Protohistoric Signatures of Household Material Wealth: An Interhousehold Analysis of the Bridge River Site (EeRI4)

Lee Nicole Reininghaus

The University of Montana

Follow this and additional works at: https://scholarworks.umt.edu/etd

Let us know how access to this document benefits you.

Recommended Citation
https://scholarworks.umt.edu/etd/782

This Thesis is brought to you for free and open access by the Graduate School at ScholarWorks at University of Montana. It has been accepted for inclusion in Graduate Student Theses, Dissertations, & Professional Papers by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.
Protohistoric Signatures of Household Material Wealth: An Interhousehold Analysis Of The Bridge River Site (EeRI4)

By

Lee Nicole Reininghaus

B.A. Anthropology, University of Montana, Missoula, MT, 2009

Thesis Paper

Presented in Partial Fulfillment of the Requirements for the Degree of

Master of Arts
Anthropology

The University of Montana
Missoula, MT

March 2011

Approved by:

Stephen Sprang, Associate Provost for Graduate Education
Graduate School

Dr. Anna Marie Prentiss, Chair
Department of Anthropology

Dr. Wade Davies
Department of Native American Studies

Dr. John Douglas
Department of Anthropology
List of Figures

Figure 1.1 Bridge River Chronology (taken from Prentiss et al. 2008) ..................3
Figure 3.1 Relief map of project area (taken from Prentiss et al. 2008) .......... 19
Figure 4.1 Figure 4.1 Plan and profile view of pithouse (taken from Teit 1900) .... 26
Figure 5.1 Plan view of Bridge River site (taken from Prentiss et al. 2008) ........ 41
Figure 5.2 Housepit 54, area 1 profile map ..................................................... 43
Figure 5.3 Housepit 54, area 2 profile map ..................................................... 44
Figure 5.4 Housepit 54, area 3 profile map ..................................................... 44
Figure 5.5 Housepit 20, area 1 profile map ..................................................... 45
Figure 5.6 Housepit 20, area 2 profile map ..................................................... 45
Figure 5.7 Housepit 20, area 3 profile map ..................................................... 46
Figure 5.8 Housepit 11, area 1 profile map ..................................................... 47
Figure 5.9 Housepit 11, area 2 profile map ..................................................... 47
Figure 5.10 Housepit 11, area 3 profile map ................................................... 48
Figure 6.1 Prestige index for each housepit ...................................................... 63
Figure 6.2 Exotic raw material index for each housepit .................................. 64
Figure 6.3 Mammal and biface indices for each housepit ............................... 65
Figure 6.4 House size indices for each housepit ............................................. 67
Figure 6.5 FCR indices for each housepit ....................................................... 68
Figure 6.6 Maximum floor thickness indices for each housepit ....................... 70
Figure 6.7 Ranked factor scores for each housepit ......................................... 75
List of Tables

Table 3.1 Bridge River Chronology..........................................................................................21
Table 5.1 BR4 stratigraphy, feature and radiocarbon dates.........................................................41
Table 5.2 Housepit diameters in Meters ......................................................................................50
Table 5.3 FCR raw data counts per activity area .........................................................................51
Table 5.4 Floor thicknesses in centimeters per activity area.........................................................52
Table 5.5 Prestige item raw data counts per housepit.................................................................55
Table 5.6 Exotic debitage raw data counts per housepit..............................................................56
Table 5.7 Exotic tool raw data counts per housepit.....................................................................57
Table 5.8 Faunal raw data counts per housepit..........................................................................58
Table 5.9 Biface raw data counts per housepit...........................................................................58
Table 5.10 Total raw data counts for each housepit .................................................................59
Table 5.11 Independent and dependent variable indices..........................................................60
Table 6.1 PCA correlation matrix .............................................................................................72
Table 6.2 Total variance explained............................................................................................72
Table 6.3 Rotated component matrix ........................................................................................73
Table 6.4 Factor scores for component one................................................................................74
Acknowledgements

I would like to give special thanks to several important people who helped me considerably throughout my research. First, I would like to thank Dr. Anna Prentiss for her amazing ideas, support and guidance, and for helping me decide to pursue graduate school in the first place. I would also like to thank the Bridge River Band for their support and enthusiasm in this research. Special thanks to Lisa Smith for her insight into statistics, and to Michael Wanzenried and Lucille Harris not only for their brains, but also for letting me stay in the lady cave during my defense. I would also like to thank Jerry Garcia for helping me to keep my sanity throughout my research process.
ABSTRACT

Reininghaus, Lee N., M.A., May 2011

Abstract Title: Protohistoric Signatures of Household Material Wealth: An Interhousehold Analysis of the Bridge River Site (EeRl4)

Chairperson: Dr. Anna M. Prentiss

This thesis is concerned with the archaeological research of the protohistoric component at the Bridge River Site (EeRl4), located in the Middle Fraser Canyon of the Canadian Plateau. The purpose of this research is to explore socioeconomic variability between households by understanding the relationships between household material wealth and house size, household demographics and household persistence through time. The approach is directed towards identifying variation in household material wealth through a comparative analysis of protohistoric archaeological material derived from three housepits excavated during the 2008 and 2009 University of Montana field investigations. To accomplish this task, I have developed three hypotheses through the use of middle range research regarding ethnographic models that aim to predict household material wealth in hunter-gatherer societies. My three hypotheses are tested using variables commonly employed in archaeological research regarding the analysis of household socioeconomic systems. The results of my research provides objective interpretation of key aspects of the protohistoric occupation at the Bridge River site, which can be incorporated into general theories regarding complex hunter-gatherers and the evolution of status and inequality in the Pacific Northwest.
Chapter 1: Introduction

This thesis encompasses archaeological research of the protohistoric occupation at the Bridge River site (EeRI4), located in the Middle Fraser Canyon of the Canadian Plateau. My research is directed towards identifying and understanding synchronic aspects of social, economic, and technological organization by identifying household variation through a comparative analysis of protohistoric archaeological material derived from three housepits excavated during the 2008 and 2009 University of Montana field investigations.

Preliminary analysis and limited subsurface testing of the Bridge River site was first undertaken in 1974 by Arnoud Stryd, with widespread site testing and excavation resuming in 2003 under the direction of Dr. Anna Marie Prentiss with the University of Montana and in collaboration with the Bridge River Band. As a result of the testing of 59 housepits accomplished during the 2003 and 2004 University of Montana field investigations, 77 radiocarbon dates were obtained from wood and charcoal samples with 53 of those samples derived from hearth, cache pit or post hole features. All recovered dates were calibrated using Calib 5.0 to facilitate the identification of major occupational patterns. Through visual examination of the calibrated mean of each obtained date, several discontinuities in occupational sequences were identified with the maximum distribution of dates segmented into two major occupational components, an early village inhabited approximately 1800-1000 cal. B.P. and a later occupation spanning approximately 500-200 cal. B.P. Further examination of dating distributions resulted in the
identification of three separate occupational events during the early village span, resulting in the development of a site chronology defined by four major occupational events, Bridge River 1 (BR 1), BR 2, BR 3 and BR 4 (Figure 1.1). The earliest occupation at the site corresponds with BR 1, with calibrated mean dates spanning from 1797-1614 B.P. BR 1 is characterized by 7 spatially unorganized house features and represents the establishment of the site. The BR 2 calibrated mean dates place occupation between 1552-1326 B.P. and is characterized by 17 housepits with a visible concentration of house structures at the north end of the site, likely representing an expansion of the site due to the increasing number of occupied housepits. Occupation seems to have been steady throughout BR 2 and into BR 3, which dates from approximately 1275-1067 B.P. BR 3 is characterized by 2 large residential clusters comprised of 29 house features and represents the peak in village size. However, following the BR 3 occupation at the site, an extended period of abandonment occurred, and major occupation of the village did not resume until 610-145 B.P. This final occupational event corresponds to the protohistoric occupation, and is referred to as BR 4 (Prentiss et al. 2008a).
Recent archaeological analysis of pithouse village sites in the Middle Fraser Canyon have been conducted with a focus on diachronic aspects of social organization and rising inequality, with much of the research regarding earlier occupational periods (Hayden 1997; Hayden and Schulting 1991; Prentiss et al. 2005, 2007b, 2008a, 2008b). However, contextual data regarding Mid-Fraser villages is limited due to a lack of widespread dating of house features resulting in an inability to effectively assess changes in residential patterns including village development, demographic expansion and subsequent abandonment. This has
resulted in archaeological debates regarding the development of social inequality and other forms of complex social institutions, with some researchers (Hayden 1997, 2000; Hayden and Ryder 1991) arguing for an early emergence of complexity in social organization and socioeconomic systems with the development of large pithouse villages arising as early as 2600 B.P. This suggests a 1500 year span of regional social complexity; however further research (Prentiss et al. 2003, 2005, 2007b, 2008a) has suggested that the development of complex social systems and wealth based inequality was a relatively late occurrence, developing circa 1200-800 cal. B.P. The development of theoretical models regarding the emergence of social complexity in Mid-Fraser villages has relied heavily on ethnographic documentation of complex social institutions including the presence of inherited wealth based inequality and elite control over resources and productive resource locales enabling household production of excess resource items resulting in the formation and maintenance of extensive trade networks reinforced through public displays of power and socioeconomic success such as potlatches and other public ceremonies. However, given the lack of systematic dating and excavation of most Mid-Fraser village sites, it is difficult to incorporate these contextually static descriptions of past lifeways into models seeking to explain the dynamic nature of complexity in social systems. To better understand the regional chronology of the Pacific Northwest and to help gauge the extent of culture change among hunter-gatherers of the Columbia Plateau, I have conducted an in depth analysis of the late component at the Bridge River site, focusing on the use of middle range theory for the development of testable hypotheses regarding variation in socioeconomic status and material
wealth at the household level. A fine-grained analysis of the BR 4 component of the Bridge River site will help to develop an understanding of the socioeconomic practices of hunter-gatherer households through an exploration of archaeological variables derived from ethnographic models used to predict variability in household material wealth. The results of my research will provide objective data that can be incorporated into further analysis regarding aspects of social organization and cultural change by highlighting variability in hunter-gatherer practices and their implication for the archaeological analysis of households.

The current study is presented in seven chapters. Following this introduction (Chapter 1), the second chapter describes the theoretical perspectives driving current research of complex hunter-gatherer societies and household archeology with an emphasis on the importance of middle range principles for the ethnoarchaeological development of testable hypotheses linked to socioeconomic variation at the household level. Chapter 3 provides a description of the environmental, cultural and temporal context of the site area followed by an in-depth summary of the ethnographic material presented to the reader with focus on the social, political and economic aspects of village life and how variability in these socioeconomic practices is represented within winter village households (Chapter 4). Chapter 5 encompasses the analytical procedures utilized in the current study, and includes research hypotheses and the methods for archeological analysis. The results of the analysis are discussed in Chapter 6, and conclusions resulting from the current study are summarized in Chapter 7.
Chapter 2: Theoretical Background

2.1 Introduction

This chapter provides a short overview of the theoretical concepts behind complex hunter-gatherer research and household archaeology in the Pacific Northwest. An abundance of theoretical perspectives have been employed in complex hunter-gatherer archaeology; however, the goal of this chapter is to highlight the importance of ethnoarchaeological interpretation and the use of middle range theory for the development of testable hypotheses regarding household wealth and status in the prehistoric Northwest.

