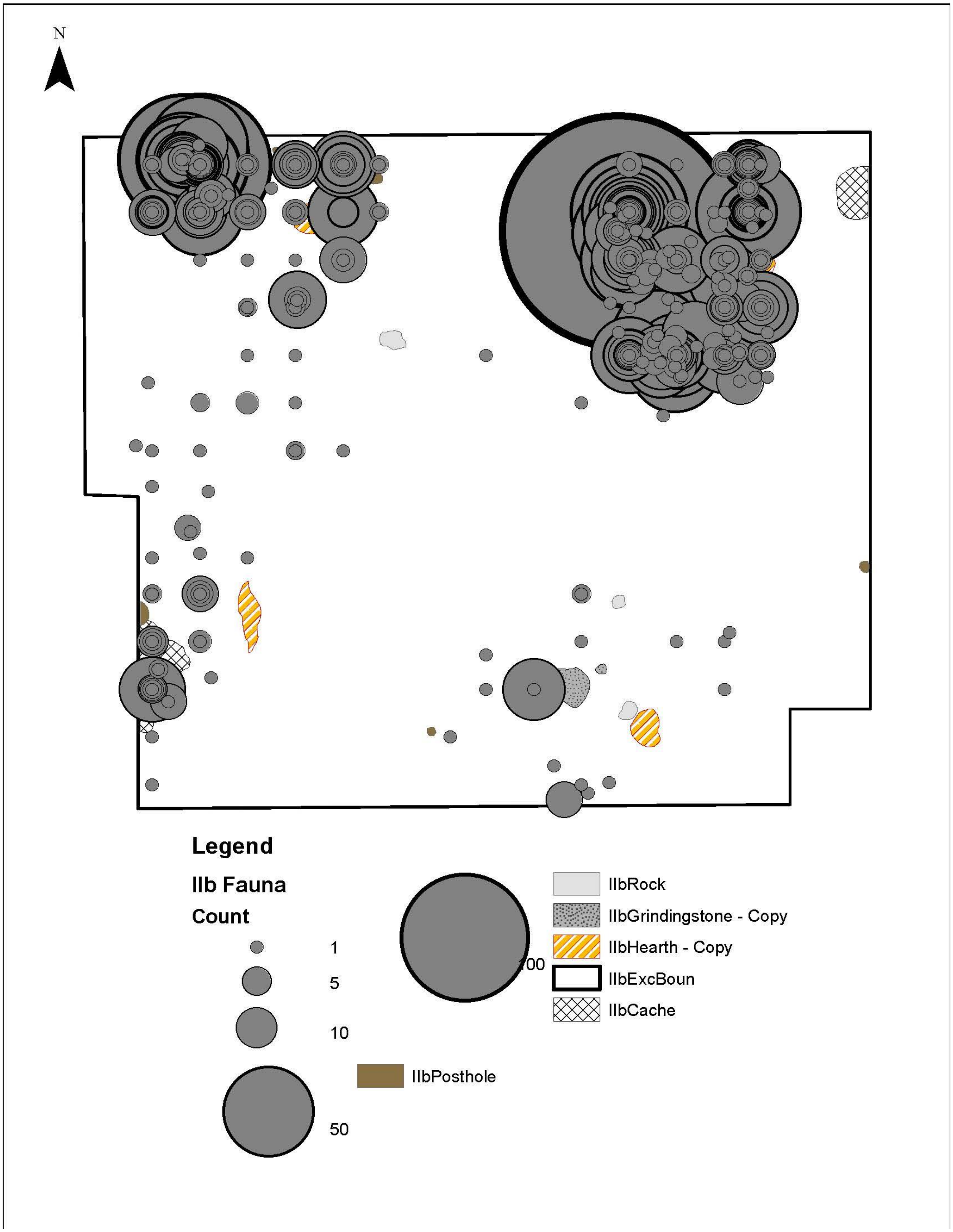

N
IIb Debitage Distribution by Raw Material Locality
IIb Deb Perc
Sum of Fields
8.5
SizeXSM
SizeSM
SizeMED
SizeLRG
Date: 4/1/2015
Kristen Dawn Barnett

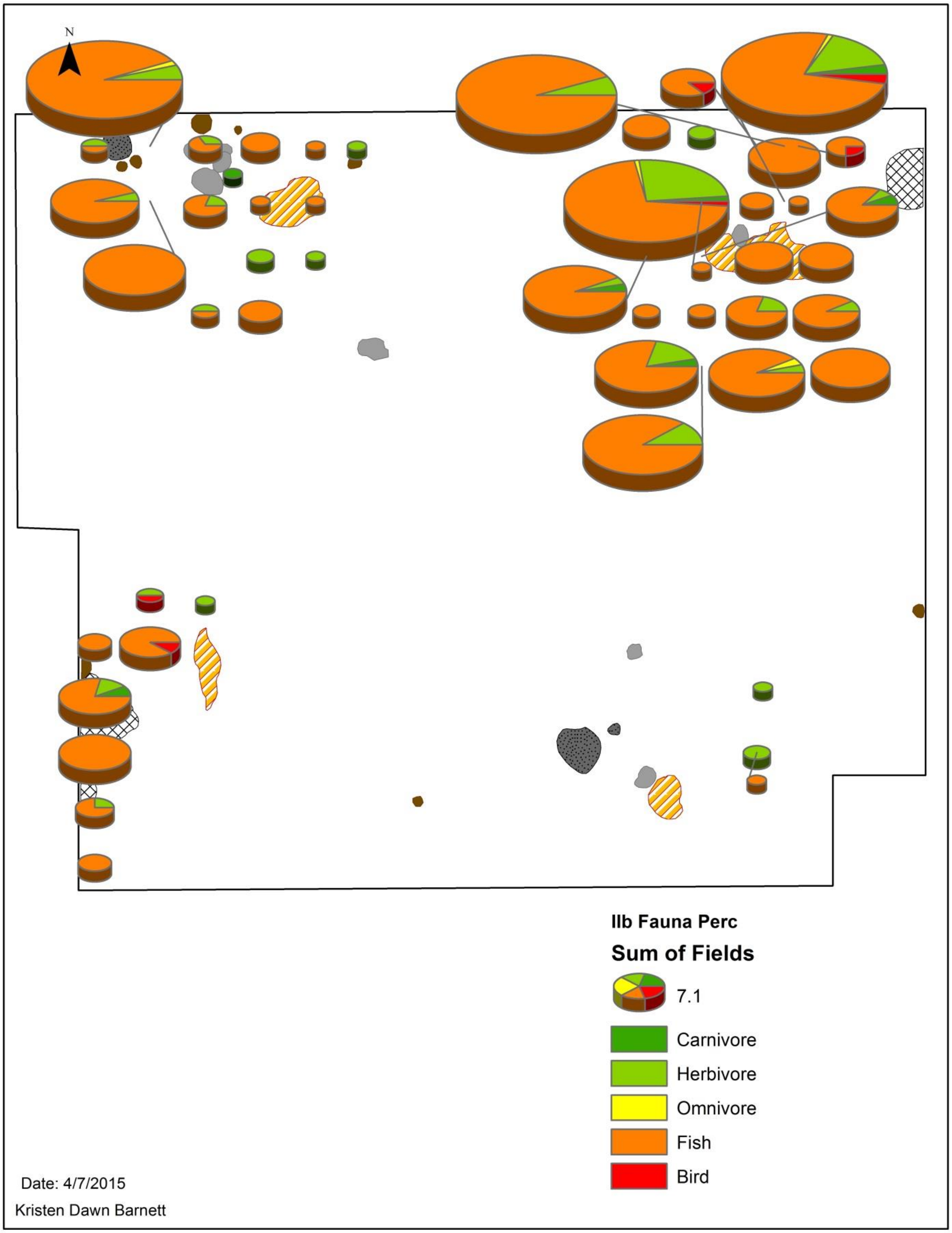

N
IIb Core distribution and count
IIbCache
Core
2
IIbExcavation Boundary
IIbGrindingstone
IIbRock
IIbPosthole
IIbHearth
Date: 3/31/2015
Kristen Dawn Barnett


N
Ilb tools perc
Knife
1
Date: 4/9/2015
Kristen Dawn Barnett

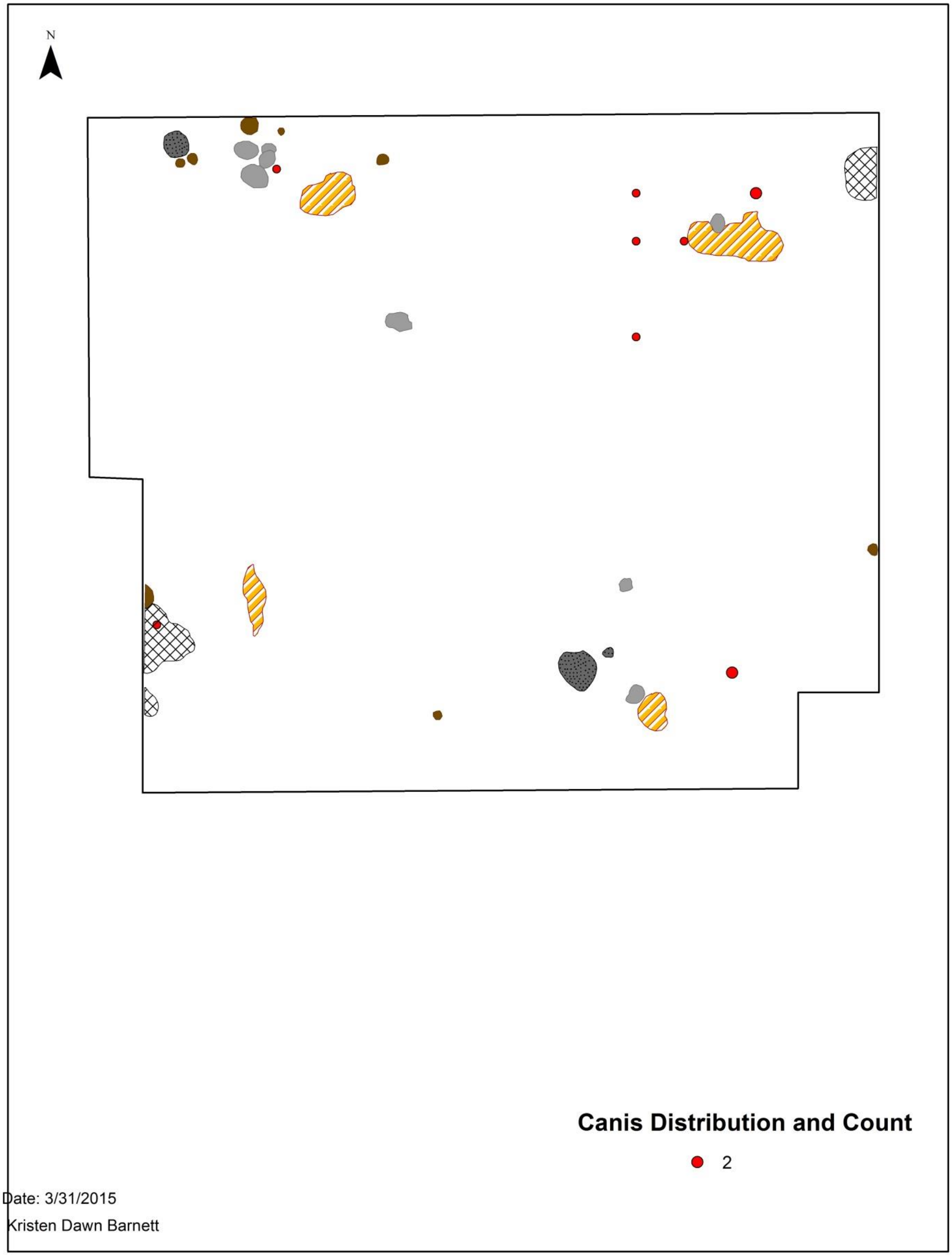

N
IIb Tool Distribution by cooking and sewing
IIb Tools Perc
Sum of Fields
7.1
Pipe
DrillPerfo
Peircers
Date: 3/31/2015
Kristen Dawn Barnett

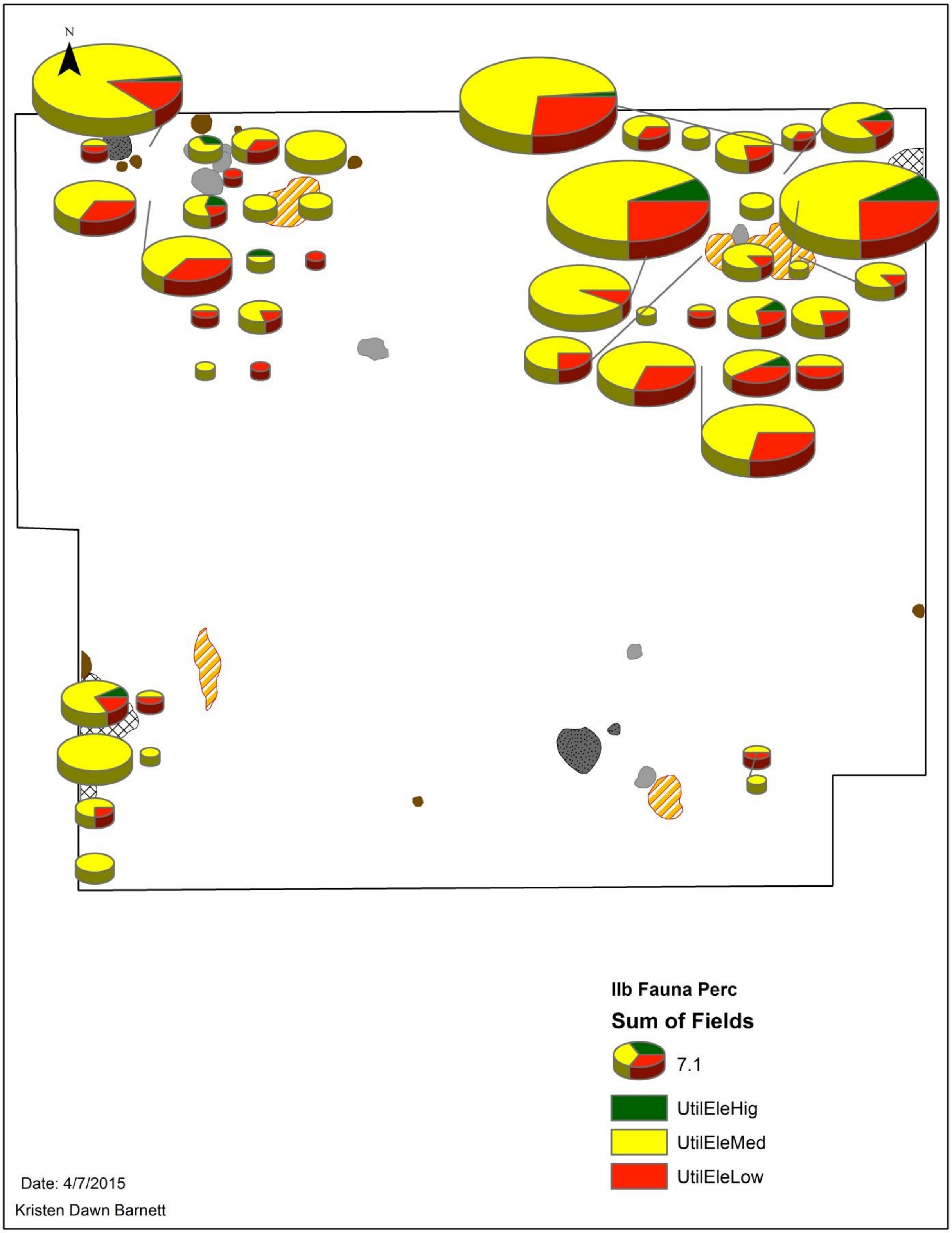

N
IIb Tool Distribution by scraper and point
IIb Tools Perc
Sum of Fields
7.1
Scraper
Points
Date: 3/31/2015
Kristen Dawn Barnett

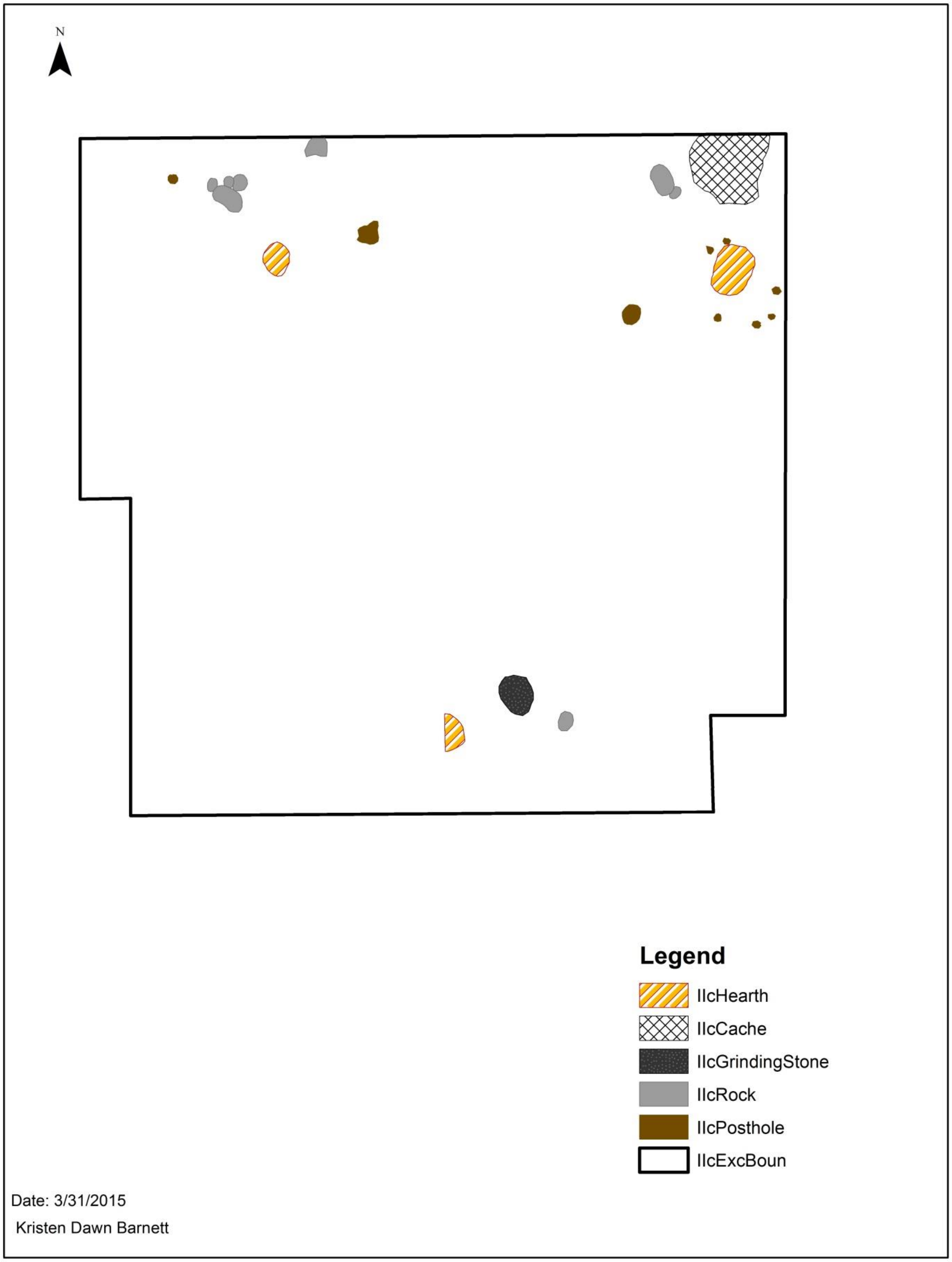

N
Legend
IIb Fauna
Count
1
5
10
50
100
IIbPosthole
IIbRock
IIbGrindingstone - Copy
IIbHearth - Copy
IIbExcBoun
IIbCache

