INSCRIBING IDENTITIES ON THE LANDSCAPE: A SPATIAL EXPLORATION OF ARCHAEOLOGICAL ROCK FEATURES IN THE LOWER FRASER RIVER CANYON

by

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ABSTRACT

The research presented in this study is an archaeological exploration of the role of monumental rock features in the formation and maintenance of community identity in the past among the Coast Salish peoples of the Lower Fraser River Canyon region of south-western British Columbia. An area of intensive seasonal aggregation during the height of the salmon fishing season, the Lower Fraser River Canyon is an area where ownership and access to valuable commodities has been paramount through time. This central place is marked by a type of archaeological feature rarely found anywhere on the Northwest Coast – large scale, stacked rock walls, terraces, and other constructions. I apply a landscape approach to understand the cultural dynamics of social interaction in this region and argue that people evoke identities at various scales and defend their territory on the landscape through the construction of these features.

Since only preliminary research had been undertaken on the rock features, I conducted a survey of the Lower Fraser River Canyon and located 82 rock features along a 7 km stretch of river. Characteristics of these features, along with three-dimensional maps of several sites where features cluster, form the basis of my analysis. I outline uses for the rock features, including fishing, defense, living surfaces, and ownership makers, before applying spatial analyses to evaluate whether or not these features formed a defensive network throughout the Canyon. The results of the Defensive Index, a quantitative measure of site defensibility, illustrate that the building of the rock features, even if their primary use was not defensive, enhances the defensibility of village sites. In addition, viewshed analyses indicate that sites with and without rock features are intervisible, supporting the hypothesis that signals could be sent through the Canyon as a warning of impending raids from either upriver or

downriver (Schaepe 2006). I conclude that while rock features were a result of co-ordinated community activity and had an impact on the identities of people living in the Canyon in the past, assigning ownership of a place to a family or community has always been an active and ongoing process.

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DEDICATION

For my mother, without whom I would not have finished, and for my father, without whom I would not have started.

1: INTRODUCTION

Transformations

We all have had moments, whether unexpected or anticipated, that have transformed our lives, altered our course, and impacted the way in which we view the world. My life changed on a sunny day in early July, 2001, when I first encountered a unique form of archaeological feature in an area of southern British Columbia known as the Lower Fraser River Canyon. I was travelling through the area in the glamorous form of transportation known as a minivan, packed in with other members of my archaeological field school from the University of British Columbia. We were driving through the landscape, guided by members of the Stó:lō First Nation, a large organization of many local First Nations bands, and learning about a completely different perspective on the places we encountered than any of us had experienced before. A cultural historian from the Stó:lō Nation, Naxaxalhts'i (Sonny McHalsie), was telling us the names of many places throughout the Upper Fraser River Valley and Lower Fraser River Canyon in Halkomelem, a dialect of Coast Salish spoken throughout the area. These named places had associated stories, some from the time of myth, others from a time only just passed, but all imbued with important cultural lessons. I recall feeling a deep sense of privilege to be the recipient of such knowledge, and listened to the stories with rapt attention, sounding out the place names in my head. On our trip, a few kilometres upriver from the small town of Yale, 170 km east of Vancouver along the Trans-Canada Highway, we pulled off to the side of the road and all piled out of the van, grateful for a chance to stretch our legs. Following Naxaxalhts'i, we crossed the train tracks, traversed the remains of an old road, and manoeuvred our way through the dense underbrush, regretting wearing shorts even in the dry midsummer heat. After a short hike, we reached the edge of the turbid waters of the

Fraser River, one of the largest salmon rivers in the world with a drainage that spans a quarter of British Columbia. The Lower Fraser River Canyon is, in geological terms, aptly named. When we reached the river, we experienced the steep-sided Canyon, reverberating with the echo of the swift, treacherous waters below (Figure 1.1)

Figure 1.1. View of the Lower Fraser River Canyon from the rock wall visited in 2001.

The waters of the Fraser, constrained by the sheer rock faces, rushed through the Canyon, tumbling over submerged rocks and creating dangerous currents. The extreme nature of the area had an immediate impact on me – here was a powerful place that seemed to convey to my eyes a sense of danger. Just upriver from our perch was a sheer cliff, behind which stood the remnants of an ancient village, and under our feet, we were informed, was another archaeological feature (Figure 1.2). After a bit of awkward shuffling, I turned and set my eyes on a 12 m long stacked rock wall. While clearly not as tall as it once would have been, the wall was impressive, constructed out of angular boulders, some of which are one metre or more in diameter (Figure 1.3). The regularity in stacking patterns and strategic placement of certain stones immediately indicated that this was not a natural occurrence, but a purposeful construction.

Figure 1.2. The author on the rock wall as described in the text, circa 2001.

Figure 1.3. Rock wall at site DjRi-46, first viewed by the author in 2001.

Little did I know then that this feature, along with many others throughout the Lower Fraser River Canyon, would become the focus of my doctoral research. At the time, I wanted to study the monumental architecture of early city-states in the Near East. Yet here in British Columbia was monumental stone architecture in a society without a reliance on domesticated foods. We were told at the time that these features had been found at several sites throughout the region and had recently been established as structures built by local Aboriginal peoples. While they had not yet been the focus of intensive research, elders and archaeologists interpreted these rock walls as fortifications, built to protect ancient villages from raiders. I recall being fascinated at the time, yet it took a few more years for me to realize that my archaeological path would not lead to Syria, but back to the Lower Fraser River Canyon.

Why was I drawn back? While there are many reasons, one of the most central to my decision was the archaeological enigma that these rock features presented. In the Northwest Coast, the primary building material for housing, tools, clothing, and canoes was wood, the majority of which came from western redcedar (*Thuja plicata*). Building with stone, however, has largely been seen as restricted to intertidal features related to fishing, shellfish gathering, and other beach clearing activity (Caldwell et al. 2010; Menzies and Butler 2007). The rock features of the Lower Fraser River Canyon are markedly different in construction from these coastal formations. First, some rock features are built of large boulders with individual volumes up to 4 m^3 and weights above 10 tonnes. On average, rocks used in these features range from 0.5 to 1 m in diameter and generally are found breaking off from local bedrock outcrops. Most are angular with flat edges that are used strategically to enhance stability of features. The masonry ranges from loosely stacked to tightly stacked, with extensive use of chinking – the use of small rocks to fill in gaps that might negatively impact the overall stability of the features. In addition, most of the rock features are terraces, built to create stable, level areas in an otherwise very steep landscape. Terraces, however, are by no means the only type of rock feature. They can range from 300 m^2 terraces 50 m above mean river level to small, semi-circular stone enclosures, less than 2 m^2, subject to yearly inundation by seasonal changes in the river level. Some consist of hundreds of rocks, while one feature is constructed from only nine large boulders and a few small rocks used as chinks. Some have extensive views, placed at locations where large portions of the rest of the Canyon are visible, while others have no view of the river at all.

When the rock features were first encountered by archaeologists, they were a puzzle, a feature type without clear precedent in this area of the world. Some were summarily dismissed as being the result of post-contact mining or railway activity, while others were interpreted as likely natural formations (Kidd 1968). Nevertheless, some researchers were interested in their connection to Aboriginal communities as early as the 1960s (Melhuish 1970). Even with the early interest, no systematic archaeological research was performed on these features until the 1990s, when Dave Schaepe and Sonny McHalsie (Naxaxalhts'i) of the Stó:lō Research and Resource Management Centre[1] began to investigate these features in greater detail. Based on their preliminary investigations, the features were interpreted as fortifications, forming a network of defense and providing evidence for inter-village governance in the Lower Fraser River Canyon (Schaepe 2000, 2001b, 2006)

When I first decided to extend their study by further examining the range, extent, use, and meanings of the rock features of the Lower Fraser River Canyon, I had previously worked only with members of the Stó:lō Nation and Stó:lō Tribal Council. As I looked into the necessary permissions to undertake my research, however, I discovered some potential barriers. Belatedly, I discovered that the Lower Fraser River Canyon was and is a site of contestation where ownership and access, largely to fishing locations, has been disputed between members of the Stó:lō Nation/Stó:lō Tribal Council[2] and the Yale First Nation for several decades. When, as an undergraduate

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[1] http://www.srrmcentre.com/

[2] Stó:lō Nation: http://www.stolonation.bc.ca/. Stó:lō Tribal Council: http://www.stolotribalcouncil.ca/

student, I was taken on the place name tour, I did not realize that moving through the landscape, naming places and telling stories, was an inherently political act (Keith and Pile 1993), involving the inscription of meaning, history and identity on these places through generations of oral knowledge. I was not aware of the contested nature of some of these places when I first visited them; instead, I became enthralled with the opportunity that such knowledge provided for working in collaboration with local communities to integrate multiple voices and different knowledge systems into a richer understanding of the past. As will be evident throughout this thesis, it did not work out quite the way I had anticipated. The nature of disputes between communities over this central landscape, defined in relation to structures of the colonial government (both of British Columbia and Canada), changed my research in important ways. While the basis of the research in this thesis revolves around the archaeological study of rock features, contemporary politics in the Canyon have come to inform my thinking and impact the very structure of my research.

In the history of anthropological research among the Coast Salish, some indigenous communities have prioritized research and developed close relationships with scholars, while others have been indifferent or actively resistant to colonial research practices.[3] This has led to particular histories being recorded and reproduced, often lending the most widely published accounts of traditional practices and stories a greater authority than other voices and perspectives that have not been recorded in the literature. The focus of my research and analysis in this thesis is on archaeological data, so other necessary background information is drawn from what has been published within academic and popular literature. There are multiple stories and histories about the Lower Fraser River Canyon, not all of which can be presented here for many

[3] A number of variables influence whether or not a First Nations band or Native American tribe has a collaborative relationship with anthropologists, including litigation. At times, "anthropologists have assumed the role of 'speaking for' the Coast Salish"(Boxberger 2007:77), although many Coast Salish communities now use collaborative research relationships to speak for themselves.

reasons, including contemporary politics. I focus, therefore, on the results of my archaeological research and what the physical remains of past cultural activity can illuminate about this historically and culturally important place.

Setting the Stage: The Cultural Context of the Lower Fraser River Canyon

Located approximately 170 km upriver from the mouth of the Fraser River at the Pacific Ocean at Vancouver, the Lower Fraser River Canyon[4] is usually considered part of the broader Coast Salish world (Carlson 2001c, 2007; Miller 2007; Mitchell 1971; Suttles 1987). The Coast Salish world consists of communities that speak variations of Coast Salish languages in the Strait of Georgia, Puget Sound, Strait of Juan de Fuca and river valleys in south-western British Columbia and Washington (Figure 1.4). Beyond linguistic similarity, people living in this region are connected via far-reaching kin networks, since Coast Salish people have "long constructed and maintained complex personal social identities that connect them to a variety of other groups" (Harmon 2007:17). Home to an abundance of natural resources, ranging from the ocean to the high alpine, the Coast Salish world was one of affiliation based on a number of different factors without centralized political leadership, but with at least two clear class differences, free people and slaves, along with ownership of productive resource locations (Carlson 2003; Harmon 2007; Schaepe 2009; Suttles 1960). Key resources included anadromous fish, particularly salmon (*Oncorhynchus* sp.), intertidal resources, and cultivated plant foods such as the starchy root of wapato (*Sagittaria latifolia*) (Suttles 1960; Turner 1995). Waterways connect much of the territory of Coast Salish peoples and travel time in the past was measured by the number of days it took to traverse the local rivers, seas and sloughs in canoes (Ames 2002; Duff 1952; Schaepe 2009).

[4] Throughout the thesis, I use the term "the Canyon" and the "Lower Fraser River Canyon" interchangeably to refer to the portion of the Fraser River drainage indicated in Figure 1.4. and Figure 1.5.

Figure 1.4. The Coast Salish world adapted from Angelbeck (2009).

Permanent winter villages were established, supplemented by seasonal movement to productive resource locations to acquire food to last throughout the winter. Villages consisted of household groups living in communal plank houses in coastal areas, supplemented by semi-subterranean pit houses as the winter weather became more extreme inland (Suttles 1990).

With a reliance on salmon as a primary food resource, catching, processing and preserving these fish to last through the winter was an important part of the yearly cycle. According to cultural historians, ethnohistorians, and ethnographers, the Lower Fraser River Canyon was the best place in the Coast Salish world to acquire the necessary salmon stocks and "was arguably the most valuable Aboriginal real estate on the Northwest Coast" (Carlson 2007:147). The steep-sided Canyon created a narrow passage for the river, providing limited room for millions of salmon to manoeuvre on their journey from the ocean to their spawning grounds. This funnel effect led to a high density of fish moving through the Canyon that, in the past, could be caught efficiently using a dip net -- a net with a long handle and a woven scoop attached to hoop at the end of this handle that could be closed to trap fish. The net would be dipped into the Fraser River at strategic points or eddies and salmon caught by the hundreds in a short period of time (Carlson 2007:147). Once taken from the river, salmon were filleted and hung up on wooden structures, known as drying racks, along the edges of the river bank. In the Canyon, smoking was not needed to preserve the salmon, as the summer months brought a consistent dry warm wind from the southwest, followed by a dry night-time wind from the northeast. The daytime sun heated the surfaces of the rocks that form the Canyon, and as night fell, this heat radiated into the atmosphere, helping to dry the salmon (Carlson 2001c:26-27). Salmon also lose fat as they travel upriver, but when fish are too fatty, they take longer to preserve and are more likely to spoil or grow mould. The amount of fat burned by the salmon between the ocean and the entrance to the Canyon is perfect for the wind-drying method.

All of these factors contributed to a social pattern of movement whereby thousands of people from all over Coast Salish territory would converge on the Lower

Fraser River Canyon for the months of July and August (MacLachlan 1998). Fishing sites, along with other productive resource locations, were owned by extended families related through descent, and rights would be passed on, usually from father to son, in public displays such as potlatches (Carlson 2007; Thom 2009). Families, tied together through bilateral kinship, formed corporate groups, the foundational unit of production (Croes 2010). These stretched across village boundaries and provided linkages between settlements (Schaepe 2009:24). People would invoke affiliations to these groups to gain access to highly productive and valuable fishing locations along the river. If communities could not show connection to a family group that owned one of the fishing rocks in the Canyon, they could bring food or other types of items to trade for rights to some salmon (Duff 1952). While access was regulated by heads of families, the general cultural ethos was toward sharing (Suttles 1960). This does not mean that disputes over access did not occur; rather, status was gained by directing food production and ensuring that all members of the extended family had enough food (Suttles 1960:300).

The *Fort Langley Journals*, complied by daily entries of the Chief Factors of Fort Langley on the Fraser River from 1827-1830, frequently note the seasonal movement, for example: "August 12, 1828: About 100 canoes of different tribes went up with their families"(Chief Factor MacMillan in MacLachlan 1998:71). Once they had acquired the fish needed for the winter, these families would pack up their canoes and head back to their winter villages: "September 22, 1828 - 345 canoes of Cowitchens already passed down" (Chief Factor MacMillan in MacLachlan 1998:75). If these canoes are assumed to have been the all-purpose canoes built by Coast Salish peoples, they had a capacity of about 10 people per canoe (Duff 1952:52). A conservative estimate based on this account after potentially 70-90 percent of the population had died of smallpox in the first wave of the disease in 1782 (Harris 1994) indicates more than three thousand individuals may have returned from the Lower Fraser River Canyon on one day in September 1828. This seasonal aggregation of large numbers of people on a highly desirable landscape ensured that the region was a nexus of social interaction, both cooperative and competitive. Along with visitors, people lived in the Canyon in permanent settlements, creating one of the highest densities of settlement along the Fraser River (Schaepe 2006, 2009).

When thousands of people aggregate in an area where others live year round, adjustments have to be made, both socially and physically, to accommodate them. What, if anything, did rock features have to do with the social and economic activity in the Lower Fraser River Canyon? This thesis is, in part, an attempt to address this question. The rock features may have been built to enforce the importance of this place by marking locations along the river that belonged to families. Access to valuable locations along the river may have been in constant negotiation, so a durable structure that could emphasise who belonged in the Canyon may have been a useful tool when disputes arose. The centrality of this region in the Coast Salish world is supported by the presence of a large winter village adjacent to Lady Franklin Rock, where the river is first constricted. The combination of pit houses, plank houses, rock features, burial mounds, and defensive structures as DjRi-14 (*X̲elhálh* in Halkomelem) indicates it was an important site for regulating access to the Canyon.

In my dissertation, I explore whether these rock walls were built as a response to the diverse nature of interaction that took place in the Canyon. With the probable absence of a centralized political structure, how did groups who aggregate seasonally for resources exert claim or control over highly desirable locations of resource acquisition? The rock features may be the result of efforts to build a material presence that emphasised belonging and may have worked to protect these communities against attack. I want to know if the array of stone walls, platforms and other features in the Lower Fraser River Canyon served as markers of identity that helped these fluid social groupings assert ownership and negotiate control over prime fishing and fish drying locations.

Inscribing Identity and Defending the Landscape

My exploration of the rock features of the Lower Fraser River Canyon is informed by three central concepts – landscapes, identity, and defensibility. The first two concepts have clear theoretical connotations, while the idea of defensibility, while often evoked by archaeologists talking about warfare, settlement patterns, and feature types, is rarely theorized and evaluated. Although I detail my theoretical and methodological approach in the next chapter, I outline these ideas here to anchor the thesis.

Landscapes

The Lower Fraser River Canyon is a landscape that has been observed through many lenses over the past decades and centuries. Impacts on the landscape range from mythic beings, to the movement of rivers of ice and water that carved the very land, to the lives of people who have lived on this river and modified the surrounding land for their own purposes. The arrival of disease, followed by explorers and colonizers, disturbance of the land to extract gold, and the destructive force of the railway and highway had transformative effects. Now, it is a focal point in the fight to reclaim Aboriginal rights and title (Carlson 2007). In this thesis, therefore, I use 'landscape' as a framework for exploring how space has been transformed into places through time. Landscape studies in archaeology have seen a major increase over the past 20 years, with research projects increasingly employing this scale of analysis to understand past human behaviours, experiences, and ways of life (Anschuetz et al. 2001; Ashmore and Knapp 1999; Barrett 1999; Bender 1992, 1999; Cosgrove 1984; Darvill 1999, 2009; Edmonds 1999; Feinman 1999; Gosden and Head 1994; Head 1993; Ingold 1993; Johansen 2008; Knapp and Ashmore 1999; Llobera 2001, 2007; Lock 2001; Maschner 1996; Nicholas 2006; Norton 1989; Smith 2003; Stoffle et al. 1997; Thomas 1993, 2001; Tilley 1994; Wagstaff 1987). Built rock features constitute a form of data that can be made sense of from a landscape perspective, where relationships between sites are highlighted. I hypothesize that the rock features, as a durable form of landscape modification, point to the process whereby meaning and identities are inscribed in visible ways.

Identity

My approach to identity draws on agency theory, considering the dialectic between agent and structure as foundational to the human experience. Identities, in this conception, "must be construed as projects, sometimes grounded, other times contingent, but always ongoing" (Meskell 2003:293). Formed by both individual and collective action, identities are evoked and enforced when necessary, and archaeologists are applying this concept to understanding the past with increasing vigour (Barrett 2001; Bernardini 2005; Cannon 1998; Coole 2004, 2005; Dobres 2000; Dobres and Hoffman 1994; Dobres and Robb 2000, 2005; Dornan 2002; Fisher and Loren 2003; Franklin and Fesler 1999; Gardner 2004; Hall 1991; Hodder 2000; Jones 1997; Joyce and Lopiparo 2005; Kockelman 2007; Meskell 2001, 2003; Owoc 2005; Pauketat and Alt 2005; Schortman and Nakamura 1991; Silliman 2001; Smith 2001; Yoffee 2007). When the process of identity-making is accelerated, such as in times where groups are threatened or challenged, change can occur in how those identities are marked. For example, while family or kin relationships always inform an individual's identity, that particular identity comes to the fore when others challenge an individual's lineage membership, or a lineage's rights to the land, resources, or social status that they claim. In scenarios such as these, what may have been implicit before comes to the surface and an identity is asserted. The evocation of an identity may resolve the challenge, but in certain situations, the very means of claiming that identity may need to become more overt to deflect any future disputes. When this occurs, the action of a group of people to assert an identity can influence the very structure of that culture and alter the means by which identities are marked. I argue in this thesis that the rock features in the Lower Fraser River Canyon may be a result of needing to assert belonging, considering the intense nature of seasonal aggregation, the high value of fishing locations, and the forms of ownership that existed on this landscape. Building a rock feature may have been an act of explicitly marking the landscape in resilient and lasting ways, and defending that location against both physical and symbolic attack.

Defensibility

Many Northwest Coast archaeologists who have studied conflict discuss the role of defensive sites in protecting communities from attack (Angelbeck 2009; Martindale and Supernant 2009; Maschner 1996; Maschner and Reedy-Maschner 1998; Moss and Erlandson 1992; Schaepe 2006). Common criteria for assessing defensibility rely on qualities of site location and enhancement, so sites on difficult-to-reach landforms with clear views and with architecture that restricts access are considered defensive, while those on flat plains with limited views and no restrictive architecture are not. Rarely are these criteria measured in a systematic way to evaluate how well these defensive sites protect those communities. With this in mind, Martindale and I developed an index of defensibility to create a comparative measure that quantifies landscape and architectural attributes (Martindale and Supernant 2009). I use this to test whether the rock features are defensive fortifications, as argued by Schaepe (2006). Defensibility, however, extends beyond the mere functional question of whether or not a wall or other such structure improves chances of surviving an attack. It also connects with identity, in that the *perception* of defensibility is often equated with strength and may be just as important in protecting a community as the defensive structure itself. (Johnson 2002)It also connects with landscape, which can have distinctive defensive qualities that are exploited and manipulated by people. Part of my argument in this thesis, therefore, is that we need to reconsider the concept of defensibility and look beyond practical issues of fortification and access, to conceive of the entire landscape as a defensive place.

Research Questions

The Fraser Canyon rock features are a relatively new aspect of the archaeological record on the Northwest Coast and, unlike other archaeological features such as houses, do not have methods established for their study. Designing a research project around these features, therefore, starts from the ground up, given that quantitative data about their size, shape, and variation has only been collected on a small percentage of the rock features (Schaepe 2006). In this section, I outline my five research questions, moving from the specifics of the individual rock features to broader anthropological questions about meaning, landscapes and defensibility.

What types of features are there? How do they relate to one another? What is their patterning on the landscape?

When I began my research, the full nature and extent of rock features present in the Canyon was unknown. Schaepe's (2006) research provided an important first step in describing several types of rock constructions and proposing hypotheses as to their use, but at the time of his initial fieldwork, he did not have the opportunity to conduct a systematic survey of the area. The number of features, their spatial location, and their overall distribution, therefore, are central questions in this thesis. As far as we know, these features are limited to a seven kilometre stretch of the Fraser River, from Lady Franklin Rock north (upriver) to Sawmill Creek (Figure 1.5).

I have limited my area of study to the extent of known features. Within this area, I conducted a ground survey to establish how many features there are and where they are located. Approximately 20 were known prior to the survey – I revisited most of these and identified others, resulting in a total of 82 identified rock features in the Lower Fraser River Canyon.

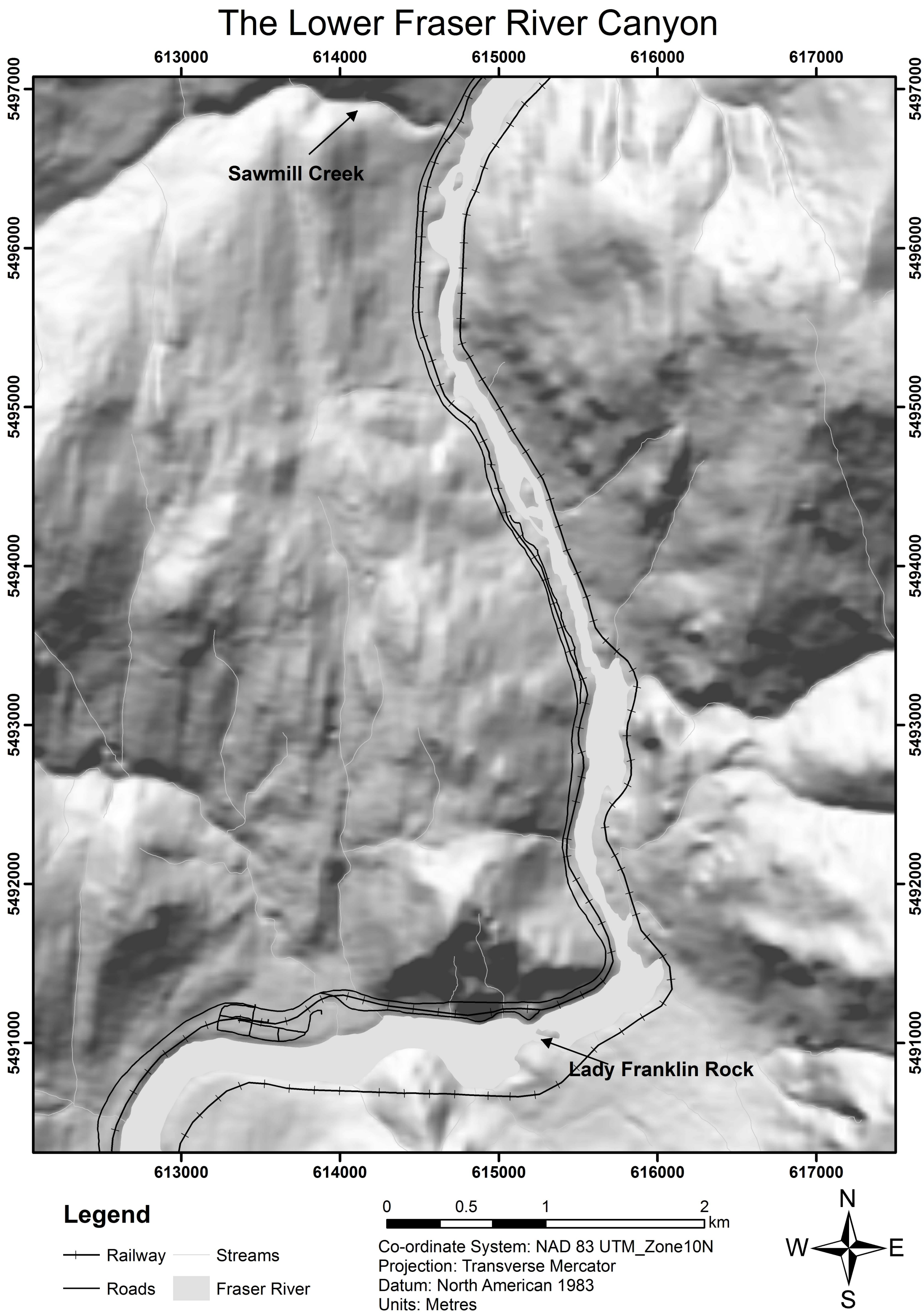

Figure 1.5. The Lower Fraser River Canyon.

In this thesis, I discuss in detail the physical attributes of a sample of these features and explore what these attributes indicate about the features. In addition, I used mapping technology to create detailed three-dimensional maps of sites where rock features cluster, adding these data to GIS that can be used to query the spatial relationships of sites and rock features. How rock features relate spatially to one another and the terrain in which they are found is important in reconstructing the cultural landscape. I look at the larger landscape on which these features are located to understand the relationship between sites. Finally, I conduct spatial analyses of three-dimensional site maps along with detailed information on dimensions, locations, and structures of the rock walls in order to answer the following questions.

What were they built for? What were they used for?

The rock likely performed specific functions – some were terraces that provided level ground in steep, rocky terrain, while others seem to be built for defense or as fishing platforms. Whether built for terracing, fishing, defense or some other reason, the use of rock features in the everyday lives of people living in this landscape is important to establish. Archaeological data from the features themselves, as well as associated materials, point to a variety of potential uses that may be correlated with historically and ethnographically known activities on the landscape. As durable forms of architecture that existed for centuries, these features may have been appropriated for various purposes over time. This illustrates a potential disjuncture from the purposeful action of a community to build a terrace on which to place a structure, and a later use, possibly several generations down the line, of this same feature as a base for a defensive wall. Additionally, rock features may potentially fall out of everyday use, but remain poignant on the landscape as monuments or markers of belonging. I explore various uses and consider the inextricable relationship between functional and symbolic elements of the rock features.

How were they built? How long did it take? How many people did it involve?

One key question about these rock wall features is how much labour was actually involved in their construction? Researchers have assumed that the construction of large scale architecture implies a great deal of labour and a social structure that could allow that labour to be organized (Ames 2001; Arnold 1993). No estimates about the type of labour, length of time, and amount of co-ordinated group activity, however, have yet been attempted for the Fraser Canyon rock features. My research addresses this issue by querying which features could have been built and maintained by a small group, and which ones required a larger scale effort to construct. I draw on Kolb's (1997) correlation of different sizes of rock structures in Hawaii to different forms of labour, and apply a similar idea to the building of rock features in the Lower Fraser River Canyon. I evaluate whether they were constructed in the same way or if they show variation in construction and arrangement, including rebuilding, maintenance and modification. Variations in the rock features point to several different methods of construction that relate to use, stability, and appearance of these structures.

When were they built? Was there more than one building event?

A central question in most archaeological research is chronology, so establishing when these features were built is an important part of my endeavour. Were the rock features were all built at the same time or built over generations, centuries, or millennia? Each of these time scales can point to different uses or purposes through time. In addition to when they were built, I attempt to establish whether they were all used at the same time. One interpretation is that these rock features form a network of communication throughout the Lower Fraser River Canyon, where each feature was visible from other ones, allowing for signalling from one to another (Schaepe 2006). If this is plausible, I need to establish contemporaneity in their use. Schaepe (2006) has hypothesized that they were constructed as part of a late period shift in settlement, but evidence suggests that rock features might date back to 8150 BP (Mitchell and Pokotylo

1996). Dating these features is difficult because the features are almost always made completely out of stone and contain little organic material, such as charcoal or bone, for conventional dating methods. I discuss my attempts at dating in Chapter 4.

Were these features defensive? What was the role of conflict in this area and how may it have affected the building of these features?

The rock features have been interpreted as defensive features, built to protect villages from raiders. One challenge I faced was how to evaluate whether such features work at a physical level to provide adequate protection in the event of an attack. I applied the Defensive Index mentioned above (described in Chapter 8), to locations with rock features, as well as to "control areas" where rock features are absent, in order to quantify defensibility and evaluate the characteristics of defended sites. I also examined individual feature attributes to see if their structure points to a primary use as defensive features, based on criteria described in Chapter 6. If rock features proved to be defensive in the sense that they work to protect the community from attack, it was possible that they were built for this purpose. Conversely, if they were not defensive in a functional sense, they may have been built for another purpose. Even if they were not structurally built to physically protect members of these villages, they may have had a symbolic impact on the perception of the landscape by peaceful and aggressive visitors.

A Journey through the Landscape of the Lower Fraser River Canyon

In Chapter 2, I outline the foundation of my theoretical and methodological approach to the analysis of rock features as the result of purposeful landscape modification by ancient peoples that influenced the structure of society. I begin by illustrating why combining a landscape approach with agency theory is a provocative means to examine the impact that building practice has on social relationships. Next, I explore the intellectual foundations of the term "cultural landscape" in order to be explicit about my application of this often ambiguous term to the rock features of the

Lower Fraser River Canyon. Delving into the intellectual history of this set of ideas also makes apparent some of the underlying biases of the landscape concept and how it is currently used in archaeology (Bender 1993a). I take a similar approach to another term that has recently become part of the archaeological lexicon – agency. Returning to some of the foundational theorists, including Pierre Bourdieu (1977) and Anthony Giddens (1984), I discuss practice and structuration before outlining the advantages and pitfalls of studying agency in the past. One of the key elements of agency theory is the dialectic between action, agent and social structure, wherein the actions of individuals, such as building a rock wall, either enforces or transforms broader social institutions, perceptions, and identities. I then integrate landscapes and agents in a critical methodology that I apply to my analysis of rock features.

Having outlined my theoretical and methodological approach, I describe, in Chapter 3, the various elements of the landscape that constitute the Lower Fraser River Canyon. I explore physical attributes, the history of the Canyon as constructed by archaeology, ethnographic reconstructions of culture, and the colonial encounter. By bringing together these different ways of viewing the landscape, I argue that we cannot understand the unusual archaeological features without all these other facets. I situate the reader in the complex, multi-dimensional nature of the Lower Fraser River Canyon, emphasising its centrality not only for local Aboriginal communities in the past and present, but also for the founding of British Columbia. I use landscape as a guiding theme in my discussion of the Canyon because it emphasises that no singular element defines this place – it is the inherent relationship between land, culture, history, and the process of assigning meaning that defines the Canyon and its associated rock features.

After situating the reader in the Canyon, I discuss methods to study the rock features. Given their uniqueness, there are no widely applied forms of analysis for rock structures. Due to this lack of developed methods, I devised a system for measuring, recording and mapping the various rock constructions. In Chapter 4, I outline my decision-making process and discuss the factors that ultimately impacted my choices about which features to study. I describe my sampling strategy, the attributes measured, and the mapping procedure. A sub-theme of this chapter is a reflexive consideration of the political context in which I undertook this research, where I describe some of the unexpected barriers I faced while trying to complete my work and the limitations that were subsequently imposed on the project's scope. Many of these encounters led to my interests in the intersection between history, the process of creating community identities, and contemporary political struggles for recognition.

In Chapter 5, I describe each individual rock feature in my sample and the sites where they cluster. As a new form of archaeological material that is not well known, I use graphics and photos to introduce the reader to the structure of the rock features, what they look like, and where they are situated on the ground. I discuss their relationship to one another in general terms and point out which ones are associated with known ancient village locations. The descriptive elements of this chapter form the basis for my subsequent analysis of attributes of the rock features in the following three chapters.

Chapter 6 presents Exploratory Data Analysis (EDA) to examine the rock feature attributes outlined in Chapter 4. This approach is useful to uncover patterns and anomalies in the level, shape and spread within the archaeological dataset. I use EDA to illuminate patterns in the variables such as length, area, volume, number of rocks, types of stacking, etc., by presenting summaries of each attribute, noting the frequency of discrete data and distribution of continuous data. In this chapter, I also discuss areas where the data do not fit expectations and are anomalous, indicating that the patterns need explanation.

In Chapter 7, I address three central questions: what types of rock features are found in the Canyon, how much labour organization was required to build them, and their primary uses. I propose several means of grouping the rock feature data to answer these questions and evaluate whether these categories explain some of the irregularity seen when exploring the data. I develop a typology to classify features into terraces or non-terraces, setting up certain patterns that are expected. I examine the dataset to see if these patterns are present, testing correlations for significance where possible. For labour investment, I divide the sample into size classes of small, medium, and large features and evaluate whether expected patterns are present. In addition, I explore whether size categories can be correlated with the labour investment of different social groups. Finally, I hypothesize three different categories of rock feature use, developed from ethnographic correlates of activities that would have taken place in the Canyon: fishing, defense, and living platforms. Some features do not fall into any of these proposed uses, based on an analysis of relevant attributes, so I investigate the potential meanings of these unclassified features, arguing that they may have served a symbolic role in marking territory and ownership.

While Chapter 7 was concerned with the individual attributes of each rock feature, I zoom out in Chapter 8 to consider both rock feature sites and the overall landscape of the Lower Fraser River Canyon. I discuss the benefits and challenges of GIS analysis in understanding spatial patterns of past cultures, arguing that we need to connect abstract models of space to other forms of data. The Defensive Index is used to quantify commonly evoked archaeological criteria for defensibility. I measure the index for sites mapped in the project, including one site that has no intact cultural rock features. The site without rock features is a control sample, designed to test whether the index values capture both landscape characteristics and built enhancements. I discuss the results of the defensibility analysis for each site, noting what this means for the defensiveness of the Lower Fraser River Canyon. The second half of the chapter applies cumulative viewshed analysis to rock features and archaeological sites in the region. I test the hypothesis that villages sites, represented by locations where rock features cluster, were connected by line-of-sight (Schaepe 2006) and compare the overall visibility of villages sites and individual rock features. I then discuss the results of the spatial analysis in light of questions of community, identity, and defensibility on the landscape.

In Chapter 9, I explore the broader cultural and theoretical context of the rock feature analysis by relating the rock feature complex to other forms of the built environment of Coast Salish peoples, including plank houses, burial cairns/mounds, and defensive sites. I argue that the rock features, while different in form than some of the other types of buildings in the area, are part of the process of marking the landscape in meaningful ways. In addition, I connect the practice of building back to the critical methodology by evaluating whether these rock features can be considered the actions of agents in society that had a lasting impact on how identities were formed, contested, and marked.

I bring everything together in Chapter 10, and revisit the research questions outlined above to explore what the research has contributed to each, and consider the value of the theoretical approach. I discuss overall archaeological implications of the results of my research and how the rock features fit into what we already know about the Canyon. This leads me to consider how these important rock feature sites are implicated in the process of identity-making, both in the past and the present. In particular, I reflect on how some contemporary disputes over rights to fishing locations and resources of the Canyon, while different in mechanism and motivation, are focused on the very sites where durable remnants of the past remain prominent on the landscape. I conclude by outlining the next steps in research on the rock features, because after spending time on the ground, I realize we are only beginning to scratch the surface of these remarkable features.

2: LANDSCAPES AND AGENTS

A Critical Methodology

The rock features located in the Lower Fraser River Canyon provide an opportunity to query how cultural identities may shift when communities engage in large-scale landscape transformations. On the Northwest Coast, archaeological rock features such as those described here are rarely recorded and do not have a clear precedent. Other archaeological features, most notably the remains of plank and pit houses, have been directly correlated with the living activities of communities and have been the focus for studies of social structure, economy, and status differentiation (Ames et al. 1992; Coupland 1988; Grier 2001; Matson and Coupland 1995; Schaepe 2009). Models exist to understand how households fit into the day-to-day lives of ancient peoples. This is not the case for the rock features – to date, the only interpretation of these features, based on preliminary research, is that they are rock fortifications (Schaepe 2006). Given their newness in the study of Northwest Coast archaeology, I searched for a method to understand these features within the broader realm of archaeological theory. This led me to theories about the cultural landscape that have been primarily developed about monumental earthworks and stone alignments in the British Isles. As I explored the use of cultural landscapes in archaeology, I came to two conclusions – first, the use of landscape is often ambiguous, since few authors explicitly define the concept when they apply it (for exceptions, see Ashmore and Knapp 1999; Bender 1993a; Hirsch 1995). Second, the relationship between the physical modification of the landscape and changes in social structure, as impacted by the actions of agents, is rarely addressed.

In this chapter, I outline my theoretical approach to understanding built rock features in the Lower Fraser River Canyon by delving into a genealogy of the landscape concept. I do this to be explicit about the historical and theoretical underpinnings of what can otherwise be seen as a generalising tool, and to outline my approach to this commonly used yet sometimes confusing term. I then outline how I incorporate the dialectic between agent and structure into my analysis of landscapes by discussing the work of Bourdieu (1977) and Giddens (1984), focusing on how their social theories have been employed in archaeology. The questions I ask about past cultural landscapes are designed to address how agents and structure, engaged in the process of structuration, contributed to the constitution of those societies and the landscape that they created through action. Building durable rock features is an example of how people living in the Lower Fraser River Canyon landscape either enforced or transformed structure. I argue that a fruitful method of exploring the material patterns we see archaeologically at the scale of the landscape is to consider them as expressions of the dialectic between agents and structure.

One of the recent criticisms of applications of agency theory in archaeology is that we do so without any consideration of methodology, or "the chosen set of tools, scale of analysis and way of thinking about the data" (Dobres and Robb 2005:160). This is an important criticism, as methodology is a way of bridging the gap between theory and practice in archaeology. However, as Johnson (2006:123) notes, agency theory and archaeological methods are often incompatible. I argue that one area where there might be some compatibility is in combining agency theory with studies of cultural landscapes, an area that has greater methodological development in archaeology. Dobres and Robb (2005) also caution against attempting to fit agency into linear models of reasoning, defined as theory →method (→methodology) + data = interpretation/explanation. After reviewing the foundations of both landscapes and agency in archaeology, I describe why these ideas are an appropriate theoretical stance for the study of the rock features of the Lower Fraser River Canyon.

Landscapes

Landscapes have diverse uses in archaeology and draw upon scholarship in a variety of fields. Here, I outline some of the genealogical history of 'cultural landscape' to situate my research on built rock features and argue for the critical application of this concept in archaeology. The landscape concept has a long history in archaeology as part of the way researchers analyze the relationship between sites on the physical landscape, but "it has only been in the past decade or so that landscape has emerged as an object of theoretical reflection within the discipline" (Thomas 2001:165). Archaeology has only recently adopted the concept of a cultural landscape from geography and applied it to studies of past societies, leading some to claim that landscape archaeology is still in its infancy (Fisher and Thurston 1999). The study of landscapes in archaeology traces its roots back to early settlement pattern analysis, because "as long as archaeologists have studied the human past, they have been interested in space, and, consequently, in landscapes" (Knapp and Ashmore 1999:1). Early attempts to define groups in the past involved an explicitly spatial component; for example, "culture area" implies a geographic boundary. Landscape archaeology developed with a strong British focus, which treated prehistoric landscapes as the sum of human construction and environmental contexts (Barrett 1999). The application of concepts of landscape in archaeology has shifted in the past few decades, and has increasingly relied upon cultural geography, anthropology and philosophy to help define the study of past landscapes from a cultural perspective (Bender 1993a; Ingold 1993; Tilley 1994). The diversity of approaches to landscapes in archaeology today is a product of its complex genealogical intellectual history.

There are two recognized sources for the origin of the word 'landscape' in English, representing aspects of either the physical land (*Landschaft*) or a sense of perspective in painting (*Landschap*). The first term is German and was adopted in England during the Middle Ages to refer either to an area inhabited by a group of people or to the land controlled by a lord, and simply represents the concept of "area" or "region" without any aesthetic or visual connotations (Cosgrove 1985). The usage of landscape to refer to property had nearly disappeared in the late sixteenth and early seventeenth century when *landschap*, from Dutch, entered the English language, primarily through landscape painters (Hirsch 1995). *Landschap* and *Landschaft* were combined, and 'landscape' came "to refer to the appearance of an area, more particularly to the representation of scenery" (Duncan 2000:429).