2.2 Complex Hunter-Gatherers

The archaeology of complex hunter-gatherers has been at the forefront of recent archaeological pursuits and theoretical investigations. The term “complex hunter-gatherers” typically refers to societies with distinct social institutions whereby leadership and status is inherited and leaders developed and maintained control over non-kin labor for the purposes of increased wealth and status (Arnold 1996; Hayden 1995; Prentiss and Kuijt 2004). Socioeconomic organization in hunter-gatherer societies can be described in terms of “collectors and foragers” whereas complex hunter-gatherers display characteristics of collector subsistence strategies since survival is based upon delayed-return economic strategies (Binford
Delayed-return economic strategies are the result of ecological constraints resulting in seasonal resource availability. Often, these resources are in high abundance during short intervals, requiring specific management logistics for maximum resource procurement. Excess harvest is then stored and relied upon for survival during periods of low resource availability. Collectors as opposed to foragers are residentially restricted as a result of this delayed return economy, typically reside in aggregated villages, and maintain private ownership of food resources and resource locales (Binford 1980). A complex system of social and political organization is usually developed to manage the production and harvest of these resources and, as a result, complex hunter-gatherers have the ability to accumulate mass amounts of material goods through the development of these socio-political institutions designed to logistically manage the excess surplus. These institutions often lead to a social hierarchy with formal group membership and result in the ability of these groups to acquire and use wealth to increase status and power within a society (Arnold 1996; Hayden 1995; Hayden and Schulting 1997; Prentiss and Kuijt 2004).

Although research regarding complex hunter gatherers have illuminated much variability in these hunting and gathering societies, the archaeology of complex hunter-gatherers has nevertheless become an ever-increasingly popular avenue of research. At the core, the study of complex hunter-gatherers is a search for new theoretical avenues seeking to explain variation in cultural constructs and human behavior (Arnold 1996; Hayden 1997; Jordan 2009; Prentiss and Kuijt 2004). Much of human prehistory has been characterized by “foraging” societies
when existence was largely egalitarian, mobile and dependent on hunting, fishing and gathering (Jordan 2009). In contrast, complex hunter-gatherers incorporate different forms of social organizational strategies that include complex social institutions and wealth based inequality, but lack the characteristics defining highly institutionalized state societies (Hayden 1995, 1997). As a result, hunting and gathering societies are ideal for the testing of general theories regarding human evolution and culture change and the study of complex hunter-gatherer archaeology has become intertwined with theoretical models regarding the formation and evolution of social, ideological and political systems (Ames 1994, 2008; Hayden 1997; Jordan 2008; Prentiss and Kuijt 2004).

The development of general theory in complex hunter-gatherer research is often derived from observations and studies of current and historically documented cultural phenomena (Binford 1983; Jordan 2008; Kramer 1979). The use of general theories in archaeological endeavors developed to help gain insight into “why the past was the way it appears to have been” (Binford 1983:194). These theories are often utilized to understand the transformation of cultural systems, however, the ethnographic observations from which these theories are derived are documentations of “the functioning of a system already in a state for which an explanation is sought” (Binford 1983:194). In other words, the use of ethnographic observation in the development of general theories represents arguments derived from a stable social system, and as a result, a tautology is developed whereby these general theories are used as “proof” to explain cultural processes (Binford 1983). A better approach is to use these ethnographic observations to develop testable
hypotheses that seek to explain the meaning behind cultural phenomena. Once reliable answers to these questions are obtained, the data can then be incorporated into higher-level theories seeking to explain the “why” behind the transformation of social systems (Binford 1983:194).

This type of research has been termed “Middle Range Theory” (Binford 1975, 1977) and can help archaeologists transform the static contemporary views of culture to an understanding of past societies through generalizing analogies observed in the contemporary (Binford 1977; Tschauner 1996). In other words, general trends in the ethnographic literature can be used to develop testable hypothesis concerning the nature of social systems, which in turn provide insight into the development and use of theoretical models seeking to explain transformation within cultural systems. Middle range research provides the archaeologist with the opportunity for objective analysis because middle range principles are “logically independent” from general theory (Binford 1982:128).

“If Middle Range principles are intellectually independent of general theory, general theory can be tested using archaeological phenomena meaningfully operationalized through middle range research.” (Tschauner 1996:5)

This implies a “paradigmatic relativism” (Tschauner 1996:6) between theoretical positions where theoretical principles gain objectivity through interaction with other conceptual concepts (Binford 1977; Tschauner 1996). As a result, middle range research provides the archaeologist with an opportunity to
utilize ethnographic documentation to develop testable hypothesis regarding the dynamics of prehistoric households.

Ethnoarchaeological interpretation requires a detailed understanding of the relationships between material culture and society as a whole (Binford 1978; Jordan 2009; Kramer 1979). The result is an ability to identify certain aspects of human behavior that is reflected through interpretation in the archaeological assemblage (Kramer 1979). A comprehensive understanding of historical processes associated with a community under study can help archaeologists evaluate hypothesis formulated from ethnoarchaeological data (Kramer 1979).

2.3 Household Archaeology

The archaeology of domestic remains is commonly referred to as household archaeology and is particularly useful in complex hunter-gatherer research. Household archaeology is focused on conceptualizing domestic structures as artifacts and how these structures can provide insight to household organization (Nash 2009). Consistent with this approach are methodological procedures derived from political, ecological and material theory. Many researchers view households as the basic unit of analysis, connecting households directly to ecological, economic, and political processes (Ames 1996; Flannery 1976; Nash 2009; Netting 1982; Steadman 1996; Wilk and Rathje 1982). Others define the household as a group of people residing in the same structure who share household activities and decision making (Blanton 1994; Winter 1976). Both of these approaches to household
archaeology are representative of materialist based analyses that view economic and ecological factors as the most influential contributors for defining the household (Flannery 1976; Nash 2009; Netting 1982; Steadman 1996; Wilk and Rathje 1982).

The use of an ecological approach to the study of households was largely influenced by the work of Robert Wilk and William Rathje (1982) and has become a common tool for the archaeological understanding of households (Ames 1996; Hendon 2006; Nash 2009; Netting 1982; Steadman 1996; Trubitt 2000). Research conducted in such a manner focuses on ecology and economy and their functional role in household production, distribution, transmission and reproduction. According to Wilk and Rathje (1982), the household can be divided into three components, the social, the material and the behavioral. The social aspect of the household encompasses the relationships of and between members of the household unit, whereas the material element of the household includes the dwelling itself, the activity areas and the material possessions of the inhabitants. The behavioral component includes the activities conducted within the household by residential members. The nature of households can be radically different between societies, and this variability creates difficulties in assigning behavioral characteristics to material correlates. Analyzing the economic and subsistence practices of a society to infer the nature of production within the household can rectify these difficulties, by identifying behavioral patterns, which can then be tested against the archaeological record (Wilk and Rathje 1982).

The use of an ecological perspective in household archaeology was borrowed from cultural anthropologists, whose agendas have been focused on the
“specific ways in which households respond to changing demographic, economic and environmental conditions” (Wilk and Rathje 1982:620). Archaeologists have utilized the idea of the household as a basic unit of analysis by employing ethnographic material from a variety of different societies to reveal generalities in how household size and organization are connected to broader social and economic practices. The use of house size can provide a basis for archaeological inferences to assess household behaviors and better understand household organization and activities (Wilk and Rathje 1982:619-620).

Inherent in this approach is the classification of the household as a functional unit. Household organization can be identified through an analysis of household function. Households perform different functions, and as a result, the “size, organization, and developmental cycle of the household” will vary (Wilk and Rathje 1982:620). To address this issue, Wilk and Rathje (1982:621) outline four functional categories to aid in the identification of the role of the household, and the relation of the household to other domestic units.

The first functional category of concern to Wilk and Rathje is that of production, defined as the procurement of resources, or the act of assigning increased value to those resources, both tasks often performed within the household (Wilk and Rathje 1982:622). To aid in the variable nature of production within the household, the scheduling of activities needs to be identified. Scheduling can be classified as either linear or simultaneous, where the individual undertakes linear activities, but a group performs simultaneous tasks. Simultaneous tasks are further categorized as simple or complex, both resulting in vastly different forms of
production. Simple tasks involve a group of people performing the same task, and complex activities involve a specialization of production whereas groups of people perform different aspects of a single task. The benefits of conducting tasks in a simultaneous manner include increased efficiency in regards to linear performed tasks. The simultaneity of production tasks will vary in efficiency and are largely dependent on the size of the group performing the task. Given that the act of production is usually conducted within the household, one could estimate the optimum size of household to accomplish a particular set of tasks (Wilk and Rathje 1982:622-623). Wilk and Rathje (1982:624) assert that simultaneous production tasks are facilitated by large household groups to increase the efficiency of task completion. The use of large households to infer the organization of production has been cross-culturally tested by Pasternak, Ember and Ember, who utilized data from 60 randomly selected societies from the Ethnographic Atlas and Human Relations Area Files to assert that extended family households are the result of “incompatible activity requirements” which require forms of labor arrangements that are not conducive to a single family household (Pasternak, Ember and Ember 1976:119; Wilk and Rathje 1982:624).

The next functional category identified by Wilk and Rathje is that of distribution, defined as the act of transferring resources from the producer to the consumer as well as the consumption of those resources. Activities include the distribution of resources within the household and the exchange of resources outside of the household. The development of large household units are the result of adaptational behaviors used to manage diversified production, which requires
the “pooling” of resources within the household (Wilk and Rathje 1982:624). Small households are dominant in societies where the acts of production lack diversity and do not require the collaboration of resources among household residents. Wilk and Rathje provide an example of diversified production from the Kekchi Maya in Central America, where some households’ subsistence practices are largely dependent on the production of rice. A large household unit is necessary to provide enough rice for household subsistence as well as for exchange, and requires the sharing of resources within the household. Wilk and Rathje state that small households are ill equipped to perform such “complex” tasks of production (Wilk and Rathje 1982:625).

*Transmission* is another functional category of distribution identified by Wilk and Rathje, and is characterized by the “transferring of rights, roles, land and property between generations”, and is largely dependent on the definition of property within a given society (Wilk and Rathje 1982:627). Ownership is closely associated with the availability of resources and land, and the access to property becomes restricted as the abundance of goods and land become diminished, usually resulting in household control over access. Household control over resources is viewed as linked to acts of resource intensification and decreased access to land (Wilk and Rathje 1982:627). This results in variable sizes of household structures, where households that control access to land and resources accumulate more residents in order to obtain sufficient labor pools to manage the production of those resources. Households with fewer resources to manage do not require the need for large labor pools, and as a result, the number of residential inhabitants is
much less than households that display ownership and goods and resources (Wilk and Rathje 1982:627-629). It has also been asserted that land controlling households are not the only residential units able to accumulate numerous inhabitants. Wilk and Rathje assert that elite households will acquire members to manage the “affairs of high office” and to better exert their influence of leadership (Wilk and Rathje 1982:630).

*Reproduction* is the last functional household category identified by Wilk and Rathje, and involves the upbringing of children within the household. This functional task requires a significant amount of labor, and the collaboration of labor among household residences allows for women to devote more time to subsistence activities. This is another factor that results in larger residential units, by allowing for increased adult labor to manage the reproductive aspects of the household and to ensure economic productivity (Wilk and Rathje 1982:631).

Wilk and Rathje claim that the above outlined functional categories of the household can be used to reconstruct the social and economic aspects of the household using archaeologically recovered data. This is accomplished by assessing aspects of community organization through ethnoarchaeological studies of “comparable ecological situations” (Wilk and Rathje 1982:633). Wilk and Rathje refer to the Kekchi Maya of the Belize lowlands as an example of the archaeological relevance of their research. In households not involved in the production of rice, they assert that labor is the limiting factor in Kekchi production, and results in the formation of kin based alliances. They also assert that based on ethnoarchaeological research, the form of production is linear, and does not involve
complex labor practices. The distribution of resources among the Kekchi does not involve the pooling of resources, and small households remain an efficient form of household production. Further, the ownership of land is not an aspect of Kekchi social organization, because access to land is not restricted. However, the Kekchi do combine labor for reproductive purposes, resulting in a flexible and efficient system of social organization. Ethnoarchaeological observations can lead researchers to answer questions regarding the nature of household organization as reflected in the archaeological record, making it possible to reconstruct the socioeconomic aspects of a society from the organizational structure of the household (Wilk and Rathje 1982:634-636).

