# DISCERNING DOMESTIC SPACE

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# IN A

# PALAEO-ESKIMO STRUCTURE

# FROM

# INTERIOR BAFFIN ISLAND

By

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*Abstract*

This thesis explores the potential for using high-resolution distributional analyses in domestic space, to better understand the social realm of Palaeo-Eskimo societies. Lithic debitage distributions from inside and around a single archaeological structure from LdFa-1, a multi-component campsite from Interior Baffin Island, were assessed to determine if patterning in the use of domestic space could be distinguished. Distributions were analyzed with Inverse Distance Weighting (IDW) interpolation, and compared to the dispersal of formal artefacts across the site. Debitage smaller than 5 cm exhibited a single area of activity within a bounded structure, while no further patterning in the use of interior space could be defined. This finding is contrary to the bilateral distribution of interior space identified by McGhee (1979) from early Palaeo-Eskimo coastal settlements, suggestive of a more relaxed social atmosphere in these inland campsites. However, further investigations with the increased resolution of this study need to be undertaken to understand the intra-site and inter-regional variation that exists in Palaeo-Eskimo structures. Most importantly, it is hoped that upcoming excavations employ similar high-resolution sampling strategies that maintain the smallest debitage for spatial analysis, so that a body of data necessary for intra-site, domestic analyses can be built up for future investigations at this scale.

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Without the inspiration, help and support of the people around me this project would not have come to fruition. I would like to gratefully acknowledge the people who made this project a success.

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*Chapter 1*

# INTRODUCTION

This thesis explores the potential for using high-resolution distributional analyses in domestic space to better understand the social realm of highly mobile societies. The rationale for undertaking household-scale investigations is provided by social theorists such as Kent (1984, 1990, 1991a, 1995, 1998) and McGuire and Schiffer (1983), who have identified a direct correlation between the structure of a population's social system and the segmentation of their activities. A methodology for exploring hunter-gatherer domestic space has been developed and successfully implemented in archaeological contexts from the Northern Great Plains (Brady 2002, O'Brien 1990, Oetelaar 2000, 2003) and Mesolithic Sweden (Loeffler 2003). This methodology is adapted and applied to a Palaeo-Eskimo context to provide a case study for investigating the capabilities of domestic spatial analysis for exploring socially oriented research questions.

A research project conducted by Dr. S. Brooke Milne of the University of Manitoba provided the opportunity to examine domestic space at a short-term encampment of small-scale, highly mobile Palaeo-Eskimo hunter-gatherers. Milne's 2007 field program slated the excavation of two structures from South-Central Baffin Island, at the LdFa-1 site (Figure 1). Her high-resolution collection techniques and analytic focus on lithic debitage, as well as formal artefacts, offered a prime dataset for analyzing the organization of activities within and around a structure.

Following from the premise that the locations and relations of artefacts reflect the activities of people as they used and maintained spaces (Gregg et al. 1991:152; Schiffer 1972:156; Simek 1984:405), distributions of lithic debitage and formal artefacts recovered from a single structural feature at LdFa-1 were qualitatively examined to understand how activities were organized in a Palaeo-Eskimo household. This distributional analysis set out to determine if a conceptualized division of interior space could be distinguished from the archaeological remains, not to define the activities that took place within and around this specific structure.

Formal tools and lithic debitage were collected and recorded using different methods, therefore two types of images were created to visualize the materials distributed inside and around the structure. Formal artefacts were mapped by point provenience, while inverse distance weighting interpolation was used with a stretched colour ramp to create smoothed images of lithic debitage distributions from 50 cm grid data (see Chapter 4). Both sets of images were examined for inconsistencies in the distribution of material across the site, to determine if there was spatial segregation of past activities.

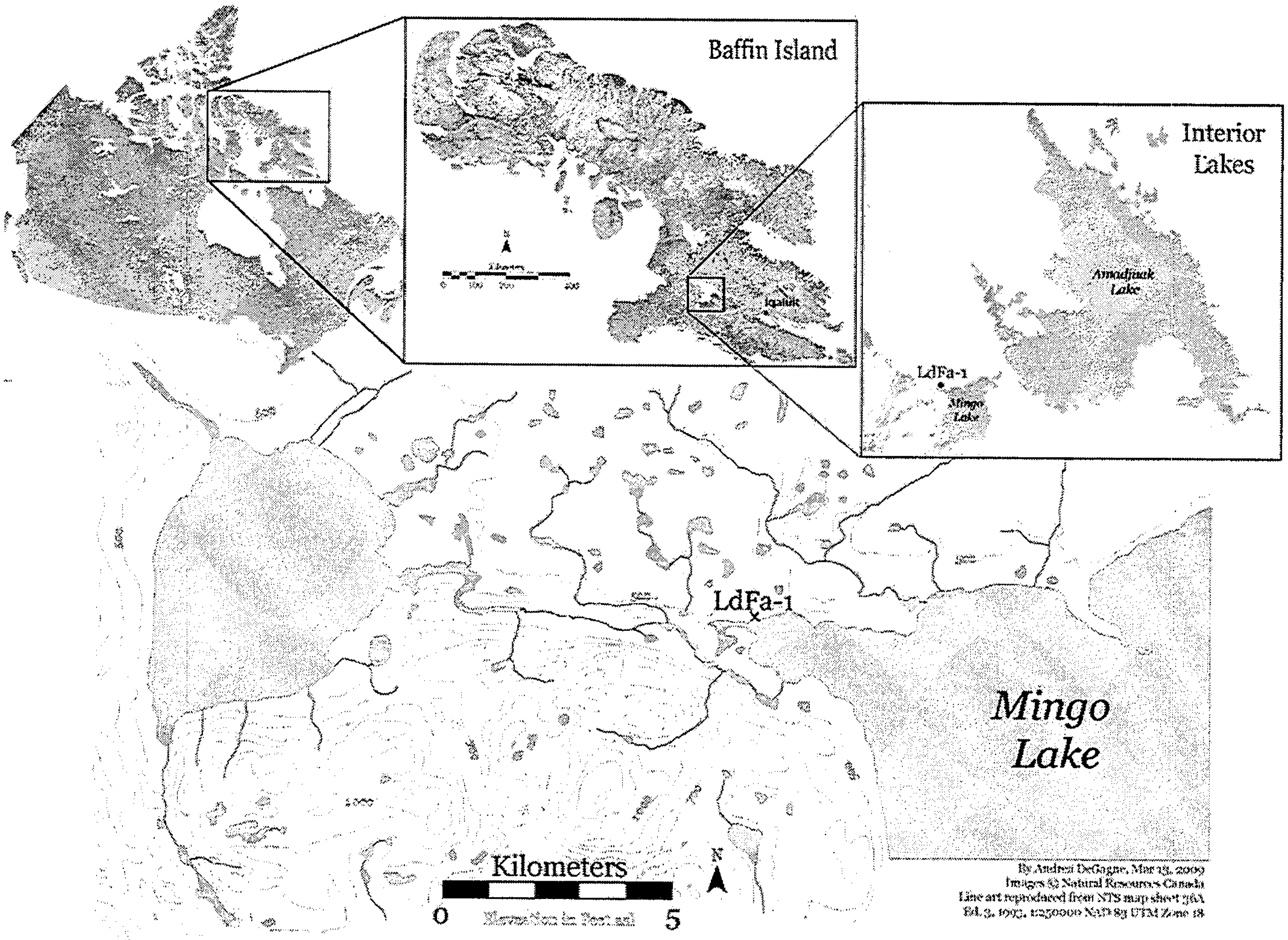


**Figure 14.** Location of LdFa-1, South Central Baffin Island, NU

Patterns identified during this visual assessment were considered with social spatial theory to interpret the domestic social structure apparent from these archaeological materials. Discerning the social structure of the occupants of this dwelling allowed for a better understanding of how inter-personal interactions and day-to-day activities were performed inside the structure, as well as how the population who used this structure conceptualized their space.

The importance of this research is two-fold. First, this study evaluates a method for exploring the social context of domestic structures in highly mobile societies. Although this method has use beyond the Palaeo-Eskimo example, it directly benefits Arctic archaeologists because it enables researchers to better understand and compare household structures, the basic building blocks of societies.

Archaeologists studying Palaeo-Eskimo populations have consistently black-boxed the social dynamics of the household group. The only published study to directly examine Palaeo-Eskimo social structure at the household scale is by Robert McGhee (1979). His exploration of structures left by some of the earliest inhabitants of the High Arctic allowed McGhee to construct an idealized model of an early Palaeo-Eskimo dwelling from the distribution of formal tools. From this model, McGhee identified a bilateral division of activities that he correlated to a male and female division of labour (McGhee 1979:55). This social order has been adopted into most understandings of Palaeo-Eskimo culture, even to the extent of becoming a defining variable of that culture (Sutherland 2003; Ryan 2003).

The methodology presented in this study allows for an evaluation of the premises and methods of McGhee's investigation, and provides a framework for future studies inquiring into the structure of the Palaeo-Eskimo domestic unit. Findings from this investigation of LdFa-1 show that distribution patterns are maintained in the smallest fraction of lithic remains, and it is within the distribution of the smallest debitage alone that domestic space can be defined. Arctic archaeologists need to be more concerned about collecting these very small materials and conducting rigorous spatially-controlled excavations than is current standard practice, if they are to obtain the level of data necessary to understand the domestic scale.

Milne (1999, 2003a) has outlined numerous benefits from collecting small debris with screening methods, however, her methodology has not yet been adopted in all Arctic studies. This research reinforces the need to collect small debitage and maintain strict spatial contextual controls in data collection should Arctic archaeologists ever pursue research at the domestic scale. Although there are issues with logistical expense and shortened field seasons, the methodology presented in this thesis provides a way to systematically collect small materials using grid-based data, speeding up the collection process yet maintaining a high enough resolution to undertake analyses of spatial patterning at a domestic scale.

The secondary importance of this thesis is its contribution to the study of the inland component of Palaeo-Eskimo life. LdFa-1 is located in a uniquely isolated context, almost 200 km from Iqaluit and 65 km from the nearest coastline (Figure 1). Moving into this region from the coast would have been a demanding venture for populations who used these areas. While the distance is long, there is an easy access route in from the upland coastal regions of Southern Baffin Island (Milne 2003a), however, Stenton's (1991) exploration of the inland region found Mingo Lake to be inaccessible from Foxe Basin on foot. Documenting the domestic organization from this interior location potentially provides archaeologists with a way of understanding the populations who used this area, and how these relate to the populations defined from coastal settlements. This study provides an example of Inland domestic space that can be contrasted with instances of this from other regions and time periods, to see how these compare.

## Organization for the Remainder of the Thesis

The rest of the thesis presents the theoretical basis for exploring hunter-gatherer domestic space, and a methodology for undertaking such analyses. The results of the investigation of a single structure from LdFa-1 provide a case study application of this methodology in a region where domestic studies have not yet been readily undertaken.

The theoretical basis for exploring hunter-gatherer domestic space is presented in the following chapter. Chapter two also presents the theoretical links between spatial organization and social structure, and provides a review of the development of hunter-gatherer domestic analyses in research from the Great Plains. Also presented are samples of methodologies in studies from other regions that have been useful for understanding the domestic organization represented in hunter-gatherer structures. My investigative method is based on the methods used in these previous studies.

Chapter three provides further contextualization of the Palaeo-Eskimo case study, orienting LdFa-1 both geographically and within a larger body of Palaeo-Eskimo research. This leads into chapter four, where the methodology used for studying the structural remains at this Arctic site is presented.

Chapter five is a presentation and discussion of the artefact distribution patterns from the Mingo Lake investigation. Distribution patterns are explored, beginning with the delineation of interior versus exterior space and consideration of how McGhee's bilaterally divided model of domestic space fits the interior Palaeo-Eskimo example. The results of the distribution analysis are discussed in chapter six, followed by conclusions about the applicability of domestic study to Arctic contexts and potential future applications of the methodology used in this study.

*Chapter 2*

# THEORETICAL BASIS FOR EXPLORING HUNTER-GATHERER DOMESTIC SPACE

As some of the most prevalent archaeological remains, architecture has been widely mapped, described, and studied as an indicator of past societies. The first cultural-evolutionary studies in archaeology in the 1800s emphasized architecture and dwelling types as indicators of the evolutionary status of societies (Lawrence and Low 1990:454). Studies of structural remains have persisted as researchers attempt to define the relationships between people and their constructed spaces, as part of the quest to discern the functional, social, and symbolic realms of past lives (Lawrence and Low 1990:457).

Houses are a specific type of built environment, definable as the culturally confined spaces in which the daily life activities and interactions of people take place. The construction and use of the house influences and is influenced by the behaviours and beliefs of the people who use them (Bourdieu 1973; Rapoport 1980, 1982:299; Parker Pearson and Richards 1994:2; Robin and Rothschild 2002:163). Houses serve the functional purpose of providing shelter for a specific number of people and the necessary accoutrements for activities undertaken within this space (Oetelaar 2000:36). In addition, domestic structures have the emblematic role that all architecture serves, taking on political, economic, social, and ideological meanings by ordering space in a way that is both conventional and symbolic for the people who use them (Cunningham 1978; Hodder 1982; Robin and Rothschild 2002:161; Portnoy 1981).

Initial studies of domestic architecture focused on construction and form, delineating house features and settlement layout to refine regional cultural histories and patterns of land-use, or to determine ways to identify domestic structures and the basic activities that took place within them (Lawrence and Low 1990:457). These regionally-focused, functionalist investigations overlooked the uniqueness of the inhabitants of these structures (Wilke and Rathje 1982:618). By disregarding the variation in household forms, archaeologists were incapable of understanding how this basic social unit changed across time and space (Allison 1999:1; Wilke and Rathje 1982:621). A distinct "household archaeology" was developed to learn more about the household as a unique social entity, which is further discussed below.

Advancements in social spatial theory provide a means by which archaeologists can see beyond the functional landscape the built environment represents, so that investigators can focus on understanding the experience of these places and contemplate the meaning behind the choices that were made during their construction and use. These theories allow archaeologists to examine how past societies perceived the world by examining the structuring of their activities, which is apparent in the distribution of their material remains (e.g. Kent 1984, 1990, 1991a, b, 1995, 1998; McGuire and Schiffer 1983). These innovations have been adopted in studies of hunter-gatherer societies, providing a means to obtain information beyond the functional aspect of life for these highly mobile populations.

This chapter presents the theoretical advancements that have enabled archaeologists to study the social aspects of hunter-gatherers through their domestic spaces. The discussion describes the development of household and domestic archaeology based on this theoretical perspective, and how investigations at this scale of analysis have enabled archaeologists to successfully identify household composition and social organization in archaeological cultures (Henry et al. 2004; Kroll and Isaac 1984; Loeffler 2003; O'Brien 1990; Oetelaar 2000, 2003). Successful methodologies for undertaking household-scale analyses in hunter-gatherer societies are also presented, and are returned to in chapter four for the derivation of a methodology for exploring domestic space in an Arctic hunter-gatherer context.

## Space as a Social Context

When viewed as the realm in which all actions take place, an entity created, reproduced, and changed by the social interactions that occur within, space becomes an integral variable for any study of social construction (Barceló and Pallares 1996; Giddens 1979, 1984). The cultural interactions individuals have with and within built space alter their perception of physical locations. Spaces become affiliated with the experiences that take place within these locations, to become the place for sleep, the place to eat, create, or interact with specific others (Torsson 1992:76). This experiential aspect of space means that cultures develop different perceptions of space, different understandings of spatial layouts, and different conceptions of the proper arrangement of activities within their built world (Lawrence and Low 1990:478).

Built space is an important part of the archaeological record because it has been intentionally constructed to unite utilitarian and symbolic functions (Gieryn 2002:41-42; McGuire and Schiffer 1983:281). Places have been created to enable a certain set of activities, but the size, appearance, and layout of constructed space is not simply dictated by physical factors such as the available materials and technology. Although designs may be limited by these variables, a society's beliefs about places, activities, and social actors are also important factors in how people arrange space (Canter 1984; Cornell and Fahlander 2007:1; Cunningham 1978; Després and Piché 1992:120; King 1980:193; McGuire and Schiffer 1983; Torrson 1992:71, 75-76).

### *Structuring of Space*

The structuring of space is two-fold. Physical barriers such as walls and objects create bounded areas and steer appropriate movement (Cornell and Fahlander 2007:5). However, how these delineated areas are put to use is further dictated by intangible restrictions in an individual's understanding of the needs of a task and the appropriate usage of available space (Rodman and Cooper 1995:590).

To communicate the prearranged use and social order of a space, builders and users of this space inadvertently or explicitly encode visual mnemonic devices in the constructed environment (Hall 1963; Tanner 1991). These signs relay information about the intended association of space and activities, so that people know how to interact within this space to perform the activities of daily life. Individuals with the proper knowledge for interpreting the encoded visual cues (referred to by Ingold 2001:22 as cultural "keys") will be able to negotiate these spaces in the prescribed manner. They will therefore feel more comfortable operating in this space than someone without the requisite cultural keys (see also Hall 1963 for a discussion of proxemics and how social behaviours influence the comfort of space). Eventually, encoded social cues become ingrained in individuals so that these signs evoke a patterned response, reminding people of past experiences in similar spaces and causing them to repeat their behaviours (Gieryn 2002:37; Kent 1984; Lawrence and Low 1990:483; Shields 1991:46).

Despite the incorporation of social cues, the use of space is not static or limited to the purpose for which the built environment was originally designed. Surroundings can be modified with the physical setting being re-ordered to accommodate the needs of individuals, but the demands put on a space are always consciously or unconsciously understood by the acting individual to be acceptable for that place (Torrson 1992:75). Spaces can thus be re-negotiated as cultural understandings of these areas and associated tasks are defined and re-defined over time (Cornell and Fahlander 2007:5).

*Structure in un-bound space*

Because of the perceptive element of negotiating structured space, erecting tangible partitions is not essential for differentiating spaces and creating a built environment. Unbound areas can be cordoned off through individuals simply understanding these spaces as having a different purpose, and using them for specific activities or organizing them according to a specific set of rules (Whitelaw 1994). These unbound spaces have the same qualities of a physically constructed environment, with similar visual cues built in, though these unbound spaces are more likely used by a society with less structural investment in their architecture (Abu-Gazzeh 1995:270-272; McGuire and Schiffer 1983:281, 286). It is this un-bound structuring of space that is most interesting to archaeologists studying hunter-gatherer populations with little structural investment. Instead of focusing on architectural features, the routine arrangement of activities alone, as seen by their archaeological signatures, can provide information about the underlying organization of the population.

People organize their behavior following social norms that are created to enforce the principles by which their world operates. Individuals are taught the structure of the social, economic, political, and ideological realms of their society, and their place in each of these, through their interactions with others in constructed spaces. The continued experience of similarly structured space then reinforces this social identity and the underlying world structure (Pader 1988; Robin and Rothschild 2002:162). By arranging activities in a socially acceptable manner, archaeological remains become the materialization of a past population's worldview (Cornell and Fahlander 2007:1; Rapoport 1982). Archaeologists can therefore access each realm of past society and the underlying configuration of their world, by studying how people operating within this society routinely organized their activities and applying the appropriate body of theory for interpreting these arrangements.

<u>Social Spatial Theory</u>

Social spatial theories are employed to understand the implications of routine arrangements of activities for the inter-personal interactions that took place to create them (e.g. Kent 1984; Kent (ed.) 1990; McGuire and Shiffer 1983; Portnoy 1981). Similar bodies of theory exist for symbolic (Dawson and Levy 2005; Parker Pearson and Richards 1994) and ideological (Wilson 1995) aspects of life, theoretically enabling questions about any of these realms to be answered on the level of the household (refer to Ashmore 2002:1173 and Oetelaar 2000:36).

In one of the first endeavours to create a middle range theory to unite architectural design with behaviours and beliefs, McGuire and Schiffer (1983) looked at the choices that were made in the construction, use, and maintenance phases of building design for both the utilitarian and symbolic aspects of structures. Although their theory generalizes hunter-gatherer structures as short-term, ephemeral constructions with little to no internal differentiation (McGuire and Schiffer 1983:283-284), their theoretical standpoint remains solid. They identified social differentiation as the cause of increased conflict in the requirements of space, reasoning that the association of certain activities with specific social sets requires spaces to be partitioned for these specialized tasks to be carried out (McGuire and Schiffer 1983:273).

Similarly, Kent (1984, 1990c:128, 1991a) identified an association between the social system of a population and the degree of segmentation in their spatial behaviours and material culture. Her ethnoarchaeological research identified consistencies in the use of space by 73 groups from around the globe with varying degrees of socio-political complexity, to establish universal principles about social interaction with the built environment (Kent 1984). Kent (1984, 1990c, 1991a) showed that the degree to which space in the domestic context is delineated, by physical boundaries or un-delineated areas of activity, correlates directly to the amount of structure within the social system of the builders and users of this space. This model is more universal in scope than McGuire and Schiffer's (1983) attempt at understanding variation in structural remains; it works for any society regardless of its level of mobility or the investment it makes in architectural features.

As postulated by McGuire and Schiffer (1983), Kent (1984:188) sees specialization as generating mono-functional activity areas, as well as mono-functional tools. In fact, Kent recognizes that the complexity of a society's social structure affects how individuals operating within the group make decisions, relate to others, and live their daily lives (Kent 1984:1, 1991a:441). Because people define themselves relative to other social roles, the way the culture they are socialized into defines social groups influences the individual's perception of themselves, others, and their world in general. The emic recognition of a difference between individuals is reflected archaeologically through an increased structuring of space, as certain tasks associated with specific roles may be carried out in defined areas or banned from others (Chamberlain 2006:39; Kent 1990:129).

Kent's model views culture, behaviour, and cultural materials as three inter-related elements that can independently be plotted along a social continuum from non-differentiation (unity) to specialization (segmentation) (Kent 1984:186-222). This continuum is useful for comparing the degree of segmentation within the socio-economic systems of two or more cultures, or to see change within a single culture over time. It is used by plotting the ratio of restricted areas versus general purpose areas, or all-purpose versus specialized tools for one population against this ratio for one or multiple comparative populations (Kent 1990:128, 1991a:442).

Using Kent's model, a group without formalized social roles will have a unified arrangement of domestic space and a generalized tool kit because there are few restrictions placed on the performance of specific tasks. However, groups differentiating between gender, age, or status roles will have a more segmented domestic space and specialized tool kits as this worldview is enforced in the organization of daily life.

*Social Actors and Emic Rational for Divided Space*

In her ethnographic research, Kent (1991a) identified gender and age to be the two basic criteria used by societies with low social complexity to discriminate social status and arrange activities. In fact, both Kent (1991a:456) and Yellen (1977:85) found socially segregated spaces to occur more frequently than functionally restricted spaces in less-complex societies. Kent (1991a:459) has also found that most kinship systems differentiate between male and female, and segregate by age, although a high degree of flexibility can exist between these roles. The segregation of space by age and/or gender becomes increasingly formalized in societies with increased socio-political complexity (Kent 1991a:459).

However, distinguishing gender or age as the emic rationale behind segmented space through archaeological remains is difficult. General ethnographic principles and multiple lines of evidence can provide a reasonably clear understanding of how societies were organized, but spatial patterning studies alone can only show that partitioning existed within a past population's worldview. While social theory and analogy can help archaeologists understand the possible cause of these divisions, they do not necessarily know how this played out in past populations.

Portnoy (1981) has explored another emic perception of space and its divisions, recognizing that most societies separate public spaces from private spaces. She found that groups who distinguished between public and private spaces conceptualized these areas by the accessibility of the space, an idea further explored in spatial syntax analyses (Cutting 2006:232; Dawson 2002; Hillier and Hanson 1984). Portnoy (1981) exemplified this using a bilateral model of a house with front areas distinguished from back areas. In this model the front areas, or those spaces easily accessed and first observed by outsiders, were most often considered public space while areas less easily accessed, or back areas, were used for private quarters.

This division of public and private space agrees with the theory that space becomes more segmented as the worldview of a society becomes increasingly compartmentalized. The formalized differentiation between public and private spaces, and acceptable activities for each of these realms, differs greatly between societies (Abu-Gazzeh 1995:270-272), similar to the recognition of formalized social roles. However, the compartmentalization of space following privacy rules is one example of how a population's worldview can alter how they arrange tasks in space without necessarily defining social actors on the basic distinctions of age or gender.

Understanding the social implications of compartmentalized space provides the link between material distributions and the cognitive divisions that structured the behaviours of past populations. Although the exact emic rationale for dividing space cannot be firmly defined, ideas about how past populations ordered their world can be accessed. It is this connection that makes the study of a highly mobile population at a household-level an interesting endeavour. Instead of intra-site spatial analyses being limited to superficially locating and characterizing the activities of past populations, archaeologists can use the organization of space to understand more about the culture itself (Kent 1984:187). The following section outlines the development of household archaeology and domestic studies, tracing the development of these specific forms of intra-site analyses.

Intra-Site Analysis

Intra-site studies of material patterning were originally developed to investigate the arrangement of space at long-term habitation sites of settled societies (Kintigh 1990:165). Methods for undertaking studies at the intra-site scale were developed through ethnoarchaeological studies of intact living surfaces from settled and semi-nomadic groups (Kent 1987). Early researchers identified spatial organization in these ethnoarchaeological contexts and isolated the material patterning of known activities so similar patterns could be recognized in the archaeological record (Mitchell et al. 2006).

The !Kung (Yellen 1977(ed.), 1991a, 1991b), Nunamiut (Binford 1978a, 1978b, 1983, 1985; Graham et al. 1982), and Alyawara (O'Connell 1987) were a few of the subjects of such ethnoarchaeological investigations of spatial organization. These ethnoarchaeological studies thoroughly documented the behaviours of individuals from these groups and the material signatures resulting from their activities. The material patterns recovered were highly publicized, and were used to create and test theories and methodologies for researching the use of space and spatial patterns in archaeological societies.

Archaeological explorations used the patterns identified in these ethnoarchaeological studies to discern behaviours of past populations. However, early archaeological studies focused on identifiying site formation processes and establishing viable methods for quantitatively locating behavioural patterns rather than searching for social causes or implications for the behaviours identified (e.g. Bartram et al. 1991; Hietala 1984; Kintigh and Ammerman 1982; Sivertsen 1980; Stevenson 1985; Vaquero and Pasto 2001).

*Household Archaeology*

Household archaeology is a specific type of intra-site analysis, in which domestic architectural remains are investigated in order to discover more about the occupants of these structures. Household archaeology understands the cooperative-household group to be the basic building block of society, the scale that articulates directly with all economic and ecological processes (Wilke and Rathje 1982:617). This group most often (but not necessarily) resides in the same house, hence the term 'household', but is essentially defined as the smallest grouping of people who work together to provide for the social and economic needs of all members (Wilke and Rathje 1982:617). If the house is understood as the structural domain of the household - the place where actions and beliefs of the household unit are embodied in material culture (Wilke and Rathje 1982:621), investigations at the scale of the house can move beyond functional and economic concerns, enabling archaeologists to come to terms with the social and symbolic aspects of domestic space.

As new developments in social theory advanced understandings of the relationships people have with their constructed space, the questions asked of domestic data broadened to incorporate social and ideological variables along with the functional and economic considerations of past populations. Thanks to theories put forth by social scientists such as Kent (1984, 1990) and Portnoy (1981), archaeologists are no longer restricted to defining functional activity areas - the place where a hearth was located, or the place where an animal was butchered. Instead, researchers can focus on defining the nuances of why people structured their spaces in the way they did, and look at what this means for how the rest of the society was organized (Ashmore 2002).

Understanding the social principles acting on the structuring of space has allowed for the emergence of domestic archaeological investigation. An offshoot of household archaeology, domestic archaeology specifically refers to the critical study of the spatial relationships of the contents and features of a house to achieve a better understanding of the social interactions that took place at the level of the household (Steadman 1996).

*Domestic Archaeology*

Domestic studies combine household archaeology's objective of obtaining a detailed understanding of the economic and social strategies of this basic social group (Wilke and Rathje 1982:633) with distribution analysis, relying on spatial data to provide information about the organization of people's activities (Allison 1999; Binford 1978, 1980, 1983; Oetelaar 2000:35; Steadman 1996:54). In combining the two concepts, domestic structural investigations allow archaeologists to understand spatial patterning and activity areas within a house beyond the functional level of task recognition (Carr 1984, 1985, 1987; Clarke 1977; Hietala 1984; Kintigh 1990; Kintigh and Ammerman 1982; Whallon 1984). Using a domestic approach to archaeological study, socially structured space can be defined and elements of its cultural significance identified. By scrutinizing each element with social theories about the use of space, researchers can attain a better understanding of social and ideological aspects of life that would otherwise be unverifiable through archaeological investigation.

Through domestic archaeological investigations, architectural features and their internal distributions have been successfully employed to understand the socio-cultural and socio-economic relationships between households and household members (Loeffler 2003; Oetelaar 2000) to provide insight into the ideologies and beliefs of past populations (Dawson 1998), and to define the processes acting at the household scale that account for cultural changes identified at broader scales of analysis (Ashmore 2002:1173).

