DELINEATION OF SITE CHRONOLOGY AND SPATIAL COMPONENTS USING MACROSCOPIC LITHIC ANALYSIS AT DhRp-52

by

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ABSTRACT

This thesis summarizes the results of an analysis of stone tools from site DhRp-52 to determine differences and similarities between its spatial and temporal components. DhRp-52 was an inland/riverine settlement that spanned approximately 2,500 years of occupational history contemporaneous with the Old Cordilleran Culture to the Locarno Beach Phase. My research analyzed stone tools to distinguish site components and structural features through time and in space, assessed similarities and differences between structures and their associated non-structural areas, evaluated the presence of three temporal components at the site, interpreted site use through assemblage structure variation, and attempted to understand how the site fit within the regional chronology. These analyses demonstrated that in most cases, stone tool assemblages reflected differences between site components through time (stratigraphy) and space (inside and outside structures). Statistically significant differences were detected between the structural and non-structural zones in the most recent and upper-most component of the site and between the three temporal components, but not in the middle component between non-structural and structural zones. These findings suggested two conclusions: 1) spatial partitioning was more prominent in the Late Component than the Middle Component, and 2) three occupational components identified by stratigraphy and radiocarbon dates were substantiated by tool assemblage variation. A comparison between DhRp-52's three temporal components and the Glenrose Cannery and Crescent Beach sites determined that although major hallmarks of lithic technological change relating to regional chronology were observed at both sites and their respective components, DhRp-52's temporal deposits cannot be assigned to the Old Cordilleran Culture, Charles Culture or Locarno Beach Phase at this time. This research at DhRp-52 contributes to the overall understanding of early human settlement in the lower Fraser River Valley and to our understanding of regional chronology. It suggests how resources other than intensive salmon harvesting may have facilitated early intensive settlement in the region, monitors lithic technological change through time in the Fraser River Valley, and how lithic assemblage composition can vary at different locations within the Gulf of Georgia region.

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DEDICATION

This paper is dedicated in loving memory to my mother, Susan, who held on to life long enough to see this finished. She is and always will be my greatest inspiration. This paper is also dedicated to Curtis and Savannah. You two are my anchors and thank you so much for every sacrifice you made to help me successfully finish this project.

CHAPTER 1: INTRODUCTION

This thesis is a macroscopic analysis of the stone tool industries and their contexts at the site of DhRp-52, located in the lower Fraser River Valley, BC. This research is part of a larger, ongoing research project involving Katzie Development Corporation and the Katzie First Nation. DhRp-52, a very large and important site located in the traditional territory of the Katzie First Nation, dates to several periods in Northwest Coast Culture history, the regional variants of which remain poorly understood beyond the Gulf of Georgia region: The Old Cordilleran Culture, the Charles Culture and the Locarno Beach Phase. DhRp-52 has three stratigraphic components and the remains of several large structural features that are associated with middle and late site components. An earlier, sub-structural deposit is located in the lowest site component. The site also contains rare wet site deposits that preserve a pre-contact wapato patch and numerous organic artifacts not normally present in dry site deposits. Between the structural deposits and the extensive dry site and wet site deposits, DhRp-52 has the potential to inform the archaeological community about early village formation, social organization, and the role of geophyte resource utilization during the period of the Charles Culture and Locarno Beach Phase. The primary objectives of this project include evaluating the lithic assemblages and their spatial patterns, understanding the formation processes affecting the site's deposits, how the site's structural features relate to each other, how the wet site components relate to the dry site components, and how the site fits within local and regional culture historical chronology. This thesis aims to achieve these objectives by examining the relationships between stone tool assemblages from the different site components and sub-assemblages between site zones.

In order to arrive at a better understanding of contextual differences and similarities, a lithic typology was created based on morpho-functional traits and through a comparison to regional variants, specifically the lithic assemblages from the Glenrose Cannery site (Matson 1976) and the Crescent Beach Site (Matson and Coupland 1995: 160). Once constructed, the spatial patterns of different tool types were evaluated through a series of hypotheses. The first hypothesis evaluated by this research states that stone tool sub-assemblages differ between structural and non-structural zones of the site's deposits. This is dependent on the assumption that structural zones have different patterns of tool use, storage, and discard than outside, non-structural zones. Although archaeology that examines structure function tends to focus on floor sub-assemblages, DhRp-52 has no firmly identified floors in its structural features and it is unknown at this time whether the structural features are domestic features. An analysis of the stone tools and their distribution within the site's large feature and non-feature zones was a first step towards understanding the nature of these large features and their relationships with contemporary outside spaces. This analysis was accomplished by assessing tool assemblages inside and outside of structural zones with statistical analyses, presence/absence comparisons and proportional comparisons. Four of the large features are inferred to be structures, the fifth feature is a large non-structural, bead-lined fire cracked rock-filled pit with unknown function(s), the sixth zone of analysis consists of the entire wet site deposits, and the seventh zone consists of possible midden deposits.

The second hypothesis evaluates the differences detected in stone tool assemblages through time. Differences in stone tool assemblages through time may have reflected the changing nature of site use through time.

Three site components were identified through their stratigraphic character and composition. They were analyzed and compared using chi-square tests and proportional comparisons of tool class distributions.

The third hypothesis evaluates whether DhRp-52's three components can be associated with known Gulf of Georgia culture-historic units. Several radiocarbon dates suggested the site deposits span the Old Cordilleran Culture, Charles Culture, and the Locarno Beach Phase. Comparisons of tool class proportions between DhRp-52, Glenrose Cannery site and the Crescent Beach site were made to compare temporal components between the two sites and to gauge the degree of fit of DhRp-52's components to known culture-historic units. Glenrose Cannery was used for comparison because it is well-documented in published literature (Matson and Coupland 1995; Matson 1976) and it has an established chronology with dates that span the Old Cordilleran Culture and Charles Culture. Crescent Beach was used because it contains a pithouse structure and has the largest reported chipped-stone assemblage in Matson and Coupland (1995: 160) making it the most comparable site to DhRp-52.

DhRp-52 is potentially one of the most significant sites in the lower Fraser River Valley region of the Northwest Coast for two reasons. On one level, site sampling is meagre in the region, which has led to creating a poor understanding of lower Fraser River Valley culture history and how it relates to larger Gulf of Georgia regional chronology. DhRp-52 is rich with data that may help fill some of those gaps in understanding, including components dating to the Old Cordilleran Culture, Charles Culture and Locarno Beach Phase. On a second level, knowledge of riverine settlement and resource use in the region are poorly understood by archaeologists. The Fraser River Valley is an ecosystem that may have provided unique resources, such as wapato (*Sagitaria latifolia*), to riverine peoples (Lepofsky 2005: 270). DhRp-52's preserved wapato patch and associated structures may allow archaeologists to understand the relationships between different patterns of resource use and social organization at an early time in history.

1.1: Previous and Current Archaeology at DhRp-52

DhRp-52 is situated on a small bench landform of Pleistocene/Holocene uplifted deltaic deposits along a slough in the Pitt Polder. DhRp-52 was initially recorded by Minni (2005) and was thought to have been primarily located on private property immediately north of the site (Shortland et al. 2008) (Figure 1). In 2006, plans to develop the area for the new Golden Ears Bridge and Abernathy Connector highway in Maple Ridge required a new archaeological impact assessment of the previously un-tested neighbouring area of Translink property (Huddlestan et al. 2007a). Shovel testing from subsequent archaeological impact assessment work provided positive results and determined that DhRp-52 was larger than previously recorded. DhRp-52 is presently known to be at least 90,300 cubic meters in volume (Shortland et al. 2008).

A series of different excavation techniques were used during site mitigation work. Site boundaries were initially determined through shovel testing and machine excavation. Excavations were carried out with a combination of machine excavated trenches, hand excavated 1x1 metre test units, and several hand excavated trenches. The latter were excavated in arbitrary 10 centimetre levels with the exception of one large feature excavated by natural levels. Hand excavations used shovel scraping and troweling methods. The hand excavated trenches were divided and excavated in checkerboard fashion in a series of 2x2 metre squares excavated as 1x1 metre units in the dry site and 2x2 metre units in the wet site. The machine excavated trenches were dug to test the boundaries of the site. These trenches determined the extent of the site boundaries because they contained a paucity of artifacts and features. The 1x1 metre units were excavated to determine where higher densities of artifacts were located within site deposits. The larger hand excavated trenches were then planned, positioned, and excavated based on the information provided by previous survey and excavation data. A total of approximately 1200 m^2 and 1700 m^3 of site deposits were excavated (Shortland et al. 2008).

Excavations revealed the site contained both a dry site and a wet site (Figures 2 and 3). The wet site was buried under two to three meters of cultural (historical) fill. The fill was machine excavated. Excavations in the dry site revealed several features including two possible structures, post moulds, hearths, and a large possible roasting pit. Wet site excavations revealed a possible fish weir, and a rock pavement of undetermined purpose. Recovered artifacts include over 100,000 beads, 65,000 pieces of debitage, 500 projectile points, 1,500 other flaked and ground stone tools, 185 wooden implements, 396 pieces of cordage, and over 600 'other' wooden artifacts (Shortland et al. 2008). Preliminary analysis suggests three temporal components exist at DhRp-52. These observations are based on the presence of two different matrix deposit types: one in upper deposits composed of a loam matrix, and one in the middle deposits composed of a sand matrix. The bottom component is identified by the presence of artifacts below structural features that are not associated with structural storage pit features.

Very little post-excavation analysis has been completed at DhRp-52 to date. Current and ongoing research focuses mostly on the role of wapato in the economic and subsistence system of DhRp-52 inhabitants and how it may have played a role in the sexual division of labour (Homan 2008). Preliminary observations of recovered artifacts and features suggest that the site may have been used as a wapato and hazelnut harvesting site (Shortland et al. 2008). A series of 30 radiocarbon dates (Appendix I) spans DhRp-52's use across the Old Cordilleran Culture (9000 to 4500 B.P.), Charles Culture (4500-3300 B.P.) and into the beginning of the Locarno Beach Phase (3300-2400 B.P.) (Matson and Coupland 1995: 98-99, 156).

My involvement with DhRp-52 has consisted primarily of lab-based work. I was brought into the project to help manage the lithic collection through identification and analysis of lithic artifacts, to develop an appropriate typology, and to train a small staff of employees to sort, identify and analyze the lithic artifacts . I was not involved with excavations but was able to observe field conditions in the last few months of the field project. My research role at the site, in addition to this thesis, has included the design and implementation of separate bead and debitage sample analyses; preliminary use-wear analysis on a small sample of lithic tools; and research into the history of archaeology in the region, particularly pertaining to household archaeology and archaeology of the Old Cordilleran Culture, Charles Culture and Locarno Beach Phase as they relate to lithic technology.

This thesis is organized and divided into five chapters. Chapter 1 introduces the site, my hypotheses, past work at the site, and regional chronology. Chapter 2 discusses the methods and data including limitations of the data, the typology and its composition, selected and excluded lithic data, how the site was divided into units of analysis, and the over-all methodology used to analyze the site's assemblages. Chapter 3 discusses the analysis results through time and space, and presents comparisons between temporal components at DhRp-52 and Glenrose Cannery and Crescent Beach. Chapter 4 discusses the results of the analysis and what the analysis has contributed to over-all site interpretations. Chapter 5 presents a discussion of conclusions, implications of this research and recommendations for future research.

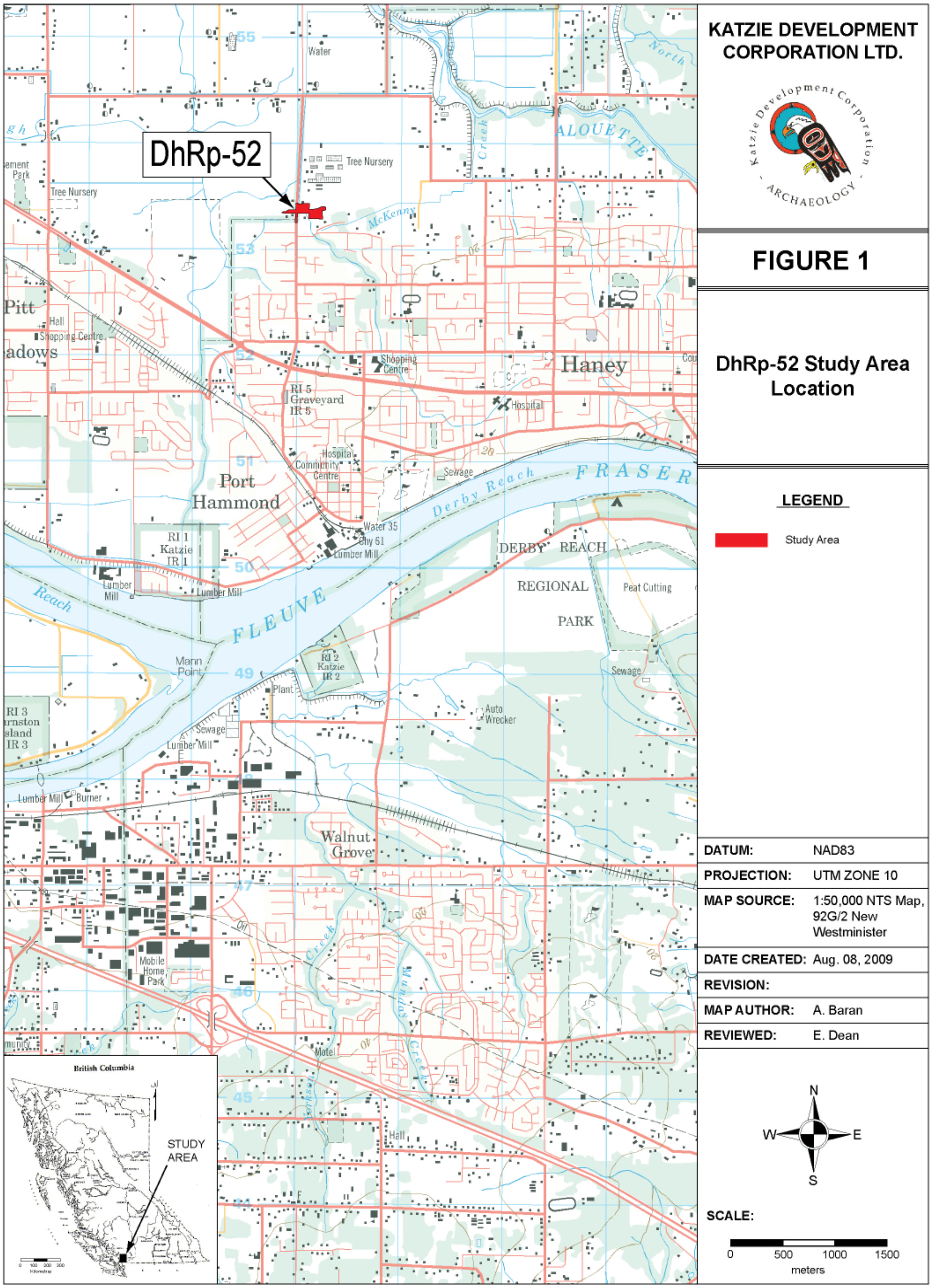

Figure 1. Location of site DhRp-52 (Shortland et al. 2008).

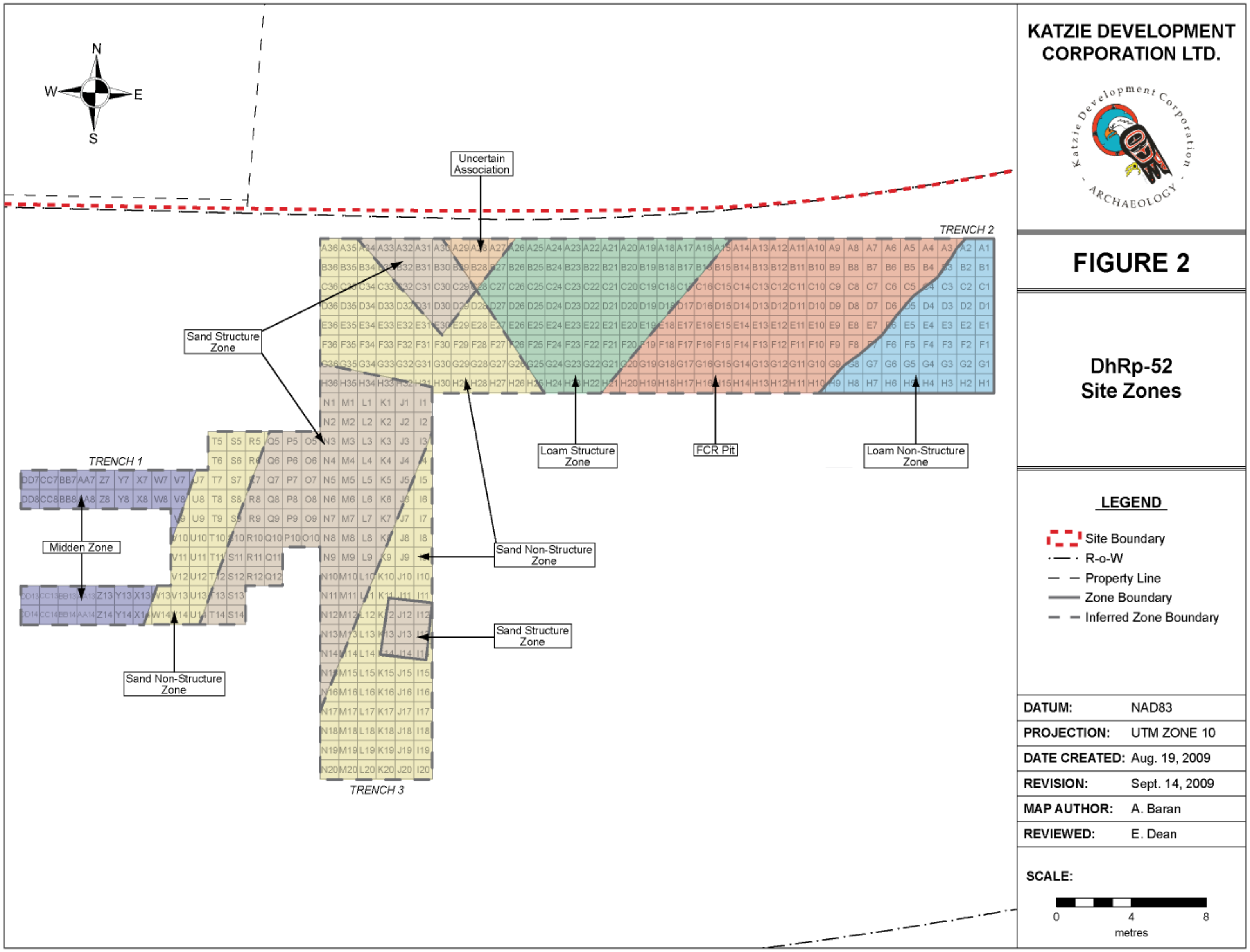

Figure 2. DhRp-52 dry site excavation map and site zones (Shortland et. al n.d.)

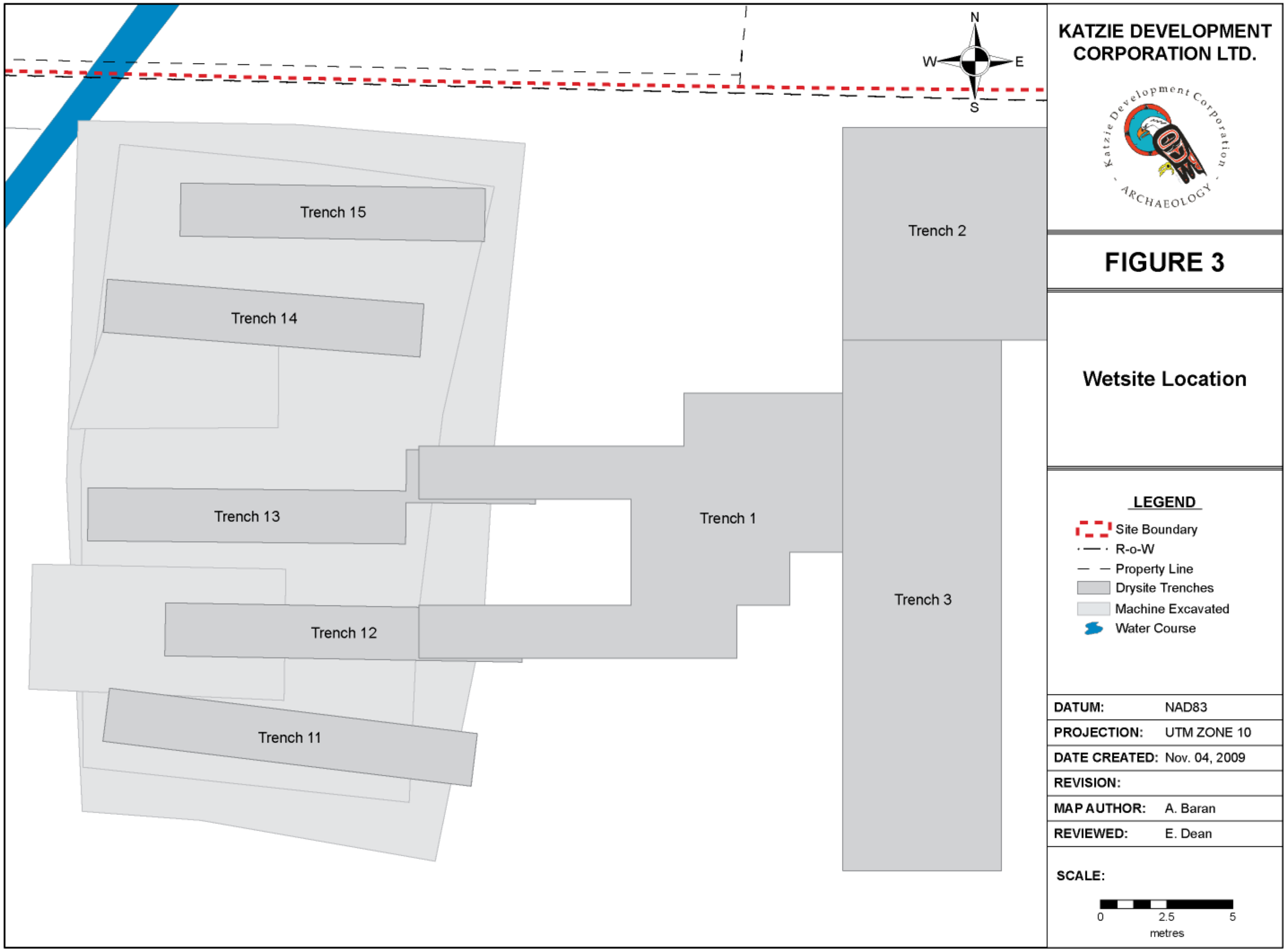

Figure 3. Wet site location and excavation map (Shortland et al. 2008)

1.2 Culture History of The Fraser River Valley (9000 BP to Contact)

DhRp-52 lies within the Northwest Coast culture area, Gulf of Georgia sub-area and Fraser River Valley sub-sub area (McLaren and Steffen 2008; Matson and Coupland 1995; Mitchell 1990). This grouping of sites is based on archaeological commonalities related to geography, material culture, and subsistence practices (Matson and Coupland 1995; Mitchell 1990: 340; Jorgensen 1980; Driver and Massey 1957; Kroeber 1939). Similarities in this area include subsistence focused on marine and riverine resources with diversified hunting and gathering, and developed fishing and wood working technologies later in time (Mitchell 1990: 340-341). Although many similarities exist, anthropologists and archaeologists have also recognized that a great range of diversity exists within the Northwest Coast (Jorgensen 1980: 60) and Gulf of Georgia sub regions (Matson and Coupland 1995).

Given that there are only a few dated sites within the Fraser River Valley, the cultural chronology used for this region is the same as that generally used for the larger, lower mainland and Vancouver Island / Gulf of Georgia region. There are some differences between island and mainland cultural chronology. This summary will focus on the mainland, Fraser Valley cultural chronology. Gulf of Georgia cultural chronology is divided into Old Cordilleran Culture (9000-4500 B.P.), the Charles Culture (4500-3500/3300 B.P.), the Locarno Beach Phase (3500/3300-2400 B.P.), the Marpole phase (2400-1500 B.P) and the Gulf of Georgia phase (1500 B.P.-contact) (Matson and Coupland 1995:81,98-99, 156, 247). There are some sampling problems with this chronology. Some cultures (such as the Old Cordilleran), are represented only by a few well-documented and dated sites and sites that represent each culture or phase are not found in every sub-region of the Northwest Coast (Martindale et al. 2009).