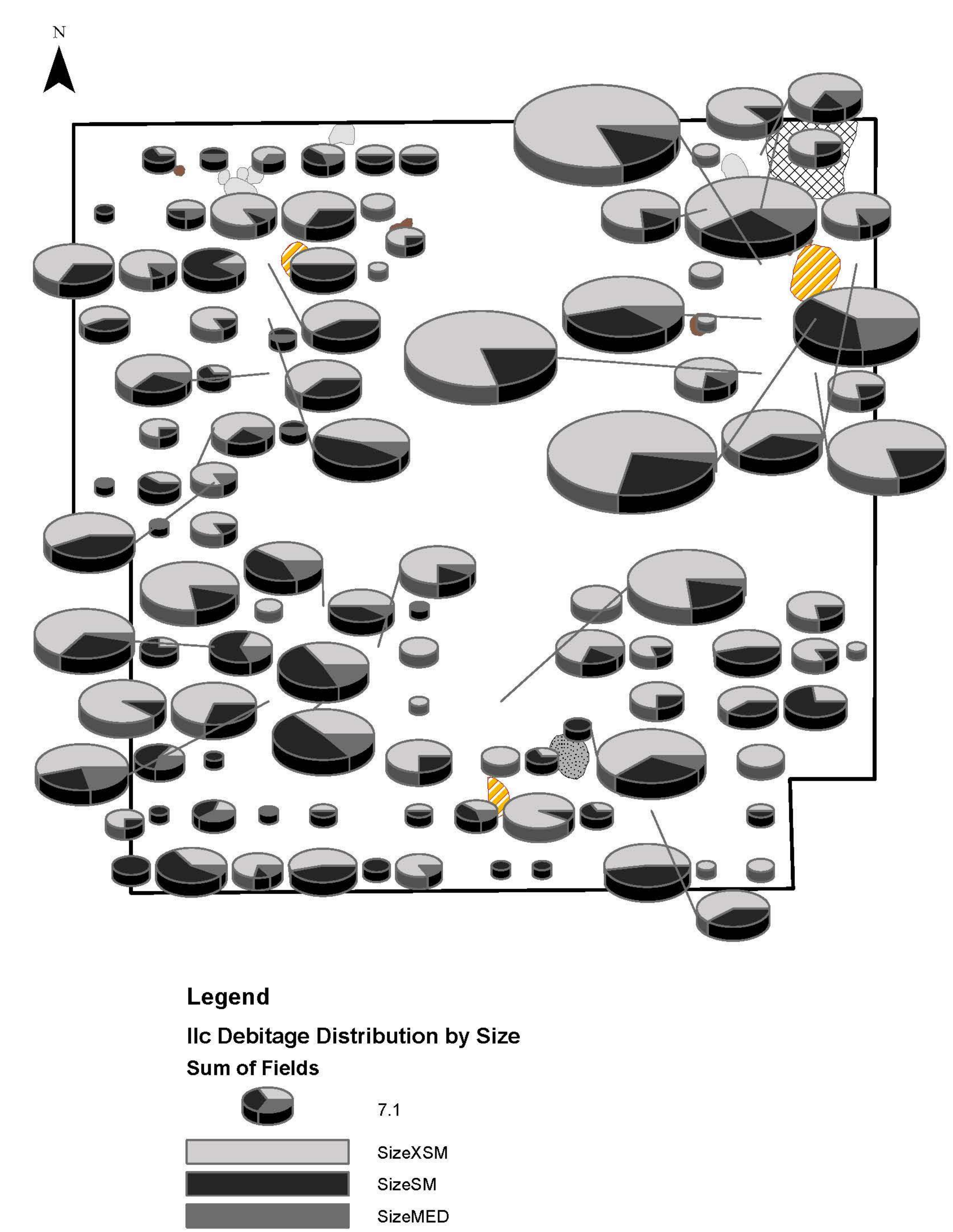


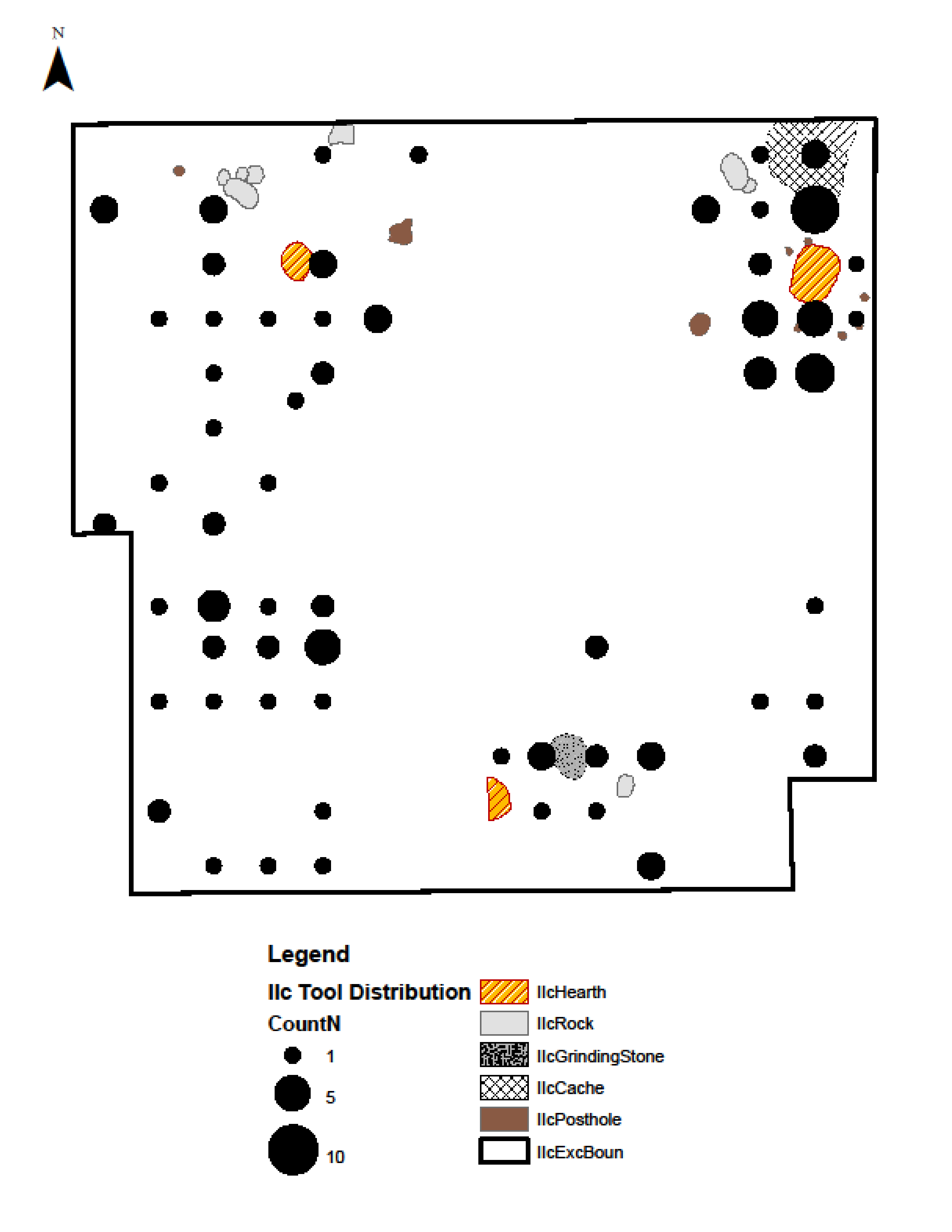
N
IIb Fauna Perc
Sum of Fields
7.1
Carnivore
Herbivore
Omnivore
Fish
Bird
Date: 4/7/2015
Kristen Dawn Barnett

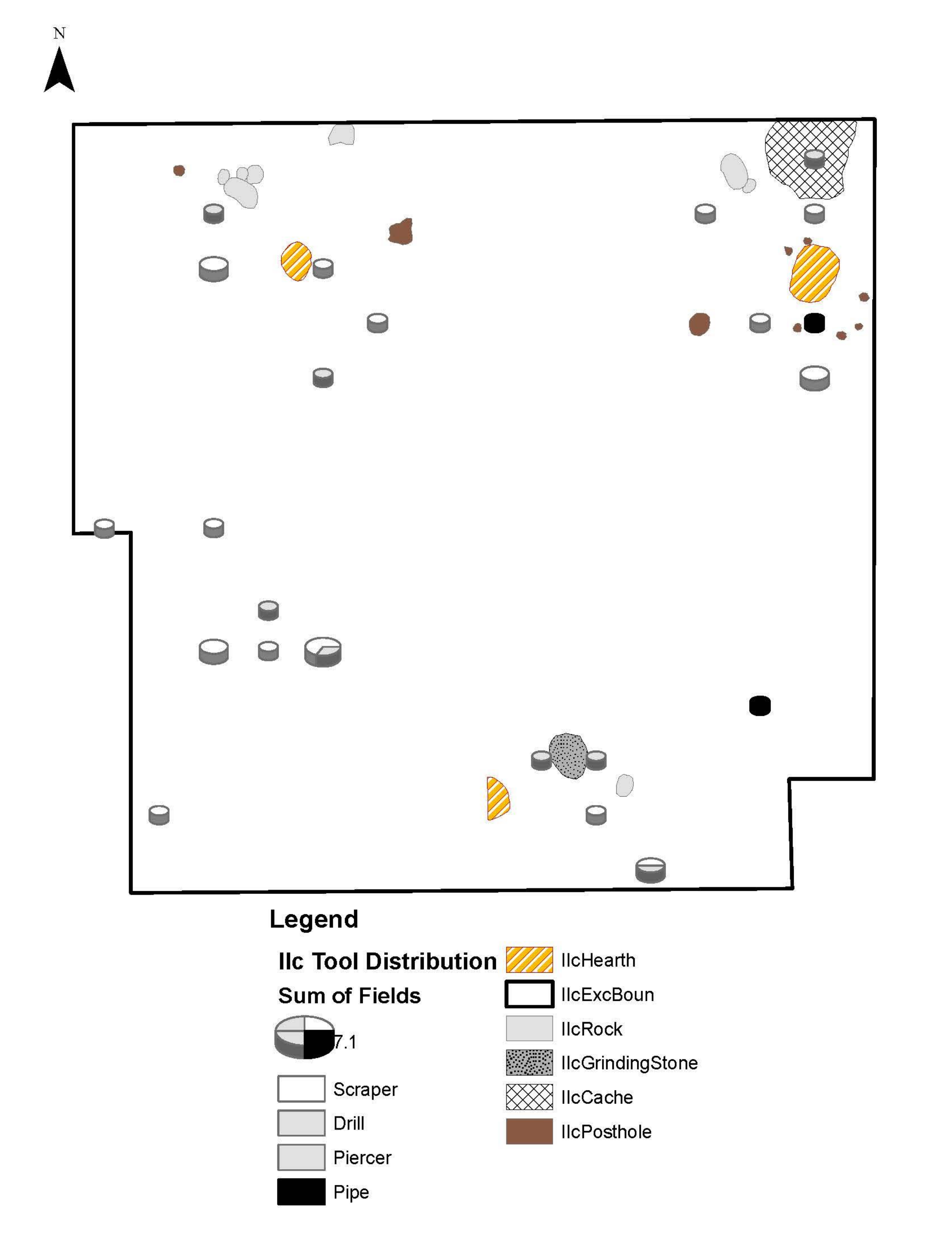

N
Canis Distribution and Count
2
Date: 3/31/2015
Kristen Dawn Barnett

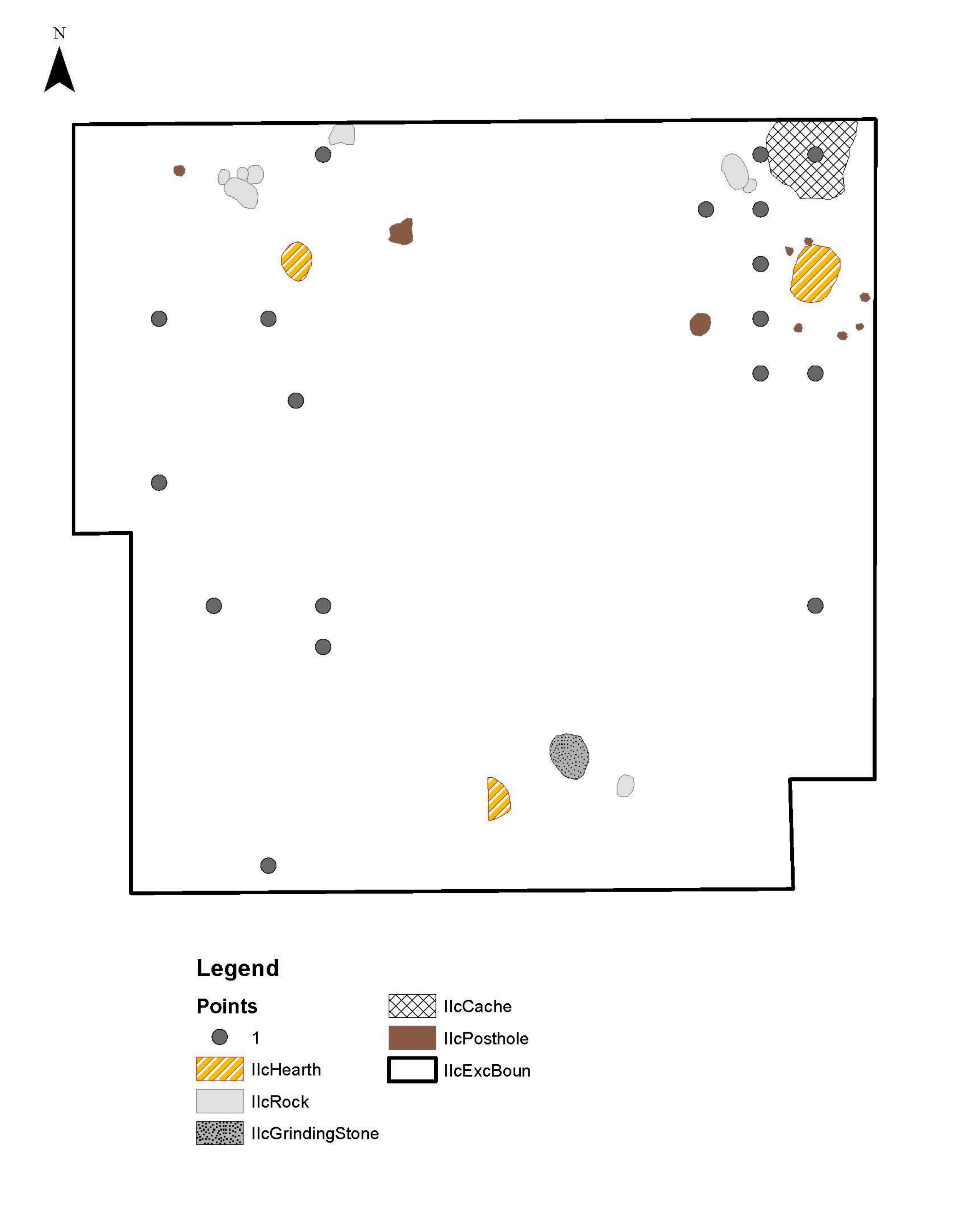

N
IIb Fauna Perc
Sum of Fields
7.1
UtilEleHig
UtilEleMed
UtilEleLow
Date: 4/7/2015
Kristen Dawn Barnett

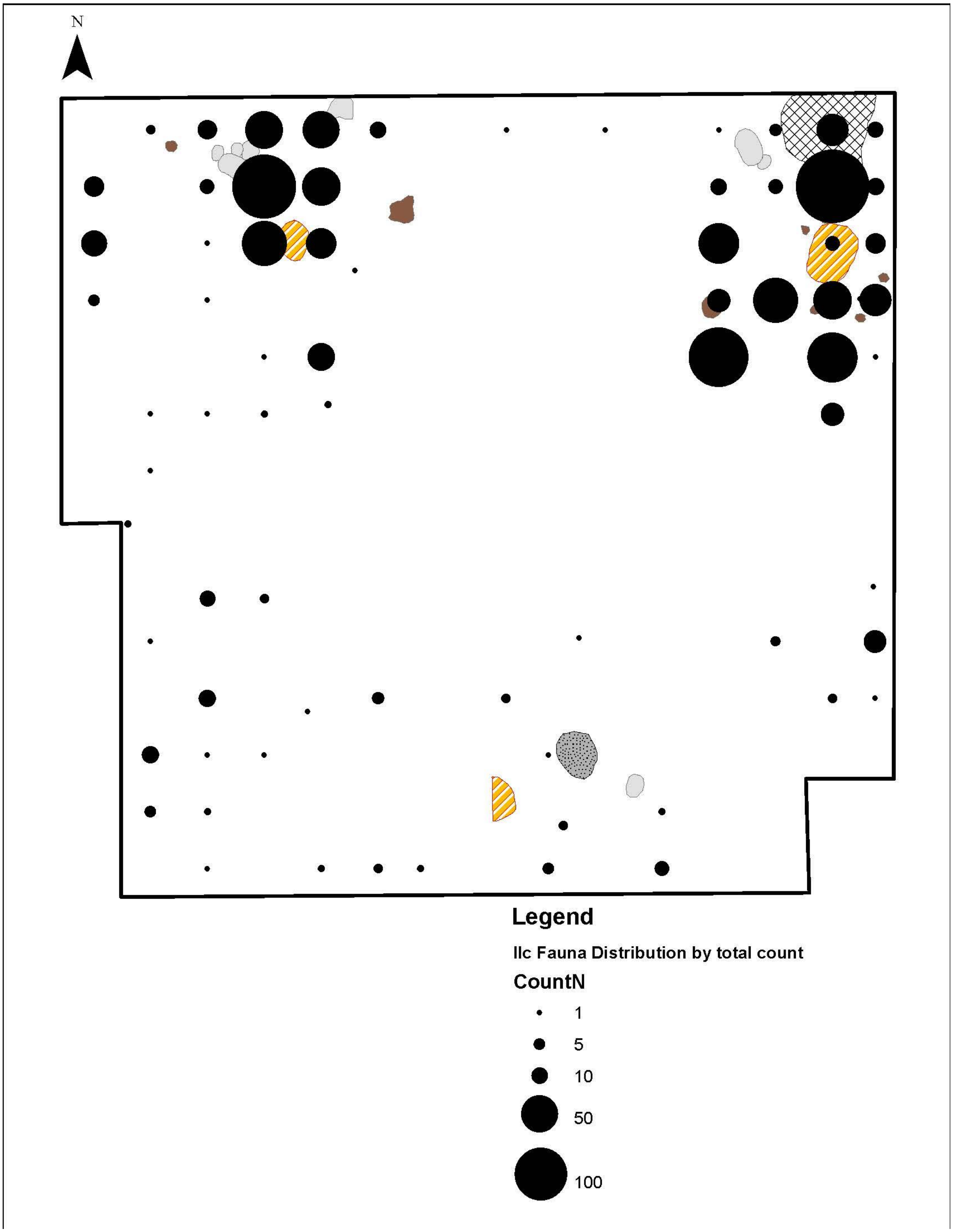

N
Legend
IIcHearth
IIcCache
IIcGrindingStone
IIcRock
IIcPosthole
IIcExcBoun
Date: 3/31/2015
Kristen Dawn Barnett