Divergent Disciplines, Divergent Landscapes

The term "cultural landscape" traces its roots to the intellectual framework of the burgeoning social sciences, specifically geography, at the turn of the nineteenth century. Carl Sauer, who was the first to employ cultural landscape as a category of analysis in English, wrote his seminal work in response to a debate between two major schools of thought – the first was the school of *Anthropogeographie* headed by Friedrich Ratzel in Germany, which gave the environment a primary role in shaping human experience, and the second was the geography that was developing in France under Paul Vidal de la Blache (Aplin 2007; Norton 1989). Buttimer (1971) notes that the Durkheim school of sociology developed at this time and influenced the debate, since Ratzel considered society from a biological standpoint and Durkheim considered society in terms of collective consciousness. Ratzel and his colleagues were interested in the ecological relationships between humans and their physical environment, a point of view that was not shared by French geographers who forcibly rejected environmental determinism (Aplin 2007; Norton 1989). Sauer, an American geographer, argued that the true realm of geographers was the cultural landscape, although he recognized the natural environment as a significant force in human culture (Cosgrove 2000b). His monograph, *The Morphology of the Landscape*, formed the basis for cultural landscape as an area of study within geography in North America.

Sauer sought to define the "nature of geography" (Sauer and Leighly 1963:313). He argued the three primary fields of inquiry in geography should be the study of the physical environment, the study of humans as subject to the physical environment, and the study of habitats of the earth (Sauer and Leighly 1963:316). He defined landscape as "a land shape, in which the process of shaping is by no means thought of as simply physical…it may be defined, therefore, as an area made up of a distinct association of forms, both *physical* and *cultural*" (Sauer and Leighly 1963:321, emphasis mine). Sauer's explicit recognition of both the human and the natural aspect of the landscape was a major leap that was made in a dynamic intellectual context. In his presentation of the landscape as a land shape, Sauer connected the idea to its etymological roots as a way of viewing (Cosgrove 1985), although he distinguished between the landscape as "an actual scene viewed by an observer" and the broader idea of a general geographical landscape (Sauer and Leighly 1963:322). The natural landscape, according to Sauer, can be considered as the physical earth before it is touched by human action, and is to be known by the "totality of its forms," including topography and climate (Sauer and Leighly 1963:337), as represented in Figure 2.1.

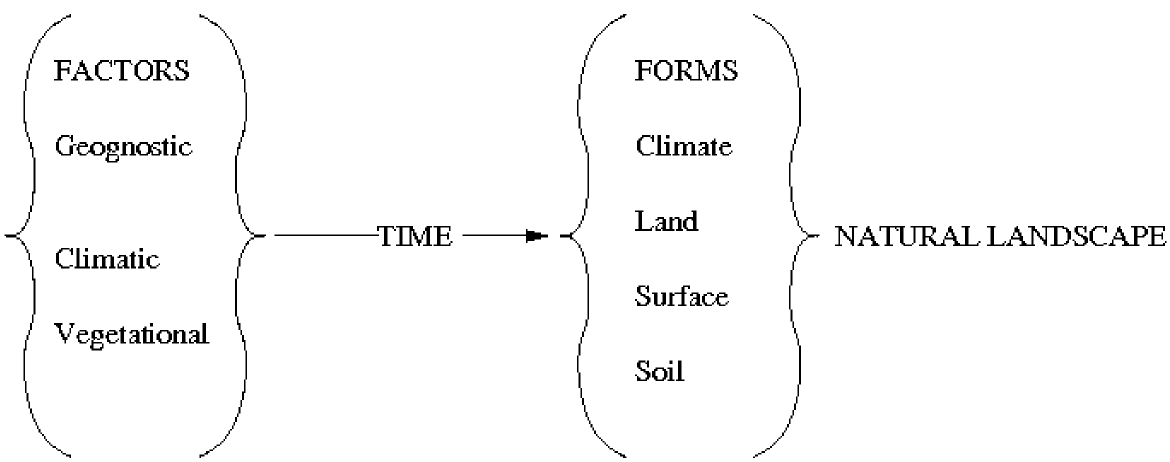

Figure 2.1. Natural landscape (after Sauer and Leighly 1963:337).

The cultural landscape, on the other hand, is the transformation of the natural landscape by humans – since man "by his cultures… makes use of the natural forms, in many cases alters them, in some destroys them" (Sauer and Leighly 1963:341). The cultural landscape must also be understood through its physical manifestations (Figure 2.2).

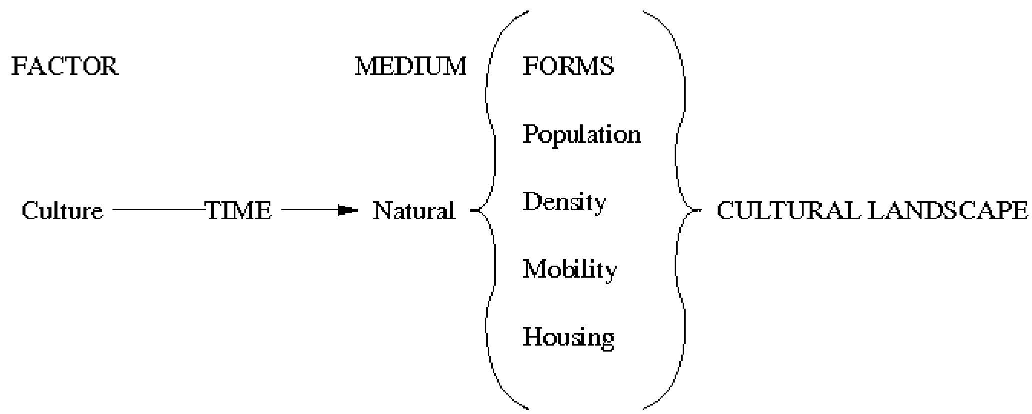

Figure 2.2. Cultural landscape (after Sauer and Leighly 1963:341).

The natural landscape, therefore, was the medium for cultural factors to create cultural forms, and "supplies the materials out of which the cultural landscape is formed" (Sauer and Leighly 1963:343). One of the important features of Sauer's presentation of the cultural landscape as the object of study for geography is his implicit assumption that a physical, natural landscape existed as a *tablua rasa* and that cultural landscape was where "culture" was imposed upon "nature" (Cosgrove 2000b). He emphasises that the visible forms of the landscape as modified by humans should be the objects of geographical study. These aspects of his paradigm came under fire during the 'new geography" of the 1960s and the 1970s as well as during the post-modern critique of the 1980s and 1990s. Regardless of later challenges, *The Morphology of the Landscape* remains a brilliant synthesis of a number of ideas about culture, landscape, and geography that were developing at the time on both sides of the Atlantic Ocean.

Archaeology developed through an increasing interest in biological and cultural origins of humankind in the second half of the twentieth century, along with the recognition of a deep antiquity of humankind (Trigger 1989). Ideas of diffusion and migration in culture change developed out of geography in Germany and were brought over to North America through the works of Franz Boas (Trigger 1989), who trained as a physical geographer under Ratzel and turned to anthropology later in his career. Archaeologists in Britain in the early twentieth century worked jointly with geographers to develop distribution maps, whereby archaeological remains could be located in relation to geographic features (Anschuetz et al. 2001; Crawford 1922). These distribution maps worked within the prevailing ideas of environmental determinism and allowed early archaeologists to examine culture change in relation to environmental changes. As this technique became more sophisticated, archaeologists began to use geographical patterning of archaeological remains to understand concepts of ethnicity (Trigger 1989). It was during this period that archaeologists began to focus their analysis on defined areas, following the work of Pitt Rivers in England (Thomas 2001). Geographical interests on the part of archaeologists were also evident in North America, where fascination with the mounds of the southeastern United States was foundational to the development of systematic archaeological practices. As greater concern for chronology and culture history rose in the early twentieth century, the geographic distribution remained central, when migration and diffusion were the two primary means for understanding both change through time and space (Norton 1989; Trigger 1989). Unlike most geographers of the time, anthropologists and archaeologists considered diffusion and migration to be two distinct processes (Norton 1989). The genealogical connections between anthropology, archaeology and geography are foundational to all three disciplines, although anthropology and archaeology have generally borrowed more than they have given (Earle and Preucel 1987).

The early periods of both geography and archaeology were characterized by the "natural science" approach that explicitly focused on classification and categorization, not interpretation (Wagstaff 1987). Although interested in human activity, neither discipline developed social theory, choosing instead to focus on physical evidence (Norton 1989; Wagstaff 1987). In the 1940s and 1950s, archaeologists began to move beyond simple artifact classification and historical reconstruction to the study of settlements and aspects of human patterns over the physical landscape. This shift was tied into developments in both anthropology and geography. Sauer, at Berkeley, was intellectually close to Kroeber (1917), who was developing his ideas about the superorganic character of cultural development at the time. Kroeber's ideas resonated in geography, especially his division "between social processes and biological or organic processes" (Norton 1989:15). Subsequent neo-evolutionary developments brought the idea of cultural ecology into anthropology (Steward 1936), where culture and environment were linked in a functional relationship. Human ecology was also being explored during the same period in cultural geography (Thornthwaite 1940), akin to but distinct from cultural ecological approaches in anthropology.

Archaeology adopted materialist concepts and applied them to the study of settlements (Trigger 1989). Steward (1937) engaged in archaeological research, using settlement patterns in the Southwest to discuss the relationships between culture and environment, an event which inspired Willey's (1953) study of the Viru Valley in Peru, the first major work that can be classified as settlement archaeology. Willey moved beyond simple classification by discussing how "settlement patterns are… directly shaped by held cultural needs [and] offer a strategic point for the functional interpretation of archaeological cultures" (Willey 1953:1). Settlement pattern archaeology became widespread after this time, with a number of settlement surveys carried out in the 1960s and 1970s (Adams and Nissen 1972; Anschuetz et al. 2001) and became a favoured method by the New Archaeologists, discussed further below. In China, K.C. Chang (1958) expanded on these ideas by pioneering studies on different scales of analysis in settlement studies – the household, the local group, and the community. The importance of these ideas in this discussion is that they set the stage for the next major revolution in both disciplines – the rise of the "new" and the turn to positivism.

New Geography, New Archaeology: New Landscapes?

In the 1960s, new approaches to landscape analysis arose in both geography and archaeology (Chang 1967; Wagstaff 1987). This particular time was one of increasing interest in the social sciences, following the tremendous growth of post-WWII university departments. Geography moved towards a deductive, positivist methodology, where specific hypotheses were formulated and tested through statistical analysis and other quantitative methods (Wagstaff 1987:27), leading this to be called the "quantitative revolution" (Butron 1963 in Earle and Preucel 1987:503). Cultural landscapes became secondary to the positivistic spatial analyses that were paramount during this time (Norton 1989), because the environment, not culture, was the focus. Both physical and human geographers downplayed the importance of history in their work, leading to what was perhaps its largest intellectual break from archaeology as a discipline. Tilley (1994), in the introduction to his phenomenological consideration of the idea of landscape, notes that during this period, both geographers and archaeologists dealt with abstract space, not human space – "space as container, surface and volume was substantial inasmuch as it existed in itself and for itself, external to and indifferent to human affairs" (Tilley 1994:12-13). This represented a schism from the Sauerian ideas of the cultural landscape.

The 'New Archaeology' was born in 1959, with Caldwell's article in *Science* that identified a shift in archaeology from questions of when and where – the focus of the culture history paradigm – to questions of "cultural processes and situations" and interpretation (Caldwell 1959:304). He cites examples of a growing concern for ecology and settlement patterns of indicative of this paradigm shift – landscape remains a central concern in archaeological research. This was followed three years later by Binford's *Archaeology as Anthropology* (1962) where he presented the idea that culture should be studied through various systems – technological, social, and ideological. Material remains, according to Binford (1965:205), reflected all three cultural systems, and therefore the goal of archaeological inquiry was "to be understood in terms of many causally relevant variables which may function independently or in varying combinations" by examining patterns of material culture. One of the major data sets against which to test these hypotheses and examine these patterns were regional analyses of settlement systems. Spatial analysis as a method for understanding past cultures continued to develop into the idea that came to be known as processual archaeology. In fact, much of Binford's work was concerned with studying a concept very similar to Sauer's cultural landscape, although with a particular focus on change, process and adaptation. As Anschuetz et al. (2001:171) observe, "[settlement] studies contribute varied insights into the diversity, the complexity, and the dynamic interdependence upon humans' technological structures, their social, political and religious organizations, and the physical environments in which they live" – in other words, they consider cultural landscapes.

The Sauerian-defined cultural landscape remained intact in cultural geography until the late 1970s, when the discipline began to experience "stirrings of dissatisfaction" (Wagstaff 1987:29). Wagstaff (1987:30), discussing both archaeology and geography's involvement in the cultural landscape discourse, notes three major sources for this dissatisfaction – a realization of the weaknesses of statistics, a re-evaluation of positivism and the hypothetico-deductive method, and a recognition that the study of modern patterns was not diachronically valid. Explicitly discussing cultural geography as a sub-discipline, Norton (1989:42) made a break between pre-1970 and post-1970 in terms of methodology and the need to "reinstate human intentionality, humans and culture into geography" and into the landscape. This eventually led to the adoption of new ways of understanding the landscape, including Marxism (Olwig 2002; Smith 2003), structural geography and the study of social and symbolic landscapes, associated with the British school (Darvill 1999; Thomas 1993).

In archaeology, a similar although again slightly later development was taking place. Drawing from both the theoretical and methodological changes in geography, as well as anthropology and sociology, scholars within the discipline began to question some of the foundations of processual archaeology (Earle and Preucel 1987; Hodder 1982). Dissatisfied with the study of cultures as adaptive systems, archaeologists began to look towards other theories to explain socio-cultural interaction, power relationships, inequality and human agency. As archaeologists began to look beyond processualism, a new space opened for cultural landscapes to be integrated into archaeological analysis, especially as this concept was being redeveloped in geography.

Landscapes Converged

In the late 1980s and early 1990s, the social sciences as a whole were coming under the influence of postmodernism. Post-processual archaeology was the particular manifestation of "the appropriation of post-structural thought and critical theory by archaeologists" and the interaction of archaeologists with post-modernity (Patterson 1989:556). One of the major challenges of postprocessual archaeology in relation to the adoption of a cultural landscape as a unit of analysis was the critique of objectivity. History and culture were conceived of in broader terms, which allows for an exploration of the interrelationships between these two constructions (Patterson 1989:558). Interest in the human experience and subjectivity led some archaeologists to look beyond their discipline for new theories and ideas.

Cultural geography began to evaluate the idea of landscape from a humanistic perspective, with the appearance of studies considering landscapes as politically, historically and socially constituted (Cosgrove 2000a). Livingstone (1992) challenged the dichotomy of nature and culture as epistemic categories. Other geographers began to realize that humans were active agents in the formation of both culture and nature. One of the major figures in this reconsideration of the Sauerian landscape was Cosgrove (1984, 1985), who recast the history of landscape in relationship to production and capitalism in Europe. Landscapes became politicized realms with human actors creating culture, place and self within humanized space (Tilley 1994). The fluid, dynamic and subjective aspects of landscape negotiation and creation became the focus (Schein 1997). Cultural landscapes were no longer the result of culture working through the medium of nature to create forms – they were complex, flexible, and constructed through social and political interactions. At this intellectual juncture, with the reformulation of cultural landscape in geography and the post-processual critique in archaeology, archaeologists drew upon a long tradition of adopting ideas from their colleagues in geography. It was at this time that cultural landscape, in its new form, became integrated into archaeological research.

In the 1990s, a proliferation of landscape studies in archaeology appeared, with two of the most notable being the edited volume *Landscape: Politics and Perspectives* (Bender 1993a) and *A Phenomenology of Landscape* (Tilley 1994). Both of these are from Britain, where interest in new cultural landscapes was most readily adopted, due to a long history of collaboration between geographers and archaeologists. Bender's (1993a) volume contains discussions of how landscapes are political, especially as related to memory and colonialism, with contributions from archaeologists, anthropologists and geographers. Although conceptually new, many of the units of analysis employed by the contributors to this volume have long histories in archaeology – spatial analysis (Bender 1993a), monuments (Tilley 1993), and the division between public and private space (Bodenhorn 1993). Tilley's work draws on phenomenological constructions to analyse landscapes as subjects:

> People and environment are constitutive components of the *same* world, which it is unhelpful to think of in terms of a binary nature/culture distinction. In the perception of the world and in the consumption of resources (utilitarian or symbolic) from that world of meanings embodied in environmental objects are drawn into the experiences of subjects. (Tilley 1994:23)

Tilley (1994) uses the Heideggerian concept of "dwelling" to understand the human experience and transformation of space to place. The environment was still considered an important part of the study of landscapes in what has come to be known as landscape archaeology (see below). Current work emphasises a variety of cultural landscape approaches such as monuments and ritual landscapes (Bender 1993a), mortuary analysis (Buikstra and Charles 1999), and the relationship between cultural identity and landscape (Fisher and Loren 2003; Maguire 2007; Straughn 2009).

The idea of a cultural landscape has been successful in these diverse disciplines because it bridges the nature-culture divide and provides a way to undermine this dichotomy (Knapp and Ashmore 1999; Layton and Ucko 1999). Its flexibility, ambiguity and inclusivity have allowed it to endure throughout the long history of archaeology. There is considerable diversity in how this concept is applied in archaeological studies today. In their review, Anschuetz et al. (2001:160-161) identify four foundational ideas for the "landscape paradigm": (1) landscapes represent cultural systems interacting with natural environments; (2) landscapes are created as places through cultural activities, beliefs and values; (3) landscapes contain all human activity; and (4) landscapes are dynamic and represent the cognitive map of a community. Feinman (1999:685) presents a different yet related discussion about what he terms the "three tenets" of the landscape approach: (1) study of the natural environment guided by social science research questions; (2) recognition that the relationships between humans and their environment is historically situated and dynamic, shaped by human action and cultural perception; and (3) realization that the human environment is a product or construction of human behaviour. In the same section of *Antiquity*, Fisher and Thurston (1999:630) avoid a list of tenets or premises but instead emphasise the scope of what they term a "landscape archaeology" – which is "a broad, inclusive, holistic concept created intentionally to include humans, their anthropogenic ecosystem and the manner in which these landscapes are conceptualized, experienced and symbolized." Knapp and Ashmore (1999:8) share a similar view in recognizing that "a landscape embodies more than a neutral, binary relationship between people and nature, along any single dimension… space is both a medium for and the outcome of human activity." In discussing the usefulness of the ambiguity of the landscape, Godsen and Head

(1994:114) echo this idea, stating, "landscape is more than the stage setting for human action… landscapes are both created and creating." Ayres and Mauricio (1999:298) note that "archaeological landscapes represent a distinct form of cultural landscape because they develop over long periods of time," an idea also found in the work of Tim Ingold (1993:154), who emphasises the impossibility of separating the concept of landscape from that of time, instead noting that landscape is relational and experiential.

A number of aspects of the concept of a cultural landscape are useful for archaeologists as a theoretical model for understanding past cultures. First, the idea of cultural landscape implies a cultural *process* (Hirsch 1995; Ingold 1993) and represents a dynamic and changing relationship either between experiences of place/space or humans/environment through time. A cultural landscape perspective allows humans to be active agents in their relationship with the physical environment, instead of passive bystanders reacting to changes. Instead of conceiving of the environment as determining, the landscape constrains and is constrained by the actions of agents who generate, and are generated by, interaction with structured landscapes. Some authors have attempted to explore this interaction through a phenomenological approach that considers dwelling in and moving through a landscape as foundational to what that landscape comes to mean at any moment (Ingold 1993; Tilley 1994). At its most extreme, this view postulates that there is no concrete reality beyond cultural experience.

Time and place are inherent in cultural landscapes, making them attractive to archaeologists concerned with change through time in a particular place or places. Another theme is of cultural landscape as *constructed* through human action, in which cultural landscapes are created primarily within the social world of a particular culture at a particular time. Perhaps the most compelling reason that archaeologists have been drawn to this concept is the fact that it is inherently holistic, encompassing many other types of archaeological data such as sites, households and artifacts.

Landscape has also been understood as a medium for the construction of the material aspects of cultural identity, inscribed through building practices, settlement patterns, mapping and naming. Knapp and Ashmore (1999) identify "landscapes as identity," which recognize that people imbue physical places with symbolic meaning through collective group action. This action enhances the meaning of the physical landscape by paying "special attention" to particular landforms or locations through construction or modification. For example, locations that become used for defense by a group may receive "special attention," being visibly prominent. Rock walls, forts, trench embankments and other fortifications also can be obtrusive modifications of the physical environment. In this way, defensive locations receive "special attention" and are a useful tool for archaeologists trying to understand processes of social identity through spatial cognition (Knapp and Ashmore 1999). These locations come to represent identity in a variety of ways, including representing boundaries or territories as well as ritual sites or ecological transitions (Knapp and Ashmore 1999).

Equally important in this particular context, is the notion that some landscapes are representative of a social or moral order. In this case, "the land itself, as socially constituted, plays a fundamental role in the ordering of cultural relations" (Knapp and Ashmore 1999:16) and can contain markers of social roles and identities. "Landscapes of transformation" are landscapes of resistance, conflict and contestation. Although Knapp and Ashmore (1999) discuss landscapes of transformation in the context of state-level societies and the current political atmosphere of globalization, this idea of landscapes as marked and boundaries drawn because of violent interaction is useful for understanding how identity, landscape and conflict intersected in the pre-colonial period of the Fraser Valley. However, it falls short of understanding the role of agency and structure, because landscapes do not just unfold through human experience – they are continuously created, reconstituted and disputed through the conscious and unconscious actions of people. As such, landscapes are a product of s*tructuration*, or the dialectic of agency and structure (Bourdieu 1977).

Agency

> Agency has alternately been equated with the individual; individually unique cognitive structures; resistance to social norms; resistance to power inequalities; the capacity for skilful social practice; freedom from structural constraints; and free will. Likewise, agency has been posited as rooted in purposeful/ intentional action; rational action; conscious practice; unconscious dispositions; and subjective experience. (Dornan 2002:304)

Agency is a concept used with increasing frequency and rigour in archaeological analyses (Dobres and Robb 2000; Dornan 2002; Gardner 2004; Joyce and Lopiparo 2005; Pauketat and Alt 2005; Silliman 2001), yet its application to theory and practice is not always well articulated. In the past 20 years, archaeologists have begun to adopt agency theory, following the work of Bourdieu (1977) and Giddens (1984), as a theoretical framework to understand the process of identity formation and agency in the past. This focus on agency theory, according to Dobres and Robb (2005:159), has been "fraught with paradoxes." Agency is now considered essential to understanding the past, but this theoretical shift has occurred without critical consideration of methodology. Instead, archaeologists have often answered questions about agents, structures and the role of the individual by applying methodologies developed for a very different approach to the past. Archaeology, as a discipline, has rarely generated theory from within (Johnson 2006) since many archaeologists apply concepts developed in other fields without full consideration of their intellectual basis. In order to move forward with critical methodologies of agency in archaeology, we must first return to the foundations of this idea.

The relationship between humans and the societies in which they live has been a central question of social theory from the earliest Greek philosophers through to the twenty-first century. Structure, in classical social theory, was a set of rules forming a matrix which governed the behaviour of individuals in society (Durkheim 1926). Early sociologists, including Durkheim, attempted to explain the nature of social interaction through collective consciousness (Erickson and Murphy 2003). This led Durkheim's student, Marcel Mauss, to suggest that society was governed by elementary structures, whereby shared mental logics explained group behaviours (Knauft 1996). During the mid-twentieth century, social theorists were debating the nature of objectivist versus subjectivist perspectives. On the one hand, Levi-Straussian structuralism, part of the French tradition after Mauss, emphasised the deterministic nature of structures on human thought, while the phenomenologists and existentialists gave more significance to individual will and experience in society (Giddens 1984). Marxism, while objectivist, strongly critiqued the static nature of structure as formulated by French structuralism:

> Whereas Levi-Strauss' structuralism emphasised synchrony, social stasis, and determinism by unconscious mental structures, Marxism and phenomenology emphasised history, social transformation and determinism by conscious subjectivity as mediated by material and economic forces. (Knauft 1996:112)

In the 1970s, several scholars responded to the modernist and structuralist perspective that was dominant in social theory by questioning the foundations of how humans interact with each other and with the structures of society. One major contribution of this reconfiguring of the nature of society was to bridge the gap between the objective or deterministic view and the subjective or experiential view. Two figures in particular contributed to a new analysis of the nature of structure and individual freedom, leading to what is now known as practice or agency theory: Pierre Bourdieu and Anthony Giddens. Understanding how agency is now considered fundamental to the human condition as well as how the study of agents and structures is both compelling and challenging for archaeology requires a nuanced investigation of the works of these two theorists.

Bourdieu's work has been hugely influential in the social sciences since he published *Outline of a Theory of Practice* in 1977 (Knauft 1996). Responding to the dominant paradigms of structuralism, functionalism and Marxism, Bourdieu (1977:3) set out to undermine the dichotomy between objectivist and phenomenological perspectives on the social world by evoking "dialectical relations between the objective structures to which the objectivist mode of knowledge gives access and the structured dispositions within which those structures are actualised and which tend to produce them." From this arises the theory of practice (generation of practice) and habitus, defined as "systems of durable, transposable dispositions, structured structures predisposed to function as structuring structures" (Bourdieu 1977:72). These structures, and the practices that create them, are not functional but are driven by *agency*, conceived as contextual and conceptual knowledge or choice as practiced by agents. *Habitus* is "the product of history and produces individual and collective practices" (Bourdieu 1977:82), illustrating that practice is historical. At times, the structures are made more real with the intervention of doxa defined through competing discourses of orthodoxy (censorship, rationalization) and heterodoxy (competing positions). Implicated in these discourses is symbolic capital - "a transformed and thereby disguised form of physical 'economic' capital" (Bourdieu 1977:183). The relationship between the individual and the community is an important element in conceptualizing practice theory. There appear to be two main reasons for the application of this theory to the archaeological record: (1) the inherent economic, symbolic and material aspects of practice, and (2) the conceptualization of the relationship between the individual, the collective and the structures which are both creating and created by those categories of people.

A related approach that has been even more influential in archaeology is Giddens' (1984) theory of structuration. Giddens' treatise on the constitution of society is based on the fundamental concept of the *duality of structure*, wherein structures only exist through the actions of agents. This represents a break from earlier texts where structure and agent were seen as separate, though deeply intertwined entities. Agency, according to Giddens (1984:9), does not refer to the intentions of agents but rather "their capability of doing those things in the first place." Intended and unintended acts of agents have intended and unintended consequences. Intention, therefore, is separate from action, since unintended consequences of actions may lead to further unconscious acts. This feedback cycle leads to the production of social systems through social practices that exhibit what Giddens (1984:17) terms "structural properties." When these systems endure through time and space, they become institutions, and those institutions constrain the actions for agents in society. Structures, in Giddens' conceptualization, are based on rules that constitute meaning and sanction modes of social conduct, and resources that can be drawn upon by agents "in the production and reproduction of social action [and] are at the same time the means of system reproduction" (Giddens 1984:19). The knowledgeability of agents is also key to the process of structuration – their "scope of control is limited to the immediate contexts of action and interaction" (Giddens 1984:11). His discussion of the recursive nature of the constitution of society includes a consideration of history, noting that history may be produced by intentional action but is not the intended result of that action, although actors do attempt to influence social systems either to maintain them or change them (Dobres and Robb 2005; Dornan 2002). For archaeologists, this way of conceptualizing society is attractive because it moves away from deterministic models and it considers agency to be both material and socially reproduced (Knauft 1996).

The theories of these two scholars have been subject to a number of criticisms, many of which are relevant for archaeology. Knauft notes five areas of critique that apply to both Bourdieu and Giddens: (1) lack of true consideration of the creative impact of individual actors; (2) emphasis on stability instead of historical transformation; (3) under-appreciation of the significance of human motivation; (4) lack of consideration of a variety of types of inequality; and (5) overly abstract definition of structure (Knauft 1996). Many of the fundamental questions that archaeologists ask about change on a variety of temporal and spatial scales, therefore, are not easily addressed using these theories in their original form. Both structurationist theorists were engaging with capitalist, modernist, post-industrial society, and neither show any nuanced consideration of how this process might work in small-scale, non-industrial societies that may contain fewer institutions. For example, one of the areas that

Giddens' theory of structuration has been critiqued specifically is the relationship between agency and power (Gardner 2004), an area of great interest to many archaeologists who study the rise of institutional inequality. Giddens' original theory does not recognize that inequality within society, while created by the actions of agents, also influences the knowledgeability and impact of individuals upon structure. Gardner (2004) uses the example of a Roman emperor, an individual who had much greater access to power than the everyday Roman of the period. The actions of the emperor, however, were constrained by certain institutions as constituted by the actions of all members of the society. People with greater access to power also had greater individual ability to function as institutions. Examples such as these illustrate the pitfalls of applying "agency theory" without interrogating the most effective ways to use it to answer questions about past human societies:

> [W]e have to overturn our whole way of thinking about the past – as the *past* – and consider the ranges of possibilities open to people in their own time and indeed how wide or narrow they considered this range to be (Emirbayer and Mische 1998:985-992). Investigating past agency is thus partly about investigating the conditions for the kind of social engagement…given that this engagement involves *action* rather than *causation*. (Dornan 2002:331)

The foundation for reconsidering the roles individuals play in the constitution of society has had major consequences for archaeology. Current applications of agency theory in archaeology vary, but Dornan (2002:309) identifies five major perspectives: (1) collective agency; (2) individual intentionality; (3) rational actors; (4) unintended consequences of struggle; and (5) practical rationality. Each of these draws upon various aspects of agency theory, but differs in consideration of the importance of the actor or whether we can, in fact, ever *see* the actions of particular agents in the archaeological record. Why agency is now seen by many scholars as important to archaeology is the fact the archaeological record *does* consist of material remnants of the actions of agents. Every artifact and feature we study is the product of the action of an individual or group of individuals in the past. Taken from an agency perspective, each action contributed to the structure of that society, whether to enforce or transform those structures. We need to move beyond mere consideration of agents, however, to question how those actions contributed to the constitution of the society in which they lived. In this way, the archaeological search for agency is misleading, because structuration is present in every facet of the archaeological record that is produced by humans. According to structuration theory, structures and agents cannot exist without the other. Our challenge is to discern how we use archaeological data and analyses to answer questions about agency and structure in the past. Johnson (2010:244) argues that our methods and practices in archaeology are in fact contradictory to the necessary and central study of agency in the past. The way we approach data by clustering, grouping and categorizing time and space into discrete units limits our ability to discuss the everyday practices that define agency. He suggests that it may be productive to "examine the potential and constraints of specific cases where agency, structure and power intersect" (Johnson 2010:246). Therefore, our challenge is to find those situations and moments where we can access the duality of structure, where the *process* is made archaeologically visible on a great enough scale for us to see the actions of agents that created the structures which constrain further action. It is in these instances that we can understand the contextual meanings of the practical and reflective actions of agents with a given society (Dornan 2002; Joyce and Lopiparo 2005).

Humans are agents, and when enough individuals are engaged with structure at a given scale, agency can become the collective action of a group towards shared goals. Much archaeological work on agency has focused on finding individual identities in the past (Hodder 2000) by reconstructing the lived lives of people. Each individual in any society is acting in dialectic with structures at different scales depending on a variety of identities such as class, gender, status, occupation, etc. Studying one side of the dialectic limits our ability to comprehend the particular properties of structure that impact agents in a given society (Dornan 2002). Another issue with attempting to find the individual in the past is that archaeologists assume the concept of the individual self is universal as opposed to a western modernist construction (Ames 2005).

Joyce and Lopiparo (2005) suggest that an appropriate scale for agency is the landscape, which contains traces of repeated practices that were necessary for the reformation and transformation of structure in the past. Considering agency within the broad scale of a cultural landscape provides a framework to connect the abstract nature of theory to the material world. Landscapes are connected inherently to the physical land. No matter the social constraints that influence the choices of actors, they are always constrained by their physical bodies. Therefore, we cannot separate the actions of agents from their physical needs of food, warmth and water. Although I am interested in the complex nature of human interaction and the amazing variability in which people meet these basic needs, we cannot ignore these biomechanical limitations when discussing the choices made by agents. Connections between the abstract process of structuration and the physical world can be found in material culture studies, and are essential to the archaeological endeavour. One of the attractive aspects of agency theory for archaeology is that it recognises “material culture actually constitutes social relations and meaning making” (Dobres and Robb 2005:162). In the absence of written texts, our only window into the past thoughts and motivations of people is through the material traces of what they produced. Reasonable interpretations of the thought processes of individuals in the past are only made possible through an understanding of all the archaeological data available. Without a connection to the archaeological record, individual narratives are in danger of becoming a reflection of the dialectic of structure of the author. A cultural landscape perspective has the potential to ground agency without detracting from its explanatory power because it encompasses the implicit relationship between people and the places they inhabit.

Every action either reforms (reinforces) or transforms structure, while structures in turn constrain those actions. Not all, but most actions by agents produce material traces, and the collective actions of agents create landscapes that reflect the structures of that society as constituted by repetition and innovation through time. Major changes in cultural landscapes may be representative of moments of transformation or rupture in the duality of structure wherein the everyday practices of agents have changed in response to an internal or external disruption. The process of structuration, although ongoing, is *accelerated* in this moment as drastic changes take place. These times of disruption and acceleration are fruitful for archaeologists because the material evidence shifts rapidly, such as a major change in settlement patterns, making the process archaeologically visible. This does not imply that structures and actions are static until disrupted. Rather, the pace of innovation or transformation is more pronounced at certain moments in history. A variety of factors may lead to these types of ruptures, including environmental factors, cultural contact and warfare. In the Lower Fraser River Canyon, therefore, the first act of building a rock feature may be representative of a moment where the process of structuration was accelerated.

Agential Landscapes of the Lower Fraser River Canyon

In considering the cultural landscape of the Lower Fraser River Canyon, I hypothesize that identity is socially constituted and constituting at different temporal and spatial scales and that landscapes are "active" locations where agents engage in ongoing multiple processes of identity formation, structuration and construction, whether intentional or not. The rock features, as an example of changes in the landscape that may be the legacy of changes in structure, would have been built by a group of agents with intent. It is doubtful that we will ever be able to access the individual motivations for constructing the features in the first place, partially due to the type and scale of data available to us. This type of feature is different from other forms of built features in the area in a number of ways, including but not limited to the materials used and the locations where they were placed. Such a disjuncture indicates a shift in the practices of individuals, which in turn impacted the structures that constrained them, regardless of whether or not the actors *intended* to transform structure. The consequences of building features that would endure on the landscape changed how the landscape itself was perceived both by inhabitants and visitors. In this particular case, the cultural landscape would be reconstituted by the act of construction, potentially leading to a more permanent and powerful statement about the people who lived in this region, as materially manifest on the landscape when encountered by others.

I base my research on the premise that the Lower Fraser River Canyon has been inhabited for thousands of years, and that occupation has left a material legacy that we can access as archaeologists. The history of land use, aggregation and forms of co-operative and aggressive interactions made this a very socially active place. All of this interaction and inhabitation led to the creation of a cultural landscape through the process of structuration. In this landscape, different activities took place, one of which was building rock features. These features provide a window to access some of the diverse forms of interaction, conflict and mediation that occurred here in the past. Moments when these features were constructed may represent an increasing concern over ownership of and access to these locations or they may represent a reaction to increasing warfare. They represent a transformation of structure through the actions of agents in the changing landscape that may have led to further change, where the overt modification of the landscape influenced how cultural identities were defined and transformed. The most central question, therefore, is what role does the construction of permanent, monumental architecture have in the creation, transformation and enforcement of community identity on a contested cultural landscape? The remainder of this thesis will combine various forms of archaeological evidence to argue that the rock features of the Lower Fraser River Canyon present an excellent opportunity to consider how agency can have periods of acceleration that make it more visible in the material record, such as the building of permanent structures, and the landscape is a medium to explore the dialectical relationship of structured agency.

3: DEFINING THE LOWER FRASER RIVER CANYON:

Introduction

Although ethnographers and archaeologists have studied the Northwest Coast as a culture area extensively, the lower portion of the Fraser Canyon and upper Fraser Valley has not been as intensively studied (Lepofsky et al. 2000). Some of the earliest archaeological work in British Columbia took place in the Lower Fraser River Canyon in the 1950s and 1960s (Borden 1950b, 1957, 1961, 1968a; Mitchell 1963). In the past fifteen years, the upper Fraser Valley has been the focus of academic research, bringing some attention back to the area as an important cultural place (Lepofsky et al. 2000; Lepofsky et al. 2005; Lepofsky et al. 2009; Schaepe 2001b, 2006, 2009; Schaepe et al. 2006). The cultural sequence in the area indicates a long history of human occupation, dating from at least 9000 BP (Mitchell and Pokotylo 1996). Schaepe (2006:21-22) notes that the Canyon "was…a significant locus of people and food, spirituality, trade and exchange, and interaction in the political economy" and it "deserves recognition as a central place in the...Coast Salish world." Carlson (2007:148) goes so far as to claim that this area "was arguably the most valuable Aboriginal real estate on the Northwest Coast." Many characteristics define the Canyon and I investigate this constellation of unique features by exploring physical, archaeological, cultural, and historical forms of landscape including. Conceiving of each of these features as a landscape allows me to emphasize how they are deeply interconnected on a broad scale.

Terms such as nested, networked, interwoven, entangled – all imply that separate landscapes, but no individual threads in the fabric can be teased out – physical, cultural, historical and contemporary landscapes are an inherent part of one another and cannot be understood in isolation. I explore each of these landscapes below, from the time before people were here through to the present, to show their relationships. While I discuss each of these below, I recognize that all of these so-called "landscapes" are implicated in the creation of all of the others, and that, ultimately, none can be considered as a discrete entity.

Physical Landscape

The study partially defined by the physical characteristics of the region, as expressed in the name "Lower Fraser River Canyon" (Figure 1.5). Defining the geological and environmental characteristics is necessary to situate my archaeological research, especially as I contend that some of these very characteristics contributed to a distinct form of architectural expression through the building of rock walls out of loose granite.

The Lower Fraser River Canyon was originally formed as part of the Canadian Cordillera between 47-35 million years ago. The entire Fraser Canyon was part of a slip fault line, a factor which contributes to its steep-sidedness (Clague 1989). During much of the late Pleistocene, the area was under the Cordilleran glacier, particularly during the last glacial maximum circa 17,000-14,000 BP (Clague 1989; Hebda 2007). The Fraser glacier began to retreat around 13,000 BP and the Lower Fraser River Canyon was ice-free by 11,000 BP (Clague et al. 1997; Mathewes and Rouse 1975). Deglaciation was rapidly followed by the development of lodgepole pine and alder forests (Schaepe 2001a).

Although the area was cooler and drier in the immediate post-glacial period, followed by a period of decreased precipitation and increased temperatures known as the xerothermic, much of the past 6000 years has been climatically stable (Mathewes and Rouse 1975). Current yearly precipitation (measured at Hope) averages 1630 mm of rainfall and 143.1 mm of snowfall with a mean January temperature of 1.1 degrees Celsius and a mean August temperature of 18.8 degrees Celsius (Canada 2010).

No data are available for the immediate Yale vicinity, but it is comparable Hope with slightly more extreme climate (hotter summers and greater snowfall in the winter). The Lower Fraser River Canyon is a transitional zone from the wetter and milder Coastal Western Hemlock zone (CWHZ) to the drier Douglas-fir Interior zone (DFIZ) (Mathewes and Rouse 1975; Pojar et al. 1987), so the region is somewhat more extreme than other areas of the Fraser Valley (Duff 1952). The development of a closed forest environment was hindered by the steep, unstable, rocky terrain and it appears that the whole area has always been a biogeoclimatic transitional zone (Mathewes and Rouse 1975). Although transitional, this area does fall within a sub-zone of the CWHZ, which is the most productive forest zone in Canada (Pojar et al. 1987). It is characterized by mixed western hemlock (*Tsuga heterophylla)*, western redcedar (*Thuja plicata)* and Douglas-fir (*Pseudotsuga menziesii*) forest with a preponderance of mosses. A variety of mosses and salal (*Gaultheria shallon)*, vine maple (*Acer circinatum*), sword fern (*Polystichum munitum)* and other low shrubs are common. A large stand of Garry Oak (*Quercus garryana*) trees occur here, a variety of oak found on southeastern Vancouver Island and the Gulf Islands (Fuchs 2001). The presence of this species points to a warm, dry, well-drained area, as Garry Oaks flourish in rocky, open landscapes and transitional forests (Fuchs 2001). Now part of an ecological reserve managed by the Yale First Nation, this stand of Garry Oaks also contains some of the largest archaeological features, including several rock features

The most important factor that defines the Lower Canyon is the Fraser River itself. With a drainage that spans nearly a quarter of the area of British Columbia, the Fraser River rushes up to 9000 m/s of water and sediment through the Canyon on its way to the Gulf of Georgia. As glaciers melted and the fissure of the Canyon became exposed, the first waters of what would become the Fraser began to flow toward the Gulf of Georgia, carrying glacial silt of what is now an extensive and highly populated delta. The river dominates the landscape today; the land is nearly impassable in places. Water and glaciers have eroded this area, creating a forbidding environment of craggy vertical cliffs, cut through by fast-moving water. Bedrock in the region is granitic and this durable rock has fractured off of the steep sides of the canyon in angular pieces of various sizes. Some granitic outcrops and glacial erratics remain in the river itself, worn smooth from the river below the high water mark, and jagged where they thrust above the surface of the rushing water. These rocky islands create major obstructions for canoe travel, and the southern entrance to the Lower Fraser River Canyon is marked by one of the largest rock outcrops, known today as Lady Franklin Rock.