1.2.1 Old Cordilleran Culture (9000-4500 BP)

The Old Cordilleran Culture artifact assemblages are known to vary across the Northwest Coast region, but are often characterized by the appearance of unifacial chopper tools co-occurring with leaf-shaped and single-shouldered bifaces, and sometimes by scrapers on thin flakes, burins, polished soapstone fragments and ochre (Carlson 1990: 63; Borden 1968: 13). Settlement strategies on the landscape included high residential mobility that allowed people to move widely and seasonally to gather, hunt and fish terrestrial, marine and riverine resources. Population densities were low relative to later cultural phases, and there was a possibly heavier reliance on tools made from perishable materials than on tools made with lithic materials. Shell midden deposits are known to occur, but are very rare (Moss et al. 2007:502). This culture is known to occur from northern Vancouver Island to the southern-most tip of the Northwest Coast culture area (Matson and Coupland 1995: 81; Carlson 1990: 62).

1.2.2 Charles Culture (4500 BP to 3500/3300 BP)

The Charles Culture varies at different locations within the region. These variants are known as the St. Mungo (Fraser Delta region), Mayne (Gulf Islands) and Eayem (Fraser Canyon region) phases (Matson and Coupland 1995: 98). These variants have similarities in material culture and sometimes overlap in time and geography, which is why Borden (1975) and Matson and Coupland (1995) group them into the Charles Culture. St. Mungo is the best represented variant, based on three well described components from the Glenrose Cannery, St.

Mungo and Crescent Beach sites (Matson and Coupland 1995: 98). Charles Culture traits developed from the previous Old Cordilleran Culture. It is generally acknowledged that the Charles Culture marks the beginning of the Developed Northwest Coast Pattern, defined as the onset or appearance of a high degree of sedentism and community size compared to other hunter-gatherer societies, the establishment of large planked houses, ranked societies with ascribed classes, ownership and control of resources by families, the existence of the multifamily household unit, large villages with large scale storage, and the existence of wealth-denoting items and items of artistic complexity (Matson and Coupland 1995: 5-7). Some Charles deposits overlap with Old Cordilleran deposits and there are many similarities between the two, suggesting cultural continuity. Many of the same artifact types existed in both cultures, but artifact class frequencies differ, such as the lower frequency of cobble tools in the Charles Culture. Different types of artifacts and different styles of bifaces also occurred in later Charles Culture deposits, including stemmed and shouldered points, smaller foliate shaped points, and the appearance of ground stone artifacts. Shellfish resources were also utilized in greater quantities as evidenced by the increased occurrence of shell middens. Shell middens preserve a large portion of perishable tools and decorative objects that otherwise would not have survived the acidic soils of the region (Matson and Coupland 1995: 100-106). Subsistence patterns indicate a focus on riverine and marine resources with a decline in terrestrial mammalian species (Matson and Coupland 1995: 109-111). Few permanent structures are associated with this period; therefore it has been argued that the people of the Charles Culture in the Gulf of Georgia region practiced a 'forager' pattern of settlement with high residential mobility (Matson and Coupland 1995: 114; Binford 1980).

1.2.3 Locarno Beach Phase (3500/3300 BP to 2400 BP)

Locarno Beach Phase components have been recovered at approximately 30 sites (including DhRp-52) and extend beyond the Gulf of Georgia region (Mitchell 1990: 341; Matson and Coupland 1995: 157, 203). Components date from about 3500 BP to 2400 BP and have many similar artifact classes as the preceding Charles Culture, but are distinguished by the appearance of a variety of new artifact classes not previously recovered in early Gulf of Georgia deposits (Matson and Coupland 1995: 156). These items include medium sized flaked basalt points, microblades and microblade cores, flaked slate or sandstone tools of generally ovoid shape, pebble and boulder spall tools, bipolar flaking technologies, large faceted ground slate and bone points, thick ground slate knives, small ground stone adzes, cordage, basketry, and fishing industry technology (Mitchell 1990: 341).

Subsistence practices included a reliance on marine, riverine and terrestrial plants and animals while using a seasonal round to hunt, fish and gather these resources (Patenaude 1985). Population densities appear to have been low, with small communities occupying the landscape relative to those in later cultural phases. Recovered burials have shown no status differentiation or the practice of wealth accumulation (Mitchell 1990: 344),with the exception of a few adult burials featuring labret wear patterns at Crescent Beach (Matson and Coupland 1995: 182) and a few labrets found in Locarno Beach deposits from the Fraser delta (Borden 1970). This is interpreted as evidence of achieved status rather than ascribed status because no "sub-adult" burials have been recovered with adornments (Matson and Coupland 1995: 161). Woodworking technology was present and adequate for the construction of plank covered dwellings and the manufacture of dug-out canoes, although archaeological remnants of such items are yet to be recovered (Mitchell 1990: 344). Locarno Beach Phase on the mainland appears to be an *in situ* development of the earlier mainland Charles Culture (Matson and Coupland 1995: 162-163).

1.2.4 Marpole Culture (2400 BP to 1100 BP)

The Marpole Culture dates from approximately 2400 BP to about 1100 BP (Matson and Coupland 1995: 203). It is represented at more than 30 sites, with house depressions at five sites, indicating a move towards a more sedentary life-style. It appears that the Developed Northwest Coast Pattern was fully flourishing during this time, given the presence of elaborate art with similar designs and themes to that found ethnographically, evidence of multi-family households, large villages of planked houses, ascribed status differences as evidenced by burials (Matson and Coupland 1995: 209; Cybulski 1991; Matson 1976; Mitchell 1971; Burley 1980), and the presence of substantial wealth items (items that are ornate and/or require a significant expenditure of labour). Burley (1980:43) and Mitchell (1971b:52) (as in Matson and Coupland 1995: 213) note that the oldest Marpole sites are associated with the Fraser River delta. This occurrence may be associated with exploitation of the abundant salmon runs that seasonally spawn up the river (Matson and Coupland 1995: 213), or to the occurrence of climate change that led to dryer and warmer periods causing major shifts in available resources throughout the Gulf of Georgia region (Lepofsky 2005).

The Marpole Culture appears to have descended directly from the previous Locarno Beach Phase. The presence of labrets and high proportions of chipped stone artifacts in early Marpole deposits tend to support this inference (Matson and Coupland 1995: 215). Artifacts commonly found in Marpole deposits include both stemmed and unstemmed points, some large foliate points, microblades and cores, ground slate points, finely made and hafted ground slate knives, shale/slate and shell disk beads, "T" shaped labrets, nipple-topped or decorated stone hand mauls, abraders, bone awls, non-toggling harpoons, and a variety of artwork and sculpture (Mitchell 1990: 345). Subsistence was mostly dependent on Fraser River salmon as well as other riverine and marine resources, especially sea mammals.

1.2.5 Gulf of Georgia Culture (1100 BP to Contact)

The Gulf of Georgia Culture is the final cultural period that developed before European contact. Also known as the Stselax Phase (Borden 1970) and the San Juan Phase (Carlson 1954, 1960, 1970), it is not well represented in the archaeology of the Gulf of Georgia region (Matson and Coupland 1995: 268). Where it has been studied, it appears that considerable differences exist between geographic regions, which may be attributed to seasonal land use patterns or to differences in how regional territories were used seasonally by different peoples or ethnic groups (Mitchell 1990: 348).

Despite regional differences, the archaeological record does exhibit some similar patterns during this cultural period. The presence of chipped stone artifacts drops dramatically, with a greater emphasis on ground slate technologies. Large, flat-topped hand mauls, large, well-made adzes, and sandstone abraders provide evidence of a well-developed wood working technology. Tools made from perishable materials are more frequently recovered including bone awls, biotins, barbed points, and antler toggling harpoons. Weaving technologies are represented by the appearance of blanket pins and spindle whorls (Mitchell 1990: 346; Matson and Coupland 1995: 268).

Subsistence practices include a heavy reliance on salmon fishing and other marine and riverine resources, supplemented by other terrestrial plant and animal resources. Most sites found within the Gulf of Georgia region are spring camps, with relatively few summer and fall camps, and no winter occupations (Patenaude 1985; Matson and Coupland 1995; Mitchell 1990: 348).

Archaeological patterns in the Gulf of Georgia and other regions within the Northwest Coast suggest that groups of individuals coexisted in large, multi-family households. These families probably settled into large summer and winter villages and dispersed to more logistically-oriented seasonal resource collection encampments during the spring, summer, and fall. The presence of trench encampments with palisades suggests inter-regional conflict among groups (Mitchell 1990: 348). Burials suggest differences in status similar to the earlier Marpole Phase.

The Gulf of Georgia region chronology demonstrates a largely *in situ* development of cultural change. Although change does occur through time, there is enough overlap in archaeological material culture and patterns to suggest that outside influence by peoples of other cultural areas was minimal until European contact (although see Prentiss and Kuijt 2004). The cultural sequence demonstrates that Gulf of Georgia peoples have a long history in the region, most likely beginning in the Old Cordilleran Culture with small populations of hunter-gatherer/foragers, and developed into one of the most culturally and socially complex regions in the world.

CHAPTER 2: METHODS AND DATA

Three hypotheses were developed and tested using data derived from the DhRp-52 stone tool assemblages. These hypotheses were that: 1) the structural zones differ in assemblage content from the non-structural zones of the site, 2) the lithic assemblages reflect changes in site use over time, and 3) the site has three discrete temporal components that can be associated with known Gulf of Georgia culture-historical units. Several steps had to be undertaken before the hypotheses could be tested. First, data limitations had to be assessed as they affect the development of units of comparison. Second, a lithic artifact typology was developed for the site. Third, the components of the site (both in time and space) were defined and identified. Fourth, the tools associated with each component were compared using a series of proportion comparisons and statistical tests.

2.1 Limitations Of The Data

There were several limitations affecting the overall ability to interpret the site's contexts and functions and to address the hypotheses. During the implementation of this research, the site was undergoing preliminary analysis and was in the descriptive phase of report writing. The final site report was not yet completed, and this thesis was intended to contribute to the report, as well as provide insight into the site's stone tool assemblages.

Faunal data can be an important indicator of site use, but was absent from the site deposits, except for several small, undiagnostic fragments from the dry site deposits. The soil was too acidic for adequate preservation of faunal remains. No faunal remains were recovered from the wet site components. Paleoethnobotanical remains and geoarchaeological evidence were still under examination at the time and are part of future research projects.

Floors were not identified in the structural feature deposits. This was not an unexpected phenomenon since floors are often composed of compact deposits, which often break down through various geological processes in the local environment. Floors are important units of analysis and comparison in the analyses of house structures, particularly function and organization (see Morin 2006; Schaepe 1998; Smith 2004, etc). In addition to the problem of floor identification, the site was primarily excavated in arbitrary 10cm levels. Most artifacts were recovered from screens rather than *in situ*. Point provenience for artifacts and artifact orientation (i.e., noting whether the artifact was lying flat on its side or not) was rarely used, or noted, in the dry site excavations. Also, most tools were assumed to be debitage in the field and were later identified as tools during the artifact sorting process in the lab after excavations had ended. Debitage was not point provenienced in dry site excavations. As no floors were confirmed and point provenience and artifact orientation were not consistently noted, whole structural feature deposits were considered "structural zones" and as units of analysis.

2.2 DhRp-52 Lithic Typology

The typology for DhRp-52 had to classify and organize a diverse and primarily chipped-stone artifact collection. It was developed after several typologies from the Northwest Coast Culture area were reviewed (Glenrose Cannery: Matson 1976; Port Hammond: Rousseau 2003; Pitt River DhRq-21: Patenaude 1985; Hoko River: Croes 1995). Attention focused on typologies with Charles Culture and Locarno Beach Phase assemblages, wide varieties of chipped stone materials, and some ground stone materials. The original intent of the project was to use a pre-existing typology from the University of British Columbia's Laboratory of Archaeology digitization project, but after further review, the classification was considered too general to provide enough comprehensive information to make any robust observations and interpretations about the site's diverse assemblages. Detection of artifact class diversity (and proportional comparisons) was considered to be the best way to identify variation between the site through time and space. Typologies that classified artifacts strictly according to inferred function were also avoided because too many *ad hoc* assumptions about tool function would have had to have been made about artifact classes without performing any use-wear analysis to properly identify artifact function. The final typology had to distinguish formal artifact morphology for the purpose of inferring general aritifact function or functional potential, evaluate the range of raw materials used, and evaluate how artifacts were manufactured to understand the nature of site use and site structure through comparisons of lithic tool assemblages.

The final typology was largely based on one developed by Matson (1976) for the Glenrose Cannery site. The Glenrose Cannery site had a chipped stone collection with similar tool classes to DhRp-52, and featured a typology that was descriptive, well-defined, and permitted future comparative studies between the two sites. The resulting typology not only addressed the technological diversity required to compare different areas of DhRp-52, but it also allowed some very general observations to be made about possible assemblage functionality without assigning specific functions to artifact classes. For example, points and bifaces are often assigned to hunting and butchering activities in functional typologies. Although their presence at a site may indicate that hunting and butchering activities did occur at the site, they may also indicate the presence of other functional activities, such as gearing-up activities that commonly occur at lower mobility sites.

2.2.1 Lithic Typology Composition

DhRp-52 has a diverse lithic collection of debitage, chipped stone tools, ground stone tools, cores, and decorative objects. To organize and capture useful information about the diversity of the site's assemblages with respect to morphology, general functionality, and manufacturing technologies across time and space, the typology had to both acknowledge and classify all of these items in a logical and accessible manner. The original accession catalogue divided items up into Tools and Non-Tools. The Non-Tool category included all lithic items inferred not to have been used as tools, and is not included in this analysis. The Tool category was divided into several grouped classes: Flake Tools, Scrapers, Points and Bifaces, Other Finely-Worked Chipped Stone Tools, Choppers, Ground Stone, Slate, and Hammer/Anvil Stones. These grouped classes were then divided into sub-classes (See Appendix II). The tool typology structure was organized by 1) Tools (versus Non-tools), 2) secondary lithic material type (non-slate or slate) in order to monitor the use of slate at DhRp-52 and to construct main artifact classes, 3) manufacturing technique (ground or chipped) to monitor manufacturing technology, 4) shape (formed or unformed) to monitor morphology and 5) grouped class to monitor both class diversity and inferred general functionality (Figure 4). Slate items were classified separately from non-slate artifacts because the presence of slate is often used as an important chronological marker for site age—something that can otherwise be difficult to identify. Classes were used later in the analysis to compare DhRp-52 tool proportions with Glenrose Cannery and Crescent Beach tool proportions through time.

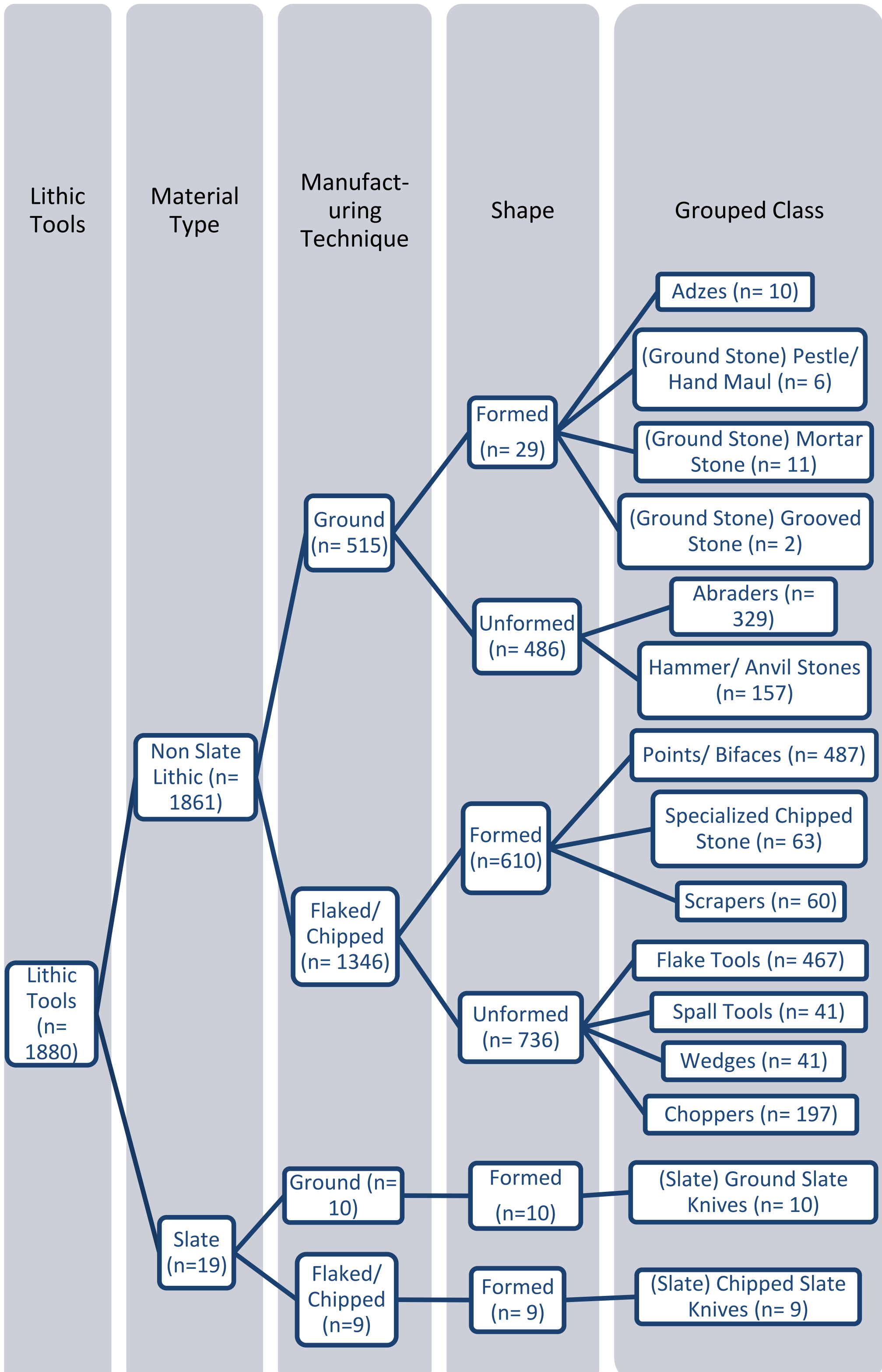

Figure 4: Tree diagram of lithic tool typology.

2.3 Selection Of Lithic Data

Lithic technology was an important part of early Northwest Coast economic-subsistence systems. Lithic artifacts are important markers of site function, mobility strategies, and culture-historic periods. Stone tools were used to collect, process, and shape wood resources that were vital to most Northwest Coast societies for economic, subsistence and ceremonial reasons. They were also used as hunting aids, plant processing implements, fish processing tools, cooking aids, etc. This diversity of activity often resulted in diversified lithic tool kits, some with more curated/specialized tools and some with more expedient/generalized tools; depending on the types of activities the site's inhabitants were involved with, the types of raw material available, and the degree of sedentism/mobility of the community. Lithic technology, therefore, allows archaeologists to gain insight into the range and types of activities that may have been carried out in past societies. A total of 1880 lithic tools from DhRp-52 were analyzed for this thesis.

2.3.1 Excluded Lithic Data

Not all tools from all portions of the site were used for this analysis. A total of 364 tools were excluded from the top 50 cm of deposits because of problems with their context and sampling. The artifact context was considered to be unreliable in the top 30 cm of deposits, because of ploughing. DhRp-52 is situated in an area where both historic and contemporary farms were known to operate causing direct disturbance at DhRp-52 and its surrounding areas. Context was also problematic in the upper 50 cm of deposits for two reasons. Natural site stratigraphy was identified by mapping out the 200 cm of bead, fire cracked rock (FCR), and matrices deposits using a geographical information systems (GIS) program. The resulting map showed no natural divisions of the site, such as large features, structures or differences in matrices, in the upper 50 cm. The lower 150 cm of deposits demonstrated clear distributions of large structures (often defined by bead and matrices distributions), their boundaries, and the general outline of the large FCR Pit feature which allowed division of the site into natural stratigraphy rather than arbitrary levels. Smaller feature distributions were also unreliable. Only 15 possible small, and possibly historic, post hole features out of 695 features were identified in the upper 50 cm of the site. No obvious pattern was observed with the post hole distribution. It appeared that the upper 50 cm of deposits were disturbed by ploughing and unknown post depositional activities and were excluded from analysis.

Sampling was also a problem because the top 30-40 cm were removed by machine. Half of the machine excavated deposits were screened but these were not evenly, nor randomly, distributed across excavation units. Machine excavated units were not always the same size (they were not always 1x1m units) nor did they always match up with the lower hand-excavated units. Both the sampling problems associated with the machine excavated units and the unreliable context of the upper 50 cm of site deposits, led me to exclude artifacts from these units from the following analyses.

2.3.2 Lithic Technology and Settlement/Mobility

This section explores how lithic technology can assist our understanding of archaeological site settlement organization and how it may apply to DhRp-52. The model most commonly used to identify hunter-gatherer settlement site types based on archaeological assemblages is Binford's forager-collector model (1980). Archaeological societies with a forager economic system were more likely to have residential mobility sites where the population moved from one location to another and extracted particular resources. These types of sites are often associated with low population densities and specialized tool kits used to extract seasonally available resources. Specialized tool kits often consist of tool assemblages with low diversity and are especially composed of formal or curated tools, made with extra effort in their production (Andrefsky 1998: xxiii). Formal tools with multifunctionality (Hayden et al. 1996: 13) also helped highly mobile people to reduce the amount of heavy materials they had to carry from location to location. Societies with collector economic systems resided in larger base camps that were not frequently moved and where the majority of the population remained throughout a portion of time, possibly a season or more. They also used smaller, task-oriented camps to extract resources which they brought back to their base camps for further processing. Foragers in task-oriented camps produced tool kits that were similar in composition to camps with residential mobility, but base camps are expected to have more generalized tool assemblages used to process a wide range of resources. Base camp tool kits are expected to have a variety of expedient tools—tools made with little effort—as well as formal tools where material transportation costs (both for tools/tool material and collected resources) are low (Andrefsky 1998: xxiii).

Sometimes activities and their relative frequencies, changed over time as new technologies made them easier or, conversely, environmental shifts made them less useful. Such changes can often be detected in the lithic tool record. The Northwest Coast is an area where changes in lithic technology have been detected and used as culture-historical markers for changes in other parts of past socio-economic systems (Mitchell 1990; Matson and Coupland 1995). Stone tools comprise approximately two-thirds of the DhRp-52 assemblage and so are likely to be good markers of technological, and possibly cultural, change at the site. As a way to approach this type of analysis, tools were categorized as to their "type of curation" (Table 1). By assessing the type of curation for artifacts associated with each component, one can measure the relative degree of mobility among the different components at the site.

Table 1: Type of curation strategy tool groupings.

Type of Curation	Artifact class	Mobility strategy associations
Expedient (Light Duty)	Acute Angled Retouch Flakes	High proportions in lithic assemblages are often associated with low residential mobility sites (Parry and Kelly 1987).
	Steep Angled Retouch Flakes	
	Steep and Acute Angled Retouch Flakes	
	Edge Modification Present Flakes	
	Spall Tools with Retouch	
	Spall Tools without Retouch	
Formed/Curated	Point	Associated with high residential mobility and activity specialization except where associated evidence suggests low residential mobility contexts. They may represent 'gearing-up' activities in such situations (Binford 1979).
	Unifacial Point	
	Biface	
	Point Preform	
	Chipped Slate Point	
	Curved Point	
	Combination Tool	
	Graver	
	Burin	
	Drill	
	Spokeshave	
	Thumb Scraper	
Heavy Duty	Bifacial Chopper	Associated with early, high to moderate mobility contexts when found as large portions of site assemblages (Matson and Coupland 1995: 70-73).
	Unifacial Chopper	
	Hammer Stone	
	Anvil Stone	
Ground Stone	Pestle/Hand Maul	Associated with low residential mobility when found in large proportions of site assemblages (Prentiss and Kuijt 2004:53).
	Mortar Stone	
	Milling Stone	
	Grooved Stone	
Abraders	Unformed Abrader	Associated with low residential mobility when found in large proportions of site assemblages (Prentiss and Kuijt 2004: 53).
	Pebble Abrader	
	Grooved Abrader	
	Shaped Abrader	
Slate	Chipped Slate Knife	Associated with economic strategies that rely on marine-based subsistence resources, often as low residential mobility collector systems.
	Ground Slate Knife	
Bipolar	Wedge	Associated with material conservation activities, particularly in seasonally limited low mobility contexts (Hayden et al. 1996).
Adze	Adze	Associated with intensive wood working activities particularly in later period sites associated with low residential mobility.