Hunter-Gatherer Architectural Studies

Archaeological studies of architecture have developed uniquely in different regions of the world with differing historical contexts, but they are generally similar in their reliance on household-level data for obtaining a better understanding of how a society operated at the most basic level. The results of detailed household-scale analyses are then combined with other levels of data to understand the culture in question on a broader scale, to define change through time and better understand past cultures.

The advancements in social theory described above have enabled investigations of domestic space to move beyond identifying the activities of household members at a certain point in time, to identify the underlying meaning of routinely differentiated spaces. This prospect enables archaeologists to question how domestic remains connect to the symbolic, ideological, and socially important beliefs that ordered the world of the people who used them, concepts otherwise unavailable to the archaeologist (Hendon 1996:46).

In order to achieve the full rewards of undertaking archaeological study on the scale of the household, domestic architecture needs to be considered as the domain of social action, and studied with the intent of determining how these structures fulfilled all the needs of a society, considering all functional, economic, social, and symbolic aspects of life (Oetelaar 2000:36). When these detailed studies are undertaken, archaeological domestic architecture plays a key role in understanding the basic organization of the social unit of past populations. With this information, larger studies can be approached that are based on substantiated data, not just assumed truths.

Despite the information that can now be gleaned from spatial studies, domestic analyses focused on highly mobile groups without permanent architectural structures are limited. The remaining sections of this chapter review the development of hunter-gatherer domestic architectural studies, as exemplified in the North American Great Plains region, and the beginnings of domestic studies in the Canadian Arctic. Similar studies of hunter-gatherer domestic space extend over Africa, Europe, and the Middle East, but the general trends in this type of study are well illustrated by studies of Plains tipi rings.

*Studies of Hunter-Gatherer Architecture from the Great Plains*

Tipi studies from the Northern Great Plains are of one of the most successful applications of spatial research for developing an understanding of the social life of nomadic hunter-gatherer culture. Domestic structures in this region are historically recorded as circular shelters constructed from timbers and skins that were transported between campsites during a group's seasonal round (Laubin and Laubin 1957). A characteristic ring of rocks once used for weighing down the edges of the shelter is left on the landscape as groups move on to the next site, the most overt indication of where a structure was once located.

Forbis' initial study of these rock rings focused on recording their locations, environmental context, and physical characteristics for quantification and inter-site comparison (Wormington and Forbis 1965). In this and other early studies, rings were reported to be highly unproductive and of relatively recent age, which, when combined with their abundance across the region, discouraged further excavation in favour of other site types (Davis 1983:1; Kehoe 1958; King 1968; Wormington and Forbis 1965:198). As a result, although the stone circles are the most abundant feature type in the archaeological record of the Northern Great Plains, studies of them did not begin in earnest until the 1970s (Oetelaar 2003:106; Quigg 1981; Quigg and Brumley 1984). When the Alberta Historical Resources act was passed in 1973 ring sites began to be recorded more thoroughly, though more for the sake of posterity than with any specific research question in mind (Morris 1981; Quigg 1981). Many of these early studies were salvage operations, recording as much information as possible for possible future use, while only a few sought to learn more about them as the remains of domestic structures.

Initial questions approached in the study of the rock rings involved identifying them as the remains of structures similar to the tipis ethnographically recorded in the region (Hoffman 1953; Malouf 1961; Mulloy 1954). After the significance of these stone rings was functionally determined, researchers moved on to the regional scale of study, quantifying the abundance of tipi rings to understand their distribution in relation to environmental contexts, cultural affiliations, dates, and seasons of use (e.g. Adams 1978; Calder 1979; Frison 1978; Mulloy 1966; Quigg 1978, 1981; Quigg and Brumley 1984; Wedel 1961). Broad-scale studies sought to determine causes for the perceived changes in structural variables, most commonly attempting to understand if ring size and/or site size changed after the re-introduction of the horse, to better understand the changes Plains populations underwent during European contact (Malouf 1961; Quigg 1978, 1981; Roll 1981).

Intra-site studies focused on individual rings to provide data for these broader regional investigations, while trying to define the physical characteristics of the tipi structure. Variables explored included door location, ring rock configuration, number of poles, and the locations of internal features and areas of activity (Morris 1981; Quigg 1978, 1981). Floor size was used to understand household composition and family size (Finnigan 1982), and density of materials recovered from within the circles, packing of stones, faunal remains and the context of the site within the landscape, were all used to assess the duration of occupation and season of use (Calder 1979; Ewers 1955; McIntyre 1978; Quigg 1979; Van Dyke and Head 1983). A functional understanding of the social composition of groups began to emerge during these exploratory investigations, with differences observed in tipi ring size, shape, and function being attributed to social differentiation between household groups (Calder1979:26). Unfortunately, further exploration of social variables did not occur until at least ten years later.

The 1980s saw the advances in social theory necessary to ask questions about hunter-gatherer domestic architecture in relation to aspects of life beyond basic functional and economic considerations. With these developments, a few architectural studies of tipi-ring features have focused on asking questions relating to household size and social composition, domestic activities, and community-level social organization (Deaver 1989; Hughes 1991; O'Brien 1990; Peterson 1997;). These questions tend to be greatly influenced by ethnographically recorded behaviours and ideological elements of the belief system of groups historically recorded in the region (e.g. Laubin and Laubin 1977:110-111), with researchers identifying patterns from recorded history and attempting to trace them back through archaeological remains (Deaver 1989; Hughes 1991; O'Brien 1990; Peterson 1997). However, it has become increasingly apparent that although the questions and hypotheses may arise from ethnographic contexts, what archaeologists can learn from household studies goes beyond tracing ethnographic patterns back through time. In order to connect populations from the past to recorded models, similarities in material patterning must be identified between the two groups.

By understanding tipis as symbolic and structured spaces comparable to how domestic structures are interpreted in more settled contexts, archaeologists were able to break away from the direct historical approach and its tendency to ascribe the values and beliefs of cultural analogues directly to archaeological populations (Davis 1983; Morris 1989; Oetelaar 2000). Instead, focus was placed on defining the arrangement and use of interior space in relation to non-functional variables such as symbolic, structural, proxemic and ergonomic needs of the domestic space. This focus lent to a better understanding of the ideological and social components of the archaeological hunter-gatherer culture (Oetelaar 2000:36). Although cultural analogues were still required to understand the distributions defined, domestic architectural studies enable distribution patterns to be located in material from past cultures, allowing behaviours to be inferred and not just attributed to past populations.

This was the case for the identification of a 2000-year-old tipi recovered by Oetelaar (2000). The circular ring of rocks around four meters in diameter was recovered from an environmental context fitting with what was described by Finnigan (1982, 1983) as a suitable site for the construction of a tipi during the historic period (Oetelaar 2000:44). A break in the bounding rocks was identified as the entrance, and a sandstone slab was found along the opposite wall, similar to the location of an altar in historic contexts. The only other recognizable internal feature was a patch of red, heat-stained earth that separated the sandstone block from the entrance, recognized as a hearth (Oetelaar 2000:45).

In his study, Oetelaar explored the distributional patterns within the formal tools, lithic debitage and faunal materials recovered from a highly detailed excavation of the interior of the structure. The interior area of the rock ring was exposed in one-meter squares, recovered in five centimetre levels. Three-point-provenience was recorded for all artefacts recovered in-situ, including formal tools, and lithic and faunal debitage, so that an image of the structure could be piece-plotted once the artefacts were analyzed.

The patterning of material remains resulting from this analysis was highly consistent with the depositional and post-depositional patterns that would occur with the arrangement of activities in tipis from historic contexts. Dense concentrations of very small materials, less than 5 mm, were recovered around the reddened earth of the hearth area, while refuse and tool fragments were located along the walls, beds, and surrounding the defined entrance area (Oetelaar 2000:47-48). Looking into the debitage, faunal, and formal artefact composition of the distributions, Oetelaar (2000:51-52) identified the bilateral partitioning of space along gender and roles consistent with those seen ethnographically, as well as grading of space by age-defined social status.

Investigating the composition of the distributions, Oetelaar (2000:51) identified a left and right bilateral division of the structure, explained as a differentiation between men's and women's space. The western half of the circle had a much greater density of materials than the east, consistent with the idea that women's work more often took place within the tipi structure (Oetelaar 2000:51). A similar bilateral division was discovered by Brady (2002), when looking at the quality of lithic materials recovered from another archaeological tipi structure. In this case, the colour and quality of lithic debitage was divided along the central boundary line, indicating that these left and right realms were used for different tasks, by differentiated social groups (Brady 2002:88, 91; Brumley and Dau 1987). This bilateral division of space is witnessed in the ethnographic experience of the Blackfoot and Cree tipis, with women occupying the western half of the space, while males occupy the East.

Another bilateral division- front and back, was also noted. Thought to be status related, Oetelaar (2000:51-52) observed a discrete lithic work area at the rear of the dwelling in the location of the sandstone slab, which again tied this rear area to being a place of honour in the house. He further identified the areas around the entrance as space for refuse and storage, a space with low status (Oetelaar 2000:52). Again, this model of spatial division correlates directly to the patterns seen in historic and present day experiences of the tipi, with a high-status position at the rear of the structure, grading to lower status roles towards the entrance. In ethnological populations, this status division correlates with age-grading. The elder male, the head of the household, occupies the rear space in the tipi and individuals present take up space along the wall in accordance with their social status, down-grading so that people of the youngest social division occupy the space nearest the entrance.

*Successful Methodologies Employed in Other Domestic Archaeological Investigations*

Archaeological studies from other regions have employed similar methodologies to investigate the social structure of archaeological societies without direct cultural analogues. These studies have used domestic spatial analysis to approach questions of social organization in past populations, including defining household orgainzation and organizational differences between two otherwise unknown populations (Henry et al. 1996; Henry et al. 2004; Loeffler 2003; Simek 1987; Simek and Larick 1983). These works have been undertaken with strictly controled high-resolution spatial analysis and have yeilded much success as a result. Two exemplary studies are presented below to demonstrate the methodologies employed in these investigations.

The first is a study by Henry et al. (2004:18), which explored the behavioural organization of Neanderthal and modern humans at the Middle to Upper Palaeolithic transition. The organization of the basic social unit for each of these populations was defined through the excavation of a 67 m$^2$ area from a 49,000 - 69,000 year old rock shelter in a 25 cm grid pattern with five centimeter arbitrary levels. In addition to collecting artefacts smaller than three centimeters in 25 cm units, a theodolite was used to record the point-location and orientation of larger artefacts, and the 3-dimensional shapes of large rocks and hearth features (Henry et al 2004:19).

Point-plotted artefacts were individually anayzed for a full suite of attributes, and a similar analysis was undertaken for a small sample of the smaller bulk-collected debitage (Henry et al. 2004:19). The distribution of formal artefacts, by tool type, and lithic debitage was qualitatively assessed from contour maps created from artefact counts. Patterns identified from the lithic debitage and formal artefact distributions were further supported by the distribution of phytoliths and starch grains (Henry et al. 2004:22-24). The recognition of complex site structure from the earliest living floors recovered from the site showed that with this resolution of data collection the routine organization of space can be traced and linked to non-economic or ergonomic factors to help archaeologists understand how past populations considered their world (Henry et al. 2004:25-29).

Another study that demonstrates the capabilities of spatial analysis for understanding both the functional and social organization of past populations is Loeffler's (2003) study of two late Mesolithic dwellings from northern Sweden. Using both formal tools and debitage distributions in his spatial analysis of discrete structures from two different sites, Loeffler was able to distinguish two non-cooperative household groups inhabiting each structure, with the households from one site following an identifiable division of labour (Loeffler 2003:244, 247-248) while the other site did not show such social distinction between domestic group members (Loeffler 2003:242-243).

This study undertook both quantitative and qualitiative analysis of the spatial distribution of formal tools by tool-type, as well as the distribution of lithic debitage by material type. Information on the distribution of burnt bone, fire-cracked rock, and red ochre supported the patterns found by mapping the debitage (Loeffler 2003:241). Formal tools were mapped by plotting point data recovered from within each structure, while lithic flake counts were plotted by contour maps of flake density (Loeffler 2003:242). By finding an overall distributional pattern within the domestic remains and further breaking these patterns down by types of activities performed within each of the household groups, Loeffler was able to distill the social organization of the household units from the overarching structural features at the site.

*Arctic Architectural Studies*

Studies of domestic architecture have already begun in the Canadian Arctic, though the majority of these are descriptive accounts of structural remains, similar to the work done with Plains tent rings in the early 1970s. Highly successful studies of domestic structures have been undertaken in Neo-Eskimo (post-1000 BP) contexts, with the compilation of descriptions of historically recorded tent structures (Lee and

Reinhardt 2003; Schledermann 1976), as well as domestic explorations looking at household composition and the house as a symbolic space (Dawson 2002; Dawson and Levy 2005; Reinhardt 2002). These household-scale Neo-Eskimo investigations have been enabled by the high levels of preservation of later deposits and the continuity between Neo-Eskimo archaeological populations and historically recorded Inuit groups. Similar Palaeo-Eskimo (4500-1000 BP) investigations have not yet been undertaken.

Neo-Eskimo explorations of the domestic sphere have been highly successful, as in Reinhardt's (2002) study of the gendered division of Neo-Eskimo space. In this case, domestic social life could be investigated through the excavation of a 500 year old collapsed Inupiat winter dwelling from the northern coast of Alaska, recovered with the inhabitants still inside. The preservation of the structure and the immaculate primary context of remains was an ideal setting to undertake a spatial analysis of the material remains and evaluate the ideas held about Thule social life and culture. The study resulted in the identification of a male/female bilateral division of space.

Another examination of domestic social life in the Canadian Arctic was undertaken by Dawson (2002) in his study of Thule whalebone houses. Dawson looked at the construction, symbolic meaning, and the experience of space inside this dwelling, using his computer-generated simulation of the Whalebone house to experience the space and explore theories about its use and significance (Dawson and Levy 2005).

Palaeo-Eskimo structures have been studied to a much lesser degree. Preservation of the structural remains of these highly mobile groups is lacking in comparison to the abundant remains from the later period. While Thule houses are preserved well enough to yield soft tissue and cloth material, the older Palaeo-Eskimo structures rarely yield faunal materials (Maxwell 1985:51; Milne 2003b:67). In addition to these preservation problems, Palaeo-Eskimo house structures were less robustly constructed in the first place. Rings of stones used to hold down the skin walls of these temporary residences, where these are still visible, are often the only architectural remnants available. However, the location and typology of Palaeo-Eskimo structures have been recorded from across the Arctic.

The majority of site-based studies pertaining to Palaeo-Eskimo dwellings have been focused on defining site-types and economic utility, and creating a cultural-history of the region. McGhee (1979) has established a hypothetical model of Palaeo-Eskimo domestic structure generally accepted in Arctic theory although it remains otherwise un-tested. Similarly, researchers such as LeMoine (2003) and Ryan (2003) have used observed architectural differences to approach questions about cultural change over time and create hypotheses about changes in domestic composition. However this perceived architectural diversity has not yet been tested with behavioural evidence at a household scale that would support the proposed patterns of change. These studies, and the compounding problems associated with them, are further outlined below.

***Palaeo-Eskimo Architectural Studies***

The first description of a typical Palaeo-Eskimo domestic structure was published by O'Bryan (1953; Ryan 2003:30), who's study marked the beginning of a common effort to create a normative structural typology for classifying Arctic architecture. The one outstanding result of this quest for a single structural typology is the recognition of a high degree of variability within structural remains from Palaeo-Eskimo occupations. Although structural variation has been reviewed to create a typology of structures found in the low Arctic (Ryan 2003:32), the behavioural implications of the observed variability are not yet understood.

Looking at Palaeo-Eskimo architecture simply as a stylistic indicator of cultural change has caused problems for attempts at explaining the changes observed, especially as the number of structural types increases. Ryan's (2003) study creates a descriptive device for classifying Palaeo-Eskimo structures across time and space in the Low Canadian Arctic, which can be employed simply by observing architectural features. However, her model overtly neglects the social factors that would complicate this typology, including the bchavioural component of understanding how these spaces were used. Her organization of structures with no understanding of the internal arrangement and use of space beyond the construction of the bounding walls and overtly built internal features proves problematic, even for simply determining between structural supports for a habitation structure and those that were used as a drying rack, an important distinction that activity area analysis can easily define (Ryan 2003a:42).

Ryan's model therefore serves to increase the understanding of how and when structures have changed, but questions as to why such changes took place remain. Without a better understanding of how the formal changes in architectural design and spatial arrangement were related to behavioural changes in the populations that used these structures, Ryan's typology will remain a descriptive device useful only for documentation.

To move beyond understanding Palaeo-Eskimo structures as mere stylistic indicators, Arctic archaeologists need to view architectural remains as the places where meaningful social interactions took place, spaces whose use and construction was directly affected by the behaviours and beliefs of their inhabitants. By looking at dwellings not only as functional but also symbolic spaces arranged to meet the needs of the populations who used them, whatever they deemed these needs to be, archaeologists can build on social research presented by Gieryn (2002), Hall (1963), Robin and Rothschild (2002), and Whitelaw (1994), to obtain a much better understanding of how past populations viewed their world and understood their roles in this.

To apply these concepts archaeologically, researchers must focus on revealing the basic social unit, as described by Wilke and Rathje's (1982) household archaeology, and apply this to archaeological excavations, similar to the domestic archaeological investigations undertaken by Loeffler (2003) and Oetelaar (2000). This method of investigation has yielded success in informing hunter-gatherer archaeologists such as Henry et al (2004) about the social order of extinct populations, and could well be applied to Palaeo-Eskimo investigations in the Canadian arctic to yield answers to those questions about the social lives of these past populations that have yet to be approached.

Small-scale studies of architectural features have already looked at structural diversity in relation to functional considerations of how individual structures were built and/or the seasonality and economic utility of the site (Maxwell 1973:208, 318, 320; Ramsden and Murray 1995; Renouf and Murray 1999; Ryan 2003b). These studies generally consist of a descriptive report of the construction and perhaps the internal layout of a specific structure or group of structures, while emphasizing functional information such as the season and duration of occupation and the underlying purpose of site occupation. For example, Ryan (2003b) describes in detail a late-Dorset structure from the Bell Site as a short-term dwelling used while hunting caribou, but does not suggest a socio-economic group inhabiting the structure, or their social realm. Other studies have explored the viability of functional explanations propose for domestic structures, such as Odgaard's (2003) exploration of the amount of heat produced by a box hearth, and how effective this would be for heating the proposed tent-like dwellings of the Palaeo-Eskimo.

Robert McGhee's (1979) study of the structures at Port Refuge is the only published investigation specifically focused on identifying the domestic life of the earliest inhabitants of the Canadian Arcitic. To understand the social structure of the earliest Palaeo-Eskimo households from the High Arctic, McGhee assessed the spatial patterning of formal artefacts recovered from the cold-component (Independence-I / Pre-Dorset) structures that he excavated over a three-week period in July of 1977 (McGhee 1979:6). In his study, McGhee overlaid formal artefact distributions from 12 completely excavated structures, a combination of dwellings, camps and work stations, to create a model of the distribution of space in a Palaeo-Eskimo dwelling (McGhee 1979:51, 52) (Figure 2).

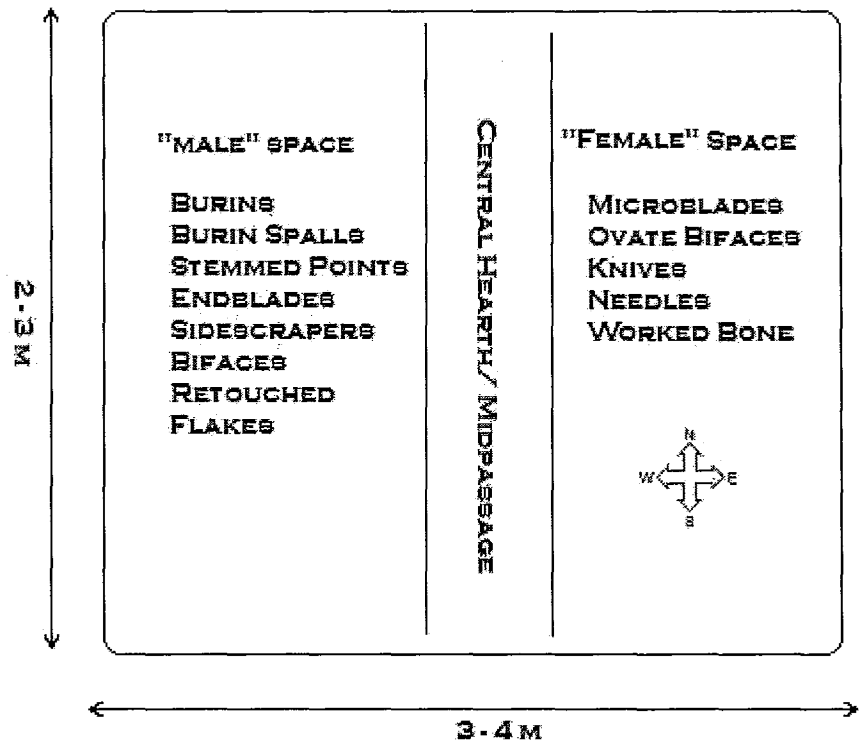


Figure 15. A depiction of McGhee's model of the use of space in a Palaeo-Eskimo dwelling from the High Arctic (McGhee 1979:52, 54)

McGhee's idealized Independence-I dwelling was a 2-3 m long and 3-4 m wide rectangular structure divided into left and right living areas by a central hearth and mid-passage (McGhee 1979:52). The living area in the western (right) side of the structure was also differentiated from that in the eastern half, with almost twice as many artefacts and a tool assemblage characterized by burins, burin spalls, stemmed points, endblades, sidescrapers, biface fragments and retouched flakes. Microblades, ovate bifaces, knives, needles and worked bones were more prominent in the assemblage in the east/left side (McGhee 1979:52, 54).

This model was described as being a clear indicator of a bilateral division of space, with "men's tools" - defined by McGhee as a tool kit consisting of burins, burin spalls and "weapons" represented in the right realm of the house, and "women's tools" – microblades and needles, appearing in the left (1979:54). The appearance of this bilateral division of space, attributed to the existence of a division of male and female tasks and a gender-based division of labour, suggests that a highly formalized social setting existed during this very early period, which has consequences for our understanding of the socio-political organization of Palaeo-Eskimo society (Kent 1991).

Despite its status as an unverified model of the use of domestic space, McGhee's bilaterally divided representation of a typical Palaeo-Eskimo household has been accepted in other Arctic investigations, to the extent that the central mid-passage has become a typological indicator for classifying Independence I sites (Sutherland 2003). The notion of bilaterally divided structuring of space is also noted in structures where the formal mid-passage was missing (Damkjar 2003:208; Odgaard 1998), which has been used to suggest a long-standing adherence to an axially-divided setup (Odgaard 1998). However, the function of these central areas and the cultural mechanisms behind the bilaterally divided space this defines are yet to be defined.

McGhee's model, however, cannot be blindly accepted. First off, the identification of gendered space is not as straight-forward as McGhee has suggested. McGhee's classifications of artefacts as either male or female tools were based solely on the use of similar tools in historic Arctic contexts and pre-conceived notions of male and female activities, which would have predisposed his results to support a gendered, rather than functional, division of space. Either distinction would be telling for understanding the cultural organization of space based on Kent's (1984) model, however, directly attributing this division to gender steps beyond what the archaeological record is capable of telling.

McGhee's associations between tools and gender roles may have been flawed, as the toolkits he defined for these social categories were based on assumed task divisions not necessarily seen even in his analogous culture. Owen (1999:24) notes that needles are not uniquely used in the domestic production of clothing, which is considered women's work, but is also a crucial implement in an Inuit hunter's toolkit, serving a variety of repair purposes. Similar arguments are made for awls and arrow straighteners (Owen 1999). These examples demonstrate the need for archaeologists to look beyond functional gender stereotypes when studying the social context of past cultures, for example by employing functional use wear analysis when defining the tasks for which tools were used in archaeological contexts (Owen 1999:18-19), and by relying on multiple lines of supporting evidence. Merely applying a gendered division of labour to explain a bilateral division of space is unacceptable.

Another objection to McGhee's model of bilaterally divided space is its inconsistency with the overall understanding of Palaeo-Eskimo life. Palaeo-Eskimo society has traditionally been depicted as having a fluid social system, flexible diet, and an advanced, versatile tool kit (Taylor 1966; McGhee 1975:55), an image at odds with the strict social ordering of the world that is suggested by a bilaterally-divided society. McGhee's finding of a gender-based division of labour in the eastern Canadian Arctic as many as 4500 years ago may be a product of a perceived analogy based on pre-conceived notions of similarity between Palaeo- and Neo-Eskimo populations (Maxwell 1985:51), rather than a true bilateral division of space. By only relying on the formal tool distributions, McGhee's study is affected by the Pompeii

Premise (La Motta and Schiffer 1999), and may be biased by insignificant sample sizes.

The Pompeii premise is the idea that the artefacts recovered by archaeologists are found as they were used in life, their distributions directly reflecting the state of that location at the time of its use, like the rooms of Pompeii that were buried by the eruption of Mount Vesuvius and frozen in the state in which they were used at the time (LaMotta and Schiffer 1999:132). Unfortunately, the archaeological record seldom preserves such a precise moment in time, and is hardly ever the context of use preserved in the archaeological remains (Binford 1981). This is especially true for formal artefacts.

Activity area research has shown that formal artefacts are the most likely to be discarded away from their area of original use, either removed from the site as highly curated objects, or properly discarded as refuse (Binford 1972, 1978; Carr 1991; Ciolek-Torrello1989; Johnson 1984:78; Kent 1984:169, 172; Murray, 1980; O'Connell 1979, 1995:214; O'Connell et al. 1991; Schiffer 1972:161). However, the smallest items with low economic value are likely to be left in place during site cleaning and abandonment (Johnson 1984:79). Distribution patterns of the smallest waste and expedient tools are more likely to be indicative of areas where activities actually occurred than are the distributions of formal, curated tools (Johnson 1984:78). Therefore, artefacts such as burins, scrapers, and blades are likely to be recovered out of their original context at an archaeological site, leaving only the small tools, such as microblades and burin spalls to indicate the location in which tools were created, used, or rejuvenated. If strict collection techniques are not used, including the use of screens to collect small materials, these tiny tools are the artefacts most likely to be missed.

McGhee's reliance on only the distribution of formal artefacts was also subject to problems inherent with a small sample size. His model of a Palaeo-Eskimo house was constructed from 12 different structures because he needed to increase the number of formal artefacts within each feature to identify any patterning in tool distributions. If studied individually, none of the structures would have yielded enough formal artefacts to exhibit a distribution pattern. Even with the amalgamation of 12 structures, the patterning McGhee noted is relying on a very small sample of formal artefacts. Although unlikely, it is not impossible that the patterns outlined by McGhee are the product of a random distribution.

Because of these issues, an investigation of Palaeo-Eskimo domestic organization needs to be undertaken from the very beginning. A new methodology that focuses on the distribution of lithic debitage, the waste products of tool creation, needs to be developed, which would increase sample size to obtain statically significant results, and rely on artefacts not likely to have been removed from their location of original discard. Applying a domestic-scale of analysis to Palaeo-Eskimo sites, if viable in this context, will provide a level of data beyond the broad categorization current recording practices offer for understanding Palaeo-Eskimo settlement patterns and social organization. Similar to the benefits seen in Plains Archaeology since the 1970s, ideas about social change through time and inter-regional interactions should then be accessible in Arctic environments.

Milne's proposed excavations during her 2007 field season focused on examining two structures from a Palaeo-Eskimo site that had undergone initial testing during her inland regional survey of South-Central Baffin Island two years prior. This project provided an opportunity to undertake a thorough domestic study in an interior Arctic context. A methodology for undertaking a household-scale analysis was developed (Chapter 4) and rigorous excavation and collection techniques were employed specifically for the creation of distribution maps with high enough resolution to permit exploration of activity patterning in and around a single structure at her research location, LdFa-1.

*Chapter 3*

## The LdFa-1 Site

LdFa-1 is an expansive archaeological site within the interior lakes of South-Central Baffin Island, Nunavut. It is a multi-occupational campsite characterized by 33 circular structures apparent on the surface (Figure 3). These features exist in a combination of robust and lighter built forms, with a variety of internal constructions. They are thought to be tent rings - the archaeological remnants of non-permanent dwellings.