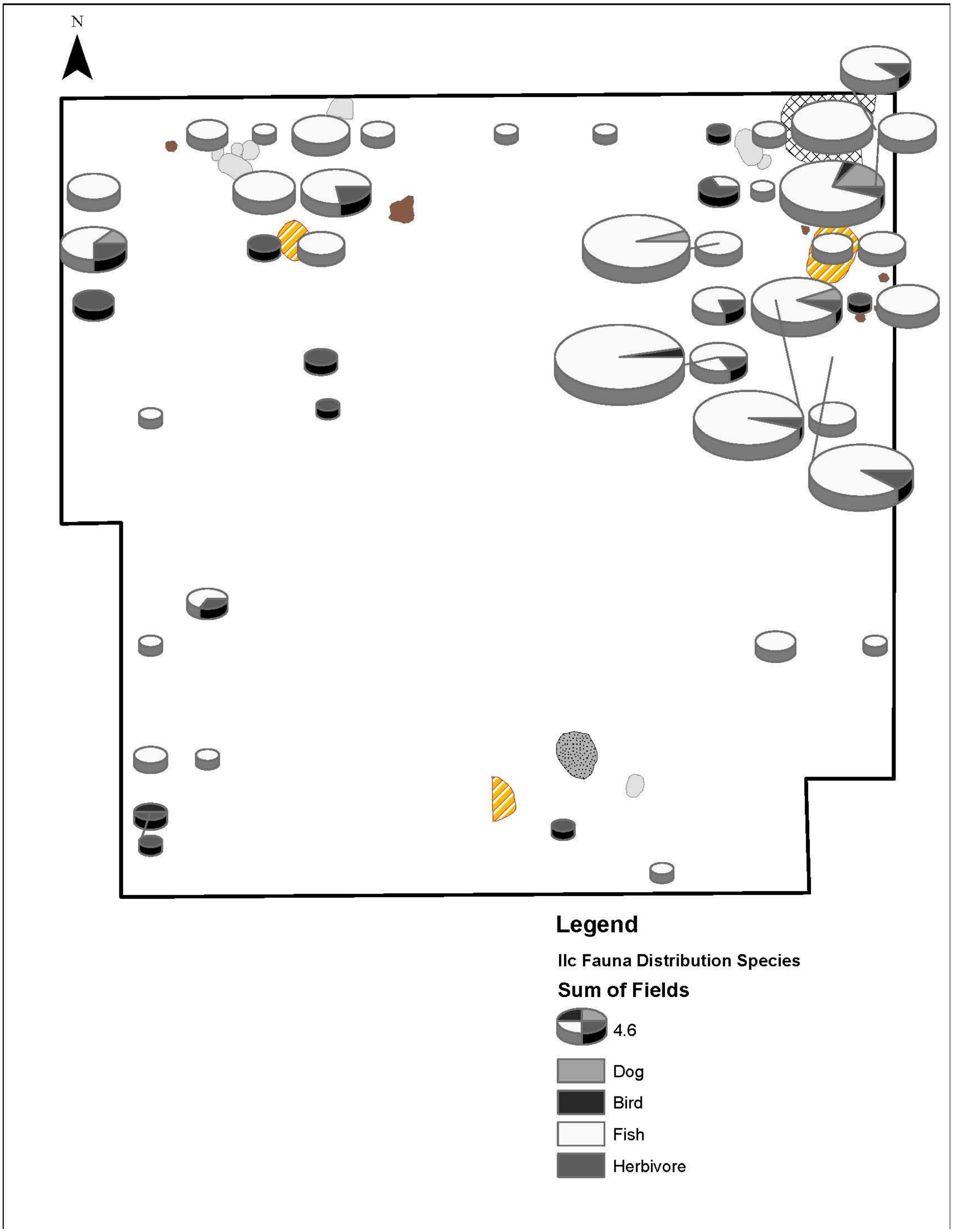

N
Legend
IIc Debitage Distribution by Size
Sum of Fields
7.1
SizeXSM
SizeSM
SizeMED

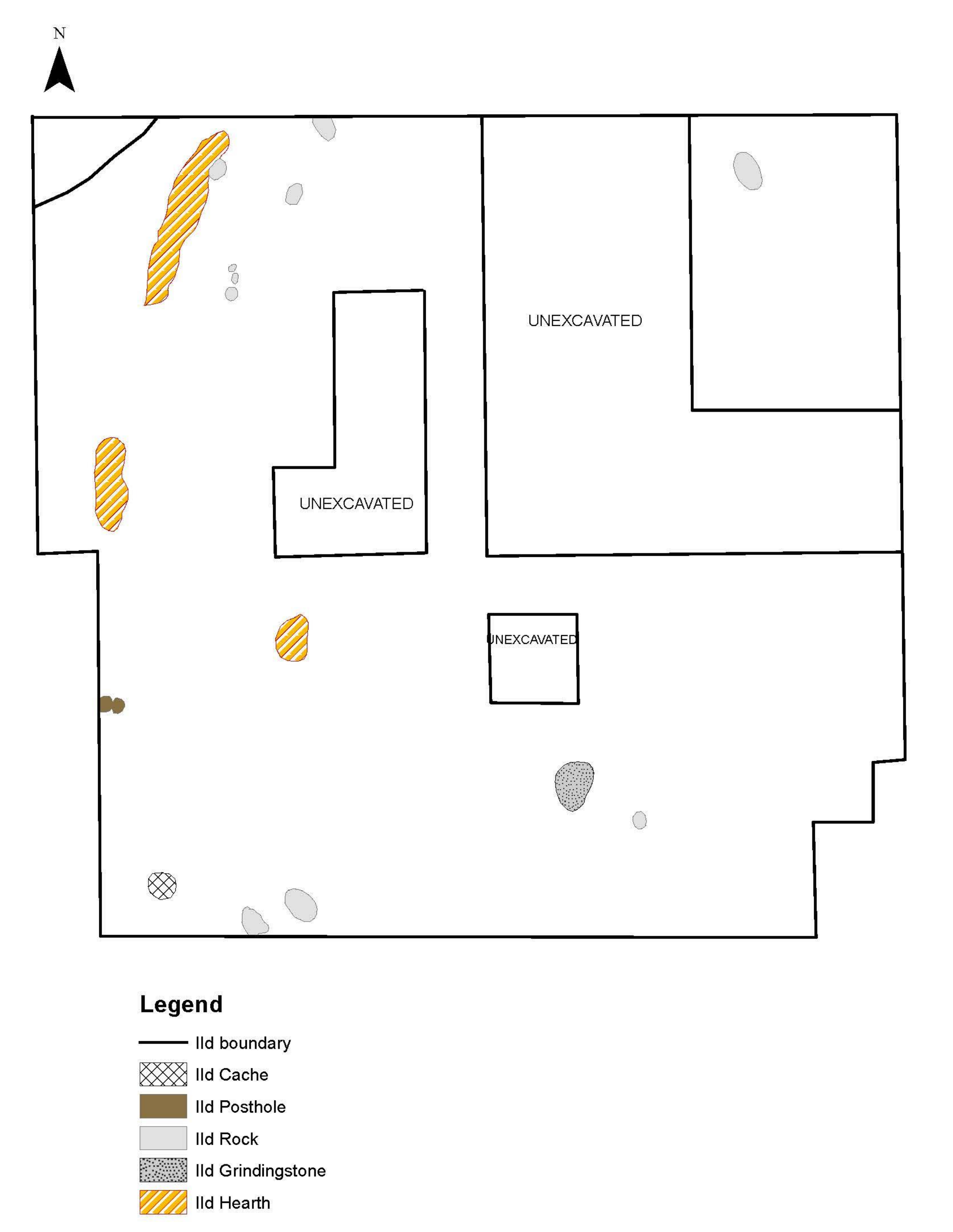

N
Legend
IIc Tool Distribution
CountN
1
5
10
IIcHearth
IIcRock
IIcGrindingStone
IIcCache
IIcPosthole
IIcExcBoun

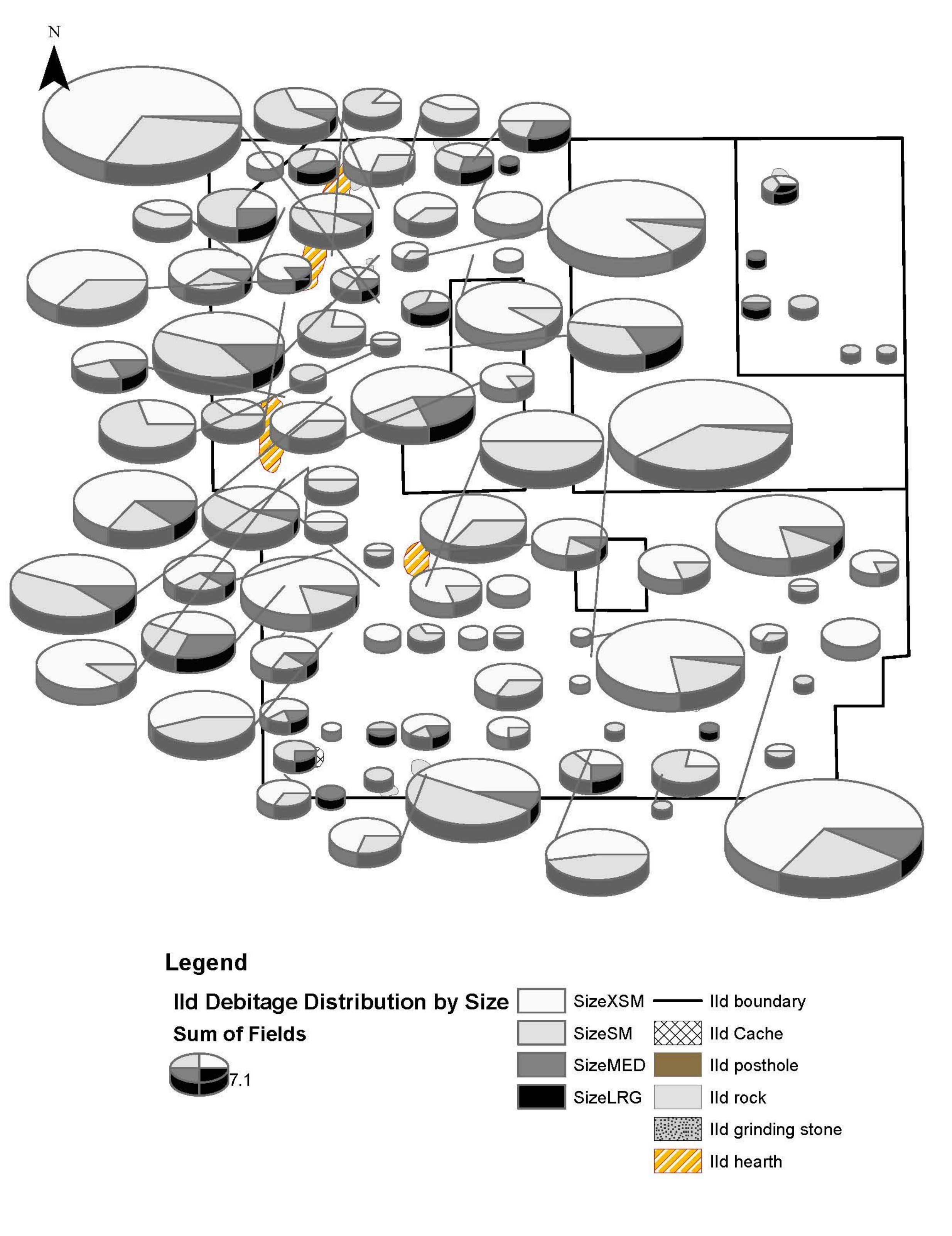

N
Legend
IIc Tool Distribution
Sum of Fields
7.1
Scraper
Drill
Piercer
Pipe
IIcHearth
IIcExcBoun
IIcRock
IIcGrindingStone
IIcCache
IIcPosthole

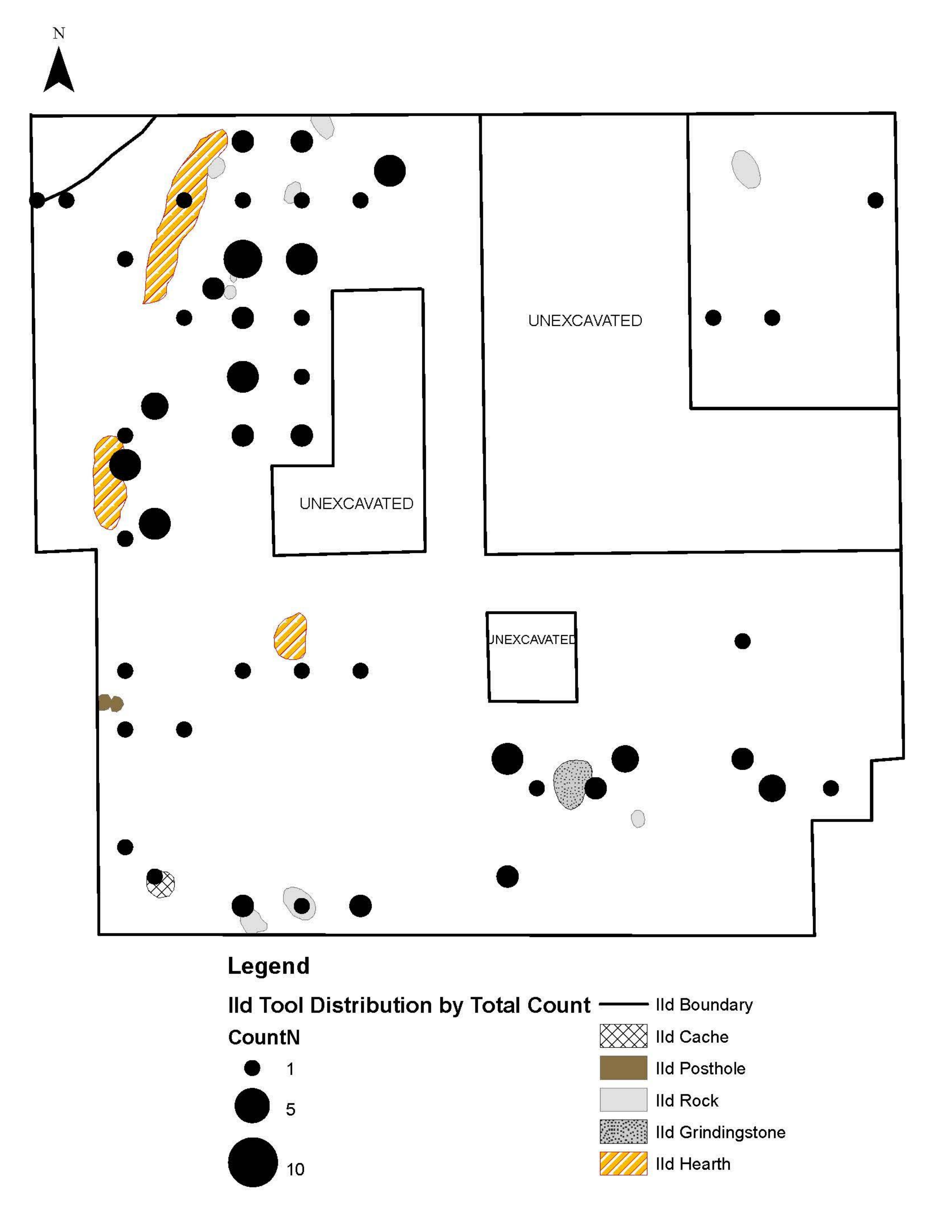

N
Legend
Points
1
IIcHearth
IIcRock
IIcGrindingStone
IIcCache
IIcPosthole
IIcExcBoun