2.3.3 Units of Analysis: Site Matrix/Temporal Components

The tools analyzed here were recovered from several different site deposits labelled as zones in Section 2.3.4. The zones were identified by stratigraphy, matrix type, artifact distributions, site type (wet site and dry site), and radiocarbon age-estimate data. DhRp-52 appears to have a sequence of three temporal components for site use based on zone descriptions. These temporal components contain the site zones described in the following section and were identified by their matrix composition and stratigraphic position within the site's deposits. However, relationships between the dated materials and the site's associated zones remain poorly understood (Table 2). Radiocarbon dates from the Early Component fall within the time span of the Old Cordilleran Culture, those from the Middle Component span the late Old Cordilleran Culture and early Charles Culture, and those from the Late Component span the Charles Culture and early Locarno Beach Phase. Tool classes (Table 3) and material types were compared between the Late Component (Loam), Middle Component (Sand), and Early Component (Sub-

Structural Sand) to both compensate for the lack of radiometric dating and to gain a better understanding of the site's chronology. The Wet Site Zone was omitted from the temporal comparison given its unresolved associations with the dry site matrices.

Table 2. DhRp-52 site components with matrix and chronological associations.

Matrix deposit type	Zones associated with matrix deposit	Site temporal component and overlap with regional chronology
Loam	Loam Non-Structural Zones, Loam Structural Zones, FCR Pit, and Midden Zone.	Late Component: Late Charles Culture/Early Locarno Beach Phase
Sand	Sand Non-Structural Zones and Sand Structural Zones.	Middle Component: Old Cordilleran Culture/Charles Culture
Sub-Structural Sand	Sand Sub-Structural Zone.	Early Component: Old Cordilleran Culture

2.3.4 Units of Analysis: Site Zones

Site Zones were used to identify locations of known structural features (such as the Sand Structural Zone), inferred structural features (such as the Loam Structural Zone), and their associated non-structural areas. Structural features, in particular, were identified by several key characteristics. They were often associated with large post holes, hearths, and 90-degree corners that form rectilinear outlines in the matrices. Structural features were initially grouped together as structural zones rather than analyzed as individual structures for some portions of analysis. They were classified in this manner because their walls have not been clearly defined, floors have not been delineated, sample sizes were small, and with the exception of one small structure, none were entirely excavated. Any observed differences between individual structures may have been the result of partial excavation rather than different tool sub-assemblages and their related functions. Rather than establish the function of each structure, the aim of this analysis was to test, at a general level, whether or not structural zones differed from non-structural zones. Presence/absence of artifacts between individual structures and some chi-square testing was later used to probe possible differences between structures. Eight different zones were employed as units of analysis and comparison. All radiocarbon age estimates in this section used median date ranges. Calibrated and uncalibrated dates for these zones are reported in Appendix I.

2.3.4.1 Loam Non-Structural Zone (LNSZ):

This zone contains all of the non-structural excavation units, non FCR Pit units and non-Midden Zone units in the Late Component (Figures 2 and 5). It is generally situated in the upper 80 cm of the site except where it drops off down-slope and may have been associated with the Midden Zone that reaches a depth of approximately 130 cm below surface. It is composed of a light yellow loam deposit, contains many of the beads from the site (with the exception of a few that seem to be intruding into the sand through various site formation processes). It is situated only in the dry site portion of the site, and is radiocarbon dated from 3700 cal B.P. to 3600 cal B.P. (Appendix I).

2.3.4.2 Loam Structural Zone (LSZ)

This zone contains all 54 excavation units associated with structural feature(s) in the Loam deposit (Figures 2 and 5). It is contemporaneous with the loam non-structural zone. The structural units in this deposit are identified not by changes in the matrix, but by an outline of beads forming a large, approximately 90 degree angle corner (that was about 11 meters x 11 meters for each side and 13 meters long across its hypotenuse) of a possible structure, the presence of small hearth features, and several large post-holes that surrounded the structural feature. Several smaller structures (or large features of unknown functions) may be located within the boundaries of this larger structural zone. This zone was not excavated in its entirety and its overall dimensions are unknown. This component was radiocarbon dated to approximately 3500 cal B.P. (Appendix I).

2.3.4.3 Fire Cracked Rock (FCR) Pit

This feature is a large (approximately 7 m wide x 4 m long at its surface and 130 cm deep) v-shaped pit full of fire cracked rock (FCR) and has a diverse sub-assemblage of artifacts (Figures 2 and 5). Its margins appear to be lined with beads. It is located in the dry portion of the site and is considered to be contemporary with the Loam deposits because it intrudes on the Sand deposits below the Loam. This feature is radiocarbon dated to approximately 3800 to 3600 cal B.P (Appendix I).

2.3.4.4 Sand Non-Structural Zone (SNSZ)

This component contains all of the sand deposits that are outside and contemporaneous with structural features in the Sand matrix deposits (Figures 2 and 5). The matrix is composed of reddish-yellow sand. It is generally situated below the Loam deposits in the dry site and is approximately 80 - 120 cm below the surface. This component is radiocarbon dated to approximately 5200 cal B.P (Appendix I).

2.3.4.5 Sand Structural Zone (SSZ)

This zone contains all excavation units associated with structural features in the Sand deposits (Figures 2 and 5). It is composed of dark-grey sand, often with a greasy feel and densely packed with FCR in some portions. It is contemporaneous with the non-structural sand component and is radiocarbon dated to approximately 5200 to 5000 cal B.P.

This zone has three structures associated with it. One structure (Sand Structure 1) has only one corner excavated and has unknown total dimensions. Its known dimensions are approximately 4 m x 4 m along each leg, 5.6 m across its hypotenuse and approximately 50 cm deep. Sand Structure 1 is radiocarbon dated to approximately 5100 cal BP (Appendix I). The second structure (Sand Structure 2) is a large rectangular feature that is approximately 60% excavated and measures 18 m long x 7 m wide and 50 cm deep. Sand Structure 2 is radiocarbon dated to approximately 5200 to 5000 cal BP (Appendix I). The third structure is excavated in its entirety. It measures 2.5 m long x 2.5 m wide and 50 cm deep. This structure is not radiocarbon dated.

2.3.4.6 Sand Sub-Structural Matrices/Zone (SSSZ)

This zone consists of reddish-yellow sand matrices that are situated below the sand structural deposits in the dry site portion (Figures 2 and 5). There are no structures associated with this zone. Several radiocarbon dates assign this component to approximately 5200 to 5000 cal B.P (Appendix I). It is deposited from approximately 120 – 180 cm below the surface.

2.3.4.7 Wet Site Zone

This zone consists of the entire wet portion of the site (Figure 3). The Wet Site is a complex deposit and it is unknown at this time which deposits are associated with which components of the dry site. This zone is radiocarbon dated from approximately 4900 B.P to 3200 cal B.P (Appendix I).

2.3.4.8 Midden Zone

This zone is situated down-slope from the upper Loam Structural and Loam Non-Structural Zones (Figures 2 and 5). It is composed of the same yellow loam as the loam zones and interfaces the dry site to the wet site. It is assumed that this zone is midden because it falls down-slope into a drainage (the Wet Site) and is maintained as a unit of analysis for comparative purposes. This zone is radiocarbon dated to approximately 3700 cal B.P (Appendix I).

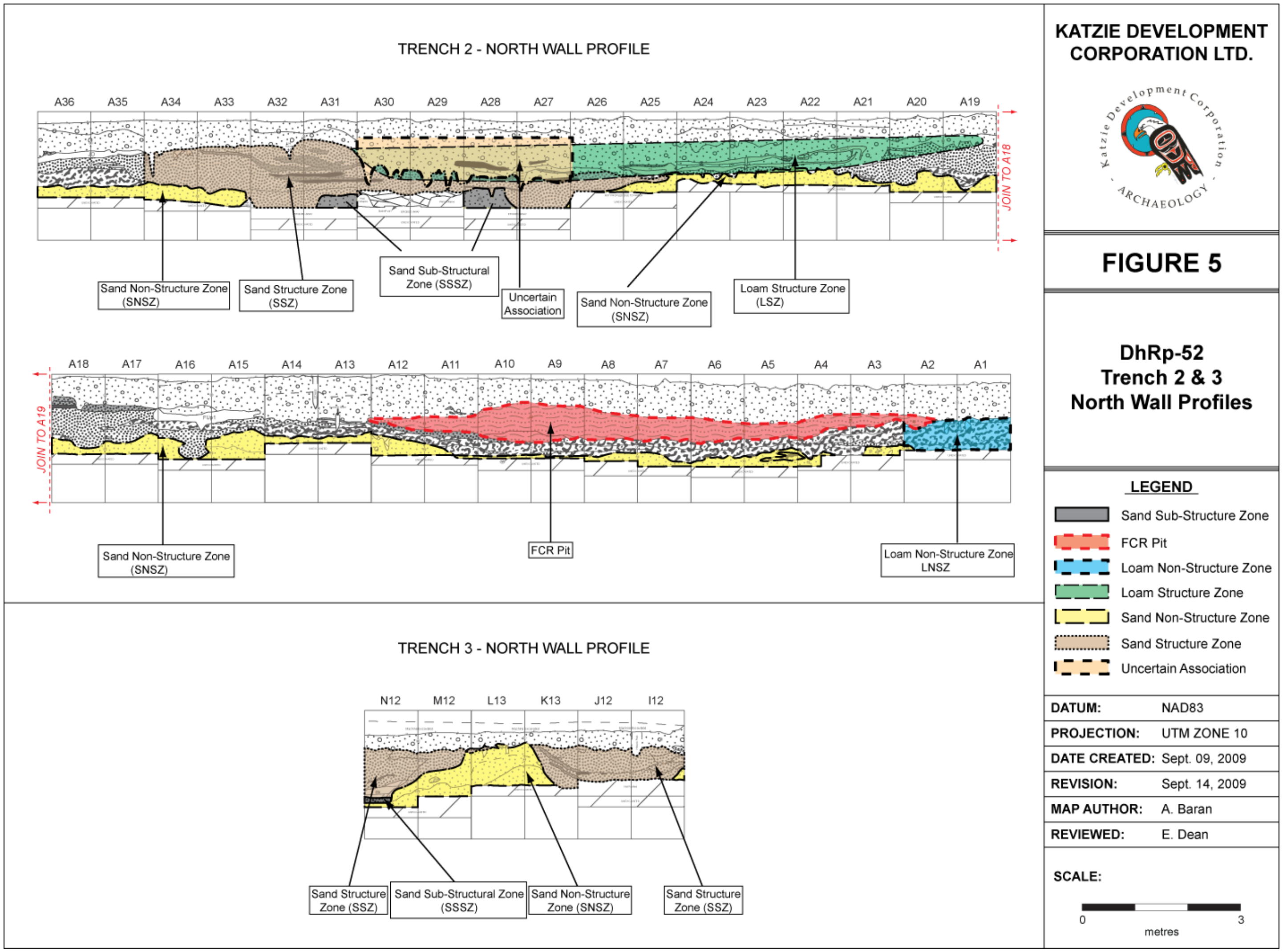

Figure 5. DhRp-52 Site Zones and Dry Site excavation profile (Shortland et al. n.d.)

2.4 Methodology

Comparisons between site zone sub-assemblages and temporal deposit tool assemblages were carried out using tool class proportions (Table 3) and chi-square tests of independence. Tool class counts were often too low for valid chi-square tests. To compensate for low counts, tool classes were grouped into larger morpho-technological categories (Table 3) for comparisons of general assemblage composition, and into larger groups based on tool curation strategies (Table 1) for comparisons of general settlement/mobility trends as general markers of cultural historical associations (Table 4). Type of curation groupings were important markers of site activity. I was specifically interested in determining whether or not the bottom-most deposits of the site do reflect a high mobility context. By grouping the tool assemblages into this category, I gauged whether or not the early (deepest) deposits were 'typical' of the high mobility contexts that are often associated with Old Cordilleran sites. Lithic material types were also compared between each unit of analysis to gauge whether or not preferences for different material types could be detected between site zones and chronological deposits, and also used as an additional line of evidence for differences between the selected units of analysis. Artifact groupings were modified to fit with Matson and Coupland's (1995) typological analysis of stone tool proportions for the Glenrose Cannery and Crescent Beach sites to gain a better understanding of regional comparisons between this site and other Gulf of Georgia sites with similar tool classes present and with similar chronological associations as DhRp-52. DhRp-52's typology is largely modified from Glenrose Cannery (1976) making Matson's descriptions of artifact classes applicable to DhRp-52's artifact classes.

Table 3. Lithic tools typology, artifact groups and class proportions across DhRp-52 site zones.

Grouped Class	Artifact Class		Loam structure zones (LSZ)	Loam non-structure zones (LNSZ)	FCR Pit	Sand structure zones (SSZ)	Sand non-structure zones (SNSZ)	Wet site	Sand sub-structural zones (SSSZ)	Midden Zone	Total
			Site zone								
Flake Tools	Acute Angled Retouch Flakes	Count	20	38	24	34	15	15	5	32	**183**
		% within site zone	9.0%	15.8%	6.5%	9.7%	9.5%	9.6%	2.7%	16.2%	**9.7%**
	Steep Angled Retouch Flakes	Count	9	13	15	13	9	8	4	15	**86**
		% within site zone	4.1%	5.4%	4.0%	3.7%	5.7%	5.1%	2.1%	7.6%	**4.6%**
	Steep and Acute Angled Retouch Flakes	Count	4	4	2	8	7	1	0	5	**31**
		% within site zone	1.8%	1.7%	.5%	2.3%	4.4%	.6%	.0%	2.5%	**1.6%**
	Edge Modification Present Flakes	Count	22	27	33	29	14	14	11	17	**167**
		% within site zone	10.0%	11.2%	8.9%	8.3%	8.9%	9.0%	5.9%	8.6%	**8.9%**
	Flake Tool count		55	82	84	84	45	38	20	69	**467**
	Flake Tool % within site zone		24.9%	34.0%	19.9%	24.1%	28.5%	24.4%	10.7%	35.0%	**24.8%**
Spall Tools	Spall Tools with Retouch	Count	5	0	8	3	0	6	0	2	**24**
		% within site zone	2.3%	.0%	2.2%	.9%	.0%	3.8%	.0%	1.0%	**1.3%**
	Spall tools without Retouch	Count	2	3	2	4	1	2	1	2	**17**
		% within site zone	.9%	1.2%	.5%	1.1%	.6%	1.3%	.5%	1.0%	**.9%**
	Spall Tool count		7	3	10	7	1	8	1	4	**41**
	Spall Tool % within site zone		3.2%	1.2%	2.7%	2.0%	.6%	5.1%	.5%	2.0%	**2.2%**
Wedges	Wedge	Count	7	5	6	1	2	5	0	5	**31**
		% within site zone	3.2%	2.1%	1.6%	.3%	1.3%	3.2%	.0%	2.5%	**1.6%**
	Wedge count		7	3	10	7	1	8	1	4	**41**
	Wedges % within site zone		3.2%	1.2%	2.7%	.3%	1.3%	3.2%	.0%	2.5%	**2.2%**
Scrapers	Thumb Scraper	Count	7	2	8	3	2	1	1	3	**27**
		% within site zone	3.2%	.8%	2.2%	.9%	1.3%	.6%	.5%	1.5%	**1.4%**
	General Scraper	Count	4	4	10	4	3	2	0	6	**33**
		% within site zone	1.8%	1.7%	2.7%	1.1%	1.9%	1.3%	.0%	3.0%	**1.8%**
	Scraper count		11	6	18	7	5	3	1	9	**60**
	Scraper % within site zone		5.0%	2.5%	4.9%	2.0%	3.2%	1.9%	.5%	4.6%	**3.2%**
Points/ Bifaces	Point	Count	34	51	62	66	26	34	20	38	**331**
		% within site zone	15.4%	21.2%	16.7%	18.9%	16.5%	21.8%	10.7%	19.3%	**17.6%**
	Unifacial 'Point'	Count	2	0	4	4	0	0	1	1	**12**
		% within site zone	.9%	.0%	1.1%	1.1%	.0%	.0%	.5%	.5%	**.6%**
	Biface	Count	11	18	8	24	4	12	9	25	**111**
		% within site zone	5.0%	7.5%	2.2%	6.9%	2.5%	7.7%	4.8%	12.7%	**5.9%**
	Point Preform	Count	3	2	4	5	1	3	4	3	**25**
		% within site zone	1.4%	.8%	1.1%	1.4%	.6%	1.9%	2.1%	1.5%	**1.3%**
	Chipped Slate Point	Count	0	0	2	1	0	0	1	0	**4**
		% within site zone	.0%	.0%	.5%	.3%	.0%	.0%	.5%	.0%	**.2%**
	'Curved' Point/Biface	Count	0	2	0	1	1	0	0	0	**4**
		% within site zone	.0%	.8%	.0%	.3%	.6%	.0%	.0%	.0%	**.2%**
	Point/Biface count		50	73	80	101	32	49	35	67	**487**
	Point/Biface % within site zone		22.6%	30.3%	21.6%	28.9%	20.3%	31.4%	18.7%	34.0%	**25.9%**
Specialized Chipped	Combination Tool	Count	3	7	5	7	5	3	0	0	**30**
		% within site zone	1.4%	2.9%	1.3%	2.0%	3.2%	1.9%	.0%	.0%	**1.6%**

Stone	Graver	Count	3	3	0	1	0	0	0	0	**7**
		% within site zone	1.4%	1.2%	.0%	.3%	.0%	.0%	.0%	.0%	**.4%**
	Burin	Count	1	1	1	0	0	0	0	2	**5**
		% within site zone	.5%	.4%	.3%	.0%	.0%	.0%	.0%	1.0%	**.3%**
	Drill	Count	0	1	0	0	1	1	0	2	**5**
		% within site zone	.0%	.4%	.0%	.0%	.6%	.6%	.0%	1.0%	**.3%**
	Spokeshave	Count	2	3	5	1	2	1	2	0	**16**
		% within site zone	.9%	1.2%	1.3%	.3%	1.3%	.6%	1.1%	.0%	**.9%**
	Specialized Chipped Stone count		9	15	11	9	8	5	2	4	**63**
	Spec. Chipped Stone % within site zone		4.1%	6.2%	3.0%	2.6%	5.1%	3.2%	1.1%	2.0%	**3.4%**
Choppers	Bifacial Chopper	Count	6	3	6	17	10	4	18	1	**65**
		% within site zone	2.7%	1.2%	1.6%	4.9%	6.3%	2.6%	9.6%	.5%	**3.5%**
	Unifacial Chopper	Count	16	5	20	25	12	10	43	1	**132**
		% within site zone	7.2%	2.1%	5.4%	7.2%	7.6%	6.4%	23.0%	.5%	**7.0%**
	Chopper count		22	8	26	42	22	14	61	2	**197**
	Chopper % within site zone		10.0%	3.3%	7.0%	12.0%	13.9%	9.0%	32.6%	1.0%	**10.5%**
Abraders	General Abrader	Count	36	29	77	54	22	25	24	21	**288**
		% within site zone	16.3%	12.0%	20.8%	15.5%	13.9%	16.0%	12.8%	10.7%	**15.3%**
	Pebble Abrader	Count	2	4	11	3	1	1	8	2	**32**
		% within site zone	.9%	1.7%	3.0%	.9%	.6%	.6%	4.3%	1.0%	**1.7%**
	Grooved Abrader	Count	2	0	0	0	2	1	1	0	**6**
		% within site zone	.9%	.0%	.0%	.0%	1.3%	.6%	.5%	.0%	**.3%**
	Shaped Abrader	Count	0	0	0	2	0	0	1	0	**3**
		% within site zone	.0%	.0%	.0%	.6%	.0%	.0%	.5%	.0%	**.2%**
	Abrader count		40	33	88	59	25	27	34	23	**329**
	Abrader % within site zone		18.1%	13.7%	23.7%	16.9%	15.8%	17.3%	18.2%	11.7%	**17.5%**
Ground Stone	Pestle/Hand Maul	Count	0	0	0	2	0	1	3	0	**6**
		% within site zone	.0%	.0%	.0%	.6%	.0%	.6%	1.6%	.0%	**.3%**
	Mortar Stone	Count	2	0	7	1	0	0	0	1	**11**
		% within site zone	.9%	.0%	1.9%	.3%	.0%	.0%	.0%	.5%	**.6%**
	Grooved Stone	Count	0	0	2	0	0	0	0	0	**2**
		% within site zone	.0%	.0%	.5%	.0%	.0%	.0%	.0%	.0%	**.1%**
	Ground Stone count		2	0	9	3	0	1	3	1	**19**
	Ground Stone % within site zone		.9%	.0%	2.4%	.9%	.0%	.6%	1.6%	.5%	**1.0%**
Adzes	Adze	Count	2	1	3	0	0	1	0	3	**10**
		% within site zone	.9%	.4%	.8%	.0%	.0%	.6%	.0%	1.5%	**.5%**
	Adze count		2	1	3	0	0	1	0	3	**10**
	Adze % within site zone		.9%	.4%	.8%	.0%	.0%	.6%	.0%	1.5%	**.5%**
Slate	Chipped Slate Knife	Count	1	1	1	4	1	1	0	0	**9**
		% within site zone	.5%	.4%	.3%	1.1%	.6%	.6%	.0%	.0%	**.5%**
	Ground Slate Knife	Count	1	4	3	1	1	0	0	0	**10**
		% within site zone	.5%	1.7%	.8%	.3%	.6%	.0%	.0%	.0%	**.5%**
	Slate count		2	5	4	5	2	1	0	0	**19**
	Slate % within site zone		1.0%	2.1%	1.1%	1.4%	1.2%	.6%	.0%	.0%	**1.0%**
Hammer/ Anvil Stones	Hammer Stones	Count	14	9	40	29	16	4	30	10	**152**
		% within site zone	6.3%	3.7%	10.8%	8.3%	10.1%	2.6%	16.0%	5.1%	**8.1%**
	Anvil Stones	Count	0	1	2	2	0	0	0	0	**5**
		% within site zone	.0%	.4%	.5%	.6%	.0%	.0%	.0%	.0%	**.3%**
	Hammer/ Anvil Stone count		14	10	42	31	16	4	30	10	**157**
	Hammer/ Anvil Stone % within site zone		6.3%	4.1%	11.3%	8.9%	10.1%	2.6%	16.0%	5.1%	**8.4%**
	Total	**Count**	**221**	**241**	**371**	**349**	**158**	**156**	**187**	**197**	**1880**

Table 4. Gulf of Georgia cultural historical components, their associated site types and characteristic lithic tool assemblages.

Culture historical component	Economic system	Settlement-mobility type	Lithic tool assemblage
Old Cordilleran Culture	Foragers (Hunter/Gatherer)	Residential Mobility Sites	High proportions of Cobble Choppers and the presence of Leaf Shaped Bifaces and Flake Tools
Charles Culture	Foragers (Hunter/Gatherer)	Residential Mobility Sites and some Seasonally Sedentary Sites.	Lower proportions of Cobble Choppers. The presence of both Chipped Leaf Shaped and Stemmed, Shouldered Bifaces. Ground Stone Points and Abraders occur in higher proportions. Flake Tools and Scrapers are present.
Locarno Beach Phase	Collectors	Base Camp Sites/ Seasonally Sedentary Sites and Task-Oriented Sites.	Quartz Crystal technology, Bipolar technology, increased use of Ground Stone, Chipped Basalt Bifaces, Chipped Slate Knives, Thick Ground Slate Knives, Ground Slate Points, Nephrite Adzes, and an increase of an Expedient Tool technology.