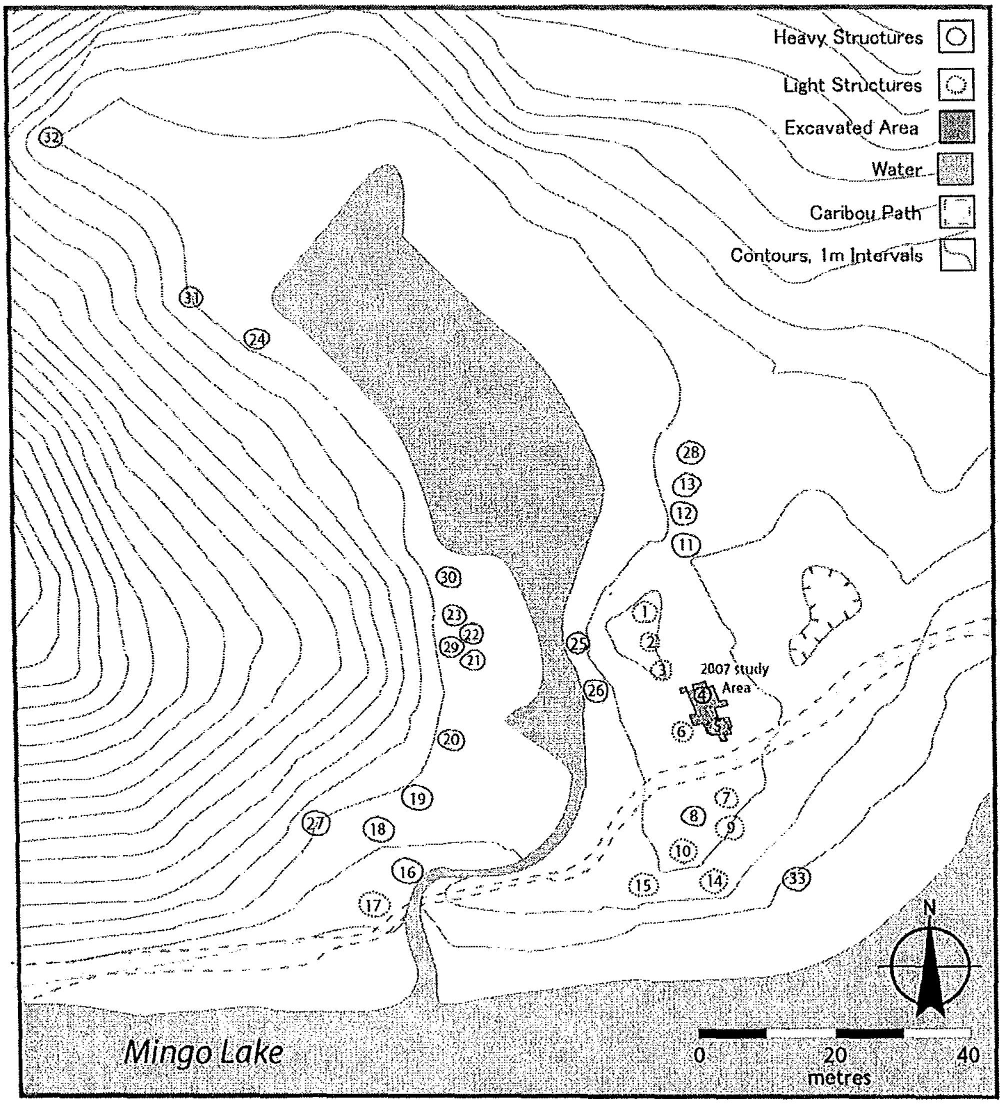


**Figure 3.** LdFa-1 topographic site map, locating features (circles), and the 2007 excavation area (Redrawn from Park 2009: Figure 4 and Milne 2005a: Map 4)

This site was first recorded by Stenton (1991) as he surveyed traditional land use in the interior region (Milne 2005a:7). Milne undertook preliminary testing at the site in 2004 when she visited during her systematic survey of the Inland Lakes region. Based on the results of these first test units, Milne slated the full excavation of two structures from LdFa-1 for her 2007 field research. Milne's initial assessment, based on tool typologies, indicated the site was used exclusively by multiple occupations of Palaeo-Eskimo populations (Milne 2005a:14-15). Radiocarbon dates obtained from caribou bone recovered from the site have concurred with this, with dates spanning from Cal BP 1160 to 950 (Beta – 246449) through Cal BP 3630 to 3440 (Beta – 246443), calculated with 2σ standard error. However, some of the artefacts recently recovered from the site reveal the presence of a Neo-Eskimo component.

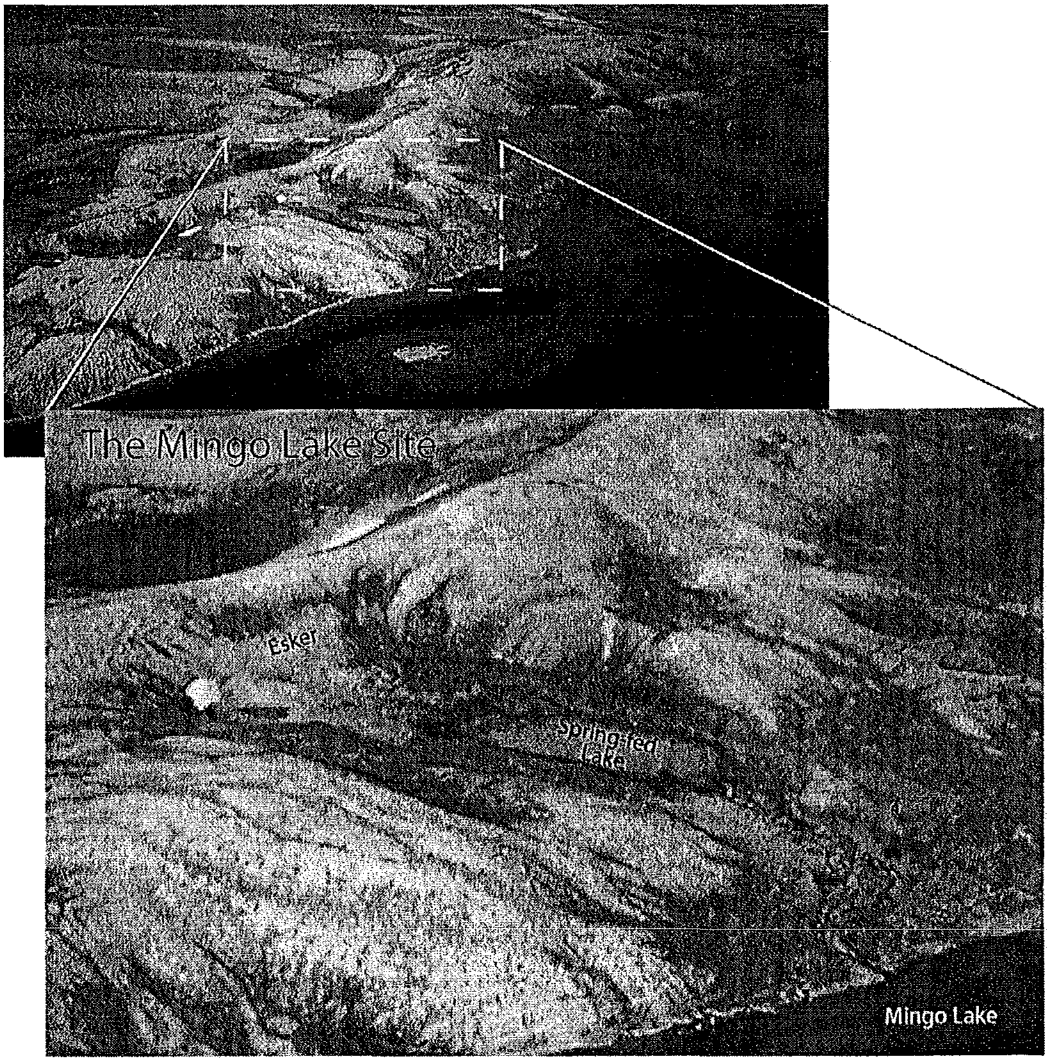


**Figure 4.** Aerial view of the north shore of Mingo Lake depicting the LdFa-1 site, and numeral 4 indicating the location of Structure 4 (Photo: Milne 2004).

The site is situated within an esker-enclosed area along the northwest shore of Mingo Lake (Figure 4). A deeply cut seasonal creek bisects the site as it feeds water from a small spring-fed lake at the north end of the site into Mingo Lake, which defines the southern site boundary. The esker rising to the north comes around to encircle the western side of the site and continues across to a second outcrop where two hunting blinds made of heavily lichened boulders are mounted half way up the lake-facing slope (Figure 5).

These hunting blinds overlook the narrowest point of Mingo Lake, and across the other side rock cairns form drive lanes running to a lower basin area protected by eskers and other landforms out of sight from LdFa-1. It is still uncertain as to which time period these cairns date. Caribou crossings at this location were a regular occurrence over the four weeks in July spent researching at the site (Figure 6). A similar presence of caribou is likely to have existed throughout past occupations. Even in years of scarcity, caribou populations aggregate in these interior regions (Riewe 1992:182).

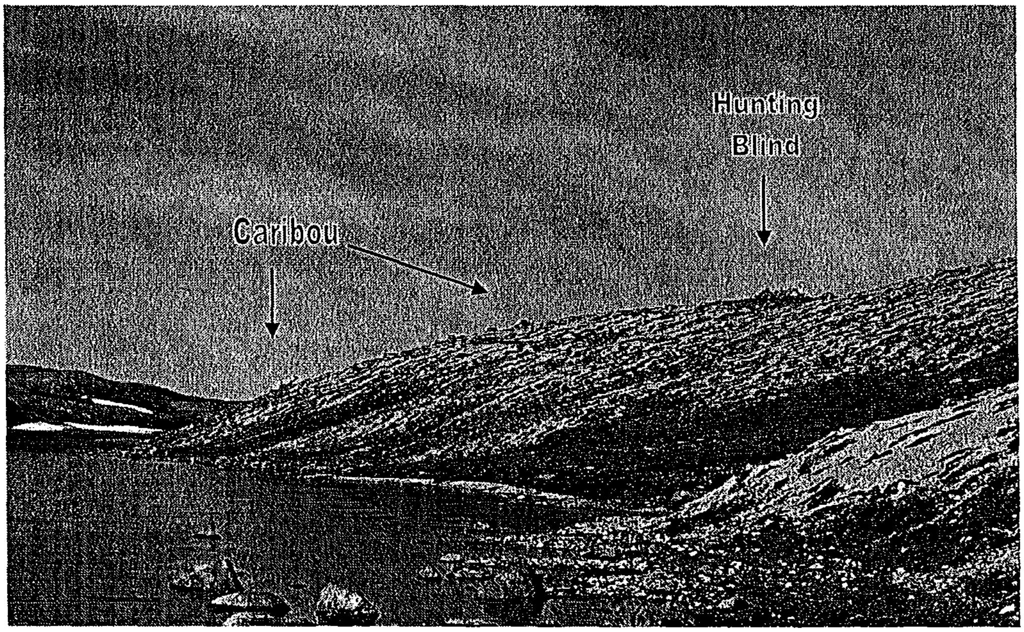


**Figure 5.** View to the west of LdFa-1. Notice the caribou passing just below the hunting blind mounted half way up the foot of the esker.

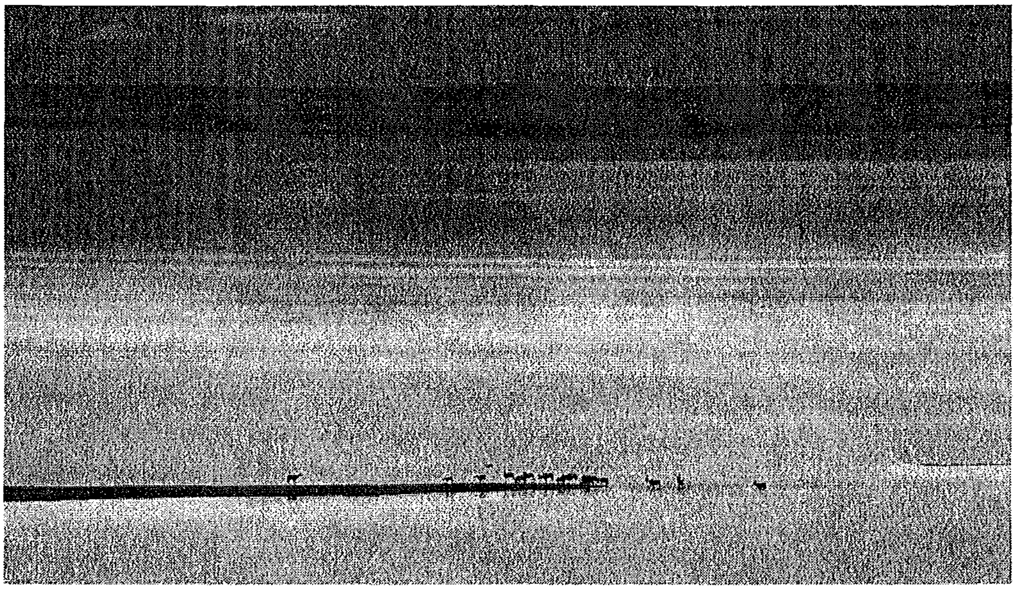

**Figure 6.** Caribou crossing further east from the site, a more common occurrence near the end of our stay at Mingo Lake, in late July.

LdFa-1 is within the present wintering range for the large South Baffin caribou herd, although it is thought that only the non-migratory mature bulls from this population remain here during the summer months (Riewe 1992:182). Females and immature caribou migrate away from the area between March and May for calving and return in the late summer through the fall, to winter east of Nettling and Amadjuak Lakes (Riewe 1992:182; Fig 3). The caribou seen during our study included a combination of males, females and calves, perhaps the returning herd or possibly caribou populations who do not migrate out of the region. There was an abundant faunal assemblage recovered from the site, from which preliminary data are available (Milne et al 2008). An abundance of caribou bone recovered from the site suggests that LdFa-1 was used for procuring caribou, however, bird bone also made up a substantial portion of the faunal assemblage

Migratory waterfowl would also have been a resource present in this inland region during the spring, summer and autumn months (Milne 2003a:94). This area is presently used to procure birds such as moulting geese, oldsquaws, gulls, loons, snow geese, and jaegers (Riewe 1992:72, 181), and Milne and Donnelly (2004) have noted the importance of snow geese in archaeological assemblages from other inland occupations. However, minimal amounts of bird bone were recovered from excavations at LdFa-1, especially in comparison to the avian assemblage recovered from the MaDv-11 site along the shores of Burwash Bay, Nettilling Lake (Milne 2005a:18). This suggests that LdFa-1 was a more specialized caribou-hunting site, although the diets of populations occupying the site was flexible and may have been supplemented with opportunistically procured resources.

The Cultural Context of Arctic **Prehistory**

The Palaeo-Eskimo were the first people to occupy the Canadian Arctic, entering into and migrating to settle throughout the Arctic in the period approximately 5000-1000 BP (Giddings 1967; Maxwell 1985:42; Milne 2005b:330). Archaeologists have further divided the Palaeo-Eskimo period into multiple regional and chronological variants, with two broad cultural periods identified in the Eastern Low Arctic, the Early Palaeo-Eskimo, further divided into Pre-Dorset and transitional Pre-Dorset/Dorset cultures, followed by the Late Palaeo-Eskimo period, which is further differentiated as the Early, Middle, Late, and Terminal Dorset periods (Ryan 2003)(Table 1).

**Table 1.** Cultural Model for the Eastern Low Arctic (Based on Ryan 2003)

| Migration | Cultural Period | Archaeological Culture | Years (BP) |
|---|---|---|---|
| Neo-Eskimo | Neo-Eskimo | Inuit | 0 |
| | | Thule | 200<br>1000 |
| Palaeo-Eskimo | Late Palaeo-Eskimo | *Terminal Dorset* | *(1000 - 500)* |
| | | Late Dorset | 1000 |
| | | Middle Dorset | 1500 |
| | | Early Dorset | 2000 |
| | Early Palaeo-Eskimo | *Transitional Pre-Dorset/ Dorset* | 2500 |
| | | Pre-Dorset | 2800<br>4500 |

After the occupation of the region by the Late Palaeo-Eskimo, a cultural change occurred in the Canadian Arctic. Neo-Eskimo groups entered the region from the Alaskan Aleutian Islands, approximately 1000 BP. This culture, known as the Thule, are the direct historic ancestors of today's Inuit peoples, who brought a new economic focus and new technologies to the Canadian North (McGhee 1990).

Going up the Country: The Inland Experience of Palaeo-Eskimo Populations

Arctic researchers have acknowledged a seasonal use of the landscape by Palaeo-Eskimo populations, as groups, whole or in part, ventured inland during summer months to procure resources and maintain social networks (Bielawski 1982; Milne 2003a:202, 2005b:342). Through lithic debitage analysis, Milne (2003a; 2005a) has shown that the interior was a place for resource extraction and socialization. Amateur flint knappers would have ventured inland to learn this skill because of the relative abundance of lithic material available in this region for novices to practice on (Milne 2005b). Although no large bedrock outcrops of the tool stone used for flint knapping have been identified at or within a close vicinity of LdFa-1, nodules of local chert weathered from some unknown nearby bedrock source are found (Milne et al. 2009).

Because of the long arduous journey to the interior, it is possible that not all members of society made the trek inland. Those who could not make the trip may have resided at upland coastal locations while a select few ventured to the interior (Milne 2003a:202). Milne suggests that the social fractionation of groups during this time may have caused interior camps to be setup differently than the more formalized coastal campsites. With only adults and older children venturing inland, camping in the interior may have had a different social feeling. Camp life may have been more relaxed, providing a retreat from the structure of everyday life on the coast (Milne 2005a:342).

However, if the society was as strictly structured as is suggested by the proposed ubiquitous axial mid-passage (Sutherland 2003) and a strict gender-divided space (McGhee 1979), the absence of members of society should not change how the world was perceived by the individuals who were present. Rules of ordered space should prevail in the interior context as they were in coastal settlements.

Because people organize their behavior following social norms that have been created to enforce the principles by which their world operates, teaching the proper methods of undertaking new tasks would also require teaching the appropriate social setup of these activities. Teaching strategies would enforce the structure of the social, economic, political, and ideological realms of the society, with each individual taught their place in each of these realms through their interaction with others in constructed spaces. Therefore, although some flexibility may be seen, any formal delineation of space within the house that would normally exist in other locations is expected to remain in place at these interior sites.

Obstacles in Understanding Palaeo-Eskimo Populations

The majority of what is known about Palaeo-Eskimo life has been developed from studies of sites along the coast and the more accessible coastal uplands(Milne2003a:81). Prior to 2004 only two sites from interior locations had been located and studied (Milne 2005b:331). But this lack of data from inland locations does not necessarily stem from a lack of sites. Research logistics have biased the archaeological sample to over-represent coastal sites, their close proximity to settlements making them more easily discovered and excavated (Maxwell 1985; Milne 2003b:67-68).

The limited data available from direct studies and the general similarities seen in environment and general circumpolar ideology have justified the use of analogy derived from other circumpolar populations (Friesen 2002; Hood 1995; LeMoine 2003). The extreme environment and subsistence-based lifestyle of historic Inuit, combined with the finding of most Palaeo-Eskimo sites at locations also later inhabited by Neo-Eskimo groups, have led most researchers to imagine their way of life as roughly comparable to that of the later inhabitants (Maxwell 1985; Murray 1997:1-2; Sutherland 1991). However, this functionally-based analogy has been applied beyond basic functional and economic aspects, to be incorporated into the social and ideological realms of Palaeo-Eskimo life. The resulting image of Palaeo-Eskimo social life is therefore quite similar to that of Neo-Eskimo populations, though more recent investigations have shown that Palaeo-Eskimo groups had a different economic focus and hunting strategy, and it has been suggested that their social living space may have been constructed in a different manner, given the architectural variability seen between features (LeMoine 2003:128, 132). However, the noted variation in structural forms has not yet been studied for behavioural differences supported by patterning in the archaeological remains.

Goals and Limitations of this Study

Divergences between the proposed daily life practices and the social organization presently ascribed to the Palaeo-Eskimo populations necessitate a re-evaluation of the basic tenets of the domestic organization of this early Arctic culture. As explained above (see Chapter 2), archaeologically identifying the degree to which domestic roles were formalized in Palaeo-Eskimo households presents a way of understanding this extinct northern culture, using an approach that bases interpretation directly on archaeological remains.

Milne's 2007 field season at LdFa-1 was established to provide micro-scale data for her more extensive investigation of the interior region. This broader project provided an ideal context for undertaking a household-scale analysis of Palaeo-Eskimo structures, and gave rise to my own thesis project, here presented. The present study critically evaluates the distribution of debitage recovered from inside and around a single structure from the LdFa-1 site, to analyze the potential of undertaking high-resolution spatial analyses in an Arctic context. The goal of this initial assessment is to determine if this structure can be identified as domestic space, and to develop a methodology for efficiently undertaking future studies at the domestic scale of analysis.

Although this study of a single structure does not provide a large enough sample size to define the domestic realm of an entire culture, or identify the existence of social principles structuring behaviours, this investigation provides the first step to undertaking these much larger inquiries. Without this initial assessment of the viability of undertaking domestic spatial analyses in an Arctic context, the process of defining differences in domestic social organization between sites and over time cannot begin..

*Chapter 4*

# DOMESTIC ARCHITECTURE RESEARCH METHODOLOGY

## Data Collection

Fieldwork for this project took place at LdFa-1 July 2-28, 2007. The field crew consisted of six individuals, led by Brooke Milne, of the University of Manitoba. Her goals for the 2007 project included excavating one heavily constructed feature and another ring of lighter construction, as well as the outdoor areas between.

### *Structure Selection*

Structure 4 was the heaviest and most circular of all the rings at the site, although at two-by-two meters, its internal space was slightly smaller than average (Figure 7). This structure was chosen because it seemed relatively old and undisturbed based on the heavy lichen growth on the peripheral rocks. It was also in close proximity to the lighter-constructed Structure 11, which contributed to achieving to the goals of the broader research project by providing a study area consisting of two structures of differing construction and an example of an affiliated outdoor space (Figure 8).

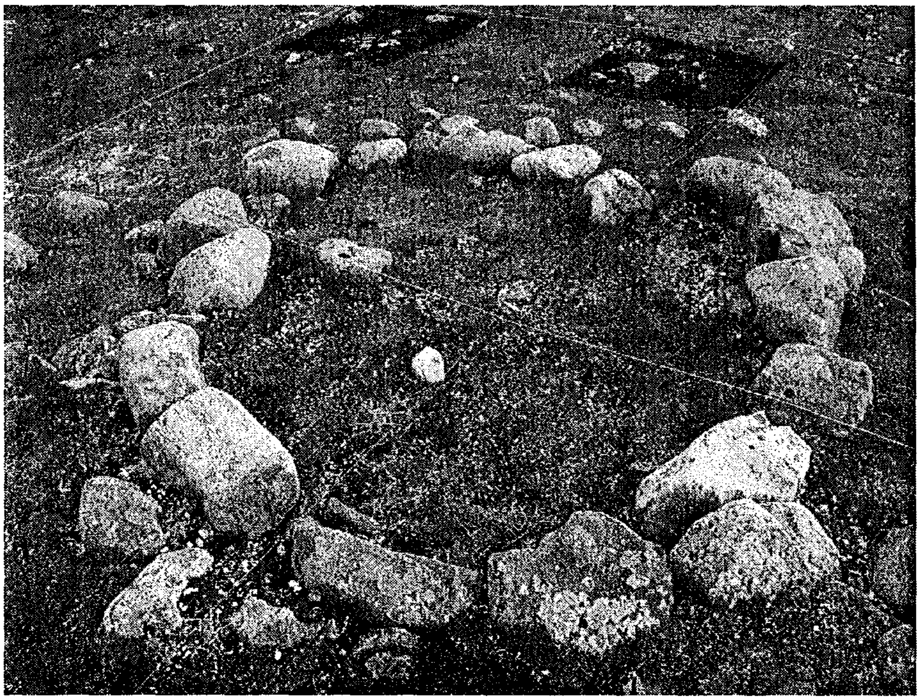

**Figure 20.** Structure 4 at LdFa-1, facing southeast. Notice the two one-meter units excavated to the south for scale

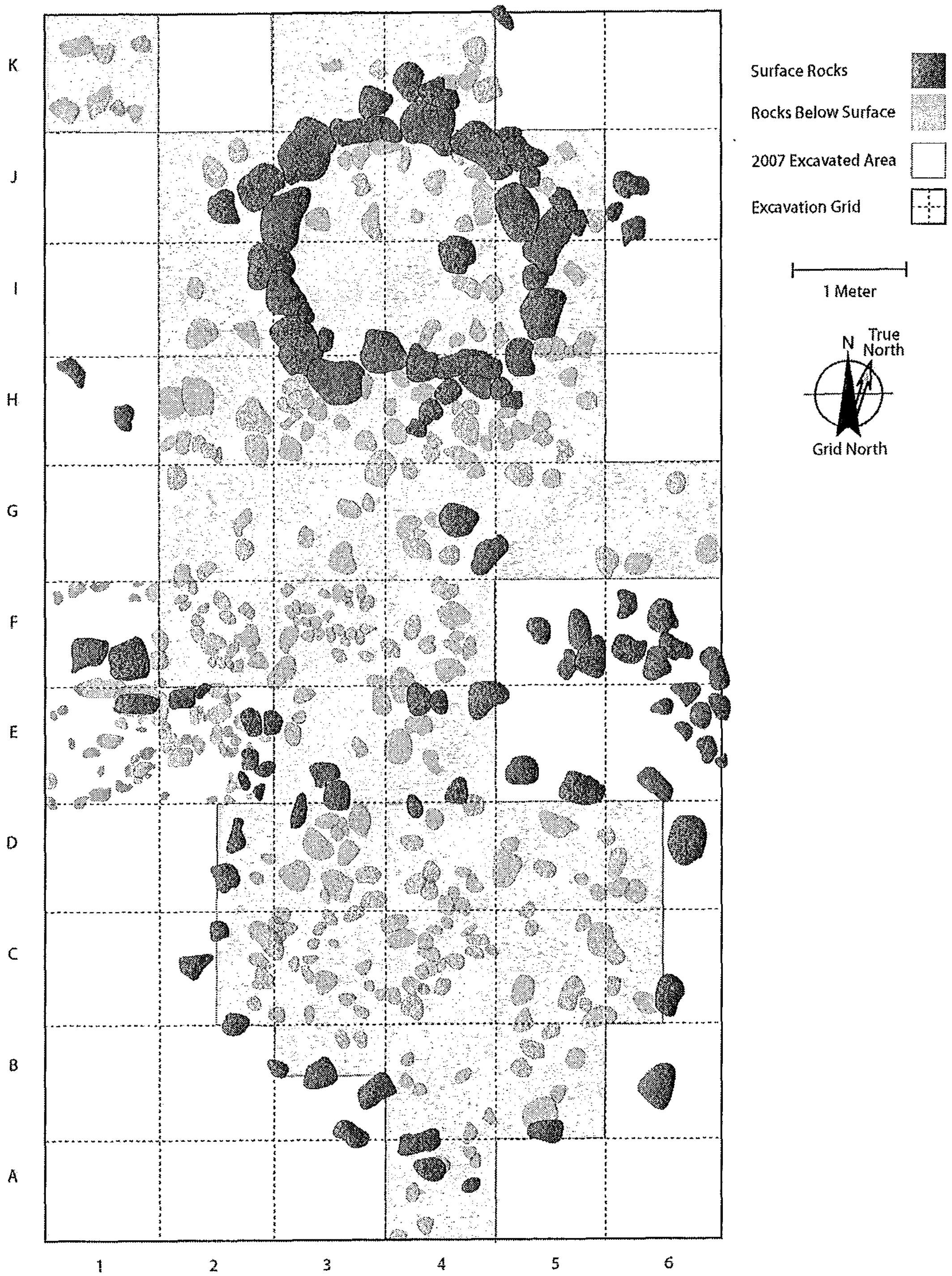


**Figure 21.** 2007 excavation area. Heavily-built Structure 4 is north of the lighter-built Structure 5 (Redrawn from Milne 2008;Figure 8 and Park 2009: Figure 17)

The heavy construction of Structure 4 was thought to be indicative of structure built more substantially to be occupied over a longer duration or during a time of bad weather, in either case, at a time when activities were most likely to have been undertaken indoors. If an indoor occupation was anticipated for an extended period of time, it is more likely that internal space would be appropriately structured, and therefore that distribution patterns would be identifiable in the archaeological remains, thus more suitable for this investigation.

The heavy construction, lack of internal features, and circular shape of Structure 4 prevent the orientation of the structure from being overtly evident. No apparent breaks in the bounding rock ring directly indicate an entrance point. However, a minor displacement of rocks at the south end of the otherwise perfectly circular construction may indicate an entranceway (Figure 9). Looking at debitage distribution patterns helps define this southern area as the 'entrance,' as smaller materials should be in similar concentrations on either side of the threshold as people tracked materials in and out of the structure

This southerly orientation and opening to water are in agreement with the location of this feature in another Palaeo-Eskimo structure excavated by Milne (2003b). Her description of an early Palaeo-Eskimo structure from the Tungatsivvik (KkDo-3) site, Frobisher Bay, has an entranceway identified in a similar location, opening to the south towards the major water body at the site, the Peterhead Inlet (2003b:71). However, the entrance described in that study was further supported by a break in the structural rocks (Figure 10).