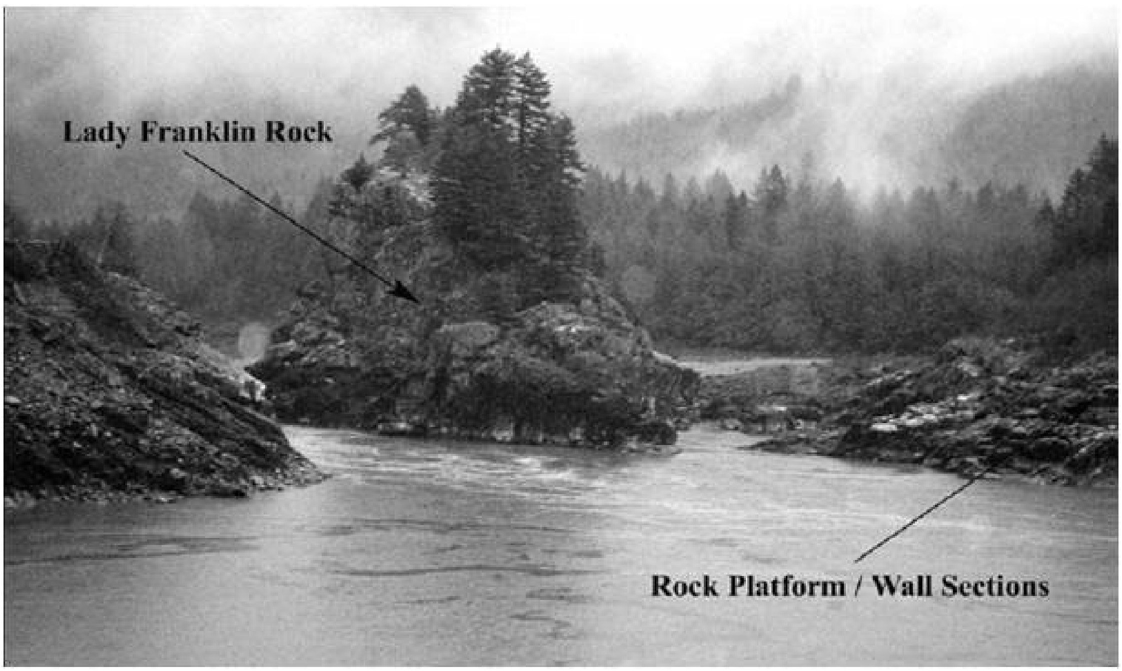

Figure 3.1. Lady Franklin Rock (from Schaepe 2006:684).

At high water in the early summer freshet, it is difficult for boats to travel past this point on the river. At high water in the late spring and early summer, the only option for travel into the Interior was narrow trails on precipitous slopes. When the Hudson's Bay Company established Fort Langley, the Chief Factor Archibald McDonald noted that the Canyon was the insurmountable obstacle for river travel into the Interior, as Simon Fraser had discovered when he travelled the river that would bear his name (Fraser 2007). The narrow Canyon, combined with dangerous obstructions both above and below the surface, created treacherous eddies and currents.

The Fraser River, prior to the collapse of the fishery at several occasions over the past 100 years, contained the largest stocks of Pacific salmon of any river in the world (Northcote and Larkin 1989). Five species of salmon ran regularly in the river: spring/Chinook (*Oncorhynchus tshawytscha*), sockeye (*Oncorhynchus nerka*), coho (*Oncorhynchus kisutch*), pink (*Oncorhynchus gorbuscha)* and chum (*Oncorhynchus keta*) (Northcote and Atagi 1997). The main salmon runs began mid-summer and could run into late October, but the true height of the fishing season was in July and August when the spring and sockeye were running and the favourable wind was blowing. Spring salmon were the favoured species for wind drying, while sockeye were valued for their oil (Duff 1952).

These environmental and geological factors provide both constraints and a range of choices for the people who have lived in the Lower Fraser River Canyon for thousands of years. This is, however, only one part of the rich tapestry that constitutes the cultural landscape of this region. The physical characteristics were managed and defined as crucial to a certain way of life through a broader set of cultural criteria wherein specific meanings were given to this landscape. In the next section, I explore the remnants of past human action represented in the material record as studied by archaeologists.

Archaeological Landscape

From an archaeological perspective, the Lower Fraser River Canyon has not been the focus of intensive research since the 1970s (Lepofsky et al 2000). Academic research has focused on the politically complex fisher-gatherer-hunters who built large, multi-family plank houses, storing salmon and discarded tonnes of shell in extensive shell middens on the areas directly adjacent to the ocean in the Northwest Coast (Figure 3.2). While similar cultural patterns appear to have been in place in the Canyon, the relative lack of data meant more attention was spent on studying the richness of the ancient fauna and flora preserved in coastal middens. A number of reasons exist, both academic and practical, why archaeologists have focused more on the coast and the Fraser River Valley than on the Canyon. For one, sites on the coast have excellent faunal preservation and can be highly visible along shorelines, making them easy to locate and rewarding to excavate. Another factor is the increasing industrial development on the Coast, particularly in the Lower Mainland and the Gulf Islands. To understand the archaeological history and significance of the Lower Fraser River Canyon, therefore, we must look beyond its borders to the Northwest Coast in general, and the Gulf of Georgia in particular. The Northwest Coast is defined as the area from Yakutat Bay in Alaska to Cape Mendocino in northern California (Figure 3.2), - boundaries which are drawn based on commonalities in language and culture (Suttles 1990). On the west, the resource-rich Pacific Ocean provides a convenient boundary; in the east, the extent of the culture area is most commonly marked by the Coast/Cascade mountain range. The area is bisected by the Canadian/U.S. border twice – both in the south and the north. This boundary has had a significant effect on the nature of research along the coast (Moss 2004). As home to peoples that did not have domesticated plants and animals and yet showed evidence of great wealth, high social stratification and permanent settlements, the Northwest Coast was an early anthropological puzzle that did not fit into attempts to classify ethnographic cultures into the evolutionary frameworks proposed by early archaeologists and anthropologists (Ames and Maschner 1999; Deur and Turner 2005). First impressions from Captain Cook's published journals were that this area was a veritable Eden where food was so abundant that no one went hungry (Deur 2002). Due to a late history of direct contact with European explorers in comparison to much of the rest of North America, the Northwest Coast drew considerable attention from ethnologists who came to preserve these vanishing cultures before they were lost (Donald 2003). Consequently, the area has a rich ethnographic record, including lists of cultural traits, recorded oral histories and large collections of ethnographic material culture.

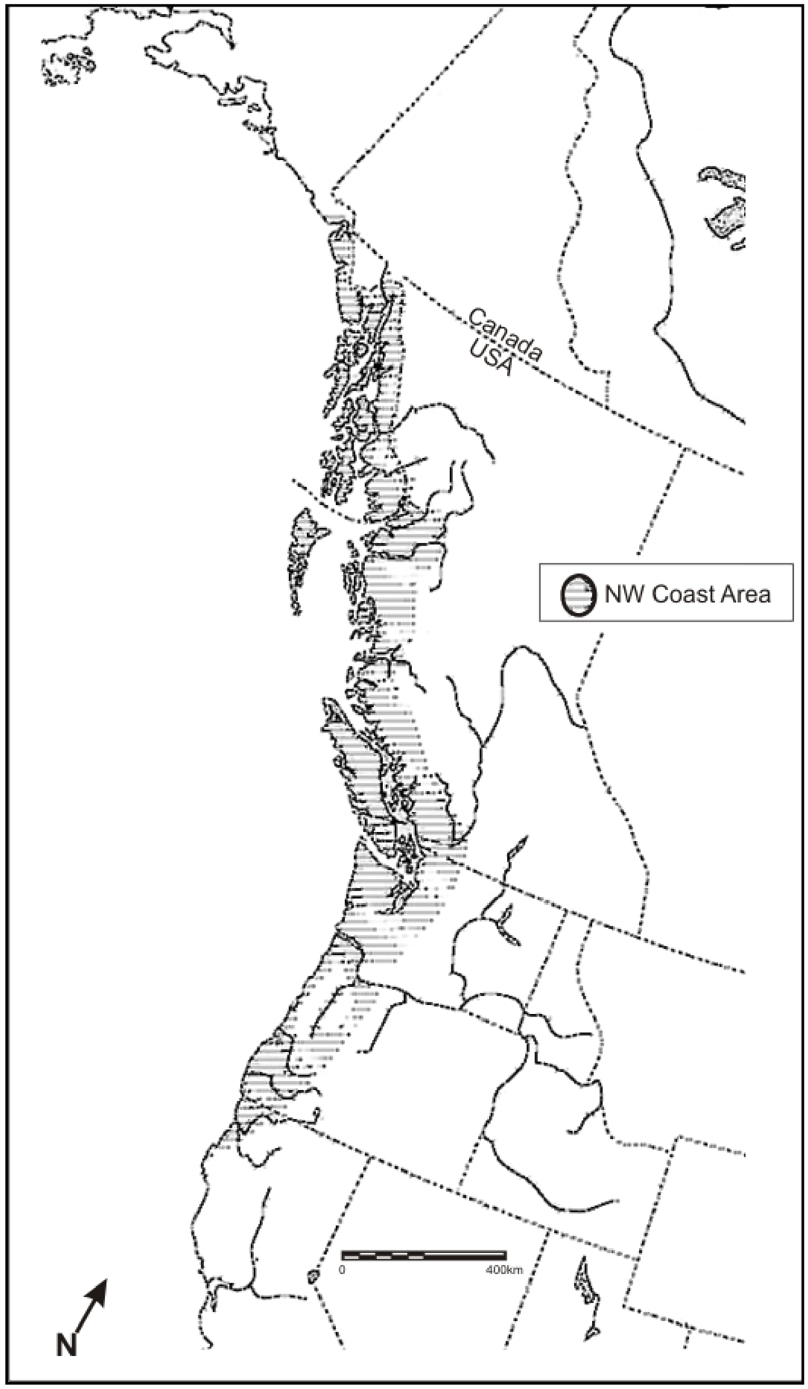

Figure 3.2. The Northwest Coast (from Donald 2003).

This will be explored in greater detail in the next section, but it is important to understanding the archaeological landscape as many archaeological explanations have relied heavily on these ethnographic reconstructions to explain cultural patterns in the past (Grier 2007; Schaepe 2009).

Archaeological research on the Northwest Coast in the past 30 years has focused largely on the development of the pattern of cultures as reconstructed from ethnography, broken down into a number of traits that may be archaeologically visible, including surplus production, storage, sedentary or semi-sedentary cooperative housing, ascribed status, craft specialization, and wealth accumulation (Ames 1994; Matson and Coupland 1995). Models for the evolution of these patterns have been put forward by a number of researchers, but the major focus has been on the intensification of the salmon fishery (Ames 1994; Burley 1980; Cannon and Yang 2006; Cannon 1998; Carlson 1998; Fladmark 1975; Matson 1985) and resource production in response to environmental pressure or variation (Ames 1981; Clark 2000; Coupland 1985). Different mechanisms for the production of wealth and the development of status have been proposed, including resource production at the level of the household (Coupland 1985) and regional interaction and exchange (Ames 1981; Grier 2003). Recent research on the Northwest Coast continues to grapple with questions of cultural complexity (Ames 2001), environmental stress (Clark 2000; Lepofsky et al. 2005) and the use of marine resources (Orchard and Clark 2005). However, a growing number of researchers are exploring other approaches to understanding complexity in the region, involving diverse types of data such as oral traditions (Martindale and Marsden 2003), households (Grier 2001; Schaepe 2009), spatial models (Mackie 2003; Maschner 1996) and fortifications (Angelbeck 2009; Moss and Erlandson 1992).

There are several smaller sub-regions identified within the broad field of Northwest Coast archaeology, of which the Gulf of Georgia (Figure 3.3) has been the most intensively studied (Ames and Maschner 1999). In his 1971 synthesis, Don Mitchell claims that the Gulf of Georgia is a distinct area based on geographic, ethnographic and archaeological characteristics.

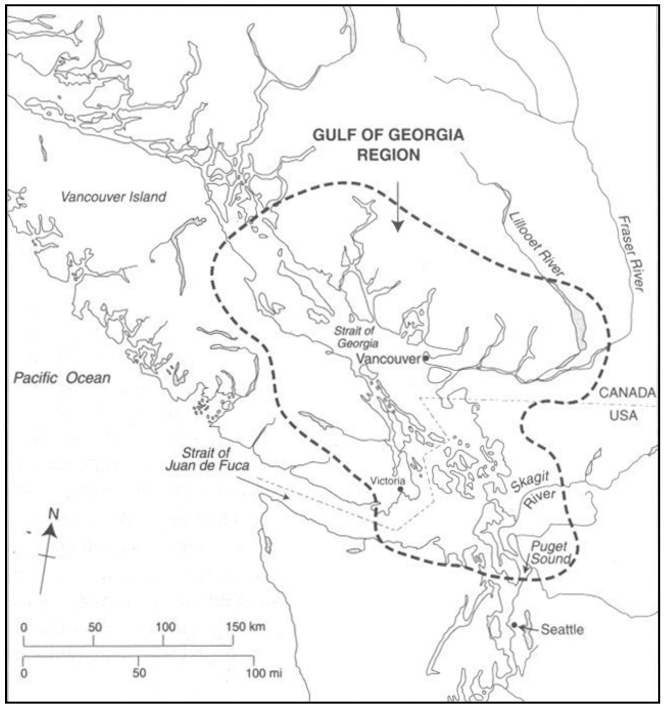

Figure 3.3. Gulf of Georgia region - borders reconstructed from Mitchell (1971). Map adapted from Grier (2001).

This leads him to make three propositions: "that the Gulf constitutes a distinctive natural area; that the area was occupied at time of contact by a population with a distinctive way of life; and that…archaeological evidence confirms the uniqueness of past cultures in the region" (1971:2). Geographically, the Gulf of Georgia is defined as the eastern coast of Vancouver Island from Bute Inlet to the Olympic Peninsula, extending to the mainland to include the Gulf Islands, the Fraser Delta and the Lower Fraser River Canyon (Mitchell 1990).

Much of the area was the traditional home of Northern and Central Coast Salish peoples, but Mitchell (1990:340) divides the "Northern and Southern subareas…as one unit, the Fraser Canyon as another." He makes this claim based on differential preservation of faunal materials and major gaps in archaeological knowledge in the region, including the Canyon. Much of the rest of the lower Fraser River Valley has been a major focus of research throughout the past 30 years (Blake 2004; Burley 1979, 1980; Graesch 2007; LeClair 1976; Lenert 2007; Lepofsky et al. 2000; Lepofsky et al. 2005;

Lepofsky et al. 2009; Matson 1980-81; Matson et al. 1990; Schaepe 2006; Schaepe et al. 2006). Archaeological patterns from other areas of the upper Fraser Valley have been applied to the Lower Fraser River Canyon, but the only academic research to take place in the Canyon since the mid-1960s has been the work of David Schaepe and colleagues (Schaepe 2000, 2001b, 2006, 2009; Schaepe et al. 2006). Their work is the foundation for my dissertation research.

Research in the Lower Fraser River Canyon began in the 1950s with the pioneering work of Charles Borden (Borden 1950a, 1950b, 1957, 1961, 1968a, 1968b, 1970, 1977) at the sites of DjRi-3 (Milliken) and DjRi-5 (Aselaw), discussed in detail below (Figure 3.4). He and his students established the first cultural sequence for the Canyon (reconstructed from Mitchell 1990 and presented in Table 3.1), demonstrating that occupation in the area dates back to at least 9000 BP (Mitchell and Pokotylo 1996). Constructed from a handful of sites, this sequence nevertheless appears to be distinct from the downriver equivalents in a number of ways. The traits associated with each of these cultural sequences are reconstructed almost exclusively from lithic artifacts, as there is virtually no organic preservation besides large, charred seeds and pits.

Mitchell explains that:

> Its archaeological distinctiveness is attained largely by the presence of remains of semi-subterranean winter dwellings, by the absence of shell midden, and by the resulting near absence of bone and antler artifacts and faunal remains from the assemblages (Mitchell 1990:348).

Early archaeological research in the Lower Fraser River Canyon focused on two sites: Milliken and Aselaw. Both locations were the focus of extensive archaeological excavation in the 1950s and 1960s but have not been revisited since.

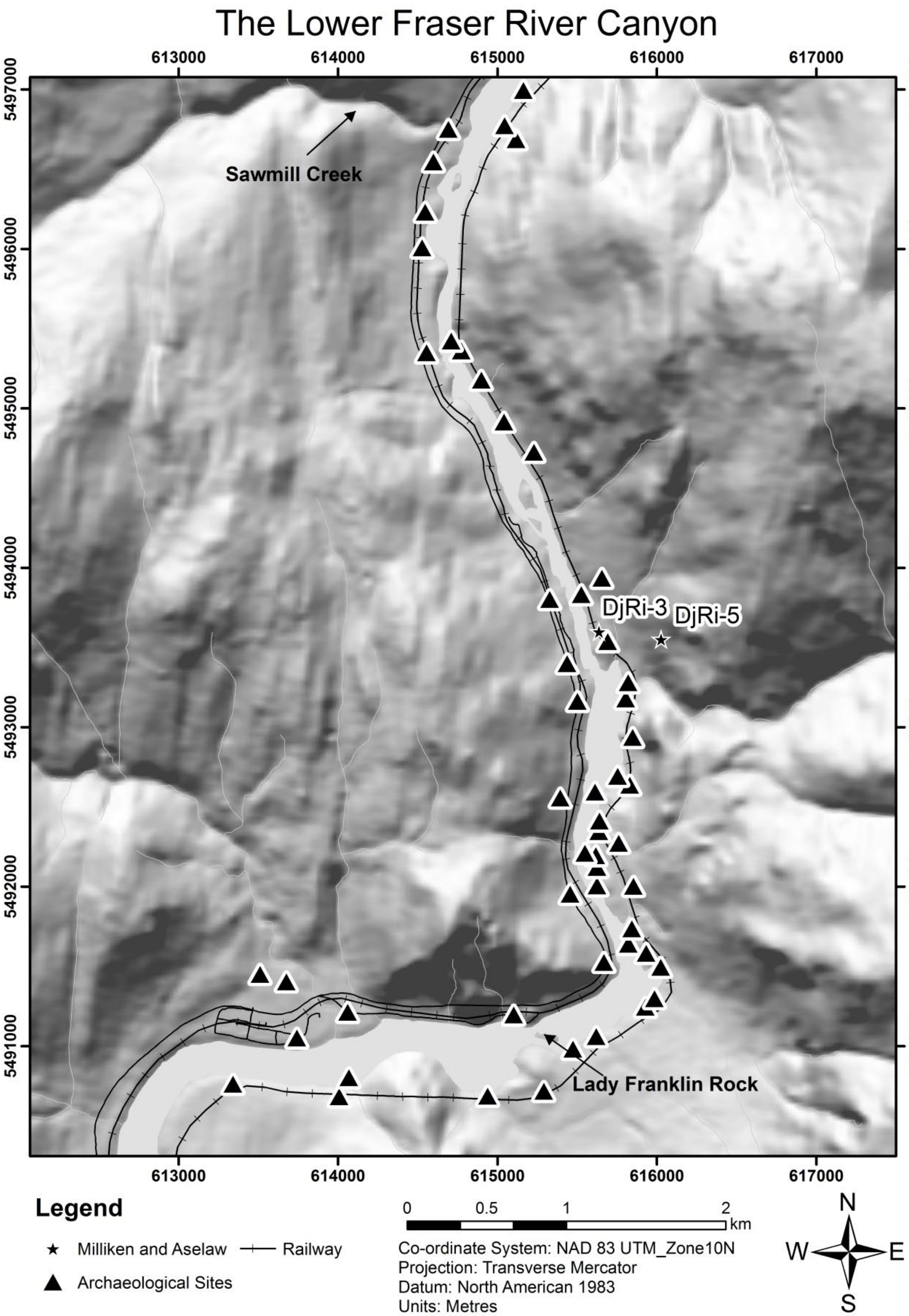

Figure 3.4. Map showing the location of DjRi-3 and DjRi-5.

Table 3.1. Cultural Sequence in the Lower Fraser River Canyon (Mitchell and Pokotylo 1996).

B.P.	**Culture history**	**Technology**
0	Canyon	soft-stone carving, small bifacial points, drills, abraders, hand mauls
500		
1000		
1500	Skamel	notched/stemmed points, drills, retouched/utilized flakes, celts, ground stone knives/saws, slate beads,
2000		
2500		
3000	Baldwin	soft-stone carving industry, stemmed and unstemmed points, microblades (quartz), celts, ground slate knives
3500		
4000		
4500	Charles	stemmed points, drills, ground and flaked slate points, ground slate knives
5000		
5500		
6000		
6500		
7000	Old Cordilleran	leaf-shaped points, pebble tools, utilized flakes, hammerstones, ground stone fragments
7500		
8000		
8500		
9000		

The Milliken site (DjRi-3) was first visited by archaeologists in 1956, when Charles Borden accompanied August Milliken on a reconnaissance mission that resulted in the collection of some artifacts and carbon samples for dating from the exposed cut bank. During three seasons of field work (1959-1961), all occupation zones were explored, including the deepest horizons dating to at least 9000 BP (Mitchell and Pokotylo 1996). The occupation layers were clearly marked by sterile sands and gravels, indicating that the site was occupied during a period when the Fraser River was flooding on a regular basis, even though "the lowest deposits of the site are now approximately 18 m above high water" (Mitchell and Pokotylo 1996:65).

During the excavations, 10 major soil zones were excavated (A-J), detailing a long history of site use dating from 9000 to 2800 BP, after which the site was abandoned. Inferences about seasonal occupation and site use are based primarily on the presence of charred choke cherry pits, as this fruit matures in August and September (Borden 1975). This coincides with yearly salmon runs, although without faunal remains and other seasonal indicators, it is difficult to determine how and why people used this location. A large number of posthole features could indicate an early presence of drying racks, raising the possibility that the fishery in this stretch of the canyon has great antiquity. An early example of a rock feature was described as a "1.2 m long wall of rocks, from two to four tiers high" and was contained within a stratigraphic zone containing carbon samples dating to 8150 BP (Mitchell and Pokotylo 1996:72). Other rock features are also alluded to, as "similar structures in the upper levels of the site seem to have served as retaining walls" (Mitchell and Pokotylo 1996:72). This could indicate a deep history of rock feature construction in the lower Fraser River Canyon.

The archaeological record of the Canyon continues at the Aselaw locality (DjRi-5), 150 m downriver from Milliken. Excavated during 1959-1961, this village was occupied from around 5000 BP through the early post-contact period (Borden 1961; Mitchell 1963). This small village is located about 30-35 m above current river levels and approximately 130 m from the river's edge (Mitchell 1963:41). An historic cemetery is adjacent to the site, a pattern which appears to be quite typical in the lower Canyon, as several other ancient village locations were used as cemeteries when people no longer used these locations. At DjRi-5, four house pit depressions remain intact, although the building of the Canadian National railway had a detrimental impact on several features and completely destroyed others (Mitchell 1963:46). Alongside the house depressions are four rock-lined pits that are not in direct association with any particular house but may have functioned as storage or cache pits.

Mitchell (1963) reported on the excavation of one of the house pits (HP1) during the Fraser Canyon Project in 1962-1962. His goal was to compare traits between coastal and interior peoples to determine people living in the Lower Fraser River Canyon show more affinity with the coast or the interior. He concluded, based on a comparison of ethnographic traits and the archaeological material from HP1 that both the Tait and the Lower Thompson are "interior-aligned Canyon cultures" showing considerable uniformity, although he noted that no ethnographic or archaeological traits were exclusive to the Lower Fraser River Canyon (Mitchell 1963:141). No subsequent excavations took place at any site in this stretch of the Canyon over the next 40 years.

Much of the archaeological research in the Lower Fraser River Canyon in the second half of the twentieth century was motivated by surveys as part of impact assessments and salvage projects (Lepofsky et al. 2000:394), the result of which was a record of a large number of archaeological sites along this area of the Fraser River. Kidd's 1963 survey focused on the east bank of the Fraser River that is only accessible by boat or train (Kidd 1968). His goal was to locate and record archaeological sites before development of housing and industry destroyed them. Kidd's survey recorded several of the rock features explored in this thesis, yet he dismisses a large concentration of them on IR3 as the result of post-contact construction activity:

> Two rectangular rock-lined pits occur there, approximately 150 yards inland and 70 feet above the river…There is a gill-netting station on the river bank below the pits, and several stone walls possibly built by miners occur a few yards upstream…A few specimens (artifacts) were collected near the pits…DjRi 22 may have been a mining or railroad camp. It was apparently established on a pre-existing aboriginal site. (Kidd 1968)

When addressing a series of rock features further upstream, he postulates that they could have been canoe runs. One of the platforms at the site labelled DjRi-22 by Kidd has been dated to the late pre-contact period, meaning that these stone walls were abandoned long before miners ever reached the area (Schaepe 2006). This persistent prejudice has led to these features being archaeologically ignored (Schaepe 2006).

Throughout the course of my research, however, I came across a brief report from 1970 by a former UBC student who had done a preliminary study on these features. He photographed, measured, and discussed some possible uses of rock features at several locations in the Canyon, clearly considering these to be important archaeological features worthy of greater study (Melhuish 1970). This student did not continue in archaeology, so research on the rock features did not get underway until the late 1990s (Schaepe 2000, 2001b, 2006). More recent research into these rock features has established that they are Aboriginal constructions that mark the landscape in monumental and resilient ways.

My motivation for exploring rock features in the Lower Fraser River Canyon stems from preliminary work by Schaepe (2000, 2001b, 2006), who, in conjunction with members of the Stó:lō Nation, identified and classified four rock wall sites in a seven kilometre stretch of the Canyon above Yale. Schaepe has proposed, based on the known archaeological, ethnohistorical and oral data, that these sites constitute a "defensive network" (Schaepe 2006:41). These formations are generally located at late pre-contact/early post-contact village sites, and are thought to date to the Late Period (1500-250 BP). Based on archaeological, ethnographic, historical and oral historical work that he has completed in conjunction with the Stó:lō Nation, Schaepe (2006:51) concludes that the rock walls functioned as fortifications, and formed a line-of-sight defensive system. Schaepe (2006:671) does note the political role that these monumental fortifications played in promoting ownership and defining territory, arguing that they demonstrate an inter-village system of governance that worked to protect this valuable landscape. Schaepe noted that the sites require further study to address their temporal and spatial distribution, so this thesis is a follow-up and expansion of Schaepe's important work. I evaluate his hypothesis in a later chapter by applying the defensive index and viewshed analysis to a sample of the rock features in the Lower Fraser River Canyon.

Overall, the archaeological landscape as embedded in the physical geography of the Lower Fraser River Canyon is rich but less studied than the adjacent Fraser River Valley and Gulf of Georgia. Although it has yielded sites of significance, there are several reasons why many researchers have chosen to focus elsewhere on the Northwest Coast, not the least of which is the somewhat acrimonious local politics that, as discussed below, have been developing over a long period. The contemporary political landscape is a direct product of the complex history of exploration, conquest and colonization.

Cultural Landscape

In this section, I consider how ethnographic reconstructions of culture have created a view of the Canyon as a central place among Coast Salish communities. I begin by addressing the complicated nature of cultural boundaries in the Coast Salish world. This has been a topic of recent study by Thom (2009) who identifies the paradox of territory within Coast Salish communities, as western concepts of fixed boundaries between communities are antithetical to many Coast Salish people. The act of drawing lines on a map does not make sense in a culture where identity was as much informed by kinship as it was by belonging to one particular place. Tensions between families and communities have been exacerbated by the necessity of claiming a territory that more often than not overlaps considerably with neighbours, family members and friends. The northern edge of the Lower Fraser River Canyon sits along a much more strictly defined boundary than many other areas of the Coast Salish world – that between the Coast Salish and the Nlaka'pamux or Interior Salish. Even today, members of the Yale community will not cross Sawmill Creek (see Figure 3.4), as it would infringe upon the territory of the Nlaka'pamux. Thus in one sense, the Lower Fraser River Canyon is well defined as the northeastern borderland of Coast Salish territory, whereas in another sense, it can be considered a central place in the Coast Salish world (Carlson 2007; Schaepe 2006). The southern boundary of the Lower Fraser River

Canyon, therefore, was subject to different forms of boundary-making than the northern portion.

Another consideration is the relationship between the ethnographic and archaeological records. This has been the recent focus of critique, as archaeologists working on the Northwest Coast have often extended observed cultural patterns from the "ethnographic present" uncritically into the distant past (Grier 2007; Schaepe 2009). While the testing of ethnographically generated models with archaeological data can prove fruitful (Schaepe 2009), the ethnographic record is best conceived as an account of changes within indigenous cultures over the past 200 years, just as the archaeological record is an account of change over the past 10,000 years. I frame this discussion of the cultural landscape in terms of the social practices that informed the identity-making process of indigenous peoples in the time just after European contact and the first smallpox epidemic of 1782. While many social practices were in place in the Canyon, the most important feature evoked repeatedly by First Nations peoples is how access to the fishery is regulated. I conclude this section by discussing of the usefulness of ethnographic accounts of culture in understanding the role of built rock features in the process of identity formation and maintenance in the late pre-contact period of the Lower Fraser River Canyon. The question of who belongs in the Canyon has perhaps never had a simple answer.

Ethnographic Reconstructions of Culture

> [T]he indigenous people living in the lower Fraser watershed are generally known collectively as the "Stó:lō" or "River People." Whether the term Stó:lō implies simple cultural similarity, social affiliation, or some degree of underlying political unity, however, is hotly debated. Some Aboriginal people regard the meaning behind the term Stó:lō as a construct of the western intellectual tradition. Others go so far as to dismiss the notion of a Stó:lō collective identity as a duplicitous fiction created by nefarious academics and Canadian politicians to facilitate the erasure of more traditional

> tribal and settlement-based forms of identification and political authority. (Carlson 2003:6)

For the people who lived in the Lower Fraser River Canyon for thousands of years, the river was the primary means of transportation, communication and sustenance. It was a central part of the lives of people from all around the Coast Salish world (Carlson 2001c). The Lower Fraser River Canyon has been portrayed as the traditional territory of the Stó:lō people, part of the larger Coast Salish speaking world, although the area of study is currently disputed between members of the Stó:lō Nation and the Yale First Nation. This is partially a product of the history of research; therefore, the following should in no way be considered a definitive history of cultural practices in this region. In this section, I discuss the work of several ethnographers whose focus was on the Coast Salish in a broad sense as well as the Stó:lō in particular. The term Stó:lō literally means "river" in Halq'emélem, the upriver dialect of the Halkomelem Coast Salish language family, but is used in anthropology to refer to "a collective of indigenous Halkomelem-speaking peoples" who inhabit the entire lower Fraser River watershed (Schaepe 2009:330). In the contemporary political landscape of this region, however, the term Stó:lō, as illustrated in the quote above, is a highly contentious term.[5] A recent focus of research (Carlson 2010; Schaepe 2009) has been on the origins of collective political identity that has come to be represented by supra-tribal organizations such as the Stó:lō Nation and Stó:lō Tribal Council[6]. While recent archaeological research by Schaepe (2009) suggests that a supra-tribal collective political and economic community may have arisen in the area by 550 BP, a historical analysis by

[5] I use the term Stó:lō here as it has been the term employed by ethnographers, anthropologists, archaeologists and the communities they work with to refer to the people who lived in the Canyon prior to their relocation to downriver reserves. This collective identity is strenuously objected to by one of the communities I have collaborated with on this project who still live in the Canyon today.

[6] The Stó:lō Nation and Stó:lō Tribal Council are institutions who represent a collective of several First Nations in the Upper Fraser River Valley and surrounding areas. For more information on the Stó:lō Nation, please see: http://www.stolonation.bc.ca/, and for more information on the Stó:lō Tribal Council, please see: http://www.stolotribalcouncil.ca/.

Carlson (2003) shows how this collective, supra-tribal *political* identity is partially a product of indigenous agency in response to devastating colonial oppression and disenfranchisement. The term political is important here, because strong inter-community connections existed in social, familial and economic realms prior to the interference of colonial forces in indigenous lifeways. Whether or not true political unity existed prior to contact is still a major point of debate.

The portion of the river, named the "Rapids" or the "Falls" by some of the earliest European settlers at Fort Langley (MacLachlan 1998), was an area where several thousand people aggregated from all over the Gulf of Georgia for as many as two months each summer at the height of the fishing season. Strong currents proved to be a major challenge for salmon returning to their spawning grounds on the upriver tributaries of the Fraser, allowing people to catch resting salmon. People would come from as far away as Vancouver Island in order to fish in the Lower Fraser River Canyon, as it was the ideal location to catch tens of thousands of salmon from the greatest salmon river in the world and wind-dry them for preservation through the winter months. The best fishing spots were highly prized locations adjacent to back-eddies, the ownership of which was negotiated through family and kin relationships. Although salmon played a crucial role in providing food to last through the winter, the landscape provided other forms of nutrition, as plant-gathering and hunting formed important elements of the subsistence pattern. Ethnographic accounts record people in this region maintaining berry patches at high elevations through selective burning (Duff 1952). Terrestrial mammals such as black bear, deer and mountain goat were taken for meat and secondary products.

Several key elements of culture tie the landscape of the Lower Fraser River Canyon to the process of identity making: (1) ownership and protection of resource locations; (2) kinship relations that permit access to resource locations; and (3) intercommunity interaction through the seasonal aggregation of people from many places in the Coast Salish world. Identities are scalar and interconnected, since ownership and protection of resource locations was the primary concern of people who lived at a series of permanent settlements within the Canyon. Access based on kinship was with family members and in-laws living along the Fraser River from the Canyon to the Delta, and other access could be negotiated through tribute and trade with members of communities across the Strait of Georgia to the islands. The cultural landscape of the Lower Fraser River Canyon, therefore, has broader connections throughout the Coast Salish world. Any person beyond this scope, unconnected by kin, was an outsider or an enemy. A constant tension between co-operation and conflict existed in terms of who had rights to access fishing locations, occasionally resulting in open hostilities, a situation which emphasizes the significance of the landscape of the Lower Fraser River Canyon for the Coast Salish of the Gulf of Georgia.

Whether or not Coast Salish society was comprised of class distinctions has been a matter of some ethnographic debate. Suttles (1987:12) suggested that Coast Salish communities were comprised of a large class of high status peoples, with a few leaders, and a smaller proportion of the society comprised of "worthless people." Below this was a small class of slaves, comprising the bottom of what Suttles terms "inverted pear" (Suttles 1958:14) social stratification. A large upper class within Coast Salish society has implications for labour organization and coercion; it is less likely that a high class person could mobilize labour from other high status people. Social organization of this form is based on Suttles' ethnographic reconstructions of culture and may not reflect pre-contact society. In fact, Schaepe (2009:258-260) argues that the social structure in the late period (550 cal BP -100 cal BP) might be an inversion of Suttles' inverted pear, with a smaller group of individuals having high status and living in large houses. Lower class people formed the largest portion of society in Schaepe's model. If this model is a more accurate representation of past social organization, then it is possible that high status people could have controlled labour from lower strata in society, both from the lower class and from slaves. The nature of class distinctions among societies along the lower Fraser River, therefore, is still being investigated.

Ownership of Resource Locations

> Prior to the migrations of the nineteenth century, the "owners" of canyon fishing sites tended to live in one of the several adjacent settlements. Ownership, expressed though the regulation of extended family members' access, was the prerogative of men, although the right was sometimes inherited through a mother's line. The system of property transfer was the potlatch naming ceremony. (Carlson 2007:157)

The canyon was a desirable place to catch and preserve salmon, so access to the area was sought after by people living all along the Fraser River and into the Gulf of Georgia. Therefore, those communities who controlled that access were in a position of organizational power (Wolf 1990:586) over their neighbours, with a greater ability to affect the lives of other people (for a detailed discussion, see Angelbeck 2009:19-20). The steep and rocky nature of the Lower Fraser River Canyon limited the number of locations with good access to a back eddy or otherwise desirable fishing spot. Extended families owned such locations (Suttles 1960:320; Thom 2009) and they were usually managed by a prominent male member of the family, known in Upriver Halkomelem as *siyá:m*. Ownership consisted of several privileges and responsibilities and included the right to deny access and the obligation to share both within and between communities. As Carlson noted, the "use of dip nets, platforms and dry racks was regulated by family leaders, who ensured that all people received sufficient winter supplies while granting higher-status relatives preferential access" (Carlson 2001a). Access to fishing spots was enforced by those living in nearby settlements and could be refused to distant affinal kin or to people who could not demonstrate kin relationships (Thom 2009:185).[7]

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[7] This practice continues today, as histories of family ownership are evoked as part of contemporary disputes around ancestral fishing locations in the Lower Fraser River Canyon. See Carlson (2007) for a discussion.

However, tensions often arose when one family did not recognize another family's rights of ownership, and if these disputes went unresolved, people sometimes experienced shortages in necessary resources (Carlson 2007:159-161). In ethnographic accounts, it appears that the more desirable the location, the more necessary it was to define which family had rights in order to that place to reduce conflict (Carlson 2001a). Familial rights to these spots were maintained by transferring of ancestral names and prerogatives to one's descendants at potlatches. Members of high-status families would come from all over the Coast Salish world to witness and clarify collective family ownership through these ceremonies (Carlson 2007).

> When a leading member assumed a name that harked back to the beginning of the world when the ancestors of the group first appeared on the spot, this not only demonstrated the validity of the group's title but perhaps also announced in effect 'this is the man in charge of our resources' (Suttles 1960).

A famous potlatch was held in 1890 to transfer hereditary rights to a Canyon fishing location. (Carlson 2007:159). Suxyel, a well-known leader of a prominent family living at the site of Aselaw, decided to move out of the Canyon to more arable land further downriver. As a necessary consequence of this move, the elders of the family required that his name and associated rights to the family fishing location be transferred to a member of the younger generation, in this case his youngest son who carried great potential for spiritual power. A potlatch was held in Yale which included guests from as far away as Vancouver Island and Powell River who witnessed the transfer and ensured the hereditary name, along with all associated privileges and responsibilities, remained part of the family line (Carlson 2007).

Intercommunity Interaction and Access to Resource Locations

While people who lived at locations in the Lower Fraser River Canyon were responsible for regulating access to valuable fishing spots, their extended kin, connected either by birth or marriage, were also entitled to share in the benefits. Advantageous marriages were often arranged to ensure access to valuable property among high-status families, since "knowing who your relatives were and being able to demonstrate family relationships was … of great economic importance" (Carlson 2001a:27). If a family from further downriver could show either blood or in-law relationships with a family in the Canyon, they had the right to partake in the summer fishery (Carlson 2007). Most people who lived along the river could trace some form of connection to a family-owned fishing station in the Lower Fraser River Canyon and claim the right to use it (Duff 1952). However, since "coastal and valley people had greater incentive to visit the canyon than their relations had to visit them," the Lower Fraser River Canyon was an important central hub of interaction, allowing the people who lived there to hold positions of power (Carlson 2001a:27). This is illustrated by the fact that one of the most highly respected leaders of the Stó:lō world, Liquitem, lived at Yale during the late nineteenth century (Duff 1952; Smith 1949).

Suttles (1960) argued that sharing access was a mechanism to cope with the variability and seasonality of resources, creating possibilities for getting rid of excess of food resources from one location (i.e. salmon) and replacing it with different resources (i.e. berries). However, sharing access also formed networks of places that people could access through both ancestral rights and marriage connections (Thom 2009:186). These networks were important among the Coast Salish, but could shift and change quite readily through generations. The fluidity of kin relations was partly constrained by families' attempts to create and maintain marriage ties to other high-status families. For example, access may have been regulated with greater care during the summer months of July and August, as this was the ideal time for wind-drying salmon (Carlson 2001c). With an aggregation of several thousand people in a seven kilometre stretch of river, location ownership may have been required to be clearly expressed and maintained. It was during this time that family connections could become mobilized and, in some cases, disputed. The physical presence of a permanent feature on that landscape could have lent greater power to a family's right to control access to that particular location.

Co-operation and Conflict

The significance of the Lower Fraser River Canyon in the cultural landscape of the Coast Salish can be illustrated further by exploring the cultural tension between the value placed on non-violent conflict resolution and the ambivalent status of warriors (for a discussion, see Angelbeck 2009:109-113). Kinship and marriage were means to obtain access to valuable fishing locations without actually residing year round in the Lower Fraser River Canyon. Among these relations, potlatches appear to have been the main mechanism to establish rights and title to these fishing spots. When disputes arose, a family would engage in a public display of ancestral connection in order to silence any dissenting voices. As Carlson (2007:157) notes, "tensions between different social and economic classes among the Coast Salish" were a result of "internal indigenous efforts at boundary maintenance." Most Coast Salish communities were structured on class lines, where the majority of the population were "worthy" people who had demonstrated connection to ancestors, knowledge and moral training, a smaller portion of the community were free but "worthless" people, either tainted by the stigma of slave ancestry or having lost/forgotten their own connections to history, and the smallest portion were slaves, considered non-human property of members of the highest class (Carlson 2007; Suttles 1958). Cultural value was placed on wisdom, ability, industry, generosity, humility and pacifism, so leaders of the highest ranking families were people who displayed these qualities and earned the respect of other members of society (Duff 1952; Suttles 1958). Tensions between members of socio-economic classes occasionally resulted in the worthless or low-class members of the village moving away to establish their own settlements (Carlson 2007) but could also be mediated by the high status and morally superior leaders (Duff 1952; Suttles 1958).

Two levels of conflict threatened the villages of the Lower Fraser River Canyon that could not be mediated away and often resulted in violence: feuds and raids for wealth (Schaepe 2006), so "most villages of any size had at least one fighting man who assumed leadership of village defence or of war-parties" (Duff 1952:81). These warriors had supernatural powers but were also considered somewhat dangerous (Angelbeck 2009); they played a central role when villages were under threat. Intercommunity conflict among the Coast Salish has been the focus of recent research (Angelbeck 2009; Schaepe 2000), partially in response to a persistent perception that Coast Salish people were passive defenders against violent intruders such as the Lekwiltok from Northern Vancouver Island. Angelbeck argues that this stems from a limited window into Coast Salish history, one blurred by the effects of disease and impacts of European firearms (Angelbeck 2007:261). An interpretation of the significance of these rock feature sites is that they acted as part of a defensive network, co-ordinated and managed by a corporate family group political structure which served to regulate access to the entire Lower Fraser River Canyon (Schaepe 2006). A collective Canyon identity, therefore, may have been best expressed during times of stress, particularly warfare. The rock wall features, if serving a primarily defensive purpose, may have been material expressions of that collective identity. The remains of these patterns, both cultural and material, were significantly disrupted by the arrival of disease, followed by the first encounters with European explorers, fur traders, and eventually the establishment of the colony of British Columbia.