This approach to archaeological investigation of the household has provided researchers with a framework to assess aspects of social organization and social differentiation among prehistoric societies. This is largely facilitated by the use of household data to infer the material wealth of households (Allison 1999; Ames 1996; Coupland 1996; Nash 2009; Netting 1982; Smith 1985; Steadman 1996; Trubitt 2000; Wilk and Rathje 1982). Archaeological research regarding Plateau villages has long incorporated ethnographic observations regarding the socioeconomic nature of households and has led to the use of these variables to interpret the rank of households within a society (Hayden 1997; 1995; Prentiss and Kuijt 2004). This is largely the result of ethnographers who noted that wealthy households tended to be composed of extended-lineages, and even in instances non-kin members (Hill-Tout 1905; Teit 1906). Archaeologists commonly utilize this concept to make inferences regarding household economic status in hunter-
gatherer populations whereby wealth is often regarded as dependent on the ability of a household to provide labor for production (Hayden 1997, 1998; Hayden and Schulting 1997; Netting 1982; Wilk and Rathje 1982). Elite households would be expected to have greater labor pools, and as a result could produce a larger array of subsistence and craft items, which could be used to gain access to prestige items such as non-local lithic raw material and other valuables of significant cultural and social importance (Arnold 1996; Hayden 1997, 1998, 2000; Hayden and Matthews 2009; Hayden and Schulting 1997; Netting 1982; Wilk and Rathje 1983).

The ethnographies of the Mid-Fraser provide archaeologists with a wealth of data regarding the socioeconomic and political organization of complex hunter-gatherer societies; however, the theoretical perspectives driving the analysis of these households are largely derived from research regarding agrarian societies with a focus on understanding the transition between foraging and agricultural subsistence practices (Flannery 1976; Netting 1983; Wilk and Rathje 1983). A better approach would be to explore the relationships between material wealth and the household on a regionally specific and temporally restricted basis and through the use of middle range principles. These methods will give insight into the variability in socioeconomic systems, the resulting implications for the material wealth of a household, and how these practices are manifested in the archaeological record.
Chapter 3: Environmental, Cultural and Temporal Background

3.1 Introduction

The purpose of this chapter is to explore the cultural, temporal and geographical context of the area and society under study. A thorough understanding of the cultural and natural environment will help to highlight important historical contingencies that are directly relevant to the development of testable hypotheses regarding Middle Fraser archaeology.

3.2 Environmental Context

The Bridge River site is situated in the Middle Fraser Canyon, a geographic area encompassing the Fraser River and surrounding areas. The Middle Fraser Canyon is located within a larger geographic region known as the Canadian Plateau, which includes the southwestern portions of modern-day British Columbia. The Canadian Plateau encompasses the northern portion of the Interior Plateau, a larger geographic system located between the Cascade and Rocky Mountains and bordered on the north by subarctic forests of British Columbia, and on the south by the Great Basin region of the western United States (Prentiss et al. 2005). The southern extent of the Interior Plateau is referred to as the Columbia Plateau, and unlike the Canadian counter-part, is defined by lowland areas and steppe shrub habitat, with
higher elevation areas concentrated in the center of the geographic region (Andrefsky 2004).

Figure 3.1 Relief map of project area (taken from Prentiss et al. 2008)

The Canadian Plateau, encompassing the Fraser, Thompson, and Okanagan River drainages, consists of variable topography with narrow river canyons and steep mountainous terrain (Figure 3.1). The region encompasses a wide variety of environmental conditions, from xerophytic in the lower elevations, to subalpine in the mountainous areas (Prentiss et al. 2005). Alexander (1992a) has divided the
region into seven environmental units, consisting of Alpine, Montane Parkland, Montane Forests, Intermediate Grasslands, Intermediate Lakes, River Terraces, and River Valleys. This diversity of environmental units results in a large array of plant and animal resources available for hunter-gatherer groups residing in the region. Commonly utilized resources include various geophytes including: balsamroot, spring beauty, avalanche lily, and wild onion; berries, including: Saskatoon, huckleberry, chokecherry; various ungulates especially deer; and a heavy reliance on anadromous fish species, in particular salmon (Cannon 1992; Hayden 1992; Prentiss et al. 2005; Turner 1992).

3.3 Cultural and Temporal Context

The Bridge River site is located on a river terrace on the north side of the Bridge River, several miles upstream from the confluence of the Fraser River. The site is located near the present town of Lillooet, is the home to the Bridge River Band of the Fraser River Lillooet, and is one a several large aggregate pithouse village sites located in the Middle Fraser Canyon. The region is currently and ethnographically home to members of the Interior Salish language family, which includes the Nlaka’pamux, or Upper Thompson, the Secwepemc, or Shuswap, and the St’át’imc or Fraser River Lillooet (Hayden 1992, 1997; Kennedy and Bouchard 1992).

A cultural chronology has been developed for the Canadian Plateau region with a focus on the late Holocene occupation (Rousseau 2004) and is defined by
three distinct temporal categories, the Shuswap (3500-2400 B.P.), Plateau (2400-1200 B.P.), and Kamloops (1200-200 B.P.) horizons. Further classification of temporal periods has been undertaken (Prentiss et al. 2005) with a focus on cultural evolutionary patterns through identification of important historical events, characterized by environmental shifts and resulting subsistence variation. This classificatory scheme is useful for identifying environmental relationships to cultural phenomena. As a result of this classificatory scheme, the late Holocene has been divided into five periods, Period I (3500-2400 B.P.), IIa (2400-1700 B.P.), IIb (1700-1200 B.P.), IIc (1200-700 B.P.) and IId (700-200 B.P.).

A specific chronology for the Bridge River site has been developed as a result of the testing of 59 housepits accomplished during the 2003 and 2004 University of Montana field investigations (Prentiss et al. 2008a). Intensive testing resulted in 77 radiocarbon dates derived from roof and floor strata contexts. All dates were calibrated to facilitate the identification of major occupational trends. Examination of calibrated mean dates indicate that the Bridge River site is defined by four major occupational events, BR 1, BR 2, BR 3 and BR 4 (Table 3.1).

Table 3.1 Bridge River Chronology (taken from Prentiss et al. 2008)

<table>
<thead>
<tr>
<th>Period</th>
<th>Date Range</th>
<th>Number of Housepits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge River 4 (BR4)</td>
<td>610 – 145 cal. B.P.</td>
<td>13</td>
</tr>
<tr>
<td>Bridge River 3 (BR3)</td>
<td>1275–1067 cal. B.P.</td>
<td>29</td>
</tr>
<tr>
<td>Bridge River 2 (BR2)</td>
<td>1552–1326 cal. B.P.</td>
<td>17</td>
</tr>
<tr>
<td>Bridge River 1 (BR1)</td>
<td>1797–1614 cal. B.P.</td>
<td>7</td>
</tr>
<tr>
<td>Pre-Bridge River (Pre-BR)</td>
<td>2538 cal. B.P.</td>
<td>1</td>
</tr>
</tbody>
</table>

Dates are presented as calibrated means.
The earliest occupation at the site corresponds with the occupational period of BR 1 and dates from 1797-1614 B.P. BR 1 is characterized by small isolated pithouse features, and a lack of organized settlement patterns. Occupation seems to have been steady throughout BR 2 and into BR 3, which dates from approximately 1275-1067 BP. During BR 2 times, numerous pithouses appear with a concentration of occupancy directed towards the north end of the site. By BR 3 the village had expanded, resulting in distinct clusters of houses, perhaps indicative of different clan groups. However, following the BR 3 occupation at the site, a period of major abandonment occurred, affecting all major villages within the region. The cause of this cultural disbandment remains a topic of inquiry, with some researchers attributing the regional collapse to the inability of the salmon runs to reach the interior due to a massive landslide (Hayden 1997). Others suggest that severe climatic warming resulted in ecological constraints that led to resource depletion and overexploitation (Kuijt 2001; Kuijt and Prentiss 2004; Prentiss et al. 2005; Rousseau 2004). Major occupation of the Bridge River village did not resume until 610-145 BP. This final occupational event corresponds to BR 4 (Prentiss et al. 2008a), also referred to as the protohistoric occupation.
4. Ethnographic Context

4.1 Introduction

This chapter provides a detailed account of traditional St’át’imc lifeways as documented by various ethnographies regarding Fraser River societies, in particular, those produced by James Teit during the Jesup North Pacific Expedition (1898-1912) which documented social aspects of the Lilooet at the turn of the twentieth century (Hill-Tout 1905; Teit 1900, 1906). These ethnographies are commonly utilized by archaeologists in Plateau hunter-gatherer research regarding socioeconomic practices and their implications for the household (Alexander 1992b; Cannon 1992; Hayden 1992, 1997; Hayden and Schulting 1997; Kennedy and Bouchard 1992; Prentiss et al. 2005, 2008a; 2008b; Romanoff 1992). The ethnographic data are presented to the reader with focus on the social, political and economic aspects of village life and how variability in these socioeconomic practices is represented within winter village households. A detailed analysis of the ethnographic material will provide a frame of reference for the development of testable hypotheses regarding variability in household socioeconomic systems during the protohistoric occupation at the Bridge River site.
4.2 Lillooet

The St’át’ímc, referred to in the ethnographies as the Upper Lillooet, occupied a one hundred square mile area encompassing the Middle Fraser Canyon. The St’át’ímc, or Upper Lillooet are members of the Interior Salishan language family and traditionally have been neighbored to the east by the Shuswap and Thompson, and to the north by the Athapaskan-speaking Chilcotin. The name Lillooet refers to two geographic groups, the Upper and Lower Lillooet. Each group was further subdivided into several groups with the Lower Lillooet comprised of the Lillooet River and the Pemberton people and the Upper Lillooet consisting of the Lake and the Fraser River people. Each group consisted of several village groups comprised of kin groups or clans (Alexander 1992b; Teit 1906).

The ethnographies document the Lillooet as practicing complex forms of social organization with the presence of hereditary chiefs, social stratification and slavery. It is documented that all of the Lillooet groups were divided into clans, or descent groups, with each village originally descended from a common ancestor. Clan membership was passed through both the male and female lineages and as a result, children could claim membership of both clans. There were no restrictions regarding intermarriage between clans, and new clans could and were easily created. Each clan had a hereditary chief, although in instances where more than one clan resided in a village, a head chief was designated. When a hereditary chief died, his role was passed on to his eldest son, and in cases were there were no sons, the eldest daughter inherited the position (Hill-Tout 1905; Teit 1906).
The ethnographies document the importance of salmon for the Lilooet and the locations of large aggregate villages within the region were often situated near productive salmon fisheries along the Fraser drainage (Teit 1906). The Bridge River site is situated near the Six Mile rapids salmon fishery, which is considered one of the most productive fisheries within the Middle Fraser Canyon (Hayden 1997; Prentiss et al. 2005). The St’át’imc name for this fishery is Sxetl’, meaning “drop off”, and villagers living at the Bridge River site most likely retained the best access to these salmon resources (Kennedy and Bouchard 1992; Prentiss et al. 2008a).