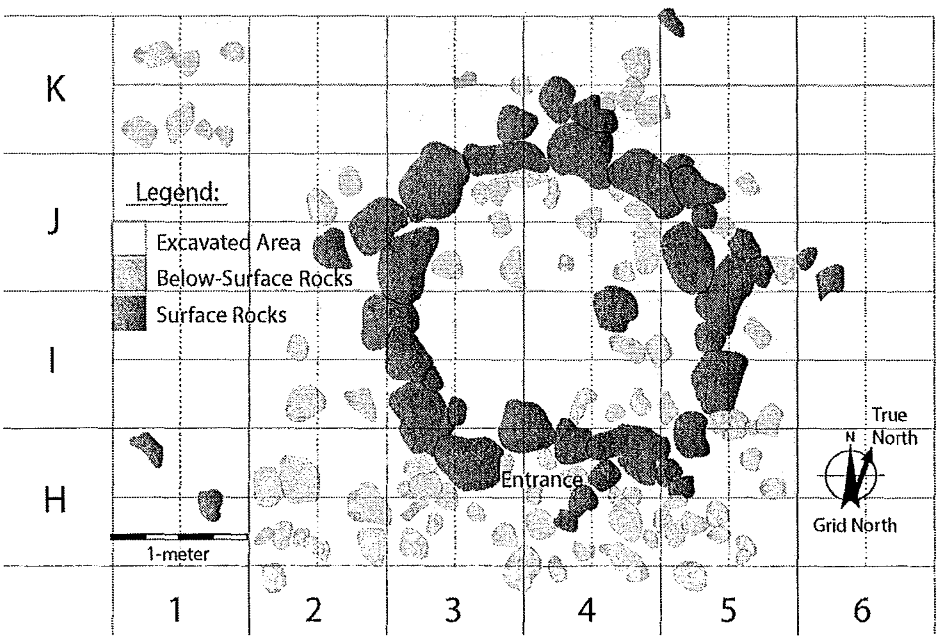


**Figure 22.** Proposed Structure 4 orientation (Redrawn from Milne 2008: Figure 8)

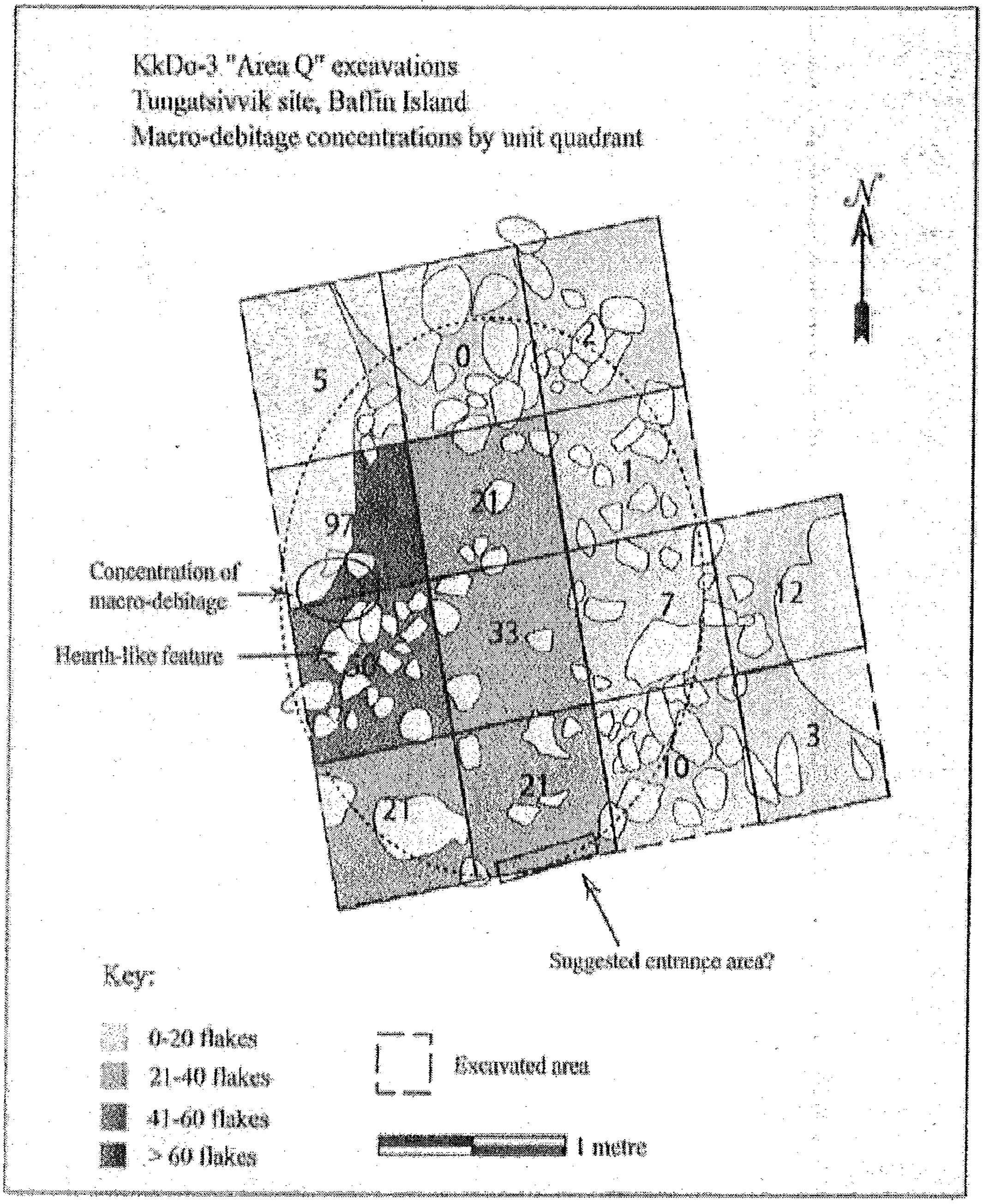


**Figure 23.** Pre-Dorset structure excavated by Milne, notice the location of the defined entrance (from Milne 2003b: Figure 6)

*Structure 4 as a Domestic Space*

Although not remarkably small for a Palaeo-Eskimo dwelling, the two-by-two meter dimension of Structure 4 has implications for the activities that could have been undertaken inside. With only six-and-a-half feet of floor space across the widest section of this feature, there was little room for activities to take place. A single person can live in such an area relatively comfortably, with space left to organize their belongings and their activities (Figure 11), However, if more than one occupant were to be added to the space, little room would remain for each individual to function separately.

**Figure 1:** Feature 4 with researcher for scale of interior dimensions.

However, there is space for a small number of people to sleep or work within the interior of the structure, if they worked together or on relatively unobtrusive activities. A family group of two adults and a few small children could reasonably have fit in this structure, however little room would remain for any differentiation of space between them. Any more people than this, however, would not fit in a structure of this size.

If the rocks that create the bounding walls had been rolled inward to remove the tent-material these rocks were thought to have weighed down, a little more space would be available for moving about the structure. However, this does not seem to have been the case. The tightly-fit boulders standing on edge were likely in place during the use of the dwelling. The tent itself may not be very tall, as high winds would likely snap a structure, or at least make inhabiting this impossible as it bent in a gale. Also, any sloping of the walls of a conical structure would further decrease space in the upper regions of the dwelling.

Activities that would have been possible with a tent-like construction of this diameter at the base would be limited. It is more than likely that activity was undertaken sitting or laying down within the structure, Large, messy tasks such as butchering and primary flaking would likely not have occurred in this inside context. As well, children's activities, running, jumping and playing, would most likely occur outdoors. However, finer detailed work requiring warm surroundings out of the wind and precipitation, such as sharpening or hafting tools, or cutting up smaller parcels of foodstuffs for cooking, are perfectly suited for such an inside space.

Apart from sleeping, other indoor activities not directly producing debitage may include socializing. Milne (2003b:81) has identified socializing to be an activity possibly undertaken in an indoor space, to be away from the bugs and environmental conditions of the Interior Arctic during the summer months. This activity could be combined with logistics planning or tool-maintenance, or other daily tasks. In a site thought to be inhabited by young flintknappers, it is likely that learning the tool-making trade was a social activity that was observed both within the domestic context as it was outside of this sheltered space.

*Site Setup and Excavation Methods*

The 2007 season began by establishing a three meter grid over Structure 4, following the baseline defined in the 2004 field season. The center of the feature was estimated and used as the centre point from which the grid was triangulated across the site. The slight slope of the land and high rocks made triangulation difficult, but the short distance between stakes reduced individual error. Units of one-by- one meter were plotted between these base stakes, and units bounded by the stones of the walls or bordering on the edge of Structure 4 were excavated using a trowel and dustpan.

Formal artefacts recovered during excavation were recorded with point data. Three-point provenience, including easting, northing, and depth below surface, was recorded in centimetres and then the piece was bagged and catalogued with a brief categorical description of the artefact recovered.

Lithic debitage and faunal remains were collected in bulk for each 50 cm quadrate, and artefacts collected from nested screens were bagged by one-quarter and one-eighth inch screen size. Any formal artefacts recovered with the screened material were separated and bagged similarly to formal artefacts recovered in-situ, with provenience data being recorded as 'recovered from screen.'

Having point-provenience coordinate data for all artefacts is the ideal for analyzing spatial distribution patterns (Oetelaar 2000), however, Milne's overall site excavation goals did not require data at this scale, nor was it possible to allot the time it would take to recover data at this resolution, given the tedium and inconsistency of this collection strategy. The alternative is collecting data as cell frequency values (Johnson 1984:80), recording the abundance of artefacts within cells of an arbitrarily defined grid that has been applied to the site. It is most common for archaeological investigations to combine both types of data in excavation; recording point-provenience coordinates for larger materials, while using screening methods to ensure consistent collection of artefacts, the size of screen dictating the minimum size of artefacts to be included in the study (Johnson 1984:80-81).

An unfortunate result of collecting cell frequency data, however, is the blurring of the spatial context from which materials are recovered. Referred to in geographic study as the modifiable areal unit problem (MAUP), it is understood that the larger the collection unit, the more homogenous the sample will seem because aggregation reduces the between-unit variation (Clark and Hosking 1986:405).

Site pixilation occurs as arbitrary boundaries are defined for data collection, which is useful when determining which matrix can be passed through the screen at one time, but bad for contextual studies. Archaeologists can only assume that artefacts were evenly spread across the unit from which they were collected. This site pixilation brings up resolution and boundary delineation issues that need to be factored into the interpretation of the spatial patterning. Larger collection units mask spatial variability within the archaeological assemblage, while smaller units require intense excavation but provide a clearer picture of material distributions.

According to Johnson (1984:81), data collected from 20x20 cm excavation units provides the equivalent resolution of coordinate data for understanding spatial patterns, eliminating the need for collecting artefact point provenience. Excavating at this scale, however, makes both artefact collection and lab analysis incredibly time-consuming. An alternative sampling size was developed for this project that would maximize field productivity and keep lab time at a minimum, while creating an image with a high enough resolution to facilitate the discrimination of patterned space.

Excavating in one-meter units was first considered, as this would enable quick data collection in the field and would provide a large sample size per unit. However, this recovery strategy would yield only four cells from the interior of the two-by-two meter Structure 4. This scale would be too coarse to provide the spatial resolution necessary to understand the division of artefacts beyond the existence of bilateral asymmetry. If multiple concentrations of artefacts existed, these would not have been apparent with this scale of data recording. Also, any clusters spanning a boundary division would not be visible.

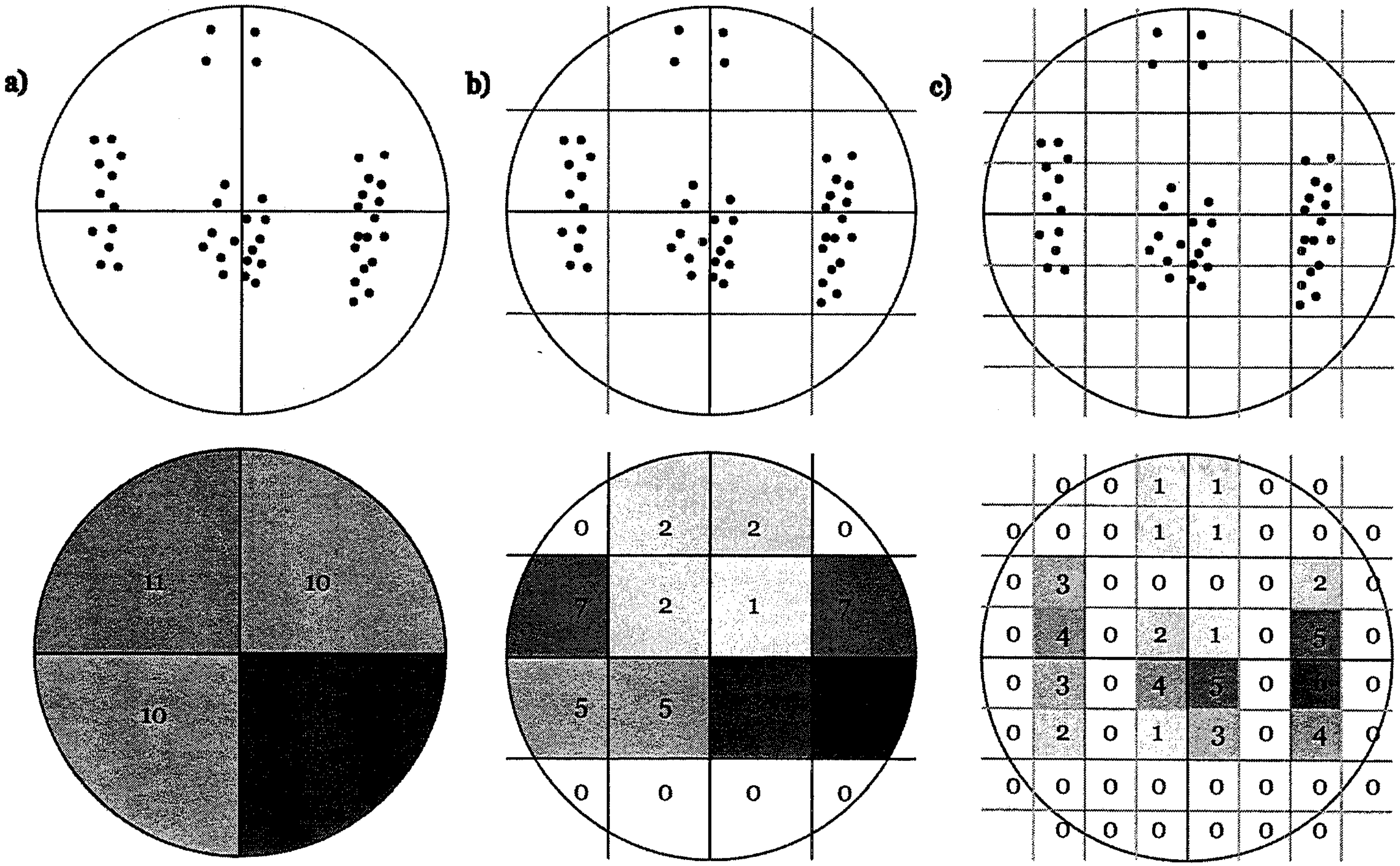


**Figure 25.** Example of the distribution pattern and the cell frequency recovered from a two-by-two metre structure excavated in A) one meter units; B) 50 cm units, and; C) 25 cm units

An example of the limitations of this scale of study can be seen when looking at an idealized structural form, such as in Figure 12. If studied by point provenience, this example structure would exhibit a left/right bilateral division of space and a central work area, with a rear 'high status' location (Figure 12a). However, excavating the structure so that it is represented only by counts from four discrete cells does not show such patterning. What is seen is a relatively smooth distribution of materials across the entire structure, perhaps with a more concentrated work area in the lower right corner, which has 18 artefacts as opposed to the 10 or 11 occurring in each of the other areas of the structure (Figure 12a, lower)

By reducing unit size to 50 cm quadrates, the number of divisions is quadrupled, which increases the resolution by four times. The increased visibility of distribution patterns when data are collected at this increased resolution is explored in the application of a 50 cm grid to the same example (Figure 12b). The distribution pattern is substantially more apparent in this visualization, with distinct left and right zones of activity, although the centre activity area becomes joined with that to the right. There is also some indication of the 'high status' area to the north, though there really is not enough distinction between this area and the other high-density areas to clearly identify this location.

Activity areas and any artefact concentrations around internal features should be visible at the 50x50 cm scale, but a further reduction to 25 cm units would increase resolution another 400% to provide an even clearer distribution pattern (Figure 12c). Johnson (1984:81) advocates this reduction, but excavating at this level becomes tedious as an area such as is represented by Structure 4 contains over 64 units. The increased number of units would increase the amount of time needed to excavate, and the limited length of the field season made this increase unfeasible. The 50 cm grid pattern was used instead for this study, to optimize the resolution in the time available.

The choice of screen size was more straightforward. Cleaning and other site maintenance activities remove and distort the largest materials at the site, with only those artefacts less than three to five millimetres likely to remain in-situ (Carr 1991:223; O'Connell 1991:72). A screen size that would allow for the smallest fraction of debitage to be collected with relative ease needed to be used, keeping in mind that the collection of screened materials becomes difficult when screen size is unreasonably small.

The Arctic context of this study provided an additional variable to hinder flake collection. Not only was negotiating the three to five millimetre flakes a problem in this dexterity-reducing cold and wet Arctic environment, but these small flakes stuck to the metal mesh of the screen to further impede flake collection. Nested screens provided a viable option to facilitate the collection of these small flakes.

One-quarter inch screen was used to separate the larger artefacts and stones from the smaller materials, while smaller artefacts and gravely matrix were captured using one-eighth inch mesh below. The maximum size of materials lost while screening with one-quarter inch mesh is approximately nine millimetres, while with one-eighth inch mesh this is reduced to about four-and-a-half millimetres. To enhance this further, areas where abundant debitage was noted during excavation were bagged as soil samples, allowing the small materials to be removed in the lab, and microdebitage, lithic debris smaller than one millimetre, to be studied from these areas.

A)

B)

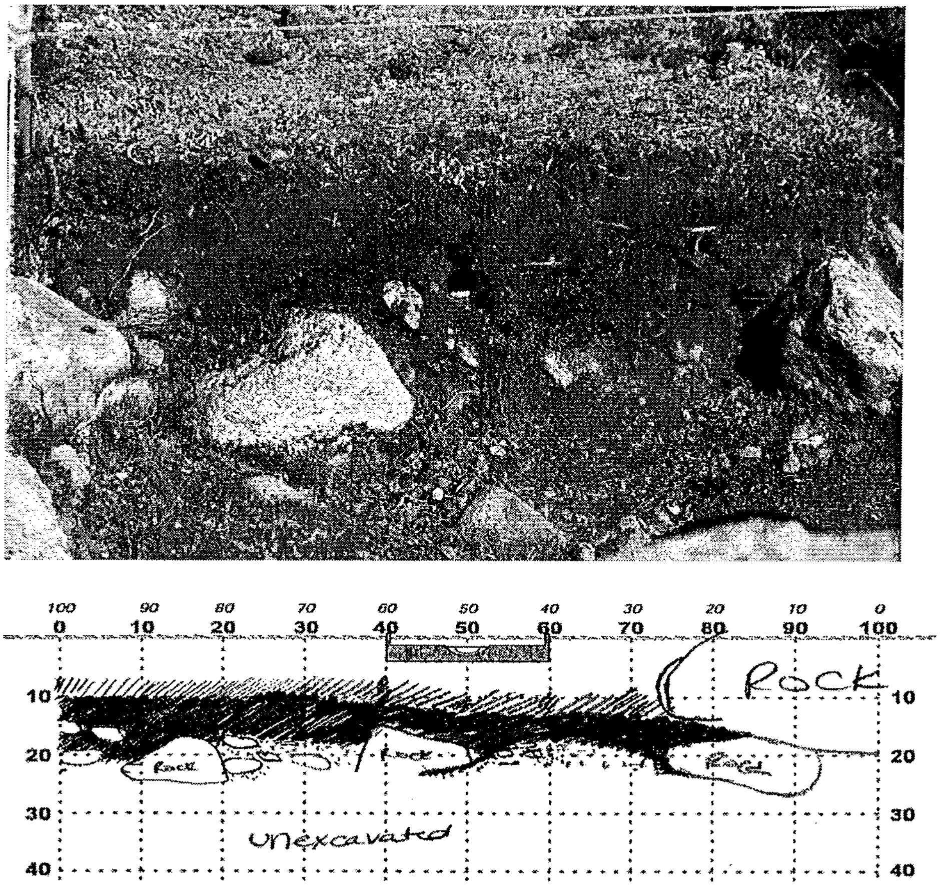


**Figure 13.** East wall of unit I3, as an example of an excavation profile;

A) Photo (0-50 cm) and; B) Excavation profile drawing (0-100 cm)

Excavation continued until sterile matrix was reached. During excavation, small rocks were removed while larger-than-fist-size stones were kept in place using a pillaring method, until the structure was otherwise completely excavated. This method involved the continuation of excavation around the object to be left in place, while leaving the object and a supporting pillar of matrix unexcavated below. Pillaring was done to maintain the spatial context of the structural rocks and any interior architectural features that may have been located during excavation. This enabled us to control for the confusing nature of tent ring outlines and the possibility that perimeter rocks were displaced by subsequent occupations.

The excavation profile was drawn for one wall of each one-meter unit. These recorded the depth of excavation and any apparent stratigraphy (Figure 13). When all that remained were the pillared rocks, these were removed, the matrix screened, and artefacts were bagged as pillared artefacts from the appropriate one-meter unit.

Unit depths averaged around 15 cm, from the willow growth at the top of the units to the sterile gravel matrix underlying the site, though this depth varied slightly across the site. No natural stratigraphic breaks were identified during excavation, and other than recording the provenience of formal artefacts and the final distance below surface for each unit, depth was not controlled for during excavation. By not dividing the excavation in artificial levels, screened artefacts will only be distributable within a unit and not attributed to any particular depth.

Although research in other geographic regions has established that depth between artefacts and changes in individual artefact elevation can provide information on periods of re-use and post-depositional disturbance of a site (McPherron et al. 2005), recording depth below surface when excavating Palaeo-Eskimo sites is not common practice. Arctic deposits are generally shallow and rocky, and there is a common absence of any kind of stratigraphy to be recorded, therefore the strict excavation of arbitrary levels is not standard procedure. In this excavation specifically, lemming activity was noted within the walls of the structure, distorting the vertical distribution of artefacts and therefore minimizing the amount of spatial information available from studying the vertical distribution of remains

*Top Plans and the Visual Record of the Excavation*

Prior to excavating each one-meter unit, a top plan was drawn to record the pre-excavated surface. A second top plan was drawn recording the formation of structural rocks that were imbedded through the matrix. This second top plan was also where formal artefacts recovered during excavation were mapped, to the nearest centimetre. Upon completion of the excavation, a third top plan was drawn of the post-excavation surface, locating any pillared rocks that remained to be removed at the very end of site excavation.

In addition to these top plans, digital photos were taken pre- and post-excavation for each one-meter unit. Digital photos were also taken when unusual formal artefacts were located, recording their in-situ context of recovery.

## Analysis:

### *Formal Artefacts*

Because most Arctic studies rely solely on the distribution of formal artefact to understand site structure, a comparative model of the distribution of space was created from the formal artefacts recovered from Structure 4. Formal artefacts with recorded point provenience were mapped into a GIS database by distributing their recorded locations across an arbitrary centimetre-based grid of the site. To view the artefact distributions as they appeared at the site, an outline of the structural rocks was traced from top plans and added to the formal artefact visualization. The resulting image of artefact distributions was qualitatively explored to locate any concentrations, in both overall distributions as well as by individual artefact types, as described in the field.

A second model was created after McGhee's model of bilaterally divided space, by plotting artefacts from each of his defined tool-kits, to see if a similar division of tools appeared in this interior context. The first toolkit included all microblades, needles and bone tools, while the second included burins, burin spalls, stemmed points, endblades, sidescrapers, biface fragments, and retouched blades (McGhee 1979:54) (See Figure 2, Chapter 2). For clarity, these were titled "female" and "male" toolkits, respectively, although it has been noted (Chapter 2) that these groups should not be correlated with gender-divided this gender division.

Burin spalls were included with the formal artefacts, even though these informal tools fit better with the distribution of small debitage when the production strategy is considered. Burin spalls, small elongated flakes removed from the top of a burin, could have been detached as refuse to sharpen the burin. However, they may also have been used as sharp puncturing tools or gravers, as noted by the presence of usewear on their tip or a lateral edge (Giddings 1956:229, 234). However, not all burin spalls were used in such a way. The first spall to be removed from the working edge of the burin was triangular in shape, rather than the rectangular shape of spalls with use-wear, and probably used only to shape the burin for the next spall (Giddings 1956: 232). Other burin spalls may have been improperly formed and thus discarded rather than used in a formal tool.

Burin spalls present much like debitage in their distribution pattern across the site. Their very small size would allow them to fall un-noticed in areas of high-activity, unless they were hafted to some other material or tool. It is unlikely that un-hafted burin spalls would have been picked up and re-deposited or scuffed out of the way, unless the other small debitage was re-located as well. The location at which these artefacts were spalled or removed from a hafted tool for replacement is likely to be the same context as these artefacts are recovered archaeologically. However, as these artefacts are diagnostic tools, they have been collected with point provenience whenever possible and presented along with the formal artefact distributions from the site.

*Lithic Debitage*

***Analysis***

Lithic debitage was assessed through flake aggregate analysis (Ahler 1989; Shott 1994), dividing the assemblage into four size categories and providing count values for each. Lithic screen bags were sorted into four distinct size groups using three nested mesh screens, debitage less than 5 mm, 5-10 mm, 10-15mm, and greater than 15 mm in maximum dimension. .

***Visualization***

Geographic Information Systems (GIS) technology was used to display the distribution of lithic materials across the site. GIS technology has only begun to be employed for intra-site spatial analyses. It is more commonly used in archaeological projects with a broader-scale focus, such as landscape studies, predictive modeling, or environmental reconstruction analyses (Lock and Stancic 1995). However, for this study, surface modeling was used to show the variability in abundance of lithic artefacts from different size classes within and beyond the walls of a single structure.

Because the lithic debitage was collected from screened materials, it was only attributable to the 50x50 cm area of the unit quadrate from which it was excavated. To establish the distribution of debitage at the site, each quadrate unit was assigned an (x, y) location co-ordinate, defined by the quadrate centroid, consistent with the grid used to place formal artefacts (Figure 14). For example, the northwest quadrant of unit K1 would have a coordinate of (125, 1075), while the southwest quadrant of the same unit would have a coordinate of (125, 1025). Each of these centroids was then weighted with a z-value for each flake size, defined as the number of flakes of that size class recovered from the quadrant.

By assigning (x, y) coordinates and z-magnitudes to the screened data, debitage distributions existed as point-data. This was beneficial for storing multiple z-values for each quadrant of the one meter units, but did not serve well to understand the distribution of lithic debitage across the site. To depict the distribution of lithic artefacts within and beyond the walls of the structure, four continuous surfaces were interpolated from these centroids, one for each size class. The 3-D Analyst tool in ArcGIS 9.1 was used to convert the weighted-point data to a smooth raster, using statistical methods of interpolation.

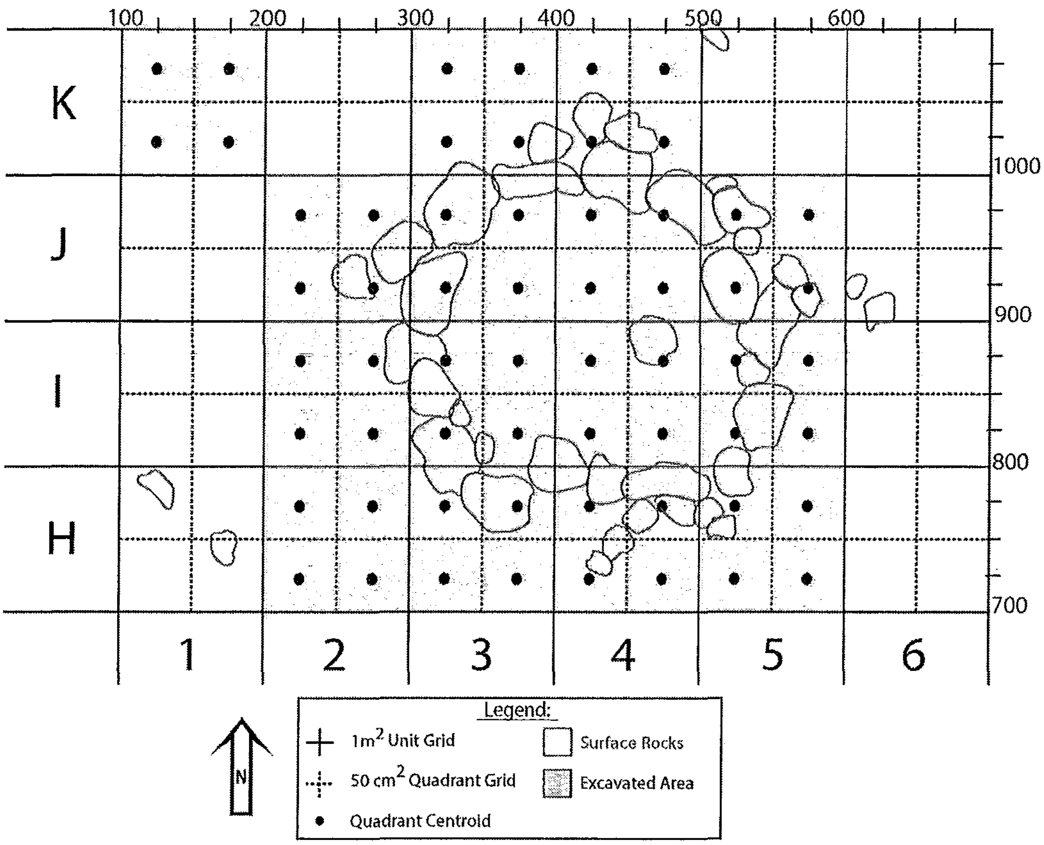


**Figure 14.** Structure 4 site grid, locating the centroids of excavated units.

The 3D-Analyst extension in ESRI's ArcGIS desktop package enabled a raster, or continuous grid of pixels each with a single magnitude value, to be created from the point-data. This allowed the variability and continuity within the magnitude of a single variable to be viewed across the entire area of the site, rather than being limited to discrete sample location (Childs 2004:32). This analytical tool works by creating a raster across an area containing point data, with the size of the pixels being defined by the user. A value is then calculated for each pixel from sample-point values using a statistical calculation. Three statistical operations were available for constructing a raster from weighted point data when using the 3-D analyst extension, including Inverse Distance Weighting (IDW), Kriging, and Spline interpolation methods.