Colonial Landscape

This section discusses the first encounters between First Nations peoples and the invading explorers from Europe. The term history has been used in archaeology as a contrast to the term prehistory. Inherent in this usage is a privileging of written history over other forms of historical reckoning and ways of knowing. I consciously avoid the term prehistory throughout this thesis, but find the term colonial landscape useful for detailing the impacts that European contact had on the other forms of landscape defined in this chapter. In this section, I also present some local First Nations' histories of contact to illustrate how the arrival of Europeans on their land influenced the relationship between settlers and First Nations groups for the next century.

First Contact

Compared to the rest of what is now defined as North America, the Northwest Coast in general had a late history of European colonization. The first recorded visits by Europeans to this region date to the mid-late eighteenth century, when Russian and Spanish explorers encountered Tlingit, Haida and Nuu-chah-nulth peoples along the outer coast (Carlson 1990a). One of the consequences of these visits, particularly Cook's 1778 "third voyage of discovery" (Carlson 1990b:70), was the recognition of the value of sea otter pelts in the growing fur trade to Asia and Europe. When this was made public, merchants were drawn to the region in great numbers. Throughout the 1780s and 1790s, Spanish, British and French explorers mapped large portions of the coast, establishing both positive and negative relationships with local First Nations. Although no permanent forts or trading posts were established until 1799, the introduction of European trade goods had a near immediate impact on the traditional political structures of First Nations (Martindale and Jurakic 2006). Exacerbating this disruption was a smallpox epidemic hypothesized to have travelled via inland trade routes and possibly decimated the population of the coast in 1782 (Harris 1994). The potential major loss of life is notable in several ways: (1) it renders much early ethnographic work problematic; (2) it makes estimating pre-contact population challenging; and (3) it means that peoples of the Lower Fraser River Canyon felt the impact of European contact at least a decade or more before they ever saw a European. Not only did this epidemic take the lives of a large portion of the population[8] (Harris 1994), it also left the structure of society in disarray, as the inherited rights to names, crests and positions of power were undermined because entire lineages may have been wiped out.

Much of the early exploration did not push up the river valleys, but in the 1790s and early 1800s, there was an increasing desire to find the famed "Northwest Passage,"

[8] Estimates about the actual percentage of the population that died from smallpox is debated, ranging up to 90% (Harris 1994).

a navigable route that would connect the east with the west. Several expeditions were mounted, and the first European to arrive at the Coast overland was Alexander Mackenzie, who followed the Bella Coola River to the ocean (Suttles 1990). This was followed by the descent of the Columbia River by Lewis and Clark in 1805-1806. Simon Fraser, of the North West Fur Company, was attempting to find the origin of the Columbia River when he embarked on his journey of 1808. The river Fraser followed to the sea was not the Columbia, much to his disappointment; it was a river now known by his name. His journey from the Interior to the Coast is the first written account that refers to the Lower Fraser River Canyon. His journal survived and provides us with a perspective on the attitudes of European explorers toward First Nations people at that time.

> Tuesday, June 28, 1808:
>
> Continued and crossed a small river on a wooden bridge. Here the main river tumbles from rock to rock between precipices with great violence…
>
> This nation is different in language and manners from the other nations we had passed…
>
> Both sexes are stoutly made, and some of the men are handsome; but I cannot say so much for the women, who seem to be slaves, for in course of their dances, I remarked that the men were pillaging them from one another.
>
> At the bad rock [Lady Franklin Rock], a little distance above the village, where the rapids terminate, the Natives informed us, that white people like us came there from below; and they shewed [sic] us indented marks which the white people made upon the rocks, but which, bye the bye, seemed to us to be natural marks. (Fraser 2007:118-120)

Here Simon Fraser is crossing a boundary from Interior to Coastal people as defined by the small creek he crossed, thought to be Siwash or Sawmill Creek. He and his crew could not navigate the river through this section of the Canyon, because the river was in freshet and highly dangerous. Of all the areas of the river, this was one of the most physically challenging, since Fraser and his crew were required to portage by scaling steep cliffs – "we had to pass many difficult rocks, defiles and precipices" (Fraser 2007:136). Simon Fraser first observed plank houses during this part of his journey: "an excellent house 46 by 23 feet and constructed like American plank houses" and that "on the opposite side of the river, there is a considerable village with houses similar to the one upon this side" (Fraser 2007:119). While there are several archaeological sites that may correspond with this village, all of these locations may have contained rock features, although these were not mentioned in Fraser's journal.

The "natural marks" shown Fraser were the remnants of a major battle between two local mythical figures. The fact that Simon Fraser did not recognize the marks meant he did not belong there, contrary to the initial impression of the people was that he was the Transformer returned to make the world right once more (Carlson 2001c). As word of Simon Fraser travelled down the river to the Coast, his reception became less and less cordial, until he encountered open hostility from the Musqueam (Carlson 2007:126). From a First Nations perspective, this visit was troubling:

> A long time ago when tribes had left winter villages to go to Yale for summer for salmon, news came from above from Big Canyon that men of a different race were coming. The people were troubled.
>
> It was thought that they must be the people spoken of in the old stories. They were getting scared. They thought that because they were the people spoken of in the old stories by their grandparents, when they appeared they would help the good people and be their friends, but if bad they [would turn] them into stone, or animals or birds…The chief sent messengers to [meet] the strangers at big Canyon and to invite them to come down…When the party got to Yale all the people were crowded the [better] to receive them and gave them all kinds of food. When the Yale people saw them they remembered that some time before a visitor to them from the Columbia River country had described the way of the white people and they then found that they were the same, and they were easy in their mind – (Chief Peter Ayessick of Hope (1890s), quoted in Carlson 2001c:84)

One of the consequences of Fraser's journey was the realization that the river was not the easily navigable trade route that the North West Fur Company had hoped. Instead, it was treacherous and impassable, so other routes into the Interior had to be established. A second descent of the river in 1828 by George Simpson confirmed this verdict (Fraser 2007). Although he travelled in the fall when the river was lower, he nevertheless found the journey terrifying and concluded that, "I should consider the passage down, to be certain Death, in nine attempts out of ten" (Simpson in Fraser 2007:50). The Fraser River was not used as a European trade route of any significance until the building of the Cariboo wagon road in 1862 (Harris 1998). In the meantime, several other events had an impact on the historical landscape of the Lower Fraser River Canyon, notably the founding of Hudson's Bay forts and the Fraser River Gold Rush.

Fort Langley

The policies of the fur companies based in what was to become Canada were to limit settlers in fur country, as employees who wished to settle "were considered threats to the trade" (MacLachlan 1998:6). For the forty years or so after the establishment of the fur trade, therefore, there were no large settlements of Europeans anywhere on the Coast. The Hudson's Bay Company, seeking to control the British rights to trade for rich furs in the region, worked to establish a headquarters north of the 49^{th} parallel and launched several expeditions to scout an appropriate location (MacLachlan 1998). Following the success of Fort Vancouver on the Columbia River, the decision was made to establish a similar presence on the Fraser River. By the summer of 1827, plans for Fort Langley were well underway, and the process of colonization began to accelerate. As was practice at the time, the Chief Factor kept a daily log book of the activities of the Fort, including the comings and goings of local Indians. The connection between Fort Langley and the Lower Fraser River Canyon is found in these daily logs, particularly when the salmon were running in the summer:

1827: Chief Factor George Barnston

> Thursday, August 2: The arrival of this fish is hailed by the natives with joy and festivity. At this time they are excellent, but only to be had at the Rapids above, where in the course of the season great quantities of them are taken by the natives and dried for winter provisions. (MacLachlan 1998:31)
>
> Monday, August 20: A number of Cowitchens passed with their families and moveables on their way up to kill Salmon at the Rapids, where they are to remain some time collecting a Stock of Dried Provisions for winter (MacLachlan 1998:33)
>
> Saturday, August 25: Families from the Sanch Village at Point Roberts have been passing in continued succession during the day all bound for the Salmon fishery. (MacLachlan 1998:34)

1828

> Thursday July 17: Rain. Indians passing in great numbers up to the fisheries. (68)
>
> Saturday July 19: 250 Cowitchens passed up. (MacLachlan 1998:69)
>
> Tuesday August 12: About 100 canoes of different tribes went up with their families. (MacLachlan 1998:71)
>
> Friday September 12: 30 canoes passed down bag and baggage from the fisheries for their wintering grounds. (MacLachlan 1998:72)
>
> Monday September 15: 35 canoes of Cowitchins passed down. (MacLachlan 1998:72)
>
> Friday September 19: 47 canoes passed down today (MacLachlan 1998:72)

These journal entries document the active late summer fishery in the Lower Fraser River Canyon, when communities from all over the Coast Salish world would aggregate to harvest and dry salmon for their. Although the absolute antiquity of this seasonal pattern is uncertain, oral histories and archaeological evidence suggest it was established prior to these European accounts.

Fort Langley had great historical significance beyond what was recorded in the journals of the Chief Factors. Suttles (1998:207) observes that “the changes were largely quantitative and significant mainly in what they foreshadowed of qualitative changes that lay ahead." The permanent presence of European traders on the Fraser River had immediate impacts on several communities, including the Kwantlen, who moved closer to the Fort to act as intermediaries in trade and to put themselves in a position of power *vis-a-vis* other groups (Suttles 1998). European trade goods had been part of the economy for at least 40 years prior to the founding of Fort Langley, but the Fort's presence would have accelerated trade and provided new opportunities to gain power. The increased use of trade goods had an impact on local production of certain tools, particularly those which could be replaced with metal (Suttles 1998). Aboriginal leaders were not all treated equally, since most Factors were more willing to bestow favours and trade with certain individuals at the expense of others. The Fort personnel did not become directly involved in the internal politics and practices of local Salish peoples unless they affected the safety or livelihood of the Fort; nevertheless, they responded to any disobedience with physical violence that foreshadowed the dominance that was to come. The Fraser River Gold Rush in 1858 was the next major event that contributed to the shift from exploration to colonization and settlement of the Lower Fraser River Canyon.

The Fraser River Gold Rush

> "A faint cry was heard from afar – first low and uncertain, like a mysterious whisper, then full and sonorous, like the book of glad tidings from the mouth of a cannon, the inspiring cry of Frazer River! Here was gold sure enough! A river of gold!" (Browne 1872:314)
>
> *Xwelitem*, that's what the Indians call the white man, because in them days those white people travelling on the way to the gold rush, they were starving. *Xwelitem*, that means starving. Well, the Indians began to feed them, feed them till they get alright. – (Dan Milo quoted in Carlson 2001c:85)

In 1858, the word of gold on the Fraser River spread down the west coast to the disheartened miners in California. While eventually it was considered a dud of a gold rush, the huge influx of Americans and other miners to the Lower Fraser River Canyon had widespread impacts, both immediate and long term, on the history of the area. Previous policy of the British government was to exploit the resources and the people without establishing permanent settlements; trading posts were established at Hope and Yale in the late 1840s with the intent of creating better trade routes to the Interior. Fort Yale was only open for two seasons – 1848 and 1849 – until it was closed. In the summer of 1858, Fort Yale reopened when it became the epicentre of the largest population near the Pacific north of California. The catalyst for the early part of the Fraser Gold Rush was a packet of gold sent to San Francisco from Fort Victoria, likely "leaked" on purpose under the watchful eye of New Caledonian governor James Douglas, who believed a gold rush would be a "modest economic stimulus" (Hauka 2003:22) in a colony experiencing a severe depression. In spring 1858, a small group of Americans struck gold on Hill's Bar, just downriver from the modern town of Yale, in what was to become the most productive claim of the entire rush. Once news had spread about gold on the Fraser, small Fort Victoria was quickly overrun by several thousand Americans bound for the Lower Fraser River Canyon. Up to 30,000 miners took part in the rush that was concentrated between Yale and Lytton (Hauka 2003). Some of the encounters between miners and First Nations people turned violent, especially with American attitudes of superiority and disdain toward Aboriginal peoples (Hauka 2003). The establishment of the colony of British Columbia was in a large part a response to growing unrest and tension between American miners and local First Nations, particularly the Nlaka'pamux (Harris 1998; Hauka 2003). Once they realized the value of gold, many First Nations people asserted their rights to their land in more forceful ways than prior to the gold rush.

The majority of the miners set out from Victoria in April, May, and June of 1858, at the absolute height of the freshet. Most of the productive bars for gold panning were under several feet of fast moving, treacherous water, so the miners stationed themselves around Fort Yale, anxiously awaiting the late summer and fall drop in water levels. This created a dangerous and volatile situation that often erupted into violence, both among miners and between miners and First Nations.

> At first the Stó:lō and Nlaka'pamux of the canyon entered into a wary economic relationship with the newcomers. The Natives supplied guides, canoes, food and women in return for trade goods and, occasionally, men. But as the non-Natives began to vastly outnumber the aboriginal people of the canyon, tensions rose and disputes became more frequent. The miners put pressure on the Nlaka'pamux and Stó:lō to provide camping space, firewood and fodder for their animals., The Nlaka'pamux and the Stó:lō watched as the miners literally destroyed their land. (Hauka 2003:78)

The crux of the conflict occurred in late summer when the rape of a Nlaka'pamux girl sparked an immediate and bloody retaliation by her family, wherein the headless bodies of the rapists were thrown into the river to wash up at an eddy still known as Deadman's Eddy. For a few months, numerous casualties occurred on both sides before Governor Douglas arrived on the scene to assert British rule over the territory in response to what he saw as an American attempt to claim sovereignty. Two months later, in November, he declared British sovereignty over the newest colony of the British Empire: British Columbia.

The gold rush marks the birth of the land question at Yale—a time when western legal structures for the division and sale of land were first put into place, redefining how land and resources were controlled and accessed (Laforet 1974). For the Coast Salish living along the river, it represented the beginning of the shift from an almost exclusively subsistence-based economy to a wage-based economy, a change which had a negative impact on the annual cycle and disrupted existing cultural practices. While information from this time period about the daily practices of First Nations peoples in the Canyon is almost non-existent beyond sensationalist media accounts of the violence between First Nations and miners, it appears that while the fishery may have been temporarily disrupted, the social and political organization within First Nation communities remained somewhat intact (Laforet 1974). The major change that occurred during the latter part of the nineteenth century was the movement of local First Nations out of the Canyon and down into the Fraser Valley, sometimes by choice and sometimes by colonial design, in order to practice agriculture (Carlson 2001c; Laforet 1974).

Many of the mining techniques used, particularly placer mining, required digging open-pits and moving great quantities of material from the edges of the river and disturbing the landscape. The miners created some rock features of their own by piling up rocks to make sluices near the river's edge. It is impossible to estimate the impact this had on the archaeological record, as so much ancient history was torn up in search of tiny flakes of gold. As will be explained in Chapter 5, the rock features produced by miners have distinctively different characteristics when compared to Aboriginal rock constructions. Nevertheless, the gold rush had a destructive impact on the landscape of the Lower Fraser River Canyon, heralding the beginning of a long history of colonial projects that transformed the landscape.

Wagon Roads, Railways and Highways

After gold fever had died down and the flood of miners had moved upriver to follow the promise of easier access to untold riches on the upper reaches of the Fraser River, the impact of the gold rush on the physical landscape and the cultural makeup of the Lower Fraser River Canyon began to be felt. With the establishment of the colony of British Columbia, the colonial machine got underway, modifying the landscape in more invasive ways to develop connections between Coast and the Interior. As demand increased for goods to be transported to the interior, Governor Douglas ordered the construction of a wagon road along the west bank of the Fraser to replace the unreliable mule road (Barman 1996). In order to lower the price of supplies to the interior, goods were transported by steamboat to Yale then loaded onto wagons to make the 400 mile trip from Yale all the way to Barkerville (Laforet 1974). At a cost of over one million dollars, the project was the first major undertaking of the new colony.

Yale served as head of navigation for over 20 years, remaining an important hub of the colony because much of the freight heading to the Interior had to pass through the town. During this time, Aboriginal people remained in separate settlements outside the town of Yale, while seeking economic opportunities in farming and agriculture. Governor Douglas and his colonial administration were realized that the interaction between First Nations communities and an increasingly large settler population was causing tension that needed to be regulated. The government decided to established reserves to protect the interests, including fishing rights, of First Nations people. In 1876, the Joint Indian Reserve Commission was founded. By 1878, only one member of this commission remained, Gilbert Sproat, who was tasked with solving the Indian Land Question (Carlson 2007). He visited Yale in order to assign reserve lands, but was initially confounded with the question of how the land should be divided up, when he immediately was informed about the unique nature of the Lower Fraser River Canyon within the broader Coast Salish world (Carlson 2007). In response to his discussions with prominent members of local First Nations families, he recommended that the entire stretch of river above Yale to Sawmill Creek be set aside as a reserve:

> The right of these and other Indians who have resorted to the Yale fisheries from time immemorial to have access to, and to encamp upon the banks of the Fraser River for the purpose of carrying on their salmon fisheries in their old way on both sides of the Fraser River for five miles up from Yale is confirmed. (Sproat in Carlson 2007:156)

Sproat retired abruptly from the commission and it took 30 more years before official reserves were registered in the Canyon. In the meantime, the Canadian Pacific Railroad was built between 1880 and 1885, cutting through the west bank of the Fraser, disturbing ancient village sites and burial grounds (Laforet 1974). The railway destroyed the Cariboo Wagon Road, leading to the construction of a new roadway in 1922. The highway was further enhanced in the 1950s, later to be superseded by the Trans-Canada highway in the early 1960s. All of these projects continued the destruction, begun during the gold rush, of cultural and archaeological sites, villages, and sacred locations in the Canyon.

Spatial Patterns of Identity, Permanence and Control of Access

The origins of the control of fishing spots and the transfer of hereditary rights are difficult to trace into ancient history. The marking of a spot through a permanent construction, such as a rock wall or platform, may be an indicator of a need to define ownership in the face of increasing demand and pressure for access. When a family invests time and energy into building a rock terrace at a fishing spot, they were enacting agency in a way that etched their claim onto the landscape and enforced their right to that location. Cultural patterns are inscribed onto the physical landscape through the act of building. The rock features in the Lower Fraser River Canyon are one of several types of construction, so I use archaeological data to explore the spatial pattern of settlement on the various landscapes of the Canyon in the following chapters.

4: ACQUIRING DATA: METHODS OF FIELD COLLECTION

Introduction

In Chapter 3, I explored the various landscapes of the Lower Fraser River Canyon to demonstrate the potential significance of the construction of rock features in past cultural practices of First Nations people. These features are a physical remnant of past occupation in the landscape and their spatial patterns and characteristics can be measured and described. The spatial relationship between the rock features may represent an aspect of the cultural landscape modified by active agents that changed the perception of visitors to this area in times of intensive seasonal aggregation. To evaluate the impact that the building of rock features had on the ways that local peoples marked and enforced their claim to lands in the Canyon, I require details on where rock features are located, how they were built, when they were built and what they were used for.

In this chapter, I outline the methods used to create a database to query spatial relationships among rock walls and terraces in the Lower Fraser River Canyon. I describe my survey, recording, and mapping procedures in detail. I highlight in this chapter how contemporary disputes influenced data collection. This is a situation often encountered by archaeologists when working with indigenous communities, but the impact of these disputes on the research is rarely discussed. I worked in an area where two communities are making claims to the territory, where I had negotiate with both to gain permission to fieldwork. Throughout the chapter, I include sections in *italics* that detail the impact that contemporary intercommunity politics had on my field research.

Background to the Project

The question of past community organization and identity was the recent focus of a major collaborative research project between the Stó:lō Nation, the University of British Columbia and Simon Fraser University. The main goal of this multi-year, SSHRC funded project was "the study of Stó:lō social interaction and group identity in the Fraser Valley" with a focus on a better understanding of the relationship between Stó:lō households, settlements and village-level organization in the late precontact/early contact period (Schaepe 2006:3). The project mapped and collected archaeological samples from eight village sites in the upper Fraser Valley (Schaepe et al. 2006:4). My own research was sparked by my participation as a volunteer for the project when I helped map and record several rock features at one site in the Canyon. In discussions with my colleagues, it became clear that additional work was required to learn more about the age, location, function, and social roles of the rock features.

I also knew that given ongoing tensions between members of the Shxw'ow'hamel First Nation, employees of the Stó:lō Research and Resource Management Centre, and members of the Yale First Nation, it would be difficult for members to undertake the research themselves. I welcomed the opportunity to work with all of the people with ancient and contemporary connections to the Canyon, as I began to appreciate the archaeological richness of the area and realized that there were so many interesting questions to ask. As a PhD student, I was also looking forward to the chance to conduct fieldwork alongside members of descendant communities and develop collaborative relationships. I applied for permission to conduct research in the Lower Fraser River Canyon from the Archaeology Branch[9], the Yale First Nation, and the Stó:lō Research and Resource Management Centre[10]. I visited the Yale and Shxw'ow'hamel First Nations, and presented my research plan for their feedback and approval. Several interesting points of conflict arose during the process of asking for permission. Within the contemporary land claim process established by the Canadian and British Columbian

9 Permit No. 2008-0257.

10 Stó:lō Investigation Permit #2007-32.

governments to allow communities to gain recognition of their rights and title to territory, naming becomes a powerful political tool to show a deep connection through time to certain spots. In the Lower Fraser River Canyon, sites are connected to valuable fishing locations. Stó:lō names were alienating to the Yale First Nation, when some members of that community felt as though their history was being erased or ignored. This was brought to my attention during an initial meeting with members at the Yale First Nation band office. I had brought a three-dimensional map of a site with me to show my plans for mapping. The map itself was labelled using the Halkomelem place name X̲elhálh, identified by members of Stó:lō communities, referring to DjRi-14, but the person to whom I showed the map had a strong negative reaction to the name. I was informed that these names were dismissing the Yale First Nation claims to these territories and that the names did not represent how Yale viewed the landscape. Members of Yale preferred I use the Borden designation to represent sites in the Canyon. While I recognize the Stó:lō have names of many places in the Canyon, I generally refer to sites using Borden designations, since they are not as politically divisive as Halkomelem names. Stó:lō place names for the locations mentioned in the text can be found in Appendix 1. Borden designations, however, are a colonial legacy which displaces indigenous naming practices, so using them is not an ideal solution.

Project Goals

The fieldwork focused on recording the spatial location of all the rock features between Yale and Sawmill Creek. I developed a set of objectives for fieldwork: (1) survey to determine the scope and extent of rock features; (2) select a sample of rock features for detailed recording; (3) map all rock features; (4) conduct subsurface testing; (5) complete defensive measurements; and (6) collect samples for possible dating. As with any fieldwork project, these objectives changed as I encountered the unexpected. The following sections are an account of the research design and my decision-making process.

Data Collection

Survey Design

My first goal was to conduct a survey of the area from Lady Franklin Rock to Sawmill Creek on both the east and west bank of the Fraser River, from the current railway down to the high water level, covering an area in excess of 1 km^2 (Figure 4.1). The Canadian Pacific Railway runs along the west bank of the Fraser River through this area, while the Canadian National Railway runs along the east bank. Three factors influenced the decision to limit the survey to the area between Lady Franklin Rock and Sawmill Creek: (1) no rock features had ever been recorded below Lady Franklin Rock; (2) the ethnographic significance of this area, coupled with the cultural boundary near Sawmill Creek between Coast and Interior Salish; and (3) the limited time and resources available. There were two locations along the eastern bank where the survey stretched above the railway. Although other surveys had been done in this area, some of the rock features had been dismissed as products of either mining or railway activity and therefore not considered a part of the archaeological landscape (Kidd 1968:229). The majority of the features recorded prior to my survey were located at or adjacent to known village locations.

Much of the area surveyed consisted of steep rocky bluffs, since these rock features seem to occur with greater frequency atop these bluffs, all of which are within 50 m of the Fraser River. Previous research by Schaepe (2006) indicated that these features were located on bluffs for defensive purposes. Another potential reason for their location is the availability of material. Many of these natural rocky bluffs are breaking apart in an angular fashion and provide good material to stack into stable rock features. While surveying, several factors limited our ability evaluate the extent of the rock features on the west bank of the Fraser River, where the highway and the railway disrupted huge portions the area.

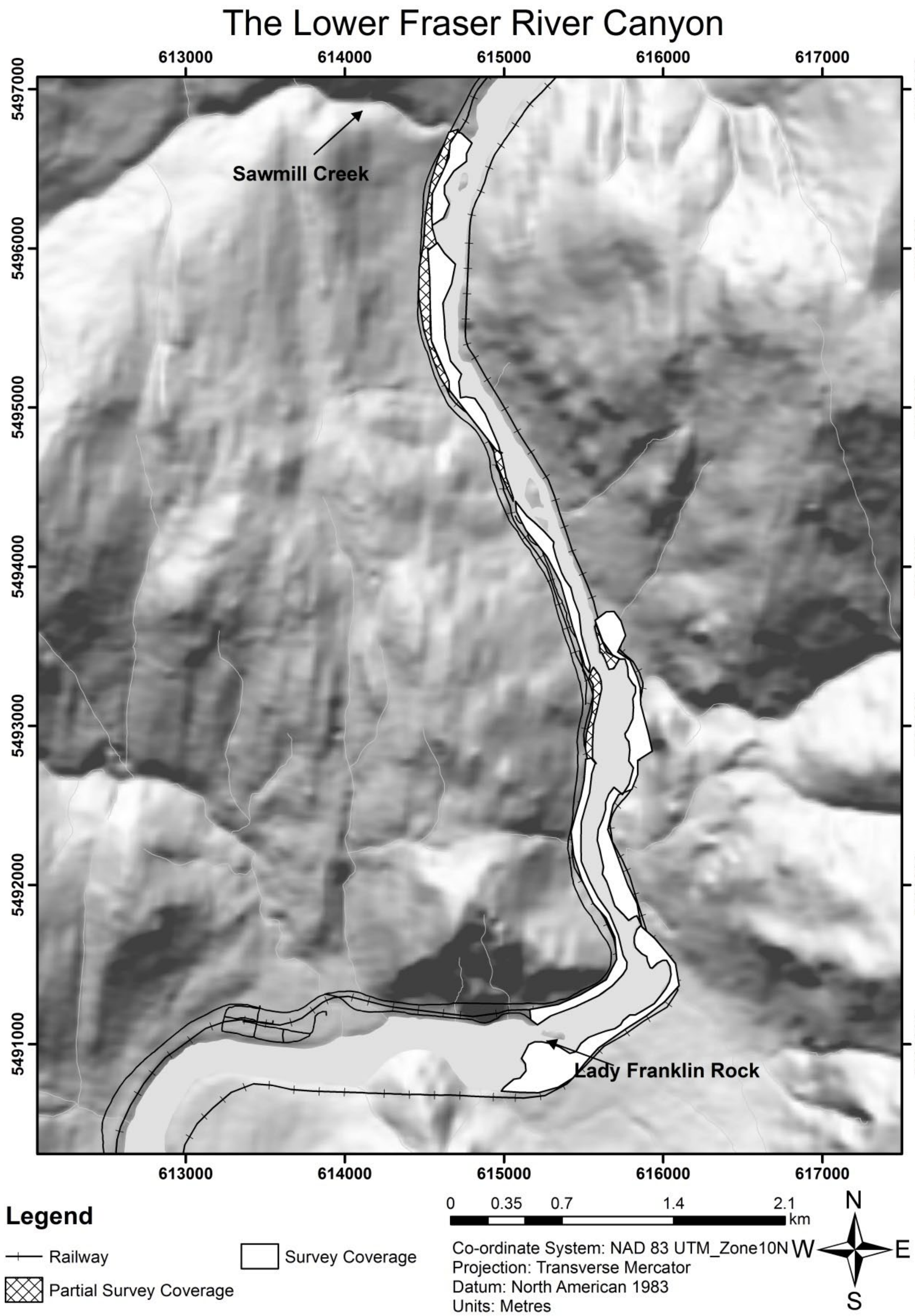

Figure 4.1. The Lower Fraser Canyon, showing area surveyed.

First, the building of this section of the Canadian Pacific Railway from Yale to Kamloops Lake in 1879 destroyed large portions of the area where rock features may have been located, including parts of ancient villages. The east bank of the Fraser has been less impacted by post-contact settlement and construction, so while the underbrush was just as dense, there was a greater possibly of seeing patterns in the distribution of rock features. The remaining landform was not only treacherous, but also thickly covered. At several points we were forced to follow established trails and could not systematically walk the steep and dangerous slope.

Many rock features were highly visible but some were obscured by moss and undergrowth. We flagged anything that resembled a rock feature during the survey. Nevertheless, we continued to find rock features throughout the remaining fieldwork, indicating that the survey procedure may have missed some features. When found, new features were flagged and included in the overall count of rock features. In addition, two features were found below the town of Yale, adjacent to DjRi-49 (Emory Creek) by Larry Hope, a member of the Yale First Nation working with us. Thus, rock features are not limited to the area above Lady Franklin Rock. Future survey should target the river bank below Lady Franklin Rock toward the town of Hope.

Survey Procedure

The main survey method consisted of a two to four person team systematically walking over the designated survey area. In many areas, the forest was dense and difficult to traverse. Features were located visually, a process hampered by thick moss on large portions of the forest floor and low brush that impeded movement as well as visual survey (Figure 4.2). Mosses obscure the structure of rock features, as in several cases, features initially identified as cultural were discovered to be natural formations once the moss had been cleared. One significant question during the survey was how to tell natural from cultural features based on visual cues. Natural formations were distinguished from cultural features based on several criteria, including a lack of organized stacking patterns, presence of bedrock that is cracking (Figure 4.3), and lack of evidence for purposeful construction. Cultural rock features have characteristics such as cap stones and chinking, whereas natural rock features are jumbled with no clear pattern. Many features are clearly cultural based on non-random stacking patterns and construction attributes (Figure 4.3). The question of natural vs. cultural features became particularly relevant when I spent two days mapping an area that appeared to have several rock features during survey. My field crew and I had spent over a week surveying before we identified these features, so we were familiar with several types of rock constructions, but my field notes reflect that I was unsure even during our initial survey as to whether or not these "features" were in fact constructed by people. Part of the reason for my uncertainty was the presence of rock formations that were natural in the area (Figure 4.3) that could have been mistaken for constructions if viewed from the river. Further complicating the process of determining the origin of the features was the location itself – it seemed similar to other locations that contained rock features, following the overall pattern of sites where I would expect rock features to be built.

Figure 4.2: Vegetation cover obscuring rock features.

Figure 4.3. Natural (left) and cultural (right) rock features.

The mapped area is adjacent to a known late-period village, provides good views up and down river, and had readily available building material. This raised the question of whether this location could be defensive without any modification. When located, each feature was flagged and labelled sequentially using temporary numbers (e.g. RF-T01), and where possible, a GPS reading was taken using a hand-held Garmin GPSMAP 60cs, although GPS readings were not always reliable, discussed further below. Basic data from each wall was collected, including length, width, and height. These initial data allowed for the selection of a sample of rock features to map and record extensively once survey was complete.

In the course of the survey and subsequent research, 91 features were located (see Appendix 2 for a listing of all rock features), 9 of which were later downgraded to natural features, leaving a total of 82 built rock features in the area. I estimate that we achieved 70-80 percent coverage of the survey area, considering the limitations of safety and terrain (Figure 4.1.). Areas where 100 percent survey coverage was achieved are indicated in Figure 4.1. The areas with partial survey coverage need to be revisited in the future to ensure that all rock features in those areas have been located. Based on the distribution of intact features, there would have been a larger complex of rock features in the past, prior to the major impacts on the landscape on both banks of the Fraser River.

In his initial exploratory research on the rock features, Schaepe (2006:681-682) identified four types of rock features from a limited sample: (1) freestanding, loose masonry, coursed rock walls; (2) loose masonry, coursed rock retaining walls/terrace facing; (3) loose masonry, boulder–piled platforms; and (4) freestanding, positioned boulder alignments. These types form a basis to identify features in the survey and were subsequently expanded to include the full range of feature types observed. The majority of the features were terraces or platforms consisting of a low retaining wall with a flat area extending on the top. Freestanding walls do exist but are rare; however, it is possible that some features that now appear as terraces were once walls. With no fill, rock walls would be more susceptible to collapse. Unfortunately, since the majority of the features are in rocky areas or on loose rocky slopes, it is often difficult to determine the extent of collapse of a given feature without further excavation.

Excavation, while the backbone of much archaeological research, is destructive and invasive. On more than one occasion throughout my years of research in the Fraser Valley, members of local First Nations expressed concern about how excavation disturbs the ground in invasive ways, I was asked by a First Nations community to limit excavation to small test-pits on top of or adjacent to rock features, even though excavation could contribute a great deal to our archaeological understanding of these features. Where features had collapsed, I was able to collect information about construction patterns, but enhancing knowledge about the below-ground data is an important to help establish their temporal context. I was able to make observations using non-invasive methods while respecting the protocols established by First Nations communities.

Some observations can be made about the rock features using the results of the intensive survey. Although features cluster at or near village locations, they are also present throughout the landscape. Many features would not necessarily work to help protect the village or community from attack, nor optimize inter-visibility. The majority of these constructions are terraces, not free-standing walls that would be expected if their primary function was to fortify village locations.

Sampling the Rock Features

The survey results indicated many more rock features throughout this landscape previously recorded, and the range of features was much greater than anticipated. A sample was selected based on: (1) accessibility of rock features; (2) feature type; (3) clustering of features; and (4) suitability of features for mapping. Areas with more than one rock feature, relatively easy access from the river, a variety of feature types, and access to known ground points, were favoured. My plan was to sample the range of known feature types while maximizing the possibility of high precision digital mapping. In total, I recorded qualitative and quantitative attributes on 37% (n=30) of known cultural rock features (Figure 4.4 and Table 4.1). Eight of the 30 features sampled were not mapped with the total station, due to their relative isolation. The 22 mapped and eight unmapped features are described in Chapter 5. The sample was judgmental and is not statistically representative of the archaeological population of rock features. As described in Chapter 6 and Chapter 7, the rock features in the sample do illuminate some patterns about how these features were used and how they represent major modifications to the landscape.

Our results from the survey show a concentration of more than 30 rock features at or adjacent to one well-known archaeological site: DjRi-14, known in Halkomelem as X̲elhálh or "hurt people." This location, adjacent to Lady Franklin Rock at the entrance to the Canyon, is far richer in rock features than any other locations and provides examples of many different types, making it an ideal focus for intensive research. My original intention was to include a number of features from this site in this project, particularly because a partial map had already been produced during previous research (Schaepe et al. 2006).

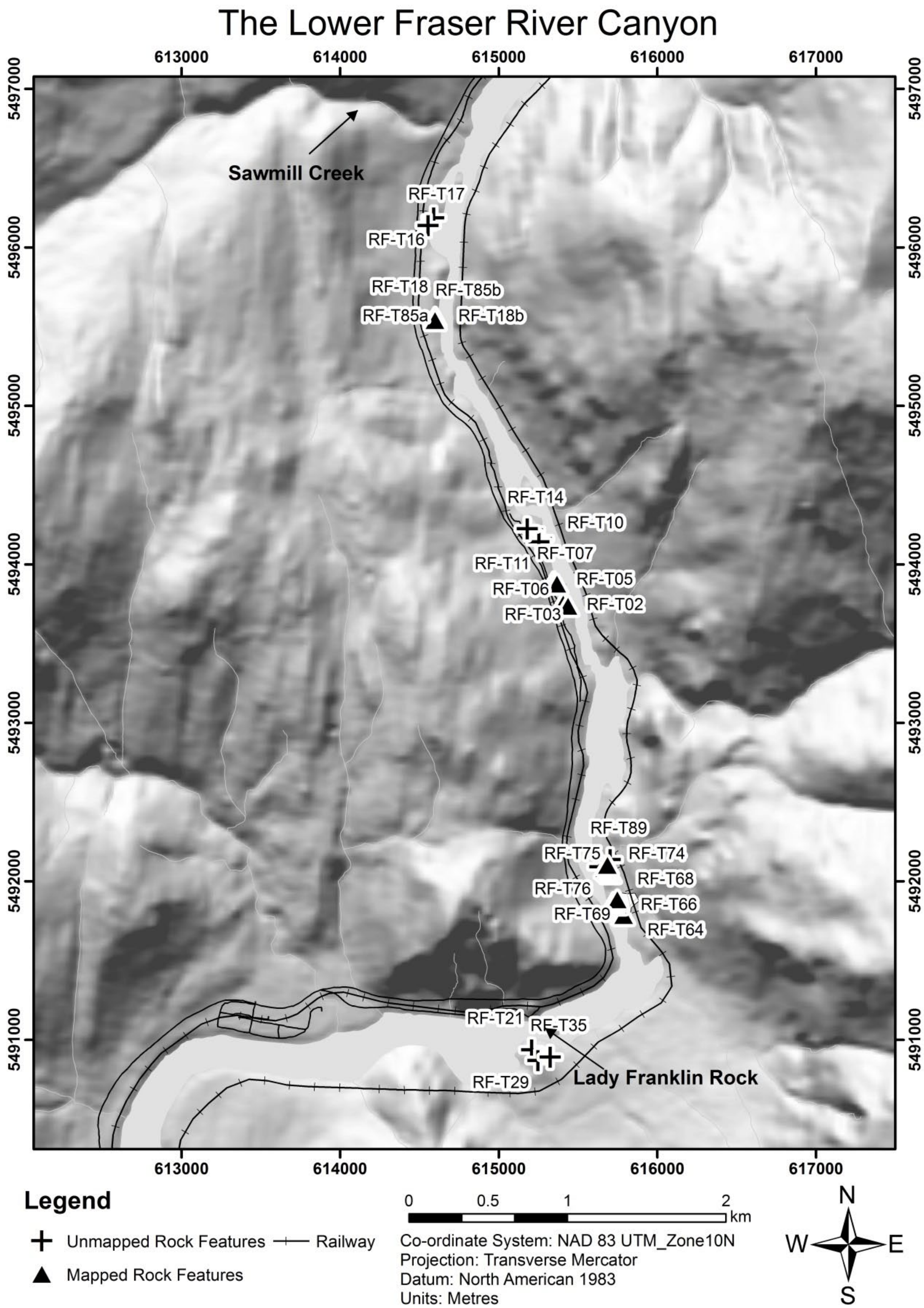

Figure 4.4. Sampled rock features in the Lower Fraser River Canyon.

Table 4.1. Sampled Rock Features.

Feature	Site	Feature Type	Mapped
RF-T01	DjRi-2(S)	Terrace/platform	Yes
RF-T02	DjRi-2(S)	Terrace/platform	Yes
RF-T03	DjRi-2(S)	Terrace/platform	Yes
RF-T04	DjRi-2(S)	Terrace/platform	Yes
RF-T05	DjRi-2 (N)	Terrace/platform	Yes
RF-T06	DjRi-2 (N)	Terrace/platform	Yes
RF-T07	DjRi-2 (N)	Terrace/platform	Yes
RF-T10	DjRi-2 (N)	Retaining Wall	No
RF-T11	DjRi-2 (N)	Retaining Wall	No
RF-T14	Unknown	Terrace/platform	No
RF-T16	DjRi-45	Wall	No
RF-T17	DjRi-45	Semi-circular stone enclosure	No
RF-T18a	DjRi-46	Wall	Yes
RF-T18b	DjRi-46	Wall	Yes
RF-T21	DjRi-14	Terrace/platform	No
RF-T29	DjRi-14	Terrace/platform	No
RF-T35	DjRi-14	Terrace/platform	No
RF-T63	DjRi-13	Linear stone alignment	Yes
RF-T64	DjRi-13	Retaining Wall	Yes
RF-T66	DjRi-13	Terrace/platform	Yes
RF-T68	DjRi-13	Terrace/platform	Yes
RF-T69	DjRi-13	Terrace/platform	Yes
RF-T73a	DjRi-62	Terrace/platform	Yes
RF-T73b	DjRi-62	Terrace/platform	Yes
RF-T74	DjRi-62	Terrace/platform	Yes
RF-T75	DjRi-62	Terrace/platform	Yes
RF-T76	DjRi-62	Terrace/platform	Yes
RF-T85a	DjRi-46	Wall	Yes
RF-T85b	DjRi-46	Wall	Yes
RF-T89	DjRi-62	Terrace/platform	Yes

While I was in the field, members of a large survey for a new BC Hydro transmission line through the area had discovered human remains eroding out of a slope on this site. DjRi-14 is situated upon Kulthlath IR3, under the jurisdiction of the Shxw'ow'hamel First Nation, whose main community is now located downriver from Hope. Because IR3 is the only reserve above Yale that does not belong to the Yale First Nation, members at Yale had petitioned the Federal government via the small claims commission to transfer jurisdiction of the reserve to them.

When human remains are found, the first step is to evaluate whether it was the result of a recent homicide. The RCMP, members of the SRRMC and the Yale First Nation converged at this spot to determine whether these were ancient remains, and if so, what was to be done with them. The day of this meeting was one of the days I had planned to map the site and record rock features. Due to the tense situation after the encounter, I was asked by one side not to include this site in this project until it had been resolved. Out of respect for the wishes of those involved, the only data from DjRi-14 included here was collected during prior projects (Schaepe 2006) and one subsequent site visit. Since this time, the reserve was confirmed as belonging to the Shxw'ow'hamel First Nation (Freeman 2009).

Recording the Rock Features

To standardize analysis of the rock features, I relied upon some of the work by Mathews (2006) on rock cairn features at Rocky Point, supplemented with examples of recording of other types of stone features or terraces in other areas of the world (Johansen 2008). Figure 4.5 is the form used to record all features in the sample, but four attributes were added after the forms were printed: rows, courses, stacking and chinking. In the following section I briefly explain how I collected these data.