2.5 Summary

Limitations of available site data highlight the importance of potential lithic data at DhRp-52. The lack of faunal data, paucity of paleobotanical data, and unfinished research into site geoarchaeology reduce the range of information available for site study and restrict the availability of contextual data to carry out definitive studies at the present time. To overcome these limitations, the site was divided into several spatial and temporal components that are grossly identified through stratigraphy, matrices, bead, and FCR distributions. The typology developed in this study enabled classification of artifacts in meaningful ways that relay information about lithic material use, manufacturing technique, and morphology. Individual classes were grouped together into a series of larger groupings to facilitate the comparison of tool assemblage diversity temporally and spatially across the site(as discussed in Chapter 3). This exercise was anticipated to contribute to our over-all knowledge concerning site use and structure. Comparisons between DhRp-52, Glenrose Cannery, and the Crescent Beach site were anticipated to provide insights concerning DhRp-52's situation within the larger, Gulf of Georgia regional chronology

CHAPTER 3: ANALYSIS AND RESULTS

A series of chi-square, presence/absence and proportion comparison methods were used to analyze the compositions of the tool sub-assemblages from the eight site zones and the tool assemblages from the three temporal components of the site. Chi-square tests were employed to determine if observed differences between each unit of analysis were statistically significant. Simple presence/absence descriptions were used to evaluate artifact classes with counts too low for valid statistical probability testing. The following sections provide a detailed description of the results.

Section 3.1 begins with a comparison of the Loam Structural Zone and Sand Structural Zone to investigate differences through time between the two structural zones. Section 3.2 is an analysis of the Loam Non-Structural Zone and Sand Non-Structural Zone. Section 3.3 compares the Loam Structural Zone and Loam Non-Structural Zone, and section 3.4 compares the Sand Structural Zone and Sand Non-Structural Zone, to identify similarities and differences between inside and outside structures within their contemporaneous matrices deposits. Section 3.5 compares the presence/absence of artifact classes between the Loam Structural Zone, the three sand structures and the Sand Non-Structural Zone to gauge possible differences between structures and their surrounding matrices. Section 3.6 explores differences between the Wet Site, Midden Zone and FCR Pit to gain insight into which zone/feature is more closely related and to better understand site formation processes. Section 3.7 explores differences between the three temporal components (Early, Middle, and Late) to better understand changes in tool use over time. Section 3.8 uses tool proportion comparisons between Old Cordilleran, Charles Culture at Glenrose Cannery and Locarno Beach Phase component at Crescent Beach with DhRp-52's Early, Middle and Late Components to 1) gauge similarities and differences between a Gulf of Georgia site with similar temporal components to DhRp-52 and 2) to gauge how DhRp-52's temporal components match up with general trends observed in the Gulf or Georgia region for the Old Cordilleran Culture, Charles Culture and Locarno Beach Phase.

3.1 Site Zone Comparisons: Structural Zones

The two structural zones (the Loam Structural Zone (LSZ) and the Sand Structural Zone (SSZ)) were compared with their respective tool sub-assemblages, type of assemblage curation, and lithic raw material to see if they are associated with, or independent from, the structural zones through time. Tool class counts and proportions were compared using cross tabulation tables and chi-square tests of independence in SPSS v.16. Initial cross tabulations of tool counts within each zone produced too many cells with expected counts less than 5 for valid chi-square tests. To address this, tool classes were grouped into larger technological classes (see Table 3 for groupings) for chi-square tests. The null hypothesis was retained, (i.e. there is no association between lithic distribution and temporal patterning), when the calculated probability level is less than .05.

3.1.1 Chi-Square Test of Independence: Structural Zones and Grouped Tool Classes

The chi-square test comparing structural zones and grouped tool classes retained the null hypothesis of independence (x^2=9.223, df=7, p=.237). Most grouped tool classes occur in relatively equal proportions for each structural zone sub-assemblage, with only slight differences between Scrapers, Specialized Chipped Stone, and Hammer/Anvil Stone classes (Appendix III-a). Scrapers and Specialized Chipped Stone make up smaller proportions of the SSZ deposits (2.1% and 5.3%; SSZ and LSZ, respectively), while Hammer/Anvil Stone tools constitute a slightly larger proportion of the SSZ sub-assemblage (9.1% and 6.7%; SSZ and LSZ, respectively). Several grouped tool classes were eliminated from the chi-square test due to low counts and are individually discussed below. These include Wedges, Ground Stone, Adzes, and Slate tools.

The LSZ contains the only two Adzes, and seven of eight Wedges found in the structure zones. This trend may be reflective of a higher incidence of woodworking or other specialized activities in the Loam component of the site. The remaining artifact classes, Ground Stone and Slate Tools, occur in almost equal proportions in each zone's tool sub-assemblage. Ground Stone constitutes .09% of the sub-assemblage in both the LSZ and SSZ. Slate tools make up 1.8% of the sub-assemblage in the LSZ and 2.0% in the SSZ.

3.1.2 Chi-Square Tests of Independence: Structural Zones and Type of Curation

The chi-square test between structural zone and type of curation variables rejected the null hypothesis of independence (x^2=10.243, df=4, p=.037). There was a weak association between structural zones and type of assemblage curation (Cramer's V=0.136). Slate, Ground Stone, and Adzes were removed from chi-square analysis due to low counts. The SSZ has a slightly smaller proportion of Expedient tools (27.9% and 30.7%; SSZ and LSZ, respectively), a slightly larger proportion of Formed/Curated tools (33.1% and 30.7%; SSZ and LSZ, respectively), a much higher proportion of Heavy Duty tools (21.4% vs. 16.7%; SSZ vs. LSZ, respectively), about the same proportion of Abraders (17.3% and 18.6%; SSZ and LSZ, respectively), and a much lower proportion of Bipolar tools (0.3%) than the LSZ (3.3%) (Appendix III-b). Both sub-assemblages appear to reflect residential mobility strategies, but gearing up activities may have been pursued more in the SSZ than in the LSZ.

3.1.3 Chi-Square Test of Independence: Structural Zones and Material Types

The Chi-square results supported the alternative hypothesis of association between structural zones and material type (x^2=23.842, df=10, p=.008) but had a weak level of association (Cramer's V=.205). Three material types were removed due to low counts: quartz crystal, nephrite and 'other' obsidian. Quartz crystal and nephrite only occur in the LSZ and the 'other' obsidian only in the SSZ. Many of the materials occur in relatively equal proportions between the two zones (Appendix III-c). Sand has a slightly higher proportion of granular basalt than the loam (25.2% and 22.3%, respectively). The proportion of vitreous basalt is almost double in the SSZ than in the LSZ (15.4% and 8.9%, respectively). The proportions of microcryptocrystalline materials (8.9%) and Garibaldi obsidian (6.2%) in the LSZ are more than double their proportions in the SSZ (3.5% and 0.9%, respectively).

3.2 Site Zone Comparisons: Non-Structural Zones

Two non-structural zones -- the Loam Non Structural Zone (LNSZ) and the Sand Non-Structural Zone (SNSZ)-- were examined to determine if tool classes, lithic technological organization and material types vary, suggesting different strategies of site use over time.

3.2.1 Chi-Square Test of Independence: Non-Structural Zones and Grouped Tool Classes

The chi-square test of independence called for rejection of the null hypothesis (x^2=28.948, df=8, p=.000). Non-structural zones and grouped tool classes had a weak (Cramer's V=.269) association. Spall Tools and Adzes were removed from the chi-square analysis due to low counts. Spall Tools occur twice as often in the LNSZ than in the SNSZ (1.2% and 0.6%, respectively), but the only Adze in these zones is located in the LNSZ. Ground Stone is completely absent from these two zones. Relative to the SNSZ, the LNSZ has a higher proportion of Flake Tools (33.6% to 28.7%), of Points/Bifaces (29.9% to 20.4%) and Slate tools (4.9% to 1.3%) (Appendix III-d). Compared with the LNSZ, the SNSZ has higher proportions of Choppers (14.0% to 3.3%) and Hammer/Anvil Stones (10.2% to 4.1%). The remainder of the grouped tool class proportions are very similar between the two zones.

3.2.2 Chi-Square Test of Independence: Non-Structural Zones and Type of Assemblage Curation

There was a significant, but weak (Cramer's V=.246) association between non-structural zones and type of assemblage curation (x^2=23.161, df=3, p=.000). Slate tools, Wedges, and Adzes were removed from the test due to low counts. Slate tools and Bipolar tools occur in larger proportions in the LNSZ than in the SNSZ (2.1% to 1.3% - Slate, 1.3% to 0.5%-Wedges). The single Adze is from the LNSZ deposits. Compared with the SNSZ, the LNSZ also has higher proportions of Expedient (Light Duty) tools (38.7% to 31.8%) and Formed/Curated tools (39.1% to 27.3%) (Appendix III-e). In contrast, the SNSZ has much higher proportions of Heavy Duty tools (24.7%) than the LNSZ (7.8%). The proportions of Abraders are similar between the SNSZ and the LNSZ.

3.2.3 Chi-Square Test of Independence: Non-Structural Zones and Material Types

There was a significant, but weak association (Cramer's V=.262), between non-structural zones and material types (x^2=27.972, df=10, p=.002). The LNSZ has higher proportions of granular basalt (36.0%), microcryptocrystalline (8.8%), quartz/quartzite (9.2%), and slate/shale (6.0%) than the SNSZ (25.8%, 4.5%,7.1%, 1.9%, respectively) (Appendix III-f). The SNSZ has higher proportions of vitreous basalt (10.9%), rhyolite/andesite (15.4%), sandstone (12.2%), and granitic/schist (5.8%) than the LNSZ (6.8%, 5.6%, 6.4%, 2.8%, respectively). The remainder of the materials, (Garibaldi obsidian and mudstone/siltstone,) have relatively similar proportions between the two zones.

3.3 Site Zone Comparisons: Loam Non-Structure and Loam Structure Zones

The comparison between the Loam Non-Structure and Loam Structure Zones examined if the two zones could be differentiated by their lithic tool sub-assemblage, technological organization strategies and lithic material types.

3.3.1 Chi-Square Test of Independence: Loam Non-Structural, Structural Zones and Grouped Tool Classes

There was a significant (x^2=22.583, df=9, p=.007) but weak (Cramer's V=.222) association between grouped tool classes and the two loam zones. Adzes and Ground Stone were eliminated from the test due to low counts. Both Ground Stone tools and two out of three Adzes are associated with the LSZ. The LSZ also has substantially higher proportions of Scrapers (5.1%), Choppers (10.1%), Abraders (18.4%) and Hammer/Anvil Stones (6.5%) than the LNSZ (2.5%, 3.3%, 13.8%, 4.2%, respectively) (Appendix III-g). The LNSZ has substantially higher proportions of Flake Tools (34.2%), Points/Bifaces (30.4%), and Slate tools (2.1%) than the LSZ (25.3%, 23.0%, 0.9%, respectively). Spall Tools, Wedges, and Specialized Chipped Stone occur in similar proportions between the two zones.

3.3.2 Chi-Square Test of Independence: Loam Non-Structural, Structural Zones and Type of Curation

A chi-square test demonstrated a significant (x^2=14.274, df=5, p=.014) but weak (Cramer's V=.177) association between the loam zones and type of curation. Both Expedient (37.1%) and Formal tool (37.5%) groups occur in much higher proportions in the LNSZ than the LSZ (30.4% and 30.4%, respectively) (Appendix III-h). This may indicate that relatively more gearing up activities occurred in the LNSZ than the LSZ. Inversely, both Heavy Duty (16.6%) and Abrader (18.4%) groups occur in much higher proportions in the LSZ than in the LNSZ (7.5% and 13.8%, respectively) which may have been the result of caching activities or heavy duty work in the LSZ. Until feature and floor deposits are better understood, this relationship remains difficult to interpret. Both Slate Tools and Wedges occur in similar proportions in both zones. Adzes had counts too low to be included in the chi-square analysis. The LSZ contains two out of three of the Adzes recovered from these two deposits.

3.3.3 Chi-Square Test of Independence: Loam Non-Structural, Structural Zones and Material Type

A chi-square test determined a significant, but weak (Cramer's V=.209) association between material type and the two loam zones (x^2=20.797, df=10, p=.023). Granular basalt (36.0% vs. 22.3% in LSZ) and slate/shale (6.0% vs. 2.7% in LSZ) occur in much higher proportions in the LNSZ while rhyolite/andesite (11.2%) and mudstone/siltstone (13.4%) occur in higher proportions in the LSZ (5.6% and 10.8% in the LNSZ, respectively) (Appendix III-i). The remaining material types occur in similar proportions across the two zones with the exception of quartz crystal and 'other' obsidian, which were left out of the test due to low counts. The only quartz crystal item is in the LSZ and the only two 'other' obsidian items are in the LNSZ.

3.4 Site Zone Comparisons: Sand Non-Structure and Sand Structure Zones

The comparison between the SSZ and SNSZ was intended to determine if the two zones could be differentiated by their lithic tool sub-assemblage, technological organization strategies and lithic material types. Although all chi-square tests indicated that grouped tool class, type of curation and material type variables were statistically independent from SSZ and SNSZ's, some interesting patterns were identified in the following sections.

3.4.1 Chi-Square Test of Independence: Sand Non-Structural, Sand Structural Zones and Grouped Tool Classes

A chi-square test determined that the Sand zones and grouped tool classes were independent; (x^2=8.444, df=7, p=.295). Tool proportions are very similar across the two zones with the exception of Adzes, Ground Stone, Flake Tools, Specialized Chipped Stone, and Points/Bifaces. Adzes are absent from sand deposits, and Ground Stone only occurs in the SSZ (Appendix III-j). Flake Tools occur in higher proportions in the SNSZ (29.2% vs. 24.7% in the SSZ). Specialized Chipped Stone tools double in proportion in the SNSZ over the SSZ (5.2% and 2.6%, respectively). Points and Bifaces occur in much higher proportions in the SSZ than the SNSZ (29.7% and 20.8%, respectively).

3.4.2 Chi-Square Test of Independence: Sand Non-Structural, Sand Structural Zones and Type of Curation

A chi-square test determined that the sand zones and type of curation were independent (x^2=2.333, df=4, p=.675). Proportions of these groupings are very similar across the two Sand zones (Appendix III-k) with the exception of Ground Stone, Expedient tools, and Formed/Curated tools. Ground Stone tools occur only in the SSZ. Expedient tools occur in higher proportions in the SNSZ than in the SSZ (31.4% and 27.5%, respectively). Formed/Curated tools occur in higher proportions in the SSZ than in the SNSZ (32.8% and 26.9%, respectively).

3.4.3 Chi-Square Test of Independence: Sand Non-Structural, Sand Structural Zones and Material Type

The Sand zones and material types were independent; (x^2=13.471, df=11, p=.264). Proportions of most material types are very similar across the two sand zones (Appendix III-l). Nephrite and quartz crystal are absent from these deposits. Vitreous basalt and slate/shale occur in much higher proportions in the SSZ than in the SNSZ (15.0% and 10.8%-vitreous basalt, SSZ and SNSZ respectively; 3.4% and 1.9%-slate/shale, SSZ and SNSZ respectively). Rhyolite/andesite and Garibaldi obsidian occur in much higher proportions in the SNSZ than in the SSZ (15.2% and 10.8%-rhyolite/andesite, SNSZ and SSZ respectively; 3.8% and 1.4%-Garibaldi obsidian, SNSZ and SSZ respectively).

3.5 Structure Comparisons: Loam Structure Zone, Sand Structures 1, 2, 3

Individual structures were compared by chi-square tests and the presence/absence of grouped artifact classes. This was the preferred approach for several reasons. First, only one structure--the small Sand Structure 3--was excavated in entirety. The remaining structures were only partially excavated and it was difficult to determine if differences between them were from sampling error or were true representations of their respective lithic sub-assemblages. Second, counts were sometimes too low for a valid chi-square test of tool distributions between specific structures. The aim of this analysis was to closely examine the tool sub-assemblages between the different structures to understand where they were potentially similar and different and to further investigate the question of no significant difference between the SSZ and SNSZ.

3.5.1 Loam Structure Zone and Sand Structures 1, 2, and 3

The LSZ and Sand Structures 1 and 2 have very similar artifact class presence/absence distributions (Table 5). All artifact classes are present in the LSZ, but not all are present in any of the sand structures. The one artifact class present in the LSZ and absent in all three sand structures is Adzes. Sand Structure 1 also lacks Ground Stone and Sand Structure 2 lacks Wedges. Sand Structure 3 has the fewest artifact classes present, but also has the smallest sample of artifacts. This structure is the most unique structure given it is the smallest, has the fewest number of artifacts (n=19), and has the least artifact classes present.

Sand Structures 1 and 2 have similar proportions of respective artifact classes more often than any other structure (Appendix III-m). Artifact classes with similar proportions (within 30%) include Flake Tools (22.2% and 25.5%, Sand Structures 1 and 2 respectively), Points/Bifaces (27.0% and 29.7%, Sand Structures 1 and 2 respectively), Adzes (absent in both structures), Slate tools (1.6% and 1.5%, Sand Structures 1 and 2 respectively), and Hammer/Anvil Stones (both with 9.5%). A Chi-square test between Sand Structures 1 and 2 indicated no significant difference between the two (x^2=5.505, df=6, p=0.481).

Table 5. Presence/absence of grouped tool classes by specific structure association.

	specific structure association				
Grouped tool class	Loam Structure Zone (LSZ)	Sand Structure 1	Sand Structure 2	Sand Structure 3	Total
Flake Tools	●	●	●	●	139
Spall Tools	●	●	●	●	14
Wedges	●	●	○	○	8
Scrapers	●	●	●	○	18
Specialized Chipped Stone	●	●	●	○	18
Choppers	●	●	●	●	64
Abraders	●	●	●	●	97
Points/Bifaces	●	●	●	●	149
Ground Stone	●	○	●	●	5
Adzes	●	○	○	○	2
Slate Tools	●	●	●	○	7
Hammer/Anvil Stone	●	●	●	○	45
Total	221	63	263	19	566
●=present; ○=absent					

3.5.2 Sand Non-Structure Zone and Sand Structures 1, 2, and 3

Several chi-square tests indicated no significant difference between Sand Structures 1, 2 and SNSZ (Sand Structure 1 and SNSZ: x^2=2.608, df=6, p=.856; Sand Structure 2 and SNSZ: x^2=8.029, df=7, p=.330) (Appendix III-n). Counts in Sand Structure 3 were too low for statistical testing.

Sand Structure 1 and the SNSZ have similar proportions of Wedges (1.6%: 1.3%, respectively), Specialized Chipped Stone (4.8%: 5.1%, respectively), Choppers (14.3%: 13.9%), and Hammer/Anvil Stones (9.5%: 10.0%, respectively). Ground Stone and Adzes are absent from both zones. Sand Structure 1 and SNSZ tool class proportions differ slightly in respect to Flake Tool (22.2%: 28.5%, respectively), Spall Tool (3.2%: 0.6%, respectively), Scraper (4.8%: 3.2%, respectively) and Point/Biface proportions (27.0%: 20.3%, respectively).

Sand Structure 2 and the SNSZ have similar proportions of Abraders (16.7%: 15.8%, respectively), Slate tools (1.5%: 1.3%, respectively) and Hammer/Anvil Stones (9.5%: 10.0%, respectively). They have different proportions of Flake Tools (25.5%: 28.5%, respectively), Spall Tools (1.5%: 0.6%, respectively), Scrapers (1.5%:

3.2%, respectively), Specialized Chipped Stone (2.3%: 5.1%, respectively), Choppers (11.0%: 13.9%, respectively), and Points/Bifaces (29.7%: 20.3%, respectively). Wedges are absent in Sand Structure2. Ground Stone tools are absent from the SNSZ.

As noted earlier, Sand Structure 3 is unique. Its sample size is quite low and it was difficult to make meaningful comparisons of its artifact class proportions with those of a sample eight times larger in the SNSZ (n=158). Nevertheless, it has a similar proportion of Points/Bifaces as the SNSZ (21.1%: 20.3%, respectively). The remainder of the observations were best represented and discussed by the presence/absence of classes (Table 6). Artifacts absent in Sand Structure 3, but present in SNSZ include Wedges, Scrapers, Specialized Chipped Stone, Slate tools and Hammer/Anvil Stones. The absence of these items may provide clues to the use(s) of this structure once additional information or non-lithic artifactual information is considered. The small sample size and limited range of artifacts may indicate this structure contains one discrete sub-assemblage or simply very few small assemblages reserved for specific purposes (i.e. a 'task-oriented' locale) (Binford 1980).

Table 6. Presence/absence of grouped tool classes by Sand Structures 1, 2, 3 & SNSZ.

	specific structure association				
Grouped tool class	Sand Structure 1	Sand Structure 2	Sand Structure 3	Sand Non Structure Zone (SNSZ)	Total
Flake Tools	●	●	●	●	129
Spall Tools	●	●	●	●	8
Wedges	●	○	○	●	3
Scrapers	●	●	○	●	12
Specialized Chipped Stone	●	●	○	●	17
Choppers	●	●	●	●	64
Abraders	●	●	●	●	82
Points/Bifaces	●	●	●	●	131
Ground Stone	○	●	●	○	3
Slate Tools	●	●	○	●	7
Hammer/Anvil Stone	●	●	○	●	47
Total	63	263	19	158	503
●=present, ○=absent					

3.6 Site Zone Comparisons: Wet Site, Midden Zone and FCR Pit

The Wet Site, Midden Zone and FCR Pit were hypothesized to be related to the Late Component, given their matrices were largely composed of loam material and several radiocarbon dates suggested their association with each other. The upper Loam deposits are a complicated palimpsest that may represent multiple occupations and site uses. How the Wet Site, Midden Zone and FCR Pit were formed, their intended functions, and their relationships to each other and the remainder of the Loam deposits remain unclear. The FCR Pit and Midden Zone may post-date the abandonment of the Loam Structure Zone. It appears that the FCR Pit deposits may have intruded slightly on the Loam Structure Zone. The Midden Zone may be material from the top portions of the site that was pushed off of the surface of the site and deposited into the drainage. The Wet Site portion appears to be associated with the Late Component, but its specific association with the Late Component is unclear. The tool analysis was intended to gain some insight about tool sub-assemblage compositions of each of these zones for general comparisons with each other and the other Loam deposits.

3.6.1 Chi-Square Test of Independence: Wet Site, Midden Zone, FCR Pit and Grouped Tool Classes

There was a weak (Cramer's V=.217), significant association between grouped tool class and the three zones (x^2=66.819, df=18, p=.000). Adzes and Slate tools were removed from the test due to low counts. Adzes occur in all three deposits, but are more frequent in the FCR Pit than in the Wet Site and the Midden Zone (3.4%; 1.5%; 1.9%, respectively). Slate tools occur in all three deposits, but occur in higher proportions in the FCR Pit and the Wet Site (1.6% and 1.3% respectively; 0.5% in the Midden). All three deposits contain Adzes which are absent in the Middle Component. This information, along with other site data, may help tie the FCR Pit, Midden Zone and Wet Site Zone to the site's Late Component.

To visualize the similarities and differences of tool proportions between these three components, I created a table of relative comparisons that paired deposits with similar proportions of tool classes for their respective sub-assemblages (Table 7). The scale of difference between tool proportions was considered to be minimal when the difference between them was 30% or less. Where all three zones had dissimilar proportions of a respective tool class, the class was determined to be independent and was not included in any pairing. Not once did all three zones have similar proportions of the same tool class. This exercise enabled comparison between the three zones to determine if any two were more similar than the third zone. The cross tabulation table of exact proportions is in Appendix III-o.

Table 7. Comparison of pairs of zones with similar proportions of grouped tool classes.

Grouped tool class	Pairs of zones with similar grouped artifact class proportions	Zone with different proportion
Flake Tools	FCR Pit (20.3%) and Wet Site (24.7%)	35.6% (Midden)
Specialized Chipped Stone	FCR Pit (3.0%) and Wet Site (3.2%)	2.1% (Midden)
Choppers	FCR Pit (7.1%) and Wet Site (9.1%)	1.0% (Midden)
Slate Tools	FCR Pit (1.6%) and Wet Site (1.3%)	0.5% (Midden)
Abraders	FCR Pit (24.2%) and Wet Site (17.5%)	11.9% (Midden)
Spall Tools	FCR Pit (2.7%) and Midden Zone (2.1%)	5.2% (Wet Site)
Scrapers	FCR Pit (4.9%) and Midden Zone (4.6%)	1.9% (Wet Site)
Adzes	Wet Site (1.5%) and Midden Zone (1.9%)	3.4% (FCR Pit)
Points/Bifaces	Wet Site (31.8%) and Midden Zone (34.5%)	22.0% (FCR Pit)
Ground Stone	Wet Site (0.6%) and Midden Zone (0.5%)	2.5% (FCR Pit)
Hammer/Anvil Stones	Independent	
Wedges	Independent	

The FCR Pit and Wet Site share a similar composition of grouped tool proportions more often than any other pairing. The degree of overlap may indicate the FCR Pit and large portions of the Wet Site were formed during a similar occupation event or under similar circumstances, and the Midden Zone may have been the product of different occupations or use events.