All of these statistical methods use values from known sample points to establish values for unknown points (Childs 2004:32). They are suited to be used with autocorrelated data sets in which values tend to be similar the closer they are together, such as temperature and altitude (Childs 2004:32; Conolly and Lake 2006:91; McCoy et al. 2002:96). However, only kriging offers a quantitative measure of this variable for the dataset in question, the others only assume that an autocorrelated data set is being used (McCoy et al. 2002:96).

Kriging is an intensive statistical procedure that uses input data points to create a mathematical model that quantifies the variance within the distribution and correlates this with the spatial distribution of values (Childs 2004:35). The kriging method first mathematically characterizes the sample data set by defining the difference in values between input sample points and the distance between these points (McCoy et al. 2002:96). Raster values are then defined using the mathematical model that results. A radius around each cell is searched for a user-specified number of data points. The distance of these points from the center of the cell and the values of the found data points are used to establish a value that fits with the earlier created model (Childs 2004:35; McCoy eat al. 2002:96). As well as producing the interpolated image, the kriging procedure allows for the creation of a variance plot that displays the statistical fit of the final model with the overall data set. The higher the variance, the more likely it is that actual values differentiate from the predicted surface (Childs 2004:35).

Splining uses a pre-established mathematical model that creates a flowing surface from known values at different test points. It is described as stretching a rubber plain between input data points, so that the plain intersects all measured points while minimizing the curvature of the surface (Childs 2004:34; McCoy et al. 2002:96). This model creates an output surface that reflects the absolute values of the original data at the test-points; however, the minimum and maximum values in the raster may be increased or decreased to create the smoothest surface (Figure 15).

IDW interpolation is the simplest of the available options, and the method used in this analysis. This method was chosen because of its relative ease of use, reliance on distance within a variable radius, and the ability to apply a boundary to the calculation, possibly useful for exploring the effect of the bounding wall of Structure 4 on the distribution.

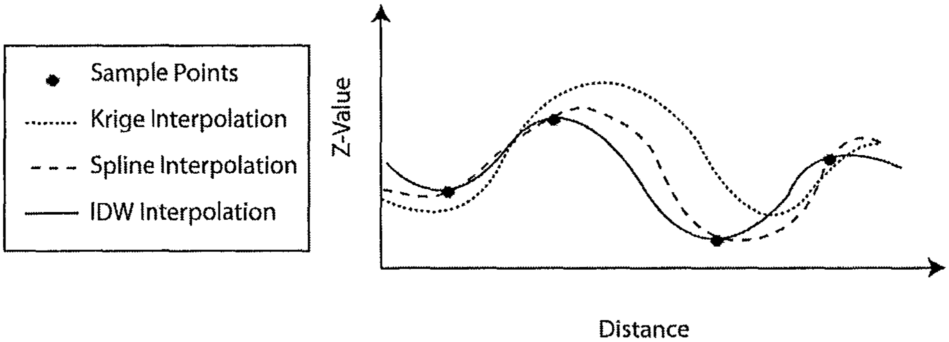


**Figure 15.** Portrayal of how derived raster values fit with input sample points, using Kriging, Splining, and IDW interpolation methods (from Childs 2004:35)

IDW interpolation relies on a distance-based algorithm that has been established based on the assumption that things close to one another are more alike than those that are farther apart (Conolly and Lake 2006:91,158). Both the values of these nearest points and the distance between the unknown raster cell and the defined data points are used to calculate the pixel values, using the following equation (from Conolly and Lake 2006:94-95):

$$\hat{z}(x_0) = \frac{\sum_{i=0}^{n} z(x_i) d_{ij}^{-r}}{\sum_{i=0}^{n} d_{ij}^{-r}}$$

*Where $z(x_0)$ is the unknown value; $z(x_i)$ are known values; and $d_{ij}$ is the distance between the known and unknown points, which is used as a weight by calculating as the inverse distance to a power of r.*

This equation calculates unknown values by averaging the weighted sum of the closest points. By weighting the contributing values with their inverse distance to the power of *r*, the degree to which the output value is dependent on the nearest value points can be altered, with higher *r* values causing the closest points to provide more influence on the interpolated value than do points further away (Childs 2004:34). Although this method does not produce a measure of accuracy of the predicted surface, as does the kriging technique, the added ability to define a boundary made this most appealing for understanding the material distributions within a bounded structure at LdFa-1.

By defining pixel values based on distance from known points, the IDW method is an exact model in which values of the original data points are maintained in the output map (Conolly and Lake 2006:91)(Figure 14). If a data point falls within a pixel, the pixel will assume the value of this data point. The minimum and maximum values will also be maintained from the input data, because the values deduced by the equation for areas between defined points are only averages of these known values (Childs 2004:35).

Quadrate centroids were used as the measured data points, their z-values defined by the count-data recovered from the entire 50 cm quadrate, by size class. Although it cannot be assumed that anthropogenic data are autocorrelated (Connoly and Lake 2006:158), the distribution patterns resulting using this method of interpolation do not vary from the visualizations created from the more sophisticated methods (Figure 16). By expanding the raster to 50 cm pixels there is essentially no interpolation between points. Every cell has a value. However, by transforming the point-data in to a continuous raster, imaging abilities were enhanced so that surface trends could be displayed.

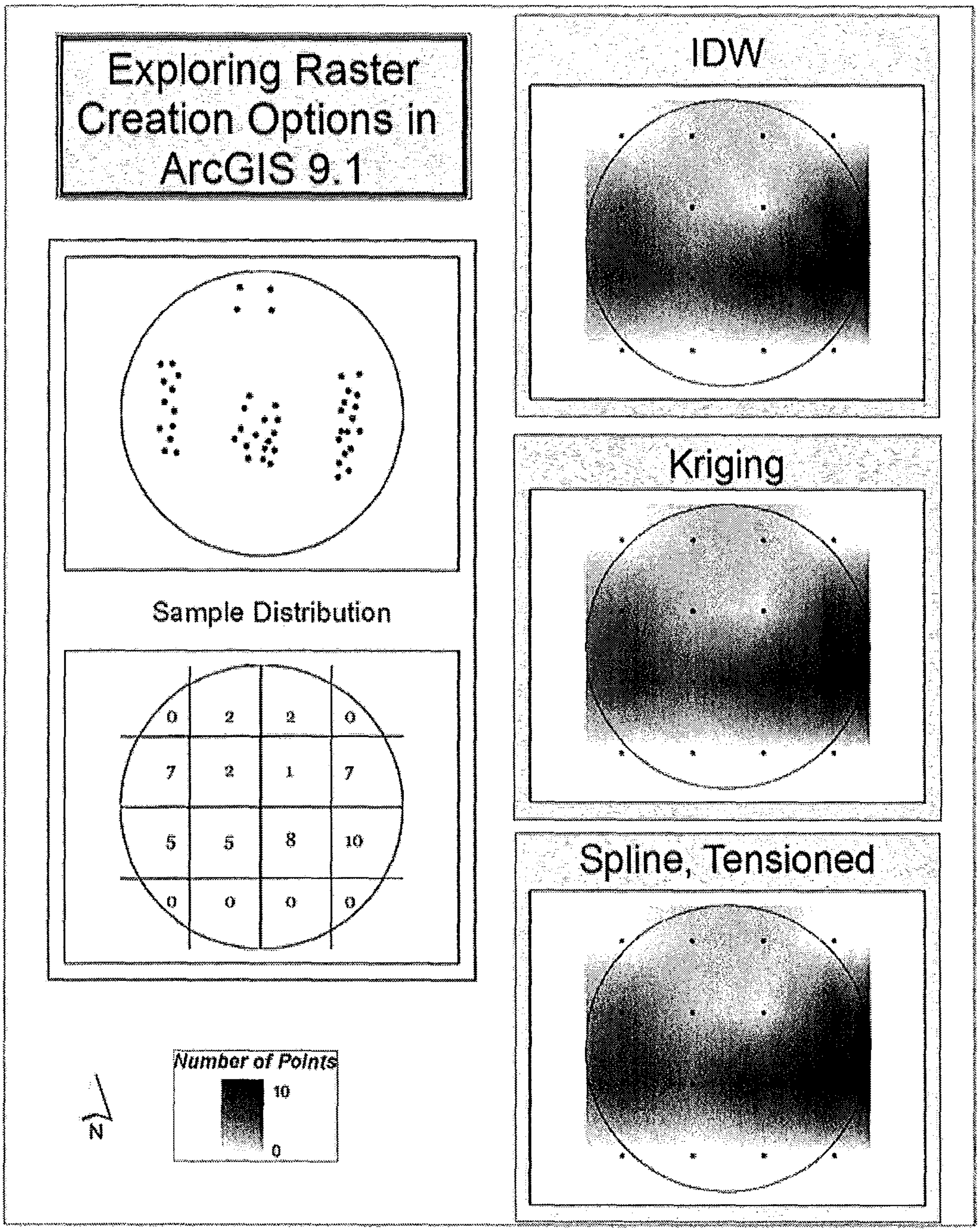


**Figure 16.** Exploring the application of Inverse Distance Weighting, Kriging, and Spline interpolation on a known data set distribution. Notice how little, if any, variation is seen between the different methods.

A disadvantage of this method is that centroid points are used as absolute values for the pixels they fall in, thereby inflating the number of flakes represented by the image. Creating an image of 50 cm pixels can rectify this. However, the image is very blocky and hard to interpret. For better visualization, a fluid pattern showing the general trends in the distributions of lithic densities was then achieved by stretching a colour ramp across the raster surface. Instead of displaying individual pixel cells in a cholorpleth map of the raster, values can be distributed along a gradient that looks for the general trend in the values of the centroid points. Although this image still has the problem of showing an inflated number of flakes, trends in the distribution data are much clearer.

Figure 17 displays the results of this IDW interpolation and stretched visualization method, using the grid-count data from the earlier example distribution developed to explore unit excavation size (Figure 12). The one-meter, 50 cm and 25 cm grid-count data have each been interpolated into a raster, which are displayed as pixel-based cholorpleth maps. The corresponding stretched visualization is then provided below. Pixel size for each raster has been determined by the grid-size, so that the one-meter grid has been visualized with one meter pixels, the 50 cm grid with 50 cm pixels, and the 25cm grid is visualized with 25 cm pixels. The value of *r* has been defined as 2, the standard for IDW interpolation (McCoy et al. 2002:136). The higher the defined value of *r*, the more emphasis is placed on the closest points (Connoly and Lake 2006:91).

### *Visual Assessment*

The raster visualization was qualitatively assessed for any apparent patterning in debitage distributions. The distinction of interior space was primarily of concern, because multiple occupations at the site could have resulted in deposition of the lithic materials at the location of feature 4 prior to its construction. If this were the case, what was thought to be the remnants of a distinction between inside and outside space would not be accurate. Especially in a structure this small, domestic space should be characterized by fine activity, with the possibility of cleaning and maintenance eliminating the majority of the larger, more obtrusive lithic debitage from the central work area. This would result in an abundance of small debitage within the interior space, with larger materials located around the periphery and outside the bounding walls.

If interior space could be defined, any other apparent distribution patterns could be assessed, such as a bilateral division of interior space. Front/back and left/right were considered as these would be easily defined, and have correlations to public/private (Portnoy 1981) and realms of separate social divisions.

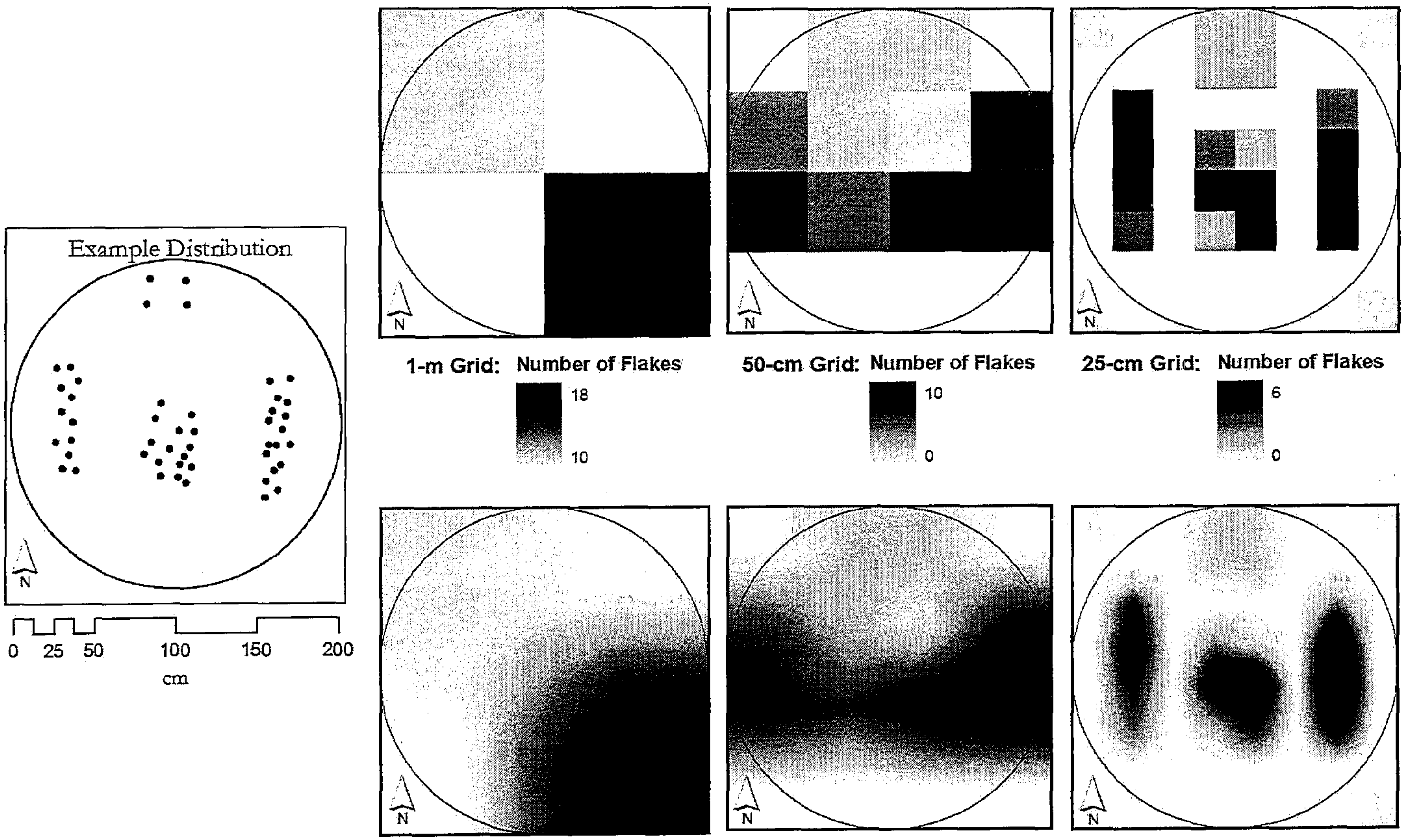


**Figure 17.** Results of the IDW method using example data. The point-distribution is pictured to the left of the IDW interpolations of one-meter, 50 cm and 25 cm grid counts. Cholorpleth maps are pictured above stretched visualizations

Distributional Considerations

A few factors exist that mar the ability of archaeologists to identify the internal distribution patterns of artefacts. The nature of the archaeological record has long been known to have both cultural and natural transforms (Schiffer 1972,1987) that alter the location of materials so these are no longer in the same primary context in which they were initially deposited, marring the visibility of behaviours that produced the original distributions. In the study of Arctic tent rings, the main factors that will hinder the ability to identify material patterning in a domestic context have been defined as cleaning and maintenance, the use of floor coverings, site re-use and contemporaneity issues, as well as natural disturbances.

Maintenance and cleaning activities, including the removal of debris and waste from the site, disturb activity area patterning and the primary context of artefacts. To understand the patterns of debitage distribution, it must be recognized that the larger artefacts were most likely removed from their primary context, with only the smallest fractions of debitage remaining in-situ at the work area (Carr 1991:223). Larger materials are less likely to be deposited where they were used, as these are the most likely to get in the way of other activities, and the easiest to collect and deposit out of the way, in peripheral areas or a defined midden.

Patterning within the smallest fraction of debitage is the best indicator for obtaining information about this primary context, but in some cases this may also be lost. The Historic Inuit not only covered the floors of their tents with gravel or willow floors (Briggs, 1970), they maintained these floors during the time that the dwelling was occupied, and rummaged through them upon site abandonment to ensure all items of value had been collected before moving (Ingstad 1954:135).

The use of furs, hides, or other removable floor coverings could also have eliminated all artefacts and debitage from work areas, as these would be removed with the mats. Although the spatial context will be lost, debitage and debris removed from the dwelling via these coverings will most likely appear in piles outside the structure. Debris merely swept off the area when this was used for other activities such as sitting or sleeping will accumulate on the floor in front of where these coverings were originally found, or along the wall of the structure. Although the direct spatial context is lost, the fact that activity took place within the structure should remain apparent, and a sample of the debris from this activity will be available.

Blurring of original patterning in artefact use also occurs if a space was used for multiple activities and in multiple social contexts. In an undivided context such as a tent, the use of a single space for more than one purpose is expected. Visitors to a dwelling may have distorted the spatial patterning of material remains from activity areas that existed only when the domestic group used the space (Briggs 1970:80).

Teasing apart the archaeological signatures of different tasks from within the space may be difficult, but is also unnecessary if the study instead focuses on defining general trends in distribution patterns.

To understand the degree of segmentation within a society, the degree to which space is divided by this group is all that needs to be recognized. This can be accomplished by identifying distinctions between spaces, an undertaking which does not necessitate the identification of specific activities or tasks (Kent 1991a). The initial step in this process is defining the spaces that were consistently divided in the repeated use of space by a culture over time. Discriminating between the activities that took place within each distinct area is then a secondary endeavour, enabling researchers to better understand the cultural mechanisms behind this definition of space, be it status or task related.

Intra-site palimpsests also exist throughout the archaeological record. Even in highly stratified sites, re-use of a site within a single paleosol, even on the same living floor is very likely, especially in mobile hunter-gatherer campsites. These sites would have been used for short periods over an extended length of time, with small groups returning annually. Although it is unknown as to whether Palaeo-Eskimo populations re-used their structures (Milne 2003b:84)

Even if structure re-use was common practice, re-use by the same cultural group should not distort the boundaries between delineated areas as, presumably, the returning people would have similar notions about how to use space. Because of this understanding, internal spaces should be organized in the same ways upon returning as they had during the initial use of the structure. Site re-use in this way should, therefore only enhance the archaeological signature of boundaries. However, if the site was used by a different group who had a different set of boundary rules, their divisions of space overlaying the original living floor will hinder the ability to define either of these boundary rules, especially if both were using local materials and performing similar activities in interior space.

An additional concern for identifying the spatial patterning of remains from activities is natural post-depositional disturbance. This first begins at the point of site abandonment, when scavenging animals distort the activity patterns. More critical to this study, however, is the effect of freeze-thaw cycles in the region. Cryoturbation can move even the smallest materials both horizontally and vertically, as well as sort sediments into geometric-shaped distributions, especially those close to the surface (Hilton 2003:198). Despite this setback, general patterns are thought to remain identifiable with careful study of the domestic area. Other natural transforms that may have affected the site are faunal degradation, caribou trampling, and carnivore scavenging. By limiting the study to the lithic debitage, faunal preservation issues may be ignored. Trampling did not seem to be an issue with the selected feature, as a caribou track extended along the southern margin of the site, and the walls of the structure extended well above the surface of the ground and remained solidly intact.

A final unfortunate consequence of studying the Palaeo-Eskimo archaeological record at the level of a single dwelling is that the assessment of social division of space is limited to this scale. Patterning that exists beyond the single household will not be available for interpretation, and therefore cannot be understood. Questions regarding inter-household interaction, the organization and use of outdoor space, and social differentiation between different structures remain unanswered. Further studies are required to elicit these data, most importantly the further study of more structures at the household scale. Broadening this research to incorporate samples of more houses within this area, as well as in other regions, both coastal and further afield, will enable these broader social scales to be understood.

*Chapter 5*

# ANALYSIS

The images resulting from the visualization of the distribution of artefacts and lithic debitage, as described in chapter four, are displayed in this chapter., The dispersal of formal artefacts is compared to the distribution patterns obtained from different sized lithic debitage to evaluate collection strategies for future studies, and to determine if domestic space can be defined using the collection methods from this investigation.

## Formal Artefact Distribution

All formal artefacts have been distributed across the excavation grid in Figure 18, with (a) and without (b) the bounding rocks of Structure 4. Not only does this formal artefact distribution show no clear indication of a left/right or front/back bilateral division of space, there is no clear inside/outside boundary. Based on a qualitative assessment on the distribution of formal tools alone, no domestic space is identifiable in this area of the site despite the bounding walls apparent on the surface.

If just the space within the bounding rocks is taken into consideration, a minimal concentration of artefacts is apparent in the southwest quadrant of the structure, within units I3 and I4. However, the more northern units do not exhibit a corresponding lack of artefacts. A burin, four burin spalls, a blade and two bifaces are all found in this rear area (Figure 19).

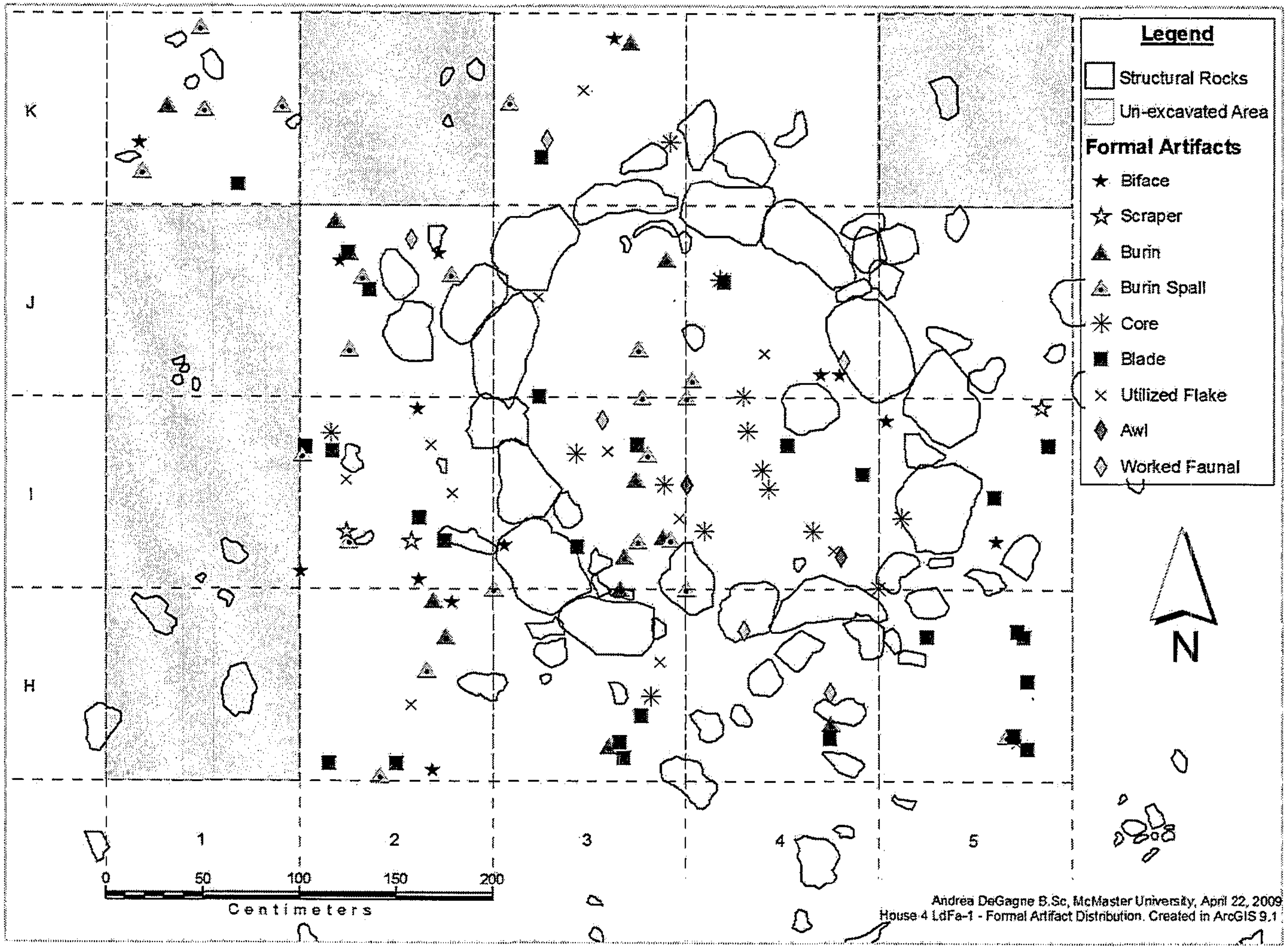


**Figure 268a.** Formal artefact distribution around Structure 4.

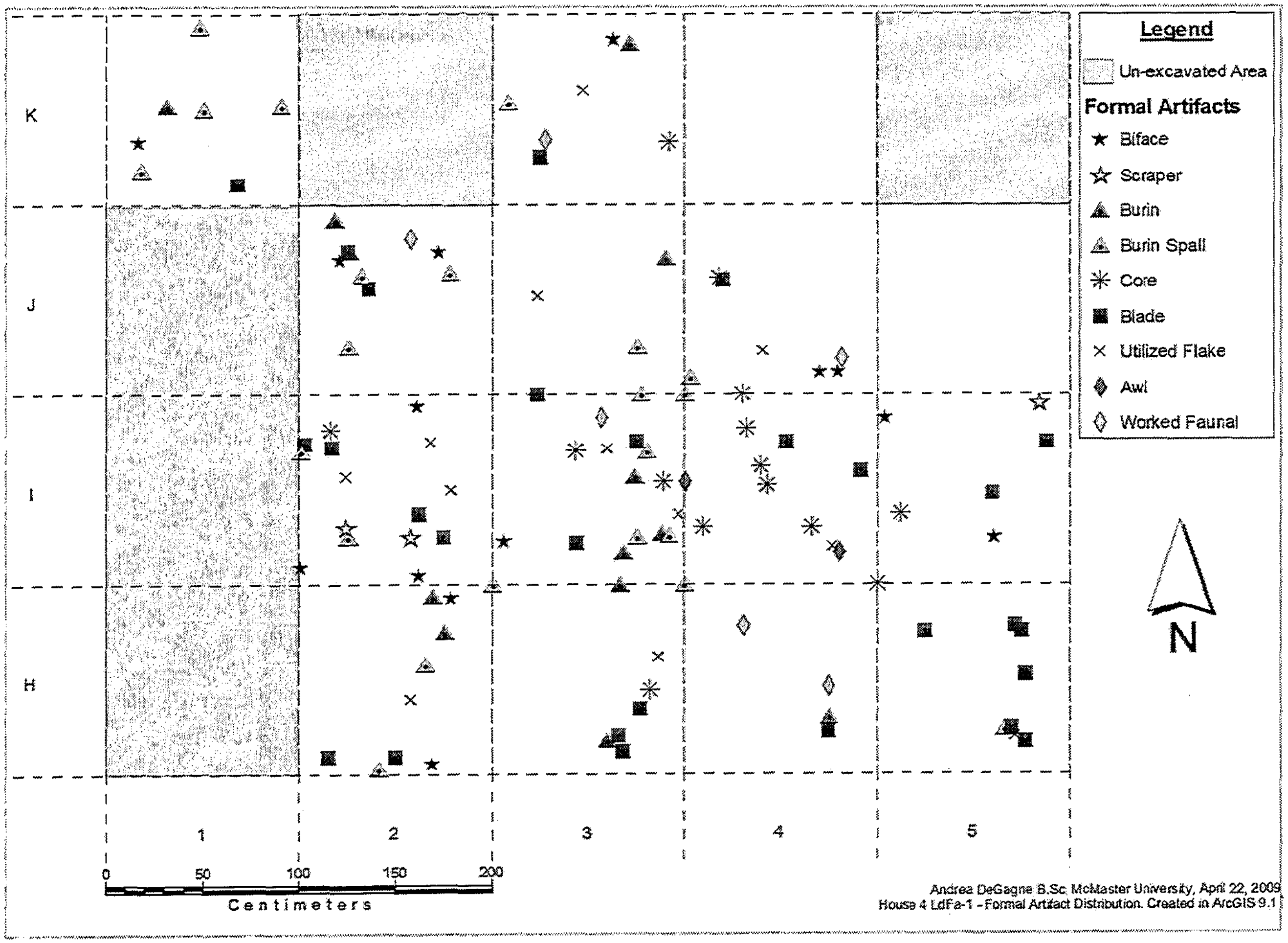


**Figure 18b.** Formal artefact distribution from Structure 4, with bounding rocks removed

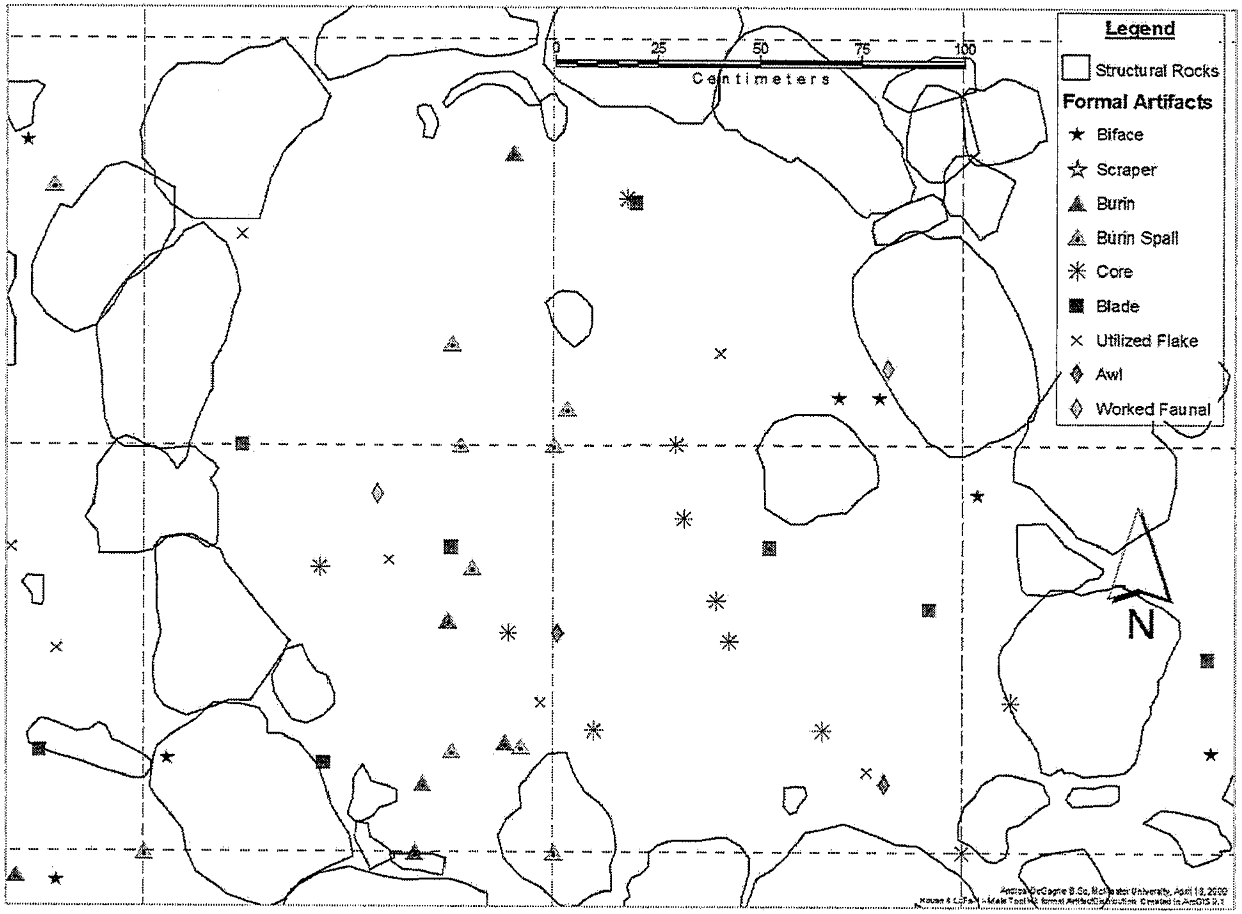


**Figure 19**. View of units I3, I4, J3, and J4, showing the distribution of formal artefacts from the interior of Structure 4.