Feature Details

Feature ID Number

Each rock feature was assigned a temporary number in the order in which it was located during survey, beginning with RF-T01, and the feature was flagged with the number. When features were located after the survey was complete, they were flagged and assigned numbers at the end of the sequence.

LFRC Fieldwork Project 2008

Feature Recording Form

Feature Information						
Borden #:		Site Name:		Date:	Page of	
Feature No.:		Feature Type:				
Recorders:						

Provenience						
☐ UTM	☐ Local Grid	Base:	N	E	mASL	
		Top:	N	E	mASL	
Direction facing:						

Feature attributes						
Length:	m.	Width:	m.	Height:	min	max
Primary Materials:						
Sphericity:		# of rocks:		Clast:		
Infill?	☐ Yes ☐ No ☐ Partial (%)	Freestanding?	☐ Yes ☐ No ☐ Partial (%)			
Vegetation?	☐ Top (%) ☐ Face (%)					
Intactness:	☐ Undisturbed ☐ Partially Disturbed ☐ Disturbed ☐ Indeterminate					
Assoc. Materials						
Other attributes:						

Details	
Notes:	Feature Sketch:

Associated records	
Photo Records:	GPS Points/Maps:
Tests:	C14 Dates:
Note Pages:	Continued?

Figure 4.5. Field form used to record rock features.

For each rock feature in the sample, I established a datum point, usually at the highest spot on one end of the feature in order to facilitate measurements. In most cases, a GPS point was taken at datum, but when the rock feature was part of a site map, this was updated by taking a point with the total station.

Borden Designation

Many rock features in the sample are located at or near previously identified archaeological sites with Borden numbers[11]. Where the Borden designation was determined, the information was included on the form to facilitate identification of the location. In some cases, a Borden designation could not be determined, or did not exist. In these cases, the field was left blank.

Feature Type

I classified the features into three main types during survey: wall, terrace/platform, and linear alignment. This allowed me to select a sample that included as many different types of features as possible. Walls consist of a single line of rocks with more than one course, and can either be freestanding or backed by a slope. Terraces and platforms are rock features with one or more courses, sometimes joined to make a corner, but always creating a flat surface on top. Linear rock alignments are single lines of rocks aligned along the edges of bluffs or cliffs. I will expand type definitions in Chapter 7.

Provenience

For each feature, the coordinates and elevation were recorded with a hand-held Garmin GPS unit unless the feature was part of a site mapped with the total station, in which case only the datum was located using the GPS. For the majority of the features,

[11] Borden numbers are a Canada-wide system for identifying archaeological sites based on 1:50,000 map sheets. Each map sheet is assigned two capital letters and two lower case letters (i.e. XxXx). When archaeological sites are located, the provincial or territorial archaeology office assigns each site a number based on the order in which sites are found.

only the top of the feature was recorded, because recording the top and bottom was redundant. The GPS error was less than ± 10 m in almost all cases where GPS reception was possible.

Direction Facing/Aspect

I wanted to capture the direction each feature faces in order to evaluate how many faced downriver, across the river, upriver, or away from the river. This allowed me to ask how many features had a downriver view that may have been necessary to recognized raiders coming to attack. Measuring the direction also provided data to test for a relationship between feature type and aspect. I took a general orientation with a compass at 18° declination, typically rounded to the nearest cardinal direction, and noted whether it faced upriver, downriver, across the river, away from the river, or a combination of these.

Feature Attributes

Length

All of the size measurements (length, width, height) were taken so I could evaluate the relationship between these dimensions, feature types, and feature use. Length represents the longest axis of the feature. In most cases, this was measured using a flexible 50 m tape held level, and recorded in metres to the nearest centimetre (e.g. 5.14 m). Some features lack clear boundaries. Where it was difficult to determine the exact edge, we estimated the maximum length.

Width

Width measures the short axis. In some cases, such as terrace features, only one or two rows were visible, so this measurement has to be considered approximate. For terraces, we measured the extent of the visible rows and the full extent of the terrace. This was confirmed by a test excavation on one terrace and soil probing of several others that indicated the terraces were built with stone. Similar to length, this was estimated to capture maximum width and taken using a 50 m flexible tape measure held level and measured to centimetre accuracy. Where the face of the feature sloped (either inwards or outwards), width measure included the slope.

Height

Height measures the maximum vertical rise of the feature. Most features have a vertical face, making the measurement of height straightforward, but in several cases, the highest point of the feature was not directly on the face due to collapse or slump. In these cases, a horizontal measurement and a slope measurement were taken to find out the maximum vertical rise. In both cases, a 50 m flexible tape was used and measurement was to the nearest centimetre.

Primary Materials

This is an estimate of the types of rocks that constituted the majority of the rock feature, based on a visual assessment (i.e. large angular boulders, rounded cobbles, etc.). This summarized several other fields to allow for general comparisons between different rock features. While this was a useful field tool to distinguish between rock features based on rock type, other categories such as clast and sphericity (discussed below) were more informative during the analysis.

Sphericity

The rocks used to create these features differ in angularity. To discuss the types of material used to build the features and evaluate if different forms of rocks were used to construct different feature types, I needed to capture their sphericity. Sphericity/roundness is a method to measure how round a rock is on a scale from well rounded (high sphericity) to very angular (low sphericity). A visual scale developed by Powers (1953) captures both the sphericity and the roundness of sediments, as sphericity relates to volume and roundedness to the occurrence of angles. A rock can contain many angles but still have high sphericity, while a rock can be rounded with low sphericity (Figure 4.6).

This 12 point scale runs from well-rounded; high sphericity to very-angular; low sphericity (Table 4.2). When one level of the scale was insufficient to capture the range of sphericity in the feature, based on a visual assessment, more numbers were included in the order of majority. For example, when we examined a feature, we estimated from a cursory count that approximately 70% of the rocks were 5 on the scale and 30% of the rocks were 10, both numbers would be recorded on the form as such: 5, 10.

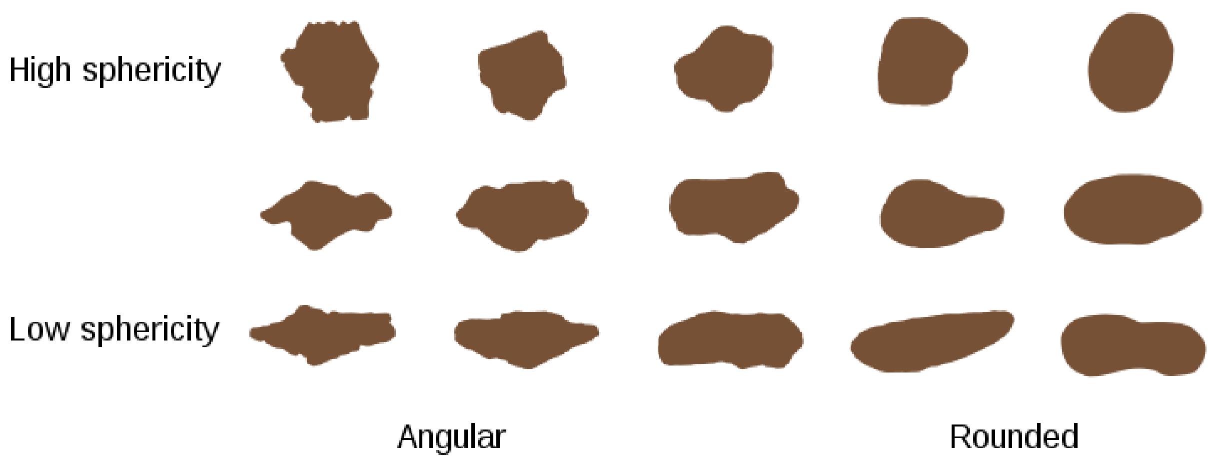

Figure 4.6. Roundness and Sphericity (Wikipedia.org).

Table 4.2. Sphericity Scale after (Powers 1953).

Code	Measure
1	Well-rounded, high sphericity
2	Rounded, high sphericity
3	Sub-rounded, high sphericity
4	Sub-angular, high sphericity
5	Angular, high sphericity
6	Very-angular, high sphericity
7	Well-rounded, low sphericity
8	Rounded, low sphericity
9	Sub-rounded, low sphericity
10	Sub-angular, low sphericity
11	Angular, low sphericity
12	Very-angular, low sphericity

Number of Rocks

The number of rocks in each rock feature relates to construction patterns. One assumption that I had made is that larger features would likely have the largest number of rocks, but as I discuss in Chapter 7, this is directly related to the size of the rocks in the feature. The number was estimated in most cases by multiplying the number of rocks from the maximum vertical axis with the number of rocks in the maximum horizontal axis. As this method is imprecise, I created a five level scale that has ranges of rocks rather than a precise estimate: (1) <20 rocks; (2) 20-49 rocks; (3) 50-99 rocks; (4) 100-199 rocks; and (5) 200+ rocks. We tested this measurement scale by counting the number of rocks visible in three different features, all of which measured within the range we estimated.

Clast

Clast is a geological measurement of the size of rock particles, from silt to boulder. Size of rocks is important to understanding construction patterns. This field captures variation in sizes of rocks used in various feature types to see if size of rock used relates to how the features were used. Since the primary materials of the rock features are no smaller than cobbles, I adapted a scale beginning with cobbles (1) and progressing up the size range, ending in large boulders (16) (Mathews 2006). Cobbles are rocks less than 200 mm in diameter, boulders range between 200 mm and 1 m in diameter, while large boulders have a diameter of greater than 1 m. The intermediate levels of the scale developed by Mathews are ordered according to the proportion of rocks of a particular size in the feature. This eliminates the need to record more than one level of the scale on the feature form.

Infill

This is an estimate of the soil to rock ratio with three categories: yes, no and partial. I included this field to evaluate whether features are constructed mostly of stone or if there was soil involved, a factor that contributes to my analysis of construction. When a large amount of soil has filled in the gaps between rocks, the infill would be measured as yes. If part of the feature has some soil or the whole feature contains some soil, an estimate of the percentage of the feature that shows evidence of infill was recorded. If the rocks are stacked with no soil visible, then infill was recorded as no. This variable serves to indicate whether soil was used in construction and/or if rock features were built in soil-rich or soil-poor environments.

Table 4.3. Clast Scale (after Mathews 2006).

Code	Clast
1	Mostly cobbles (>200 mm)
2	Mostly cobbles, some boulders (<200 mm)
3	Mostly cobbles, some boulders, some large boulders (<1 m)
4	Mostly cobbles, some large boulders
5	Some cobbles, some boulders
6	Some cobbles, some boulders, some large boulders
7	Mostly boulders, some cobbles
8	Mostly boulders, some cobbles, some large boulders
9	Mostly boulders, some large boulders
10	Some boulders, some cobbles, some large boulders
11	Some boulders, some large boulders
12	All boulders
13	Mostly large boulders, some cobbles
14	Mostly large boulders, some cobbles, some boulders
15	Mostly large boulders, some boulders
16	All large boulders

Freestanding

A rock feature was recorded as freestanding in all cases where the entire feature was not backed by bedrock, additional rocks, or fill. The rock face had to rise above the surface of the ground behind it. The process of measurement followed the same style as infill: yes, no and partial. If part of the rock feature is freestanding, this was measured as a percentage. This category is important for defensibility. In general, defensive fortifications are somewhat freestanding, as this provides an area to hide behind in times of attack. Whether the rock features in the Canyon are freestanding, therefore, is an important attribute to measure.

Vegetation

The main purpose of recording the amount of vegetation present on the face and surface of features was to estimate the accuracy of other measurements. Where vegetation was heavy, parts of the feature were obscured. For the majority of the sampled features, vegetation, including moss, small brush, and saplings, was removed if possible to facilitate other forms of measurement such as the number of rocks, type of stacking, clast, and sphericity. Once cleared, the amount of vegetative cover on the top and face of the features was recorded.

Intactness

The majority of features display obvious signs of disturbance, including the remains of modern garbage, displacement of rocks on top of features, and portions that have slumped down. The scale of undisturbed, partially disturbed, disturbed and indeterminate worked well. Where the overall size and shape of the feature appeared to be altered due to natural or cultural transforms, the feature was considered disturbed. While an important characteristic of rock features, estimating intactness is quite challenging because I had to estimate how much the feature has been disturbed without knowing the original extent.

Associated Materials

This category recorded any materials found in association with the feature, including artifacts, historical refuse and modern garbage. We collected artifacts on the surface in danger of being lost if left exposed to the elements. Otherwise, if materials were situated in areas not likely to be disturbed, they were left *in situ*. Historical and modern materials (i.e. glass, metal, refuse) were noted in this category to indicate a continued use of locations. When features were located at village sites or directly adjacent to other rock features, those associated features were noted.

Courses

Courses are rows of stone in dry-set masonry (Harris 1983), where the stones are offset as the feature is stacked (Figure 4.7).

Figure 4.7. Coursed rock features with medium-loose stacking (left) and tight stacking (right).

The number of courses can increase stability and lessen the tendency of the rock face to collapse. Almost all rock features in the sample show coursing in their construction, but the number of courses visible was variable. Coursing indicates construction patterns, rebuilding activities, and additions to original walls. I measured courses by counting the number visible on the face of rock features. Where coursing was not present, such as in linear boulder alignments, I measured courses as zero.

Stacking

A variable that was not included on the initial form but became relevant once I had begun the recording process was how tightly rocks were stacked to fit together. After recording several features, I realized that there was a range of stacking, from very tightly stacked (i.e. virtually no space between rocks) and loosely stacked (i.e. visible space between rocks). I formulated a scale to represent tightness of stacking: (1) loose; (2) med-loose (see Figure 4.7); (3) medium; (4) med-tight; and (5) tight (see Figure 4.7). This was measured for each feature by a visual assessment of the overall space between the rocks in the feature. This attribute is useful in evaluating whether certain types of features were more or less tightly stacked; indicating if stacking was an important criterion in construction methods.

Chinking

Chinking occurs when smaller rocks are used to either hold up a larger rock or fill in gaps in a wall. The insertion of smaller rocks into gaps increases stability of the features and often serves to flatten the overall look of the face. This is one of several measures to show that these were purposely constructed rock features, not random natural occurrences. Chinking was measured on a simple presence/absence scale because there was not a lot of variation in types of chinking throughout rock features in the sample. If any chinking was visible in the face of the feature, chinking was recorded as present.

Mapping the Rock Features

Once the sample was established and features recorded, the next task was to prepare the site for detailed three-dimensional topographic mapping, focusing on the areas surrounding the sampled rock features. One project goal was to create a GIS, or Geographic Information System, for the Lower Fraser River Canyon using available data, supplemented with detailed three-dimensional topographic data of selected areas. While archaeologists are increasingly using digital mapping technologies, a GIS in this context is best conceived of as "a suite of tools that help people interact (Wildesen and Witherspoon 1978) and understand spatial information" as well as a method to make sense of spatial and temporal relationships between "natural and anthropogenic phenomena" (Conolly and Lake 2006:11). GIS presents a method to ask questions and test hypotheses about the production of space in the past. To produce a GIS, I collected all accessible map data for the region, including high-resolution topographic maps, aerial photographs, satellite imagery, known archaeological sites, and previous maps of the area.

Collecting this type of detailed ground surface data provides high-quality spatial information on which GIS analyses can be run to compare various rock feature locations within the Lower Fraser River Canyon. 3D maps serve as a useful tool for visualizing the ground surface without the extensive forest cover that exists in some areas today. My original intention was to include detailed three-dimensional maps of the rock feature faces; however, the detail of the vertical nature of these features was difficult using technology that cannot capture overhang.

My goal was to create a geographically accurate map, so known coordinates were needed to tell the total station where it was located in space prior to mapping. Each site was walked first to determine the ideal location to establish a base station to maximize coverage of the rock features using the minimum number of stations. Once a suitable location was found, a handheld GPS unit (Garmin GPSMAP 60CS) was placed on the ground to obtain readings in UTM (Universal Transverse Mercator) coordinates for a minimum of one hour in order to minimize error. For all maps, a GPS point with reception from at least six satellites was used for the base station, with an error of no more than ± 7 m. While higher precision would have been desirable to ensure greater accuracy, several limitations prevented the gathering of these, the most important of which is a high probability of multipath error. This occurs when incoming satellite signals bounce off surrounding vertical surfaces such as canyon walls or large trees. Open areas as far away from steep bluffs as possible were chosen as base station locations to minimize the chance of multipath error. In most cases, a back site was established by sighting a point due north at a spot as far away from the site as possible, with the bearing established by a digital compass and confirmed by a handheld magnetic compass. This provided the total station with an orientation but required post-processing using known ground points in order to ensure geographic accuracy. In all but one case (DjRi-2N), when imported into ArcMap 9.3, the maps as produced were close to their ground locations and were able to be corrected.

Once a base station and backsight were established for the total station, mapping points were shot using a hand-held prism at approximately 1 m intervals to capture basic surface topography. Wherever possible, points were taken at the high water mark to establish site boundaries, and where this was not feasible due to safety concerns, points were obtained for the high-water mark from a previously acquired digital elevation model from GeoBase Canada (Canada 2008). For the rock features, measurements were taken at smaller intervals, usually at the boundaries of individual rocks. Other features near the rock features, such as house pits, were also mapped. Additional stations were set up as necessary from the first station and a traverse was closed at each location with accuracy of 2.0 cm or less for all three dimensions.

Six locations with 22 rock features were mapped using these methods (Figure 4.8). While mapping, one location was found not to contain any culturally constructed rock features. This map serves as a control sample against which to test aspects of defensibility of the other locations that do contain rock features—as will be discussed in Chapter 7. The mapped rock features clustered in five site locations: DjRi-2(N), DjRi-2(S), DjRi-46, DjRi-13 and DjRi-62, discussed in detail in the next chapter. Several features (RF-T10, RF-T11, RF-T14, RF-T16, and RF-T17) did not fall within these clusters.

Dating the Rock Features

Several of my research questions hinge on whether or not the rock features of the Lower Fraser River Canyon were built and used around the same time. To establish when the features were built, I explored several potential means of dating the rock features, including Optically Stimulated Luminescence, lichenometry, and dendrochronology.

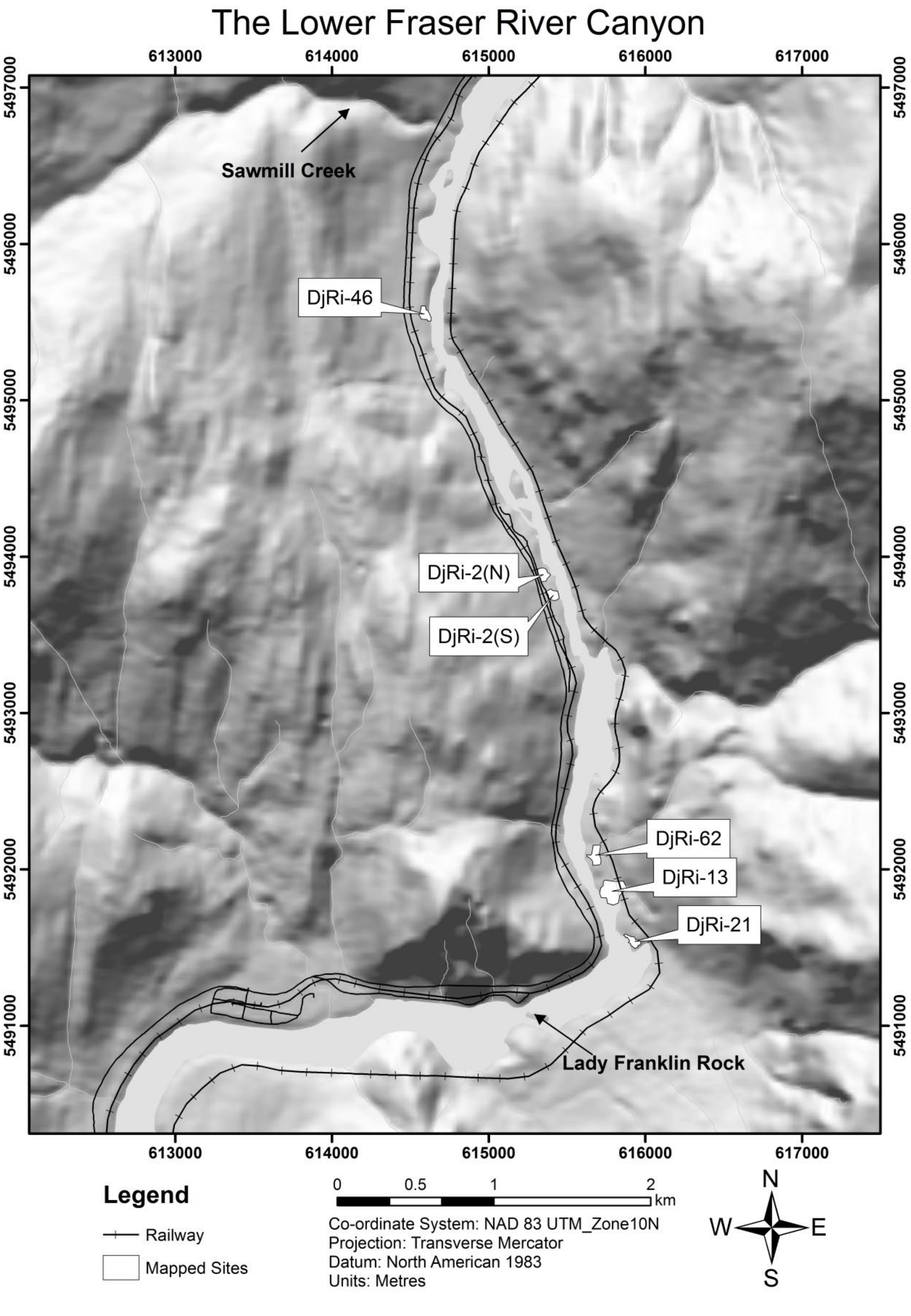

Figure 4.8. Sites mapped in the field.

I attempted to collect materials in good archaeological contexts for radiocarbon dating by putting in a 50 cm X 50 cm test excavation unit on the top of the terrace above RF-T01 and RF-T02, but I encountered the surface of the rock terrace about 40 cm below the surface. Acquiring material for radiocarbon dating, therefore, would require larger excavations.

Optically Stimulated Luminescence dating measures the decay of the signature left by light on crystalline structures of quartz and feldspar (Feathers et al. 2006; Greilich et al. 2005). Samples can be collected from sediment in buried fluvial deposits or the underside of stones in ancient structures, taken back to a lab, and analysed to estimate when the grains in the sediment or in the stone were last exposed to light. Applied primarily to geoarchaeological samples of buried fluvial sediments (Feathers et al. 2006; Fuchs and Wagner 2005; Vafiadou et al. 2007), archaeologists have recently applied this method to stone structures in Peru and Germany (Greilich et al. 2005) with some success. Two issues prevented me from attempting this type of dating: first, the sampling method involves collecting materials under the cover of darkness, using specialized equipment. The steep nature of the landscape made collecting samples difficult. In addition, after discussing the methods with a local luminescence lab at the University of the Fraser Valley, I was warned that the method was not very effective in dating the actual surfaces of rocks but was much more reliable for buried sediments. These sediments required excavation to collect and were beyond the scope of the project.

A second method for dating the construction of the rock features was to measure the growth of species of lichen to estimate when they would have started growing. Most rock features have one or more species of lichen growing on their surface and some show 50-70% of the surface with lichen growth. This does not work for all types of lichen, and a visit by a geographer who specializes in dendrochronology and forest ecology confirmed that none of the species growing on the features were ideal candidates for lichenometry (Maertens 2009).

Ultimately, the method that proved most feasible and informative was dendrochronology, whereby we removed cores from living trees growing on top of various rock features. Dendrochronology is an established method of dating in archaeology (Baillie 1982; Kuniholm 2001; Schweingruber 1988) and has been applied to ancient wood, charcoal, and modern samples to calibrate the radiocarbon curve. The basic principal behind dendrochronology is measuring the growth patterns in trees, where a tree-ring is added every growing season (Baillie 1995). Trees encode variation in moisture and temperature, affecting the size of the growth ring. Due to differences in sizes of rings, trees from the same area can be correlated, where dry years can be matched up in different trees with overlapping ages (Wigley et al. 1987). This has allowed archaeologists to reconstruct sequences into the distant past. For my purposes, however, I was interested in dating the ages of living trees, working under the assumption that when rock features were used, they would not have had trees growing out of them. The trees, therefore, would have establishment dates that occur after the features were abandoned. This method had already been used to date the stump of a Douglas Fir (*Pseudotsuga menziesii)* growing out of the top of a rock feature at DjRi-14, resulting in a date of establishment between 1780 and 1790 (Schaepe et al. 2006).

Dating Procedure

With the assistance of Tom Maertens of the Department of Geography at the University of British Columbia, I collected 18 samples from Douglas Fir trees at three sites: DjRi-2(S), DjRi-62 and DjR-14 (Table 4.4). For samples at DjRi-2(S) and DjRi-62, a minimum of five trees of similar diameters were sampled. This allows for comparison between trees at the site and to test if more than one tree was established at a similar time. Samples were taken from trees growing on top of terrace features (Table 4.4). Each sample was collected, mounted, sanded and then the rings for each sample were counted twice.

Table 4.4. Dendrochronology Dating Results.

TCS	Site Sample	Count	Estimated age	DBH	DCH	CH	Species	RF
1	DjRi-62-01	1935	1919	51.6	61.7	48	Douglas Fir	RF-T74
2	DjRi-62-02	1972	1947	42	47.7	50	Douglas Fir	RF-T74
3	DjRi-62-03	1935	1915	55.7	63.6	42	Douglas Fir	RF-T75
4	DjRi-62-04	1931	1919	48	56.58	43	Douglas Fir	RF-T75
5	DjRi-62-05	1933	1919	49	56.2	52	Douglas Fir	RF-T75
6	DjRi-62-06	1943	1923	36.6	43	38	Douglas Fir	RF-T75
7	DjRi-62-07	1938	older than 1938	60.2	67.5	39	Douglas Fir	RF-T75
8	DjRi-2S-01	1940	1915	70	79.2	35	Douglas Fir	RF-T01/RF-T02
9	DjRi-2S-02	1949	1933	65.5	80.4	42	Douglas Fir	RF-T01/RF-T02
10	DjRi-2S-03a	1928	1913	61.5	70.4	32	Douglas Fir	RF-T01/RF-T02
11	DjRi-2S-03b	1945	older than 1935	61.5	70.4	35	Douglas Fir	RF-T01/RF-T02
12	DjRi-2S-04	1920	1905	65.5	76.6	38	Douglas Fir	RF-T01/RF-T02
13	DjRi-2S-05	1926	1915	59	65.6	41	Douglas Fir	RF-T01/RF-T02
14	DjRi-2S-06	1948	older than 1938	76.4	91.2	37	Douglas Fir	Rim of house pit
15	DjRi-14-01	1863	older than 1853	154	144.5	47	Douglas Fir	Front of bluff
16	DjRi-14-02	1816	1790s	118	107.5	42	Douglas Fir	RF-T21
17	DjRi-14-04	1810	1790s	92	102	34	Douglas Fir	RF-T35

Due to the size of the rings on the samples, no magnification was required for the visual count. Several yearly rings were correlated on different samples, including 2007, which appeared on all samples as a small ring when compared to other years. In addition, we collected a sample from a smaller Douglas Fir that had been cut down during clearing of rock features, taking sections of the tree at ground level and 40 cm above ground level. This provided an estimate of how long it would take for the tree to reach 40 cm in height and resulted in a ten-year difference in rings. For all trees in the sample, it is estimated that it would have taken ten years ± five years to reach coring height, considering the variation in coring height from 32-52 cm. In most cases, the core missed the pith, or centre, of the tree. Where the sample was considered to be close to the pith, an estimate on the missing years was made, based on the curvature of the rings. Where curvature was not visible, no estimate was made and the sample was only marked as older than the count by a minimum of ten years growth.

Dating Results

As seen in Table 4.4, the samples from DjRi-62 and DjRi-2(S) have estimated establishment dates between 1905 and the mid-1930s. Established about a century after European contact, the trees at these sites do not contribute to our understanding of when the features were abandoned. It is possible that the building of highways and railways through these areas meant older trees were cut down, while the Fraser River flood of 1894 could have also washed out some of the original growth. Even without older trees, the similarity of these features to other features in the sample with earlier dates, coupled with the presence of lithic flakes and heat-altered rock, indicates that they are ancient constructions.

At DjRi-14, the situation is different because the top of the large bluff that constitutes the northern portion of the site has not been subject to significant disturbance. The trees growing on rock features at this site date from the late 1700s, matching up with dates reported by Schaepe (2006). Neither sample with counts in the 1810s (DjRi-14-02 and DjRi-14-04) reached pith, although the rings showed some curvature. Thus, with the addition of some years that are not captured on the sample, along with the ten years of growth to reach the coring height, a reasonable estimate for the establishment of these trees is 1790-1795. This is more than a decade before Simon Fraser's journey through this region, indicating that these rock features had been abandoned before he reached the area.

Discussion

Collecting data from rock features in the Lower Fraser River Canyon without extensive excavation involved an adaptation of methods used for other types of features elsewhere on the Northwest Coast. I surveyed the region between Lady Franklin Rock and Sawmill Creek, and locating a total of 91 rock features, 82 of which were determined to have a cultural origin. A sample to record and map in detail was selected, based partially on the range of types and locations of features, but also influenced by contemporary community politics. Throughout the chapter, I detailed several moments where my research came up against the concerns of local peoples, and the results of those encounters. My project may have been quite different if these incidences had not occurred, a point which emphasises the need for archaeologists to be explicit, where possible, about their engagement with the concerns of indigenous communities.

5: ANALYSING THE ROCK FEATURES

I described the attributes and the mapping procedure used to create the maps that form the basis of my spatial analyses. The quality of the data can be impacted by the types of methods chosen, so the way I collected data was designed to address the research questions at the centre of the dissertation. In the process of establishing an archaeological data set on which to perform quantitative analysis, many more types of features in a wider variety of topographic locations were recorded, indicating that we are just beginning to comprehend the range of uses for rock structures in the Coast Salish world. I detail the sampled features and the associated archaeological sites in the following chapter before moving on to my analyses in Chapter 6 and Chapter 7.Describing the Rock Features and Sites

Before presenting the results of my analysis in Chapters 6, 7, and 8, using the data collected via methods described in the previous chapter, I first provide here an overview of all the sampled rock features and sites mapped in the project. This serves to situate the various rock features and sites on the landscape of the Lower Fraser River Canyon. Many features are located on known archaeological sites, some of which were the focus of past research. Each of these sites is depicted and described in detail, accompanied by a map of the general site location (Figure 5.1). Features not on previously recorded archaeological sites are not part of the detailed site maps created in the course of the project and are discussed in the final section of the chapter.

DjRi-2(S) and DjRi-2(N)

Known by the Stó:lō Halkomelem speakers as *Í:yem*, this archaeological site was first recorded by Duff (1952) and was surface collected from 1956-1970, according to the site form on record with the provincial Archaeology Branch.

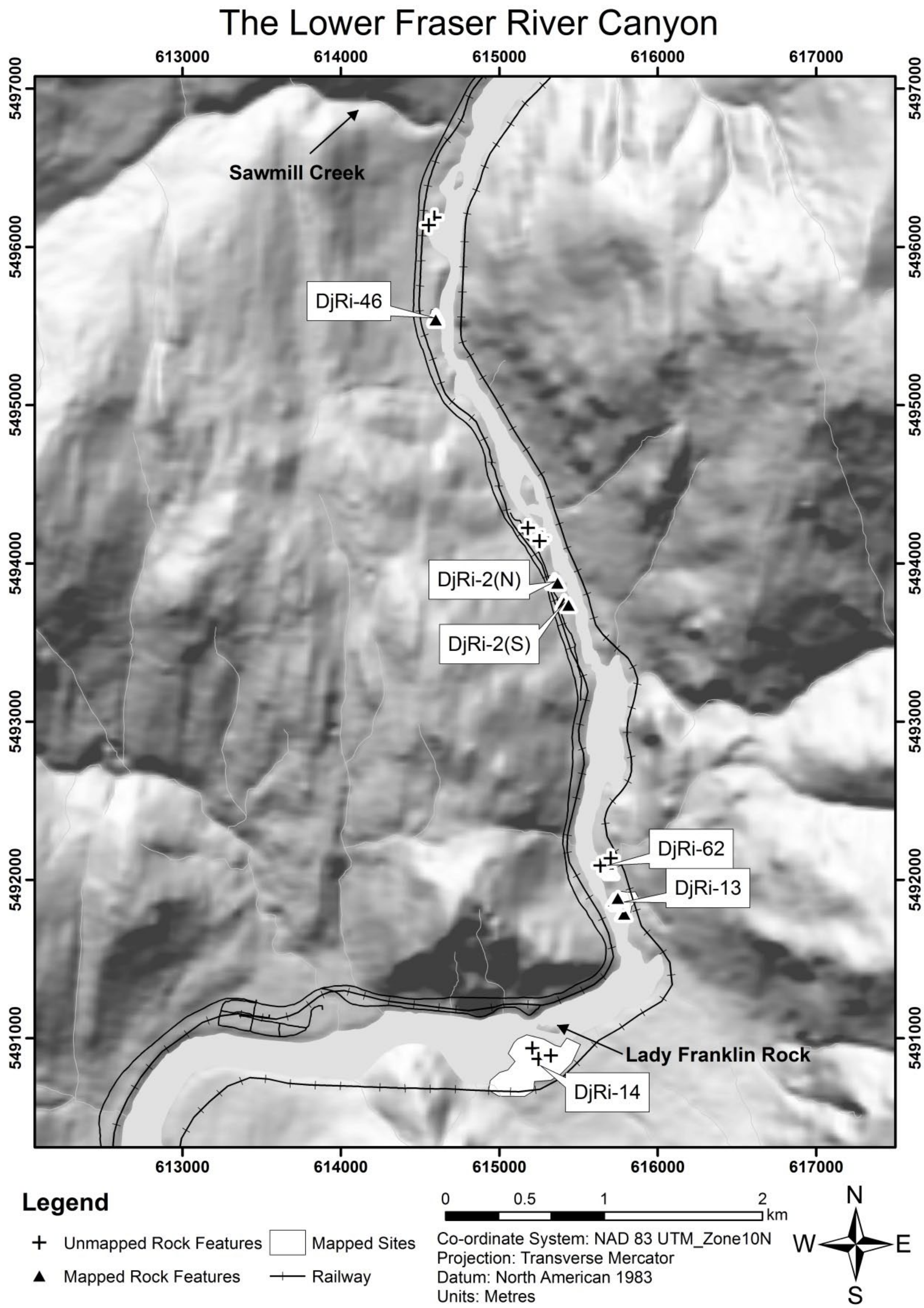

Figure 5.1. Rock features and mapped sites.

About 200 meters up a paved side road upriver from Yale sits a cemetery on the river side[12], providing permanent testimony to the importance of this area through time, because this was built at a village site where people may have been buried for thousands of years. The cemetery marks the beginning of the site of DjRi-2, much of which was destroyed with the building of the railway. The site remains, patchy now, along much of the next 600 meters to the north. Two portions of the site contain eight rock features, considered in this project as DjRi-2(N) and (S). About 200 meters north of the cemetery, a small path leads down the forested slope of road construction fill, east toward the water and DjRi-2(S) (Figure 5.2). A house pit lies a few meters north of the trail, partially impacted by the roadway but still largely intact, the remains of what was recorded by Duff (1952) as an important late precontact period village. A large rocky bluff extends along the northern portion of the site, creating a natural boundary between this area of the site and DjRi-2(N). As the trail continues, it crosses the top of a flat area with a short but sharp drop, slightly out of place on the natural slope. When explored further, the drop is a five metre long face of a rock terrace: RF-T01 (Figure 5.3). Four metres to the south is another terrace face, RF-T02, 6.2 m in length, oriented perpendicular to RF-T01 (Figure 5.4). The area between these two features is filled with a jumble of large rocks and cultural material, including heat-altered rock and flaked lithic debris. These two features were likely once connected, but the middle section has slumped down. If the area between was a rock feature in the past, RF-T01 and RF-T02 would have been part of a larger, 'L' shaped terrace (Figure 5.2). The area atop the terrace is flat and may have been a spot where a rectangular plank house was built. Situated about 25 m above mean river level, the terraces provide a broad downriver view.

[12] The cemetery used to have a white fence and a large cross marking the people who had been reburied there after the railway displaced burials. The fence and memorial were removed from the area by the Yale First Nation in October 2008 (http://www.mail-archive.com/natnews-north@yahoogroups.com/msg06737.html).

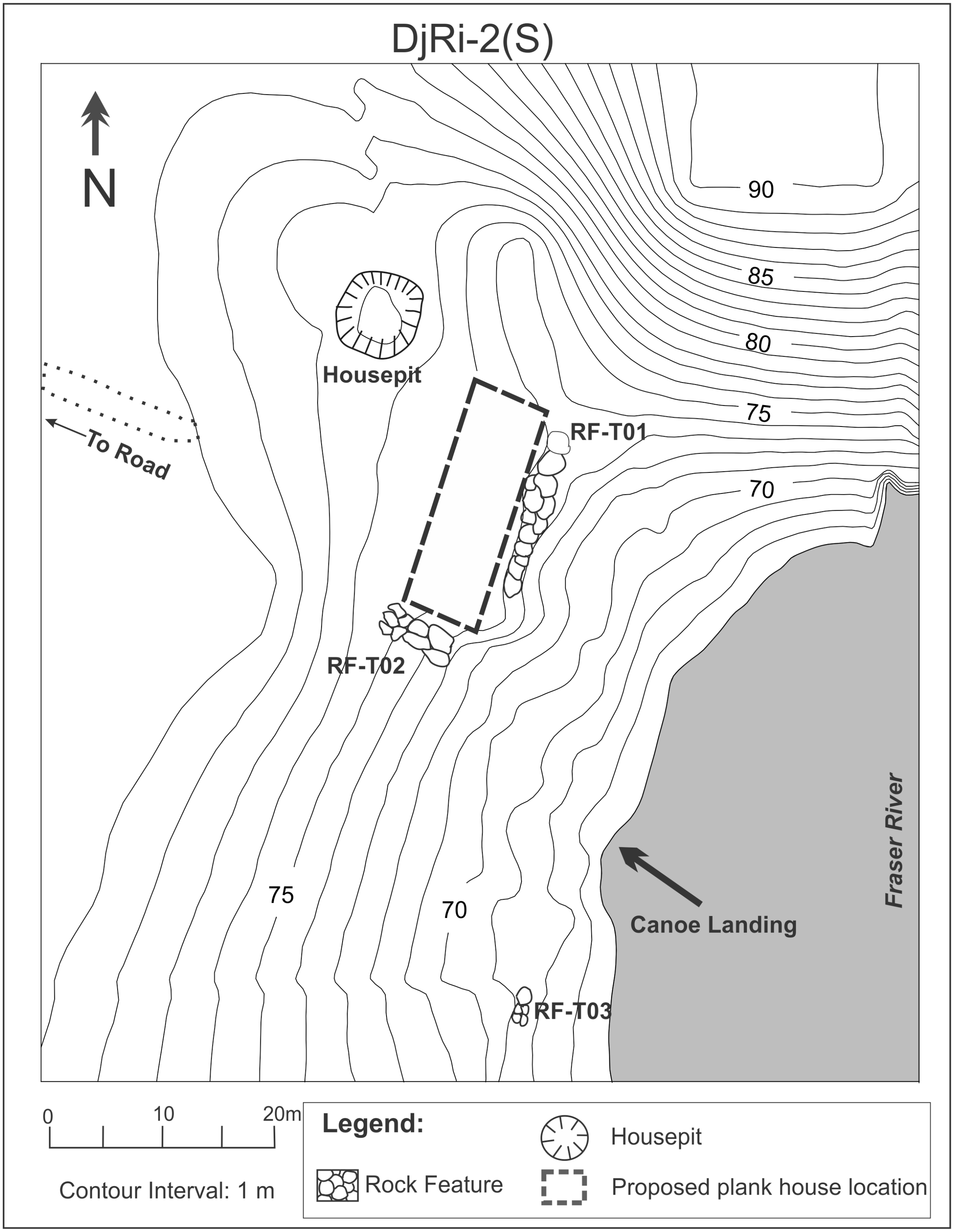

Figure 5.2. Sketch map of DjRi-2(S).

Figure 5.3. RF-T01 - A portion of the terrace feature located at DjRi-2S. The area above the rock feature is flat and the down river portion (seen at the left in this photo) has slumped away. Lithic materials (flakes) were found in this feature.

Figure 5.4. RF-T02 - A portion of the terrace feature located at DjRi-2S. This feature runs perpendicular to RF-T01 and is less clearly stacked. The eastern edge (seen at right in this photo) is formed by a large piece of bedrock.

A third, much smaller rock terrace, RF-T03, lies 20 m southeast of the first two, only 5 m above the high water line (Figure 5.5). This feature is only 1 m high and 3 m long and sits at the base of a slope, creating only a small flat area on top. A modern trail runs upriver across the top of RF-T01 and along the front edge of the steep, rocky bluff to an active drying rack area. The area of the intact site area covers slightly more than 1000 m^2, just a small portion of what was likely a large village site prior to the road and railway construction.

Figure 5.5. RF-T03 - This feature is down slope from RF-T01 and RF-T02. It is small and heavily disturbed, but some stacking can be seen. The down river edge (seen at left in this photo) has a rock containing a water worn bowl-shaped depression.

While the rock bluff can be crossed to reach the northern portion of the site, the trail is steep and difficult to traverse. A more navigable but overgrown path leads behind the rock bluff to meet DjRi-2(N) (Figure 5.6), but the easiest access today is via a small one lane road. About 100 m further past DjRi-2(S), there is a pull-off that looks as if it were designed as a parking spot for at least two modern vehicles.