N
Legend
IIc Fauna Distribution by total count
CountN
1
5
10
50
100

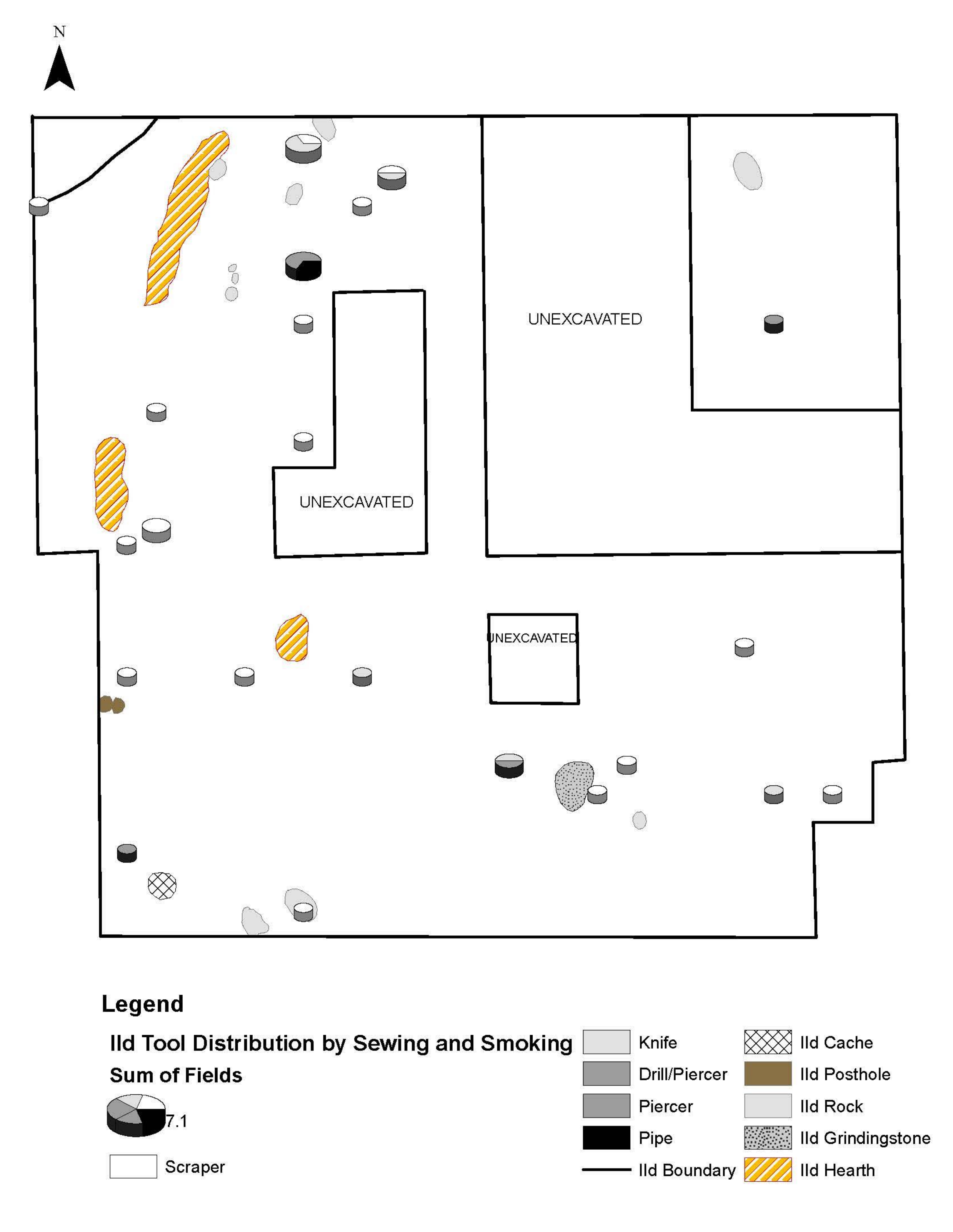

N
Legend
IIc Fauna Distribution Species
Sum of Fields
4.6
Dog
Bird
Fish
Herbivore

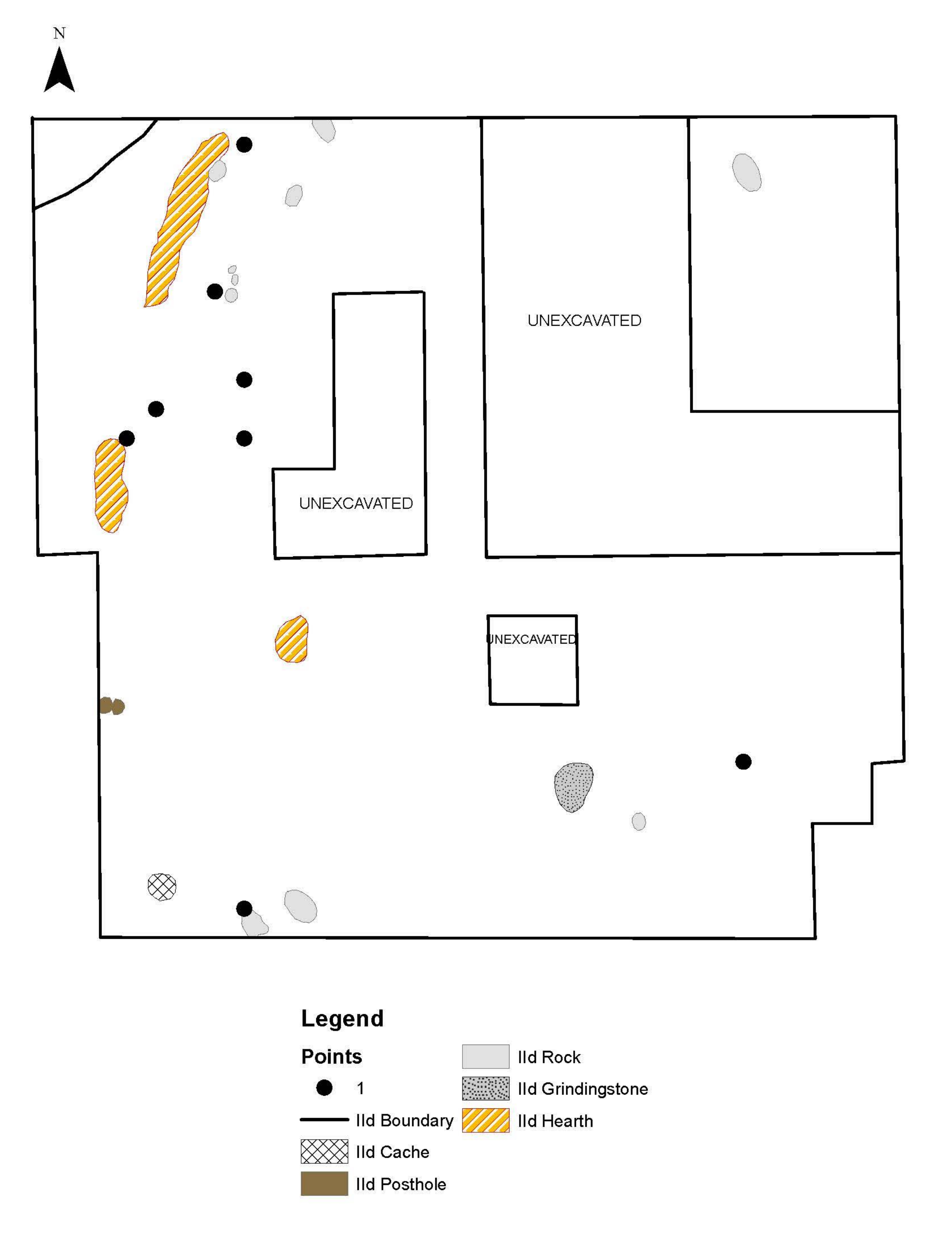

N
UNEXCAVATED
UNEXCAVATED
UNEXCAVATED
Legend
IId boundary
IId Cache
IId Posthole
IId Rock
IId Grindingstone
IId Hearth

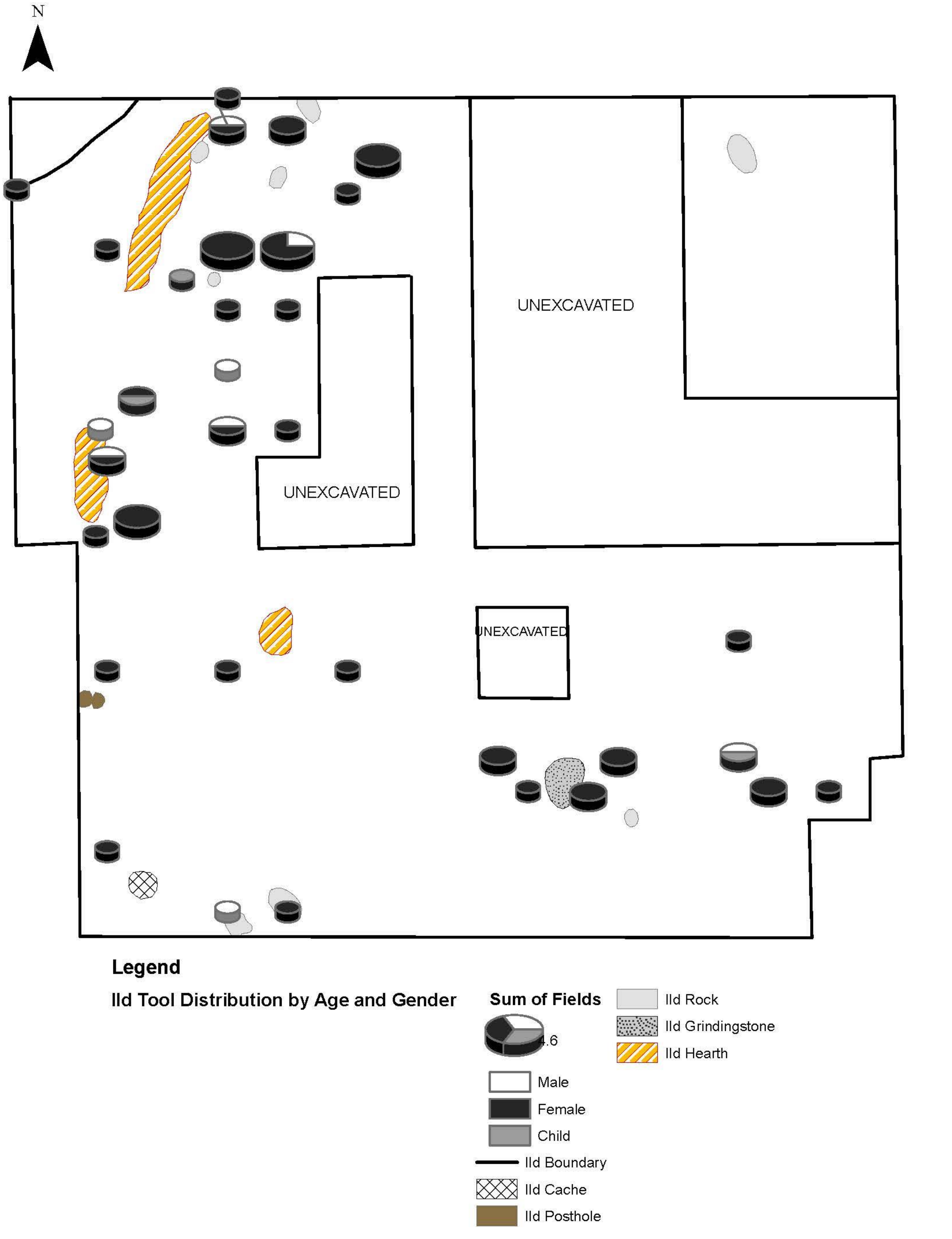

N
Legend
IId Debitage Distribution by Size
Sum of Fields
7.1
SizeXSM
SizeSM
SizeMED
SizeLRG
IId boundary
IId Cache
IId posthole
IId rock
IId grinding stone
IId hearth

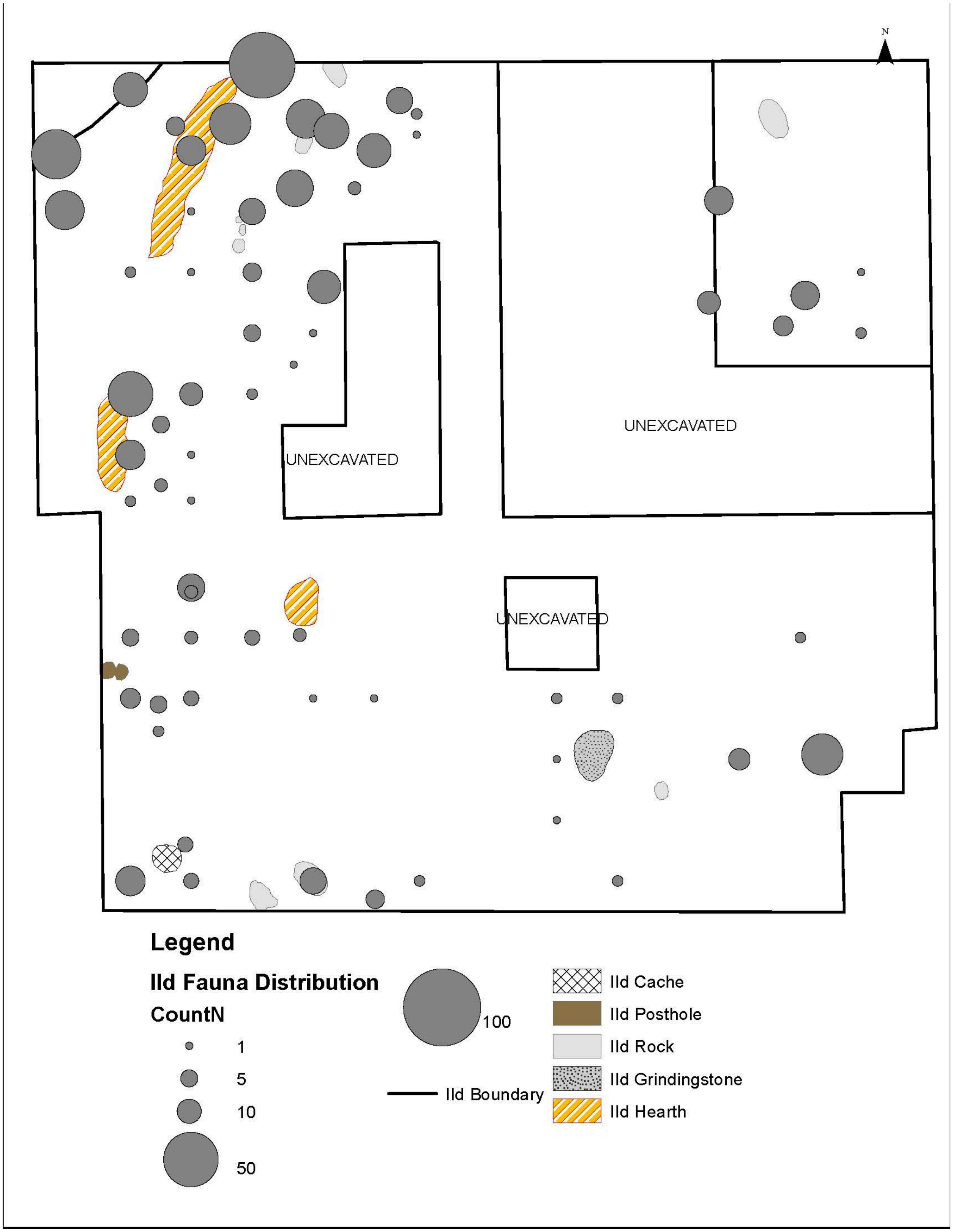


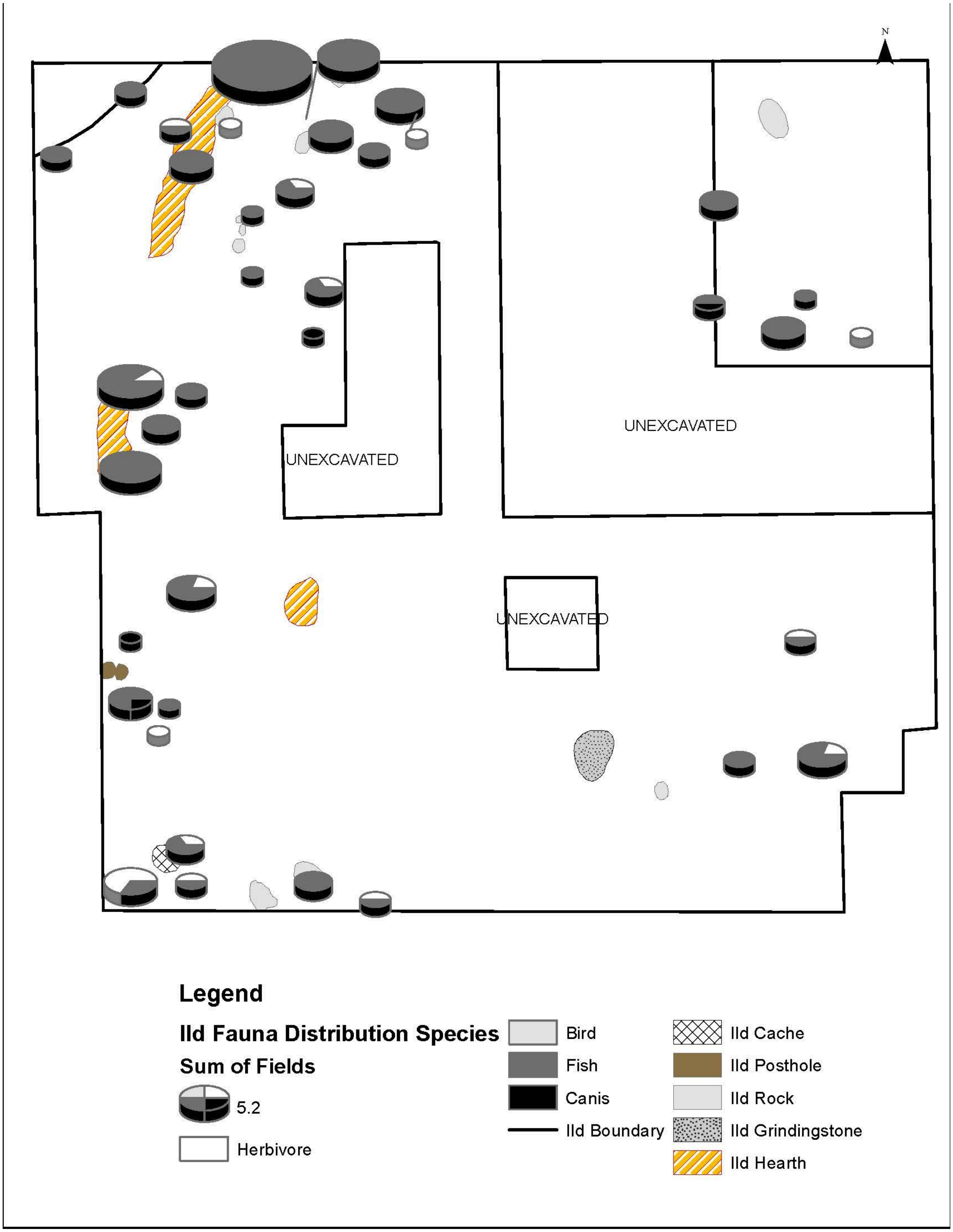
N
UNEXCAVATED
UNEXCAVATED
UNEXCAVATED
Legend
IId Tool Distribution by Total Count
CountN
1
5
10
IId Boundary
IId Cache
IId Posthole
IId Rock
IId Grindingstone
IId Hearth