Ethnographically there were 54 recorded winter villages within the region during the late nineteenth century (Kennedy and Bouchard 1978). Small villages usually consisted of only three to four pithouses and larger villages were documented as being comprised of 25 structures or more (Teit 1900; 1906). The villages were comprised of numerous semi-subterranean structures, constructed several meters in the earth and usually ranging between 5-20 meters in diameter. The size of these structures was dependent on the size of the household, with larger multi-family units residing in larger sized structures. The pithouses were constructed with a wooden superstructure, covered in matting and finished with clay. Each structure was constructed with a central opening through the roof serving as an entryway and smoke hole with a large timber-constructed ladder for access. Some variation was present in construction techniques, with additional side-entryways and hidden escape routes a somewhat common occurrence. The vast majority of the pithouses however, seem to largely follow the standard pithouse construction techniques (Figure 4.1). The pithouses were consistently
occupied throughout the winter months, generally from mid-November to early March, and intermittently occupied during the summer months by those less capable for travel during logistical subsistence forays. These pithouses were often inhabited for generations, with the wooden superstructures burned and rebuilt numerous times for reoccupation. The interiors of the structures were lined benches constructed of earth and wood, covered with hides to serve as sleeping quarters. Each family unit resided in a certain area circling the center of the pithouse, each with their own hearth and storage features (Teit 1900, 1906)

*Figure 4.1 Plan and profile view of pithouse (taken from Teit 1900)*
During the spring and summer months the Lilooet left their winter pithouses to engage in more mobile subsistence behaviors, with a focus on the procurement of various roots, berries, plants and other important resource items including trout, white pine nuts, cedar bark and lithic raw material. The seasonal round of the Lilooet encompassed various environmental zones as food resources were available. These resources were diligently collected and stored for winter survival.

The late summer and fall were focused on salmon fishing and hunting, and acquiring and preparing enough surplus for the winter months (Alexander 1992; Hayden 1992, 1997; Prentiss et al. 2005; Teit 1906). During these months, base camps were set up at the fishing stations and in addition winter village sites were also utilized for extended Saskatoon harvest (Alexander 1992).

Salmon was the most important food resource for the Lilooet, and winter survival for was dependent on the ability to harvest and accumulate mass surplus for storage (Cannon 1992; Carlson 2010; Hayden 1992; Kennedy and Bouchard 1978; Romanoff 1992). Numerous species of salmon were available to the Lilooet along the Fraser River; however, the large sockeye runs of late summer provided the best opportunity for mass harvest. The low water levels facilitated the traditional fishing methods, which involved the use of dip-nets, set-nets and float-nets. The dip-net is hand-held with a long handle and bucket-style net, the set-net is a rectangular style net attached to poles, whereas the float-net, similar in construction to the set-net, is attached to floats. The nets were used from the steep cliff edges along the banks of the salmon fisheries, with all three traditional fishing methods used by men and women alike (Carlson 2010; Kennedy and Bouchard 1978, 1992;
Romanoff 1992). As important than the ability for the Lillooet to mass-harvest the abundant sockeye runs was the ability for the bountiful harvest to be effectively preserved for winter storage. The dry climate of the Interior as well as the low-fat content of the sockeye species provided the Lillooet with exceptional drying conditions (Kennedy and Bouchard 1992; Romanoff 1992).

An immense amount of labor was involved with the salmon preservation process. Traditionally salmon was wind-dried on wooden racks at the fishing stations, and preparation for the wind-drying process involved the cutting and filleting of the fish, and keeping the fresh fish in an environment free of insects and moisture for a period of six to seven days (Kennedy and Bouchard 1992; Romanoff 1992). The ethnographies document that the labor associated with the processing of the stored salmon was largely undertaken by women, except in instances of substantial harvest. During such times men would shift their attention from fishing to drying. Given that the drying process demanded substantial labor requirements, it is not surprising that polygamy was documented as a common practice among the Lillooet. Households generally consisted of numerous wives, and this facilitated the labor needs required to maximize the salmon preservation process (Romanoff 1992; Teit 1906).

The ability to access these fishing locales was critical for the ability of households to acquire a surplus of salmon, as well as to harvest during the early spring Chinooks, which generally ran during times of low resource abundance. According to the ethnographies, there were public and private fishing locales with each winter village site controlling a stretch of river (Kennedy and Bouchard 1992;
Romanoff 1992; Teit 1906). These areas were considered part of the territory of the village, and all members of the village were allowed access. It is documented that the only way to gain access to these areas was to marry into the community. The importance of access is also reflected through the hereditary control over individually owned rocks, which was customary for the Lillooet. Fishing rocks consisted of a wooden fishing platform and drying rack, which was constructed and dismantled every year to avoid destruction from the spring floods. These rocks were considered to be owned; however, it was customary for the owner to share access to the site. The owner of the rock was responsible for the upkeep of the platform and drying rack, often camped at the site, and kept the most fish harvested from the area. When an owner of the rock passed on, the fishing station could be given to any relative, male or female alike (Romanoff 1992; Teit 1906).

As a result of the superb drying conditions within the Interior and the ability for the Lillooet to maximize salmon harvest through the development of specific social institutions, the Lillooet were able to preserve enough salmon to make it a key trade item, especially for coastal populations where climatic conditions constrained the ability to effectively preserve mass-quantities of salmon (Romanoff 1992; Teit 1906). As a result, trade centers were developed at fishing stations, and people from the Coast and neighboring areas congregated to participate. The ethnographies provide extensive documentation regarding the variety of items traded to the Lillooet in exchange for the wind-dried salmon. These items included dentalium and other shells from the coast, lithic material for tool manufacture, goat hair blankets, copper, guns, horses, deer hides, cedar bark, food resources, and
slaves. In addition to salmon as an important trade item, the Lillooet are documented as providing other resources such as nephrite, bark hemp, twine and rope, berries, dried meat, fat, and dressed skins (Hill-Tout 1905; Teit 1906).

Not only were these times for subsistence and trading ventures, but these were also times for extensive social gatherings, which included a variety of games, potlatches and other festivities. The ethnographies document that during the salmon runs thousands of people would travel inland to the fishing areas, providing the Lillooet with the opportunity for the formulation of social networks, often accomplished through marriage. The intermarriage between different clans was common and provided the Lillooet with an opportunity for access to new technologies, territory and to a variety of non-local goods. Festivals were often clan oriented, and elaborate rituals were developed with costumes and masks worn by participants representing each clan’s manitou. These masks are documented as representing the power and distinction of the clan, and could only be worn during special occasions such as during the potlatch (Hayden 1992; Hill-Tout 1905; Teit 1906). The Lillooet formed and solidified relationships through the redistribution of food resources and other goods during the potlatch, a ceremony practiced throughout many of the Interior and Coastal societies. A potlatch could be given by one individual household to another or by the household clan chief to another clan chief, with the chief representing the entire clan population. During the potlatch, goods were distributed with an expectation of future repayment, resulting in the formulation of extended relationships with the participants (Teit 1906). This was primarily used as a means to increase or maintain the power and status of the
household or clan, and it is documented that competitive potlatches often developed between clan chiefs (Hayden 1995; Teit 1906). Games were also an important the formulation of social relationships and they were played by men and women of all ages. Dice was a favorite game among the women, and was played using four marked beaver or marmot teeth. Men played several forms of shooting games, where points were tallied according to the distance of the arrow from the target. In addition, ball, dart, ring and card games were played extensively. Gambling almost always accompanied these games, and success in betting was credited to the luck or spiritual power of the individual or group. Singing, storytelling and dancing often accompanied many of the festivities practiced by the Lillooet (Teit 1906).

After the salmon runs, the Lillooet focused their attention primarily on hunting deer, sheep, bear, marmot and other wild game. Hunting was undertaken using snares, fences, dogs, bows and arrows, and rifles. Fresh meat was evenly distributed amongst the hunting party, regardless of who was responsible for the kill. The surplus meat from hunting was dried and stored for winter consumption, and the hides were prepared for trade or personal adornment. The Lillooet are documented as having hunting chiefs, who were given social and political distinction, and were considered to possess spiritual power (Romanoff 1992; Teit 1906).
4.3 Wealth and Status

The ethnographies provide a wealth of information regarding status inequality in Lillooet culture. The ethnographies document that individual status could be achieved or ascribed, and Teit (1906) documents that individuals with achieved status often had greater political influence. Both ranks bore the title of chief; however, the hereditary chief was considered clan chief. Status was gained in several ways, often through extensive potlatches and feasting, occupational success, ceremonial and ritual abilities, and the development of important social and political relationships. Often these chiefs gained their status through success in war, hunting or religious dancing. The children of such chiefs, as opposed to the hereditary elite, could only gain equal status through their own success or merit (Teit 1906).

The ethnographies document the wealthy elite as socially distinguishable from the poorer, less elite members of the community. High status individuals were documented as having resided in large houses and had access to resource surplus through controlled access to important resource locales and prestige goods. These individuals were documented as marrying numerous wives and maintaining slaves as to facilitate resource production. As a result of the ability for these wealthy households to accumulate mass amounts of resource surplus, these high status individuals are documented to have possessed prestige items such as dentalia and other exotic shells, rare raw material including nephrite and copper, exquisitely fabricated personal items such as goat hair robes, buckskin clothing and elaborate
personal ornamentation. The ownership of these prestige items resulted from the ability of these wealthy households to maintain extensive trade networks with other, often distant, villages, and often these relationships were solidified through an exhibition of power publically displayed through ritual feasting and giving during potlatch ceremonies (Teit 1906).

4.4 Summary

The ethnographic descriptions of the Lillooet provide archaeologists detailed information regarding the socioeconomic condition of households at the turn of the twentieth century. From the ethnographies it is clear that the Lillooet practiced complex forms of social organization with the presence of hereditary chiefs, elite control over resource surplus, resource locales and non-kin labor. Household success was dependent on the ability for accumulation of surplus for winter survival. The ethnographies also provide detailed documentation of characteristics considered to be markers of elite status; however, it is unclear as to the degree that these characteristics contributed to the formulation and maintenance of wealthy households during the protohistoric occupation at the Bridge River site. The ethnographic documentation of prestige as represented through a variety of items including non-local material and goods, prestige foods such as large mammals, large houses and households and successful trade relationships, provides frames of reference for the development of testable hypotheses regarding variability in socioeconomic practices. Was the status of elite households dependent on the
hereditary control over resources and important resource locales? Did the success of a household involve the incorporation of extended families and non-kin residential members for the ability to produce an accumulation of food and material goods? Were the socioeconomic systems that defined the protohistoric occupation at the Bridge River site similar or different in nature from those documented in the ethnographic record?

The use of a middle range approach in the analysis of the household socioeconomic systems provides archaeologists with an advantage to better understand the socioeconomic systems in place during a temporally restricted occupation and the result is data obtained through principles that are theoretically different from general theories utilized in hunter-gatherer research. The resulting data provide archaeologists with objective lines of evidence that can be incorporated into general theories regarding the variation and evolution of hunter-gatherer societies in the Pacific Northwest.
Chapter 5: Analytical Approach

5.1 Introduction

This thesis research is directed towards examining inter-household variability in socioeconomic status as represented from three protohistoric household components at the Bridge River site. The ethnographies regarding the Lilooet provide detailed descriptions of socioeconomic organization and traditional lifeways, and archaeologists have long been drawing from these records as a source of information for inferences regarding the wealth and status of households. Although these lines of evidence are commonly employed in hunter-gatherer research, little is known about the particulars regarding the development and maintenance of socioeconomic and political relationships. Before these static representations can be utilized in general theories regarding hunter-gatherer societies, they need to be tested on a site specific and temporally restricted basis, and through the use of middle range research it is possible to understand the relationships between wealth, status, and household and markers of wealth commonly used to predict household material wealth in hunter-gatherer societies in the Pacific Northwest. The results of this test can then be utilized to help infer details regarding the development and maintenance of household wealth and inequality on the Canadian Plateau.
5.2 Hypotheses

Three different hypotheses have been developed regarding the use of archaeological data to infer household material wealth among hunter-gatherer societies.

1. House size predicts household material wealth with large houses expected to represent wealthy households.

2. Household demographics predict household material wealth with densely packed households expected to represent wealthy households.

3. Longevity of household occupation predicts household material wealth with wealthy households expected to have longer spans of occupation than less wealthy households.

To construct a framework to effectively address my research problem, I have conducted a materialist-based test for the three different models previously identified that aim to predict socioeconomic variability within households. Each test will employ measurement techniques commonly utilized by archaeologists as valid approaches to the analysis of households (Ames 2006; Arnold 1996; Bowles et al. 2010; Carr 1995; Hayden 1997, 1998; Hayden and Schulting 1997; Netting 1982; Prentiss et al. 2007, 2008a; Smith et al. 2010; Voss and Young 1995; Wilk and Rathje 1982).