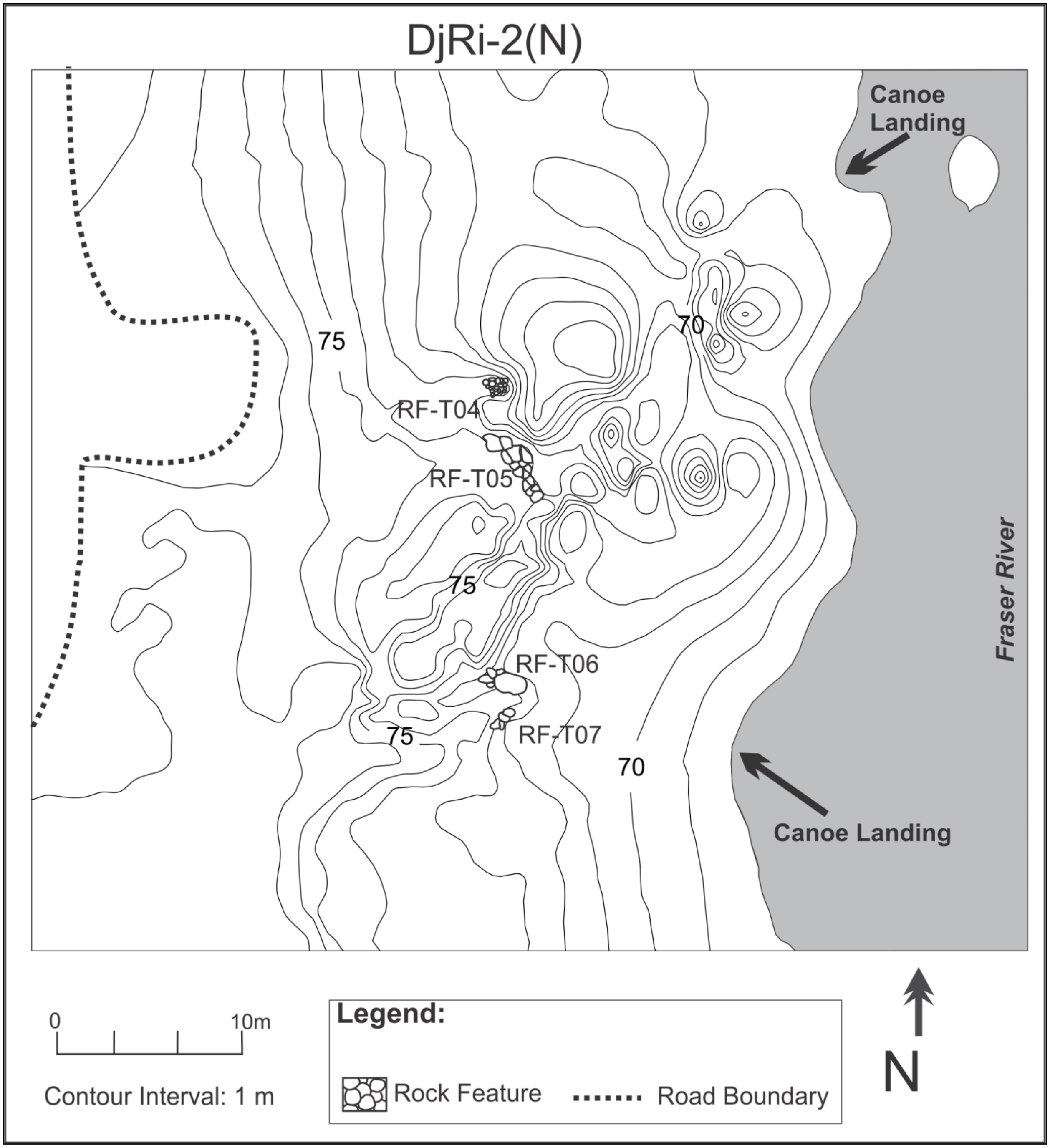

Figure 5.6. Sketch map of DjRi-2 (N).

This area tops a steep slope to the north that leads directly down to a back eddy in the river and contains four mapped rock features, separated by a bluff with a gap (Figure 5.7). A small distinct trail leads off of the pull-out, angling to the south toward a portion of ground that is quite flat relative to the surrounding topography. The trail traverses ground at the base of another rock terrace: RF-T05 (Figure 5.8). Made from larger rocks than the features at DjRi-2(S), this feature also creates a wide, flat terrace, but the view faces upriver, not down. The rest of the area between RF-T05 and the mean water level, approximately 30 metres below, is a gradual slope, making this feature distinctive. RF-T04, on the other hand, blends into the slope about 10 m down from RF-T05 (Figure 5.9). Constructed out of smaller rounded cobbles, where the other features in the area are built out of large angular boulders, RF-T04 has collapsed to the point where it is difficult to distinguish its original shape and size. One unique aspect of this site is the long rock bluff that divides it in two with one gap at the centre (Figure 5.7). The rest of the bluff is steep sided and smooth, making it difficult to traverse. At some time long ago, water or ice carved a breach in the bedrock that constitutes this rocky bluff.

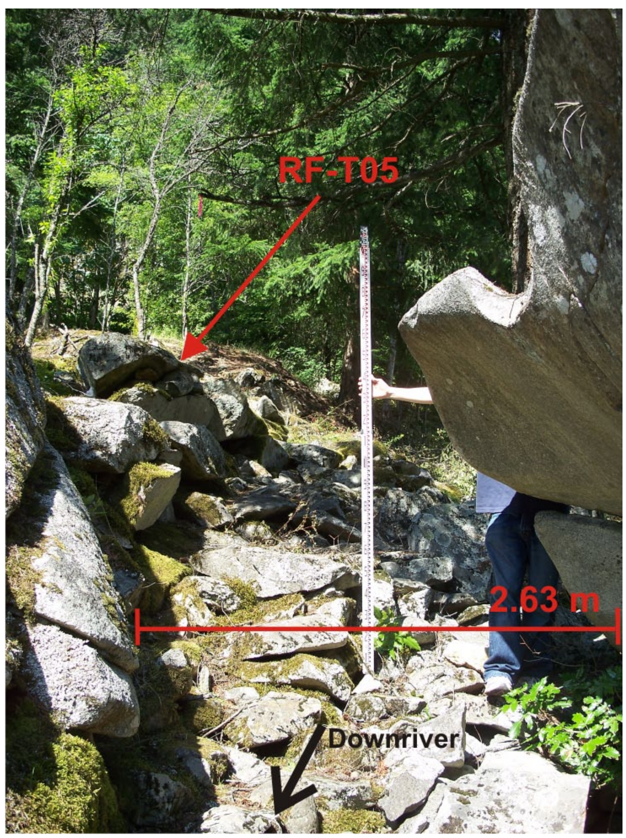

Figure 5.7. Gap between the two sides of the bluff at DjRi-2(N). This gap restricts access to the upriver portion of the site.

Figure 5.8. RF-T05 - A terrace feature just down from the road at DjRi-2N. This feature shows chinking and some use of "cap" stones to create a flat surface stretching over 9 m atop the feature.

Figure 5.9. RF-T04 - Two views of the upper portion of RF-T04, a small terrace. This feature is a combination of angular boulders and river cobbles. The feature slopes some distance toward the river. RF-T05 is visible in the background of the photos.

Figure 5.10. RF-T06 - Small terrace feature topped with a large cap stone. Several small stones are holding the cap stone flat. The feature has slumped down slope considerably.

Now just over two and a half meters at its widest point (Figure 5.7), this opening provides the opportunity to control and monitor movement between RF-T05 and the group of features RF-T06 (Figure 5.10) and RF-T07 (Figure 5.11), located 20 m downriver. It begins at the termination of RF-T05 and provides access for perhaps two people walking abreast, with an excellent view downriver as one travels from RF-T05 through this gap. The sides are imposing, 3 m high granitic bedrock and are worn smooth from the passage of water (Figure 5.9). Once through, there is a narrow pathway curving west to the other set of rock features. These three features run along the edge of a flat area which ends in a steep 20 meter drop to the river. In this case, it appears that the features were built up between areas of bedrock, filling in gaps to make a terrace. Bedrock outcrops are visible between these features today. Overall, DjRi-2(N) covers a 2000 m^2 area, with five rock features defining two distinct terraces.

Figure 5.11. RF-T07 - Another small terrace feature just down river from RF-T06 (to the right in this photo). This feature is stacked between two pieces of bedrock and is therefore quite narrow.

DjRi-46

Another 1.7 km upriver from DjRi-2, on the west bank of the Fraser, is DjRi-46 (Figure 5.12), another village site partially destroyed by construction. Known to the Stó:lō as *Lexwts'ó:kw'em*, this location was first recorded in 1974 and was revisited in the late 1990s and early 2000s (Schaepe 2001b). Accessing this site requires parking near the railway and passing across a modern fishing camp. About 150 meters from this fishing camp, a 40 m sheer rock bluff overlooks the Fraser. To the west, a series of cache pits and house pits lie protected behind the massive outcrop, marking an ancient settlement area. Primary river access to the village would be via two canoe landing locations just down slope from the site.

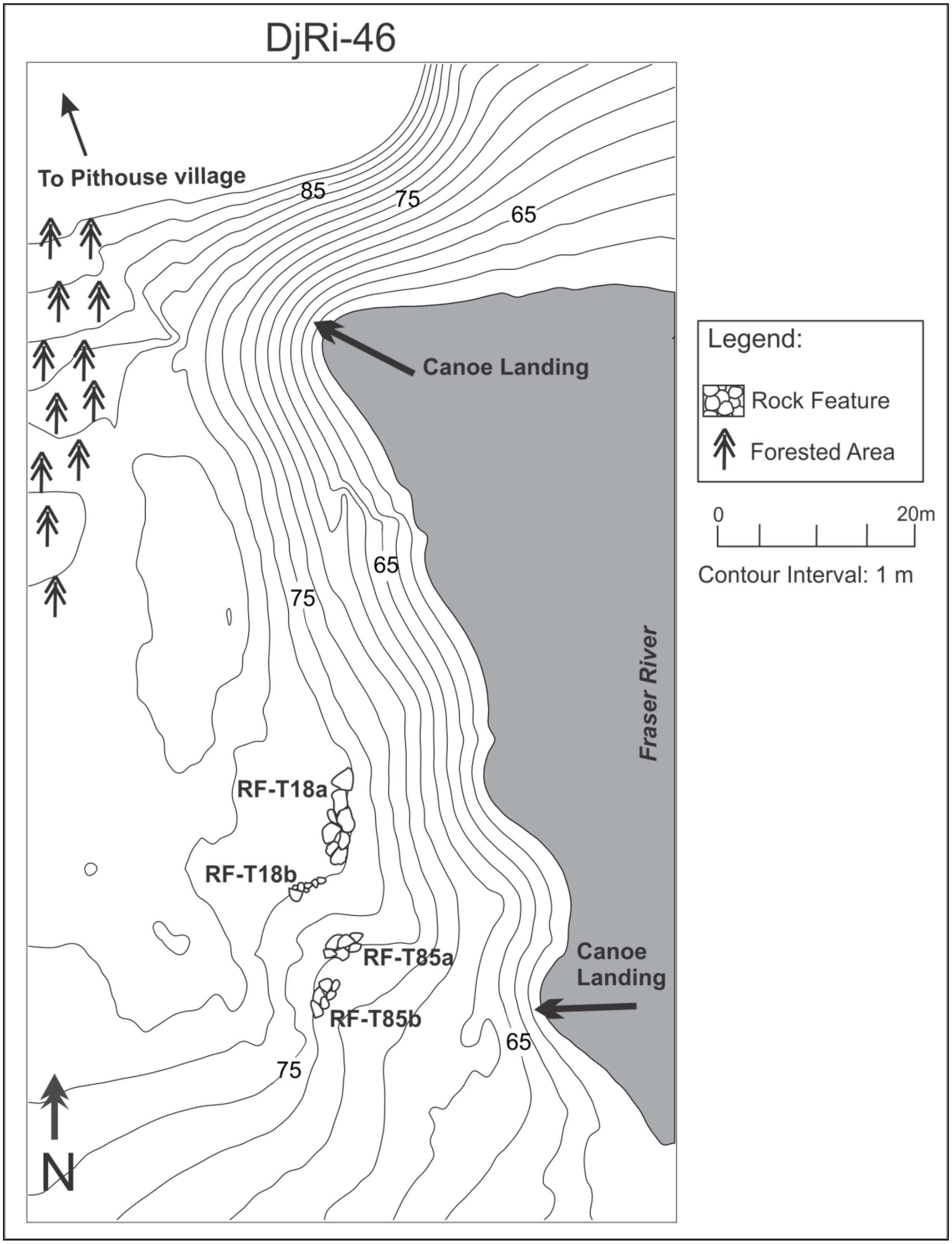

Figure 5.12. Sketch map of DjRi-46.

Two rock features in four segments[13]: RF-T18a, T18b, T85a, and T85b, are located right at this point of access to the village (Figure 5.12 –Figure 5.16). This entire area was heavily overgrown, but the features became clear as small vegetation was removed. The features sit at the top of a gradual slope down to the Fraser, and while RF-T18 was built at the edge of a terrace, the others were constructed along the slope below, making it unlikely that they would have been used for living purposes, since the area behind is on a gradual slope, not suitable for building structures.

Built from large, angular boulders, these features enhance the natural features in the area, although they have collapsed considerably since first built. We found that one rock feature, previously thought to be cultural, was a bedrock outcrop (Schaepe 2001b:52). One striking feature of this site is the excellent view it affords downriver, especially once the vegetation has been cleared away.

Figure 5.13. RF-T18a - This feature was once more freestanding and sits 10 m upriver from RF-T18b. It overlooks a steep drop and contains some large boulders.

[13] Rock features which appear to have been connected in the past, but have now partially collapsed, were recorded with the same feature number with each section is distinguished by a lower-case letter (e.g., RF-T18a, RF-T18b, etc.)

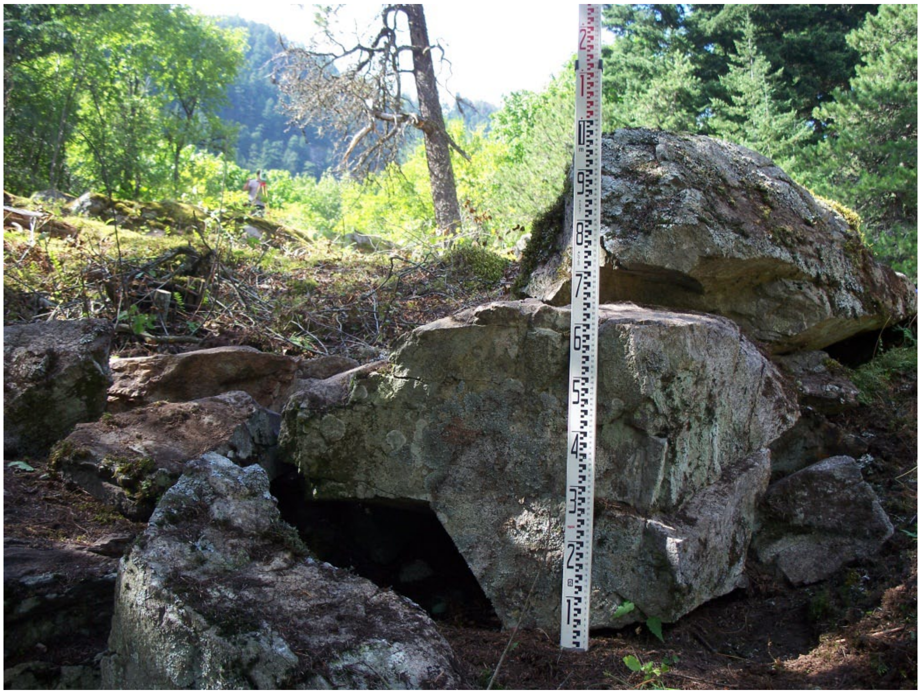

Figure 5.14. RF-T18b - This is a jumbled feature 10 m downriver from RF-T18a. It appears likely that these features were once joined.

Figure 5.15. RF-T85a - This feature is located down slope from RF-T18 and it is jumbled. Some intact stacking patterns remain.

Figure 5.16. RF-T85b - This feature is near RF-T85a, suggesting that they were once a single feature blocking access to the site above.

DjRi-14

Although not mapped herein, this site has 30-plus rock features, only three of which were recorded using the methods described above. The site has been the focus of past research (Schaepe et al. 2006) and is one of the better explored sites in the Canyon, known as *X̱elhálh* in Halkomelem (Figure 5.17). Located just upriver from the town of Yale on the southeast corner of the Fraser where the river curves from its northern direction is Lady Franklin Rock. A large island in the middle of the river, this rocky outcrop causes the river to split and flow around it, creating treacherous currents and large swells.

At high water in June and July, the swells can reach upward of six feet high and the waters become impassable by canoe. Right below Lady Franklin Rock is a bay of relatively still water, providing a place to land a canoe for a portage around the difficult waters ahead.

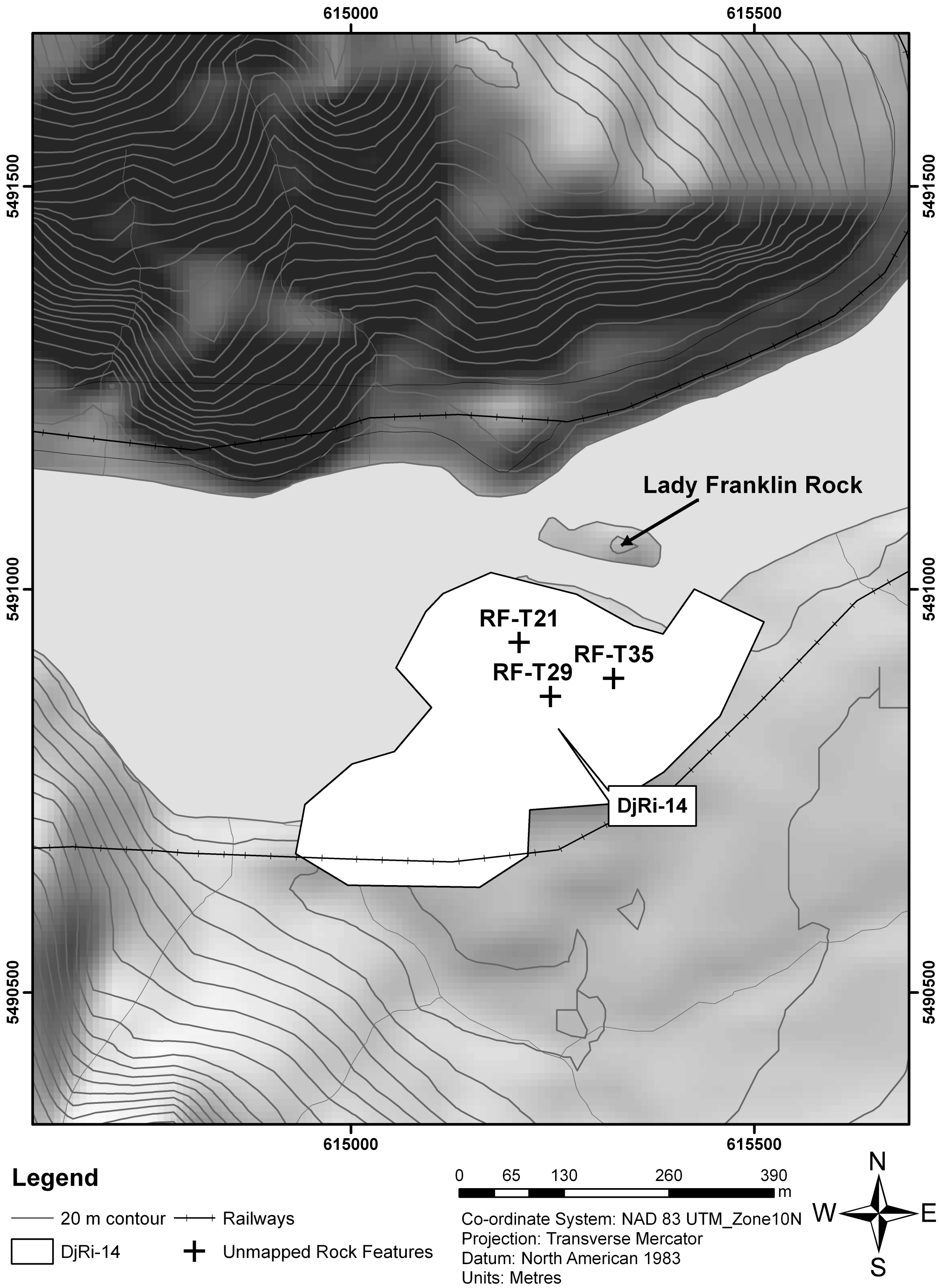

Figure 5.17. Map of the DjRi-14 locality.

On a 10 m high terrace above the bay is an ancient village with many house pits, cache pits and the possible remains of plank houses. As with other sites in the Canyon, a cemetery lies within the site boundary and was used until the 1930s. The northern end of the site consists of a steep rock bluff, climbing another 40 m in height. At first glance, this appears to be the site boundary, but a pathway leads up the bluff. Upon reaching the top, rock features are visible on the surface atop the bluff and stretching along the northeastern face. Consisting primarily of terraces, these features are 1-3 m in height. The three features described here are RF-T21 (Figure 5.18), near the south-western edge of the bluff facing downriver; RF-T29 (Figure 5.19), at the top of the path leading from the housepit village; and RF-T35(Figure 5.20), situated along the north-eastern slope.

Figure 5.18. RF-T21 - This feature was recorded in winter and did not get cleared as extensively as some others, so its shape is somewhat unclear. It does form a clear terrace edge but is primarily constructed out of smaller angular boulders.

The terraces range from 7-11 m in length and modify slopes to create flat areas. At the base of the bluff, near the high water mark, sits a rock feature in several sections, stretching for 200 m (Schaepe 2006:684) along the eastern bank facing Lady Franklin Rock, marking the location in a very visible way.

Figure 5.19. RF-T29 - This is a terrace feature situated between two large bedrock outcrops atop the bluff at DjRi-14.

Figure 5.20. RF-T35 - This is another terrace feature. It is down slope on the upriver side of the bluff of DjRi-14 and is quite tightly stacked with smaller stones than other terraces. The tree stump on top of this feature has been dated to the 1790s.

DjRi-13

Continuing along the east bank of the Fraser River, about 1 km upriver from the rapids at Lady Franklin Rock, lays a shallow sandy bay, exposed at low water, containing a back eddy formed by a large rock outcrop. This marks the edge of DjRi-13, known in English as the Mike Victor site and in Halkomelem as *Q'aleliktel* (Figure 5.21). Described by Duff (1952), this site was revisited in the 1980s as part of a heritage assessment for a proposed twin-tracking project by CN Rail. The east side of the sandy bay is filled in with debris from the construction of the CN railway that creates a steep, loose rocky slope about 25 m high. To the north stand a series of bluffs stretching upriver, cut through by modern activity, and leaving three large, unorganized, linear rock piles, shown in Figure 5.22These piles sit between two rocky hills and consist of smallish, rounded boulders with no appearance of deliberate stacking in contrast to other rock features built using large, angular boulders with clear construction patterns and chinking. Atop the southern of the two bluffs at this location are two rock features facing downriver with an excellent view (Figure 5.23 and Figure 5.24). The larger of the two, RF-T63, is similar to other rock features in aspect and location, but differs in that it consists of only nine large boulders stretching across 9 m, with a few smaller cobbles for chinking or stabilization, in a linear formation following the edge of a steep drop to the river (Figure 5.24). Just 5 m to the southeast and down slope from RF-T63, is RF-T64, a 3 m long feature with clear stacking on top of the underlying bedrock (Figure 5.23). While smaller than RF-T63, it shares a similar unobstructed view downriver and was likely part of what was a larger feature in the past.

The northern bluff marks the beginning of a bedrock outcrop that continues another 800 meters along the east bank of the Fraser River. Three rock features sit on top of this bluff, two facing either down river or across the river, RF-T66 (Figure 5.25) and RF-T68 (Figure 5.26), with the third facing inland towards the east, RF-T69 (Figure 5.27).

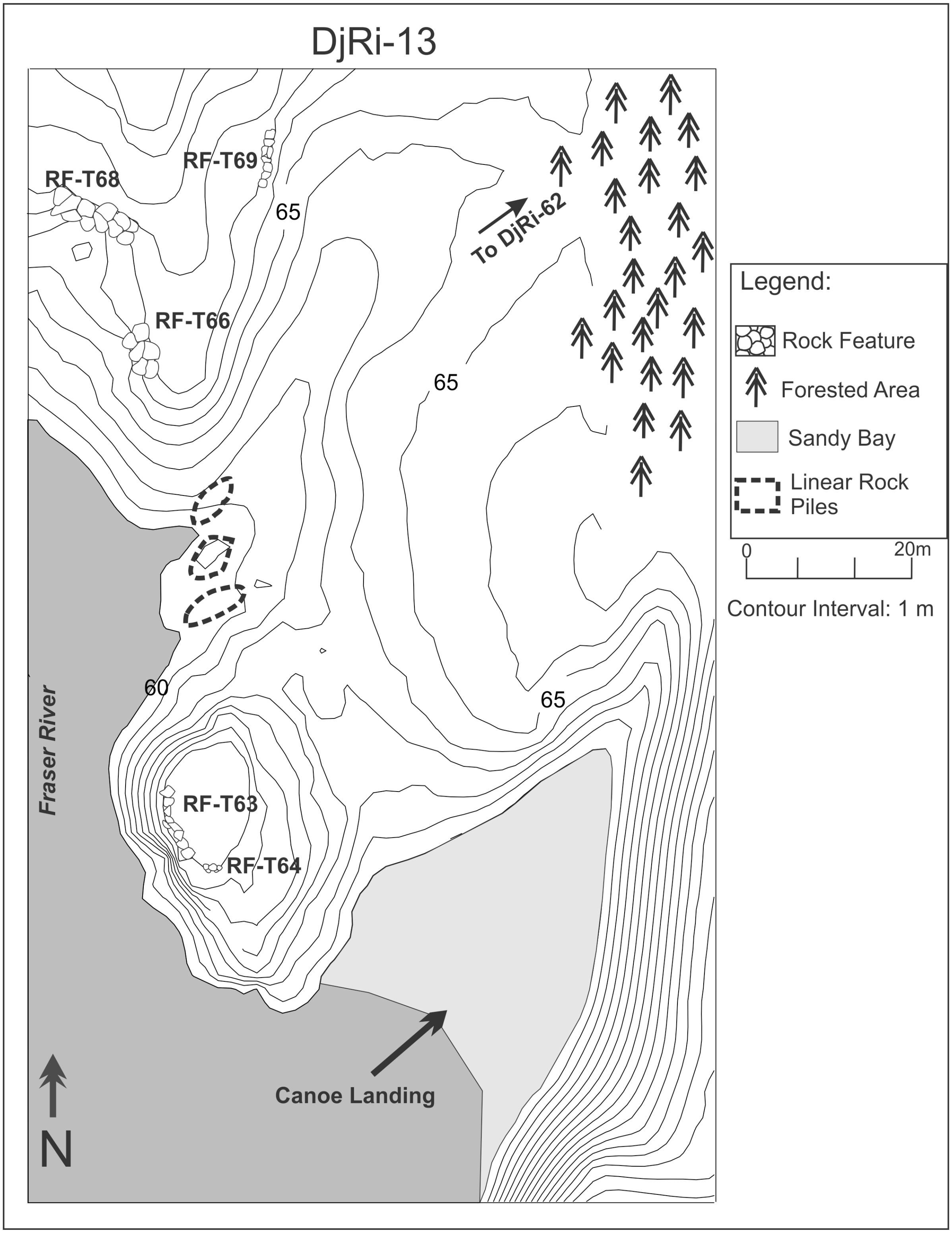

Figure 5.21. Sketch map of DjRi-13.

Figure 5.22. Linear rock piles at DjRi-13

Figure 5.23. RF-T64 - This feature is 5 m down river and down slope from RF-T63. It is quite jumbled but there appears to be some deliberate stacking patterns within the feature.

Figure 5.24. RF-T63 - This is a linear boulder alignment placed at the top of a sheer bluff leading down toward the water. There is an excellent view down river from this location and it is the only completely freestanding feature in the entire sample.

Figure 5.25. RF-T66 - This feature consists of a jumble of small boulders and very large angular boulders, but the strategic placement of chinks indicates purposeful construction. The top is flat and there may be additional remnants of a similar feature at the back of the bluff.

Figure 5.26. RF-T68 - This feature is situated atop a third bluff at DjRi-13 and faces down river. This is the feature first photographed in the 1887 (Schaepe 2006) and is a large terrace, creating a flat area behind.

Figure 5.27. RF-T69 - Facing away from the river, this feature is another long terrace, although a major portion of the face of the terrace is buried in sediment.

RF-T66 is the southernmost feature, situated along the edge of the bluff on the river side of a small knoll and providing a view both across and down river. While somewhat jumbled today, this 5.7 m long feature may have been part of a rock alignment that circled the entire southern portion of this knoll in the past. It is flush with the top of the rocky knoll, creating an extension that stretches toward the river. RF-T68 is 15 m north of RF-T66 and faces downriver while at the same time affording a view upriver. It marks the front of an 8.5 m long, linear terrace that stands about 1.5 m high, creating a flat, stable ground surface, suitable for building. As described by Schaepe (2001b:53), this rock feature is visible in a photo from the area in 1887. RF-T69, 15 m east of RF-T68, is also a terrace, the face of which is partially obscured by soil and vegetation. Constructed of smaller rocks than RF-T68, RF-T69 creates a sharp 1 m drop that would otherwise not exist in this location. The area behind this feature is also flat and rectangular, suggesting that a structure could have been built on top of it. Another important aspect of RF-T69 is the presence of a large Douglas Fir tree (with a diameter greater than 1 m) growing right through the terrace wall and destroying part of its edge. Although this tree has not yet been cored to determine its tree ring age, due to issues with a lack of similar sizes of trees nearby to confirm the sample, the size of the tree may suggest the terrace was constructed before the European colonization of the Canyon began.

DjRi-62

Behind the mining piles at DjRi-13 is an unusually flat area, modified in the 1950s by heavy equipment to provide access to the historic cemetery some 400 m to the north and the base for a cable car that used to stretch across the river. It appears that this area is a continuation of DjRi-13, but recorded officially as DjRi-62 during of the twin-tracking project in the 1980s. Today, there is a small trail leading from the flat area behind DjRi-13 into the dense underbrush of the forest.

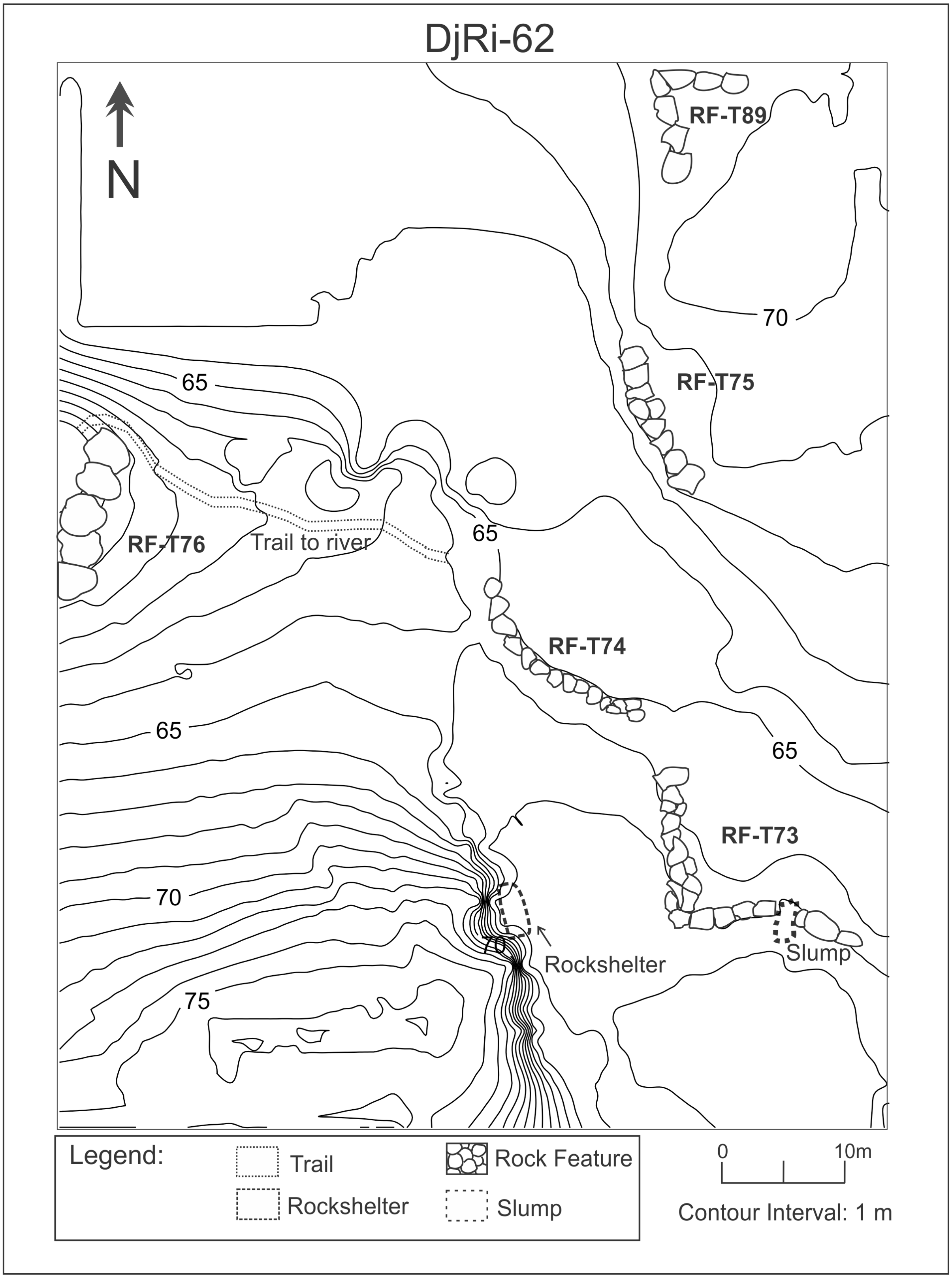

Figure 5.28. Sketch map of DjRi-62.

As one follows the trail away from the river, it leads between two bluffs that eventually block the view of both the river and the railway. Continuing along the trail, the forest thickens and the light dims, until about 200 m back from the water's edge, there is a sharp rise in the otherwise flat ground. The bluffs tower some 15 m above this flat surface with the westernmost bluff creating a small rock shelter (Figure 5.28). Initially, the thick brush and moss obscured what were some of the most impressive rock features: RF-T73a (Figure 5.29) and RF-T73b (Figure 5.30), which together creates a two-sided terrace feature covering about 170 m^2. Unlike all other terrace features we recorded in the survey, it is L-shaped: RF-T73a 11 m runs east-west, while RF-T73b runs 17 m north-south, meeting in the southwest corner. Both terraces show some evidence of collapse, exposing the internal structure of small angular stones capped with large, flat, angular boulders—some as much as 1.5 m across. At the northern end of RF-T73b sits a very large boulder, just 4 m north of which is the beginning of another long terrace feature: RF-T74 (Figure 5.31). At 18 m long, it is the longest feature in the sample, even though it rises, at most, 1 m above the ground surface on which it sits. It is similar in construction to RF-T73, where large cap stones help to create level ground. To the east of this feature, rising above the area defined by RF-T74 is RF-T75, a tall, clearly stacked rock feature that appears to serve more as a retaining wall than a terrace (Figure 5.32).

RF-T75 sits near the base of the eastern portion of the bluff separating the site from the CN rail line, and creates a level ground surface—though not as extensive as RF-T73 and RF-T74. Part of this feature has collapsed, likely caused by a tree-fall, while several large trees still grow atop it. The lower part of the feature is covered in soil and heat-altered rock. The stacking pattern mirrors other terraces in the area, although the rocks, on average, appear to be larger and heavier. A further 15 m to the north of RF-T75 is another rectangular feature, RF-T89, measuring 8 m in length by 5 m in width, showing less clear stacking patterns than the surrounding features.

Figure 5.29. RF-T73a - This is the south edge of an L-shaped feature. The corner of the 'L' is located at the left end of this photo. Large angular rocks are strategically placed on the top of the feature to create a flat surface. At some point in the past, the middle portion of the feature collapsed.

Figure 5.30. RF-T73b: This is the west edge of an L-shaped feature. The corner of the 'L' is located at the right end of this photo. Large angular rocks are strategically placed on the top of the feature to create a flat surface but some have slid down off the top.

Figure 5.31. RF-T74 - This feature is just north of RF-T73. It is the longest feature in the sample at 18+ m. As with other features at this site, the top of the feature is a large, flat area.

Figure 5.32. RF-T75 - This is a terrace feature - the flat surface on top is emphasised by the trees growing out of the top. The feature has clear stacking with some evidence of chinking and a preference for large boulders.

Just five metres above this feature is a formation of large, flat rocks, ranging from 0.5 m to 1 m in length, placed on edge to form a rectangle. When located, this feature seemed to be fairly intact, with perhaps 20-30 rocks standing. However, upon our return to record the area, a tree had fallen on part of the feature, making it difficult to record. Although is not part of the sample of rock features studied in this thesis, it is an interesting case that warrants future research.

Down slope from RF-T74 is a small path to the bank of the Fraser River. At the base of the path we found one of the most striking features in our entire sample: RF-T76 (Figure 5.34). Standing with a maximum height of nearly 3 m, it is capped with immense rocks, the largest of which measures 2.5 m by 1.5 m by 1 m, with an estimated weight of approximately 10 tonnes (based on a density of 2.7 tonnes per m^3).

Others are similar in size, indicating that a great deal of labour was required to construct RF-T76. Its overall shape resembles a wedge, with the shallowest part at the northern end and the deepest part to the south, filling in and levelling a slope in the underlying bedrock. The view from the top of the terrace looks both across and upriver, though the same view can be had from the surrounding bluffs. There is a small flat area atop the feature, but due to a lack of soil to fill in the cracks between rocks and increase stability, it does not appear an ideal location for building—perhaps soil used as fill has eroded away since the structure was built. DjRi-62 is the site of monumental construction on an unprecedented scale for the Canyon.

Unmapped Features

Several rock features in the sample do not cluster around the above mapped sites (Figure 5.35). These rock features are either isolated, such as RF-T14, or occur in pairs, such as RF-T10/RF-T11 and RF-T16/RF-T17.

Figure 5.33. RF-T89 - This feature lies about 25 m upriver from RF-T75 and is a low L-shaped terrace that stands at maximum about half a metre above the ground surface. The feature is quite flat on top but partially buried in soil.

Figure 5.34. RF-T76 - This feature is down slope from RF-T73, T74 and T75. It is constructed out of some of the largest rocks in the entire sample, weighing upward of 10 tonnes. The feature is almost 3 m high and shows clear stacking patterns.

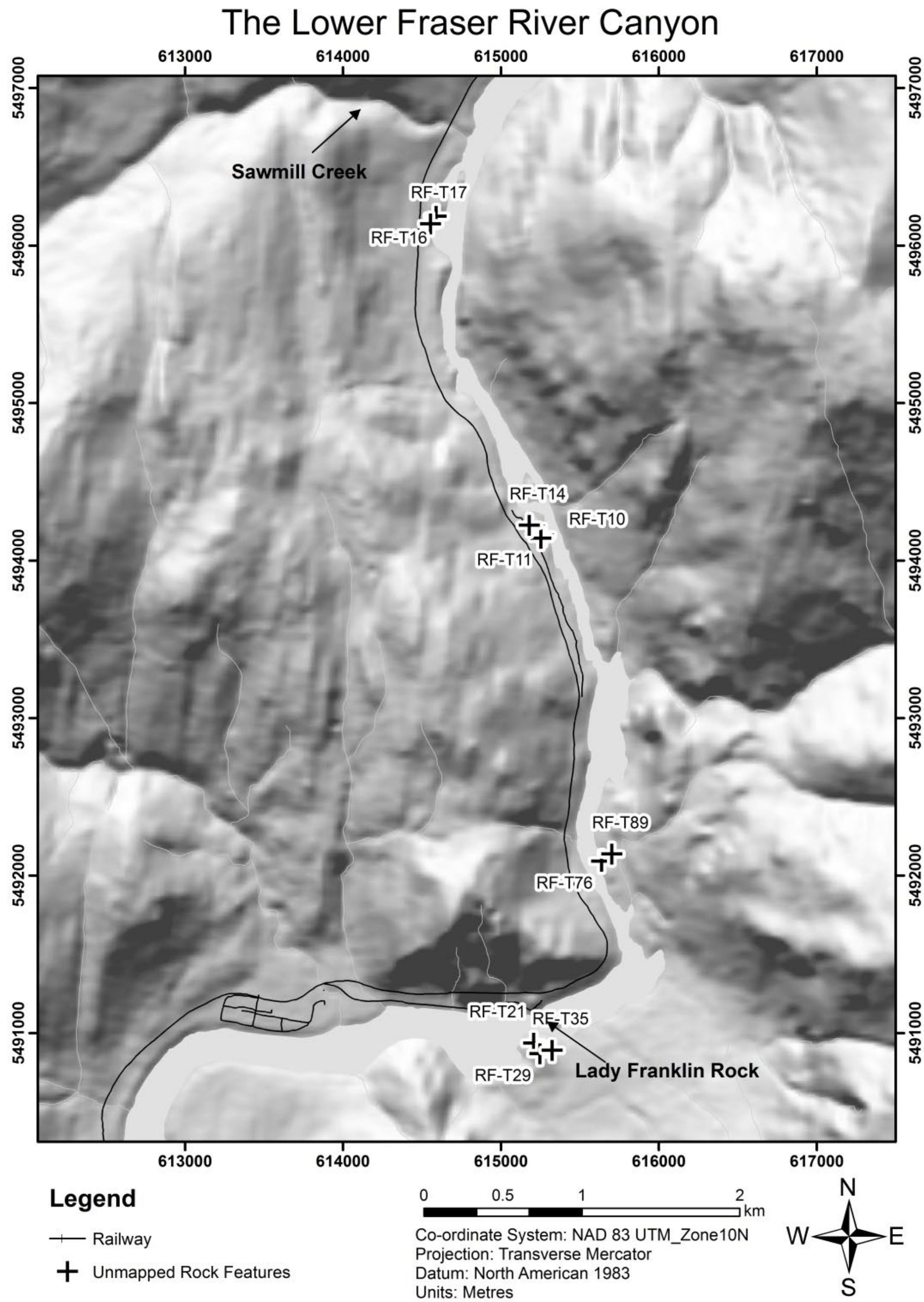

Figure 5.35. Location of unmapped rock features included in the sample.