3.7 Temporal Comparisons: Early, Middle and Late Components

The primary objective of this analysis was to see if the tool assemblages within site temporal components reflected changes in tool use over time. The three temporal components were identified by their matrix composition and location within the site's stratigraphy (see Table 2). Chi-square tests and proportion statistic comparisons were used to analyze these components.

3.7.1 Chi-Square Test of Independence: Early, Middle and Late Components and Grouped Tool Classes

There was a significant (but weak: Cramer's V=.225) association between the three components and grouped tools classes (x^2=169.488, df=16, p=.000). Choppers and Hammer/Anvil Stones dominate the Early Component (49.5% combined vs. 22.4% combined in the Middle and 13.4% in the Late) while Flake Tools and Points/Bifaces have very high proportions in the Late (55.2% combined) and Middle (52.8%) assemblages (vs. 29.9% in the Early) (Appendix III-p). There is also an increase in Spall Tools, Scrapers, and Wedges through time, with larger proportions of these items in the Late Component. Adzes are only present in the Late Component and Slate tools are only present in the Late and Middle Components.

3.7.2 Chi-Square Test of Independence: Early, Middle and Late Components and Type of Curation

There was a weak (Cramer's V=.209) but significant association between the three components and type of curation(x^2=149.239, df=12, p=.000). The proportions of Expedient tools, Formed/Curated tools and Bipolar tools increase through time, while proportions of Heavy Duty tools decrease through time (Appendix III-q). The proportions of Ground Stone and Abraders remained relatively similar over time. Slate is absent from the Early Component. Adzes are only present in the Late Component.

3.7.3 Chi-Square Test of Independence: Early, Middle and Late Components and Material Type

The three components and material type demonstrated a weak (Cramer's V=.193) but significant association (x^2=115.500, df=18, p=.000). Granular basalt is more prominent in the Late (27.3%) and Middle (28.0%) Components (vs. 20.0% in the Early Component) (Appendix III-r). The Middle Component has a much higher proportion of vitreous basalt (15.5%) and 'other' obsidian (2.2%) than Late (7.5%, 0.3%, respectively) and Early Components (5.5%, 0.7%, respectively). The use of microcryptocrystalline, Garibaldi obsidian, slate/shale, and mudstone/siltstone materials increase through time. The use of sandstone and rhyolite/andesite materials decrease through time. Nephrite and quartz crystal are only present in the Late Component.

3.8 Glenrose Cannery, Crescent Beach and DhRp-52 Temporal Component Comparisons

The following sub-sections used lithic tool counts and proportions from Glenrose Cannery, Crescent Beach and DhRp-52 temporal components to gauge similarities and differences between the sites. Data for Glenrose Cannery was provided by Matson and Coupland (1995) and Matson (1976) and data for Crescent Beach was provided by Matson and Coupland (1995: 160). DhRp-52's lithic typology was largely derived from the Glenrose

(1976) typology so comparisons between DhRp-52 lithic classes lithic classes used by Matson and Coupland (1995) were unproblematic.

3.8.1 Early Component and Glenrose Cannery Lithic Tool Proportional Comparisons

The Early Component was compared with the oldest Glenrose temporal component; the Old Cordilleran Culture component. When compared with artifact proportions from Glenrose Cannery's Old Cordilleran component (Matson 1976: 289-291), there were few similarities present (Table 8). DhRp-52 has more than three times the proportion of Bifaces, double the proportions of Spokeshaves, almost double the proportion of Miscellaneous Ground Stone, a substantially much larger proportion of Abraders, and double the relative amount of Hammer Stones in comparison to Glenrose. Glenrose has much higher proportions of Narrow Angled Unifaces (or Acute Angled Retouched Flakes), much higher proportions of Scrapers, three times the amount of Utilized Flakes, and a substantially higher proportion of Cortex Spalls. Unlike Glenrose, Wedges are absent from DhRp-52.

The artifact classes that were most proportionally similar are Bifacial Choppers and Unifacial Choppers. They are nearly identical. Matson and Coupland (1995: 79) note that Pebble Tools (Choppers) generally occur in much higher frequencies at coastal sites than at inland sites. This observation is based on data from the Milliken site, located in the Fraser Canyon. Milliken's two Old Cordilleran components had 11.8% and 18% Pebble Tools in their assemblages. Matson and Coupland note that although these are relatively high proportions, they are still quite low in comparison to Glenrose. They hypothesize that Choppers may have been used as marine resource extraction tools (to scrape mussels off of rocks) at Glenrose, which may be why they occur in higher proportions along coastal sites (1995: 79). Given that DhRp-52 is an inland riverine/wetland site, they probably served other purposes at this location.

Table 8. Early Component and Glenrose Cannery Old Cordilleran lithic tool comparisons.

	Glenrose		**DhRp-52**	
Artifact Class	**Count**	**%**	**Count**	**%**
All Bifaces	20	4.52%	35	18.71%
Narrow Angled Unifaces (Acute Angled Retouch)	42	9.50%	5	2.67%
Notches and Denticulates (Spokeshaves)	2	0.45%	2	1.06%
Scrapers	56	12.66%	5	2.67%
Stone Wedges	2	0.45%	0	0%
Utilized Flakes	77	17.42%	11	5.88%
Miscellaneous Ground Stone	4	0.90%	3	1.60%
Abrasive Stones	3	0.68%	34	18.18%
Hammer Stones	34	7.69%	30	16.04%
Bifacial Choppers	41	9.27%	18	9.63%
Unifacial Choppers	94	21.27%	43	22.99%
Cortex Spalls	67	15.16%	1	0.53%
Total	442	100%	187	100%

3.8.2 Middle Component and Glenrose Cannery Lithic Tool Proportional Comparisons

Middle Component artifact proportions at DhRp-52 were compared with the Charles Culture component at Glenrose Cannery (Matson 1976: 289-291). DhRp-52 has more than twice as many Bifaces, four times as many

Abrasive Stones (Abraders), three times as many Hammer Stones, almost three times as many Bifacial Choppers, and twice as many Unifacial Choppers than Glenrose. Glenrose has more than twice as many Retouched Flakes, a slightly higher proportion of Spokeshaves, twice as many Scrapers, a slightly higher proportion of Wedges, more than twice as many Utilized Flakes, three times as many Miscellaneous Ground Stone items, almost twice as many Cortex Spalls than DhRp-52. Ground Stone Bifaces are only present at Glenrose and Ground Slate Knives are only present at DhRp-52.

Artifact proportions are very different between Glenrose Cannery and DhRp-52 (Table 9). Nevertheless, some important hallmarks for the transition from Old Cordilleran to Charles Culture were observed at both DhRp-52 and Glenrose. Matson and Coupland (1995: 100) note that Choppers decrease tremendously in proportions in Charles Culture components. DhRp-52 and Glenrose Chopper proportions decrease by over 50% in their respective Middle Components. A second important hallmark for Charles Culture sites is the increase in occurrence of Ground Stone assemblages. Ground Stone Bifaces make their first appearance at Glenrose during this time and Ground Slate Knives make their appearance at DhRp-52.

Table 9. Middle Component and Glenrose Cannery Charles Culture lithic tool comparisons.

	Glenrose Cannery		**DhRp-52**	
Artifact Class	**Count**	**%**	**Count**	**%**
All Chipped Bifaces	52	12.80%	133	27.25%
Ground Stone Bifaces	4	0.98%	0	0%
Ground Slate Knife	0	0%	2	0.41%
Retouched Flakes	128	31.52%	64	13.11%
Notches And Denticulates (Spokeshaves)	4	0.98%	3	0.61%
Scrapers	57	14.03%	34	6.96%
Stone Wedges	4	0.98%	3	0.61%
Utilized Flakes	82	20.19%	43	8.81%
Miscellaneous Ground Stone	8	1.97%	3	0.61%
Abrasive Stones	18	4.43%	84	17.21%
Hammer Stones	14	3.44%	47	9.63%
Bifacial Choppers	8	1.97%	27	5.53%
Unifacial Choppers	15	3.69%	37	7.58%
Cortex Spalls	12	2.95%	8	1.63%
Total	406	100%	488	100%

3.8.3 Late Component and Crescent Beach Lithic Tool Proportional Comparisons

Late Component tool proportions were compared with the tool proportions from the Locarno Beach component at Crescent Beach (Matson and Coupland 1995: 160) (Table 10). Tool proportions between the two sites were quite different from each other, but the presence of Adzes at both sites may indicate a Locarno Beach hallmark at both DhRp-52 and Crescent Beach. Other than the presence of Adzes, DhRp-52's Late assemblage has more hallmarks for the Locarno Beach Phase than the Crescent Beach site. DhRp-52 has an increase in the occurance of Groundstone, a decrease in the occurrence of Choppers, and an increase in the occurrence of Wedges. Crescent Beach's Locarno assemblage containes no Ground Slate Knives, no Spokeshaves, no Scrapers, no Utilized Flakes, no Micellaneous Ground Stone and no Cortex Spalls. The two sites have similar proportions of Hammer Stones, Adzes, and Abraders. They differ in that Crescent Beach's assemblage has higher proportions of Retouched Flakes, Wedges, and Choppers versus DhRp-52 which only has a higher proportion of Bifaces (as well as a more diversified chipped-stone assemblage).

Table 10. Late Component and Crescent Beach Locarno Beach lithic tool comparisons.

	Crescent Beach		DhRp-52	
Artifact Class	**Count**	**%**	**Count**	**%**
All Chipped Bifaces	21	19.27%	270	26.89%
Ground Slate Knife	0	0%	8	0.80%
Retouched Flakes	39	35.78%	125	12.45%
Notches And Denticulates (Spokeshaves)	0	0%	10	1.00%
Scrapers	0	0%	96	9.56%
Stone Wedges	5	4.59%	23	2.29%
Utilized Flakes	0	0%	99	9.86%
Miscellaneous Ground Stone	0	0%	22	2.19%
Abrasive Stones	16	14.68%	184	18.33%
Hammer Stones	9	8.26%	76	7.57%
Choppers	17	15.60%	58	5.77%
Cortex Spalls	0	0%	24	2.39%
Adzes	2	1.83%	9	0.90%
Total	109	100%	1004	100%

3.9 Summary

This chapter reports the results of several analyses that used both chi-square statistics (see Table 11 for summary) and proportional comparisons. Comparisons of tool and material type proportions produced significant associations through time and space for most pair-wise comparisons. Trends in tool use were observed over time, such as the decreased use of Choppers and increased use of more specialized tools, such as Adzes. Material types changed over time, suggesting that access to, or preference for, different material types changed through time at DhRp-52. The observed changes in tool and material type proportions suggested that in most cases, these variables can be used as indicators of site-use change across time and space. Tool and material type proportional differences successfully detected differences between the structural zones, non structural zones, Loam Non-Structural Zones and Loam Structural Zones, the Midden Zone, FCR Pit and Wet Site Zone, and temporal components. Tool and material type proportional differences were not good indicators of site-use change between the Sand Non-Structural Zone, Sand Structural Zone and individual sand structures. Tool proportion comparisons were also found to be a good yardstick for gauging differences between sites within the region. Comparisons between Glenrose Cannery, Crescent Beach and DhRp-52 indicated that although some important chronological trends in lithic technology were observed at all sites, there are some very real differences that may be due to a variety of factors including site location, site use/function, and period(s) of occupation. All of these observations are addressed in detail in Chapter 4.

Table 11. Summary of chi-square tests.

Units of analysis	Tool /material grouping	Significant association
Structural Zones	grouped tool classes	no
	type of assemblage curation	yes
	material type	yes
Non Structural Zones	grouped tool classes	yes
	type of assemblage curation	yes
	material type	yes
Loam Non-Structural & Structural Zones	grouped tool classes	yes
	type of assemblage curation	yes
	material type	yes
Sand Non-Structural and Structural Zones	grouped tool classes	no
	type of assemblage curation	no
	material type	no
Sand Structures 1 & 2	grouped tool classes	no
	type of assemblage curation	n/a*
	material type	n/a
Wet Site, Midden and FCR Pit	grouped tool classes	yes
	type of assemblage curation	n/a
	material type	n/a
Temporal Components	grouped tool classes	yes
	type of assemblage curation	n/a
	material type	n/a
*n/a: a valid test was not possible or completed for the respective pair wise comparison.		

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CHAPTER 4: DISCUSSION

This thesis used lithic tools to better understand the overall site structure at DhRp-52. The first hypothesis was aimed at using stone tools to detect associations between structural and non structural zones within the site. Associations between tools and site zones were established in the Loam deposits between structural and non-structural zones, but the tools were not good indices of different site use between the SSZ and SNSZ. Associations were also established between tools, the LSZ and SSZ, the LNSZ and SNSZ, but not between the individual sand structures. The second hypothesis was aimed at using stone tools to detect associations between tools and time at DhRp-52. Stone tool assemblages were found to have a statistically significant relationship between the three proposed temporal components, suggesting site use changed over time. The third hypothesis was aimed at associating DhRp-52's temporal components with established Gulf of Georgia chronology. A comparison between Glenrose Cannery and Crescent Beach tool assemblages from their Old Cordilleran, Charles Culture and Locarno Beach components and DhRp-52's tool assemblages from its Sub-Structural Sand, Sand and Loam components revealed that although some major trends in lithic technology are observed through time, some major differences in tool class proportions between the sites may suggest that the current regional chronology may not fit well with riverine sites such as DhRp-52. The following sections discuss these findings in further detail.

4.1 The Late Component: Loam Associated Zones

The Late Component is clearly complex. Tool assemblage data from this analysis supported the inference that the Wet Site, FCR Pit, and Midden Zone were associated with the Loam matrices. Several tool classes and material types only occurred in the aforementioned zones which separated these deposits from the Middle and Early Components. Adzes and nephrite only occurred across all Loam, Midden, FCR Pit and Wet Site Zones. Quartz crystal occurred only in the Loam Structure Zone, Midden Zone and FCR Pit.

Other factors separated the Late from the Middle and Early Components. Microcryptocrystalline, Garibaldi obsidian, slate/shale, and mudstone/siltstone material increased proportions in the Late assemblage (Appendix III-r). Although Wedges, Spall Tools and Scrapers also occurred in the Middle assemblage, they were much more prevalent in the Late assemblage (9.1% combined vs. 4.6% combined in the Middle). The proportions of Expedient tools and Formed tools reached a maximum in the Late assemblage (64.3% combined, vs. 59.0 % in the Middle and 31.5% combined in the Early assemblages). All of these observations suggested a shift in raw material use and technological strategies from earlier patterns in the Middle and Early components.

The relationships between the LSZ and LNSZ remain unclear. The LSZ and LNSZ were distinguished by different proportions of Heavy Duty tools, Abraders, Expedient tools and Curated tools (Appendix III-h). It remains difficult to hypothesize why so many Heavy Duty tools and Abraders occurred in the structural zone until the structure itself is better understood and other artifactual evidence is taken into consideration. The FCR Pit, Wet Site and Midden were related, but were differentiated by tool assemblage compositions as well.

Assemblage curation analysis indicates that, although different tool curation strategies occurred between Loam site zones, they generally suggest a low residential mobility or 'base camp' strategy. In many respects, this assemblage reflects a Locarno Beach Phase chipped-stone assemblage. The low proportions of Ground Stone items, such as Hand Mauls and Pestles, and the low proportions of Ground Slate differentiates this component from more marine-based Locarno-aged assemblages. The few ground Slate Knives from DhRp-52 were thick (approximately 4mm). Thick Ground Slate Knives were more common in Locarno age components than Marpole age components (Matson and Coupland 1995: 156).

4.2 The Middle Component: Sand Associated Zones

The Middle Component is also complex. The majority of tools were from the largest, most extensively excavated structure in the site, however, there were no statistically significant differences between the tool proportions inside and outside the structures or between individual structures. There were several possible explanations for this. The tool classes may not have been properly represented due to partial structure excavations. Given the structures were only partially excavated (with the exception of the small structure associated with only a small number of tools), differences between structure zone and non-structure zone tool assemblages may have been too similar to be visible. A second possibility may stem from how structures were initially grouped as units of analysis in this study. There is a possibility that differences between inside and outside structures were perceptible, but because structure sub-assemblages were combined into one unit, the differences between inside and outside were not apparent. This may suggest different uses for the structures. Theoretically, if the structures were used for the same purpose, their sub-assemblages should not differ significantly and it would not matter if they were combined for this analysis. A third possibility is that although different activities may have occurred inside and outside the structures, the lithic tool sub-assemblages did not reflect those differences. A fourth possibility may be that the structures were not structures and require further analysis to determine what they were. A fifth possibility may be attributed to site abandonment activities that may have affected assemblage remains and composition at the site. A sixth possibility may stem from merging artifact classes into larger classes for statistical testing. Although this technique did allow differences to be detected in many other site zones, differences between tool sub-assemblages in the Middle Component may have been too subtle for this method of statistical testing. A seventh possibility may be dependent on how intensively this portion of the site was used.

Although no statistically significant differences were found between the SSZ and the SNSZ, there were some notable trends associated with the Middle Component. The Middle Component contained higher proportions of vitreous basalt and ‘other’ obsidian. Sourcing of the ‘other’ obsidian had not been completed and testing is dependent on external research projects, but it was quite different from Garibaldi obsidian in appearance and texture and was speculated to be non-local. This trend may have been indicative of increased trade activities during the occupation(s) of this component. The Middle assemblage also appears to transition from the Early Component to the Late Component assemblages. Often, the Late and Early Component assemblages had inverse relationships of artifact classes and curation strategies, but the Middle Component assemblage was positioned somewhere in the middle of the two. This may have been indicative of DhRp-52’s use over a long period of time and that DhRp-52 followed trends suggested by Matson and Coupland for Northwest Coast cultural development (1995).

4.3 The Early Component: Sand Sub-Structural Zone

The Early assemblage initially reflected an Old Cordilleran chipped stone assemblage. High proportions of Choppers and Hammer/Anvil Stones (Heavy Duty tools) that surpass all other artifact categories reflect similar trends in other Old Cordilleran components (i.e., Glenrose). The Early assemblage significantly differed from the Late and Middle assemblages with higher proportions of Heavy Duty tools and mudstone/siltstone materials, the absence of more exotic material (e.g., nephrite, quartz crystal) and the very low occurrence of slate/shale artifacts. The Early assemblage also reflected a residential mobility site. When Heavy Duty tools were removed from the assemblage, the proportion of Expedient tools (Flake Tools, Spall Tools, etc.) stayed low, but Bifaces increased from 18.7% to 36.5% (Figure 6). This indicates that this component reflected a residential mobility strategy commonly associated with Old Cordilleran sites.

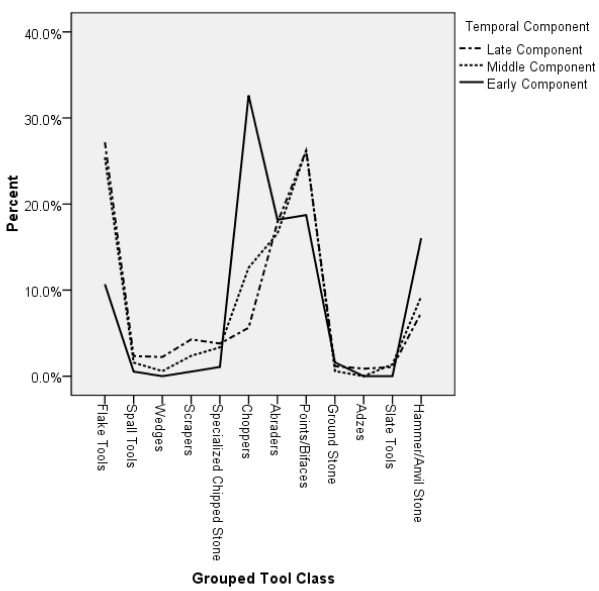
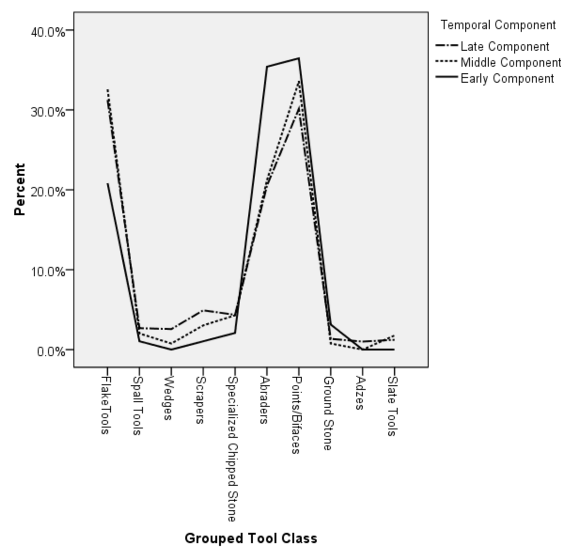
Line Graph Including Choppers and Hammer/Anvil Stones	Line Graph Excluding Choppers and Hammer/Anvil Stones
	

Figure 6. Line graphs of grouped tool classes by temporal components, with Choppers and Hammer/Anvil Stones included/excluded from assemblages.

Although differences are apparent between the Early Component and the upper two components, there are enough similarities to indicate that changes between site uses were *in situ* rather than the result of dramatic outside influences. The range of tool classes stayed relatively similar over time with the exception of proportional and density changes and the addition of a few lithic technologies (i.e. Adzes and Ground Slate tools). Some point styles changed, but were largely consistent through time, especially at DhRp-52. Early attempts at exploratory data analysis and statistical tests for between-zone and between-matrices comparisons revealed no significant differences in point styles at this site and were not included in this analysis.

4.4 Components at DhRp-52, and Old Cordilleran Culture, Charles Culture and Locarno Beach Phase at Glenrose Cannery, Crescent Beach and the Gulf of Georgia Region

Section 3.8 used lithic tool proportions from Glenrose Cannery and Crescent Beach to measure how DhRp-52's three temporal components compared to a site with similar tool classes and time span. This comparison was also used to gauge how DhRp-52's three temporal components generally fit within larger Gulf of Georgia cultural chronology. Although major chronological hallmarks of lithic technological change through time are observed at both sites, tool proportions are often quite different between the sites and their respective components (Figure 7). This analysis does not completely support or refute the hypothesis that DhRp-52 contained three temporal components that are similar to traditional Gulf of Georgia chronological units.

DhRp-52's Early Component appears to have reflect an emphasis on chipped stone tool and biface production, use, and maintenance activities, and possibly some emphasis on woodworking or organic tool manufacture and maintenance. The high proportions of Bifaces, Hammer Stones and Abraders suggest such an inference. Conversely, Glenrose's Old Cordilleran component has higher proportions of Flake Tools, Scrapers, and Spall Tools which suggest that this site/component was used for other (possibly other resource processing) activities.

DhRp-52's Early Component may or may not have been a part of the Old Cordilleran Culture. As noted in Section 3.8.1, Chopper proportions between Glenrose and DhRp-52 were almost identical. DhRp-52 radiocarbon dates (Appendix I) suggested that its Early Component lined up with Old Cordilleran Culture dates. Given the radiocarbon dates, Chopper proportions, and large proportions of Chipped Stone Bifaces, DhRp-52's Early Component fits well with the Old Cordilleran Culture. On the other hand, the stark differences in other tool proportions and different emphasis on some technologies over others between Glenrose Cannery and DhRp-52 suggest that if DhRp-52's Early Component is part of the Old Cordilleran Culture, then our understanding of the regional differences within the Old Cordilleran Culture may be quite limited. Many, but not all, suggested Old Cordilleran sites are either poorly dated or undated and many lack good, quantitative descriptions of their assemblages (as discussed in Matson and Coupland 1995: 77-79). This leaves the archaeological community with a small sample size of firmly dated sites for comparative and regional analyses. Until there is a better understanding of regional variability during this period, it is difficult to confirm that DhRp-52's Early Component is part of the Old Cordilleran Culture.