My first hypothesis is that house size can be used to predict household material wealth where large houses would be expected to represent wealthy households. House size has commonly been employed as a tool for archaeologists to
infer household economic variability within village sites, and is largely the result of the work of Wilk and Rathje (1982) and Netting (1982) concerning socioeconomic variability in agrarian societies. Wilk and Rathje’s approach to archaeological investigation of the household has prompted researchers to assess aspects of social organization and social differentiation among prehistoric societies and to facilitate the use of house size as an indicator of household wealth (Allison 1999; Ames 1996; Coupland 1996; Nash 2009; Netting 1982; Smith 1985; Steadman 1996; Trubitt 2000; Wilk and Rathje 1982). This is an approach verified by Netting’s (1982) analysis utilizing ethnological data from agrarian societies to infer that wealthy families resided in large households. He utilizes an ecological approach in his analysis, and states that wealth is dependent on the ability of a household to provide labor for production. This results in larger household units increasing their access to wealth. He concludes by stating that household size is an accurate indicator of inequality and wealth in stratified societies, and that variation in house size reflects distributions of wealth and can be used as a cross-cultural model for analysis, “regardless of the culturally valued type of household organization” (Netting 1982).

My second hypothesis is that household demographics can be utilized to effectively predict household material wealth. The use of demographics to address socioeconomic variability within household contexts is closely tied to the theoretical perspectives driving the use of house size to measure wealth, but focuses directly on the ability of households to gain access to labor for the purpose of accumulating resources and wealth (Arnold 1996; Hayden 1997, 1998; Hayden and Schulting 1997; Netting 1982; Wilk and Rathje 1982). If this is accurate we should expect to
see the relationships between the number of people residing in a structure and indicators of demographic density reflected in the results of analysis.

My third hypothesis is that household material wealth can be predicted by residential longevity whereas elite households would be expected to persist through time longer than less elite households due to success in economic ventures. Socioeconomic success is closely tied to the ability for the household to maintain positive social networks and access to important resource locales, often accomplished through the formulation of elite hereditary lineages. Further, continued household success should require an ability for the household to recruit members to ensure household production. As a result, the household can be viewed in terms of lineages, and long-lived houses representative of successful corporate entities with hereditary status to ensure household longevity. The use of household longevity to measure household wealth has been utilized by many archaeologists, some using measurements such as reproductive success, (Bowles et al. 2010; Smith et al. 2010) while others view the concept of household health as representative of the persistence of the household cycle through time (Ames 2006).

The use of these hypotheses to test the relationships between the household and status and wealth will help to solidify the archaeological research of hunter-gatherer socioeconomic systems by providing an explicit framework for the analysis of archaeological variables to predict household material wealth and status variation. These three hypotheses will be tested through the use of independent variables to infer socioeconomic status against archaeological evidence of material prestige items derived from the excavation of three households. A fine-grained
analysis of the BR 4 component of the Bridge River site with a focus on testing the effectiveness of predictive models used to interpret the material wealth of households will provide results that will either confirm or reject elements of the ethnographic model and subsequent archaeological assumptions regarding variation in household material wealth. This test has been accomplished through an analysis of artifact assemblages from domestic activity areas at the household level. Analysis provides a better understanding of the relationships between household demographics, size, occupational persistence and material wealth, granting archaeologists insight into the nature of household economic, demographic and subsistence practices and the effect of these variables for relative household wealth accumulation.

5.3 Methodological Framework

The sample utilized for my thesis research is the result of the 2008 and 2009 archaeological field investigations at the Bridge River site. Excavation was focused on activity areas identified by means of remote sensing techniques, including electrical conductivity and vertical magnetic gradient methods (Prentiss et al. 2007a, 2008a). Activity areas are defined as the living surfaces of individual family units within the household and are characterized by hearth and cache pit features. Data collected from these living surfaces are ideal for providing insight into the socioeconomic variability of households as these activity areas are representative of the socioeconomic practices of these family units.
Six housepits were selected for excavation based upon their relative house size and their radiocarbon dates, obtained during the 2003 and 2004 field investigations (Prentiss et al. 2008a), which were directed towards understanding the occupational chronology of the site. A minimum of three activity areas per housepit was selected for excavation. Each activity area was excavated in 50 x 50 cm units with a focus on identifying living surfaces. To facilitate this process, archaeologists relied on hand troweling for the identification of fine-grained textures, and utilized natural stratigraphy for strata designations. All floor surfaces were excavated in 5 cm levels, and all artifacts from these surfaces were point plotted when possible. All sediment was screened using 1/8 “mesh to recover fragmentary bone and small lithic debitage pieces. In addition, soil samples were collected for ethnobotanical data, sediment samples were obtained for geomorphological analysis of housepit stratigraphy, radiocarbon samples were collected when possible from hearth features and detailed plan and profile view maps were drawn for each activity area. Further, sediment characteristics were documented for each excavated activity area, documenting sediment composition, excavated volume of sediment and fire-cracked rock (FCR) counts. Of the six houses in which archaeological excavation was focused, three were identified as representative of the BR 4 occupational phase, and consisted of Housepits 54, 20, and 11 (Figure 5.1).
Figure 5.1 Plan view of Bridge River site (taken from Prentiss et al. 2008)

Table 5.1 BR4 stratigraphy, feature data and radiocarbon dates

<table>
<thead>
<tr>
<th>Housepit</th>
<th>Stratum</th>
<th>Feature Area/Code/#</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>CP</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>II(1)</td>
<td>PH</td>
<td>7</td>
</tr>
<tr>
<td>20</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>II</td>
<td></td>
<td>328 ± 31 (390 mean)*2</td>
</tr>
<tr>
<td>11</td>
<td>I</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>II</td>
<td>H</td>
<td>184 ± 34 (142 mean)</td>
</tr>
</tbody>
</table>

(I= surface, II=floor, V=roof).
(CP=Cache Pit; PH=Post Hole; H=Hearth).
*1: Indicates dates derived from 2003 and 2004 field seasons.
*2: This is a posthole containing the original post, extending throughout the unit from II(1) through the base of III(1).
Housepit 54 was determined to be representative of the BR 4 occupation due to the presence of several items indicative of Euro-American contact within the first roof deposit. The artifacts consisted of a single opaque blue glass bead and three pieces of sheet metal indicating that the household was most likely occupied sometime after European contact into the region. No radiocarbon samples were obtained for Housepit 54. A radiocarbon date was obtained for Housepit 20 during a prior field season from a feature located on the first floor surface (Prentiss et al. 2008b) resulting in a mean calibrated date of 390 B.P. placing household occupation during the mid-seventeenth century (Table 5.1). Housepit 11 was determined to be occupied during BR 4 times resulting from a mean calibrated date of 142 B.P. obtained from a small hearth feature located on the first floor surface (Table 5.1) placing household occupancy during the mid to late nineteenth century. Given the presence of Euro-American items in the first roof component in Housepit 54, occupancy for the underlying floor surface can definitively be placed during protohistoric times. No Euro-American artifacts were recovered from the other two households; however radiocarbon dates for Housepits 20 and 11 also place occupancy during the late BR 4 component. Given these late dates, it would be reasonable to infer that the households were occupied in a similar temporal context as Housepit 54, with the deepest identified portion of the Housepit 54 floor component closest in time to those of the other two sampled households. While these results most likely indicate household occupancy for all three housepits was during protohistoric times, the sample utilized in the current study is relatively small with excavation focused towards the identification of housepit occupational
chronology rather than obtaining information pertaining to a single occupational component. Rather, an excavation strategy focused on obtaining a wider perspective of living surfaces would help to identify datable material from feature contexts. However, for the purposed of this study, the utilized sample consists of three protohistoric housepit components, each with three excavated activity areas characterized by one living surface and a single roof stratum (Figures 5.2-5.10).

*Figure 5.2 Housepit 54, area 1 profile map*
Figure 5.3 Housepit 54, area 2 profile map

Figure 5.4 Housepit 54, area 3 profile map
Figure 5.5 Housepit 20, area 1 profile map

Figure 5.6 Housepit 20, area 2 profile map
Figure 5.7 Housepit 20, area 3 profile map
Figure 5.8 Housepit 11, area 1 profile map

Figure 5.9 Housepit 11, area 2 profile map
Laboratory analysis was undertaken by University of Montana graduate students and supervised by Dr. Anna Prentiss of the Department of Anthropology, University of Montana. Lithic analysis was conducted by Nicole Crossland, Lucille Harris, Lee Reininghaus and Maggie Shirack and was undertaken using micro and macroscopic techniques for the identification ofdebitage and tool characteristics. Size, material, presence of thermal alteration, technological type, cortex and fracture initiation were documented for all tools anddebitage using the modified Sullivan and Rosen typology (MSRT) (Prentiss 1998; Sullivan and Rosen 1985). In addition, use-wear and retouch characteristics for all tools were carefully documented, edge angles for each use-edge was obtained, and each tool was measured and drawn in profile and plan view using calipers. All tools were classified using the Bridge River lithic tool typology, originally based on Hayden’s (1997) Keatley Creek typology,
which is focused on classifying tools into morphofunctional types (Prentiss et al. 2009).

All faunal material was analyzed by Eric Carlson, Lisa Smith, Hannah Schremser and Wyatt Ward and was focused on identifying class, genera and element characteristics. The presence of human modification was documented through identification of cut marks, striations, and evidence of burning that had resulted from butchering and processing techniques. All recovered elements were weighed by taxonomic class. In addition, fragmented mammal bone was categorized into six different size grades to facilitate the identification of variability in the intensity of processing for marrow (Prentiss et al. 2009).

In regard to the current study, variability in household socioeconomic status was measured using specific lithic and faunal data as well as additional data extrapolated from detailed plan and profile maps of excavated units (Table 5.5). My first hypothesis, that house size is directly correlated to household material wealth where large houses are representative of elite households, required a comprehensive sample representative of various sized residential structures. Of the three housepits chosen for purposes of this research, Housepit 20 is considered a large house, measuring 16.6 meters in maximum diameter and Housepit 54 is considered a medium sized house, measuring 12.2 meters in maximum diameter. Housepit 11 is of special interest as it is characterized by two different sized housepits in a single depression, visible by the presence of an additional inner rim and confirmed through radiocarbon dating (Prentiss et al. 2010). The larger, older component measures 13.9 meters in diameter, however, the BR 4 component
measures 8.5 meters in maximum diameter resulting in a complete sample representative of a small, medium and large house structure (Table 5.2).

Table 5.2 Housepit diameters in meters

<table>
<thead>
<tr>
<th>Housepit</th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Size</td>
<td>12.2</td>
<td>16.6</td>
<td>8.5</td>
</tr>
</tbody>
</table>

To effectively test my second hypothesis that increased household demographics is reflective of socioeconomic success in residential contexts where evidence of demographic density should be significantly associated with markers of material wealth, FCR counts were obtained for each floor strata (Table 5.3). The use of FCR data to estimate demographic variability within households has been used by archaeologists in conjunction with calculated measures of total excavated sediment from each floor unit (Prentiss et al. 2007b). FCR densities to calculate demographic characteristics of households have been utilized in previous research conducted on the Canadian Plateau and have been demonstrated to be closely correlated with botanical remains from food processing activities (Prentiss et al. 2007b). This is important because it suggests that high densities of FCR are likely correlated with the amount of food consumed within the household and the presence of numerous or larger hearths, both of which are logical results of an increase in household population density. While it is possible that frequencies of FCR may be affected by
variability in cooking strategies, the use of FCR to estimate population density within residential units has promise to be quite effective (Prentiss et al. 2007b).