Unlike many other features in the sample, this rock structure does not create a flat surface on top; instead, it forms the base of a slope. The bottom layer of the structure is a bedrock outcrop topped by five courses of stone, well-stacked and with little apparent slump. A small trail runs to the north of the feature, up slope, and toward a second rock feature: RF-T11 (Figure 5.36). Standing 2 m high, this feature is littered with modern refuse, and the trail has cut through the centre. The top is flat, but the area behind continues to slope upward. These features, along with RF-T12 just upriver (not included in the sample), appear to be a part of a modification of this slope, the purpose of which remains a mystery.

Figure 5.36. RF-T10 and RF-T11, situated on a rocky slope with considerable modern detritus.

RF-T14

Another 70 m upriver from RF-T10 and RF-T11, a small creek drains from the surrounding mountains, passing under the old highway on its way to the Fraser River. Heavy moss grows along the rocks that line the creek, but right near where the small creek meets the Fraser is a notably vertical surface. Situated at the base of a 25 m tall sheer rock face is a tightly packed terrace feature, revealed after pulling away thick, mossy growth. The cliff forms the downriver boundary of the feature, while the creek drainage marks the upriver boundary. Nearly 2 m high, RF-T14 (Figure 5.37) is distinctive as it is constructed out of a large number of very tightly packed small boulders and cobbles. The feature forms an 'L' shape, with two intact sides, one facing upriver and the other facing across the river. A cobble chopper was located near the base of the river side of the feature, suggesting that it may be of precontact antiquity, but its construction materials smaller and it is more tightly stacked than other rock features in the sample.

Figure 5.37. A portion of RF-T14. This is a small, unusually situated rock feature. A similar rock feature is on the other side of the creek from this location, but this whole area needs to be mapped to understand the relationships between these features.

RF-T16/RF-T17

Half a kilometre upriver from DjRi-46 is another high rock bluff. From the railway, a clear path leads to an area with a cabin and dry rack, marking the fishing location used in the summer by the Pettis family from Seabird Island, who were kind enough to share food and wind dried salmon with us when we were working there. The trail continues along the downriver stretch of the bluff, creating a means to bring salmon up from the river. About halfway down the slope is a low rock feature: RF-T16 (Figure 5.38). Partially buried in soil, this feature has been there since before the Pettis' built their fish camp over 35 years ago and creates a small terrace .5 m high and 2.75 m long. The rocks used to construct this feature are similar to other features in shape but are on a smaller scale. Just down slope from RF-T16, a cobble chopper was found, indicating ancient activity on the site. At the base of the trail, adjacent to the high water line, sits a rock pile made out of a jumbled combination of angular boulders and large river cobbles.

Figure 5.38. RF-T16, situated on a trail leading down from a modern fish camp, but buried in soil and associated with ancient cultural materials.

This was constructed by the Pettis family to create a safe place for the children to swim when the water is high. Another 10 m downriver is RF-T17 (Figure 5.39), not built by the family, consisting of three sides that create an almost semi-circular shape. A large boulder forms the south east corner, and a buried boulder forms a portion of the western wall. RF-T17 consists of three walls with stacked rounded small boulders and large cobbles, while the centre is open and sandy. Both the shape and the construction material of this feature are not like other features in the sample. The rocks are rounded and the feature creates an empty space in the middle. While the use of RF-T17 is unclear, it was suggested that it was related to fishing, perhaps designed to create a trap (discussed in Chapter 7). Historic metal was found nearby, along with a sling stone, indicating both ancient and historic activity.

Figure 5.39. South wall of RF-T17. This feature also has a north wall and a west wall, but they are considerably more disturbed than the south wall. The eastern edge is open to the river.

Having described the rock feature and sites in a qualitative fashion, I spend the next two chapters engaging in various forms of quantitative analysis to evaluate what the attributes and spatial relationships of the rock features can indicate about ancient landscape modification, ownership, and the process of defining identities.

6: EXPLORING PATTERNS IN THE ROCK FEATURE DATA: SUMMARIZING THE VARIABLES

Introduction

I turn my attention to summary measures of the attributes of the sample in this chapter. Using an Exploratory Data Analysis (EDA), I examine the attributes described in Chapter 4. Exploratory Data Analysis is a method developed to explore data using descriptive statistics and emphasises recognizing patterns by examining visual representations of data (Tukey 1977). The main goal of this chapter is to present summary data and describe overall patterns in rock feature attributes based on the sample at hand; Chapter 7 explores possibilities for why these patterns may exist. I use descriptive data from this chapter in my discussion of the rock features in the next chapter, where I present groupings based on construction patterns and use of rock features that may explain some of the differences between rock features. The exploration of differences and patterns within these data has the potential to contribute to the overall project of understanding how rock features may mark agency and identities on the landscape by establishing possible purposes for their construction.

Exploratory Data Analysis

> EDA is…a flexible, data-centred approach which is open to alternative models of relationships and alternative scales for expressing variables, and which emphasizes visual representations of data and resistant statistics (Hartwig and Dearing 1991:12-13)

As no systematic consideration of the entire range of rock features had been attempted previously, I designed my quantitative analysis to be exploratory in nature – I did not initially set out to formally test pre-defined hypotheses. Instead, I undertook an exploratory analysis of the sample of rock features recorded. EDA is used to suggest patterning in the data that may generate hypotheses to ultimately test with confirmatory statistics. EDA is an approach to analysis that uses a set of techniques to graphically examine and manipulate data in order to expose underlying structure, assumptions and anomalies (Tukey 1977). Graphical exploration of data is effective "when it *forces* us to notice what we never expected to see" (Tukey 1977:vi) and point out the places where what we see can be misleading. Viewing and manipulating the data may uncover patterns that help to define feature types and uses that I would not have seen otherwise. EDA is based on the assumption that "the more we know about the data, the more effectively it can be used to develop, test and refine theory" (Hartwig and Dearing 1991:9). Four themes are important in EDA: (1) resistance, or insensitivity to localized small changes in data; (2) residuals, or what remains after a model has been fit to the data; (3) re-expression, or the transformation of the scale of the data to simplify analysis; and (4) revelation, or the use of visual displays to reveal patterns in the data (Hoaglin et al. 1983). This approach is a good first step to describe possible relationships between categories of archaeological data, particularly with a type of feature that is poorly understood. In addition, taking an exploratory approach to the data illustrates areas of analysis that I may not have otherwise considered, both in the transformation of individual variables and in areas of comparison and correlation between variables. A recent application of an EDA approach to data in the Lower Fraser River examined changes in house size and shape through time inferred from EDA, along with what this can illustrate about social and political organization (Schaepe 2009).

In this study, I fuse frequencies, bar-charts, stem-and-leaf plots and boxplots. These provide visual displays of both discrete (i.e. presence/absence or rank-order) and continuous (i.e. length) variables to check for errors, assess where data are "smooth" – showing regularity in the underlying structure of the data – or "rough" – deviations from the smooth data showing no pattern (Hartwig and Dearing 1991). For continuous data, stem-and-leaf plots show the shape of the distribution and spread, whereas a boxplot can also show symmetry as well as skewness. Much of the data are nominal[14] or ordinal[15] measurements, so I also use tabulation of individual and multiple categories to explore patterns within the quantitative data. These summary measures show where there are patterns and deviations, leading me to look more closely at rough areas to see if either transformations or grouping the data into batches is required.

Rock Feature Data

Attributes were recorded for the 30 sampled rock features, located throughout the Lower Fraser River Canyon, adjacent to Late Period (550-100 BP) villages and situated near non-village locations. Table 6.1 summarizes these basic data. All recorded information on all rock features in the sample can be found in Appendix 3.

Three sets of features sampled are directly related to each other: RF-T18a/RF-T18b, RF-T73a/RF-T73b and RF-T85a/RF-T85b. My labelling method was designed to capture the relationship between two portions of what is hypothesised to have been, or still is, one rock feature. These features were recorded individually within the sample and assigned their own labels, although they are related. Because of the methods by which the data were collected, I left these features in their individual parts for the exploratory analysis.

As disparate types of data were acquired from the rock features, some coding was necessary to prepare the data for statistical analysis, so the measurement scale of each variable was defined and an appropriate code assigned.[16] After coding, I generated numeric and graphic summaries of the data using SPSS 16.0. For each variable, I discuss

[14] Nominal scale data, meaning "in name only," is a type of data to which a numerical value may be assigned (i.e. 1, 2, 3) to distinguish between categories, but there is no ordering to the scale. (Fletcher and Lock 2005)

[15] Ordinal scale data are also categorical, but the numbers assigned represent a scale (i.e. low, medium, high). Continuous variables can be grouped to create ordinal categories. (Fletcher and Lock 2005)

[16] Details of and rationale for coding are located in Appendix 4

patterns, outliers, and elements of the data summaries and present some of the overall trends as a first step before defining feature typologies in the next chapter.

Table 6.1. Summary of Sampled Rock Features Indicating Site Name and Feature Type.

Feature Number	Site (Borden)	Feature Type
RF-T01	DjRi-2(S)	Terrace/platform
RF-T02	DjRi-2(S)	Terrace/platform
RF-T03	DjRi-2(S)	Terrace/platform
RF-T04	DjRi-2(S)	Terrace/platform
RF-T05	DjRi-2 (N)	Terrace/platform
RF-T06	DjRi-2 (N)	Terrace/platform
RF-T07	DjRi-2 (N)	Terrace/platform
RF-T10	Unknown	Retaining Wall
RF-T11	Unknown	Retaining Wall
RF-T14	Unknown	Terrace/platform
RF-T16	Unknown	Wall
RF-T17	Unknown	Semi-circular stone enclosure
RF-T18a	DjRi-46	Wall
RF-T18b	DjRi-46	Wall
RF-T21	DjRi-14	Terrace/platform
RF-T29	DjRi-14	Terrace/platform
RF-T35	DjRi-14	Terrace/platform
RF-T63	DjRi-13	Linear stone alignment
RF-T64	DjRi-13	Retaining Wall
RF-T66	DjRi-13	Terrace/platform
RF-T68	DjRi-13	Terrace/platform
RF-T69	DjRi-13	Terrace/platform
RF-T73a	DjRi-62	Terrace/platform
RF-T73b	DjRi-62	Terrace/platform
RF-T74	DjRi-62	Terrace/platform
RF-T75	DjRi-62	Terrace/platform
RF-T76	DjRi-62	Terrace/platform
RF-T85a	DjRi-46	Wall
RF-T85b	DjRi-46	Wall
RF-T89	DjRi-62	Terrace/platform

Discrete Variables

The majority of the rock feature attributes recorded were categorical, designed to capture the presence/absence of materials and characteristics, or placing features into categories such as shape. Some attributes (e.g. relative number of rocks, infill) are ordinal measurements. Here, I present frequency tables to summarise each variable in the database and briefly describe patterning in the data. This portion of the chapter is primarily descriptive, although I note where there is a distinct trend or features that do not fit in the overall patterns.

Rock Feature Type

In the field, I used three working types to create a categorical variable. Two types were added in the field to distinguish certain features encountered during survey, resulting in five categories: (1) terrace/platforms, linear or rectangular features creating artificial flat areas, corresponding to the extent of the feature; (2) walls, or linear features with some evidence of being freestanding; (3) retaining walls, linear features backed by slopes; (4) linear stone alignments, features consisting of one course of boulders; and (5) semi-circular stone enclosures, multi-sided features creating an open area in the centre. Within the sample of 30 features, 20 (67 percent) were classified as terraces (Table 6.2).

Table 6.2. Frequency Distribution of Rock Feature Types.

Feature Type	Frequency	Percent
Terrace	20	66.7
Wall	5	16.7
Retaining Wall	3	10.0
Linear Boulder Alignment	1	3.3
Stone Enclosure	1	3.3
Total	**30**	**100.0**

Two categories had only one feature in them, limiting the amount of analysis that can be performed on these data. Therefore, from the various types noted, I developed a new categorical variable: terrace and non-terrace. This allowed me to compare characteristics of terrace features against non-terrace features to explore other elements of features that might support my field designation. I discuss the implications of this new variable in relationship to other feature typologies developed in the next chapter.

River View

Most features (n=22, 73 percent) had some form of river view (Table 6.3). Table 6.4 shows that 30 percent (n=9) of all features had an exclusively downriver view, while only 13 percent of features (n=4) had an exclusively upriver view. When combining categories, more features had some form of view downriver (40 percent, n=12) than some form of upriver view (23 percent, n=7).

Table 6.3. Frequency Distribution of River View of Rock Features.

River View?	Frequency	Percent
No	8	26.7
Yes	22	73.3
Total	**30**	**100.0**

Table 6.4. Frequency Distribution of River View by Direction of the View.

Direction of River View	Frequency	Percent
None	8	26.7
Upriver	4	13.3
Downriver	9	30.0
Across River	3	10.0
Up and Across River	3	10.0
Down and Across River	3	10.0
Total	**30**	**100.0**

Primary Materials

The most common primary material, found in 47 percent (n=13) of all features, was angular boulders ranging between 20-50 cm in diameter (Table 6.5). Overall, 93 percent (n=27) of the features were constructed out of angular boulders of various sizes, illustrating these may have been a preferred building material. Angular boulders are found in abundance in areas adjacent to rock features, but rounded stones are also common, suggesting that builders intentionally selected angular boulders. Two features (RF-T16 and RF-T04) were constructed out of rounded boulders. RF-T16 is a unique feature in a number of ways because it was the only stone enclosure in the sample (see Ch. 5 for a detailed description).

Table 6.5. Frequency Distribution of Rock Feature Primary Materials.

Primary Material	Frequency	Percent
Angular Boulders	14	46.6
Large Angular Boulders	6	20.0
V. Large Angular Boulders	8	26.7
Rounded boulders	2	6.7
Total	**30**	**100.0**

Number of Rocks

For each rock feature, I estimated the number of rocks. Table 6.6 indicates that 43 percent of features (n=13) had between 50-99 rocks as part of the visible construction. Portions of rock features still covered in soil or vegetation were not included in this count, so for terrace features, the count was an underestimate of the full extent. The two features at the upper end of the scale, built out of 200+ rock features, were RF-T14 and RF-T04, both terrace features with volumes on the smaller end of the scale. This suggests there may be a relationship between clast and number of rocks, as discussed in the next chapter.

Table 6.6. Frequency Distribution of Number of Rocks in Rock Features.

Number of Rocks	Frequency	Percent
<20	4	13.3
20-49	6	20.0
50-99	13	43.3
100-200	5	16.7
200+	2	6.7
Total	**30**	**100.0**

Clast

Most features contained mainly boulders (n=26, 87 percent), and features that were not a majority of boulders were equal amounts of boulders and cobbles (n=4, 13 percent) (Table 6.7). This indicates that boulders were the preferred material for constructing all rock features, with 50 percent of features (n=15) in categories that were majority boulders or large boulders. As seen in Table 6.7, only two features lacked cobbles, because cobbles are often used for chinking, as discussed below.

Table 6.7. Frequency Distribution of Rock Feature Clast.

Clast	Frequency	Percent
Some cobbles, some boulders	3	10.0
Some cobbles, some boulders, some large boulders	1	3.3
Mostly boulders, some cobbles	4	13.3
Mostly boulders, some cobbles, some large boulders	7	23.3
Some boulders, some cobbles, some large boulders	4	13.3
Some boulders, some large boulders	1	3.3
Mostly large boulders, some cobbles	1	3.3
Mostly large boulders, some cobbles, some boulders	8	26.7
All large boulders	1	3.3
Total	**30**	**100.0**

Sphericity

Table 6.8 shows the frequency of the primary sphericity, and Table 6.9 shows the frequency of secondary sphericity. Only one rock feature (RF-T07) did not have a secondary sphericity recorded, so the percentages in Table 6.9 are based on 29 features. Frequencies in both tables show that 28 features had a primary angular shape (93 percent), while an equal number of features (n=28) had a secondary angular shape (93 percent). For roundedness, there was a slight emphasis on low sphericity, with 16 (53 percent) features with primary sphericity and 21 (72 percent) with a secondary sphericity showing low sphericity, which indicates rocks are more flat than round overall.

Table 6.8. Frequency Distribution of Primary Sphericity of Rocks in Rock Features.

Sphericity	Frequency	Percent
Rounded, high sphericity	1	3.3
Sub-rounded, high sphericity	1	3.3
Angular, high sphericity	11	36.7
Very-angular, high sphericity	1	3.3
Sub-angular, low sphericity	7	23.3
Angular, low sphericity	7	23.3
Very-angular, low sphericity	2	6.7
Total	**30**	**100.0**

Table 6.9. Frequency Distribution of Secondary Sphericity of Rocks in Rock Features.

Secondary Sphericity	Frequency	Percent
Sub-angular, high sphericity	1	3.5
Angular, high sphericity	6	20.7
Very-angular, high sphericity	1	3.5
Well-rounded, low sphericity	1	3.5
Sub-rounded, low sphericity	1	3.5
Sub-angular, low sphericity	4	13.8
Angular, low sphericity	9	31.0
Very-angular, low sphericity	6	20.7
Total	**29**	**100**

In a cross tabulation, the large number of empty cells precludes any confirmatory tests (Table 6.10), but a few patterns emerge. All of the features that have a primary sphericity of 5 - angular, high sphericity had a secondary sphericity of 10 - sub-angular, low sphericity, 11 - angular, low sphericity, or 12 - very-angular, low sphericity. Features were built out of a combination of angular rocks, both rounded and flat. In addition, features with a primary sphericity of 12 - very-angular, low sphericity had a secondary sphericity of 5 – angular, high sphericity or 6 – very-angular, high sphericity, again suggesting that angularity was an important consideration when selecting rocks with which to build features.

Table 6.10. Cross-tabulation of Primary and Secondary Sphericity of Rocks in Rock Features.

		Secondary Sphericity								Total
Sphericity		**4**	**5**	**6**	**7**	**9**	**10**	**11**	**12**	
2	Count	-	-	-	1	-	-	-	-	**1**
	%	-	-	-	100%	-	-	-	-	**100%**
3	Count	-	-	-	-	1	-	-	-	**1**
	%	-	-	-	-	100%	-	-	-	**100%**
5	Count	-	-	-	-	-	3	6	2	**11**
	%	-	-	-	-	-	27.3%	54.5%	18.2%	**100%**
6	Count	-	-	-	-	-	-	-	1	**1**
	%	-	-	-	-	-	-	-	100%	**100%**
10	Count	1	2	-	-	-	-	3	1	**7**
	%	14.3%	28.6%	-	-	-	-	42.9%	14.3%	**100%**
11	Count	-	3	-	-	-	1	-	2	**6**
	%	-	50%	-	-	-	16.7%	-	33.3%	**100%**
12	Count	-	1	1	-	-	-	-	-	**2**
	%	-	50%	50%	-	-	-	-	-	**100%**
Total	**Count**	**1**	**6**	**1**	**1**	**1**	**4**	**9**	**6**	**29**
	%	**3.4%**	**20.7%**	**3.4%**	**3.4%**	**3.4%**	**13.8%**	**31.0%**	**20.7%**	**100%**

Freestanding

The results are summarized in Table 6.11. Of features showing some evidence of being freestanding, only two features (7 percent) were more than 50 percent freestanding. The one completely freestanding today feature is RF-T64, the only linear boulder alignment in the sample. Whether or not a feature is freestanding helps determine whether these features could have served as defensive features, because if there was no space to stand or crouch behind the feature, it would not protect people from oncoming attackers unless enhanced by other materials such as wood.

Table 6.11. Frequency Distribution of Freestanding Features.

Freestanding	Frequency	Percent
Yes	1	3.3
No	23	76.7
Partial (<50%)	5	16.7
Partial (50%+)	1	3.3
Total	**30**	**100.0**

Infill

Infill categories were designed (see Table 6.12) to capture the variation while accounting for the possibility of some error in my estimated percentage. Within the sample of rock features, 60 percent (n=18) were completely infilled, where the surface of the feature was filled in with soil and/or rock. When we probed the subsurface of several features, we encountered additional rock, so the infill is usually a combination of rock with soil. Only five features (17 percent) had less than 25% infill. This variable also may be related to types of features and feature use, discussed below, because terraces are more likely to have a high level of infill, while walls are more likely to have less infill.

Table 6.12. Frequency Distribution of Infill of Rock Features.

Infill	Frequency	Percent
0-25%	5	16.7
26-50%	2	6.7
51-75%	3	10.0
76-99%	2	6.7
100%	18	60.0
Total	**30**	**100.0**

Intactness

As seen in Table 6.13, 80 percent of features (n=24) showed evidence of disturbance by either natural or cultural activity, with areas of feature collapse or slumping. Only two features, RF-T64 and RF-T29, did not show evidence of disturbance, while four features– RF-T03, RF-T04, RF-T11, and RF-T18b were substantially disturbed. In these cases, the extent of disturbance may affect my ability to interpret other attributes, such as whether or not features are freestanding.

Table 6.13. Frequency Distribution of Intactness of Rock Features.

Intact	Frequency	Percent
Undisturbed	2	6.7
Partially Disturbed	24	80.0
Disturbed	4	13.3
Total	**30**	**100.0**

Chinking

A large majority of features (n=24, 80 percent) showed chinking (Table 6.14), where small stones created stability and filled in gaps between larger stones. Only 6 features (20 percent) lacked evidence of this technique. This variable may be related to clast, since many rocks used for chinking were cobble sized. I explore whether the presence/absence of chinking relates to differences in construction patterns or feature types in the next chapter.

Table 6.14. Frequency Distribution of Chinking in Rock Features.

Chinking	Frequency	Percent
No	6	20.0
Yes	24	80.0
Total	**30**	**100.0**

Stacking

Table 6.15 shows no dominant category for stacking, although most fell within medium-loose to medium-tight (n=25, 83percent). The one feature high on the scale was RF-T14, with virtually no space between rocks in this feature (Figure 6.1). Stacking may be related to size of the overall feature, as well as sphericity. Angular boulders, for example, may be easier to stack strategically so less space is visible between rocks.

Table 6.15. Frequency Distribution of Stacking in Rock Features.

Stacking	Frequency	Percent
Loose	4	13.3
Medium-loose	6	20.0
Medium	10	33.3
Medium-tight	9	30.0
Tight	1	3.3
Total	**30**	**100.0**

Figure 6.1. Tightly stacked rock feature - RF-T14.

Artifacts/ Fire-Altered Rock

A total of 12 features (40 percent) have associated artifacts in the form of chipped, ground, or pecked lithic materials (Table 6.16). I recorded historical artifacts under a separate category to distinguish features with only pre-contact cultural material from those with only historical material. I discuss the relationship between ancient and historic materials in a later section. Most artifacts were located within the face of the feature, uncovered during our clearing, or directly on the surface of the feature itself. Eight lithic flakes found in a test excavation at RF-T02. Associating FAR with ancient cultural activity is more difficult than pre-contact artifacts, considering that historic or modern activity could lead to FAR on the surface of features.

Table 6.16. Frequency Distribution of Artifacts on Rock Features.

Artifacts	Frequency	Percent
No	18	60.0
Yes	12	40.0
Total	**30**	**100.0**

The presence of FAR within the feature can point to possible uses, so I recorded it when the FAR was not just on the surface, but also coming out of the feature itself. Eight features (27 percent) had FAR present (Table 6.17). I compare the features with FAR to those with artifacts when I discuss overall relationships between variables in the next chapter.

Table 6.17. Frequency distribution of Fire-altered Rock on Rock Features.

Fire-altered Rock	Frequency	Percent
No	22	73.3
Yes	8	26.7
Total	**30**	**100.0**

Historic Material

In addition to ancient cultural material, I recorded features with historical material. This was distinguished from beer bottles, cans, and other refuse. Historical materials were determined by the amount of discolouration on metal objects and the shape, colour, and visible wear on glass objects. As with artifacts and FAR, this is based on surface materials observed during the clearing of features, so excavation of the features may change this frequency. The majority of rock features (60 percent, n=18) were not directly associated with historical material (see Table 6.18).

Table 6.18. Frequency Distribution of Historical Materials on Rock Features.

Historic Materials	Frequency	Percent
Absent	18	60.0
Present	12	40.0
Total	**30**	**100.0**

Continuous Variables

Some rock feature attributes are measured on a continuous ratio scale, including feature length, width, height, courses, metres above river level, and aspect. From these variables, I created two additional variables to measure rock feature dimensions: area in m^2, a product of length x width, and volume in m^3, a product of length x width x height. Unless otherwise noted, all of the original variables were measured to the cm (i.e. 2.56 m). In this section, I present summaries of the continuous variables using stem-and-leaf plots and boxplots. The measures of centre and spread for each variable are presented in Table 6.19. I discuss the general trends, including measures of level and spread, within each variable and note where the data are rough. In Table 6.20, I present five number summaries for all five continuous variables, which I will reference when discussing the shape and spread of the distributions below. These data show some patterns that suggest possible groupings of the rock features based on their dimensions, which I explore further in the next chapter.

Table 6.19. Summary Measures of Level and Spread for Continuous Variables.

	Length (m)	Width (m)	Height (m)	Area (m^2)	Volume (m^3)
Mean	8.73	5.81	1.70	58.68	107.58
Median	8.50	2.61	1.71	26.04	53.07
Range	16.42	18.80	2.49	283.99	381.13
IQ Range	6.15	7.32	0.89	85.08	189.05
SD	**4.38**	**5.25**	**0.69**	**70.4**	**122.47**

Table 6.20. Five-number Summaries for Continuous Variables.

	Length (m)	Width (m)	Height (m)	Area (m^2)	Volume (m^3)
Upper Hinge	11.52	9.2	2.1	94.86	201.9
Upper IQR	3.02	6.59	0.39	68.82	148.83
Median	8.50	2.61	1.71	26.04	53.07
Lower IQR	3.19	0.73	0.51	16.26	40.22
Lower Hinge	**5.31**	**1.88**	**1.2**	**9.78**	**12.85**

Length

Lengths of rock features range from 2.54 m to 18.87 m. Figure 6.2 shows two clusters, one near the low end of the scale, and the other at 8-11 m. No extreme values were noted. The boxplot (Figure 6.3) lacks outliers or far outliers, although the upper whisker is longer than at the lower one, indicating substantial spread around the centre and a positive skew.

Stem (1.0)	Leaf	
2	57	Cluster 1
3	2335	Cluster 1
4	8	
5	58	
6	38	
7	6	
8	0455	Cluster 2
9	134	Cluster 2
10	579	Cluster 2
11	477	Cluster 2
12		
13	5	
14	3	
15		
16		
17	25	
18	9	

Figure 6.2. Stem-and-leaf plot of rock feature length.

The median value falls in the centre of the interquartile range indicates that the centre of the distribution does not show a positive skew, so the distribution is being affected by a few large values. The stem-and-leaf and boxplots give us some sense of the shape, but to supplement the visual display, I looked at the level and spread of the distribution based on measures such as the mean, median, standard deviation and inter-quartile range.

For rock feature length, the mean value is 8.73 m, while the median is 8.50 m and standard deviation is 4.38 m. The mean and median values are similar, with the mean slightly higher. The mean is not overly affected by the higher values, so can be considered a good measure of the centre for the distribution of rock feature length. In addition, the more resistant median and inter-quartile range indicate a fairly equal split between the two middle quartiles of the data, with an upper IQR of 3.02 m and a lower IQR of 3.19 m (Table 6.20). In this case, the distribution appears fairly normal, a point that is supported by the relatively small standard deviation and the data can be considered smooth.

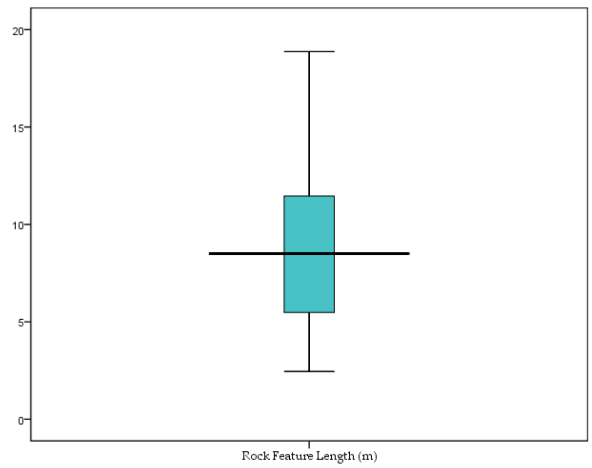

Figure 6.3. Boxplot of rock feature length.

Width

Width had a minimum value of 0.74 m and a maximum value of 19.54 m. For terrace features, the width of the flat surface created by the feature was included, even if rock was not visible on the surface. Four features were tested with a soil probe throughout the flat areas and all tests encountered rocks at 15-40 cm below the surface, indicating that measuring the full extent of the flat area on top is a reasonable measure of width. I also conducted a 50 cm by 50 cm test excavation atop a terrace feature, in which I encountered rocks that were similar to others visible on the face of the feature at approximately 35 cm below the surface. A stem-and-leaf plot (Figure 6.4), with the stem at 1 m and the leaf at 10 cm, shows a distinct cluster between 0-3 m, with another possible grouping at 5-11 m, and three large values. These large values were not identified as extremes.

The boxplot of feature width (Figure 6.5) has the upper whisker noticeably longer than the lower one, showing a positively skewed distribution. The lower quartile of the inter-quartile range is quite small (0.73 m) and the upper quartile is more than eight times larger (6.59 m) (Table 6.19), emphasising that the skewness of the data is inherent throughout and not just caused by large outlying values.

Stem (1.0)	Leaf	
0	7	
1	01668899	**Cluster 1**
2	1125667	
3	4	
4		
5	0	
6	8	
7	0	
8	12	**Cluster 2**
9	08	
10	8	
11	14	
12		
13		
14	3	
15		
16	6	
17		
18		
19	5	

Figure 6.4. Stem-and-leaf plot for rock feature width.

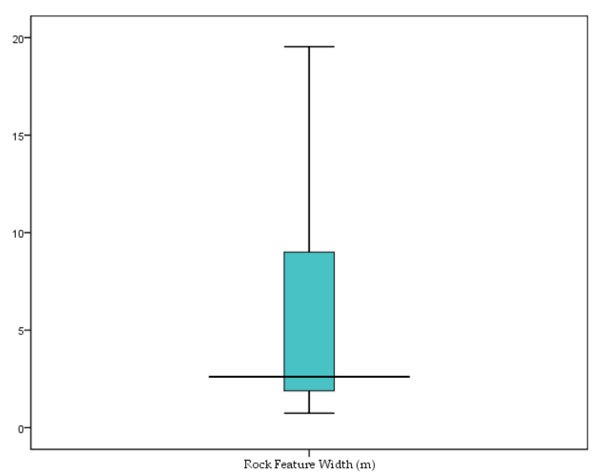

Figure 6.5. Boxplot of rock feature width.

This is supported by looking at measures of the centre (Table 6.19), where the median is 2.61 m and the mean is 5.81 m. The mean is more than twice the size of the median, and is skewed by high values. In this case, even the resistant measures of median and inter-quartile range point to an overall positive skew to the data, with a much larger range in the upper 50% of the data. Width is rougher than length, with some large values skewing the distribution. This distribution requires some explanation, which I address in Chapter 7.

Height

Height has a smaller range, 0.49 m to 2.98 m, than either width or length. The stem-and-leaf plot, with a stem of 1 m and a leaf of 10 cm, shows a peak around 1.5-1.8 m, but no distinct clustering (Figure 6.6). The boxplot (Figure 6.7) shows nearly equal whiskers and the median falling in the centre of the inter-quartile range.

Stem (1.0)	Leaf
0	
0	57789
1	002222
1	5566778889
2	001
2	667799

Figure 6.6. Stem-and-leaf plot for rock feature height.

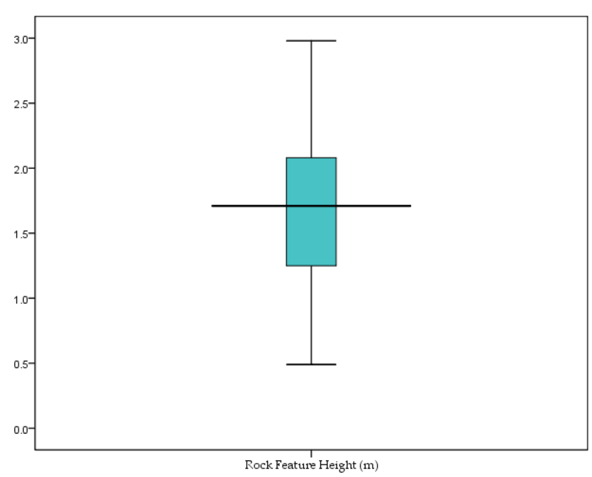

Figure 6.7. Boxplot of rock feature height.

For measures of the centre for this variable in Table 6.19, the mean is 1.71 cm, while the median in 1.70 cm. The spread is concentrated around the median and mean, indicated by the relatively small value of the inter-quartile range (Table 6.20). Overall, the data approximates a normal distribution, indicated by the relatively small standard deviation of 0.69 m. In this case, the mean is a good measure of the centre, and height can be considered a smooth variable.

Area

Area has a range of 2.3 m^2 to 286.0 m^2. As seen in the stem-and-leaf plot, the skew present in the width is increased in the area variable. I had originally produced a stem and leaf plot with each stem representing 100 m^2 (Figure 6.8), but this obscures some details of the distribution, although it does illustrate the strong positive skew in the data. When each stem represents 10 m^2, a pattern emerges of a small cluster of features at 92-104 m^2 and three extremes giving more detail and still showing the strong positive skew.

Stem (10.0)	Leaf	
0	2247889	
1	00378	**Cluster 1**
2	3457	
3	9	
4	28	
5	9	
6	2	
7		
8		
9	256	**Cluster 2**
10	334	
3 extremes	194, 229, 286	

Figure 6.8. Stem-and-leaf plots for rock feature area.

Unlike boxplots of the continuous variables explored above, area is quite rough, with two outliers and a long upper whisker (Figure 6.9). This shows that some large cases, such as features RF-T73a and RF-T73b, are skewing the distribution. The mean area of features (58.7 m^2), is more than twice the median (26 m^2).The inter-quartile range is in the lower end of the distribution and many of the features with high values lie outside this range. The median is near the very bottom of the inter-quartile range, showing an uneven distribution between the two middle quartiles, with an upper IQR of 68.8 m^2 compared to a lower IQR of 16.3 m^2 (Table 6.20).

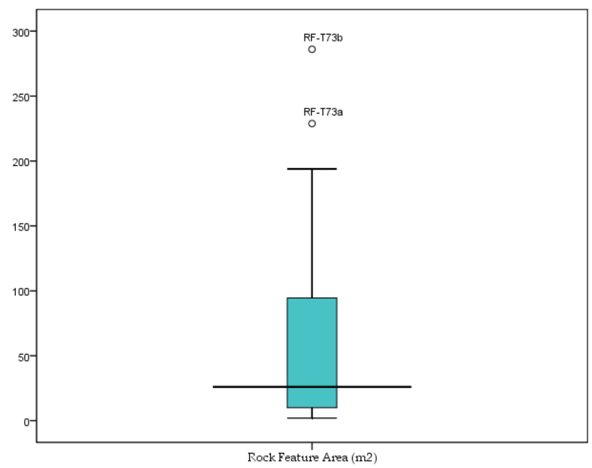

Figure 6.9. Boxplot of rock feature area.

The standard deviation is 70.4 m^2, larger than the mean, while the distribution has an interquartile range of 85.1 m^2, as seen in Table 6.19. With a standard deviation larger than the mean, the data are rough, and if confirmatory statistical tests were undertaken, a transformation would be necessary. The first steps with these data are to see if grouping them into categories based on some of the categorical attributes for comparison makes for smoother patterns within the continuous variables. For example, grouping the features based on size and re-exploring the continuous variables in batches might account for some of the skewness.

Volume

The overall volume of rock features ranges from 0.99 m^3 to 382.12 m^3. A stem-and-leaf plot, with a stem of 100 m^3, shows a strong positive skew with a large cluster between 0-90 m^3, a secondary cluster from 170-270 m^3, and three large values over 350 m^3 (Figure 6.10). These large values, however, are not noted as extremes. The boxplot also shows a strong positive skew, with a long upper whisker (Figure 6.11). Based on skewness of the spread, the data cannot be considered smooth.

Stem (100.0)	Leaf	
0	000011111133444	**Cluster 1**
0	566789	
1		
1	79	**Cluster 2**
2	14	
2	77	
3		
3	568	

Figure 6.10. Stem-and-leaf plot for rock feature volume.

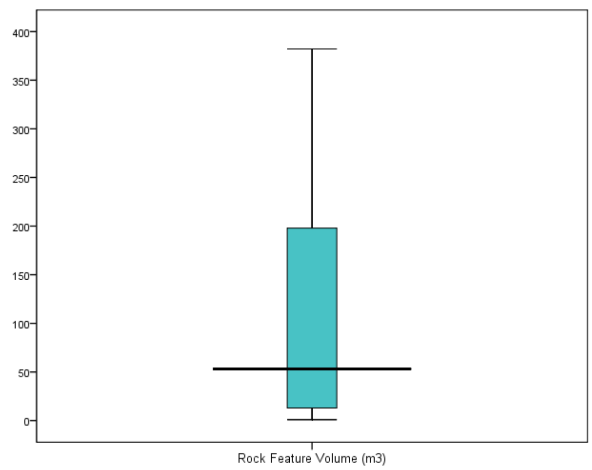

Figure 6.11. Boxplot of rock feature volume.

Numeric summaries of level and spread show some evidence of roughness in the data, with a mean of 107.6 m^3, twice as much as the median at 53.1 m^3 (Table 6.19). The standard deviation for volume is 122.5 m^3, larger than the mean, indicating considerable variation around the mean. The shape of the spread is illustrated by the relationship between the median and the inter-quartile range. The lower quartile range is 40.2 m^3, while the upper quartile range is 148.8 m^3, emphasising the positive skewness in the dataset as a whole (Table 6.20). Even within the resistant measure of the inter-quartile range, therefore, the data are positively skewed, with a much larger range seen in the upper half of the data.

Courses

Another attribute I measured was the visible courses for each rock feature, which had a minimum value of one course and a maximum value of 12 courses. The stem-and-leaf plot for this variable in Figure 6.12 shows that most features cluster between two and five courses, and three features have 10 or more courses: RF-T14, RF-T05, and RF-T35. These features were not noted as extremes in the stem-and leaf. The boxplot (Figure 6.13) shows two outliers at the upper end of the scale and roughness in the data.

Stem (1.0)	Leaf	
1	0	
2	0000000	
3	00000	**Cluster 1** (stems 2–5)
4	00000000	
5	0000	
6	0	
7	0	
8		
9		
10	00	
11		
12	0	

Figure 6.12. Stem-and-leaf plot of rock feature courses.

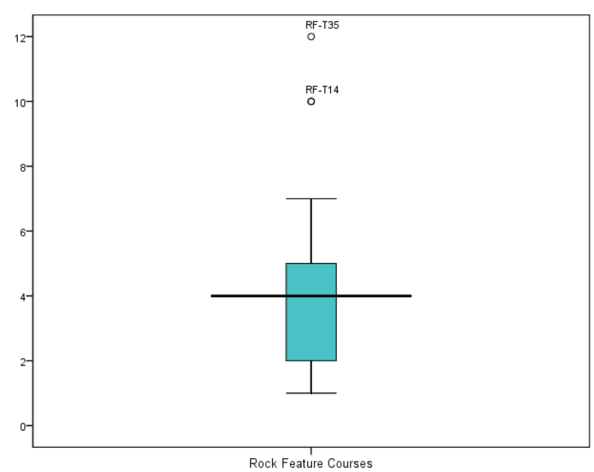

Figure 6.13. Boxplot of rock feature courses.

The mean value for rock feature courses is 4.2, with a median of 4.0 and a standard deviation of 2.6 and an inter-quartile range of 3. The distribution is not even, with the median showing that the upper quartile of the midspread has a smaller range than the lower quartile of the midspread, suggesting a negative skew, but the large values at the upper end of the scale are creating an overall impression of a positive skew in the data.

Metres above River Level

For each feature elevation above river level was calculated in metres, resulting in a range of 3 m to 35 m. As seen in the stem-and-leaf plot with a 10 m stem in Figure 6.14, the majority of features cluster between 10-23 m above river level. Overall, the distribution is fairly smooth, with a mean of 18 m, a median of 16.4 m, and a standard deviation of 8.1 m. The inter-quartile range shows a clustering of data within the two middle quartiles, and the third quartile is larger than the second. A similar trend is evident in the boxplot, showing a slight positive skew but a fairly symmetrical distribution (Figure 6.15).

Stem (10.0)	Leaf
0	34
0	6
1	0111244
1	5556667889
2	11123
2	6
3	02
3	55

Figure 6.14. Stem-and-leaf plot of rock feature elevation above river level.

Aspect

I was not able to visually discern which features were facing any particular cardinal direction. The data appear smooth, with a mean aspect of 191 degrees, a median aspect of 169 degrees, and a standard deviation of 99 degrees.

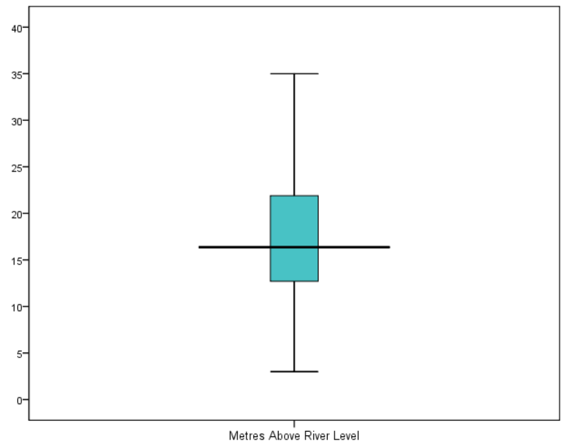

Figure 6.15. Boxplot of metres above river level.