*Applicability to McGhee's Model of Bilaterally Divided Space*

As an experiment to understand if distributions at LdFa-1 were more visible when relying on only the tool types McGhee (1979) used to identify his model of domestic space, artefacts were visualized as his idealized Palaeo-Eskimo toolkits. If the doorway of Structure 4 was located along the southern boundary of the structure where a slight break in the circular formation of the bounding rocks occurs, the right realm, defined as "male" space would be to the west, while the eastern realm would be a separate "female" space (Figure 20).

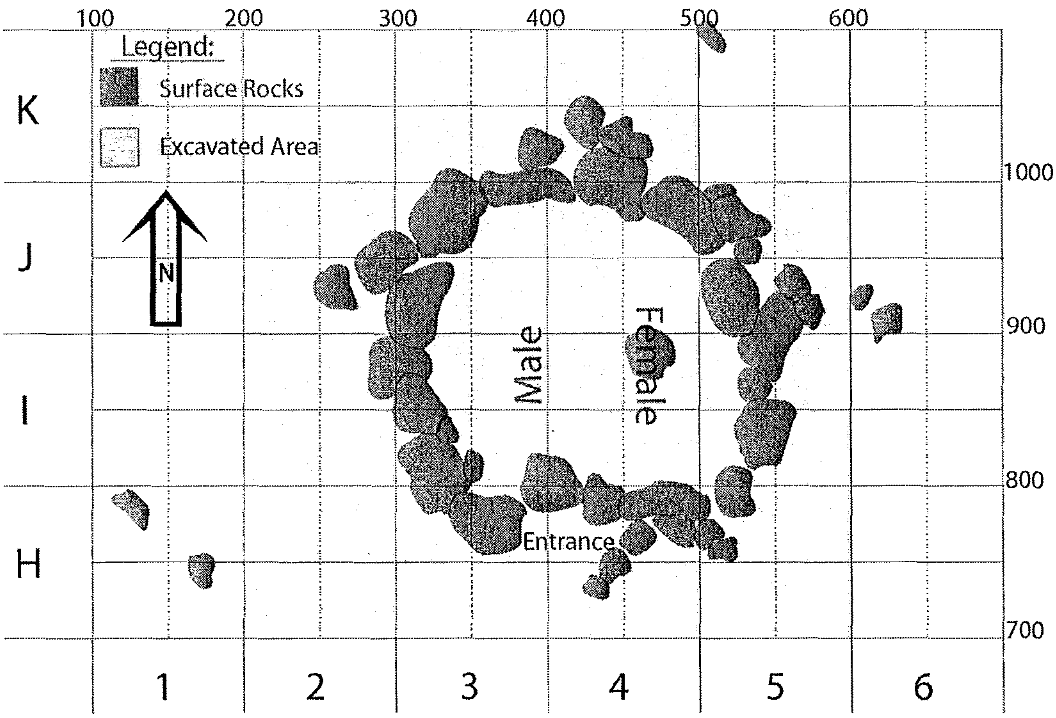


**Figure 20.** McGhee's male/female divided space imposed on Structure 4

The distribution pattern McGhee would have encountered had he mapped this feature as part of his model for the use of domestic space does not support a bilaterally divided living area.. Tools from both pre-defined assemblages are dispersed across the interior of the structure. The "female" toolkit is relatively evenly dispersed throughout the site, impeding the definition of a structure at all(figure 21). However, the distribution of "male" tools follows a graded distribution, densely concentrated in the southwest of the site and decreasing in concentration to the northeast (Figure 22). Again, no structural form can be established at the location enclosed by the bounding rocks, should these be removed. However, if the interior of the structure is isolated, burins and burin spalls seem to conform to the left-right bilateral division of space, only being present within the western realm. However, because of this overall distribution pattern and the inability to define separate inside and outside work areas, identification of the western realm as male space would be inappropriate. The slight patterning seen may be a localized pattern within a larger random distribution, not specific to interior space. Based on these distribution maps, it is clear the McGhee's model does not fit with the findings from Structure 4 at the LdFa-1 site.

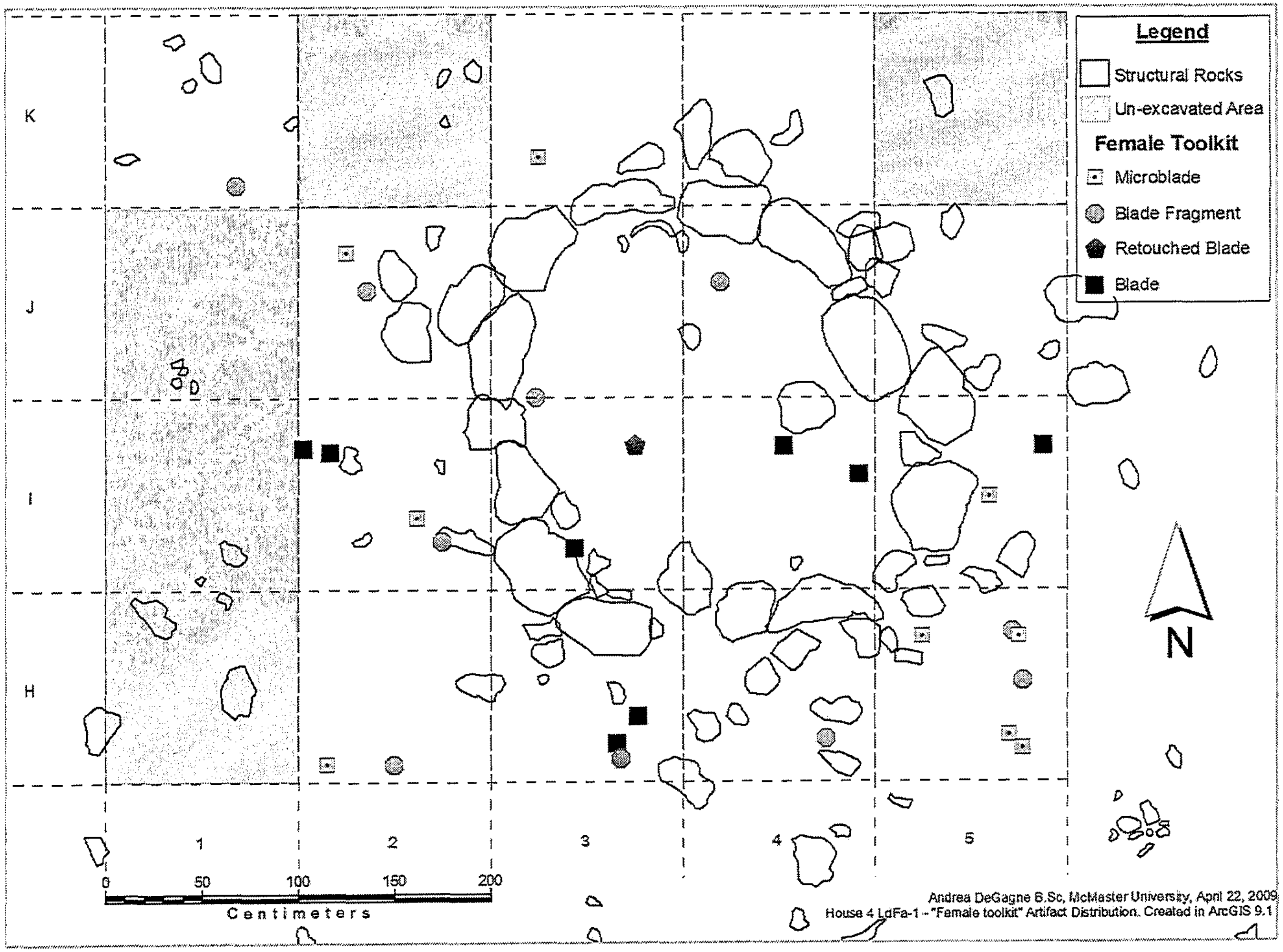


**Figure 21.** Distribution of artefacts from McGhee's (1979) female toolkit.

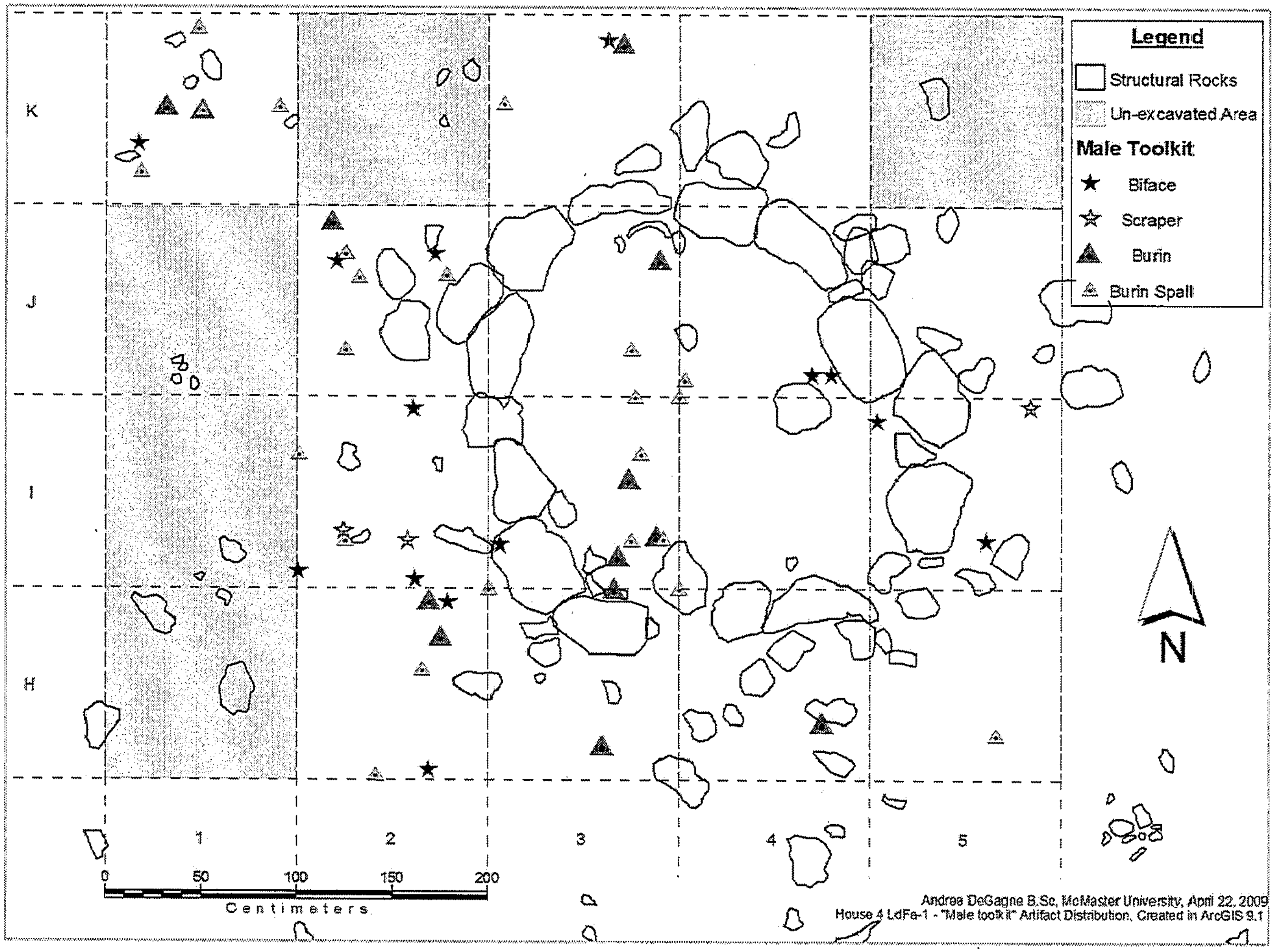


**Figure 22.** Distribution of artefacts from McGhee's (1979) male toolkit

Debitage Distribution

Debitage distribution images were created using IDW interpolation of count data collected from 50 cm quadrates. The rasters resulting from this interpolation are presented below (Figure 23), displayed as chloropleth maps showing cell values. The patterning in these data has been further expressed by stretching an un-classified grayscale colour ramp across the distribution to smooth the image (Figure 24). Finally, a classified version of this stretched visualization is presented to further clarify the patterns within the lithic distributions at the site (Figure 25). The classified versions of the distributions divided the data into classes with equal intervals, by dividing the range of data into categories equally spread across the dataset (McCoy et al. 2002:138).

These images display the abundance of flakes across the site, showing the distribution of flakes for each of four specific size class, including debitage greater than 15 mm, 10-15 mm, 5-10 mm, and less than 5 mm. By breaking up the overall distribution of artefacts into smaller groups based on size classes, the composition of lithic concentrations could be better understood, providing a better understanding of the organization of activities at the site.

*Distribution of Lithic Debitage across Structure 4*

The blocky chloropleth maps initially created from debitage count data are greatly supplemented by the maps created using IDW interpolation and stretching a continuous colour ramp over the raster. Further classifying the visualization enabled the distribution patterns to become even clearer, allowing a straightforward visual assessment of the debitage distribution to be completed.

Regardless of the visualization strategy, the distribution of lithic debitage exhibits two areas of concentration, one in the southwest corner of the excavation and the other within the interior southwest quadrant of the structure. The highest concentration of materials spanned units H2 and H3. A possible hearth was recognized bordering this concentration to the south, with burnt soil and calcine materials being recovered. The other area with a high concentration of lithic debitage existed within the western house-wall boundary, however, this distribution is not well defined in all size-classes of material. These two areas of concentrated materials are discussed below.

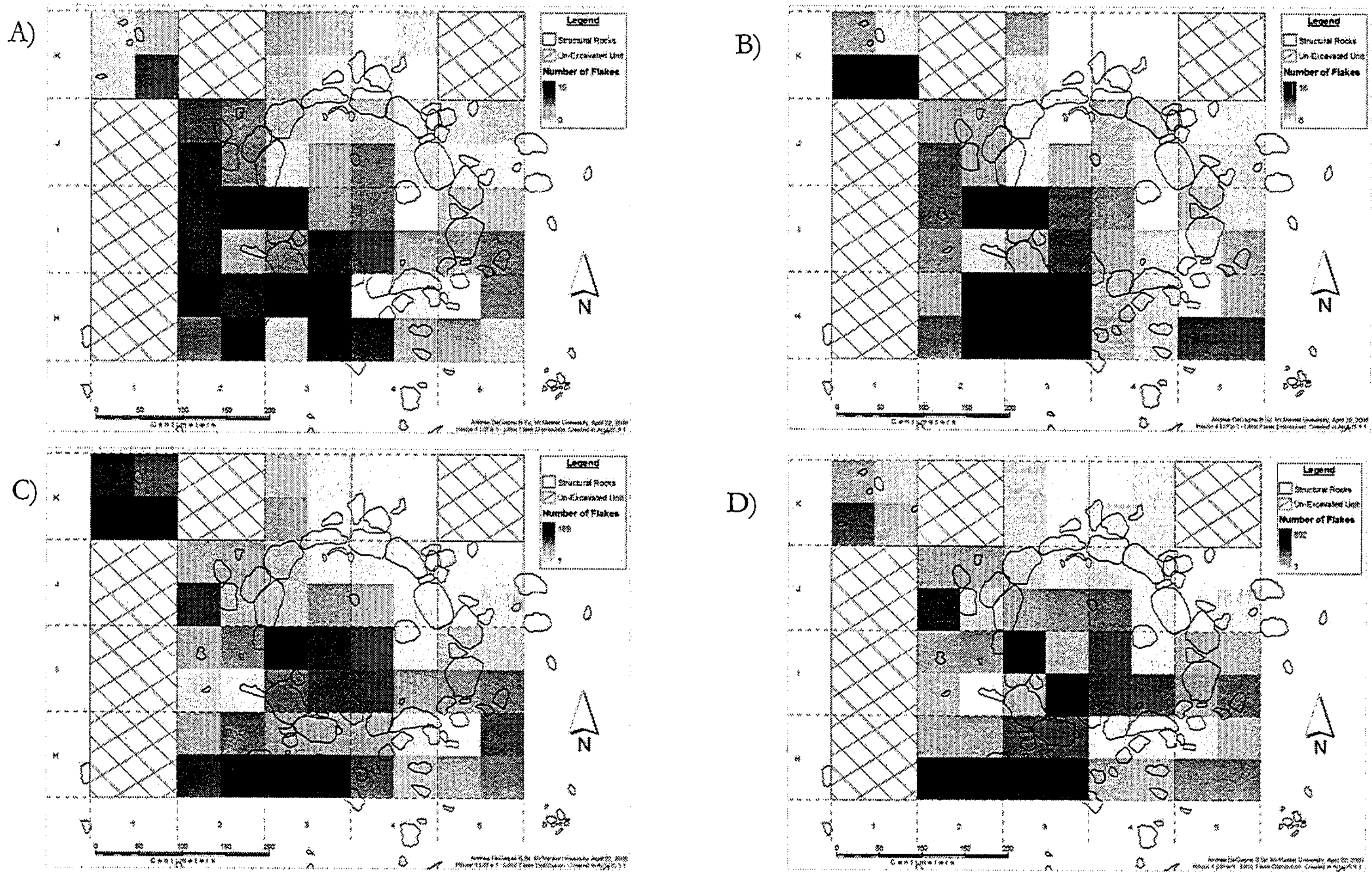


**Figure 23.** Chloropleth maps of debitage distribution rasters with structural rock overlay, for debitage A) Greater than 15 mm; B) 10-15 mm; C) 5-10 mm, and; D) Less than 5 mm.

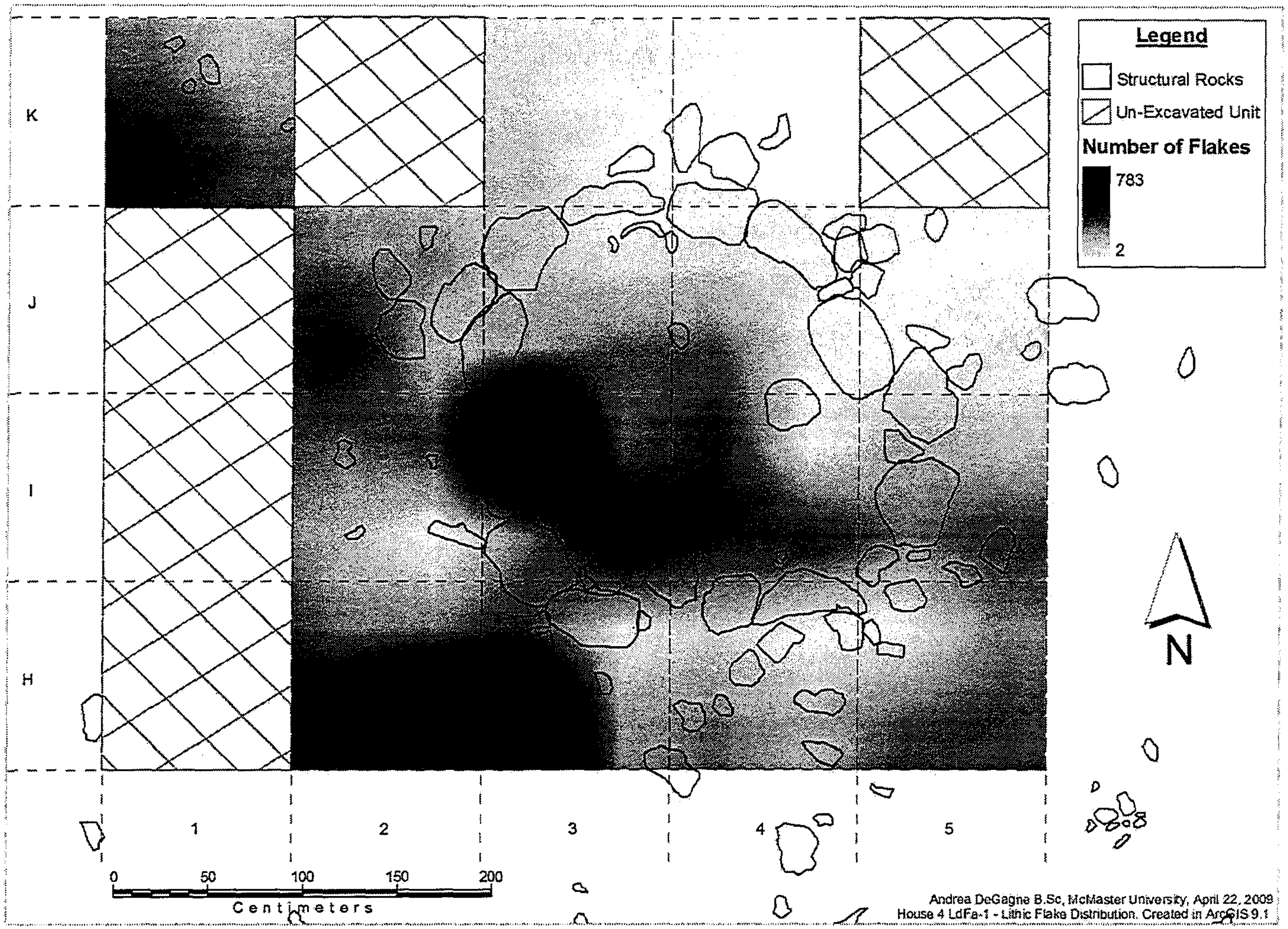


**Figure 24a.** Distribution of all lithic artefacts across Structure 4, displayed with an un-classified stretched colour ramp

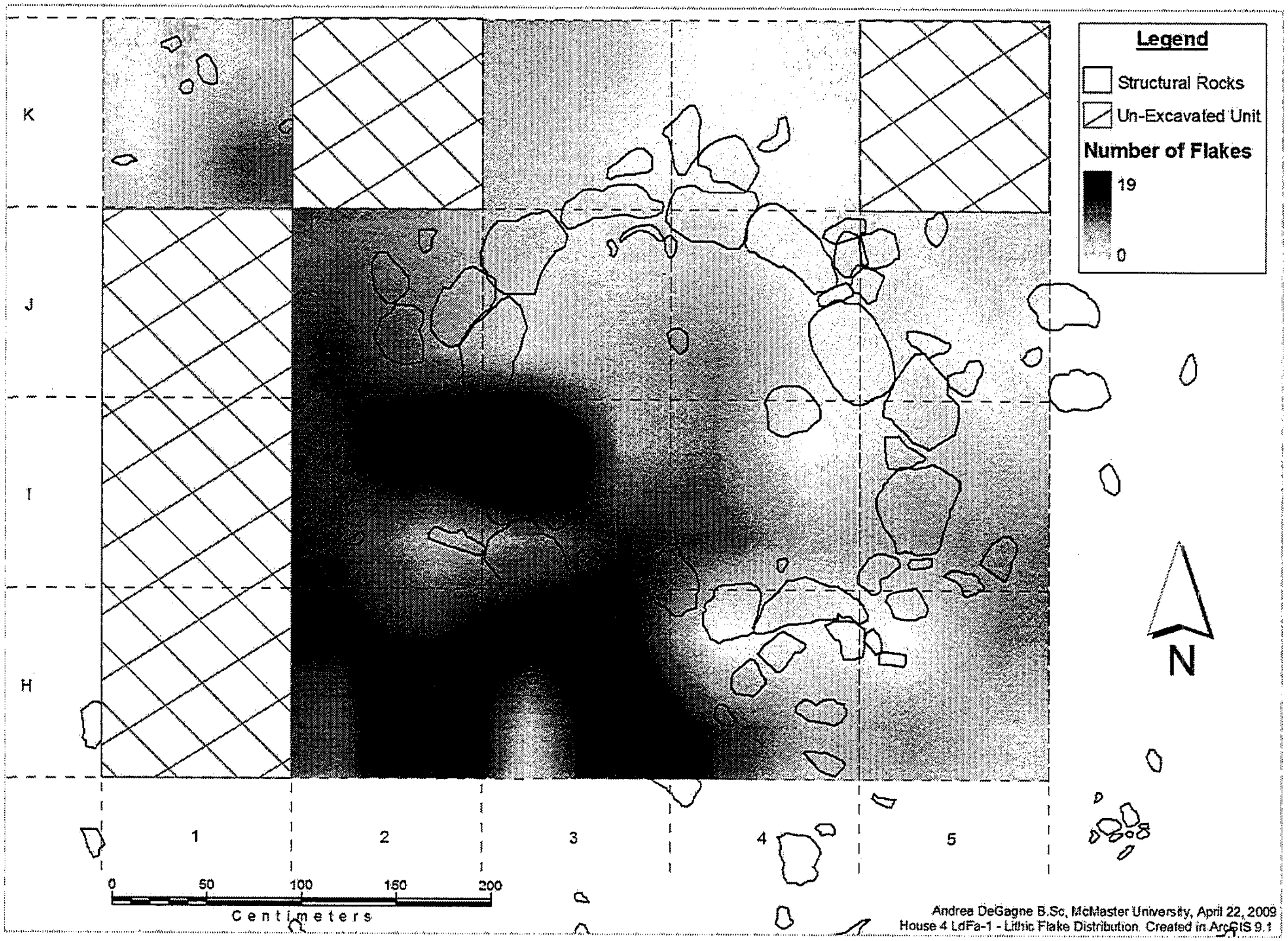


**Figure 24b.** Distribution of lithic artefacts larger than 15 mm, displayed with an un-classified stretched colour ramp