Table 5.3 FCR Raw Data Counts per Activity Area

<table>
<thead>
<tr>
<th>Housepit</th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA1</td>
<td>623</td>
<td>673</td>
<td>974</td>
</tr>
<tr>
<td>AA2</td>
<td>643</td>
<td>494</td>
<td>465</td>
</tr>
<tr>
<td>AA3</td>
<td>416</td>
<td>260</td>
<td>676</td>
</tr>
<tr>
<td>Total</td>
<td>1682</td>
<td>1427</td>
<td>2115</td>
</tr>
</tbody>
</table>

The data utilized to test my third hypothesis, that household persistence through time is an effective predictor of household material wealth where high-status households would be expected to have increased occupational duration relative to less wealthy households, consisted of measurements of floor thickness (Table 5.4). To effectively measure the persistence of households through time, the maximum floor thickness of excavated floor surfaces per excavated unit was carefully calculated from detailed profile maps of excavated activity areas. Houses with long durations of occupation should have an increased amount of floor sediment compared to houses with short-term occupational spans. The thickest floor deposits for the three sampled households was in Housepit 54, which consisted of two separate BR 4 living surfaces. While increased amounts of floor sediment could be reflective of variability in construction techniques, radiocarbon dated floor sequences from several housepit deposits at the Bridge River site (Housepits 11, 16
and 54) indicate that floors were reconstructed periodically at intervals of 15-25 years coinciding with household structural and roof maintenance (Alexander 2000), suggesting the floor thickness is reflective of household longevity rather than construction techniques (Prentiss et al. 2011).

*Table 5.4 Floor thicknesses in centimeters per activity area*

<table>
<thead>
<tr>
<th>Housepit</th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA1</td>
<td>45</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>AA2</td>
<td>10</td>
<td>18</td>
<td>12</td>
</tr>
<tr>
<td>AA3</td>
<td>14</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td><strong>MAX</strong></td>
<td>45</td>
<td>19</td>
<td>12</td>
</tr>
</tbody>
</table>

To aid in the testing of the above hypothesis, the results of my research have been obtained by using several independent measures to infer socioeconomic status against several dependent variables commonly used as archaeological evidence of household material wealth (Arnold 1996; Ames 2006; Hayden 1997, 1998, Hayden and Schulting 1997; Prentiss et al. 2008a). The dependent variables consist of archaeological data consistent with material wealth items (Table 5.5) and include prestige items, exotic raw material, and household mammal consumption (bifacial tool production and mammal remains). The use of prestige items, exotic raw material, and hunting practices as representative of material wealth accumulation has been utilized by archaeologists as valid approaches to the analysis of socioeconomic systems in hunter-gatherer societies. Hunting as a proxy for elite
status households derives from ethnographic accounts of the Lilooet regarding the importance of hunting chiefs as well as the use of deer hides for trade purposes (Romanoff 1992; Teit 1900, 1906). As a result, evidence of hunting has been subsequently utilized by Plateau archaeologists when exploring socioeconomic variability of prehistoric households (Hayden 1997, Hayden and Schulting 1997; Prentiss et al. 2007b). The presence of non-utilitarian items, high quality clothing, serving ware, jewelry and ornamental objects have been used by many archaeologists as predictors of wealth in prehistoric societies (Arnold 1996; Hayden 1997, 1998, Hayden and Schulting 1997; Prentiss et al. 2008a, 2008b; Smith 1985). The quantity, diversity and exoticism of household material artifacts, regardless of functional category, are also common predictors of wealth, as elite households would tend to accumulate greater amounts and increased variability of goods and higher rates of nonlocal material than poorer households (Smith 1985). The quantity and diversity of artifacts can also be reminiscent of craft specialization, which has commonly been used by archaeologists as an indicator of complexity and increasing social inequality (Arnold 1996; Hayden 1997, 1998; Hayden and Schulting 1997; Nash 2009; Prentiss et al. 2008b; Trubitt 2000). Exotic items recovered from household contexts can be good indicators of wealth, indicating participation in long-distance trade relations, formation of possible political alliances, and social connections which may increase access to wealth accumulation (Arnold 1996; Blake 2004; Hayden 1997, 1998, Hayden and Schulting 1997; Lightfoot and Feinman 1982; Smith 1985). Exotic raw materials for the Mid-Fraser region are identified by Hayden (1998, 2000) as high quality or possessing special
value, while others include material ideal for tool manufacture (Prentiss et al. 2008b, 2009).

The independent variables consist of housepit diameter, used to infer house size, FCR density as representative of household demographics and maximum floor thickness to infer household persistence through time. Archaeologists commonly utilize house size as a variable in cross-cultural analysis of households and have been a common model employed in the analysis of social inequality and diachronic aspects of social complexity. The use of house size and household demographics as models to interpret status differentiation in archaeological research has been largely influenced by the use of ecological models, which view wealth as a factor dependent on the ability to accumulate labor for resource procurement and production. This approach views the household as directly connected to ecological, economic, and political processes, and the need for increased household labor results in the formation of large residential units, and consequently the need for large residential structures (Netting 1982; Wilk and Rathje 1982). The concept of household occupational longevity as a predictor of household material wealth is derived from a similar theoretical perspective, with household survival as a consequence of a successful strategy of economic risk management (Ames 2006).

A series of indices have been developed for each independent and dependent variable to effectively compare measures of variation between households by compensating for differences in sample size between each housepit (see also Prentiss et al. 2007a, 2008b). The indices for the dependent variables consist of a
prestige item index, an exotic raw material index, a mammal index, and a bifacial tool index.

The prestige item index was calculated through quantification of the total number of prestige items, with the total number of prestige items for each housepit divided by the total excavated sediment in meters cubed per each housepit. This results in an index that can be effectively utilized in comparison between households by representative sample regardless of amount of excavated sediment within the households (Ewen 2003). Prestige items for the Lillooet include highly valued objects, some of which require extensive investments in manufacture time. For the purposes of this analysis, the prestige items include beads, ornamental objects, steatite pipes, nephrite tools, shell, and objects crafted from various metals (Table 5.5).

Table 5.5 Prestige item raw data counts per housepit

<table>
<thead>
<tr>
<th>Housepit</th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steatite pipe</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Beads</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Metal</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nephrite Tools</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ornamental</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Shell</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>13</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
The exotic raw material index was developed in a similar fashion, utilizing lithic tools constructed from raw material requiring the use of logistical forays for procurement or extensive trade networks for the acquisition of these exotic raw materials, or those highly valued for production or special purposes. For the purpose of the current study, prestige raw material items include those manufactured from copper, obsidian, Hat Creek chert, pisolite, steatite and nephrite (Table 5.6-5.7). In addition, debitage resulting from the production and maintenance of these highly valued tools was incorporated into the index to generate a robust sample from each housepit. The index was developed by quantifying the total number of items produced from exotic raw material divided by the total excavated sediment in meters cubed for each individual household (Prentiss et al. 2008b).

*Table 5.6 Exotic debitage raw data counts per housepit*

<table>
<thead>
<tr>
<th>Housepit</th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hat Cr. Chert</td>
<td>15</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Obsidian</td>
<td>7</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Pisolite</td>
<td>14</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Nephrite</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Copper</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>37</td>
<td>7</td>
<td>17</td>
</tr>
</tbody>
</table>
Table 5.7 Exotic tool raw data counts per housepit

<table>
<thead>
<tr>
<th>Housepit</th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steatite</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Hat Cr. Chert</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Obsidian</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Pisolite</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Nephrite</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Copper</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

The mammal and bifacial tool indices were developed to predict household material wealth by measuring household productivity in hunting practices, an indicator of household wealth derived from the ethnographies (Teit 1900, 1906). The mammal index was calculated through summation of the total mammalian faunal remains by the total faunal remains from each individual household (Table 5.8-5.9). The calculation of the mammal index by dividing the total mammal remains by the combination of the total faunal remains allows for comparison between households by compensating for sampling differences and household demographic biases (Broughton 1994). The same concept was utilized in the development of the bifacial tool index, which was obtained through quantification of the total bifacial tools uncovered by the total lithic tool assemblage derived from each household.
Table 5.8 Faunal raw data counts per housepit

<table>
<thead>
<tr>
<th></th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Mammal</td>
<td>26</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>Med/Lg. Mammal</td>
<td>115</td>
<td>34</td>
<td>88</td>
</tr>
<tr>
<td>Med. Mammal</td>
<td>0</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Ind. Mammal</td>
<td>0</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Odocoileus</td>
<td>11</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Oncorhynchus</td>
<td>23</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Aves</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Castor canadensis</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>177</td>
<td>74</td>
<td>160</td>
</tr>
</tbody>
</table>

Table 5.9 Biface raw data counts per housepit

<table>
<thead>
<tr>
<th></th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bifaces</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Points</td>
<td>11</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Biface frag.</td>
<td>8</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Bifacial knife</td>
<td>2</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Distal tip of biface</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Bifacial adze</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Preform</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29</td>
<td>8</td>
<td>13</td>
</tr>
</tbody>
</table>
The indices for the independent variables consist of house size index, fire-cracked rock (FCR) index and a maximum floor thickness index. The house size index consists of the diameter of each housepit in meters, an effective approach due to the circular nature of the residential structures. The FCR index, utilized to measure household demographics, was obtained through quantification of the total amount of FCR per each household by the total volume of excavated sediment from each household to compensate for sampling differences between households. The maximum floor thickness index was calculated through measurement of the maximum floor thickness in centimeters per each household, inferring residential persistence of the household.

Table 5.10 Total raw data counts for each housepit

<table>
<thead>
<tr>
<th>Housepit</th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Tools</td>
<td>199</td>
<td>54</td>
<td>126</td>
</tr>
<tr>
<td>Total Bifaces</td>
<td>29</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Total Mammal</td>
<td>152</td>
<td>53</td>
<td>136</td>
</tr>
<tr>
<td>Total Fauna</td>
<td>177</td>
<td>74</td>
<td>160</td>
</tr>
<tr>
<td>Max Floor Thickness (cm)</td>
<td>45</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>Total Prestige</td>
<td>13</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total Exotic Debitage</td>
<td>37</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>Total Exotic Tools</td>
<td>11</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Total Exotic</td>
<td>48</td>
<td>8</td>
<td>23</td>
</tr>
<tr>
<td>Total FCR</td>
<td>1682</td>
<td>1427</td>
<td>2115</td>
</tr>
<tr>
<td>Meters Excavated (cubed)</td>
<td>0.93</td>
<td>0.92</td>
<td>1.32</td>
</tr>
</tbody>
</table>
Table 5.11 Independent and dependent variable indices

<table>
<thead>
<tr>
<th>Housepit</th>
<th>54</th>
<th>20</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Size (m)</td>
<td>12.2</td>
<td>16.6</td>
<td>8.5</td>
</tr>
<tr>
<td>Max Floor Thickness (cm)</td>
<td>45</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>FCR Index</td>
<td>1809</td>
<td>1551</td>
<td>1602</td>
</tr>
<tr>
<td>Prestige Index</td>
<td>13.98</td>
<td>1.09</td>
<td>0</td>
</tr>
<tr>
<td>Exotic Raw Material Index</td>
<td>51.61</td>
<td>8.7</td>
<td>17.42</td>
</tr>
<tr>
<td>Mammal Index</td>
<td>0.86</td>
<td>0.72</td>
<td>0.85</td>
</tr>
<tr>
<td>Biface Index</td>
<td>0.15</td>
<td>0.15</td>
<td>0.09</td>
</tr>
</tbody>
</table>

The indices help illustrate the relationships between household material wealth and house size, demographics and occupational longevity in households. The results of my research will highlight the relationships between several commonly utilized factors derived from ethnographic material that archaeologists use to infer socioeconomic variability in hunter-gatherer societies. Socioeconomic variability in hunter-gatherer societies varies drastically between and within geographic and cultural regions, and alternative lines of analysis that attempt to predict household material wealth and status differentiation should be tested on a site specific and temporally restricted basis to ensure validity in archaeological analysis. The results of my research are intended to provide the necessary data required to identify the relationships between house size, household demographics, household longevity and household material wealth, and in doing, will formulate a better understanding of the socioeconomic characteristics of households during the protohistoric occupation at the Bridge River site and highlight the variability.
present in hunter-gatherer households. The results will also provide data indicative of specific socioeconomic practices, providing a better foundation for the testing of general theoretical models regarding the evolution of complex hunter-gatherer societies. The archaeological implications resulting from the current research are not restricted to studies focused on the culture of the Interior Plateau, but will affect a broader arena of hunter-gatherer research by providing a framework for the interpretation of ethnographic data and the use of models derived from ecological and economic theory which guide current research in complex hunter-gatherer archaeology.
Chapter 6: Analysis and Results

6.1 Introduction

This chapter is intended to provide results of the current study, and is organized in six sections, beginning with a description of material wealth data patterns resulting from the prestige item, exotic raw material, mammal and biface indices. Parts two through four provide a description of identified data patterns pertaining to the independent variable indices, house size (hypothesis 1), household demographics (hypothesis 2) and household occupational longevity (hypothesis 3) and is facilitated through the use of a series of graphs for each independent and dependent variable. Section five provides statistical test results while part six provides a summary of the test results.