Differences between Glenrose Cannery's Charles Culture component and DhRp-52's Middle Component were also notable. Both sites' tool assemblages demonstrate a continuation of trends observed in their respective earlier components. DhRp-52's Middle assemblage emphasizes Chipped Stone Bifaces, Abraders and Hammer Stones (Figure 7). Glenrose's Charles Culture assemblage emphasizes Flake Tools and Scrapers, but proportions of Spall Tools dramatically decrease from the previous component. Chipped Stone Bifaces and Flake Tools increase during this component at Glenrose from the previous component. This could indicate there was a shift of focus from one resource to another, or possibly the replacement of Spall Tool technology with another technology. Ground Slate tools make their appearance at both Glenrose and DhRp-52 in their respective middle components. Ground Slate Knives are present at DhRp-52 but not at Glenrose, and Ground Slate Bifaces are present at Glenrose and not at DhRp-52. This small piece of evidence may indicate that differences between Glenrose and DhRp-52 were partly due to site location. Ground Slate Knives are often associated with salmon/fish processing and Ground Slate Bifaces are commonly associated with sea mammal hunting. Although salmon occurred at both riverine and marine locations and are hypothesized to have been processed with multiple technologies, the presence of Ground Slate Knives at DhRp-52 may indicate a use of this resource in a more inland, riverine setting versus sea mammal hunting which was probably more likely to occur at more marine-based locations like Glenrose. Without firm faunal evidence at DhRp-52, it is difficult to support this argument, but future research at other riverine sites may shed light on this issue.

At this time it is difficult to determine whether or not DhRp-52's Middle component is part of the Charles Culture. Radiocarbon dates (Appendix I) suggest that this component overlaps with the late Old Cordilleran Culture and early Charles Culture. The drop in Cobble Choppers and the appearance of ground slate technology at both Glenrose and DhRp-52 suggest that DhRp-52's Middle Component firmly demonstrates a few major hallmarks of lithic technological change from the previous Old Cordilleran Culture to the Charles Culture. The differences in other tool proportions could be due to a number of factors including site location (riverine/inland vs. marine), the overlap in dates at DhRp-52 between the Old Cordilleran Culture and Charles Culture, and differences in site use (intensive-winter settlement with large structures vs. seasonal use). Until the sample size for sites of a similar age and location increases, it is difficult to firmly establish that DhRp-52's Middle Component is part of the Charles Culture.

Trends in lithic technology differed at both Crescent Beach and DhRp-52 in their latest components (Figure 7). DhRp-52's Late assemblage continued to have high proportions of Chipped Stone Bifaces, Abraders, and Hammer Stones, and low proportions of Choppers but has higher lithic artifact diversity than Crescent Beach. Crescent Beach has three times as many Retouched Flakes, double the proportion of Wedges, three times as many Choppers, and double the proportion of Adzes than DhR-52, but also has lower lithic artifact class diversity than DhRp-52.

Crescent Beach's Locarno Beach Phase component somewhat fits with expectations of a Locarno Beach Phase lithic assemblage (Mitchell 1990: 341). Increases in Ground Slate technology, which is absent at Crescent Beach, and higher occurrences of Adzes are lithic technological markers of this phase. DhRp-52's Loam Matrices component contained a small sample of Adzes and Ground Slate technology, but the sample size was quite low. Again, differences in tool proportions between the two sites could be due to the overlap of dates between late Charles Culture and Locarno Beach Phase (Appendix I) at DhRp-52. Other factors, again, may be attributed to differences in site location and use. It is difficult to assign DhRp-52's Loam Matrices component to the Locarno Beach Phase at this time.

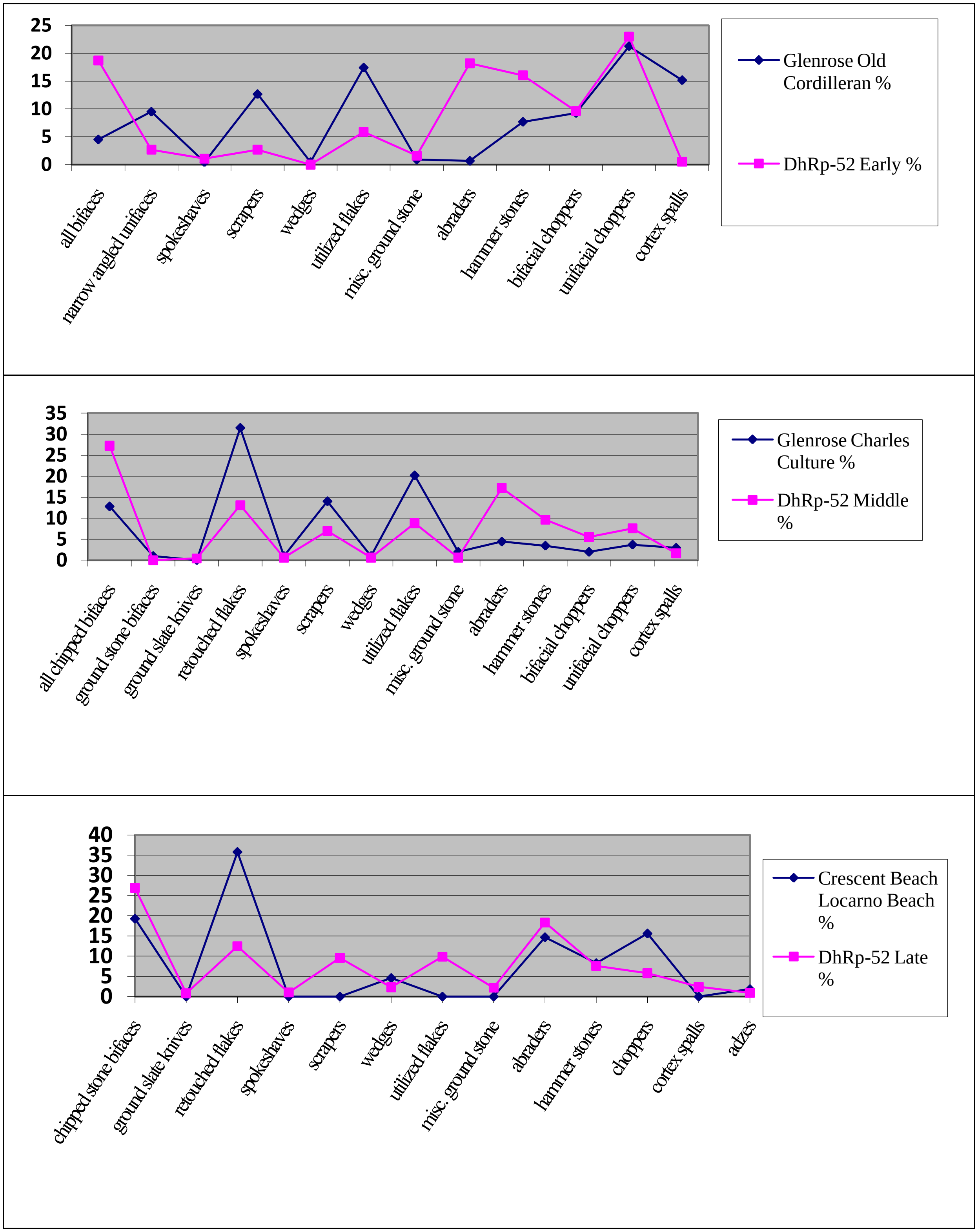


Figure 7. Comparison of tool class proportions between DhRp-52 temporal components, Glenrose Cannery and Crescent Beach established Gulf of Georgia temporal components.

4.5 Preliminary Site Interpretations

DhRp-52 is encompassed by three phases of site use: the Early Component, the Middle Component and the Late Component. The earliest component may represent the establishment of a temporary resource extraction site. Data on the type of curation strategy support the theory that this component represents a high-mobility context site. Work on the geological and environmental setting of the site is currently underway and it is unknown if wapato was associated with this Early Component. If it was associated, this component of the site may have represented the discovery of this resource at its particular location, which may have eventually led to its intensive use later in time.

The Middle Component represents a change in site use from the earlier component. The presence of large, permanent structures and the change in tool proportions between the Early Component and the Middle Component supports this observation. The lack of any statistical significance between lithic tools and zone association within this component may also provide some interesting insight into household/structural and social organization after more artifact and feature analysis is completed. The lithic tool data suggest that areas of the site were not being partitioned or designated for particular activities. Radiocarbon results also suggested that these structures may have been contemporaneously in use. Rather than one structure representing a single, extended family, these structures may have represent the occurrence of multiple families building multiple structures at the same time in the same place or the presence of a small village. Tools and materials commonly associated with social status or rank were absent from this component. Between the statistically even distributions of lithic tools, the presence of multiple permanent structures, and the lack of tools and materials commonly associated with social stratification, it appears that small villages may have been constructed in the Fraser River Valley where social organization may not have been as stratified as suggested in later Marpole times. This may indicate that rigorously ranked societies may not be a prerequisite for construction and maintenance of permanent structures and/or villages. Again, more research is required to properly address these concerns and social stratification or ranking may not always manifest itself in the material record.

Although it was difficult to determine if the structures associated with this component were used for domestic use, ceremonial use, a combination of both, etc (see Schaepe 1998), the larger two, Sand Structure 1 and Sand Structure 2, probably represent domestic houses rather than non-domestic use structures (see Morin 2006). Their floor midden deposits were relatively deep, suggesting a long period of use, and also contained a wide variety of artifacts which suggest that these structures did not have a specialized purpose. The purpose of the smaller structure, Structure 3, is also difficult to interpret at this time. It may not have been as intensively used as the two larger structures. Although it did have a smaller range of artifacts in its floor midden deposits, it also had the least number of artifacts in its deposits (n=19, versus 63 in the partially excavated Sand Structure 1, and 263 in Sand Structure 2). This structure may represent a type of special use structure, such as a storage shed, and the tool items left behind may simply be residuals of artifacts both used within the building's walls or possibly a limited occurrence of items that were intentionally stored or used in the building and then forgotten.

Regardless of structure function, it was clear that people were quite settled on the landscape at some locations during the onset of the Charles Culture. Work by Schaepe (1998) and Mason (1994) has presented the presence of permanent structures, and possibly villages, during this time within the region. The paucity of sites containing evidence for permanent structures in the Gulf of Georgia region during the Charles Culture could merely be the result of sampling error. DhRp-52 is located relatively far away from the current position of the Fraser River. The site may have been located closer to the river 5,000 years ago, or closer to other substantial drainage systems, which would have allowed its inhabitants access to a major riverine resource for various subsistence items, (including wapato, dated to the Middle Component at DhRp-52), and transportation requirements which would have increased its viability for more intensive settlement situations. If such was the case with DhRp-52, then more early sites associated with permanent structures may be found further away from the current position of the river within the Fraser River Valley.

The Late Component of the site overlapped with the late Charles Culture and Locarno Beach Phase (as per radiocarbon dates). This deposit also represents a change in site use from the previous Middle Component. Changes in tool proportions and material types support this conclusion. Although not addressed in this thesis, several other lines of evidence support a change in site use from the previous component. Approximately 98% of the stone disc beads (n~100,000) were recovered from Loam-associated zones. The remaining 2%, recovered from the lower components, were attributed to beads falling into units during excavation and to some intrusive activities from the Loam occupation inhabitants into the earlier components. Many of the decorative items such as labrets and earspools were also recovered in the Loam zones and not in the earlier deposits. The presence of the large FCR Pit feature, the association of the Midden Zone with the Late Component and not the Middle Component, and the sometimes ambiguous boundaries of the Loam Structural Zone also suggest changes in site use and possibly a higher intensity of site use than in the earlier components.

This component possibly represented the final intensive occupation of the site during pre-contact times. It appeared that site organization had become more partitioned than in the previous component, as suggested by chi-square results, but due to intensity of site use, or lack of partitioning often expected in later Marpole times, these statistical results demonstrated a weak association between tools and Loam zones. The complexity of the Loam Structural Zone was discussed in section 2.3.1.2. This zone is currently under review and several structures within this zone may be delineated at a later date. The FCR Pit and Midden are under a similar review. Several matrices and FCR density distribution maps may delineate a series of processing features or roasting pits within the over-all FCR Pit, which may indicate this area was used for similar purposes during the entire occupation(s) of the Late Component. The beads that were 'lining' the larger pit feature may not actually be lining the feature, but rather may have been the result of cultural formation processes associated with roasting/processing pit construction, use and maintenance activities. The formation processes of the Midden Zone are poorly understood at this time. It is unknown if the Midden was created through archaeological cultural formation processes, historical farming cultural formation processes, or a combination of both. Hopefully further radiocarbon testing can resolve this concern. The Wet Site was mostly associated with the upper Late Component of the dry site, although several radiocarbon dated wapato suggested that wapato was available as a resource during the earlier Middle Component.

Generally, it appears that the Late Component represents a period of higher intensity site-use, the appearance of social stratification, (or at least the appearance of material distinctions), possibly the presence of a ceremonial component to the site (because of the widespread distribution of stone disc beads in this component), use of the site as a intensive settlement with permanent structures, and the possible intensive use of localized resources such as wapato. The site appears to have been abandoned around 3000 cal BP, at least for intensive use. Abandonment may have been due to changing environmental and socio-economic conditions. Changes in the course of the Fraser River, sea level, and mid-Holocene climate, (although see Moss et al. 2007) may have turned the site into an unviable spot for a large settlement or village. Site abandonment is a complicated topic and is currently under review within the larger DhRp-52 research project.

CHAPTER 5: CONCLUSIONS

The primary objectives of this thesis were to analyze the DhRp-52 lithic tool assemblages and sub-assemblages to better understand relationships between different site zones, the changing nature of the site through time, to determine if three temporal components existed at the site, and to better understand how these fit into the regional Gulf of Georgia chronology. This was accomplished by examining differences and similarities between tool sub-assemblages and assemblages from structural zones, non-structural zones, Midden, the FCR Pit, Wet Site, and temporal components at DhRp-52. The analyses demonstrated that the some parts of the site (the Loam Structural and Loam Non-Structural Zones, the FCR Pit, the Midden Zone, the Wet Site, and the Sub-Structural Sand Matrices) can be differentiated through lithic tool assemblage characteristics, while some (the Sand Structural and Sand Non-Structural Zones and individual sand structures) cannot, and that the lithic assemblages can provide insight into both logistical mobility strategies and cultural historic associations at DhRp-52. It also provides useful observations into the site's potentially long history of occupation and gradual change over time.

DhRp-52 was occupied over a span of approximately 2,500 years. The lithic tool assemblages confirmed the presence of three distinctive temporal components. The differences between the components reveals that the site has been used in different ways over time. The lithic tool assemblage from the earliest component of the site suggest a focus on a formalized tool kit that is commonly associated with mobile hunter-gatherers. This tool kit represents the earliest uses of the site by people and possibly the 'discovery' of important and accessible resources that would later allow intensive settlement to be a viable option at this location.

The lithic tool assemblage from the Middle Component suggests a more sedentary lifestyle. This component contained a wide range of lithic tool classes and demonstrates important shifts in technology commonly associated with settlement sites, such as an increase in expedient technology. The presence of multiple, contemporaneous, well defined, large structures also suggests that DhRp-52 was used as an intensive settlement during this component. Unfortunately, tool sub-assemblages were not helpful in differentiating the boundaries of different structures and their contemporaneous, non-structural areas. This may indicate that although social stratification may have been present at DhRp-52 during this time, lithic tools are not good markers for identifying site partitioning related to different functional and spiritual activities. The wide variety of stone tools within the structures also suggest that they were probably not special use structures, but rather were probably domestic structures where a variety of activities would have taken place within the house.

The lithic tool sub-assemblages from the Late Component were helpful at differentiating site spatial components and demonstrated site use had changed most drastically between this component and the earliest component and only very subtly from this component and the Middle Component. The addition of adzes and quartz crystal tools suggest some differences between the Late Component and the two earlier components but the proportions of other grouped tool classes are very similar between the Late and the Middle Components. Site use was possibly more intensive during this component, as inferred by the fuzzy boundaries of spatial components, the presence of the Midden Zone, and the presence of the FCR Pit. The tool sub-assemblages also suggest that this component continued to be used as a settlement location rather than a special use or high mobility site.

DhRp-52's relationship to Gulf of Georgia chronological associations remains unclear. The comparison between Glenrose Cannery's Old Cordilleran, Charles Culture components and Crescent Beach's Locarno Beach Phase components with DhRp-52's Early, Middle, and Late Components confirms some association with the larger regional chronology, but the differences between the three sites and their tool assemblages are quite notable. These differences may simply be due to factors discussed in Chapter 4, but until a larger sample of sites similar to DhRp-52 are located in the region, it will be difficult to determine exactly how DhRp-52 fits into Gulf of Georgia chronology.

The overall importance of DhRp-52 is clear. Its contribution to our understanding of regional chronology and possible sub-regional variants will broaden our understanding of how people lived in and used the Fraser River Valley. The presence of the site also adds to our knowledge of how people were settling in the region during Charles Culture times. Previous work by Schaepe (1998) suggests the possibility of small village aggregation during this time and this new evidence from DhRp-52 supports this concept. Clearly more archaeological sampling needs to be undertaken in locations away from the river and in deeper deposits to find these sites and fill these sampling gaps. Unfortunately, they may be a challenge to locate. Much of DhRp-52's intact deposits were located well below traditional shovel testing depth. Further commercial and residential development in the Fraser River Valley may expose more of these sites during future archaeological mitigation projects.

Limitations affecting this research mostly relate to the limited amount of analysis completed to date on the site as a whole. The entire DhRp-52 project is still in its infancy and many important problems remain to be solved. These include, but are not limited to, a good understanding of site formation processes, relationships between features (smaller features) and larger site components, structure functions (i.e. are these domestic or ritual structures), and detailed analysis of other non-lithic artifact classes. Some of this research has been undertaken and is currently on-going and was not available for this study.

Directions for future research include all aforementioned research possibilities, and also studies of variation within specific tool classes, microwear analysis, material sourcing, and comprehensive debitage analysis may contribute more specific information concerning site function, trade patterns and lithic technological strategies used at DhRp-52.

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Appendix I: DhRp-52 Radiocarbon Dates and Associations

Sample #	Trench	Unit	Depth (cm dbd)	Sample Type	Association	Uncalibrated RC Date	Calibrated* RC Date	Radiocarbon Laboratory
25	2	A25	112	Charcoal	Loam Structural Zone	3290 +/- 15 BP	Cal 3563 to 3469 BP	KECK Carbon Cycle AMS Facility
656/ 657	2	A8	50-60	Charcoal	Loam Non-Structural Zone	3370 +/- 15 BP	Cal 3682 to 3569 BP	KECK Carbon Cycle AMS Facility
146B/ 147B	1	O5	50-60	Charcoal	Loam Non-Structural Zone	3485 +/- 15 BP	Cal 3829 to 3699 BP	KECK Carbon Cycle AMS Facility
666/ 667	2	A8	100-110	Charcoal	FCR Pit	3450 +/- 15 BP	Cal 3824 to 3641 BP	KECK Carbon Cycle AMS Facility
670/ 671	2	A8	120-130	Charcoal	FCR Pit	3465 +/- 15 BP	Cal 3827 to 3648	KECK Carbon Cycle AMS Facility
13B	1	BB13	190-200	dry/wet site interface	Midden	3478 +/- 24 BP	Cal 3833 to 3689 BP	Xi'an AMS Centre
W4	14	2	236.6	Charcoal	Wet site	3020 +/- 20 BP	Cal 3330 to 3161 BP	KECK Carbon Cycle AMS Facility
n/a	WS2	2x2	3(80-90)	Wapato; RC log #17	Wet Site	3080 +/- 40 BP	Cal 3380 to 3210 BP	BETA Analytic
W103	15	5	209.5	Charcoal	Wet Site	3180 +/- 15 BP	Cal 3443 to 3372	KECK Carbon Cycle AMS Facility
W95	12	5	212.2	Wood	Wet Site	3280 +/- 20 BP	Cal 3561 to 3453 BP	KECK Carbon Cycle AMS Facility
W27	13	4	224.8	Wood	Wet Site	3355 +/- 15 BP	Cal 3676 to 3559	KECK Carbon Cycle AMS Facility
51	WS1	2x2	3(80-90)	Wooden implement	Wet Site	3350 +/- 40 BP	Cal 3690 to 3470 BP	BETA Analytic
W109	12	5	236.2	Wood	Wet Site	3440 +/- 15 BP	Cal 3818 to 3639 BP	KECK Carbon Cycle AMS Facility
W63	15	3	236.8	Wood	Wet Site	3440 +/- 15 BP	Cal 3818 to 3639 BP	KECK Carbon Cycle AMS Facility
55	WS2	2x2	4(90-100)	Wooden implement	Wet Site	3470 +/- 40 BP	Cal 3840 to 3640 BP	BETA Analytic
48	WS1	2x2	3(80-90)	Wooden implement	Wet Site	3510 +/- 40 BP	Cal 3890 to 3690 BP	BETA Analytic
W85	15	3	247.8	Charcoal	Wet Site	3595 +/- 15 BP	Cal 3965 to 3842 BP	KECK Carbon Cycle AMS Facility
W147	15	5	251.5	Wood	Wet Site	4125 +/- 15 BP	Cal 4811 to 4551 BP	KECK Carbon Cycle AMS Facility
W126	12	5	276.2	Charcoal	Wet Site	4200 +/- 15 BP	Cal 4836 to 4653 BP	KECK Carbon Cycle AMS Facility
W136	12	5	290.2	Charcoal	Wet Site	4345 +/- 20 BP	Cal 4964 to 4855	KECK Carbon Cycle AMS Facility
152B/ 153B	1	O5	80-90	Charcoal	Sand Structural Zone (Structure 2)	4370 +/- 15 BP	Cal 4971 to 4866 BP	KECK Carbon Cycle AMS Facility
105A	2	H34	139-144	Charcoal	Sand Structural Zone (Structure 1)	4465 +/- 15 BP	Cal 5278 to 4978 BP	KECK Carbon Cycle AMS Facility
162B	1	O5	130-135	Charcoal	Sand Structural Zone (Structure 2)	4490 +/- 15 BP	Cal 5285 to 5046 BP	KECK Carbon Cycle AMS Facility
160B/ 161B	1	O5	120-130	Charcoal	Sand Structural Zone (Structure 2)	4525 +/- 20 BP	Cal 5305 to 5053 BP	KECK Carbon Cycle AMS Facility
6B	1	Q10	200-205	Base of pit depression	Sand Structural Zone (Structure 2)	4536 +/- 25 BP	Cal 5312 to 5053 BP	Xi'an AMS Centre
19A	3	I20	136-140	base of depression w/ FCR	Sand Non-Structural Zone	4534 +/- 25 BP	Cal 5311 to 5053 BP	Xi'an AMS Centre
88	2	C18	160-167	Hearth feature KC-N	Sand Sub-Structural Zone	4472 +/- 24 BP	Cal 5285 to 4978 BP	Xi'an AMS Centre
63	2	B32	180	Associated w/ bone	Sand Sub-Structural Zone	4496 +/- 24 BP	Cal 5290 to 5046 BP	Xi'an AMS Centre
170B	1	O5	170-175	Charcoal	Sand Sub-Structural Zone	4530 +/- 15 BP	Cal 5306 to 5057 BP	KECK Carbon Cycle AMS Facility
674/ 675	2	A8	140-150	Charcoal	Sand Sub-Structural Zone	4765 +/- 15 BP	Cal 5584 to 5471 BP	KECK Carbon Cycle AMS Facility

*Calibrated with CALIB Radiocarbon Calibration 5.0.2; 2 Sigma

Appendix II: Lithic Typology. Class Definitions and Descriptions

Flake Tools **(n=541, 28.6%)**

Flake Tools have retouch confined to the flake margins, and the ventral and dorsal surface of the flake is identifiable. They are often considered to be expediently crafted tools and depending on tool variability in tool morphology, are often used for relatively short periods of time (such as discussed for expedient knives by Hayden et al. 1996: 17). They can easily be made from a wide variety of materials because their manufacturing requirements are often not as constrained as formal tools (Andrefsky 1998: 154). It should be noted that Flake Tools associated with higher rates of curation, such as burins and Scrapers, are classified under the specialized chipped stone type.