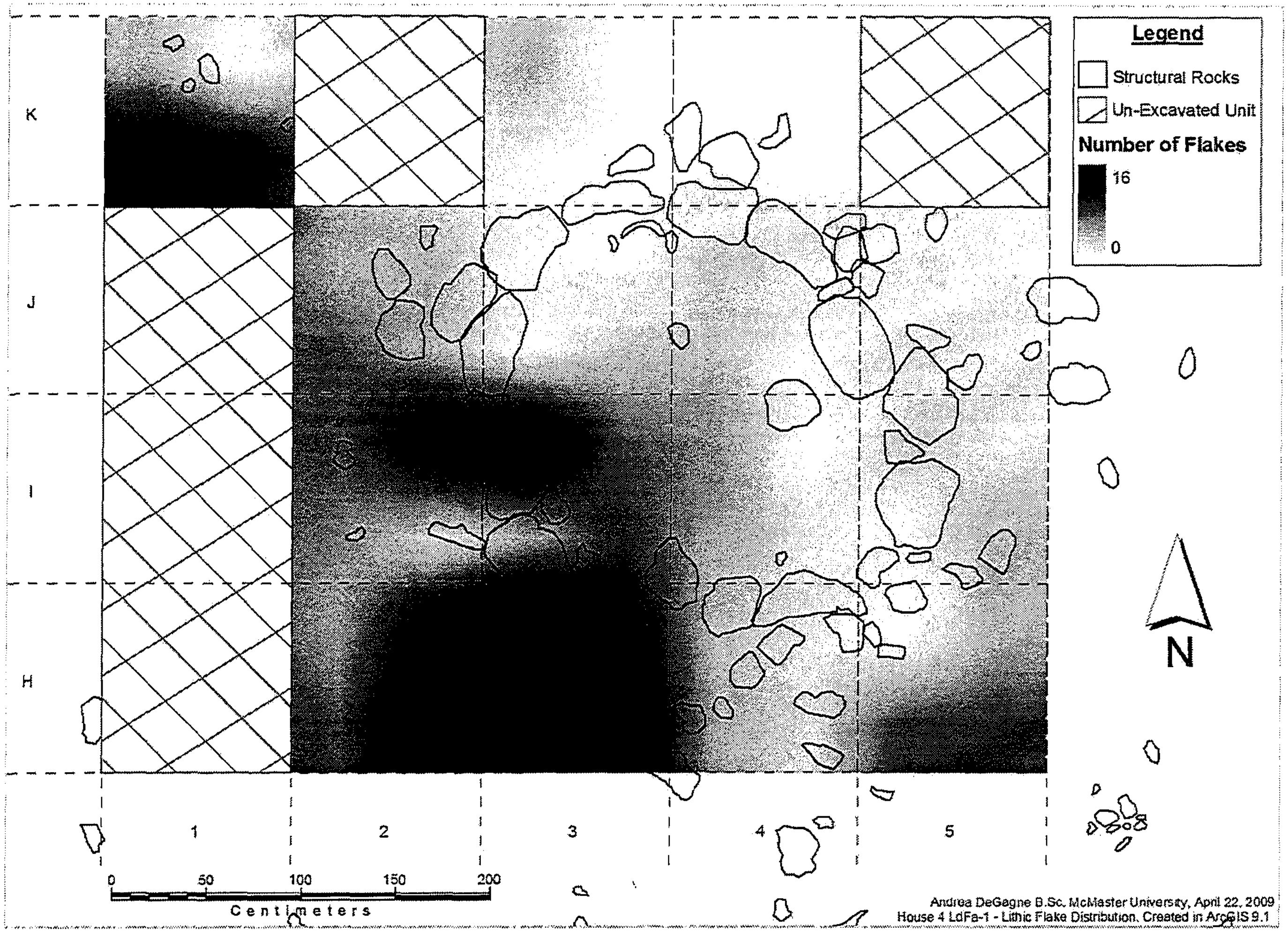


**Figure 24c.** Distribution of lithic artefacts 10-15 mm, displayed with an un-classified stretched colour ramp

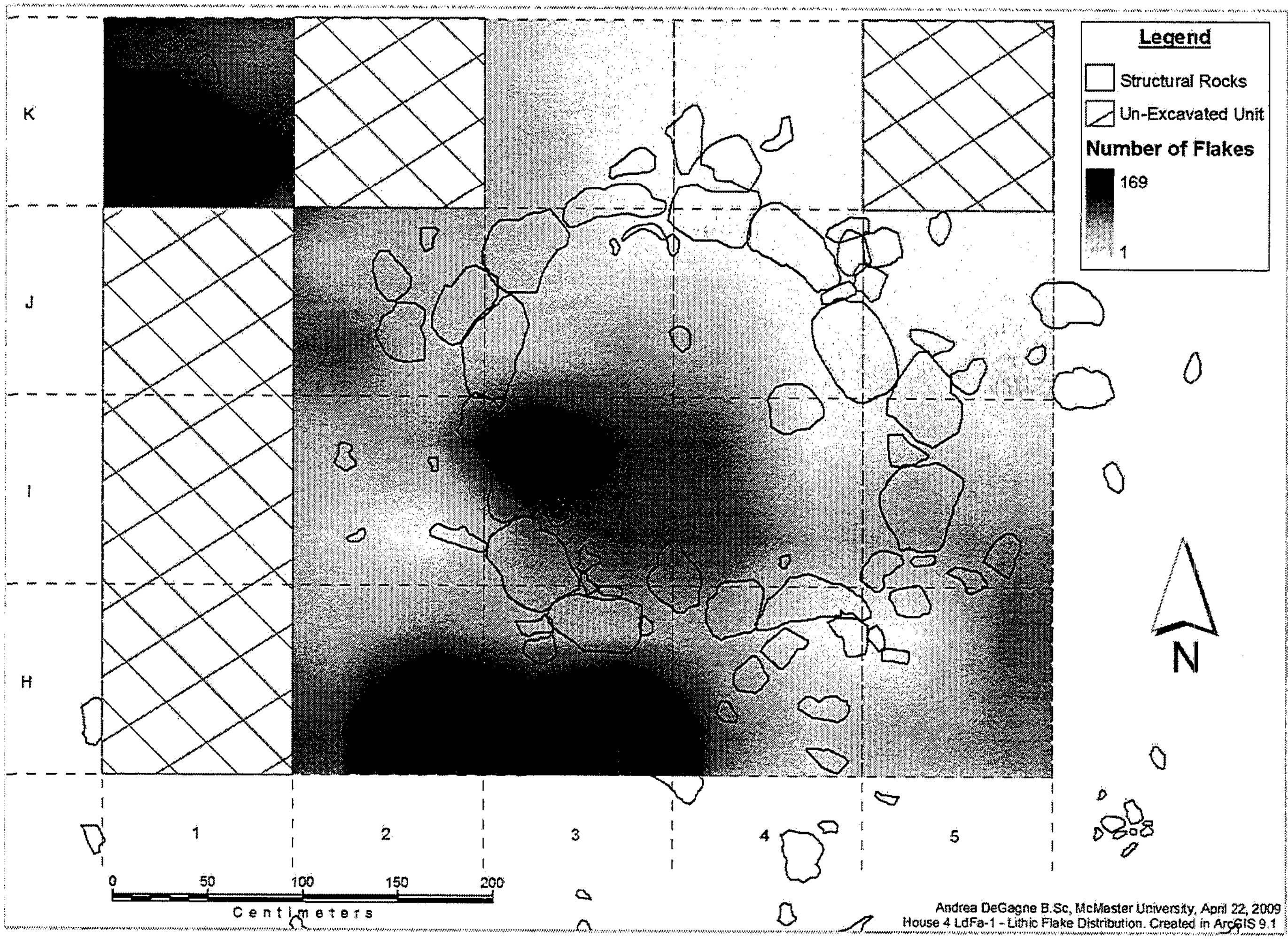


**Figure 24d**. Distribution of lithic artefacts 5-10 mm, displayed with an un-classified stretched colour ramp

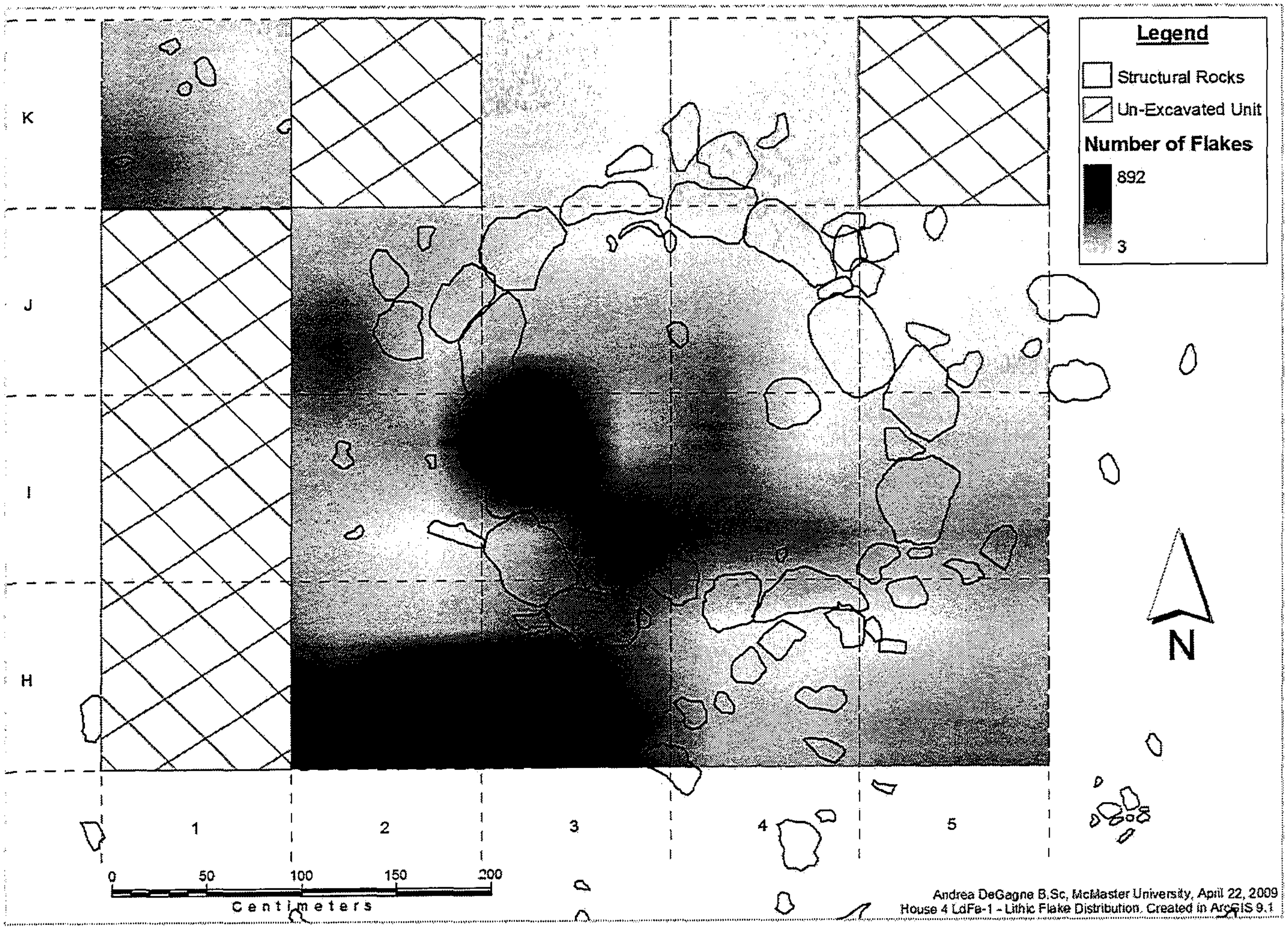


**Figure 24e.** Distribution of lithic artefacts less than 5 mm, displayed with an un-classified stretched colour ramp

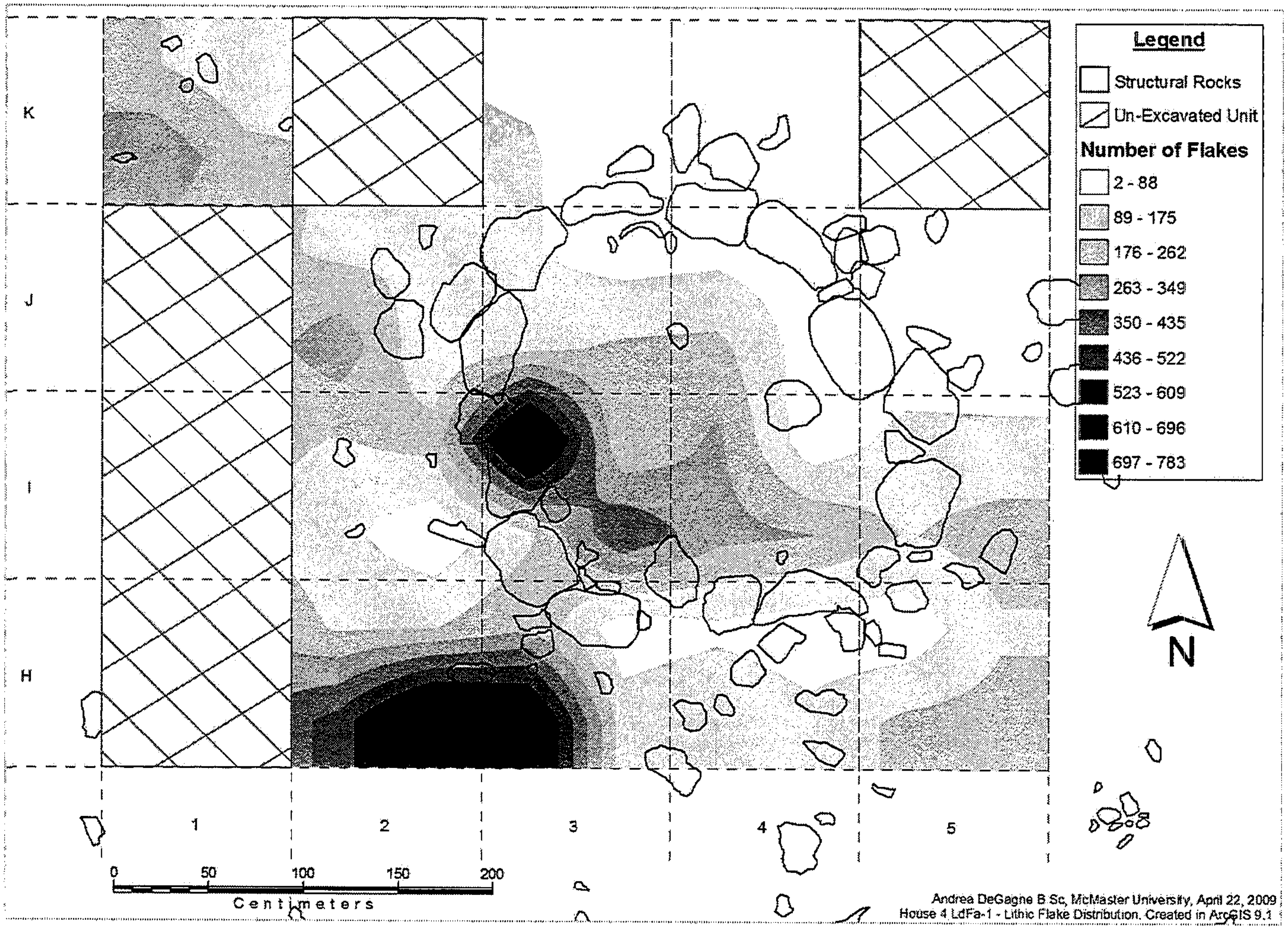


**Figure 25a.** Distribution of all lithic debitage across Structure 4, classified with equal intervals.

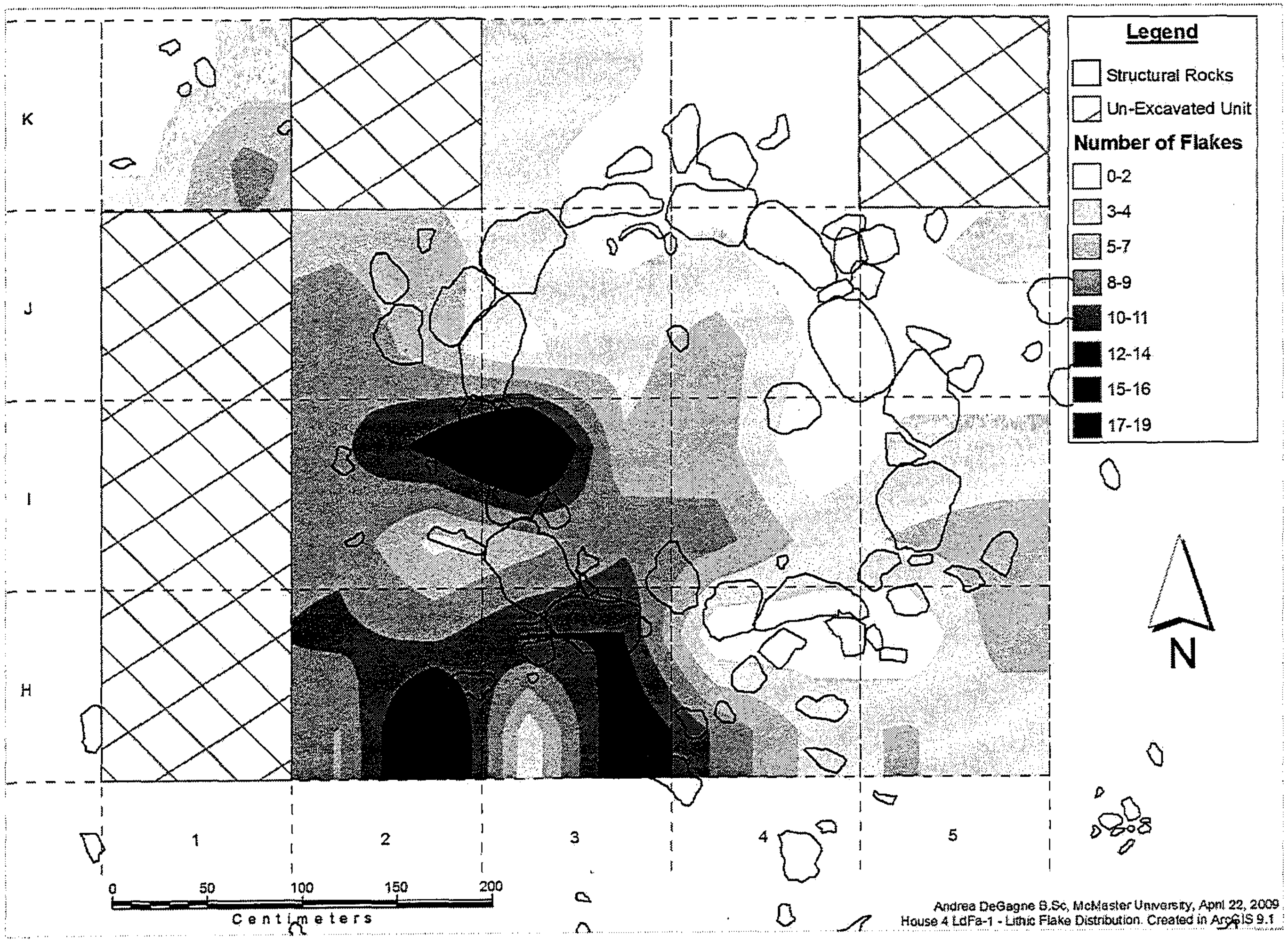


**Figure 25b**. Distribution of lithic debitage larger than 15 mm, classified with equal intervals

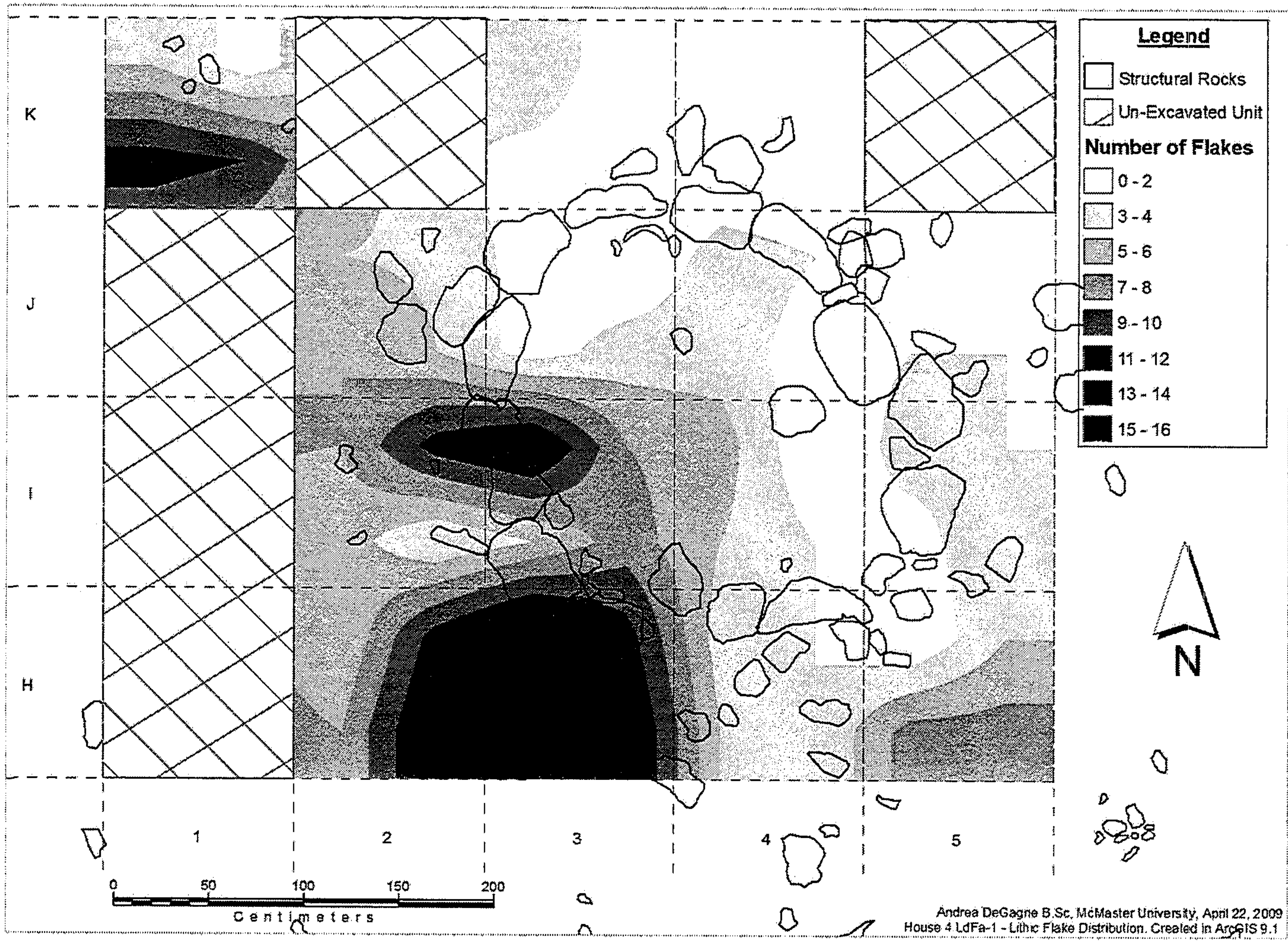


**Figure 25c.** Distribution of lithic debitage 10-15 mm, classified with equal intervals

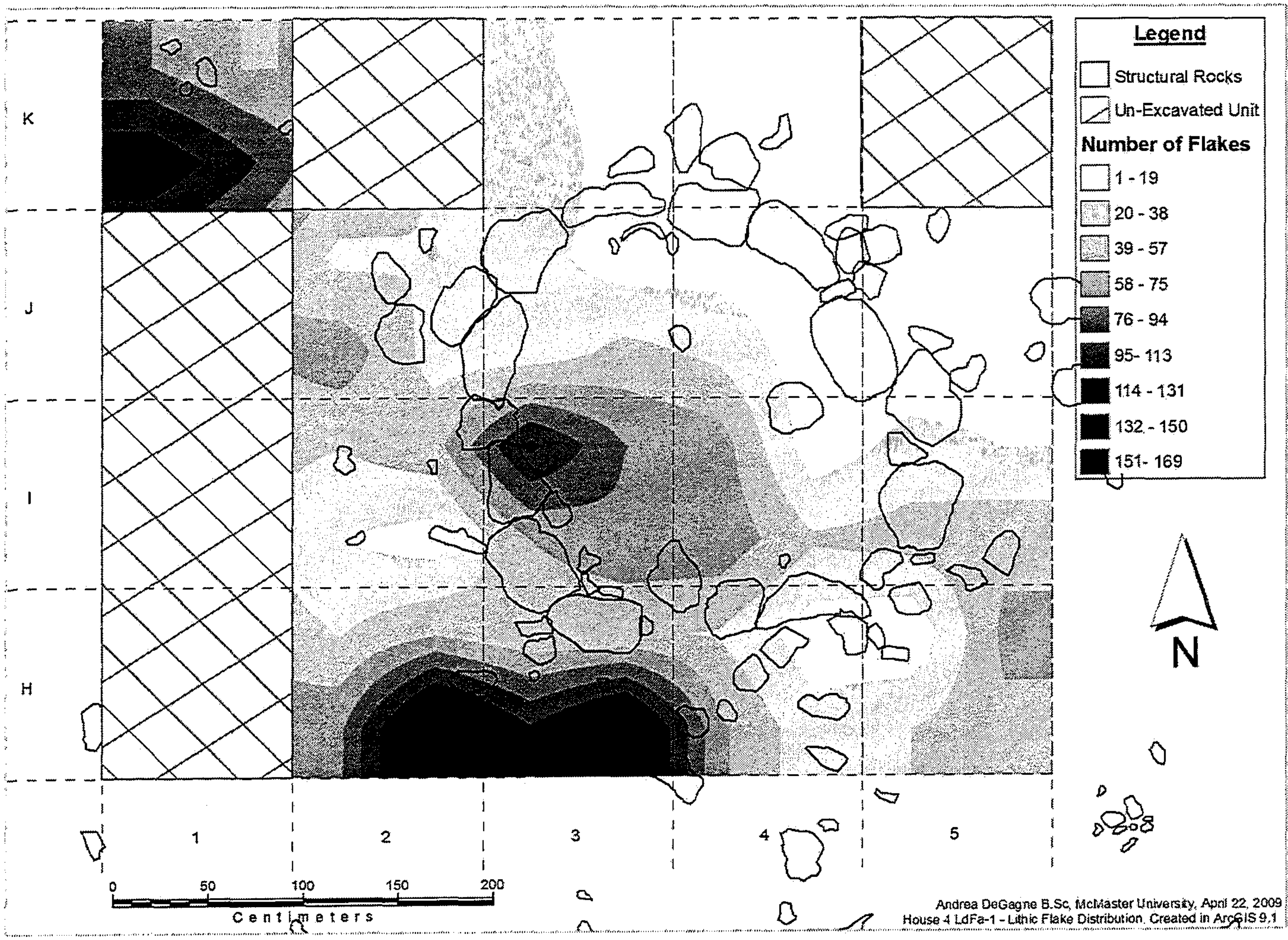


**Figure 25d.** Distribution of lithic debitage 5-10 mm, classified with equal intervals

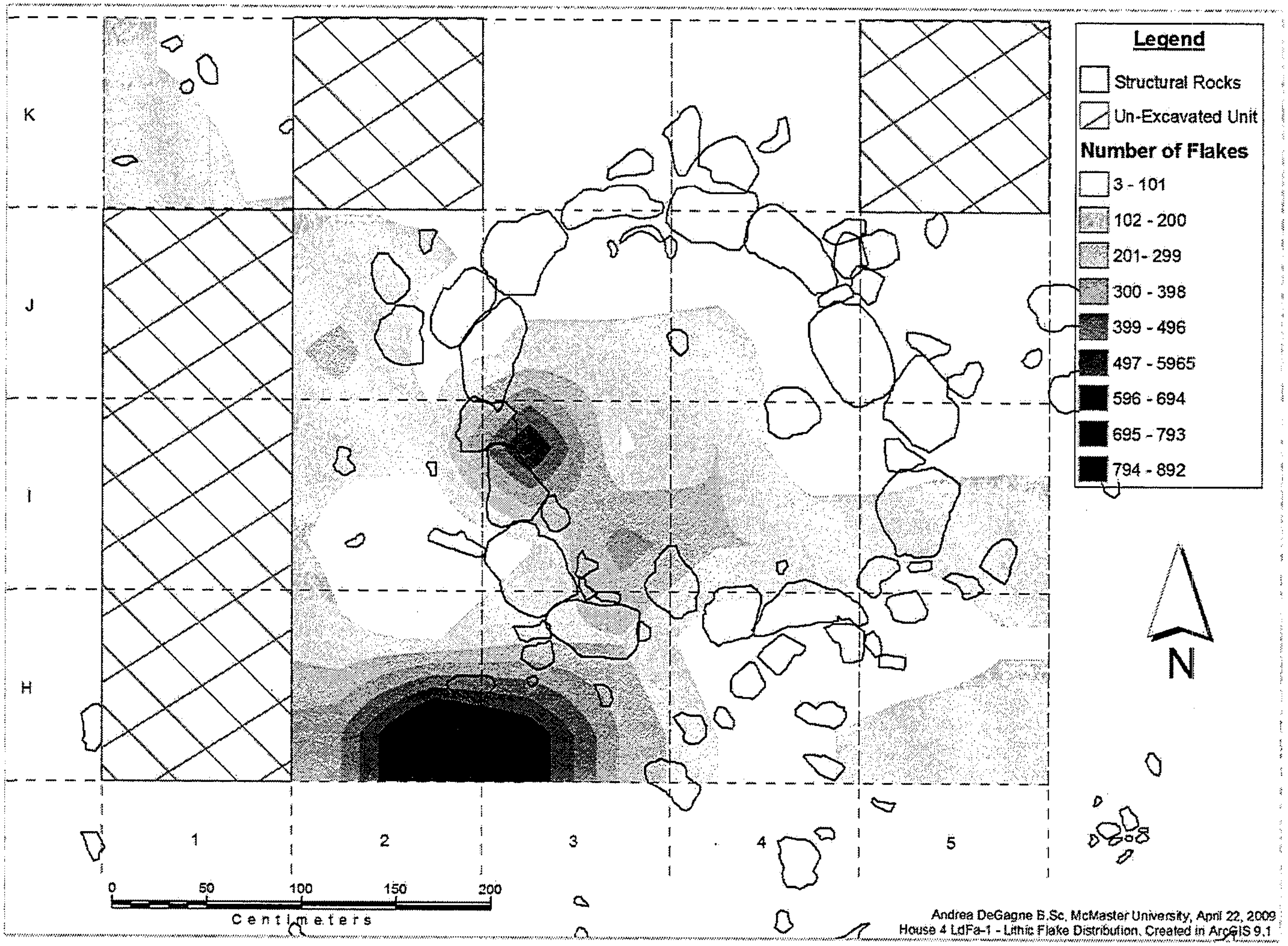


**Figure 25e.** Distribution of lithic debitage less than 5 mm, classified with equal intervals

*The Possible- Hearth as an Area of Outdoor Activity*

Hearths are the center of everyday activity for hunter-gatherer groups. They are the source of heat and light for many activities, where cooking, lithic manufacture, eating, and maybe sleeping, conversation, and play, all occur (Binford 1983:190; Vaquero and Pastó 2001:1210). Therefore, to find the largest concentration of artefacts at the site surrounding an area of burnt debris and calcine material is not surprising. Although this could be a secondary refuse dump where burnt remnants of material were deposited after cleaning, and not physically burned themselves, it is not yet understood if cleaning strategies were employed in Palaeo-Eskimo populations (Milne 2003b:84). However, the distribution of materials around this outdoor area is supportive of this being an outdoor work area.