6.2 Dependent Variables

Variability in household material wealth was measured through the use of four separate indices representing three dependent variables commonly utilized to predict household material wealth in Mid Fraser archeology. The dependent variables consist of prestige items, exotic raw material and the presence of mammal remains and bifacial tool use, both indicators representative of mammal consumption.
Based upon the chart illustrating the prestige index for the three protohistoric households, Housepit 54 clearly displays higher measurements of prestige wealth items relative to the other two households. Housepit 20 displays a higher prestige index than Housepit 11, indicating that there was likely variability in household access to prestige material wealth items (Figure 6.1).

The results for the exotic raw material indices display similar results with Housepit 54 measuring a substantially higher index than those of the other two housepits. However, in contrast to the prestige item index, Housepit 11 scores slightly higher than Housepit 20, with Housepit 11 out-weighing Housepit 20 in both the exotic debitage and tool counts (Figure 6.2).
The mammal and biface indices, while not as profoundly uneven as the other two variables, display general trends consistent with the prestige and exotic raw material indices. The index results for Housepit 54 scored highest for both the mammal and biface index, however the biface index results for Housepit 20 the scored evenly with Housepit 54, both with indices of 0.15. The biface index for Housepit 11 displayed marginal results when compared to the other two households, however, the mammal index provided results consistent with the exotic raw material index due to a low mammal index score for Housepit 20 and a relatively high index score for Housepit 11 (Figure 6.3).
The four indices utilized to measure variability in household material wealth display results that confirm differentiation in household economic status was present during the protohistoric occupation of the Bridge River site. These results provide insight into the relative status of each sampled household, providing a framework for the testing of additional models aiming to predict variability in the development and maintenance of elite households. The dependent variables consistently provide results that indicate Housepit 54 had more access to material wealth items relative to the other two households, suggesting that Housepit 54 was occupied by high-status individuals. However, the index results for Housepits 20 and 11 are not so clear, with Housepit 11 scoring higher in both the exotic raw material and the mammal indices, and lower for the biface index, suggesting variability in access to material wealth items for individuals residing in lesser
affluent households. However, the index results for both housepits 20 and 11 were consistently marginal when compared to those of Housepit 54, and for the purposes of the current research, Housepit 20 and Housepit 11 are both considered to be representative of less-elite households.

Based upon the presence of prestigious material items, exotic raw material and mammal consumption, the socioeconomic status of the three protohistoric households are relatively ranked with the highest measurements of material wealth present in the Housepit 54 artifact assemblage. A households’ access to prestige items represents the ability for the household to acquire or gain success in a number of different variables. The nature of these variables can only be inferred through examination of data relative to the conditioning factors for the increased wealth and status of the household. The index data representative of the dependent variables is important because it provides us with an opportunity to test more in depth inquiries regarding the relationships between conditioning factors for household socioeconomic variability contextually relevant to the protohistoric Bridge River occupational component. The current research results have the possibility to provide insight into questions regarding how wealth was acquired, how status was institutionalized, and how household power was displayed through household construction, personal adornment and household possession of exotic and or prestige items and the consumption and or allocation of highly sought after food resources such as mammal resources.
6.3 House Size (Hypothesis 1)

Analysis of the use of house size to infer household material wealth as represented in the protohistoric component of the Bridge River site provide results that indicate that the use of house size is not an effective predictor of socioeconomic variability between households.

*Figure 6.4 Chart illustrating the house size indices for each housepit*

![House Size Chart](chart.png)

Given that each dependent variable suggests Housepit 54 was a high-ranked household, Housepit 54 should be larger in diameter than both housepits 20 and 11. The results of the current study are in contrast to this hypothesis, as the largest of the three sampled structures is Housepit 20, which does not appear to be reflective of an elite household. Housepit 54, while larger in size than Housepit 11, is not characterized as a large residential structure and displays strong indications of an
elite ranked household as a result of the dependent variable index results (Figure 6.4).

6.4 Household Demographics (Hypothesis 2)

The results of this study support the use of household demographics to gauge household material wealth at the Bridge River site during the protohistoric occupational component. Variability in household demographics was analyzed through the use of an FCR index.

*Figure 6.5 Chart illustrating the FCR indices for each housepit*

The use of an FCR index to predict socioeconomic variability in household material wealth is derived from the models suggesting that increased household demographics should correlate with the economic success of the household. The
FCR index for Housepit 54 provides results that are consistent with those of the dependent variable indices (Figure 6.5). The FCR indices for Housepits 20 and 11 are similar, with Housepit 11 scoring slightly higher than Housepit 20, results that are consistent with the mammal and exotic raw material indices. The indices indicate that household demographics may correlate with the ability of a household to gain access to material wealth items. However, the actual differences between household FCR frequencies are minimal and further analysis regarding the relationships between the identified variables will be needed to help confirm or reject the use of demographic variability to measure household material wealth.

6.5 Occupational Duration (Hypothesis 3)

Analysis of occupational duration as a means to predict household socioeconomic variability in the protohistoric component of the Bridge River site indicate that household persistence through time can effectively predict variability in household material wealth. Results were confirmed through the use of a maximum floor index.
The maximum thickness of residential floor deposits for each housepit provides index results that are consistent with the dependent variable indices (Figure 6.6). This is confirmed as Housepit 54 has an increased accumulation of floor sediment when compared to the Housepit 20 and Housepit 11 floor characteristics due to the presence of two separate BR 4 floor deposits. Given that the number of re-flooring events is likely correlated to the length of household residential occupancy rather than construction techniques, an increased number of floor deposits should coincide with an increased amount of material wealth accumulation if household occupational longevity is a conditioning factor for material wealth accumulation. Further, the maximum floor thickness indices for Housepits 20 and 11 are consistent with both the prestige item and biface indices suggesting that residential occupational duration is correlated with the ability of a household to gain access to material wealth items.
6.6 Statistical Analysis

To better understand the relationships between the independent and dependent variable indices and the effect on variability in household material wealth during the protohistoric component of the Bridge River site, a Principal Components Analysis (PCA) was conducted utilizing each independent and dependent variable index. A PCA is useful for identifying patterns present in a set of multivariate data by reducing the complexity of the data through transformation of the original data into unrelated components that account for decreasing proportions of the variation present in the original data set. These components, referred to as principal components, result in an ability to decrease the number of variables that need to be considered as a large proportion of the total variance of the original variables is explained within the first few principal components. These extracted components can be further used to provide a simplified summary of the test results (Landau and Everitt 2004).

The PCA begins with a correlation matrix, used to identify the relationships between the original data indices (Table 6.1). A description of the total variance explained by the principle components is provided in Table 6.2 with 100 percent of the total variance contained within the first two principal component results. The two-component solution was then rotated using the Varimax method for factor rotation (Table 6.3) providing factor scores for each principal component and household (Table 6.4 and Figure 6.7).
### Table 6.1 PCA correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>Prestige</th>
<th>Exotic RM</th>
<th>Mammal</th>
<th>Biface</th>
<th>House Size</th>
<th>FCR</th>
<th>Max Floor Thick</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td>Prestige</td>
<td>1.000</td>
<td>.965</td>
<td>.495</td>
<td>.559</td>
<td>.020</td>
<td>.967</td>
</tr>
<tr>
<td></td>
<td>Exotic RM</td>
<td>.965</td>
<td>1.000</td>
<td>.704</td>
<td>.324</td>
<td>-.241</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Mammal</td>
<td>.495</td>
<td>.704</td>
<td>1.000</td>
<td>-.444</td>
<td>-.859</td>
<td>.700</td>
</tr>
<tr>
<td></td>
<td>Biface</td>
<td>.559</td>
<td>.324</td>
<td>-.444</td>
<td>1.000</td>
<td>.840</td>
<td>.330</td>
</tr>
<tr>
<td></td>
<td>House Size</td>
<td>.020</td>
<td>-.241</td>
<td>-.859</td>
<td>.840</td>
<td>1.000</td>
<td>-.235</td>
</tr>
<tr>
<td></td>
<td>FCR</td>
<td>.967</td>
<td>1.000</td>
<td>.700</td>
<td>.330</td>
<td>-.235</td>
<td>1.000</td>
</tr>
<tr>
<td></td>
<td>Max Floor Thick</td>
<td>.991</td>
<td>.923</td>
<td>.376</td>
<td>.664</td>
<td>.152</td>
<td>.925</td>
</tr>
</tbody>
</table>

*a. This matrix is not positive definite.*

### Table 6.2 Total variance explained

<table>
<thead>
<tr>
<th>Component</th>
<th>Initial Eigenvalues</th>
<th>Extraction Sums of Squared Loadings</th>
<th>Rotation Sums of Squared Loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>% of Variance</td>
<td>Cumulative %</td>
</tr>
<tr>
<td>1</td>
<td>4.46</td>
<td>63.718</td>
<td>63.718</td>
</tr>
<tr>
<td>2</td>
<td>2.54</td>
<td>36.282</td>
<td>100.000</td>
</tr>
<tr>
<td>3</td>
<td>.000</td>
<td>.000</td>
<td>100.000</td>
</tr>
<tr>
<td>4</td>
<td>.000</td>
<td>.000</td>
<td>100.000</td>
</tr>
<tr>
<td>5</td>
<td>.000</td>
<td>.000</td>
<td>100.000</td>
</tr>
<tr>
<td>6</td>
<td>.000</td>
<td>.000</td>
<td>100.000</td>
</tr>
<tr>
<td>7</td>
<td>.000</td>
<td>.000</td>
<td>100.000</td>
</tr>
</tbody>
</table>

Extraction Method: Principal Component Analysis.
Component one has rotated component scores highly loaded on all variables except for house size near or above 0.5 indicating that component one is measuring variability in signatures of household material wealth. Factor scores indicate that Housepit 54 contributed the strongest to this component when compared to the other two households, results that are consistent with those produced by examination of the independent and dependent variable indices. The results for component two are strongest on house size, followed by the biface index and is likely identifying variability in size of residential structure, which appears to have a positive effect on the amount of biface tools utilized by the household. Housepit 20 contributed the strongest to this component followed by Housepit 54.
Component one measures variability in household material wealth and as a result, the factor scores for each household can effectively be utilized to rank the relative socioeconomic status of each household. According to the above measures, the factor scores for the three sampled households provide results that strongly indicate the presence of material wealth based inequality between the three household components, with Housepit 54 measuring substantially higher than the other two households (Figure 6.7).