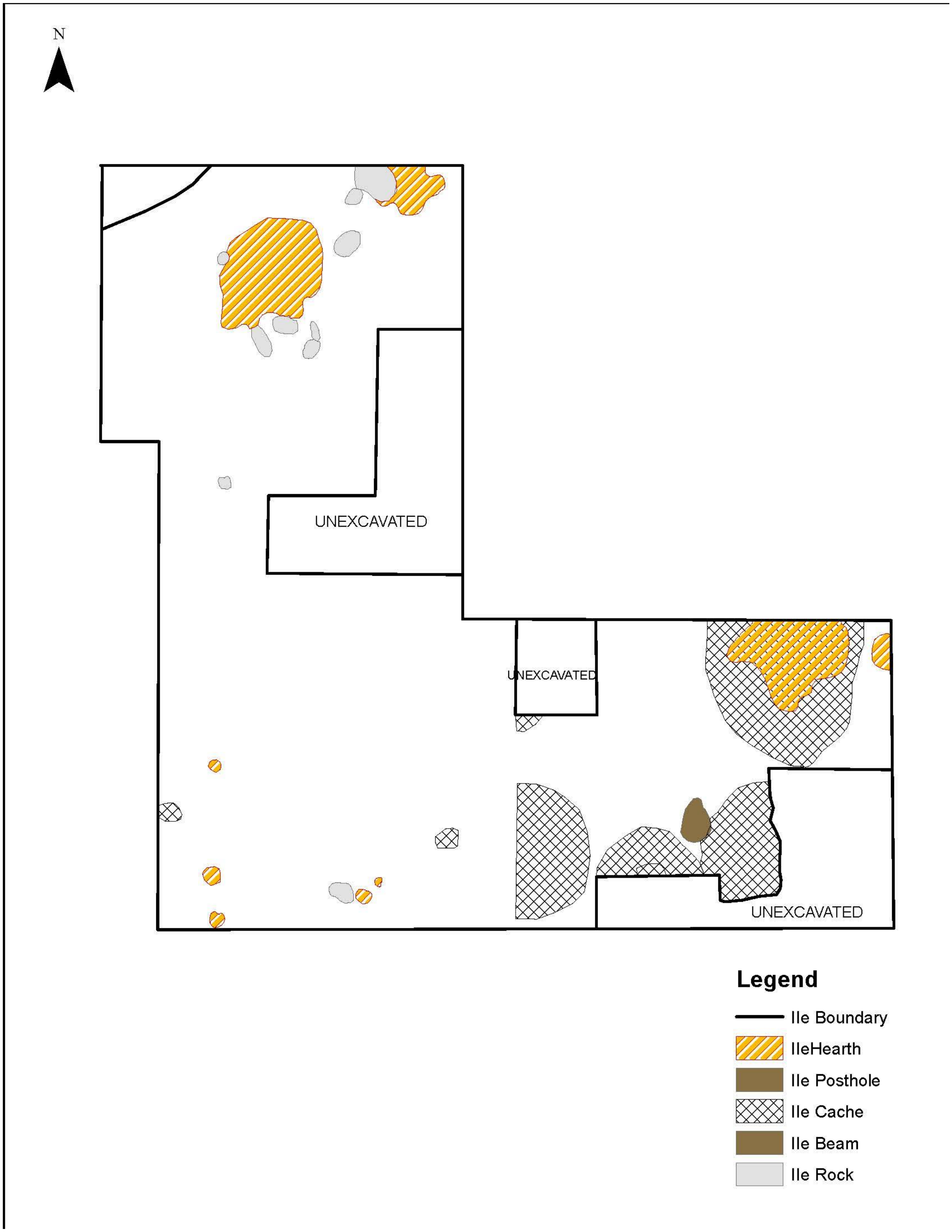

N
UNEXCAVATED
UNEXCAVATED
UNEXCAVATED
Legend
IId Tool Distribution by Sewing and Smoking
Sum of Fields
7.1
Scraper
Knife
Drill/Piercer
Piercer
Pipe
IId Boundary
IId Cache
IId Posthole
IId Rock
IId Grindingstone
IId Hearth


N
UNEXCAVATED
UNEXCAVATED
UNEXCAVATED
Legend
Points
1
IId Boundary
IId Cache
IId Posthole
IId Rock
IId Grindingstone
IId Hearth

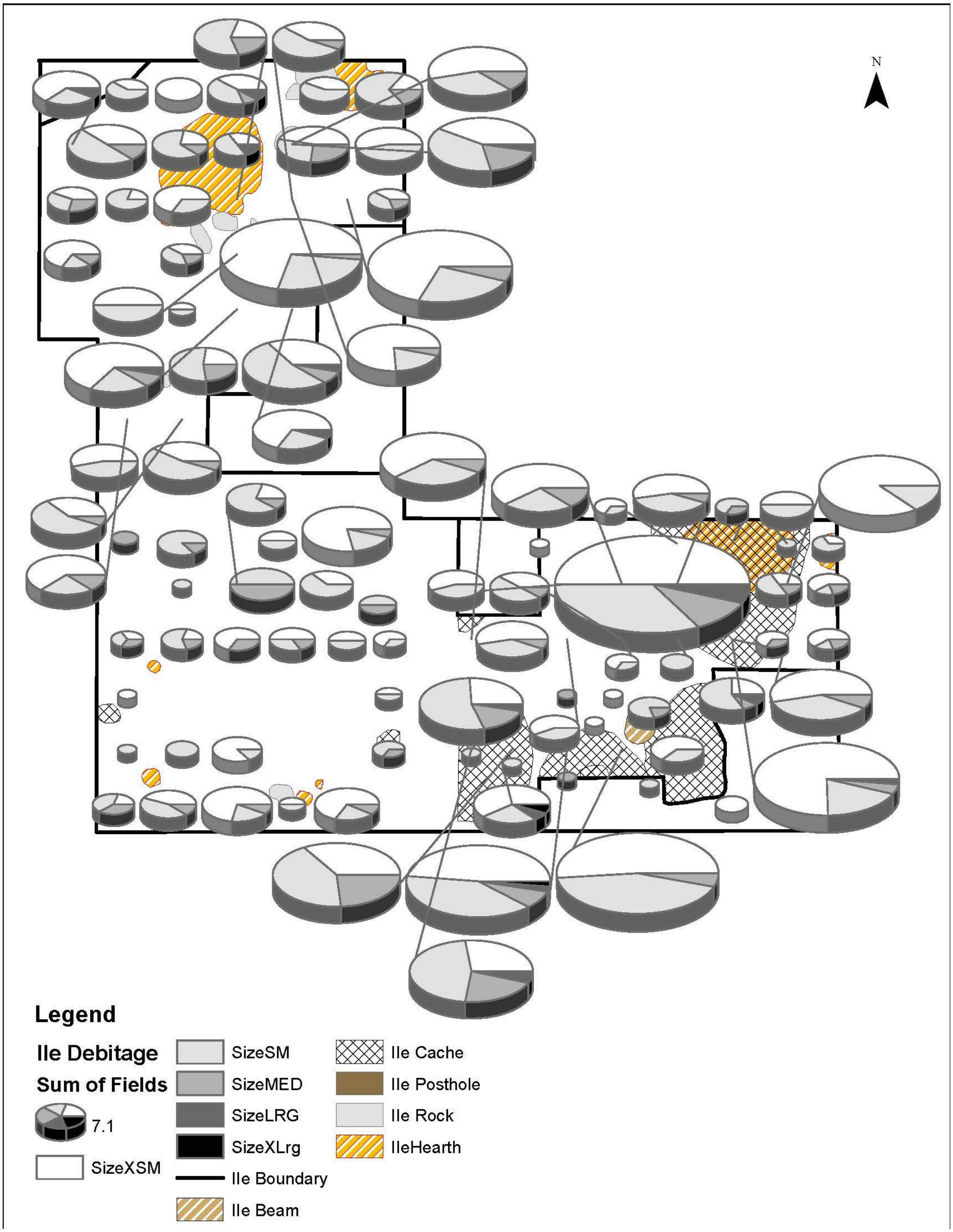

N
UNEXCAVATED
UNEXCAVATED
UNEXCAVATED
Legend
IId Tool Distribution by Age and Gender
Sum of Fields
4.6
Male
Female
Child
IId Boundary
IId Cache
IId Posthole
IId Rock
IId Grindingstone
IId Hearth

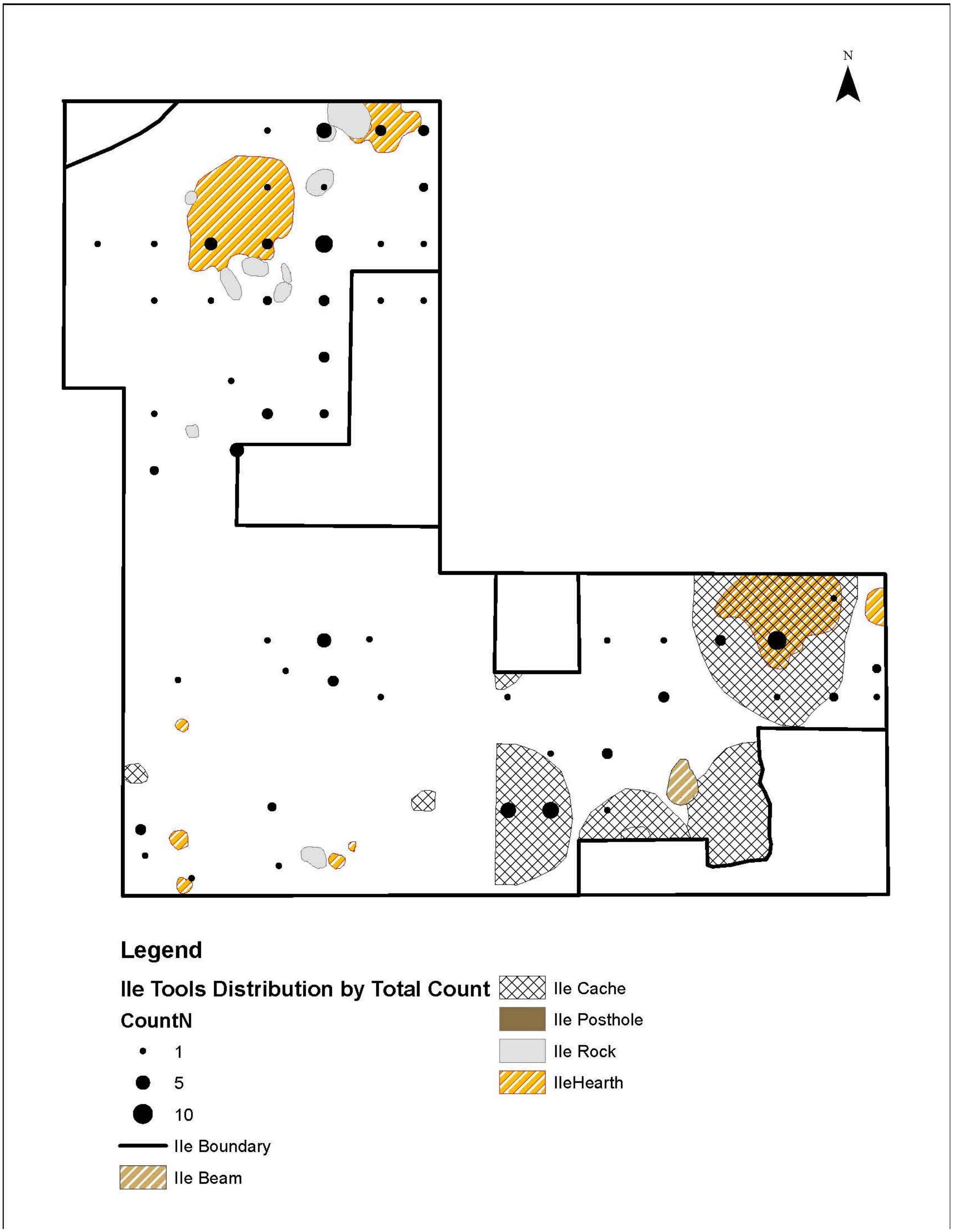

N
UNEXCAVATED
UNEXCAVATED
UNEXCAVATED
Legend
IId Fauna Distribution
CountN
1
5
10
50
100
IId Boundary
IId Cache
IId Posthole
IId Rock
IId Grindingstone
IId Hearth

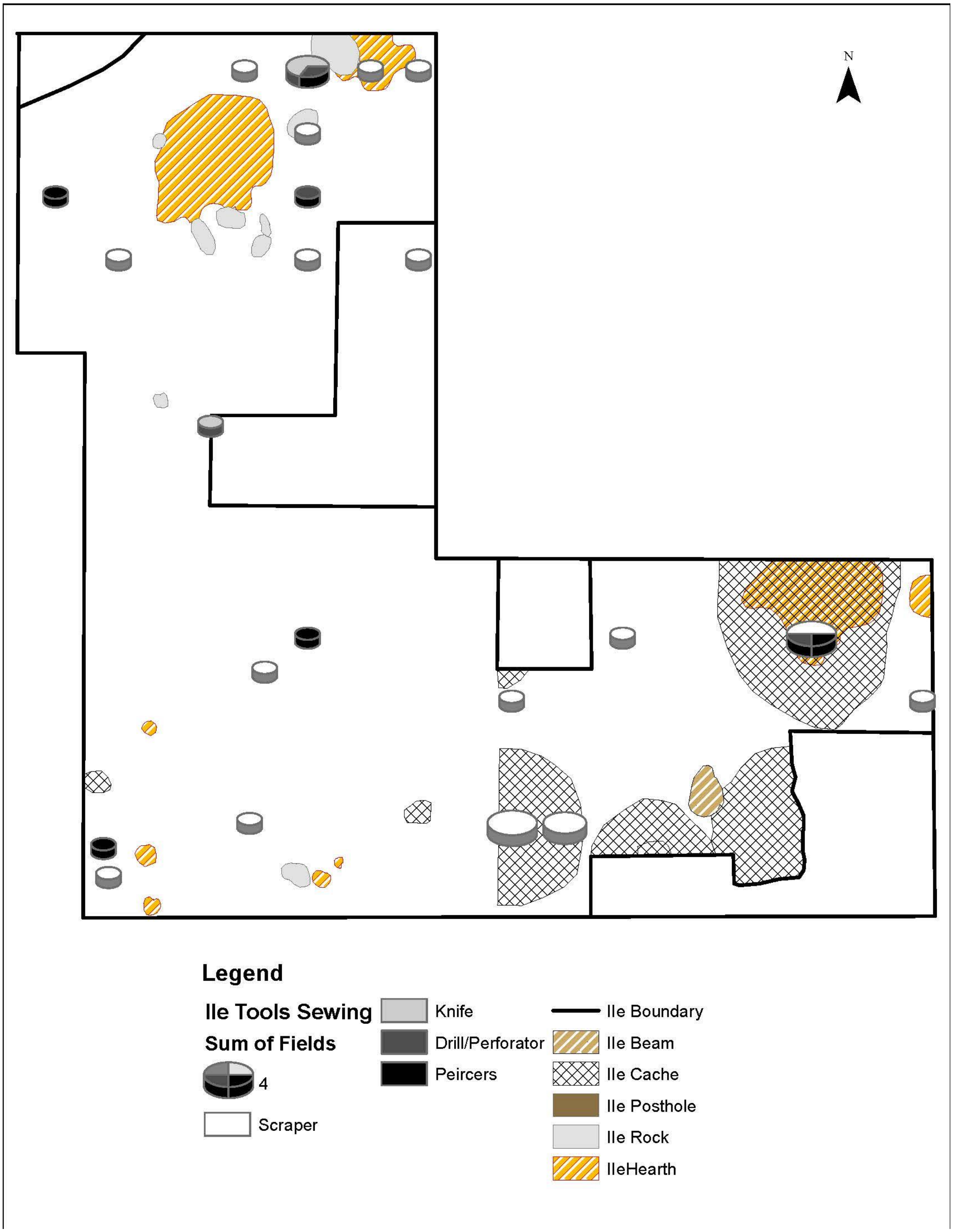

N
UNEXCAVATED
UNEXCAVATED
UNEXCAVATED
Legend
IId Fauna Distribution Species
Sum of Fields
5.2
Herbivore
Bird
Fish
Canis
IId Boundary
IId Cache
IId Posthole
IId Rock
IId Grindingstone
IId Hearth

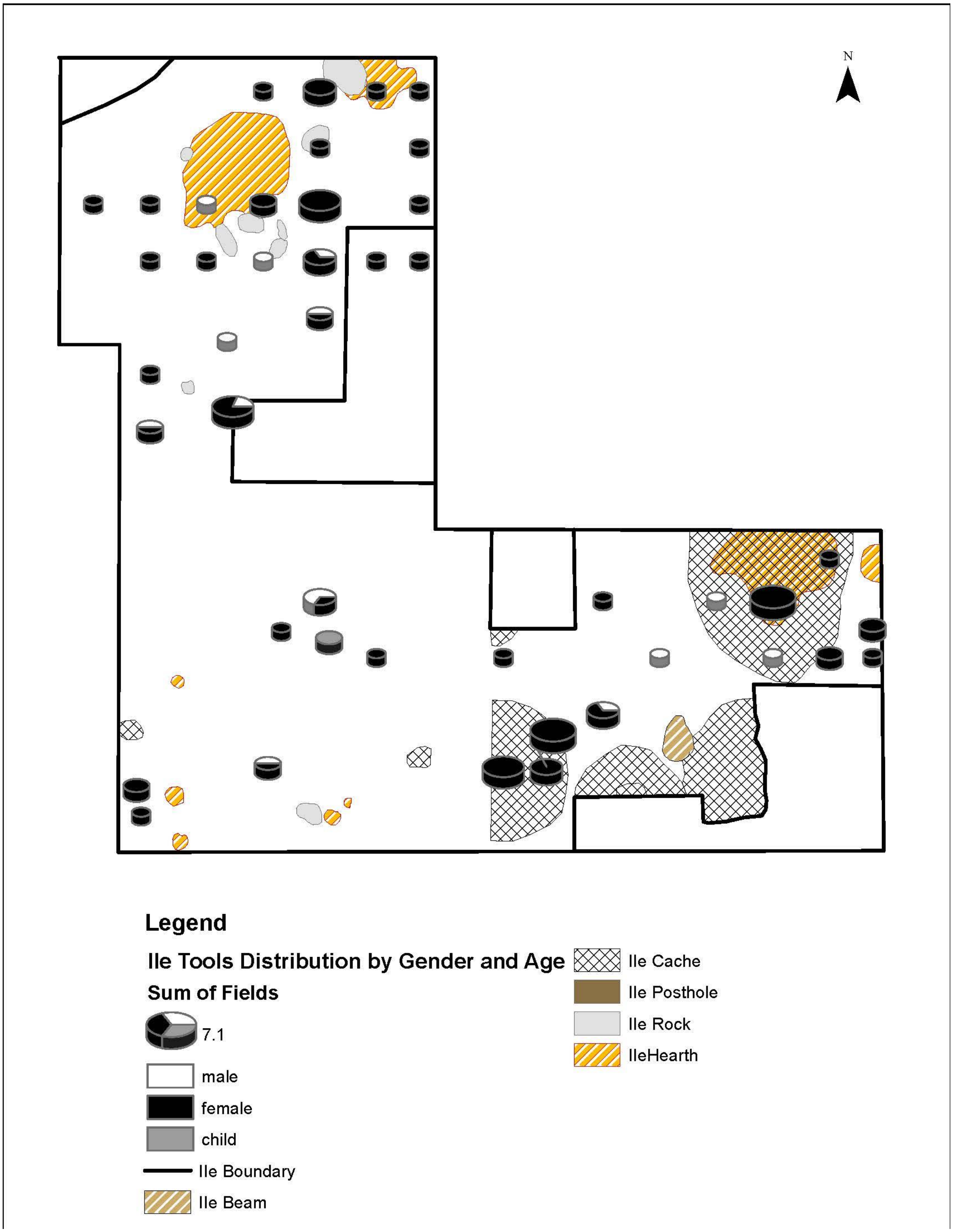

N
UNEXCAVATED
UNEXCAVATED
UNEXCAVATED
Legend
Ile Boundary
IleHearth
Ile Posthole
Ile Cache
Ile Beam
Ile Rock