The high concentration of debitage in the southern portion of the excavated area is tightly confined to a one-meter radius around the proposed hearth feature. This radius is consistent with outdoor hearth assemblages from other hunter-gatherer campsites, which span an elliptical area approximately two meters in diameter (Vaquero and Pastó 2001:1213; Stevenson 1991). Without the bounding walls of an enclosure, the light and heat of a fire would tie activities to an outdoor hearth and limit the distance of activities from this, explaining the high concentration of artefacts in such close range.

To provide further support for the identification of this southern debitage concentration as the focus of outdoor activity, the assemblage was assessed against Binford's (1978a) drop and toss model. If this was indeed an area where activities took place, two tiers of material should cluster around the hearth. These two tiers represent a distinction between the work areas close to the hearth where small materials were dropped in-place, and a separate outer ring where larger materials were tossed out of the way (Binford 1978a:345; 1983:153). This is recognizable archaeologically with a high concentration of smaller materials adjacent to the hearth, while the highest frequencies of larger debitage should appear slightly removed from this centralized area of activity (Stevenson 1991).

The debitage distributed around units H2 and H3 fits with Binford's model. The smallest lithic debitage, those less than 10 mm, were tightly bound to the southern quadrants of units H2 and H3 and the distribution terminated prior to abutting the house wall (Figures 25 d and e). Larger debitage, flakes larger than 10 mm, existed in similar concentrations across the entire one-meter unit, mixed with the smaller debitage and not strictly conforming to the outer toss-ring model. However, these larger artefacts were found further from the defined hearth location than were the smaller lithic artefacts, and the distribution of these larger flakes abutted the outer wall of the structure but continued no further (Figures 25 b and c), possibly indicating that this barrier was in place while the proposed hearth was in use.

### *Interior Space*

The division of interior from exterior space is most notable when looking at the distribution of lithic debitage less than 10 mm in size. This small lithic debitage was found throughout the interior of the ring of rocks, with the distribution stopping at the bounding wall (Figure 24 d and e). Concentrations of the smallest artefacts, those less than 5 mm, cover the central area of the house with an abundance of 100-200 flakes per 50 cm quadrate. The lowest concentrations of artefacts occur along the northern and eastern walls at concentrations between 0-100 artefacts per 50 cm quadrate. The highest concentrations of small debitage occur along the east-southeast wall of the structure, where nearly 700 pieces of lithic debitage less than 5 mm in size were found within 2500 $cm^2$. This abundance of lithic artefacts quickly decreased to 200-300 flakes per 50 cm quadrate, spread across the southwest interior space.

With sample sizes this large, the patterns seen in this distribution cannot be thought of as random. Unlike with the distributions larger debitage, a handful of flakes randomly dispersed in the site will not change the distributions seen. In combination with the large sample size, small artefacts have been found to remain where they were deposited, not being as greatly affected by post-depositional processes and cleaning, should this have occurred at the site. Therefore, patterns identified within the distribution of this smaller debitage are meaningful for understanding how activities took place within this structure.

The distribution of the largest debitage at the site exhibits a similar pattern of distribution across the study area, with one exterior concentration and one interior concentration of materials. However, there is a general lack of this large debris from inside the structure (Figure 24 b, c). A few large flakes are distributed throughout the central interior of the structure, ranging from three to seven pieces per 50 cm quadrate. The most notable concentration of large debris spans the northeast quadrant of unit I2 through to the northwest quadrant of unit I3 (Figures 24 a, b, and 25 b, c). This concentration falls across the bounding wall, as seen in the unit top plan (Figure 26).

Two interpretations of this distribution are possible, the first being that the house wall was built across the distribution, while the second sees this cluster as the amalgamation of two adjacent but separate areas of refuse deposition. The latter explanation is more likely in this case, given the strong distinction between inside and outside space when looking at the distribution of smaller lithic debitage existing in much higher frequencies.

The small sample size of this distribution of larger debitage does not preclude the existence of similar abundances of artefacts in two adjoining areas, as the maximum cell-count is only 19 flakes (Figure 24b). In addition to this disparity of smaller debitage throughout the distribution, a distinction between the interior and exterior of the structure was made at this location during excavation. An abundance of faunal material was noted from inside the structure, whereas this concentration was not found outside of the structure wall.

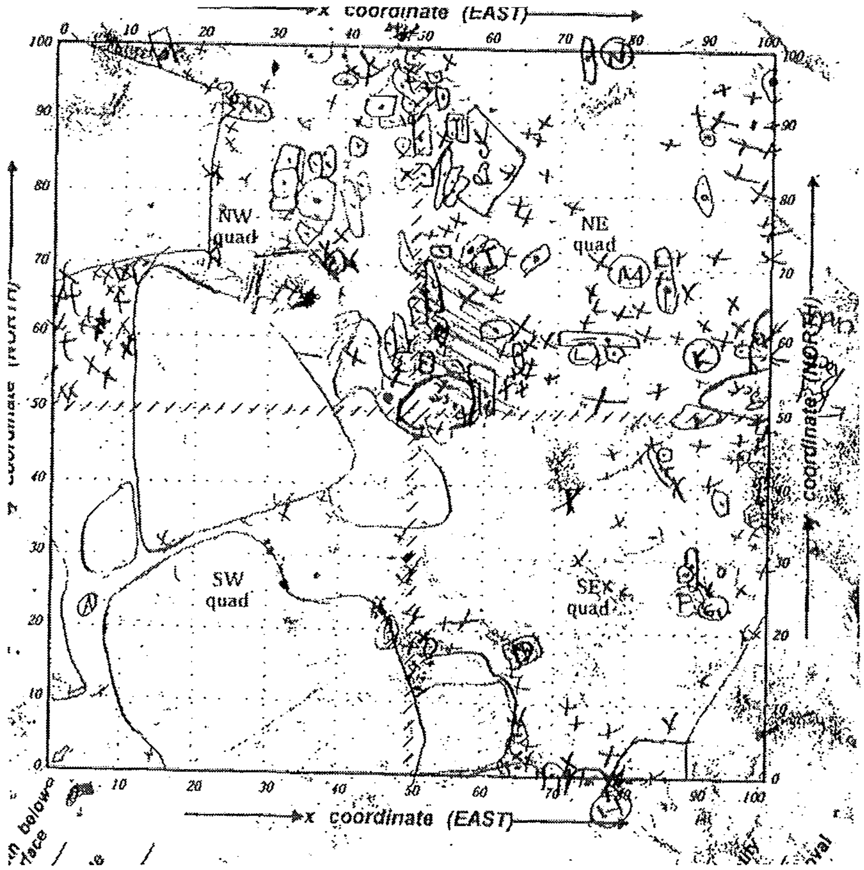


**Figure 26.** Top plan drawn for Unit I3, from the field excavation form

What is being seen along the west wall is a possible toss-zone or isolated dumping spot abutting the house wall from the outside, combined with an area where larger materials were displaced or otherwise deposited to be out of the way from within the structure. The high concentration of artefacts along the interior of the western and south western structural wall represents the centre of activity in the dwelling. The concentration of debitage of all sizes is much higher along the west wall than what was seen throughout rest of the structure for all sizes of lithic debitage, in stark contrast to the almost complete lack of artefacts along the northern and north eastern interior walls.

The occurrence of such a high concentration of small artefacts in a single 50 cm quadrate abutting the wall is suggestive of a dumping area, where the material remnants of activities undertaken within the structure were deposited during cleaning. Although the highest concentration is isolated to a single 50 cm quadrate, lithic debitage appears in increased concentrations of all size classes across the southwest portion of the structure, indicating that this dumping area may have been part of the centralized location of activities within the dwelling.

The increased concentration of small lithic debitage continues to the south, terminating at the proposed location of the access point to the structure. The concentration also appears to extend beyond the wall of the structure, with a similar abundance of small debitage occurring on both sides of the rock wall (Figure 25 e). Finding an equal abundance of small lithic debitage on both sides of the bounding wall was one of the criteria used to define an entrance. However, this location, slightly shifted from the earlier suggested location of an access area to the structure, was probably not the door,. The alignment of the rocks on their sides, tightly fit to be aligned with the remainder of the rocks, suggests that these have not been moved since they were first set in place. The height of the rocks in this location would make entering and exiting the inside space precarious, whereas the shorter rock adjacent would provide an easier access point. In either case, the heavily constructed configuration of Structure 4 would have provided a solid barrier between inside and outside, preventing the scuffing of material between inside and outside from occurring.

This concentration of lithic debitage is adjacent to two work zones, each characterized by a large quantity of debitage. Functionally speaking, it would be awkward to trek through this workspace, and a toss-zone should not be found within a high-traffic area such as a doorway. A better explanation for this apparent branching of the lithic debitage beyond the structure wall is that this is the location of two separate areas of lithic deposition. The area inside the structure, next to the entrance, may have been a continuation of the increased concentration of debitage seen 50 cm north along the western structural wall, and therefore part of the interior activity area. The high concentration of debitage on the outside of the structure was likely not associated with this interior abundance, but connected to the outdoor work area immediately to the south.

It is interesting that there are no small materials along the interior edge of the structure in the north and east. Even if there were a floor covering present in this area, material would be expected to fill the break between whatever covered the floor and the edge of the structure if refuse-producing activity had been undertaken in this location. Other than an overall lack of material, there are no other indications of a floor covering in this area when looking at the distribution patterns from all sizes of lithic debitage and formal artefacts. It is therefore possible that refuse-producing activities were simply restricted to the more central and south western parts of the structure. The area to the north and east would probably have not been a high-traffic zone or area of abundant activity, although in a structure this small it is more likely a restricted space, such as a sleeping platform.

Structure 4

Based on the debitage distributions from within and around Structure 4 at LdFa-1, it can be determined that this construction was a focal point of everyday activity and can thus be classified as a domestic structure. Further interpretations than this are sparse from the distributions recovered. The only further distinction that could be made is division of left and right realms from this structure, not as two work areas but as a possible functional divide between the location where refuse-producing activities took place and a place where other activities were enjoyed in an un-sullied location. There is no indication of use of this structure by differentiated social actors, but it is not impossible to consider that more than one person used this space during its occupation. The quarters would be tight, but the inside of the structure appears to be used for working on unobtrusive projects that created small, manageable waste flakes that could be deposited in an out-of the way area on the western side of the structure.

The comparison of the internal distribution of materials from Structure 4 at LdFa-1 fits closely with the description of two other examples of Palaeo-Eskimo structures available from coastal regions of Baffin Island. Structure 4 from LdFa-1 is very similar in size and in the distribution of debitage recovered from the Palaeo-Eskimo structure at Area Q of the Tungatsivvik (KkDo-3) site (depicted in Chapter 4, figure 10, above). The archaeological assemblages collected from both these structures further adhere to the distribution defined by Dekin's (1976) model of Palaeo-Eskimo domestic space, wherein a single area of activity is recognized from the western realm the interior of a circular feature, while a lack of artefacts exists opposite of this.

Distribution patterns mapped from the Palaeo-Eskimo structure recovered from Area Q at KkDo-3 display a similarly relatively-high concentration of artefacts in the rear left of the defined structure, As was seen with the distributions from Structure 4 at LdFa-1, this culminated in one very large concentration in a pointed area that tapers off quickly to the north and eastern edges of the structure but continues further, in a lower concentration, to the southwest and the location of the door (Milne 2003b: Figure 6). Milne has used this distribution of debitage in conjunction with the formal tools found at the site to establish areas of activity within the small structure, including a butchering area near the door, and a sleeping area, characterized by a lack of artefacts, to the east of a hearth-like structural feature at the rear of the structure (Milne 2003b: 71). This hearth-feature was defined based on by the large quantities of material existing in this location and the presence of larger bounding rocks creating a structural feature, however there were no signs of burning reported with this feature, similar to the lack of burnt materials from structure 4 at LdFa-1 (Milne 2003:71).

Flakes are much more abundant in the distribution of debitage from Feature 4, however, this is most likely the product of collection technique. Three hundred fourteen pieces of debitage were recovered from Area Q (Milne 2003b:71). Comparatively, over 800 pieces of debitage smaller than 5 mm were collected from a single unit inside structure 4 from LdFa-1. If the discrepancy in sample size is understood to be a result of collection technique, debitage frequencies from the Area Q structure seem to be generally comparable to a bulk count of all artefacts larger than 5 mm from the present study, correlating to the faction of debitage recovered using quarter-inch mesh screens. However, no screens were used to excavate Area Q. Understanding the artefacts that were overlooked by not collecting with screening methods would be an interesting endeavour, especially since the distribution patterns from the two sites turned out similarly. It would also be interesting to understand the size distribution of materials across the interior of the structure, and how this correlates to the distribution of debitage across Structure 4, however this is also not available from the published data.

Another divergence between the two structures is how formal artefacts are dispersed. Tools cluster within the north western realm of the structure at KkDo-3. Milne (2003b:71) used the locations of these formal tools to interpret the activity areas outlined in her study of the Area Q structure, further supporting these with patterning seen in microdebitage distributions. A similar formal tool distribution is not seen in the studied feature at LdFa-1. Here, formal artefacts seem to be evenly distributed across the study area. However, this does not mean that space was not similarly used in the two structures. Differences in site function could cause a variation in the toolkit present and the activities that were undertaken in this standardized work space.

Another consideration is that these formal tools are not actually representative of the activities that took place during the use of the structure, as has been described above (Refer to Chapter 2: 37-38). However, it has been established that the debitage distributions contribute more to an understanding of the overall use and organization of space, and these distributions are comparable between the structures from both coastal and inland sites. The similarities in the debitage pattern, regardless of the distribution of formal artefacts, suggest that a true model for the organization of Palaeo-Eskimo domestic space exists, although this needs to be substantiated with repetition of the same pattern in more examples of similarly defined space. Through the completion of further studies of Palaeo-Eskimo structures, with high-resolution collection and visualization, this model of the use of space can be authenticated.

Suggestions for how future studies of domestic architecture in the Canadian Arctic should proceed are further discussed below, including the research topics and suggestions of structural forms to be studied. Also presented are some modifications to the present collection methodology so that high-resolution data can be obtained in the most efficient way possible. Such a methodology enables the exploration of the huge number of structures that are required to establish a model for the use of space.

*Chapter 6*

# RESULTS AND CONCLUSIONS

This exploratory assessment of the potential for using high-resolution spatial analysis to define domestic space in an Arctic context has proven successful. The methods used in this study have provided a clear delineation of inside space from outside space in Structure 4 from LdFa-1. Furthermore, two distinct areas were delineated from the space inside this structure. A highly-productive area characterized by an enormous amount of small lithic debitage was discernible apart from an area in which almost no debitage was found. This distribution correlates to a functional division of space within the structure. The people who used this dwelling kept debris-creating tasks away from areas used for non-debris creating activities. Based on the patterns observed in the distribution of lithic debitage across the study area, Structure 4 was a center of activity for a small un-differentiated social group.

It is unlikely that domestic space could have been defined from this structure without the methods developed in this study. No domestic space would have been distinguishable within the area bound by the structural rocks if formal artefact distributions were solely relied on. Although formal tools can tell the utility of the site overall, the distribution of these within the site, especially within a single structure at a site, does not necessarily correlate to the areas in which they were used. Intra-site, and more specifically intra-structural distribution studies based on the dispersal of formal tools are impeded by problems of small sample size and tertiary or disturbed contexts.

Without the lithic debitage distributions, specifically the distribution of the debitage less than 10mm, structure 4 from LdFa-1 was un-recognizable as a domestic context. The very small interior space and heavily fitted construction may have prompted interpretations such as a wind shelter or other structure that was used for only a short time and therefore did not house the remnant archaeological patterns of daily life. Other possible identifications included the base of a cache or a perhaps some form of landscape marker set up when populations moved away from the site, as distributions of larger debitage seemed to span the well-made structural walls. However, by visualizing the smallest debitage with the Inverse Distance Weighting methodology, this structure could clearly be defined as having a focus of activity specific to its interior.

The high resolution collection techniques employed by this study made collection of lithic debitage a quick, standardized process. The Inverse Distance Weighting methodology applied in this study is useful for continuing the study of intra-site variability at LdFa-1, as well as excavating more structures of various constructions within both the inland and coastal regions, to better understand the variability and similarities at both the regional and inter-site scale. With a larger body of high-resolution intra-site data to build from, more substantial conclusions about

Palaeo-Eskimo ways of life and social organization can be reached. Domestic studies in the Arctic provide a means of expanding the currently limited knowledge about Palaeo-Eskimo cultural development and thus similar studies should be continued in the future.

Future Applications for High-Resolution Intrasite Analysis in the Arctic

This study has defined the domestic unit occupying Structure 4 to be the most basic social unit recognizable in the archaeological record. A small, un-differentiated group appears to have used this space, given the size of the dwelling and the single area of workspace. The differentiation of interior work areas from exterior work areas was very clearly marked; however, there is no indication that the space was identified with any specific social divisions of society.

A preliminary analysis was here undertaken to compare the distribution of space in Structure 4 from LdFa-1 with that previously defined in similar circular structures from the coastal uplands, namely the Tungatsivvik (KkDo-3) site. Although the scale of data was off between the two sites, a similar distribution of activities as found within both structures. This pattern in the use of space within a circular structure from South Baffin Island was also comparable to the distribution of space described by Deakin (1976) from structures at Lake Harbour, on the Southern coast of Baffin Island. The results of this analysis have suggested that there may be a standard form of the use of space within Palaeo-Eskimo domestic space. However, more examples of such a distribution must be found before this can be more than a loosely suggested hypothesis.

Domestic studies in the Canadian Arctic may proceed in two different ways, although these are not mutually exclusive and would both involve the excavation of many more proposed domestic structures. The first study would be an attempt at defining the most basic form of the domestic group, which can be done by creating a standard base form of the use of space in domestic structures. The second option would be to study a broader range of structural forms to understand if and how the perceived variability in architectural construction was modified by the behaviours and social organization of the people who created and used these spaces.

Undertaking more studies of similarly small structures with no internal features would be beneficial for understanding if the pattern of use defined for both Structure 4 and the Area Q house from KkDo-3 is indeed substantiated. Understanding if the basic division of domestic space defined in the present study is a consistent occurrence in architecturally similar Palaeo-Eskimo structures at both a regional and a site level would enable archaeologists to establish a model of Palaeo-Eskimo domestic space. This baseline domestic form could be used to define un-bound structures in the archaeological record, and would provide a good start to a broader study looking at defining changes in time and across space that may become apparent in the further investigation of more structures from different geographic areas or with varying architectural forms.

Examination of other structures from the LdFa-1 site should also be considered, as this study would provide a better idea about the intra-site social organization of Palaeo-Eskimo populations. It may be that what was thought to be undifferentiated domestic group from the study of a single structure is actually one portion of a more complex social organization that differentiated their activities between structures. To understand this level of data a more thorough understanding of the use of space may be required, similar to Milne's (2003b) analysis of the structure at Area Q, or Oetelaar's study of tent rings from the Northern Great Plains. In such a study, the tasks and materials from recognized activity areas would need to be understood so that these could be compared. This can be accomplished using methods of mass analysis (Ahler 1989) to understand the lithic assemblages from each space.

Another study that should be undertaken is a clarification of the structural typology presented by Ryan (2003) for the architectural features from across the Arctic. Studies of different structural types should be undertaken to better understand how the perceived changes in the use of space correlated to changes in the behaviours of the people who used them. Increased structuring of space may or may not be seen with a change in the size or shape of a dwelling. It would be interesting to understand the differences in the structuring of space between a feature with no formalized internal features, such as was seen with Structure 4 in this study, and structures with formalized midpassages. With a large enough body of data to work from, researchers will be able to understand changes in the social unit across both time and space and identify the behavioural causes and causes in the shifts that have been noticed in architectural styles.

## High Resolution Domestic Studies in Arctic Contexts: A Methodology for the Future

This assessment of the lithic debitage distributions from a single feature at a site from interior Baffin Island has shown that hunter-gatherer spaces are best investigated with high resolution methods for recording and analysis, provided by reducing both the size of artefacts collected and the size of collection units. The level of data provided with a 50 cm excavation grid and the collection of artefacts as small as one-eighth inch greatly exceeds the data available from the point-collection of formal artefacts alone. This increased resolution leads to a much better understanding of how populations regularly used and divided their spaces, far better than the locations of formal artefact tools and loosely correlated cultural analogues.

However, increasing resolution by collecting artefacts in a 25 cm grid pattern may yield further success in depicting the organization of space within features similar in size to the 2 x 2 m structure of this investigation. Although this methodology was foregone for this study, artefacts collected with a 20 cm excavation grid have been shown to provide as greatly detailed distribution pattern as is created using artefacts with recorded point-provenience (Johnson 1984:81). A similar result was obtained with the 25 cm grid example visualization created for exploring grid-size options (Figure 17, Chapter 4, above). The 25 cm grid was able to provide a much clearer picture of the distribution pattern than the 50 cm grid could, however, the number of units also quadrupled.

The choice of a 50 cm excavation grid for this project was made with the idea that formal artefacts would need to be piece-plotted during excavation. When this recording was combined with the extraordinary number of units needing to be excavated with a 25 cm grid the amount of field time required to excavate the 2 x 2 m house was much greater than the two weeks of field time allotted. However, given the limited amount of information provided by these provenienced artefacts, gathering data with this level of precision for this select sect of artefacts may be un-productive. By eliminating the recording of point-provenience and instead collecting all materials using a 20 or 25 cm excavation grid, time could be saved carefully excavating and sorting in the field. Instead, small units could be chunked out and screened with all materials bagged together to be sorted later in a lab setting. This methodology also permits controls in depth to be put in place by excavating units in 5 cm arbitrary levels. This allows for more information about site and structure re-use to be obtained, if available, which is critical for providing answers to questions regarding structural re-use and site cleaning.

Another option for excavating smaller sized units and ensuring the collection of all artefacts within each sample would be to employ a sampling strategy such as coring, which foregoes complete site excavation to instead collect a complete suite of data from standard intervals across the site that could be interpolated in to a smoothed visualization. Coring enables the removal of cylindrical samples of matrix and archaeological materials from across the site, preserving the stratigraphy and density of small flakes. Samples can be recovered with a system similar to the Eijkelkamp system described by Canti and Meddens (1998:98-99), which removes soil cores 6 cm in diameter that can be taken back to a laboratory for analysis.

Coring therefore provides data similar to using smaller collection units with increased control over the vertical dimension. The collection of the entire section of matrix and the artefacts associated with this also ensures the complete collection of lithic debitage and microdebitage, as well as phytoliths and samples for chemical or isotopic testing that may be discovered in future studies. Because the material can be placed within the 6 cm area from which the core was removed, micro-scale patterns in artefact distributions can be discerned. Multiple cores can easily be taken from across a small area, and the Inverse Distance Weighting methodology used in this study can be used to understand distribution patterns.

Coring methods have already been suggested for research at Palaeo-Eskimo sites (Milne 2003b), and this research method is well suited to use with Inverse Distance Weighting interpolation. This raster-creation method is capable of creating a smoothed vision of distributions based on known areas of concentration. Because of this, the data do not have to be continuous across the site, but rather, distributions can be inferred given a large enough body of sample points to create an accurate representation of the area in question. If cores are systematically extracted from across a site, from inside, outside, and surrounding features, a substantial amount of data can be collected regarding the organization of activities by relying on distribution patterns of microdebitage(Milne 2003b: 79-81).

Microdebitage is the flake material less than one millimetre that cannot be analyzed with the naked eye (Hull 1987). Among others, Milne (2003b, 2005a) has advocated the study of the distribution of microdebitage in Arctic environments, as this tiny material performs similarly to the smallest debitage at the site, appearing in high concentrations at areas where activities took place, and its distributions are not likely to have been affected by site maintenance activities.

However, there are a few setbacks to this methodology. Formal artefacts are less likely to be recovered from cores than from complete excavation, because many are larger than 6 cm in diameter and they are non-uniformly distributed across the site. This may hinder the ability to assign a cultural period to the deposits, leaving chronology to be defined through radiocarbon dating.

Also, the rocky nature of the sub-soil may hinder the coring process; the matrix nearing the bottom of the excavation commonly contains pebbles and cobbles. Furthermore, if microdebitage is successfully collected, analyzing distributions of this is a time-consuming task (Milne 2003b). Analyzing enough cores to obtain a reasonably accurate idea of spatial distributions will therefore be a challenge in a study covering a large area.

Another concern would be the depth of Arctic deposits. The deposits at this site are relatively thin at around 25 cm, and the average coring machine recovers cores in excess of one meter in depth (Canti and Meddens 1998:98). A large coring device may be excessive for studies of these sites in low-depositional environments. An alternative method would be to use a soil sampler yielding cylinders of matrix 1 inch diameter (cm), up to 18 inches (45 cm) long (Stein 1986:514). This smaller sample would be useful for finding microdebitage and some of the small flake debitage, but again, artefacts larger than 1 inch will not be collected.

If coring is a viable option for arctic archaeology, this method would provide a standardized sample from which to understand the distribution of lithic debitage across the site. When used with the visualization strategies presented in this study, an even higher resolution of data is available. This would provide an effective way to identify distribution patterns in domestic space. Combined with an excavation strategically undertaken to obtain a sample of fauna and formal artefacts from the site for dating purposes, this method could yield all of the requisite data for understanding both the what and when behind change in the use of space, while further application of social theory can help archaeologists determine the why and how.

The visualization methods developed in this study are valuable for continuing investigation into the social life of hunter-gatherer populations. Although this study of a single structure from Interior Baffin Island did not yield more than a basic pattern of social organizational, this does not mean that further investigations of Palaeo-Eskimo architecture will provide the same results. Should any social differentiation exist in the use of space in Palaeo-Eskimo cultures, further domestic studies using high resolution spatial analysis will reveal these divides. .

Previous investigations of structures from short-term hunter-gatherer occupations in other regions have shown that using high-resolution collection techniques can enable complex patterns of domestic organization to be located, should these exist. Gathering the data necessary to identify these patterns provides information beyond the seasonality and economic focus of these hunter-gatherer sites. By looking beyond the functional interpretations of hunter-gatherer sites and seeing these groups as social beings with meaningful ideas, a better understanding of the how these groups experienced life can be obtained.

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