Table 6.4 Factor scores for component one

<table>
<thead>
<tr>
<th>Housepit</th>
<th>Factor Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>54</td>
<td>1.15458</td>
</tr>
<tr>
<td>20</td>
<td>-0.59186</td>
</tr>
<tr>
<td>11</td>
<td>-0.56272</td>
</tr>
</tbody>
</table>
Figure 6.7 Chart illustrating the ranked factor scores for each housepit

The results of the PCA indicate that variability in household material wealth was present during the protohistoric component of the Bridge River site, supporting the initial conclusions resulting from examination of the independent and dependent variable indices (Table 5.11). The analysis indicates that the size of residential structure (hypothesis 1) is not a good indicator of the ability of a household to acquire material wealth. The PCA results also provide additional confirmation that the use of household demography (hypothesis 2) and occupational duration (hypothesis 3) are correlated to household access to material wealth, supporting the use of these variables to effectively predict relative household socioeconomic status during the protohistoric occupation.
6.7 Summary

The analysis of household socioeconomic variability of the protohistoric occupation of the Bridge River site provide results that indicate the use of house size is not an effect predictor for the material wealth of the household. Second, examination of FCR densities indicate that elite households possess archaeological indicators of increased household population as opposed to less wealthy households, suggesting that household demographics can effectively predict the socioeconomic nature of the household. Third, results show that the use of the maximum floor thickness can effectively predict household socioeconomic variability indicating that elite houses are inhabited for longer occupational spans than those of less ranked households.

The results of the current study indicate that the use of house size to gauge variability in household wealth in complex-hunter gatherer research should be carefully examined. This is contrary to the standard ethnographic assumption that has influenced commonly employed models in Mid-Fraser research (Hayden 1997, 1998; Hayden and Schulting 1997). Further, the results of this analysis have implications regarding the theoretical development of predictive models directed towards identifying socioeconomic variability in the household. As previously stated, the use of house size as a means to understand household material wealth based inequality is largely the result of theoretical models developed to understand household economic variation in agrarian societies. The theoretical framework supporting these models are heavily influenced by political and ecological theory,
and view the household as a functional unit directly connected to ecological, economic and political processes (Ames 1996; Flannery 1976; Nash 2009; Netting 1982; Steadman 1996; Wilk and Rathje 1982). This functional perspective of the household has prompted hunter-gatherer archaeologists to interpret the ethnographic record through a theoretically influenced filter. As a result, ethnographic documentation of extended family lineages and non-kin household members has prompted archaeologists to regard wealth as dependent on the ability of the household to provide labor for production (Hayden 1997, 1998; Hayden and Schulting 1997; Wilk and Rathje 1982; Netting 1982) where wealthy families incorporated non-kin members into the household and consequently resided in large residential structures. This results in larger household units with increased access to wealth. However, the current study provides contrary results illustrating that house size is not a conditioning factor for relative household access to material wealth. Despite previous research supporting the cross-cultural use of house size to predict socioeconomic success (Netting 1982; Wilk and Rathje 1982), it is clear that household strategies for social and economic success can vary drastically.

Despite the failure for house size to predict household material wealth, the results of this test are consistent with several models derived from the ethnographies, suggesting that household demographic density and household persistence through time are both conditioning factors for increased relative wealth. The concepts viewing household persistence and household demographic variability as predictors of household material wealth are derived from similar theoretical perspectives, recognizing increased household occupational longevity and
household demographics as coping strategies or the result of a good coping strategy for economic risk management (Ames 2006). The results of the current study support this theoretical perspective with the thickest floor deposits and FCR counts present in Housepit 54, the highest ranked household. However, due to house size failing to correlate with measures of demographic variability, it appears that increased household demography is not characterized by large residential structures.

These results are significant as the theoretical perspectives driving the use of house size and household demography to predict household material wealth are similar in nature. Large house structures are viewed as the result of the incorporation of non-kin members into the household to increase household access to labor for production purposes. The use of household demography to predict household socioeconomic status also views labor as the driving force behind household access to increased material wealth accumulation, however, focuses directly on the general population of the household rather than the number of families residing within a residential structure. As a result, the outcomes of the current study imply that increased residential demography may be the result of larger family units rather than an increased number of smaller family units. Such inferences drawn from the test results can be utilized to generate new hypotheses for future testing. For instance, increased residential demography may be the result of a household composed of numerous kin-based members whereas large structures with decreased household demography could be due to numerous, yet smaller family units residing in a single structure as a coping strategy for success, resulting
in a household composed of non-kin members. Households that are able to increase demography through incorporation of kin-based members could be better conditioned to gain access to accumulations of material wealth than households consisting of smaller, non-kin families residing in a single unit due to a less stable occupational duration for the household due to the lack of a common lineage, perhaps limiting the ability of the household to gain an accumulation of important material wealth items consistently through time.

Given the implied correlation between material wealth, occupational longevity and increased household demography through incorporation of kin-based residential members, it is possible to propose that access to material wealth was likely inherited during the protohistoric occupational component of the Bridge River site. Although the ethnographies document the presence of both ascribed and achieved status, it is possible that significant socioeconomic success was ascribed, while less affluent individuals gained status through utilization of different strategies for gaining access to important material wealth items such as occupational success, ceremonial and ritual abilities and development of important social and political relationships. The material wealth gained through these methods should be unevenly distributed within the household due to the lack of kin-based commonalities to promote distribution of these prestige items within the household. This implies that access to material wealth as a result of achieved status would be difficult to identify on the household level without comparative analysis between activity areas within a single residential structure. This new hypothesis is tentatively supported by the current test results that indicate household wealth is
closely correlated to the ability for a household to gain members and persist through time, however further research and a larger sample size is needed to understand how different socioeconomic strategies condition long term household material wealth accumulation.

The results of the current study do indicate however, that during the protohistoric occupational component, relative household socioeconomic success when defined as increased household accumulation of material wealth items, is conditioned by the ability for the household to gain residential members and persist through time.
Chapter 7: Conclusion

While the results of this study are far from conclusive as they were derived from just three sampled house structures, I believe that my research has provided a framework for the research of hunter-gatherer households and presents insight into new avenues for future research at the Bridge River site. Current study results indicate that standard cross-cultural models, either derived from ethnographic documentation or initially developed to explain socioeconomic variability in agrarian households, are not necessarily conducive to household strategies employed by complex hunter-gatherer societies. Rather, the relationships between material wealth and the household should be explored on a site specific and temporally restricted basis to better understand the conditioning factors for wealth based inequality and how these strategies are reflected in household archaeological deposits.

The use of ethnographic data can help initiate a fine-grained analysis regarding household socioeconomic processes of a specific cultural component by highlighting general trends related to the socioeconomic status of individuals and households. However, these observations are a static representation of cultural practice and provide little detail regarding how wealth was developed and maintained. The use of middle range principles can help archaeologists gain insight into the dynamic nature of socioeconomic systems through analysis of a temporally restricted occupation. The results can then be used to develop testable hypotheses obtained through principles that are theoretically different from general theories.
utilized to understand broad cultural shifts in hunter-gatherer cultural practices. The resulting data provides archaeologists with objective lines of evidence that can provide insight into the utility of general theories regarding the variation and evolution of hunter-gatherer societies in the Pacific Northwest. The theoretical implications resulting from the current study indicate that the use of middle range theory can help to bolster general theoretical models specifically tailored to an area of study by understanding the conditioning factors for variability archaeological assemblage.

In this study I sought to understand household socioeconomic variability within the protohistoric occupational component on a more intimate level than previously documented. This was accomplished through the development of three testable hypotheses regarding household material wealth commonly employed in Mid-Fraser hunter-gatherer research to identify elite households. The analysis results were obtained by identifying several dependent variables representative of material wealth and several independent variables directly related to the three hypotheses derived from ethnographic data used to predict the likelihood of household material wealth accumulation.

The results of this analysis provide valuable data regarding archaeological indicators of household wealth based inequality. The use of house size to predict household material wealth was determined to be an ineffective predictor of socioeconomic status in this case, where household demography and occupational persistence through time were found to be significant factors for the ability of the household to acquire material wealth accumulations. These results, not only
provide data relative to the socioeconomic qualities of a household, but also provide insight regarding variability in household strategies for the development and maintenance of material wealth accumulation. Analysis results indicate that increased household material wealth may have been inherited and possibly maintained through residential incorporation of kin-members allowing for increased occupational duration of the household. Analysis further indicates that a variety of strategies were likely employed by less elite households to increase socioeconomic success, however, material wealth accumulation would be difficult to identify without an in-depth analysis between activity areas within a residential structure.

The current study results are intended to provide a framework for the analysis of hunter-gatherer households by displaying results that can be objectively utilized in future research regarding complex hunter-gatherers in the Pacific Northwest.
Resources:

Alexander, Diana


Allison, P.M.

Ames, Kenneth M.


Andrefsky, William Jr.

Arnold, Jeanne E.

Blake, Michael
Binford, Lewis R.


Broughton, Jack

Bowles, Samuel, Eric Alden Smith and Monique Borgerhoff Mulder

Cannon, Aubrey

Carr, Christopher

Chatters, J. C.

Coupland, Gary and E.B. Banning

Ewen, Charles, R.
Flannery, Kent  

Goodale, Nathan B., William C. Prentiss and Ian Kuijt  

Hayden, Brian  


Hayden, Brian and Rolf Matthewes  

Hayden, Brian and Rick Schulting  

Hendon, Julia A.  

Hill-Tout, Charles

Kennedy, Dorothy I.D. and Randy Bouchard


Kramer, Carol

Kuijt, Ian

Kuijt, Ian and William C. Prentiss

Landau, Sabine and Brian S. Everitt

Lightfoot, Kent G. and Gary M. Feinman

Nash, Donna J.
Netting, Robert McC.  

Prentiss, Anna M., Guy Cross, Nicole A. Crossland, and S. Tosh McKetta  

Prentiss, Anna Marie, Guy Cross, Thomas A. Foor, Mathew Hogan, Dirk Markle and David S. Clarke.  

Prentiss, Anna Marie, Lisa Smith, Lee Reininghaus, Maggie Shirack, Michael Wanzenried and Ogden Ward  

Prentiss, Anna M., Natasha Lyons, Lucille E. Harris, Mellisse R. P. Burns, and Terrence M. Godin.  

Prentiss, Anna M., Nicole Crossland, Eric Carlson, Hannah Schremser and Lee Reininghaus  

Prentiss, Anna Marie, Thomas A. Foor, Guy Cross. Lucille Harris and Michael Wanzenried  
Prentiss, William C. and Ian Kuijt
2004  The Evolution of Collector Systems on the Canadian Plateau. In
*Complex Hunter-Gatherers: Evolution and Organization of Prehistoric Communities on the Plateau of Northwestern North America*, edited by
William C. Prentiss and Ian Kuijt, pp. 49-66. University of Utah Press,
Salt Lake City.

2005  The Archaeology of the Plateau of Northwestern North America
During the Late Prehistoric Period (3500-200 B.P.): Evolution of Hunting and Gathering Societies. *Journal of World Prehistory* 19(1), 47-118.

Romanoff, Stephen

Rousseau, Mike K.
2004  Culture Historic Synthesis and Changes in Human Mobility, Sedentism, Subsistence, Settlement, and Population on the Canadian Plateau. In
*Complex Hunter-Gatherers: Evolution and Organization of Prehistoric Communities on the Plateau of Northwestern North America*, edited by
William C. Prentiss and Ian Kuijt, pp. 3-22. University of Utah Press,
Salt Lake City.

Smith, Eric Alden, Kim Hill, Frank W. Marlowe, David Nolin, Polly Wiessner, Michael Gurven, Samuel Bowles, Monique Borgerhoff Mulder, Tom Hertz and Adrian Bell
2010  Wealth Transmission and Inequality among Hunter-Gatherers.
*Current Anthropology* 51(1), 19-34.

Smith, Michael E.

Steadman, Sharon R.

Teit, James

Tringham, R.

Trubitt, Mary Beth

Tschauner, Hartmut

Turner, Nancy J.

Voss, Jerome A. and Robert L. Young

Wilk, Robert R. and William L. Rathje

Winter, Marcus C.