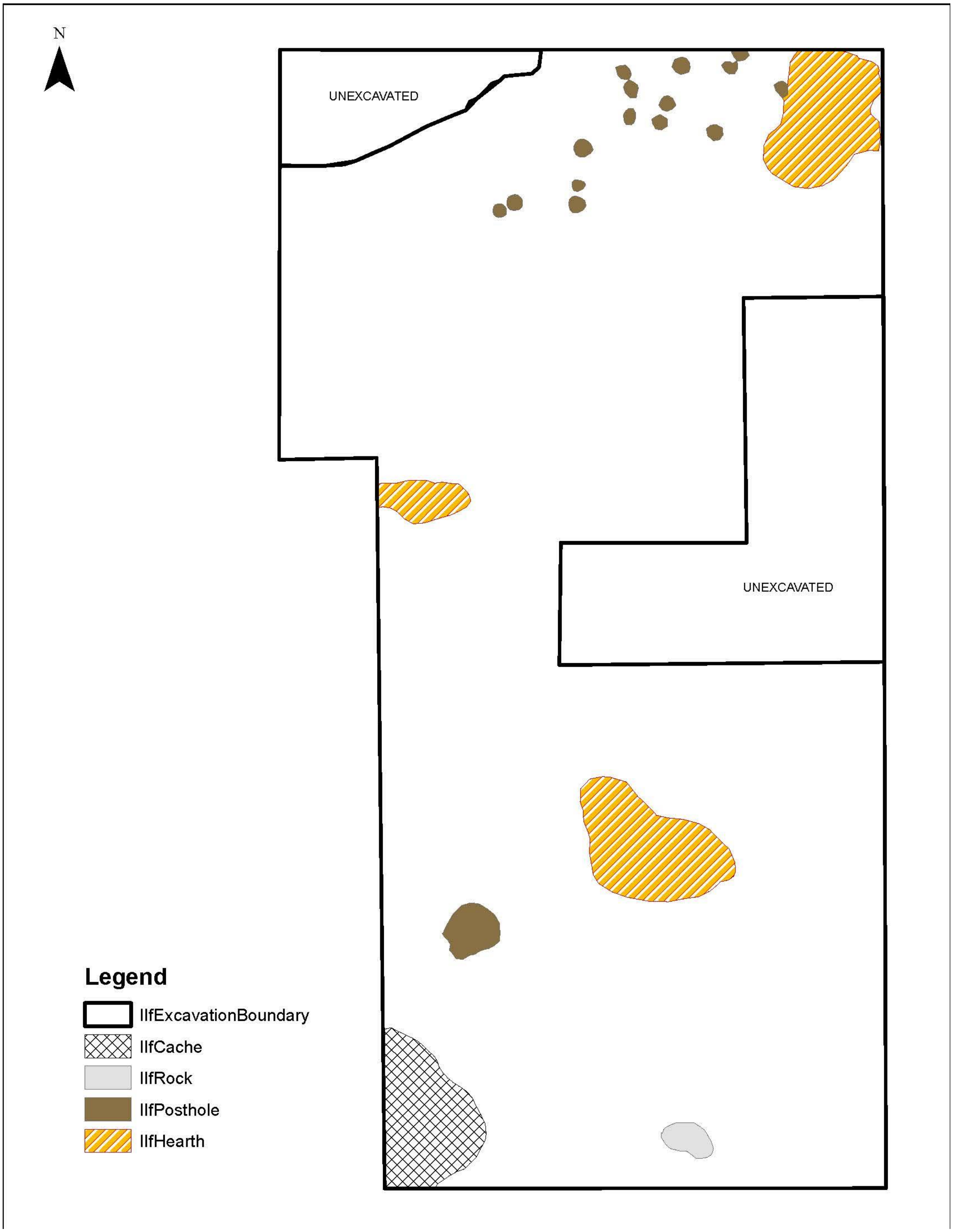

N
Legend
IIe Debitage
CountN
1
5
10
50
100
IIe Boundary
IIe Beam
IIe Cache
IIe Posthole
IIe Rock
IIeHearth

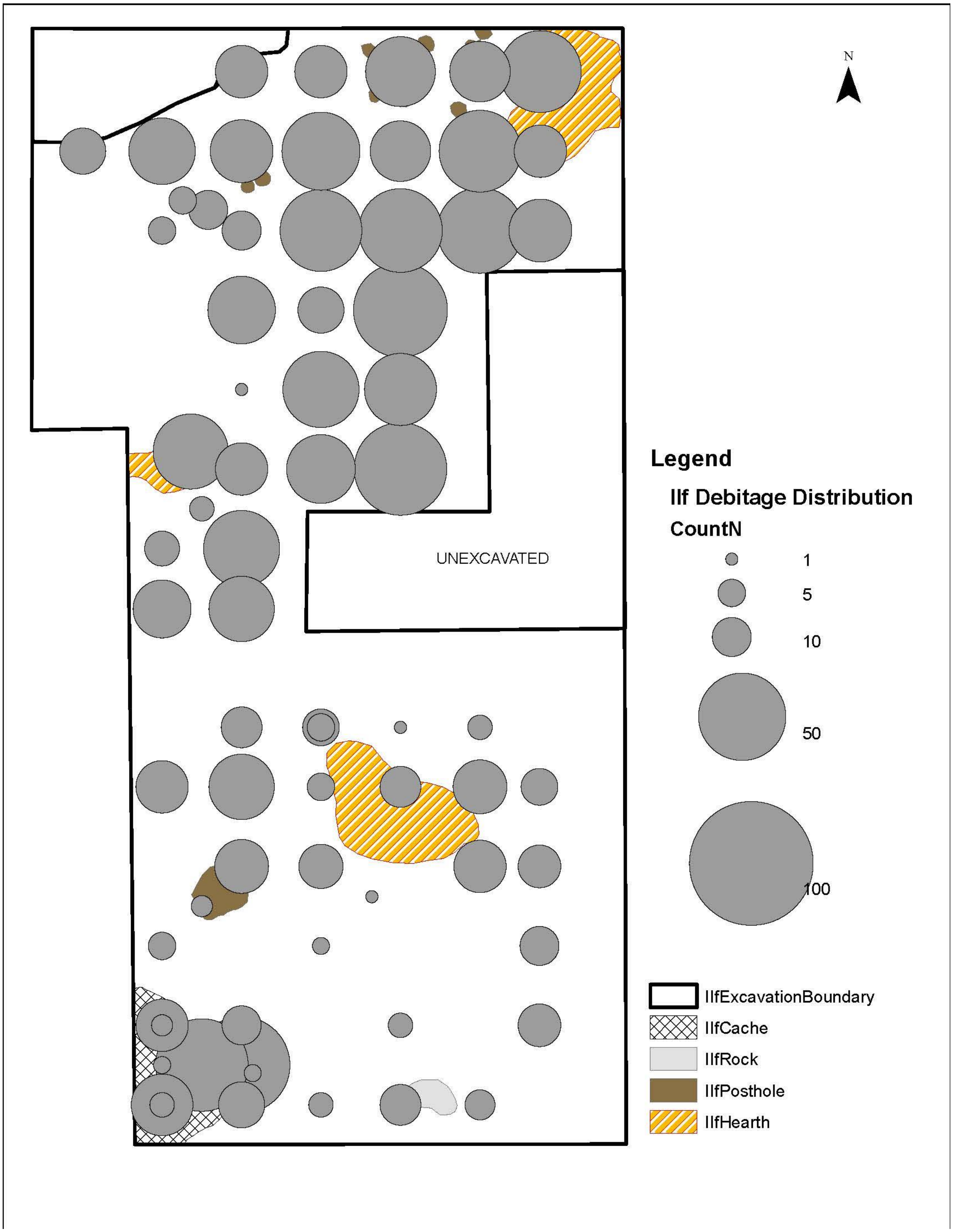

N
Legend
IIe Debitage
Sum of Fields
7.1
SizeXSM
SizeSM
SizeMED
SizeLRG
SizeXLrg
IIe Boundary
IIe Beam
IIe Cache
IIe Posthole
IIe Rock
IIeHearth

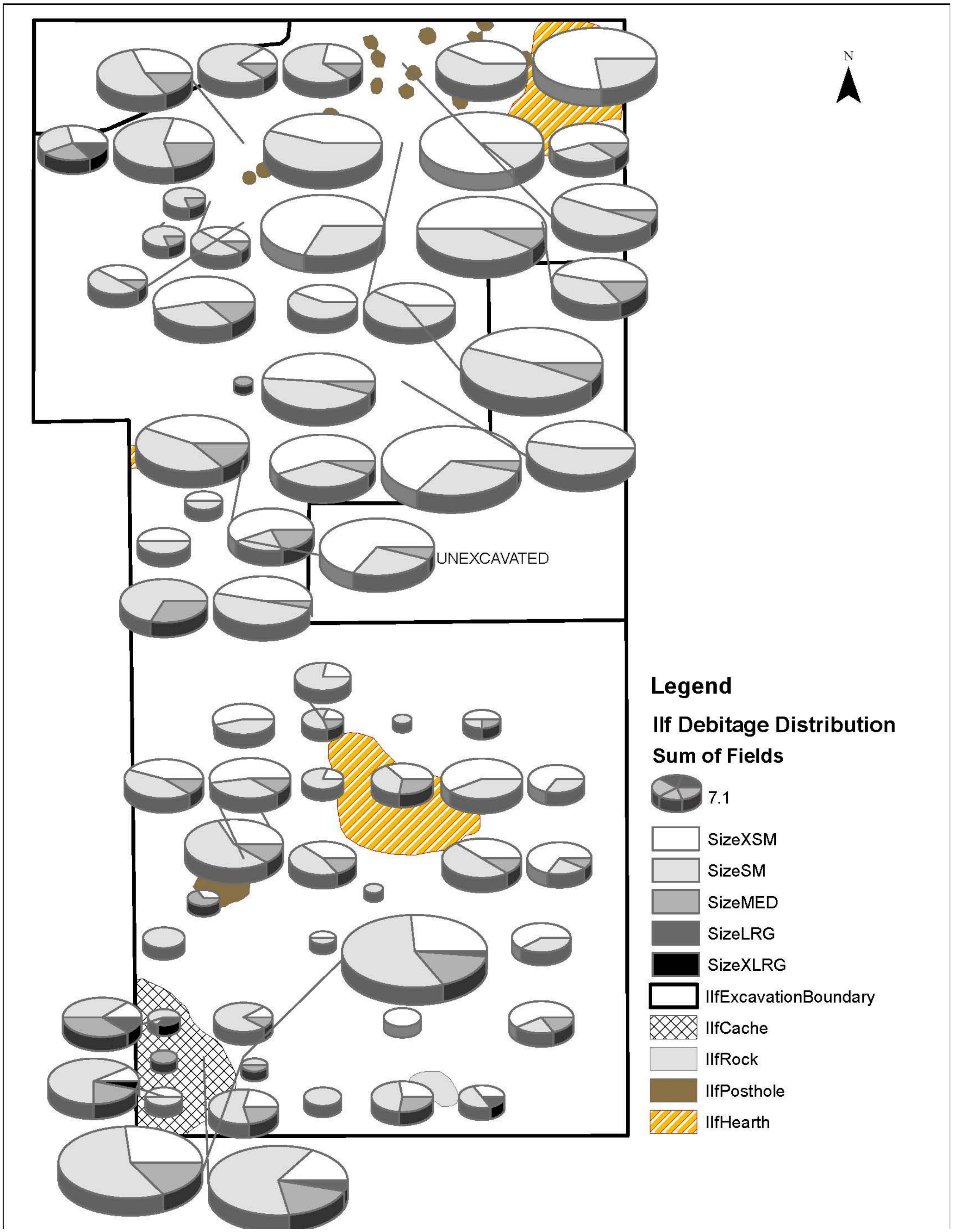

N
Legend
IIe Tools Distribution by Total Count
CountN
1
5
10
IIe Boundary
IIe Beam
IIe Cache
IIe Posthole
IIe Rock
IIeHearth

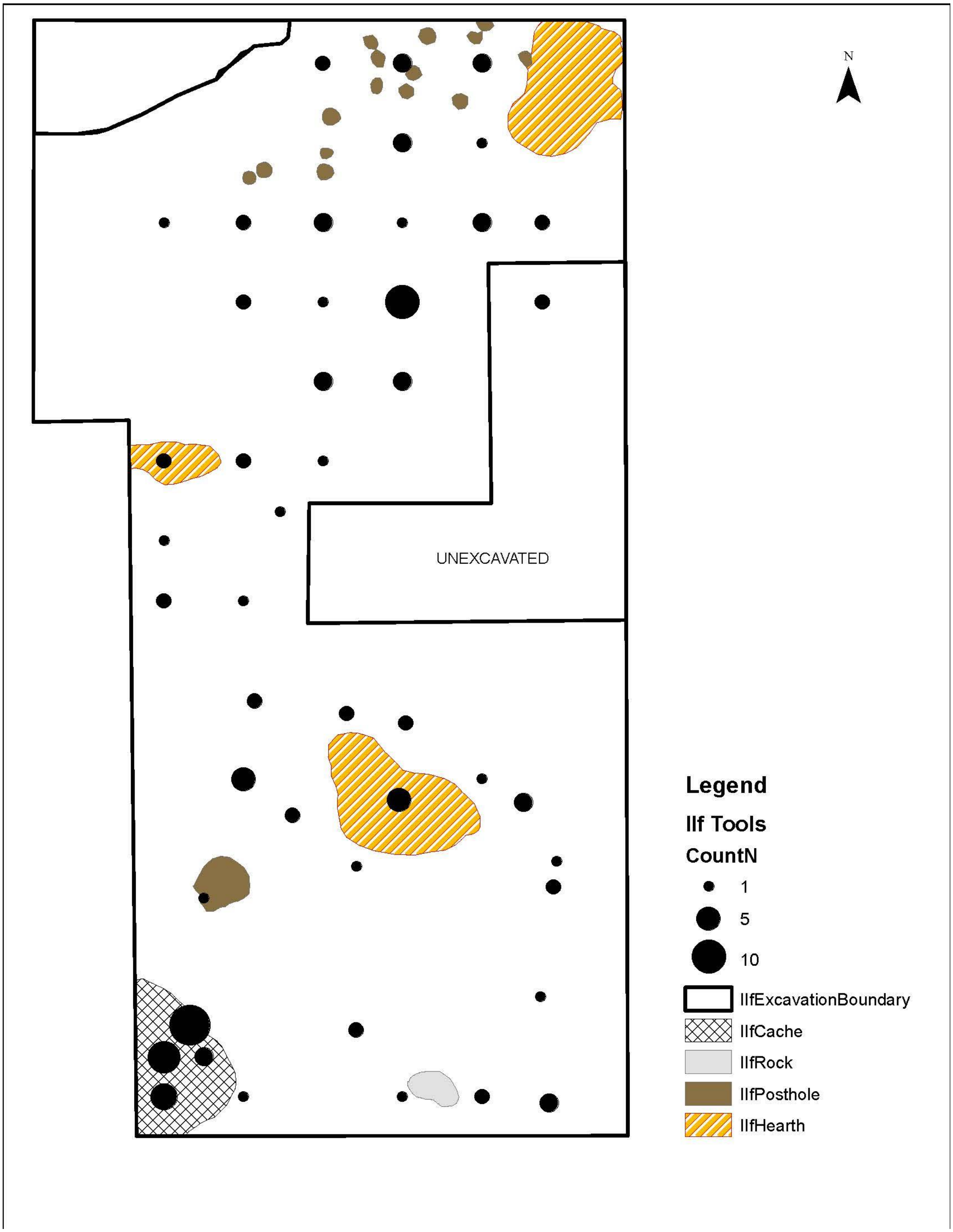

N
Legend
Ile Tools Sewing
Sum of Fields
4
Scraper
Knife
Drill/Perforator
Peircers
Ile Boundary
Ile Beam
Ile Cache
Ile Posthole
Ile Rock
IleHearth