There are seven classes of Flake Tools for DhRp-52: Acute Angled Retouched Flakes, Steep Angled Retouched Flakes, Steep and Acute Angled Retouched Flakes, Edge Modification Present Flakes, Spall Tools with Retouch, Spall Tools without Retouch, and Wedges.

These items are considered to have complete dimensions (length, width, thickness) due to the difficulty of determining whether retouch was first applied to a complete flake that later broke, or to a broken flake that had retouch applied to it.

Acute Angled Retouched Flakes (n=183, 9.7%)

These artifacts are flakes with acute, 45 degrees or less, (sometimes termed narrow-angled) retouch along the margin(s) (see Matson 1976: 117). This kind of retouch is often associated with cutting activities that can range from hide and fibre processing to any activity that requires a sharp edge. Retouch may range from uni-marginal retouch, bi-marginal retouch, and retouch on multiple margins of the flake.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	37.25	26.88	9.05	16.97
Median	32.31	23.50	7.56	5.84
Std. Deviation	17.89	13.16	5.99	38.06
Minimum	10.70	6.47	0.15	0.18
Maximum	122.79	91.01	49.65	356.50

Steep Angled Retouched Flakes (n=87, 4.6%)

These artifacts are flakes retouched with steep angle (45 degrees or greater) retouch along the margin(s). The retouch on these items is often irregular and sometimes creates a denticulate or serrated edge to the flake. They should not be confused with unformed or formed (thumb) Scrapers which often have regular retouch and have been retouched sufficiently to alter the original plan outline of the flake blank.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	40.00	28.76	10.65	20.38
Median	37.07	26.64	9.80	8.82
Std. Deviation	17.81	13.42	6.74	37.87
Minimum	7.99	4.32	2.08	0.09
Maximum	116.30	88.24	38.23	305.90

Steep and Acute Angled Retouched (n=31, 1.6%)

These artifacts are flakes with both acute and steep angled retouch along the margin(s). They are potentially functionally multi-purpose tools that can be used for both cutting and scraping activities.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	40.86	29.18	10.11	16.08
Median	39.09	28.87	8.69	10.02
Std. Deviation	13.85	12.06	6.16	18.87
Minimum	18.50	11.96	2.43	0.94
Maximum	74.11	63.33	31.75	92.38

Edge Modification Present Flakes (n=167, 8.9%)

These artifacts display some type of damage on the flake margin. Damage includes crushing, grinding, or irregular edges. These types of damage cannot be macroscopically confirmed as use-wear and may have been caused during excavation or storage (i.e. bag wear). They were set aside for future microscopic use-wear analysis as possible tools.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	40.60	34.94	10.38	29.03
Median	34.91	28.99	8.84	8.96
Std. Deviation	20.75	21.64	6.49	49.52
Minimum	8.15	9.61	1.46	0.18
Maximum	104.36	140.99	39.76	347.90

Spall Tool with Retouch (n=24, 1.3%)

These artifacts are produced by striking a flake off the end of a cobble. They have a completely cortex-covered dorsal surface and are retouched along the margins. Some archaeologists hypothesize that these items may have been used for food processing (Rousseau et al. 2003: 92) and others hypothesize they may have been used for fibre processing (Patenaude 1985: 157). The specific function of these items at DhRp-52 is unknown and cannot be confirmed through macroscopic analysis.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	54.87	41.76	16.21	63.42
Median	45.18	31.71	15.32	20.01
Std. Deviation	26.75	21.96	7.57	74.53
Minimum	23.38	18.07	5.69	2.99
Maximum	101.48	94.67	32.47	263.70

Spall Tool without Retouch (n=18, 1.0%)

These are made in the same manner as the Spall Tools with Retouch, but lack retouch. These were set aside because they may be have been reserved for later use and do not show any macroscopic signs of usewear.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	68.25	52.85	16.64	78.49
Median	56.86	42.28	16.13	41.17
Std. Deviation	31.31	26.54	6.79	82.64
Minimum	28.10	26.42	6.46	4.97
Maximum	148.66	118.20	27.61	289.50

Wedges (n=31, 1.6%)

These are flakes that show battering on opposite margins and often have flake removals perpendicular to the battered margins (cf. Matson 1976:128). They may have been used to split bone or antler during tool manufacture (Matson 1976: 128) or as cores. They are often the product of bipolar flaking, or wedging, which is a lithic reduction strategy often associated with material conservation (Odell 2003: 49).

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	21.79	20.32	6.15	3.78
Median	20.62	18.50	5.63	2.68
Std. Deviation	6.98	6.53	2.24	3.47
Minimum	10.76	12.19	2.64	0.40
Maximum	40.55	38.20	11.57	14.15

***Scrapers* (n=61, 3.2%)**

Scrapers are sometimes flakes with unifacial flaking, (but several of these from DhRp-52 appear to be recycled Bifaces,) often on their dorsal surface, have regular and extensive, steep angled retouch on one or more margins and are formed. The Northwest Coast culture area has an extensive typology for Scrapers that includes side Scrapers, Thumb Scrapers, Hide Scrapers, End Scrapers etc. DhRp-52 has two classes of Scrapers; Thumb Scrapers and General Scrapers. Thumb Scrapers are the most notable scraper form from the site and make up approximately 50% of the Scraper collection. The remainder of the Scrapers vary in shape and design and are therefore classified as General Scrapers. Although their assumed function is scraping, their exact scraping function (i.e., wood working, plant processing, etc.) is unknown at this time.

All Scrapers are measured at their maximum dimension for length, then perpendicular at maximum dimension for width. Thickness is measured at maximum dimension along the cross section of the tool.

Thumb Scrapers (n=28, 1.5%)

Thumb Scrapers are generally unifacially-steep-angled, retouched flakes that are 'thumb-shaped' (rounded at one worked edge and then transition into some-what straight, parallel margins that resemble a straight-stemmed haft element). The retouch is usually very regular and can occur at only one end (the rounded, convex end) or around the entire margin of the tool. At this time, it is unknown if any of these items were hafted, but some show possible signs of haft wear (slight grinding on lateral margins).

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	23.79	23.22	7.07	4.99
Median	22.74	22.91	6.51	4.33
Std. Deviation	6.39	6.28	2.57	5.26
Minimum	14.03	12.81	4.06	0.80
Maximum	46.60	38.33	15.46	29.66

General Scraper) (n=33, 1.7%)

These are Scrapers that appear not to have any specific form requirements outside of having regularly and extensively steeply-retouched edges. A few of the artifacts in this class resemble Glenrose Cannery's small steep-edged flakes and may have served a special function due to their delicate nature (Matson 1976:119). They are made on thin flakes with one or more margins that are very finely, regularly and steeply retouched. Other General Scrapers in this class are made from a variety of flakes and have a variety of convex, concave, and straight scraper edges.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	28.51	23.57	8.56	8.54
Median	26.28	21.80	7.85	5.18
Std. Deviation	12.45	10.70	3.93	13.36
Minimum	9.10	11.61	2.01	0.67
Maximum	56.88	66.88	20.64	75.28

<u>Points and Bifaces</u> *(n=487, 25.8%)*

Points and Bifaces make up a large portion of the stone tool collection at DhRp-52. Points are defined as any bifacially worked tool that is relatively symmetrical, has an evident haft element, and may have served as a projectile point while also acknowledging that they could potentially be multifunctional tools used for a variety of functions (e.g., butchering). Bifaces are often classified as knives in the Northwest Coast (Matson 1976: 106) but are sometimes classified as Points (Nelson 1969: 150). Their ambiguous designation derives from their large size and sometimes asymmetrical shape which can cause confusion about their over-all function(s). Rather than try to distinguish larger Bifaces as knives or Points, or when fragments could not be identified as a point fragment, bifacially worked items are classified as Bifaces. Points and Bifaces are considered to be multifunctional tools that were often reworked and resharpened many times as needed, used as cores, and were often recycled when broken. They are often associated with high mobility contexts because they allow people to move about the landscape without having to carry a large, heavy toolkit with them; the biface is mostly all they would require for their stone tool kit (Hayden et al. 1996: 22). Points and Bifaces can also be found in more sedentary contexts as well for a myriad of reasons. In some cases, these items are manufactured at base camps or village sites and sometimes even stored for later use. It is often the case that the most desirable and durable materials are reserved for these artifacts because of their design and use requirements (Andrefsky 1998: 154; Hayden et al. 22-23).

Points and Bifaces are divided into six classes: Points, Preforms, Bifaces, Chipped Slate Points, Unifacial Points, and Curved Points. Measurements for these artifacts are recorded as either complete or incomplete. This was possible because missing parts of Points and Bifaces can often be inferred from the piece in hand. In cases where the fragment was ambiguous, such as a determining whether an end piece is either a pointed distal end (no obvious stem, etc.) or proximal end of a point, the fragment was recorded as a proximal fragment. This assumption was carried out mostly due to requirements of the LOA database that was later adapted to our collection. (In other words, there was no option for 'end' fragment, only distal, proximal, or medial.)

Points (n=331, 17.6%)

This class includes all items that may have been used as projectile points but are also acknowledged to have potential as multifunctional tools. They are made of a wide variety of materials, sizes and styles. Several important morphological attributes were recorded to capture the shape/style of these items. These attributes include general form, blade shape, stem shape, and notching type (when present) (from McLaren and Steffen 2008). General form describes the point as lanceolate, stemmed, foliate, notched, triangular or pentagonal in form. Blade shape describes the blade as excurvate, straight, recurved or incurvate. Stem describes the stem as contracting, contracting/expanding, expanding or straight. Notching describes the notch (if present) as basal one, basal indentation, corner one, corner two, basal two, side two, or side two.

Generally, most of the DhRp-52 Points are either foliate shaped or stemmed, have excurvate or straight blades, are not notched and have contracting stems. According to McLaren and Steffan (2008), the foliate points from DhRp-52 are generally common in the Fraser Valley about 8000 years BP to contact, and the stemmed points from the site are found from about 5000 years BP to contact. A future, more intensive, statistical analysis of additional point attributes may refine these time periods in the future for the site's point collection.
The point metrics summary table below includes metrics statistics for complete Points only.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
# Complete	150	150	150	150
Mean	53.74	20.38	7.79	9.23
Median	53.84	20.00	7.67	8.40
Std. Deviation	16.03	4.61	1.63	5.28
Minimum	18.11	6.99	3.50	0.60
Maximum	118.28	32.76	13.14	37.10

Preforms (n=25, 1.3%)

Preforms are not as common as Points in DhRp-52. Some were rejected before they could be manufactured into finished Points because of too many compounding mistakes during manufacture or flaws found in the material. Others may have just been lost or forgotten. It must be noted that some Bifaces may have served as Preforms but if they are large with regular lateral edges, they are classified as Bifaces because their intended functions are unknown. Preforms in this class were identified as having irregular or wavy (unfinished) lateral edges and thick cross-sections relative to over-all size. All Preforms are included in the metrics statistics summary table.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	48.05	21.29	10.20	11.29
Median	48.00	20.47	10.00	9.87
Std. Deviation	12.40	4.54	3.13	7.70
Minimum	27.00	15.56	6.00	3.37
Maximum	74.04	32.53	20.40	34.81

Bifaces (n=111, 5.9%)

This category is reserved for items that are bifacially worked and demonstrate asymmetrical blade and/or stem/haft element features. Artifacts in this category also consist of fragments that are bifacially worked, but are too fragmentary to be identified specifically as projectile point fragments. Complete Bifaces are presumably used for cutting functions, but may have also served as preforms. Only complete artifacts are included in the metrics statistics summary table below.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
# Complete	16	16	16	16
Mean	43.96	25.87	10.78	16.58
Median	40.20	24.45	9.57	7.30
Std. Deviation	16.86	12.56	4.65	19.33
Minimum	20.08	5.93	5.38	1.37
Maximum	70.86	54.21	20.71	61.45

Unifacial Points (n=12, 0.6%)

These Points are often facially worked on the dorsal surface of the flake, and only worked along the margins of the ventral side of the flake. It is unknown at this time whether or not these are a type of Preform, expedient Point, or may have served a special purpose and have not been reported elsewhere. Many of these Points appear to be 'finished' Points which may indicate that they are not preforms. All are complete and are included in the metrics statistics summary table below.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	45.96	20.77	6.72	7.35
Median	45.18	20.79	6.42	5.88
Std. Deviation	11.77	3.98	1.52	4.57
Minimum	29.75	14.62	4.00	2.13
Maximum	65.40	27.09	9.12	16.20

Chipped Slate Point (n=4, 0.2%)

Chipped Slate Points were segregated from the larger Point class to differentiate chipped slate from ground slate items. Ground Slate Points are often associated with Northwest Coast assemblages but do not occur in the assemblages used for this analysis. (The only two Ground Slate Points recovered from DhRp-52 were from surface deposits.) All four are complete and are included in the metrics statistics summary table below.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	57.01	23.04	7.33	12.90
Median	60.85	25.00	8.10	14.70
Std. Deviation	22.45	7.98	3.09	9.57
Minimum	26.23	12.60	3.10	1.10
Maximum	80.10	29.55	10.00	21.10

Curved Biface (n=4, 0.2%)

These are Bifaces with curved lateral cross-section profiles. It is unknown if they are preforms or if they served a special purpose. Three are complete and are included in the metrics statistics summary table below.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	49.71	23.83	6.91	9.09
Median	55.00	22.00	6.10	10.00
Std. Deviation	9.80	5.17	1.83	3.33
Minimum	38.40	19.83	5.63	5.40
Maximum	55.73	29.67	9.00	11.86

Specialized Chipped Stone Tools *(n=63, 3.3%)*

The artifact classes in this category are items inferred to have one or more specialized functions. They are made from a variety of materials and are various sized. The five classes in this category are Combination Tools, Gravers, Burins, Drills, and Spokeshaves. Measurement statuses for these items depend on the tool itself. Combination Tools are considered complete because their original form is unknown. Gravers, Burins and Spokeshaves are considered complete because the identifiable attribute of the tool that defines its class must be complete for the tool to be classified as such. Drills can be incomplete. Their original shape can often (but not always) be known depending on what fragment is available for identification.

Combination Tools (n=30, 1.6%)

The artifacts in this class are quite variable. They all appear to have been used for multiple functions or for tasks that required more than one type of tool edge. Some of these have combinations of steep edges of concave, convex, and/or straight margins with drill or perforator tips. They vary in shape and size and could potentially be classified further into more specific categories.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	37.88	26.81	7.48	8.68
Median	38.59	25.34	7.27	6.24
Std. Deviation	11.45	8.48	2.57	7.67
Minimum	19.05	14.26	2.92	1.28
Maximum	61.27	53.00	13.66	33.70

Gravers (n=7, 0.4%)

Gravers are items that have a shaped point or tip with retouch/usewear that may have been used for graving activities. They are often associated with bone or wood working and are considered to be specialized tools. A few artifacts in this category appear to be gravers but only microscopic usewear analysis can confirm their function.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	24.48	17.40	4.15	2.33
Median	21.20	15.01	3.64	1.38
Std. Deviation	8.86	6.58	1.44	2.95
Minimum	18.26	10.90	2.62	0.50
Maximum	43.72	30.55	6.70	8.91

Burins (n=5, 0.3%)

These artifacts are considered to be chisel tools for bone or wood working that are produced by detaching a flake at a right angle from the margin of a flake. These are also considered to be specialized tools.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	28.94	20.54	6.59	4.45
Median	28.51	19.25	5.79	3.38
Std. Deviation	5.029	7.78	1.74	3.63
Minimum	22.58	11.68	5.39	1.42
Maximum	36.69	32.98	9.62	10.64

Drills (n=5, 0.3%)

Drills are items used in a rotary motion to perforate a variety of materials including stone, leather and fabric. They can be hand-held, but are often hafted to facilitate more efficient drilling. No complete Drills were recovered from DhRp-52 and none are listed in measurement statistics summary table.

Spokeshaves (n=16, 0.8%)

Spokeshaves, sometimes classified as "notches" (Matson 1976) are a small tool with a steeply-retouched concaved edge that can be used to smooth out and finish a wooden shaft. They are can be made from a variety of artifact classes including complete flakes, flake shatter, and other broken tools such as Bifaces. All are considered to have complete measurements because the actual tool is the notch itself. In cases where an item has a steeply-retouched concave edge that appears to be incomplete, the item was simply classified as incomplete given it was difficult to confirm that it may have been a Spokeshave and not part of some other worked/working edge.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	36.33	28.65	9.11	9.37
Median	35.46	28.09	8.33	7.45
Std. Deviation	9.66	8.61	3.02	6.57
Minimum	23.25	17.88	4.51	1.88
Maximum	52.16	49.86	16.04	22.62

Choppers *(n=197, 10.4%)*

Choppers are commonly occuring artifacts in the region. While they are especially known to characterize the Old Cordilleran phase (9,000 B.P. to 5,500 B.P.) of Northwest Coast culture history, they also do occur in all culture-historic occupations of the culture area. These items are sometimes classified pebble tools, pebble cores, and cobble choppers. Choppers are made from pebble or cobble-sized cortex covered rocks and are made by chipping off large flakes from the pebble or cobble nodule. Sometimes the removed flakes are used as flake blanks or as tools themselves, but the actual core is also used as a tool. Their possible uses vary and range from digging implements, (i.e. to dig post holes, storage pits), to anvil stones, to post support implements, etc., but they are most commonly associated with wood working. There are many possible classification typologies for Choppers (see Stewart 1996: 41). A more intensive analysis of the Chopper category may reveal that some of DhRp-52's Choppers are also scraping planes (See Matson 1976: 145). DhRp-52's Chopper typology is kept simple by dividing them into two categories, Bifacial and Unifacial.

Bifacial Choppers (n=65, 3.4%)

Bifacial Choppers are cobbles or pebbles bifacially or bimarginally flaked to have two faces which often form a steep, pointed edge (Matson 1976: 141) or a steep blunt/rounded edge.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	101.36	86.61	50.99	636.03
Median	97.90	84.25	49.22	575.00
Std. Deviation	33.79	27.85	16.95	486.07
Minimum	47.53	45.04	20.94	78.00
Maximum	272.55	182.62	100.36	2603.40

Unifacial Choppers (n=132)

Unifacial Choppers are cobbles or pebbles that have been unifacially flaked to produce one acute or steep angled edge that intersects with the cortex (Matson 1976: 142).

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	102.64	87.40	52.43	665.13
Median	100.69	88.74	51.81	563.10
Std. Deviation	26.80	20.67	16.11	440.80
Minimum	31.55	48.77	17.97	96.85
Maximum	187.11	141.19	93.90	2606.00

Ground Stone *(n=359, 19%)*

This category is reserved for all items, excluding slate items, that use grinding and/or pecking as a manufacturing technique. This includes shaped Abraders, General Abraders, Pestles And Hand Mauls, Mortar Stones, Milling Stones, Grooved Stones, Miscellaneous Ground Stone Fragments, Unknown Ground Stone Items, And Adzes.

Abraders (General/Unformed) (n=289)

The artifacts in this class generally consist of items that Matson (1976: 155) terms "abrasive stones" and Mitchell (1971: 129) classifies as "Irregular Category". These are stones often made from sedimentary materials, and range from fine to coarse grained. Most are quite fragmentary and it is difficult to confirm which measurements are complete and incomplete.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	61.21	46.75	17.84	102.43
Median	55.81	41.76	14.73	53.09
Std. Deviation	28.98	21.52	11.78	168.62
Minimum	11.21	9.77	2.69	0.44
Maximum	210.64	120.19	67.83	1551.40

Abraders (Pebble) (n=32, 1.7%)

The Abraders in this class are often pebbles or cobbles made from a sedimentary material, are domed shaped, and have a completely cortical surface with the exception on one flat face that has been ground from abrading activities.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	71.62	52.05	29.12	245.82
Median	66.38	50.43	26.26	77.77
Std. Deviation	28.19	21.68	17.80	350.07
Minimum	25.63	18.88	4.94	3.41
Maximum	150.90	98.72	68.04	1557.04

Abraders (Grooved) (n=26)

Grooved Abraders are items that are made from various grits of sedimentary rock and have a grooved surface. This grooved surface usually ranges from 2 mm to 5 mm wide and was probably used to abrade some type of wooden/organic shaft or pole. They are often made from a piece of stone of appropriate size for being hand-held. Measurements from this category are considered complete because the actual tool is the groove itself rather than the whole stone.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	50.85	40.64	18.15	49.14
Median	44.85	40.79	13.90	18.78
Std. Deviation	27.98	18.72	12.98	77.84
Minimum	22.97	20.83	10.20	4.78
Maximum	103.08	72.29	44.35	207.20

Abraders (Shaped) (n=3, 0.2%)

These are usually fine-grained abraders that have been formally shaped, often with bevelled edges.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	99.93	70.21	20.30	333.35
Median	103.41	64.11	14.44	111.34
Std. Deviation	39.28	25.48	11.45	397.36
Minimum	59.02	48.34	12.97	96.60
Maximum	137.35	98.19	33.50	792.10

Pestle/Hand Maul (n=6, 0.3%)

The artifacts in this class are often associated with heavy-duty wood working and food processing activities. Several of these items from DhRp-52 are shaped with either a nipple top or a bell-shaped base. Most are fragmented.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	142.36	110.03	74.59	1742.17
Median	138.92	103.24	77.63	1631.40
Std. Deviation	21.26	19.25	18.39	983.14
Minimum	123.03	95.09	54.86	819.10
Maximum	165.13	131.75	91.27	2776.00

Mortar Stone (n=11, 0.6%)

The Mortar Stones from DhRp-52 are often made from igneous rock with large crystals, are pebble sized and have a small depression that ranges from approximately 30 - 40 mm in diameter ground into the rock. There is one exception. One Mortar Stone is made from a cobble-sized rock, was also used as a Hammer Stone, and has a similar sized depression as the smaller Mortar Stones. The intended use for these items is unknown and none have any macroscopically visible residue in their bowls.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	75.30	54.95	32.95	368.58
Median	61.20	45.55	30.46	133.92
Std. Deviation	38.69	23.47	13.61	570.95
Minimum	40.90	36.49	20.80	53.75
Maximum	165.22	108.14	67.69	1535.04

Grooved Stone (n=2, <.5%)

These items are rocks, probably a quartzite material, that have a groove in them. The groove is so polished that it is the same texture as the cortex on the rock, so it is unknown if these items are actually artifacts. A microscopic analysis of these items may reveal their status as artifacts or non-artifacts.

Case Summaries				
	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
1	102.61	64.51	40.48	411.90
2	75.00	45.52	35.98	126.07

Adzes (n=10, 0.5%)

The Adzes from the site are quite small. Similar items have been classified as small shaped celts at Glenrose Cannery (Matson 1976: 151) and as celts or chisels at the Port Hammond site (Rousseau et al. 2003). All appear to be made of nephrite and some are quite fragmentary. They are commonly associated with wood working activities.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
# Complete	7	7	7	7
Mean	27.33	19.66	6.95	8.60
Median	25.45	19.21	6.39	5.58
Std. Deviation	16.56	6.75	2.52	7.73
Minimum	9.10	11.92	4.73	3.38
Maximum	49.30	28.29	10.31	19.89

***Slate* (n=21, 1.1%)**

Slate items were given a special category for several reasons. DhRp-52's lithic collection is quite large, and Slate composes a very small proportion of the overall collection. Slate can be an important chronological marker for sites in the Northwest Coast. Slate artifacts commonly occur in later component sites, such as Marpole. Given such a small amount of Slate was found at DhRp-52, the site was thought to be a mostly earlier component site. Therefore ,it was reasoned that the Slate items should be given a separate category for future re-evaluation of its associations in the site's deposits and to have a more efficient way of analyzing which artifact classes it most commonly occurs. Slate was also set aside because it can be difficult to analyze and identify as a particular class if it is chipped rather than ground. By setting aside all things slate, it enabled us to re-examine the artifacts made from this material type more effectively.