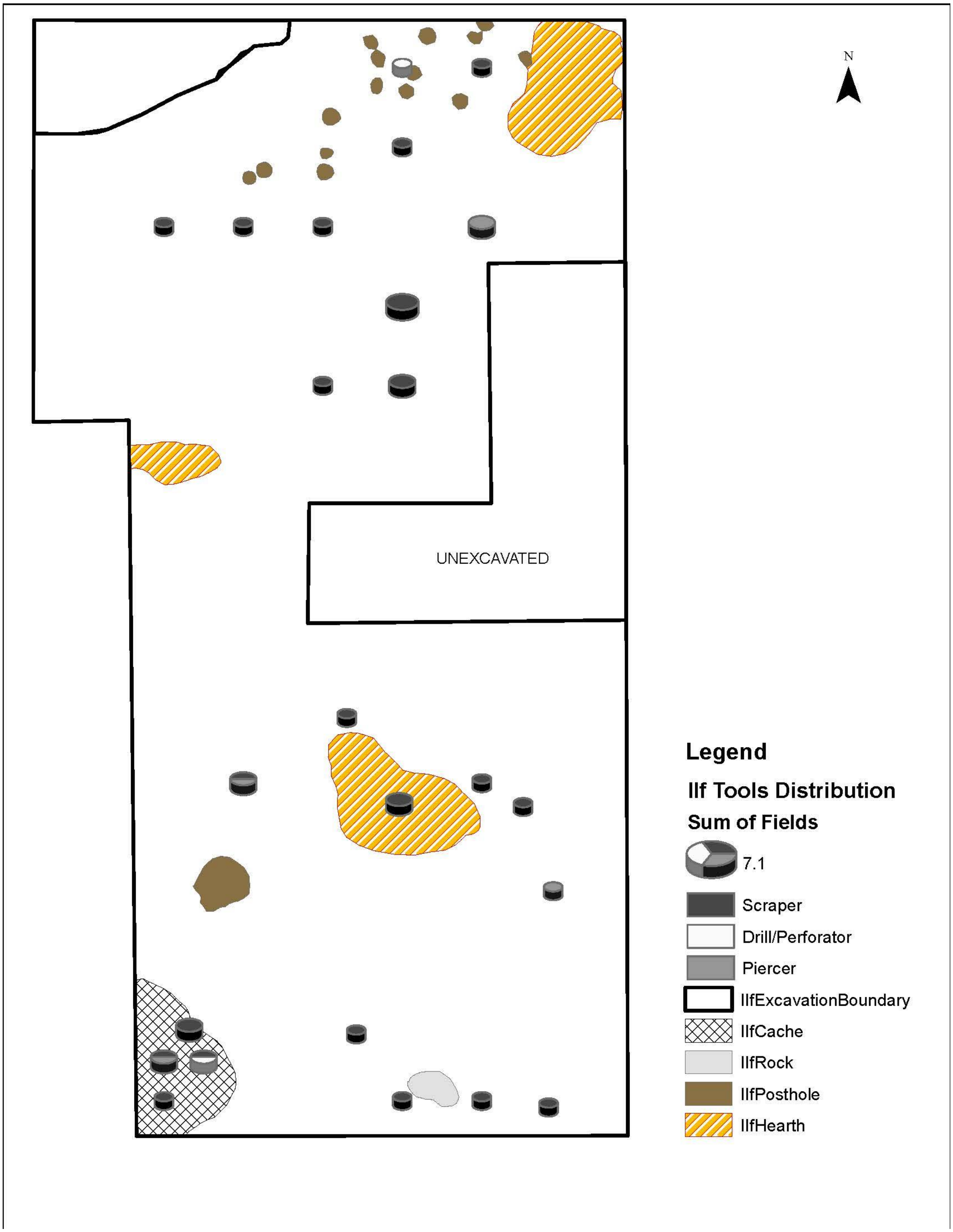

N
Legend
Ile Tools Distribution by Gender and Age
Sum of Fields
7.1
male
female
child
Ile Boundary
Ile Beam
Ile Cache
Ile Posthole
Ile Rock
IleHearth

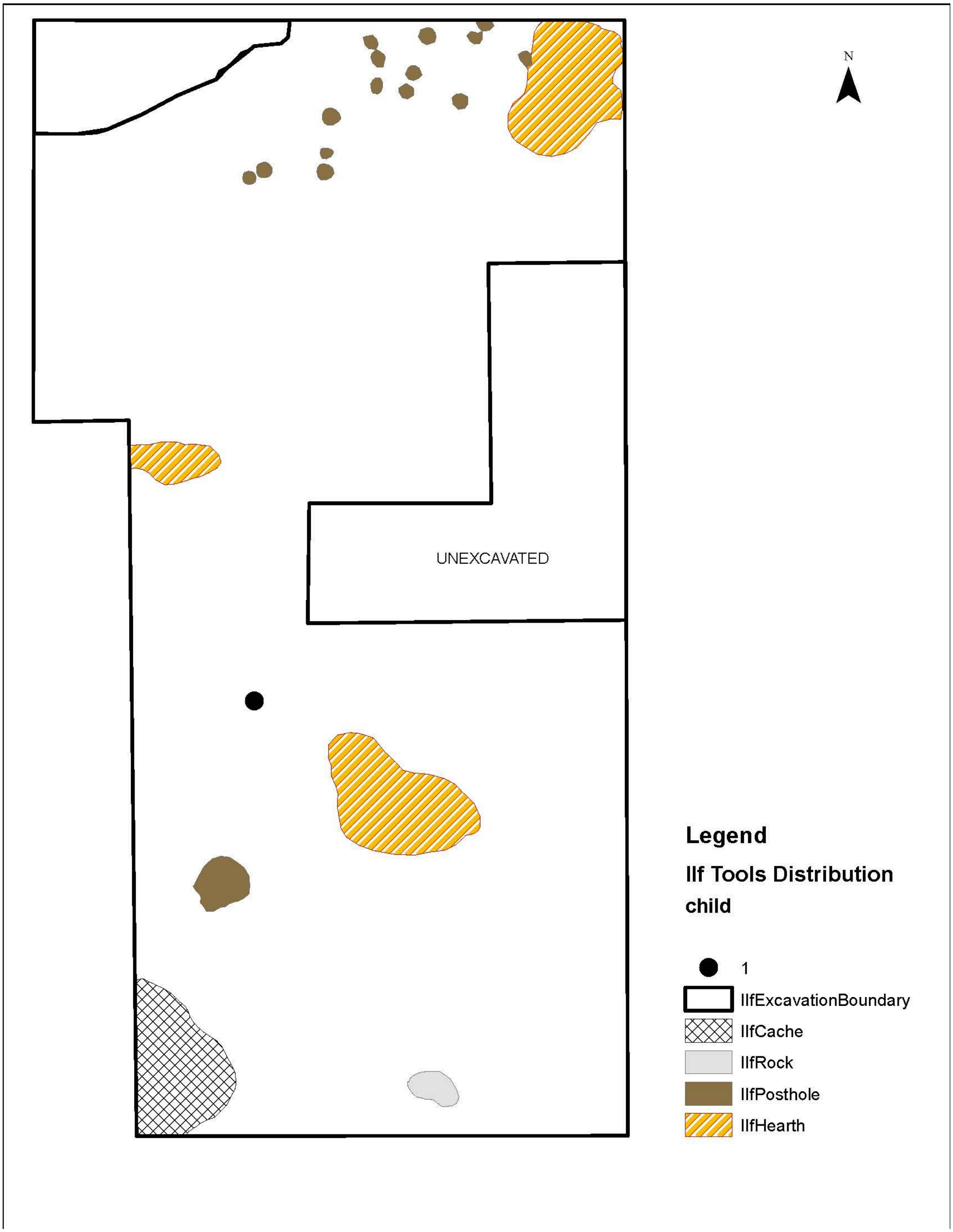

N
UNEXCAVATED
UNEXCAVATED
Legend
IlfExcavationBoundary
IlfCache
IlfRock
IlfPosthole
IlfHearth

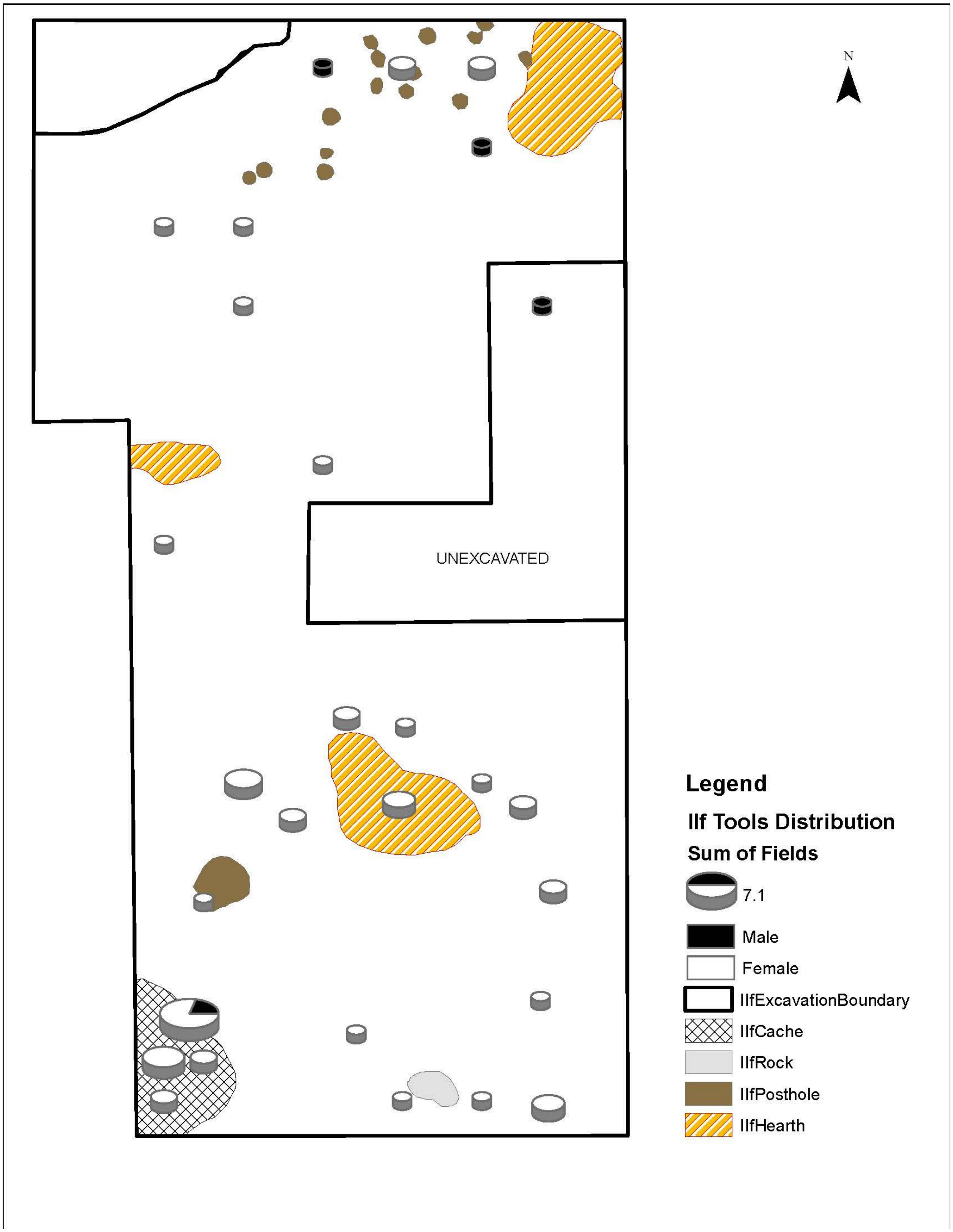

N
UNEXCAVATED
Legend
IIf Debitage Distribution
CountN
1
5
10
50
100
IIfExcavationBoundary
IIfCache
IIfRock
IIfPosthole
IIfHearth

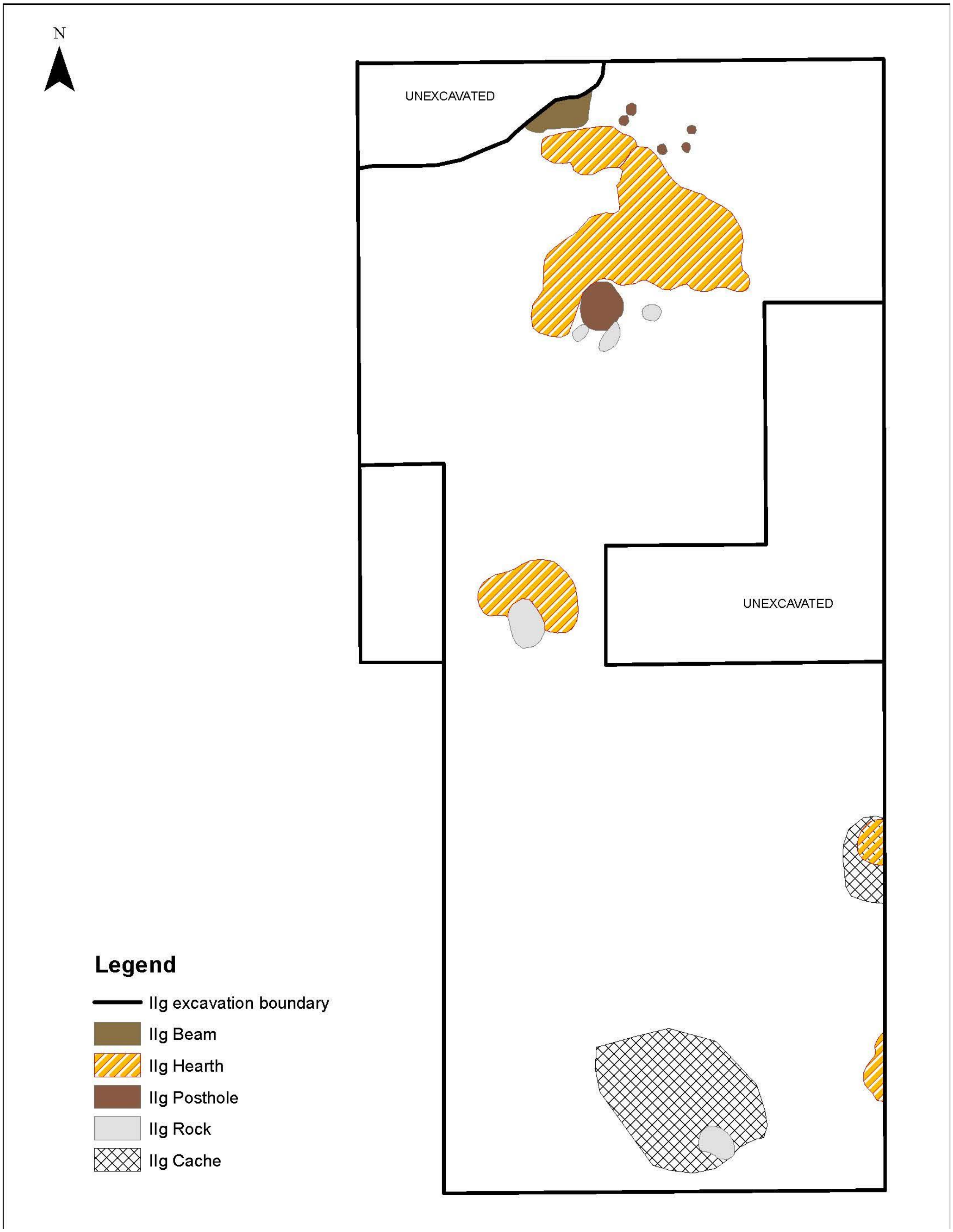

N
UNEXCAVATED
Legend
IIf Debitage Distribution
Sum of Fields
7.1
SizeXSM
SizeSM
SizeMED
SizeLRG
SizeXLRG
IIfExcavationBoundary
IIfCache
IIfRock
IIfPosthole
IIfHearth


N
UNEXCAVATED
Legend
IIf Tools
CountN
1
5
10
IIfExcavationBoundary
IIfCache
IIfRock
IIfPosthole
IIfHearth

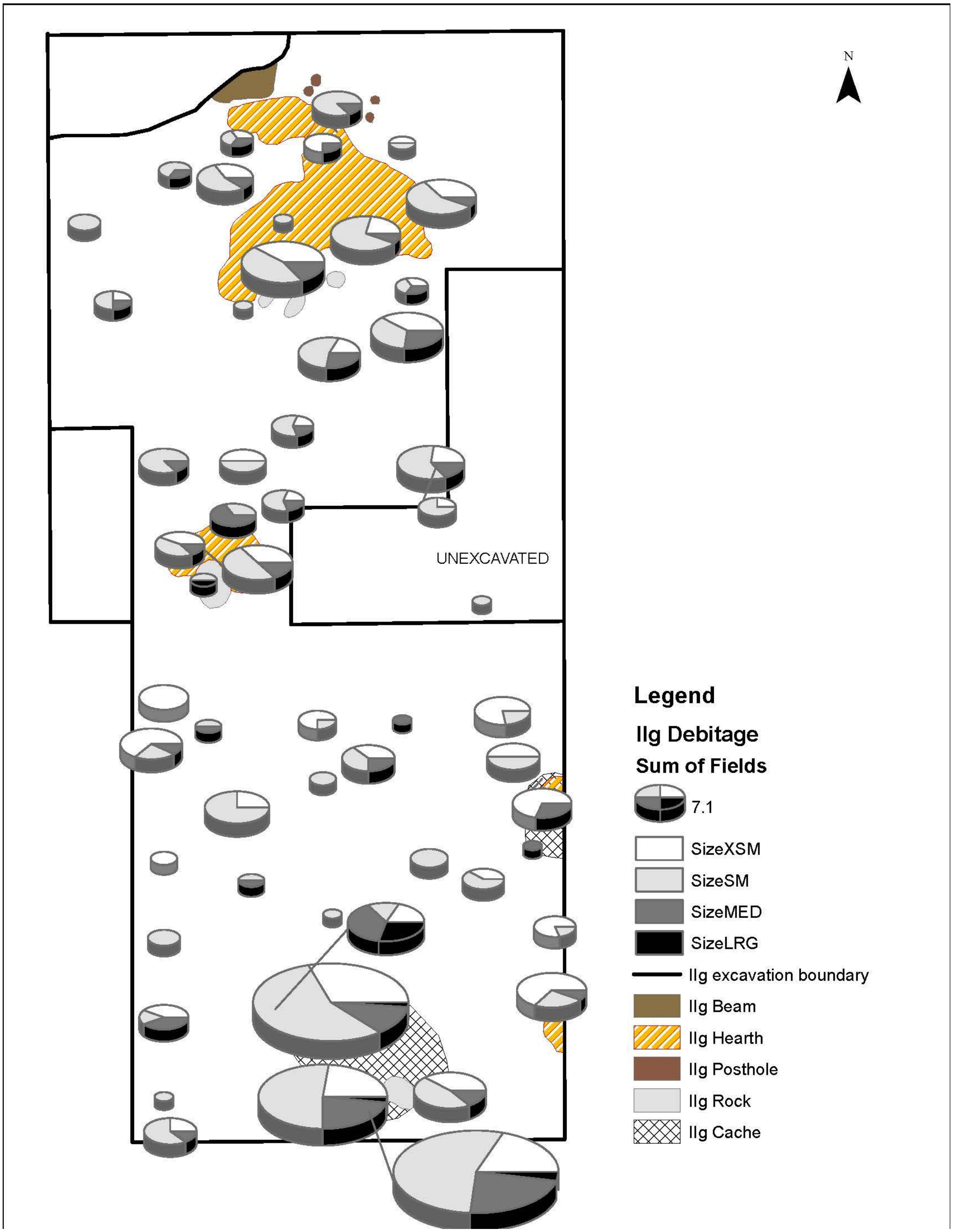

N
UNEXCAVATED
Legend
IIf Tools Distribution
Sum of Fields
7.1
Scraper
Drill/Perforator
Piercer
IIfExcavationBoundary
IIfCache
IIfRock
IIfPosthole
IIfHearth