Chipped Slate Knife (n=11, 0.6%)

Items in this category have a chipped slate straight edge. It is difficult to determine if these items are complete or fragments because it is unknown if they were meant to have a specific overall form.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	69.80	36.38	6.92	25.05
Median	56.61	30.29	6.13	9.41
Std. Deviation	33.30	25.81	5.04	44.65
Minimum	45.54	17.82	2.96	3.85
Maximum	155.23	109.20	21.21	156.93

Ground Slate Knife (n=10, 0.5%)

Ground Slate Knives have grinding on both faces of the slate material to form a bevelled edge. They are usually associated with Marpole components in site deposits, but thicker versions of this class are found in earlier components. The average thickness for DhRp-52 ground slate knives is 5.5 mm.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	68.45	34.98	5.52	16.75
Median	69.45	24.57	4.72	11.03
Std. Deviation	25.54	25.50	2.17	12.68
Minimum	29.00	11.76	2.75	1.17
Maximum	109.43	81.94	9.64	34.37

Hammer Stones and Anvil Stones *(n=157, 8.3%)*

Hammer Stones are often pebble or cobble-sized rocks with evidence of battering at one or two ends. They are used for a variety of purposes, but are most often associated with stone core reduction/stone tool production. Anvil Stones are often larger than hammer stones and are identified by the presence of battering marks in the middle of a somewhat flat stone. These items are also identified with bipolar lithic reduction, but could have been used for a variety of purposes (depending on size) such as pile driving. These items are considered to have complete measurements because no formal shape is required and, although they may break, they may still be used as either Hammer Stones or Anvil Stones.

Hammer stones (n=152, 8.1%)

Hammer Stones from the site are mostly made from quartzite, but are also made from a variety of other materials.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	96.94	63.40	43.97	544.23
Median	95.25	62.76	44.75	372.60
Std. Deviation	34.20	23.26	16.47	565.56
Minimum	39.11	16.97	12.04	22.50
Maximum	248.60	135.90	78.83	4000.00

Anvil Stones (n=5, 0.3%)

The Anvil stones from the site are items that show evidence of battering on a flat surface of the rock.

	Artifact Length (mm)	Artifact Width (mm)	Artifact Thickness (mm)	Artifact Weight (g)
Mean	183.20	138.04	59.97	3408.46
Median	174.92	113.71	51.81	1401.00
Std. Deviation	92.36	52.70	16.89	3901.31
Minimum	104.39	91.45	44.38	689.20
Maximum	331.19	223.04	82.55	9979.20

Appendix III-a: Cross Tabulation Table of Structural Zones and Grouped Tool Classes

		Site zone		
Grouped tool class		Loam Structure Zones (LSZ)	Sand Structure Zones (SSZ)	Total
Flake Tools	Count	55	84	139
	% within site zone	26.4%	24.7%	25.4%
Spall Tools	Count	7	7	14
	% within site zone	3.4%	2.1%	2.6%
Scrapers	Count	11	7	18
	% within site zone	5.3%	2.1%	3.3%
Specialized Chipped Stone	Count	9	9	18
	% within site zone	4.3%	2.6%	3.3%
Choppers	Count	22	42	64
	% within site zone	10.6%	12.4%	11.7%
Abraders	Count	40	59	99
	% within site zone	19.2%	17.4%	18.1%
Points/Bifaces	Count	50	101	151
	% within site zone	24.0%	29.7%	27.6%
Hammer/Anvil Stones	Count	14	31	45
	% within site zone	6.7%	9.1%	8.2%
Total	Count	208	340	548
	% within site zone	100.0%	100.0%	100.0%

Appendix III-b: Cross Tabulation Table of Site Structural Zones and Type of Assemblage Curation

		Site zone		
Type of curation		Loam Structure Zones (LSZ)	Sand Structure Zones (SSZ)	Total
Expedient (Light-Duty)	Count	66	95	161
	% within site zone	30.7%	27.9%	29.0%
Formed/Curated	Count	66	113	179
	% within site zone	30.7%	33.1%	32.2%
Heavy Duty	Count	36	73	109
	% within site zone	16.7%	21.4%	19.6%
Abraders	Count	40	59	99
	% within site zone	18.6%	17.3%	17.8%
Bipolar	Count	7	1	8
	% within site zone	3.3%	.3%	1.4%
Total	Count	215	341	556
	% within site zone	100.0%	100.0%	100.0%

Appendix III–c: Cross Tabulation of Structural Zones and Tool Material Types

		Site zone		
Material type		Loam Structure Zones (LSZ)	Sand Structure Zones (SSZ)	Total
granular basalt	Count	50	87	137
	% within site zone	22.3%	25.2%	24.1%
vitreous basalt	Count	20	53	73
	% within site zone	8.9%	15.4%	12.8%
microcryptocrystalline	Count	20	12	32
	% within site zone	8.9%	3.5%	5.6%
rhyolite/andesite	Count	25	38	63
	% within site zone	11.2%	11.0%	11.1%
quartz/quartzite	Count	17	22	39
	% within site zone	7.6%	6.4%	6.9%
obsidian, Garibaldi	Count	14	5	19
	% within site zone	6.2%	1.4%	3.3%
slate/shale	Count	6	12	18
	% within site zone	2.7%	3.5%	3.2%
mudstone/siltstone	Count	30	40	70
	% within site zone	13.4%	11.6%	12.3%
sandstone	Count	20	30	50
	% within site zone	8.9%	8.7%	8.8%
granitic/schist	Count	11	25	36
	% within site zone	4.9%	7.2%	6.3%
unknown/other	Count	11	21	32
	% within site zone	4.9%	6.1%	5.6%
Total	Count	224	345	569
	% within site zone	100.0%	100.0%	100.0%

Appendix III-d: Cross Tabulation Table of Non-Structure Zones and Grouped Tool Class

		Site zone		
Grouped tool class		Loam Non-Structure Zones (LNSZ)	Sand Non-Structure Zones (SNSZ)	Total
Flake Tools	Count	82	45	127
	% within site zone	33.6%	28.7%	31.7%
Wedges	Count	5	2	7
	% within site zone	2.0%	1.3%	1.7%
Scrapers	Count	6	5	11
	% within site zone	2.5%	3.2%	2.7%
Specialized Chipped Stone	Count	15	8	23
	% within site zone	6.1%	5.1%	5.7%
Choppers	Count	8	22	30
	% within site zone	3.3%	14.0%	7.5%
Abraders	Count	33	25	58
	% within site zone	13.5%	15.9%	14.5%
Points/Bifaces	Count	73	32	105
	% within site zone	29.9%	20.4%	26.2%
Slate Tools	Count	12	2	14
	% within site zone	4.9%	1.3%	3.5%
Hammer/Anvil Stones	Count	10	16	26
	% within site zone	4.1%	10.2%	6.5%
Total	Count	244	157	401
	% within site zone	100.0%	100.0%	100.0%

Appendix III-e: Cross Tabulation Table of Non-Structure Zones and Type of Curation

		Site zone		
Type of curation		Loam Non-Structure Zones (LNSZ)	Sand Non-Structure Zones (SNSZ)	Total
Expedient (Light-Duty)	Count	89	49	138
	% within site zone	38.7%	31.8%	35.9%
	% of Total	23.2%	12.8%	35.9%
Formed/Curated	Count	90	42	132
	% within site zone	39.1%	27.3%	34.4%
	% of Total	23.4%	10.9%	34.4%
Heavy Duty	Count	18	38	56
	% within site zone	7.8%	24.7%	14.6%
	% of Total	4.7%	9.9%	14.6%
Abraders	Count	33	25	58
	% within site zone	14.3%	16.2%	15.1%
	% of Total	8.6%	6.5%	15.1%
Total	Count	230	154	384
	% within site zone	100.0%	100.0%	100.0%
	% of Total	59.9%	40.1%	100.0%

Appendix III –f: Cross Tabulation Table of Site Non-Structural Zones and Material Type

		Site zone		
Material type		Loam Non-Structure Zones (LNSZ)	Sand Non-Structure Zones (SNSZ)	Total
granular basalt	Count	90	40	130
	% within site zone	36.0%	25.6%	32.0%
vitreous basalt	Count	17	17	34
	% within site zone	6.8%	10.9%	8.4%
microcryptocrystalline	Count	22	7	29
	% within site zone	8.8%	4.5%	7.1%
rhyolite/andesite	Count	14	24	38
	% within site zone	5.6%	15.4%	9.4%
quartz/quartzite	Count	23	11	34
	% within site zone	9.2%	7.1%	8.4%
obsidian, Garibaldi	Count	12	6	18
	% within site zone	4.8%	3.8%	4.4%
slate/shale	Count	15	3	18
	% within site zone	6.0%	1.9%	4.4%
mudstone/siltstone	Count	27	17	44
	% within site zone	10.8%	10.9%	10.8%
sandstone	Count	16	19	35
	% within site zone	6.4%	12.2%	8.6%
granitic/schist	Count	7	9	16
	% within site zone	2.8%	5.8%	3.9%
unknown/other	Count	7	3	10
	% within site zone	2.8%	1.9%	2.5%
Total	Count	250	156	406
	% within site zone	100.0%	100.0%	100.0%

Appendix III-g: Cross Tabulation Table of the Loam Structure and Non-Structure Zones and Grouped Tool Classes

		Site zone		
Grouped tool class		Loam Structure Zones (LSZ)	Loam Non-Structure Zones (LNSZ)	Total
Flake Tools	Count	55	82	137
	% within site zone	25.3%	34.2%	30.0%
Spall Tools	Count	7	3	10
	% within site zone	3.2%	1.2%	2.2%
Wedges	Count	7	5	12
	% within site zone	3.2%	2.1%	2.6%
Scrapers	Count	11	6	17
	% within site zone	5.1%	2.5%	3.7%
Specialized Chipped Stone	Count	9	15	24
	% within site zone	4.1%	6.2%	5.3%
Choppers	Count	22	8	30
	% within site zone	10.1%	3.3%	6.6%
Abraders	Count	40	33	73
	% within site zone	18.4%	13.8%	16.0%
Points/Bifaces	Count	50	73	123
	% within site zone	23.0%	30.4%	26.9%
Slate Tools	Count	2	5	7
	% within site zone	.9%	2.1%	1.5%
Hammer/Anvil Stones	Count	14	10	24
	% within site zone	6.5%	4.2%	5.3%
Total	Count	217	240	457
	% within site zone	100.0%	100.0%	100.0%

Appendix III-h: Cross Tabulation Table for Loam Structure, Non-Structure Zones and Type of Curation.

		Site zone		
Type of curation		Loam Structure Zones (LSZ)	Loam Non-Structure Zones (LNSZ)	Total
Expedient (Light-Duty)	Count	66	89	155
	% within site zone	30.4%	37.1%	33.9%
Formed/Curated	Count	66	90	156
	% within site zone	30.4%	37.5%	34.1%
Heavy Duty	Count	36	18	54
	% within site zone	16.6%	7.5%	11.8%
Abraders	Count	40	33	73
	% within site zone	18.4%	13.8%	16.0%
Slate	Count	2	5	7
	% within site zone	.9%	2.1%	1.5%
Bipolar	Count	7	5	12
	% within site zone	3.2%	2.1%	2.6%
Total	Count	217	240	457
	% within site zone	100.0%	100.0%	100.0%

Appendix III-i: Cross Tabulation Table for Loam Structure, Non-Structure Zones and Material Type

		Site zone		
Material type		Loam Structure Zones (LSZ)	Loam Non-Structure Zones (LNSZ)	Total
granular basalt	Count	50	90	140
	% within site zone	22.3%	36.0%	29.5%
vitreous basalt	Count	20	17	37
	% within site zone	8.9%	6.8%	7.8%
microcryptocrystalline	Count	20	22	42
	% within site zone	8.9%	8.8%	8.9%
rhyolite/andesite	Count	25	14	39
	% within site zone	11.2%	5.6%	8.2%
quartz/quartzite	Count	17	23	40
	% within site zone	7.6%	9.2%	8.4%
obsidian, Garibaldi	Count	14	12	26
	% within site zone	6.2%	4.8%	5.5%
slate/shale	Count	6	15	21
	% within site zone	2.7%	6.0%	4.4%
mudstone/siltstone	Count	30	27	57
	% within site zone	13.4%	10.8%	12.0%
sandstone	Count	20	16	36
	% within site zone	8.9%	6.4%	7.6%
granitic/schist	Count	11	7	18
	% within site zone	4.9%	2.8%	3.8%
unknown/other	Count	11	7	18
	% within site zone	4.9%	2.8%	3.8%
Total	Count	224	250	474
	% within site zone	100.0%	100.0%	100.0%

Appendix III-j: Cross Tabulation Table of the Sand Structure, Non-Structure Zones and Grouped Tool Class

		Site zone		
Grouped tool class		Sand Structure Zones (SSZ)	Sand Non-Structure Zones (SNSZ)	Total
Flake Tools	Count	84	45	129
	% within site zone	24.7%	29.2%	26.1%
Spall Tools	Count	7	1	8
	% within site zone	2.1%	.6%	1.6%
Scrapers	Count	7	5	12
	% within site zone	2.1%	3.2%	2.4%
Specialized Chipped Stone	Count	9	8	17
	% within site zone	2.6%	5.2%	3.4%
Choppers	Count	42	22	64
	% within site zone	12.4%	14.3%	13.0%
Abraders	Count	59	25	84
	% within site zone	17.4%	16.2%	17.0%
Points/Bifaces	Count	101	32	133
	% within site zone	29.7%	20.8%	26.9%
Hammer/Anvil Stones	Count	31	16	47
	% within site zone	9.1%	10.4%	9.5%
Total	Count	340	154	494
	% within site zone	100.0%	100.0%	100.0%

Appendix III-k: Cross Tabulation Table of the Sand Structure, Non-Structure Zones and Type of Curation

		Site zone		
Type of curation		Sand structure zones (SSZ)	Sand non-structure zones (SNSZ)	Total
Expedient (Light-Duty)	Count	95	49	144
	% within site zone	27.5%	31.4%	28.7%
Formed/Curated	Count	113	42	155
	% within site zone	32.8%	26.9%	30.9%
Heavy Duty	Count	73	38	111
	% within site zone	21.2%	24.4%	22.2%
Abraders	Count	59	25	84
	% within site zone	17.1%	16.0%	16.8%
Slate	Count	5	2	7
	% within site zone	1.4%	1.3%	1.4%
Total	Count	345	156	501
	% within site zone	100.0%	100.0%	100.0%

Appendix III-l: Cross Tabulation Table for Sand Structure, Non-Structure Zones and Material Type

		Site zone		
Material type		Sand Structure Zones (SSZ)	Sand Non-Structure Zones (SNSZ)	Total
granular basalt	Count	87	40	127
	% within site zone	24.6%	25.3%	24.9%
vitreous basalt	Count	53	17	70
	% within site zone	15.0%	10.8%	13.7%
microcryptocrystalline	Count	12	7	19
	% within site zone	3.4%	4.4%	3.7%
rhyolite/andesite	Count	38	24	62
	% within site zone	10.8%	15.2%	12.1%
quartz/quartzite	Count	22	11	33
	% within site zone	6.2%	7.0%	6.5%
obsidian, other	Count	8	2	10
	% within site zone	2.3%	1.3%	2.0%
obsidian, Garibaldi	Count	5	6	11
	% within site zone	1.4%	3.8%	2.2%
slate/shale	Count	12	3	15
	% within site zone	3.4%	1.9%	2.9%
mudstone/siltstone	Count	40	17	57
	% within site zone	11.3%	10.8%	11.2%
sandstone	Count	30	19	49
	% within site zone	8.5%	12.0%	9.6%
granitic/schist	Count	25	9	34
	% within site zone	7.1%	5.7%	6.7%
unknown/other	Count	21	3	24
	% within site zone	5.9%	1.9%	4.7%
Total	Count	353	158	511
	% within site zone	100.0%	100.0%	100.0%

Appendix III-m: Cross Tabulation Table of Grouped Tool Class by Specific Structure Association

		specific structure association				
Grouped Tool class		Loam Structure Zone	Sand Structure 1	Sand Structure 2	Sand Structure 3	Total
Flake Tools	Count	55	14	67	3	139
	% within specific structure association	24.9%	22.2%	25.5%	15.8%	24.6%
Spall Tools	Count	7	2	4	1	14
	% within specific structure association	3.2%	3.2%	1.5%	5.3%	2.5%
Wedges	Count	7	1	0	0	8
	% within specific structure association	3.2%	1.6%	.0%	.0%	1.4%
Scrapers	Count	11	3	4	0	18
	% within specific structure association	5.0%	4.8%	1.5%	.0%	3.2%
Specialized Chipped Stone	Count	9	3	6	0	18
	% within specific structure association	4.1%	4.8%	2.3%	.0%	3.2%
Choppers	Count	22	9	29	4	64
	% within specific structure association	10.0%	14.3%	11.0%	21.1%	11.3%
Abraders	Count	40	7	44	6	97
	% within specific structure association	18.1%	11.1%	16.7%	31.6%	17.1%
Points/Bifaces	Count	50	17	78	4	149
	% within specific structure association	22.6%	27.0%	29.7%	21.1%	26.3%
Ground Stone	Count	2	0	2	1	5
	% within specific structure association	.9%	.0%	.8%	5.3%	.9%
Adzes	Count	2	0	0	0	2
	% within specific structure association	.9%	.0%	.0%	.0%	.4%
Slate Tools	Count	2	1	4	0	7
	% within specific structure association	.9%	1.6%	1.5%	.0%	1.2%
Hammer/Anvil Stones	Count	14	6	25	0	45
	% within specific structure association	6.3%	9.5%	9.5%	.0%	8.0%
Total	Count	221	63	263	19	566
	% within specific structure association	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix III-n: Cross Tabulation Table of Grouped Tool Class by Sand Structures 1, 2, 3 and SNSZ

		specific structure association				
Grouped tool class		Sand Structure 1	Sand Structure 2	Sand Structure 3	Sand Non-Structure Zone (SNSZ)	Total
Flake Tools	Count	14	67	3	45	129
	% within specific structure association	22.2%	25.5%	15.8%	28.5%	25.6%
Spall Tools	Count	2	4	1	1	8
	% within specific structure association	3.2%	1.5%	5.3%	.6%	1.6%
Wedges	Count	1	0	0	2	3
	% within specific structure association	1.6%	.0%	.0%	1.3%	.6%
Scrapers	Count	3	4	0	5	12
	% within specific structure association	4.8%	1.5%	.0%	3.2%	2.4%
Specialized Chipped Stone	Count	3	6	0	8	17
	% within specific structure association	4.8%	2.3%	.0%	5.1%	3.4%
Choppers	Count	9	29	4	22	64
	% within specific structure association	14.3%	11.0%	21.1%	13.9%	12.7%
Abraders	Count	7	44	6	25	82
	% within specific structure association	11.1%	16.7%	31.6%	15.8%	16.3%
Points/Bifaces	Count	17	78	4	32	131
	% within specific structure association	27.0%	29.7%	21.1%	20.3%	26.0%
Ground Stone	Count	0	2	1	0	3
	% within specific structure association	.0%	.8%	5.3%	.0%	.6%
Slate Tools	Count	1	4	0	2	7
	% within specific structure association	1.6%	1.5%	.0%	1.3%	1.4%
Hammer/Anvil Stones	Count	6	25	0	16	47
	% within specific structure association	9.5%	9.5%	.0%	10.1%	9.3%
Total	Count	63	263	19	158	503
	% within specific structure association	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix III-o: Cross Tabulation Table of FCR Pit, Wet Site, and Midden Zone by Grouped Tool Class

		Site zone			
Grouped tool class		FCR Pit	Wet Site	Midden Zone	Total
Flake Tools	Count	74	38	69	181
	% within site zone	20.3%	24.7%	35.6%	25.4%
Spall Tools	Count	10	8	4	22
	% within site zone	2.7%	5.2%	2.1%	3.1%
Wedges	Count	6	5	5	16
	% within site zone	1.6%	3.2%	2.6%	2.2%
Scrapers	Count	18	3	9	30
	% within site zone	4.9%	1.9%	4.6%	4.2%
Specialized Chipped Stone	Count	11	5	4	20
	% within site zone	3.0%	3.2%	2.1%	2.8%
Choppers	Count	26	14	2	42
	% within site zone	7.1%	9.1%	1.0%	5.9%
Abraders	Count	88	27	23	138
	% within site zone	24.2%	17.5%	11.9%	19.4%
Points/Bifaces	Count	80	49	67	196
	% within site zone	22.0%	31.8%	34.5%	27.5%
Ground Stone	Count	9	1	1	11
	% within site zone	2.5%	.6%	.5%	1.5%
Hammer/Anvil Stone	Count	42	4	10	56
	% within site zone	11.5%	2.6%	5.2%	7.9%
Total	Count	364	154	194	712
	% within site zone	100.0%	100.0%	100.0%	100.0%

Appendix III-p: Cross Tabulation Table of Early, Middle, and Late Temporal Components by Grouped Tool Class

		Matrices association			
Grouped Tool class		Loam Matrices	Sand Matrices	Sand Sub-Structural Matrices	Total
Flake Tools	Count	280	129	20	429
	% within matrices association	28.1%	26.0%	10.9%	25.6%
Spall Tools	Count	24	8	1	33
	% within matrices association	2.4%	1.6%	.5%	2.0%
Wedges	Count	23	3	0	26
	% within matrices association	2.3%	.6%	.0%	1.5%
Scrapers	Count	44	12	1	57
	% within matrices association	4.4%	2.4%	.5%	3.4%
Specialized Chipped Stone	Count	39	17	2	58
	% within matrices association	3.9%	3.4%	1.1%	3.5%
Choppers	Count	58	64	61	183
	% within matrices association	5.8%	12.9%	33.2%	10.9%
Abraders	Count	184	84	34	302
	% within matrices association	18.4%	16.9%	18.5%	18.0%
Points/Bifaces	Count	270	133	35	438
	% within matrices association	27.1%	26.8%	19.0%	26.1%
Hammer/Anvil Stone	Count	76	47	30	153
	% within matrices association	7.6%	9.5%	16.3%	9.1%
Total	Count	998	497	184	1679
	% within matrices association	100.0%	100.0%	100.0%	100.0%

Appendix III-q: Cross Tabulation Table of Early, Middle, and Late Temporal Components by Type of Curation

		Matrices association			
Type of curation		Loam Matrices	Sand Matrices	Sand Sub-Structural Matrices	Total
Expedient (Light-Duty)	Count	328	144	21	493
	% within matrices association	32.1%	28.4%	11.2%	28.7%
Formal/Curated	Count	329	155	38	522
	% within matrices association	32.2%	30.6%	20.3%	30.4%
Heavy Duty	Count	134	111	91	336
	% within matrices association	13.1%	21.9%	48.7%	19.6%
Ground Stone	Count	12	3	3	18
	% within matrices association	1.2%	.6%	1.6%	1.0%
Abraders	Count	184	84	34	302
	% within matrices association	18.0%	16.6%	18.2%	17.6%
Slate	Count	11	7	0	18
	% within matrices association	1.1%	1.4%	.0%	1.0%
Bipolar	Count	23	3	0	26
	% within matrices association	2.3%	.6%	.0%	1.5%
Total	Count	1021	507	187	1715
	% within matrices association	100.0%	100.0%	100.0%	100.0%

Appendix III-r: Cross Tabulation Table of Early, Middle and Late Temporal Components by Material Type

		Matrices association			
Material type		Loam Matrices	Sand Matrices	Sand Sub-Structural Matrices	Total
granular basalt	Count	261	127	29	417
	% within matrices association	27.3%	28.0%	20.0%	26.9%
vitreous basalt	Count	72	70	8	150
	% within matrices association	7.5%	15.5%	5.5%	9.7%
microcryptocrystalline	Count	112	19	7	138
	% within matrices association	11.7%	4.2%	4.8%	8.9%
rhyolite/andesite	Count	98	62	44	204
	% within matrices association	10.3%	13.7%	30.3%	13.1%
quartz/quartzite	Count	93	33	15	141
	% within matrices association	9.7%	7.3%	10.3%	9.1%
obsidian, other	Count	3	10	1	14
	% within matrices association	.3%	2.2%	.7%	.9%
obsidian, Garibaldi	Count	52	11	3	66
	% within matrices association	5.4%	2.4%	2.1%	4.2%
slate/shale	Count	39	15	3	57
	% within matrices association	4.1%	3.3%	2.1%	3.7%
mudstone/siltstone	Count	134	57	15	206
	% within matrices association	14.0%	12.6%	10.3%	13.3%
sandstone	Count	91	49	20	160
	% within matrices association	9.5%	10.8%	13.8%	10.3%
Total	Count	955	453	145	1553
	% within matrices association	100.0%	100.0%	100.0%	100.0%