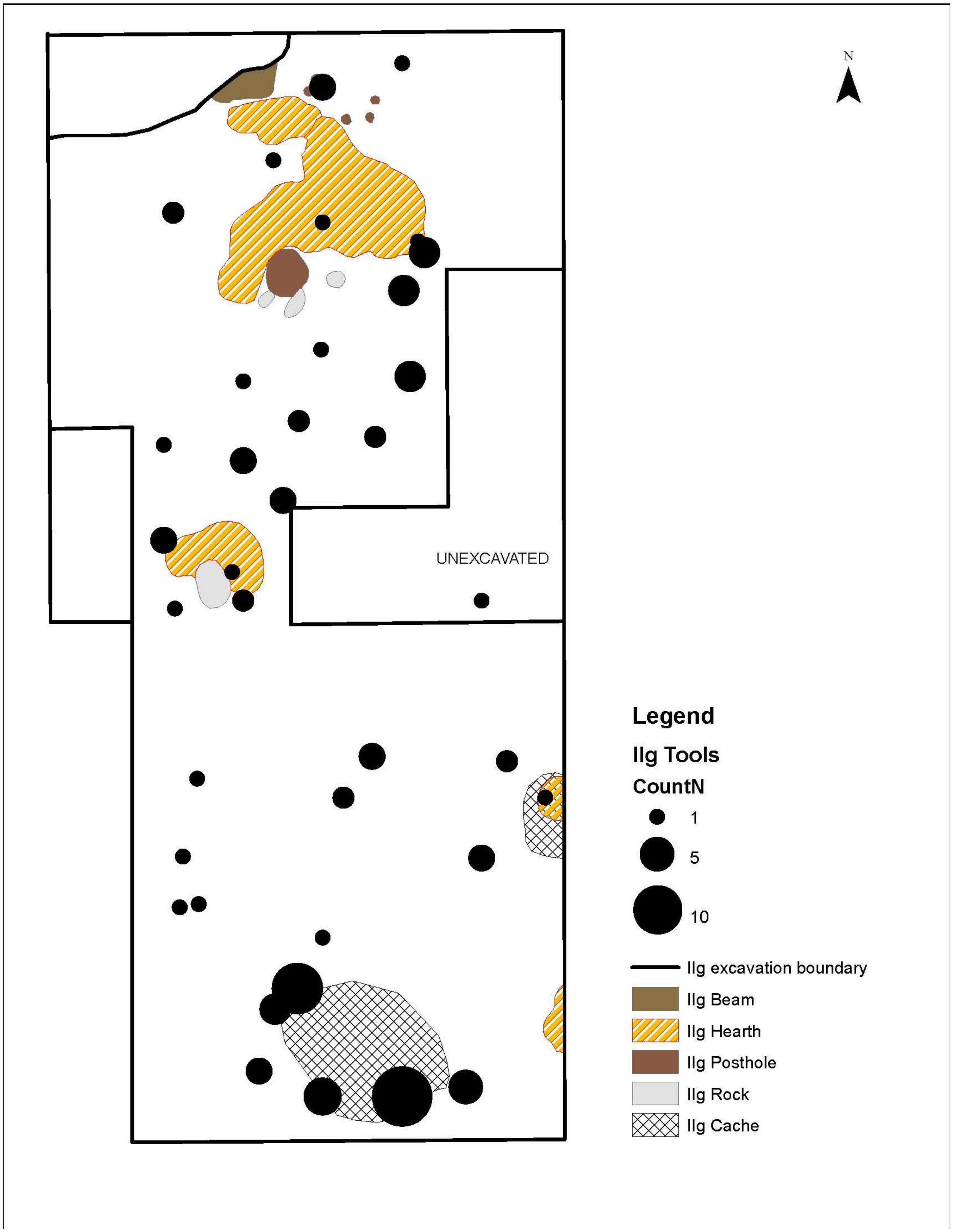

N
UNEXCAVATED
Legend
IIf Tools Distribution
child
1
IIfExcavationBoundary
IIfCache
IIfRock
IIfPosthole
IIfHearth

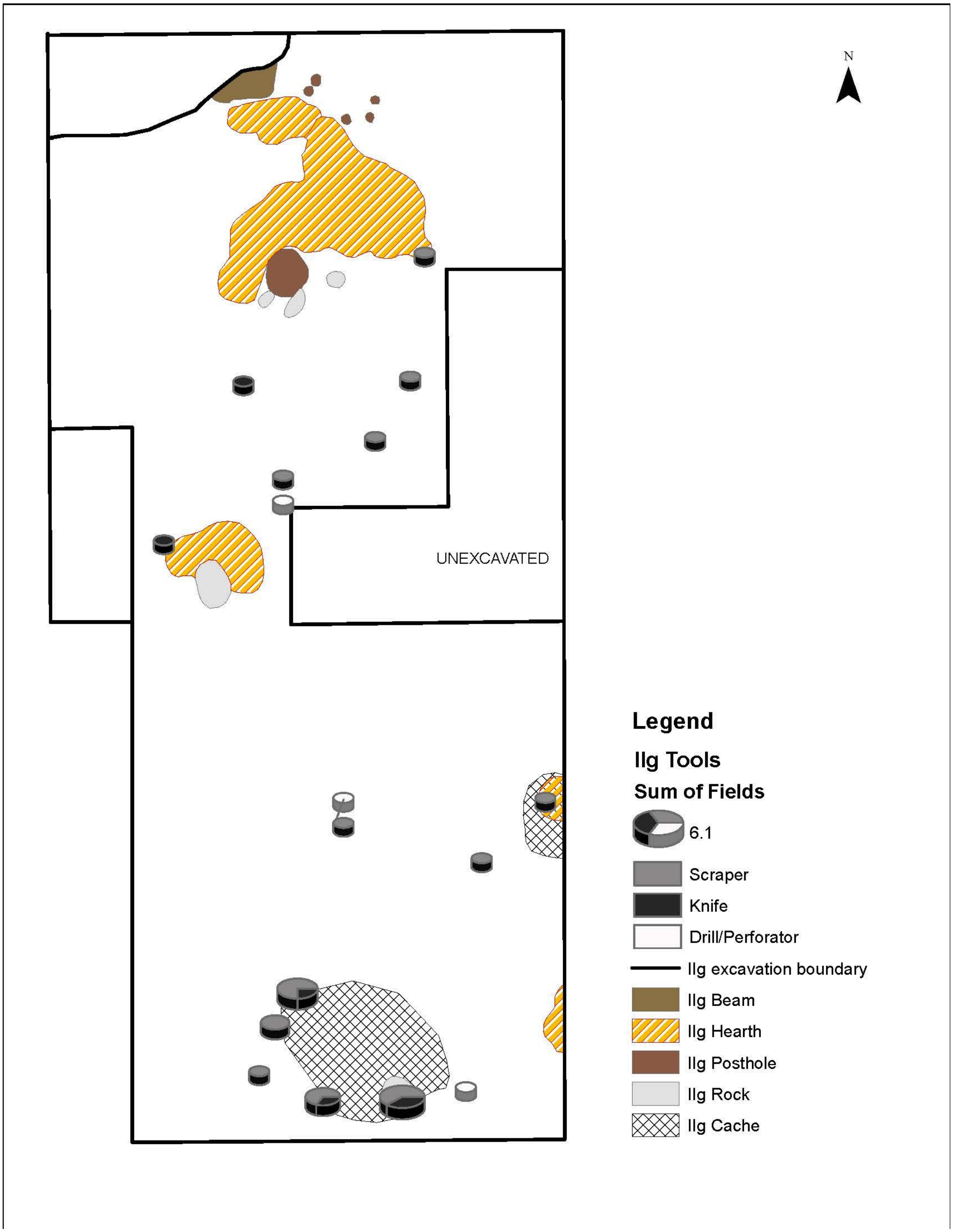

N
UNEXCAVATED
Legend
IIf Tools Distribution
Sum of Fields
7.1
Male
Female
IIfExcavationBoundary
IIfCache
IIfRock
IIfPosthole
IIfHearth

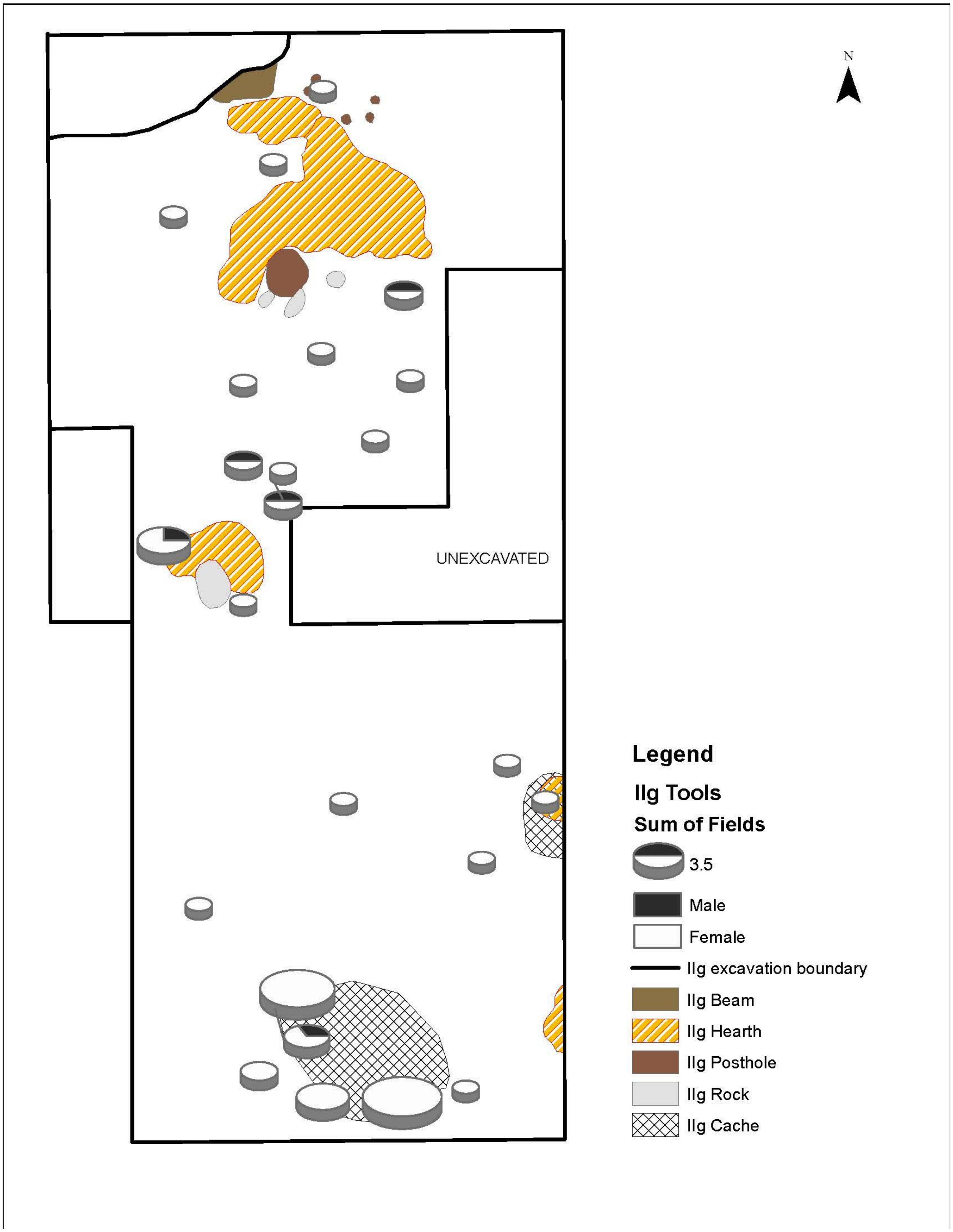

N
UNEXCAVATED
UNEXCAVATED
Legend
IIg excavation boundary
IIg Beam
IIg Hearth
IIg Posthole
IIg Rock
IIg Cache


N
UNEXCAVATED
Legend
IIg Debitage
CountN
1
5
10
50
100
IIg excavation boundary
IIg Beam
IIg Hearth
IIg Posthole
IIg Rock
IIg Cache


N
UNEXCAVATED
Legend
IIg Debitage
Sum of Fields
7.1
SizeXSM
SizeSM
SizeMED
SizeLRG
IIg excavation boundary
IIg Beam
IIg Hearth
IIg Posthole
IIg Rock
IIg Cache


N
UNEXCAVATED
Legend
IIg Tools
CountN
1
5
10
IIg excavation boundary
IIg Beam
IIg Hearth
IIg Posthole
IIg Rock
IIg Cache


N
UNEXCAVATED
Legend
IIg Tools
Sum of Fields
6.1
Scraper
Knife
Drill/Perforator
IIg excavation boundary
IIg Beam
IIg Hearth
IIg Posthole
IIg Rock
IIg Cache


N
UNEXCAVATED
Legend
IIg Tools
Sum of Fields
3.5
Male
Female
IIg excavation boundary
IIg Beam
IIg Hearth
IIg Posthole
IIg Rock
IIg Cache

Appendix H

Wooden Artifacts

(Anna Marie Prentiss)

Fish Arrow or Spear Tip

A small partially burned wooden object resembling a harpoon head (Figure AH.1) was recovered from within a shallow pit (Feature A1 [2013]) containing charcoal fragments and burned pine needles on the IIa floor (Block A). The artifact is approximately 6 cm in length and is made from a single piece of as yet unidentified wood. As is evident in the photo, bark is still present on the proximal end of the tool. The distal end is sharpened as are two barbs located along one margin. The barbs appear to be sharpened twigs that were part of the original wooden branch. The proximal end appears to have been cut or snapped and it is not clear if this occurred prior to- or after burning. Teit (1906:228) notes that the Upper Lillooet (St'át'imc) used "…spears with detachable points…for pulling out fish at weirs or dams." This artifact fits Teit's description and thus appears to represent a rare example of a fishing spear or arrow head. Its presence within a shallow pit filled with burned needles raises the possibility that it was deposited through some form of ritual. Another possibility is the pit was simply dug for cleanup of kitchen refuse and the burned tool was simply collected and dumped into the pit with other material. I am not aware of such an artifact ever having been found in the Mid-Fraser area. If such items were made from wood then this should come as no surprise as it would require specialized conditions (i.e. burning and placement in a context preventing further damage).

Figure AH1. Wooden fishing spear or arrow point. Note sharpened tip (right) and two sharpened barbs.

Wooden shafts

Two partially burned wooden shafts were recovered from a shallow hearth feature (C7) from Stratum IIg in Block C (Figure AH 2). Shaft 1 (in two fragments: 1a and 1b) is nearly 20 cm in length while the other (also in two fragments 2a and 2b) is just short of 15 cm. Each is approximately a centimeter in diameter. Wood type has not been identified though it is similar to wood from local Saskatoon berry bushes. The shafts were found associated with two small stone arrow points. There are no obvious scrape or cut marks on the shafts, though given their burned condition, this is difficult to assess (Figures AH 3 and 4). Likewise it is also hard to know for sure whether the ends were cut or broken. Cutting does seem possible if not likely given the flat ends on each shaft and the fact that wood from berry bushes tends to be quite challenging to simply snap when fresh. Length and width of each shaft is in the range of many ethnographic and archaeological examples of arrow foreshafts in the Rocky Mountains, Pacific Northwest, and western Arctic regions of North America (e.g. Husted and Edgar 2002: Plates 48 and 49; Mason 1894:Plate LI; Nelson 1899: Plate LXI). As noted by Teit (1906:225; see also Teit 1900), the St'át'imc were known to use foreshafts on their arrows ("Many war-arrows had detachable foreshafts, like those of the Thompson Indians"). Given the association of these shafts with two stone arrow points within the same hearth feature I suggest that they may have been originally destined to be further developed as foreshafts. This also raises the interesting possibility that the deposition of these items in a hearth feature came about via some form of ritual process. If these do reflect examples of wooden foreshaft technology then may be another archaeological first for the Mid-Fraser region.

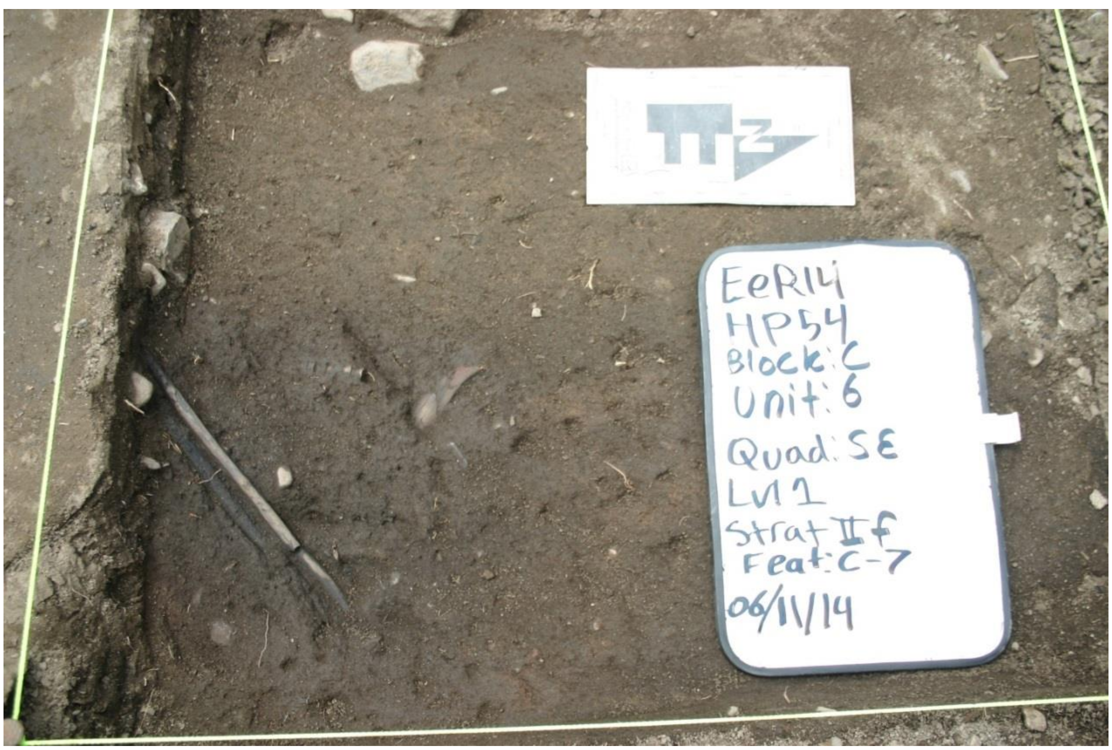


Figure AH 2. Wooden shafts *in situ* in Feature C7 (lower left). Shaft 1a and 1b on right; Shaft 2a and 2b on left. Stratigraphic designation should be IIg.

Figure AH 3. Shaft 1a and b.

Figure AH 4. Shafts 2a (upper) and b (lower).

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