It is not very easy, looking at the stem-and-leaf and boxplot, to visualize the direction that these features face. After some additional exploration, I decided that representing the degrees of a compass in a circle, divided into eight wedges, each representing 45°, might capture the patterns more efficiently. I then added counts of features that fall within each wedge and used shading to emphasize differences between those counts (Figure 6.16).

Figure 6.16 shows that 5 features had an aspect between 0-45°, while 7 had an aspect between 46-90°. Only one feature had an aspect between 316-360°.

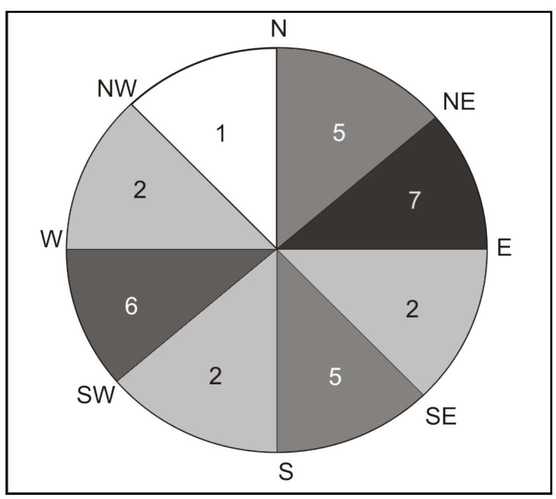

Figure 6.16. Aspect of rock features. Values in each 45°circle interval indicate the number of rock features within that range. Cardinal direction is indicated at the junction of each wedge and wedges with darker shading indicate a great number of features falling within that range.

Overall, the aspect range with the greatest number of features is 0-90°. This pattern is interesting because the northern direction is upriver for many sites. Fourteen features are on the west bank of the Fraser River, with the remaining 16 on the east bank. If rock features were placed to have views of the river, the aspect should be roughly equal between east and west. Figure 6.16 shows that 19 (64 percent) of the features had more easterly aspect, while 11 (37 percent) had a more westerly aspect. This difference may reflect the variation in direction of the river view.

Discussion

Overall, EDA techniques indicate some trends in the sample of rock features in the Lower Fraser River Canyon, as well as some areas where data deviate from the main patterns. Most rock features have a view of the river, although more rock features have a view downriver than a view upriver. A large portion of the rock features are not at all freestanding; only two are currently over 50% freestanding today, and most show some portion of infill, meaning they are filled in with rock and soil. This supports the interpretation that most of these features are terraces, designed to create a flat surface and not a wall. In variables related to construction methods, most features show stacking patterns that range from medium-loose to medium-tight, and 80% show evidence of chinking to increase feature stability. Most features are constructed out of 50-99 angular boulders, although these range in size from small boulders to very large boulders. The angular boulders selected to build the features are closer to flat than round in most cases. Only two features are built out of rounded boulders, and none are cobble-dominant.

I was curious as to whether features with one category of cultural material were likely to have another form of cultural material, so I constructed three contingency tables, which indicate that 50 percent (n=6) of the features with artifacts also have historical materials (Table 6.21). In total, 42 percent (n=5) of features with artifacts have

FAR (Table 6.22) and 42 percent (n=5) of features with historical materials have FAR (Table 6.23).

Table 6.21. Contingency Table of Features with Historical Materials and Artifacts.

Historic Material		Artifacts No	Artifacts Yes	Total
Absent	Count	12	6	18
	%	66.7%	33.3%	100%
Present	Count	6	6	12
	%	50%	50%	100%
Total	**Count**	**18**	**12**	**30**
	%	**60%**	**40%**	**100%**

Table 6.22. Contingency Table of Features with Artifacts and FAR.

Artifacts		FAR No	FAR Yes	Total
Absent	Count	15	3	18
	%	83.3%	16.7%	100%
Present	Count	7	5	12
	%	58.3%	41.7%	100%
Total	**Count**	**22**	**8**	**30**
	%	**73.3%**	**26.7%**	**100%**

Table 6.23. Contingency Table of Features with Historical Materials and FAR.

Historic Material		FAR No	FAR Yes	Total
Absent	Count	15	3	18
	%	83.3%	16.7%	100%
Present	Count	7	5	12
	%	58.3%	41.7%	100%
Total	**Count**	**22**	**8**	**30**
	%	**73.3%**	**26.7%**	**100%**

Only two features in the sample have artifacts, FAR and historical materials – RF-T73a and RF-T73b. The tables do not meet the criteria for a Chi-squared test due to small sample size, but a Fisher's Exact test indicates no significant association, with 2-sided values of 0.458 for Table 6.19 and values of 0.210 for both Table 6.20 and Table 6.21. Some continuous variables indicate a large range in the size of rock features. Width, area, and volume all show areas of rough data that may be better studied by splitting the sample into categories based on size.

Since one of the central questions in this thesis is what these rock features were used for, dividing features by a series of proposed uses may also explain some of the data. In the next chapter, I move beyond describing patterns to evaluating different ways of dividing the sample and developing a feature typology by comparing variables and exploring relationships.

7: EVALUATING FORM, LABOUR INVESTMENT, AND FUNCTIONS OF ROCK FEATURES

In this chapter, I attribute analysis to explore the form and function of the rock features in the Lower Fraser River Canyon. I propose several methods of grouping rock features to explain the patterns identified through EDA and suggest some possible ethnographic correlates that may explain the use of rock features. My three groupings are designed to: (1) develop a typology of rock features; (2) evaluate the amount of labour invested in different features; and (3) explore possible functions of the rock features. I identify the relevant variables, outline expectations, and evaluate whether the groups account for the variability in the data. The analytical methods use in this chapter are derived from EDA approaches discussed in Chapter 6, unless where otherwise indicated. I examine how these different means of dividing the sample result in different patterns with the discrete variables. The small sample size limits confirmatory statistical testing in most cases, but my analysis here suggests possible relationships. My goal is to explore elements of the rock feature data that address several of my research questions, including how these features were constructed, the amount of labour required to build them, and their uses. These interpretations create a foundation for examining the purposes for which these features were built, how they were the result of conscious and unconscious actions of agents, and how they became mobilized within the social structures of ancient communities. I conclude the chapter by assessing whether or not the data I collected can answer these questions, where the gaps are, and suggest directions for future research.

Evaluating Rock Feature Types

The rock features of the Lower Fraser River Canyon show much variability in design. The builders likely had a set of specific functions in mind when they invested time and energy to build rock features. Even so, while the building of most stone features had a specific purpose, it also had consequences through time that may not have been anticipated by the original designers. Archaeological analysis of these rock features may show changes in their construction and use over long time spans, showing that they have consequences for the social lives of people. While the first rock features built in the Lower Fraser River Canyon may have been the result of experimentation by builders, the similarities and differences between these structures can indicate whether features follow certain consistent construction patterns. I examine these by exploring a typology that captures main differences in the existing form of the rock features.

In his initial analysis, Schaepe defined four types of what he classifies as "rock fortifications" (2006:671). He uses several lines of analysis, including oral history, linguistic analysis and ethnography to arrive at this interpretation. I prefer the term "rock features" because it includes a wider range of stone structures, both defensive and non-defensive. As seen in Table 7.1, Schaepe's main criteria for determining types of rock features were the type of masonry, presence/absence of coursing, presence/absence of a backing, and whether or not features were freestanding. My work suggests additional attributes can help differentiate among types, expanding on Schaepe's initial typology.

Table 7.1. Rock Feature Types Defined by Schaepe (2006).

Type	Masonry	Coursing	Freestanding	Backing
TYPE I	Loose	Yes	Yes	No
TYPE II	Loose	Yes	No	Yes
TYPE III	Loose	Yes	No	Yes
TYPE IV	None	None	Yes	No

Two attributes are especially useful for distinguishing among types of features: freestanding and infill. Both of these variables indicate whether or not features were constructed to create a flat surface. I divided my field typology (see Chapter 6), which had two categories with only one feature, into 'terrace' vs. 'non-terrace' features and compared these with other discrete variables. This allows for more robust comparisons, because feature categories with only one example do not allow for much analysis. In total, 20 features (66.7%) are terraces and 10 features (33.3%) are non-terraces (Figure 7.1).

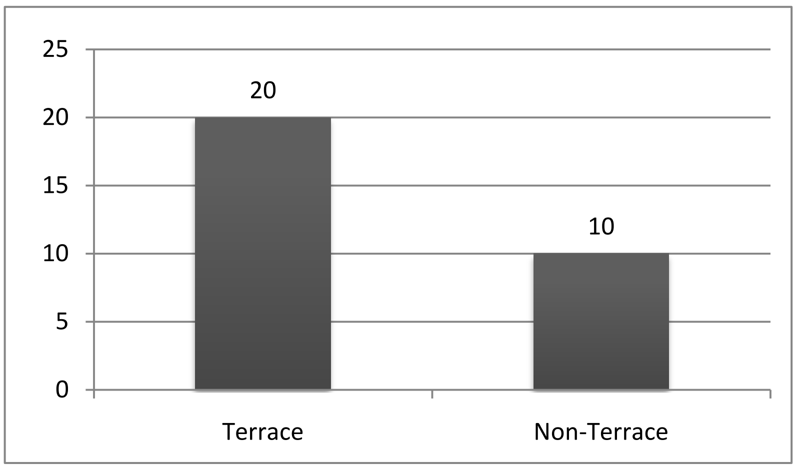

Figure 7.1. Bar chart showing the frequency of terrace and non-terrace features in the overall sample.

To evaluate the validity and utility of this designation, I generated a series of expectations for some of the discrete and continuous variables. After outlining these below, I examine other variables to see if the expected patterns are observed. The expected patterns are that terraces are likely to:

1) have greater presence of cap stones than non-terraces
2) have different chinking and stacking patterns than non-terraces
3) be associated with village locations than non-terraces
4) have larger widths, areas, and volumes than non-terrace features

Discrete Variables

Nineteen of 20 features (95 percent) classified as terraces are 0 percent freestanding and only one (RF-T06) is 1-49 percent freestanding (Figure 7.2). The partially freestanding feature has a large pit behind the face, although the origin of this pit is unclear. Due to other construction patterns, including the presence of a large "cap" stone, RF-T06 does not appear to have been initially constructed as freestanding. Non-terrace features are more likely to be freestanding, with half (n=5) of the non-terrace features being less than 50 percent freestanding. The non-terrace features less than 50 percent freestanding include three retaining walls, where the faces of the features are backed by a slope, not a flat surface.

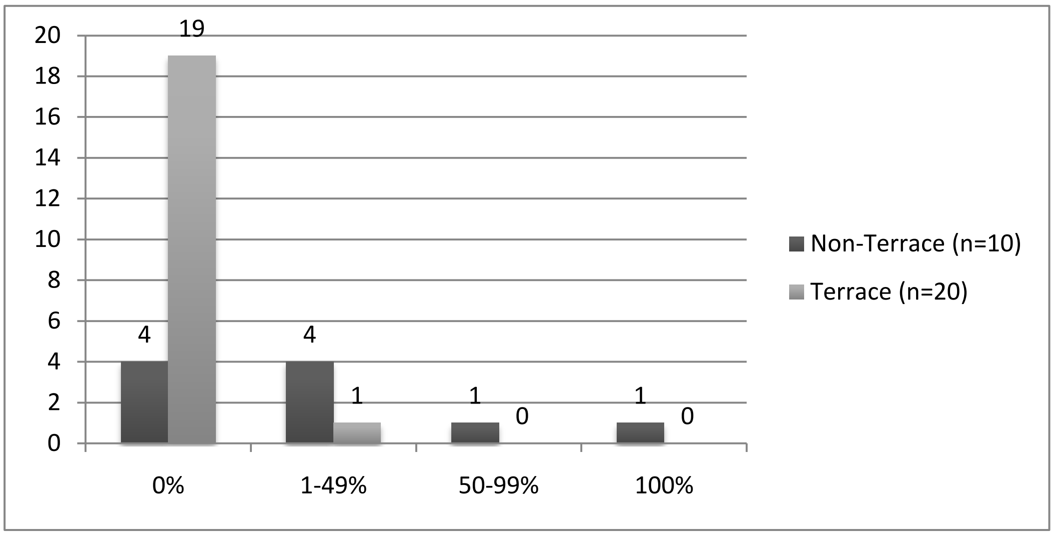

Figure 7.2. Bar chart comparing the frequency of freestanding terrace and non-terrace features.

There is one feature that is not freestanding that I classified as a wall in the field, but looking at both the characteristics of the feature and its proximity to RF-T10, RF-T11 might need to be re-classified as a retaining wall. It is located in an area of active modern use and may have been considerably disturbed. In addition, RF-T11 does not have a river view or a point of access from the river. RF-T63 is completely freestanding and unique in location and structure. Other features that are less than 50 percent freestanding and are not terraces include several "wall" features, such as RF-T18a, RF-T18b, and RF-T85a. These three features are in close proximity to one another and are aligned along a slope that serves as an access point to a village location. The final feature less than 50 percent freestanding is RF-T17, the semi-circular stone enclosure.

Another criterion used to determine whether features were terrace or non-terrace features was whether they were filled in with rock and soil, a trait captured in the infill variable. Most terrace features (n=17, 85 percent) have complete infill (Figure 7.3), and while some non-terraces have partial infill, only one (10 percent) shows 100 percent infill – RF-T64, a small retaining wall feature just upriver from RF-T63. The terrace features with less than 100 percent infill can be accounted for because some features are built around bedrock, a natural version of the cultural practice of infill.

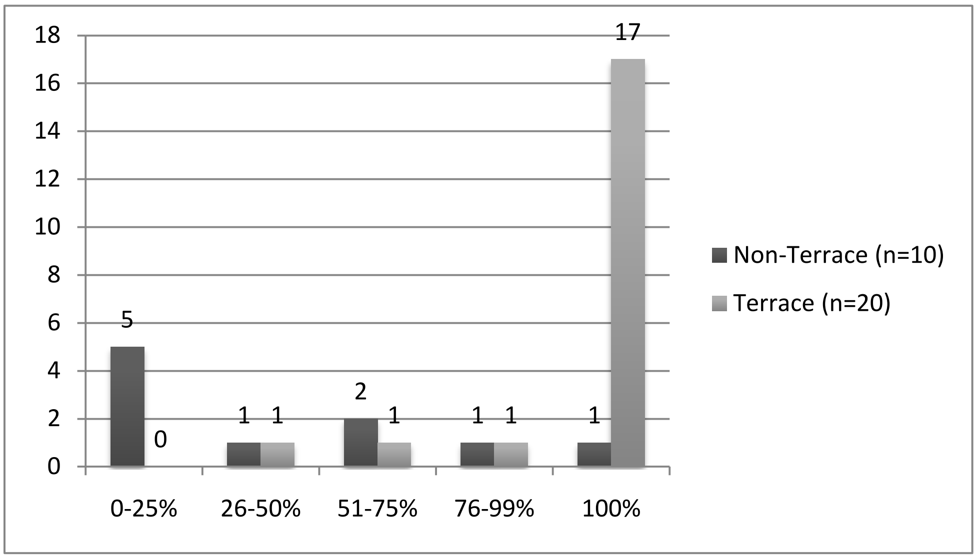

Figure 7.3. Bar chart comparing the frequency of terrace and non-terrace features that show infill.

Other variables expected to show different patterns within the terrace/non-terrace categories include the presence of cap stones, the presence of chinking, and the tightness of stacking. Terrace features show a much greater occurrence of cap stones, with 12 terraces having cap stones, while only one non-terrace has a cap stone (Figure 7.4), supporting the idea that terraces were built in order to create a stable surface.

Unlike some of the other variables, comparing terrace/non-terrace and presence/absence of cap stones results in a 2 x 2 table that I tested for statistical significance. The Fisher's Exact test indicated a 2-sided p= 0.017, significant at an alpha level of 0.05. There is a significant association between two variables, indicating that terraces are more likely to have cap stones than non-terraces.

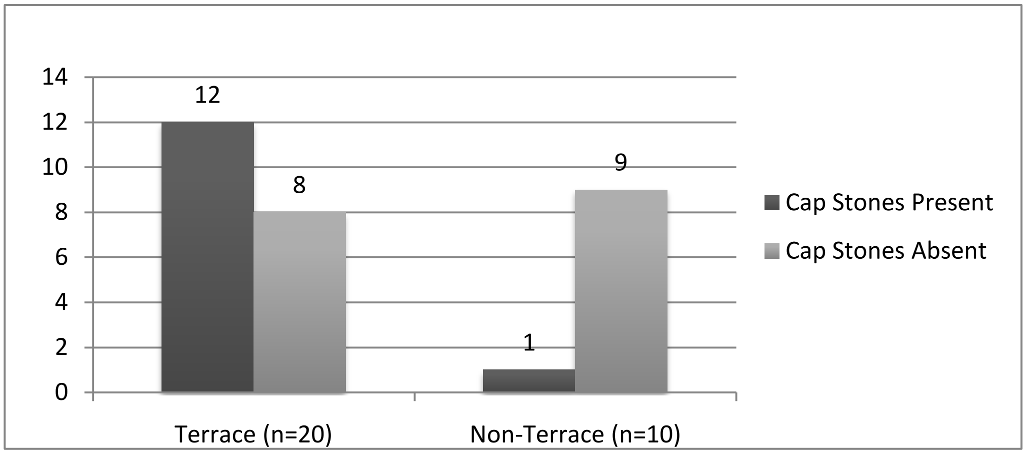

Figure 7.4. Bar chart comparing the frequency of terrace and non-terrace features with cap stones.

Chinking, as a construction method, can increase stability. Terraces are likely to have different requirements for stability than non-terraces, but both may require stability. When I examined the presence/absence of chinking, the data suggest that chinking is somewhat more common in terrace features than non-terrace features, with 17 terrace features (85 percent) built using chinks (Figure 7.5). I tested for association of these two variables using the Fisher's Exact test. The result is not significant (p=0.37), and I cannot reject the null hypothesis of no association based on the current sample.

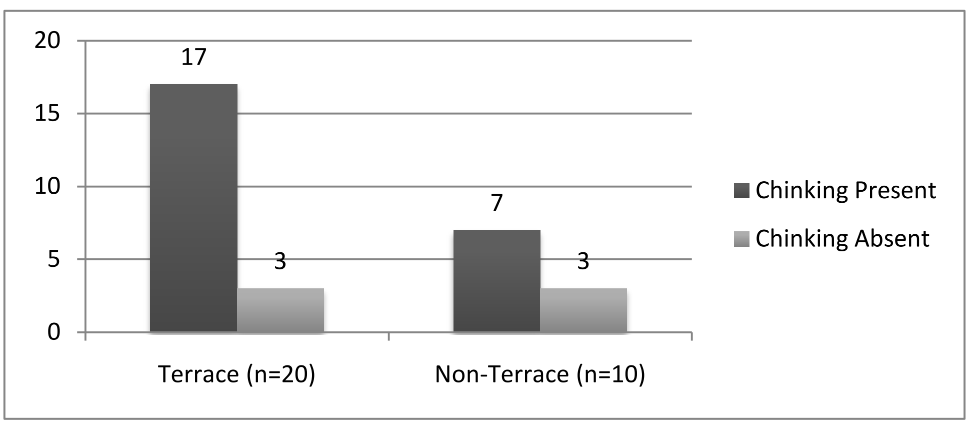

Figure 7.5. Bar chart comparing the frequency of terrace and non-terrace features with chinking.

The tightness/looseness of stacking may also vary between terrace and non-terrace features. I measured stacking on a ranked scale with five categories. Terraces tend to have medium stacking (n=8, 40 percent) and are less likely to have loose stacking (n=1, 5 percent) than non-terraces (n=3, 30 percent). The feature that is tightly stacked is a terrace (n=1, 5 percent), seen in Figure 7.6. There is no clear pattern of loose or tight stacking within non-terrace features, as they are equally likely to have loose as medium-tight stacking (n=3, 30 percent).

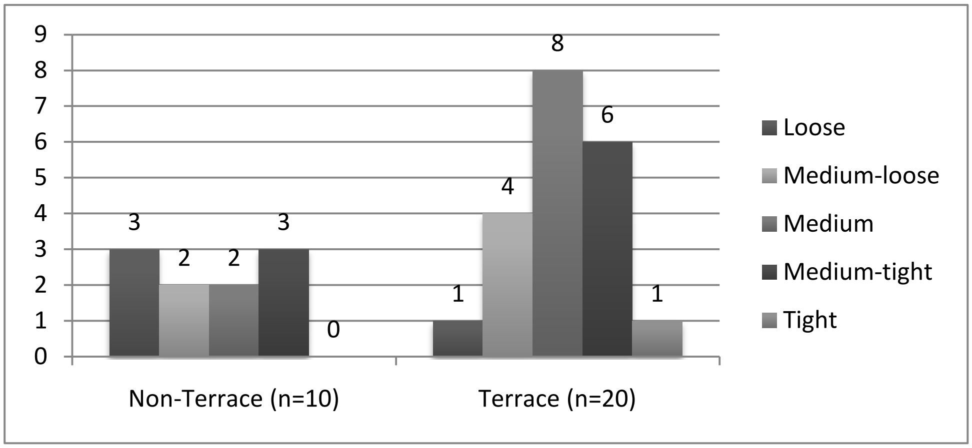

Figure 7.6. Bar chart comparing the frequency of terrace and non-terrace features with tightness of stacking.

Village association is the final discrete variable of interest when comparing terrace and non-terrace features. The expectation here is that terrace features are more likely to be associated with ancient village locations than non-terrace features. This appears to be the case, since 19 terrace features (95 percent) and six non-terrace features (60 percent) are associated with village locations (Figure 7.7).

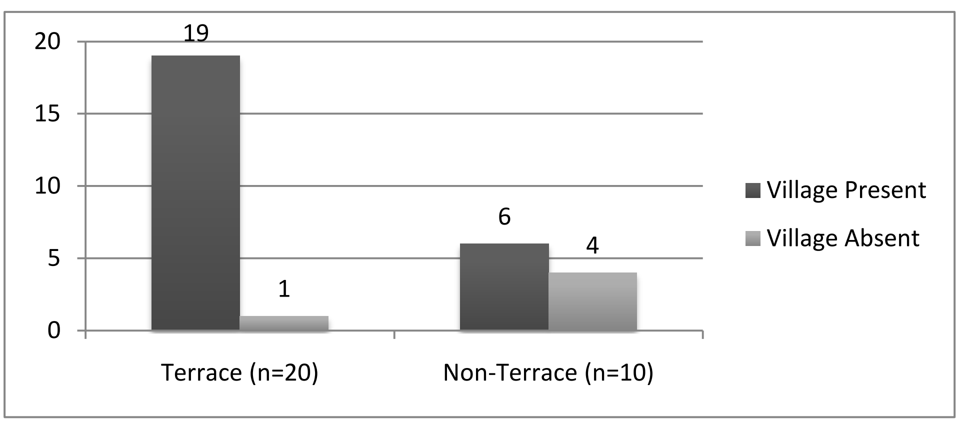

Figure 7.7. Bar chart comparing the frequency of terrace and non-terrace features with villages.

I tested the statistical significance the observed pattern with a Fisher's Exact test The resulting value of p=0.031 is significant at an alpha of p=0.05, indicating association of the two variables and that terrace features are more likely than non-terrace features to be associated with village locations. This may point to different uses for terrace features than non-terrace features, a subject explored further below.

Continuous Variables

Among the continuous variables, three are of interest when comparing terrace and non-terrace features. First, terraces are expected to have larger widths than non-terrace features. This leads to expected larger values of area and volume of terrace features. When I examined these three variables for the entire sample, these categories showed a strong positive skew and some ‘rough’ areas, so I seek here to evaluate whether dividing the sample into terrace and non-terrace features yields smoother patterns of rock feature width, area, and volume. The larger overall range of width within terraces (Figure 7.8) is expected, because this was a main criterion in distinguishing between terrace and non-terrace features.

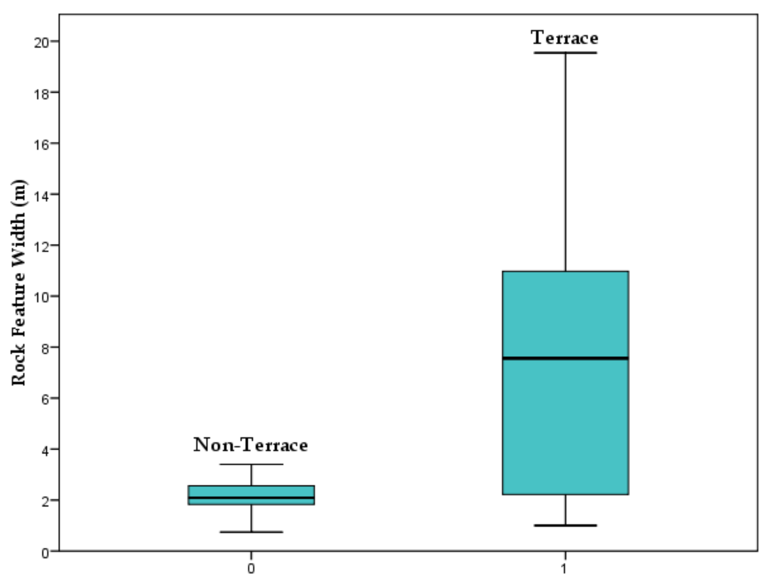

Figure 7.8. Boxplot comparing width of rock features based on terrace/non-terrace categories

There is some overlap on the bottom end of the scale, so some non-terrace features have a larger width than some terrace features, but mean and median values indicate that, terrace features have larger widths than non-terrace features. The range of terrace feature width is 18.54 m, compared to 2.66 m for non-terrace features (Table 7.2). Terrace features have a mean width of 7.52 m and a median width of 7.56 m, while non-terrace features have a mean width of 2.10 m and a median of 2.09 m (Table 7.2).

Table 7.2. Comparison of Measures of Centre and Spread of the Entire Sample and Terrace/Non-Terrace Features.

Width (m)	**All (n=30)**	**Terrace (n=20)**	**Non-Terrace (n=10)**
Mean	5.81	7.52	2.10
Median	2.61	7.56	2.09
Range	18.80	18.54	2.66
IQ Range	7.32	8.98	0.79
SD	5.25	5.42	0.70
Area (m^2)			
Mean	58.68	81.30	13.44
Median	26.04	60.60	10.04
Range	283.99	283.57	25.17
IQ Range	85.08	82.90	15.85
SD	7.04	76.92	8.43
Volume (m^3)			
Mean	107.58	149.60	23.65
Median	53.07	85.82	13.15
Range	381.13	379.06	79.25
IQ Range	189.05	234.26	32.91
SD	122.47	130.57	24.55

Looking at the spread, the median is near the centre of the interquartile range for both terrace and non-terrace features. Upon closer examination of the middle range of values, however, the distribution of terrace widths is slightly negatively skewed, with a lower IQR of 5.5 m and an upper IQR of 3.48 m (Table 7.3). Non-terrace features, however, have a slight positive skew, with an upper IQR of 0.47 and a lower IQR of 0.32. While there is still a long tail in terrace width, the skewness is affected by a couple of large values and is not present in the distribution as a whole.

Table 7.3. Five-number Summaries for Terrace/Non-terrace Distributions.

Width (m)	Terrace (n=20)	Non-Terrace (n=10)
Upper Hinge	11.04	2.56
Upper IQR	3.48	0.47
Median	7.56	2.09
Lower IQR	5.5	0.32
Lower Hinge	2.06	1.77
Area (m^2)		
Upper Hinge	102.5	26.52
Upper IQR	41.91	13.48
Median	60.59	10.04
Lower IQR	40.99	2.37
Lower Hinge	19.6	7.67
Volume(m^3)		
Upper Hinge	270.7	42.37
Upper IQR	184.88	29.22
Median	85.82	13.15
Lower IQR	49.38	3.7
Lower Hinge	36.44	9.45

Terrace feature area has a greater overall range and larger average area than non-terrace features (Figure 7.9), although there is some overlap at the lower end of the scale. The area range for terrace features (283.57 m^2) is larger than the range for non-terrace features (25.17 m^2) (Table 7.2).

The mean value for terraces is 81.3 m^2 and the median is 60.6 m^2, while for non-terraces the mean is 13.44 m^2 and the median is 10.04 m^2 (Table 7.2). Terraces, therefore, are larger in area than non-terrace features. The boxplot supports this definition - there are two outlying values in terrace area. However, the relationship between the median and the two middle quartiles shows that the distribution of terrace area is being skewed by some large values. The upper IQR, at 41.91 m^2, is almost the same as the lower IQR, at 40.99 m^2 (Table 7.3). Non-terrace features remain skewed when looking at the midspread. Overall, the data are smoother when compared to the numbers in the whole sample, but there is still some evidence of positive skew. Terrace volume range is 379.06 m^3 and non-terrace volume range is 79.25 m^3 (Table 7.2). Mean volume is 149.6 m^3 for terraces and 23.60 m^3 for non-terraces; median values are 85.82 m^3 and 13.15 m^3 respectively (Table 7.2).

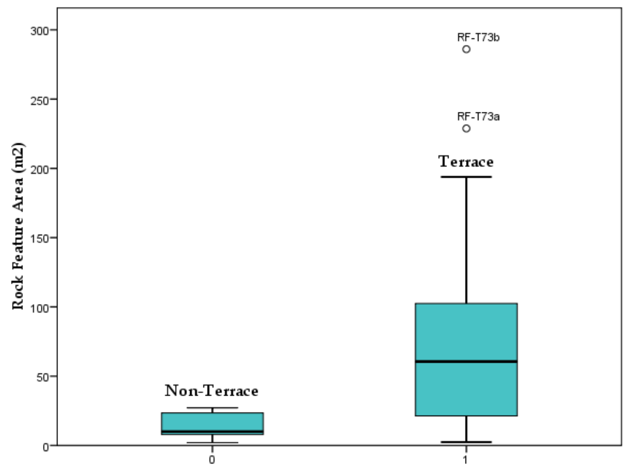

Figure 7.9. Boxplot comparing area of rock features based on terrace/non-terrace categories.

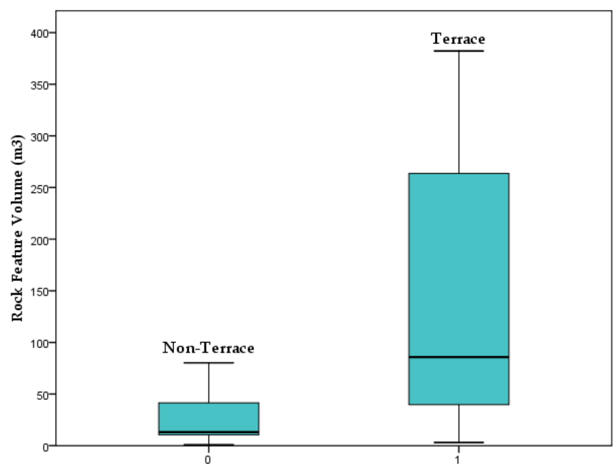

Figure 7.10. Boxplot comparing volume of rock features based on terrace/non-terrace categories.

Volume still shows a positive skew in both terrace and non-terrace categories, with median values in the lower portion of the interquartile range. For terrace features, the upper IQR, at 184.88 m^3, is almost four times the lower IQR value of 49.38 m^3 (Table 7.3). For non-terrace features, the upper IQR is almost eight times as large as the lower IQR, with values of 29.22 m^3 and 3.7 m^3. In both cases, the difference in upper and lower IQR values indicates that the positive skew is present throughout the distribution.

One fundamental question that arises is whether the differences between the category of terrace and non-terrace are significant. I ran the variables of width, area, and volume through the Mann-Whitney test to see if the null hypothesis, where the two samples are drawn from the same population, can be rejected. All three variables returned results below p=0.05, with width at p=0.013, area at p=0.003, and volume at 0.004. In all cases, the null hypothesis can be rejected, indicating that these samples are drawn from different populations.

Discussion of Terrace vs. Non-Terrace Features

The structure of a terrace requires a different form of planning and design than a non-terrace feature, so comparing these archaeological remnants of past building practices shows that features were built with specific plans in mind. Dividing the sample into these two types opened up a series of expectations about patterns within each category. When I reviewed the discrete data, most expectations were supported, but only three could be tested for significance. Based upon a visual exploration of the data, the patterns within variables that were used to divide the sample are confirmed, with terrace features much more likely to show complete infill and less likely to be freestanding than non-terrace features. Terraces are also likely to have medium stacking patterns, whereas no clear stacking pattern emerges within non-terrace features. Of the variables where I could test correlations, two returned significance values below alpha: cap stones and village locations. In both cases, terraces are more likely to have cap stones and be associated with villages than non-terrace features. The observed pattern of more terraces with chinking, however, was not significant, so terraces and non-terraces may both be likely to have chinking.

Terraces have larger average widths, areas and volumes than non-terraces. While dividing the sample into two types resulted in significant patterns in a couple of variables, it did not succeed in smoothing all of the rough patterns observed. There are several outstanding issues; first, the two categories do not capture the range of features – terraces may have several purposes and non-terraces can vary wildly in size, shape, and other attributes. Grouping non-terraces together is helpful for examining what defines a terrace in opposition to those non-terrace features, but not for understanding differences in use. Different feature designs are present, intended to serve different functions, but we cannot get a full picture of those based on this distinction alone. I delve deeper into the data to uncover patterns based on construction types and labour investment in the next section.

Construction: Estimating Labour Investment

Large-scale construction has been the focus of study among researchers interested in social complexity and the development of institutional inequality (Earle 1987; Kolb 1997; Webster 1990). The ability of elites to control the products of the labour of others has been associated with particular types of societal structure, usually termed "complex" and comprising chiefdoms or states. Among smaller-scale cultures without institutionalized central leadership, labour has been a consideration, mostly in how it may become mobilized by elites striving for status. Arnold (1993) argued that the control of labour is a key factor in the rise of complex hunter gatherers, where it becomes the mechanism for a shift from egalitarian to non-egalitarian relations. This is accomplished by transferring the products of labour from the producer to a higher status non-producer. Emerging leaders control labour by food provisioning, surplus production, services, rituals and large-scale projects, and this can involve increasing numbers of people and labour expenditures per person (Arnold 1993). When considered in this light, the building of permanent rock structures at prime fishing locations could represent both the mobilization of group labour and control of surplus production or even control of the labour of other individuals, including slaves (Ames 2001). Determining whether the building of these features represents a shift in social organization or the emergence of political leadership from these archaeological data alone is difficult. Little is known about how many individuals required to construct these features and whether labour requirements extended beyond the individual. I attempt to explore this issue by addressing rock feature size as well as the size of stones used in their construction.

While some of the rock features in the Lower Fraser River Canyon are large-scale and may have required many individuals working together to manoeuvre and place stones, many rock features are small-scale and could have been built by a few individuals. This has implications for the types of agency at work within the society at the time, because the ability to bring together a large group to build a rock features is the mobilization of a different type of power and set of identities than a few people building a feature at their fishing spot. In order to investigate the amount of labour required to build various rock features, I drew upon the work of Kolb (1997), who used ethnographic data to define estimates of labour required to construct various rock formations in Hawaii. He defined three levels of labour mobilization as represented in stone architecture: (1) family, or small-scale projects where labour was recruited from within the kin group; (2) festival, or medium-scale projects where family labour was exchanged with a powerful individual for other commodities; and (3) corvée, large-scale, monumental constructions where labour was centrally organized and obligatory (Kolb 1997:268). Each level was associated with several types of architecture and an estimate of overall area or length of the structure, including agricultural walls, terraces, boundary walls, residences, trails and ritual buildings. Kolb used the term "volume" to describe rock features constructed by different groups, but his measure is m^2, or area. In general, agricultural features less than five metres long and less than 20 m^2 were considered family constructions, as well as boundary walls less than 150 m in length or ritual structures less than 150 m^2 (Kolb 1997:275). Although these criteria were developed in the specific ethnohistoric context of Hawaii, they provide a useful measure of labour involved in constructing stone structures that has been applied to the archaeological record. While I do not explicitly match up rock feature volumes with Kolb's categories, his work is one of the few examples that attempts to correlate rock structures with group labour.

Another useful avenue of comparison is to compare rock features with other building projects on the Northwest Coast that represent significant amounts of group labour, particularly the construction of large wooden plank houses. Throughout the Northwest Coast, these structures were a vital part of the settlement landscape. Evidence for some form of built structure at coastal sites extends back 5,000 years, inferred by the presence of rectangular depressions in shell middens on the coast (Martindale et al. 2009) and patterns of post holes, hearths and other features at sites along the Fraser River (Lepofsky et al. 2009). While the size and shape of plank houses has shifted throughout history, houses recorded in the ethnographic record were the seat of households, or multi-family kin groups, and were a significant part of the status, economy and identity of those groups (Ames 1994; Grier 2001). According to Ames et al. (1992), the construction and maintenance of large plank houses through time represented a major investment in labour and materials, organized at the level of the household. The household was "a unit of economic and social cooperation" that did not always correspond to a single dwelling (Wilk and Rathje 1982:620) but forms the basis of subsistence economy, social interaction and material production (Grier 2001). Some rock features may have been the product of household labour and built to serve the specific needs of a smaller family[17] group, i.e., as a dry rack foundation. Larger platforms may have been foundations for large plank houses and could involve the household working together to demonstrate their status. There are many sites along the Lower Fraser River where both plank and pithouses – semi-subterranean dwellings – are present (Lepofsky et al. 2009). In 1808, Simon Fraser noted several locations in the Lower Fraser River Canyon with plank houses with sizes close to 100 m^2 (Fraser 2007), supporting the traditional knowledge that longhouses were an important part of the landscape (Carlson 2001c). Some of the Canyon rock features may be have been built to create rectangular terraces that fit with expected forms and dimensions of Coast Salish wooden plank houses (Figure 7.11).

[17] I use the term family here to distinguish a scale of social unit between the individual and the household. Family among the Coast Salish can mean all people related across the landscape, but I apply the term to a group who would own and use a fishing location. This could involve a portion of a larger household, but could also include people who did not live year round in the Canyon.

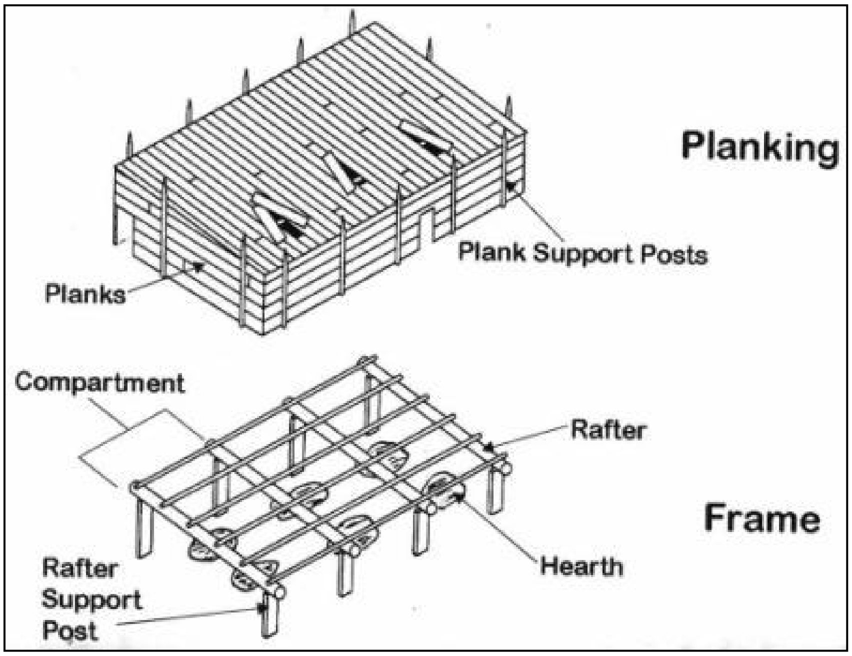

Figure 7.11. Coast Salish Plank House (from Grier 2001).

The river narrows and the sides are very steep at the entrance of the Canyon, leaving few large flat areas on which to build longhouses. To build a village with both pit houses and plank houses, therefore, some landscape modification might be required. There are some examples of pit houses built on slopes, such as at DjRi-5, but it is more difficult to build a plank house without a large, flat, stable area. I consider how the building of plank houses relates to the rock features below.

Analysis of Construction Patterns

The amount of labour used to build the rock features can be measured in several ways. While Kolb uses area (described as volume in his paper), I measured a third dimension of the rock features, resulting in a volume measure of m^3. I use volume as a means to divide the sample into three size categories of small, medium, and large features. While the inspiration for these categories is drawn from the work of Kolb (1997), the way I divided the features is more of a factor of my exploration of the data in Chapter 6. Here, I present a stem-and-leaf plot for volume (with a stem of 10 m^3) to demonstrate my method of dividing the sample by size (Figure 7.12).

Stem (10.0)	Leaf
0	1347
1	013345
2	
3	33
4	156
5	
6	039
7	4
8	0
9	8
10	
11	
17	3
19	8
21	4
24	9
27	88
35	5
36	9
38	2

Figure 7.12. Stem-and-leaf plot of rock feature volume.

Stretching out the stem-and-leaf allows me to look for breaks in the data that suggest ways to divide up the volume size categories. Small features have volumes less than 20 m^3 (n=10, 33 percent). These range from the smallest feature, RF-T16, with a volume of less than 1 m^2, to RF-T11, with a volume of 14.8 m^3. Medium features have volumes between 30.47 m^3 and 97.51 m^3 and 11 features in the sample (37 percent) have volumes in this range. Medium features could conceivably be divided into two categories, but the difference from 46 m^3 to 60 m^3, considering the range, was not deemed a sufficient gap to create a fourth category at this time. The nine large features, (30 percent), range in volume from 172.94 m^3 to 382.12 m^3 and are all terrace features, potentially suitable as a base for building a plank house. These are similar to the Kolb's (1997) categories for area, but the correlation is coincidental.

The method I used for estimating volume (length by width by height) is likely an overestimate in most cases. However, one method to test to see whether volume is markedly different than area is to run a linear regression to test for correlation between these two variables. If the result is a strong positive correlation, then volume is a valid means to divide the sample into size categories, because it is not creating a different pattern than area. I ran a linear regression of these two variables, resulting in a Pearson'-R value of 0.940, indicating a strong positive correlation between area and volume in the sample (Figure 7.13).

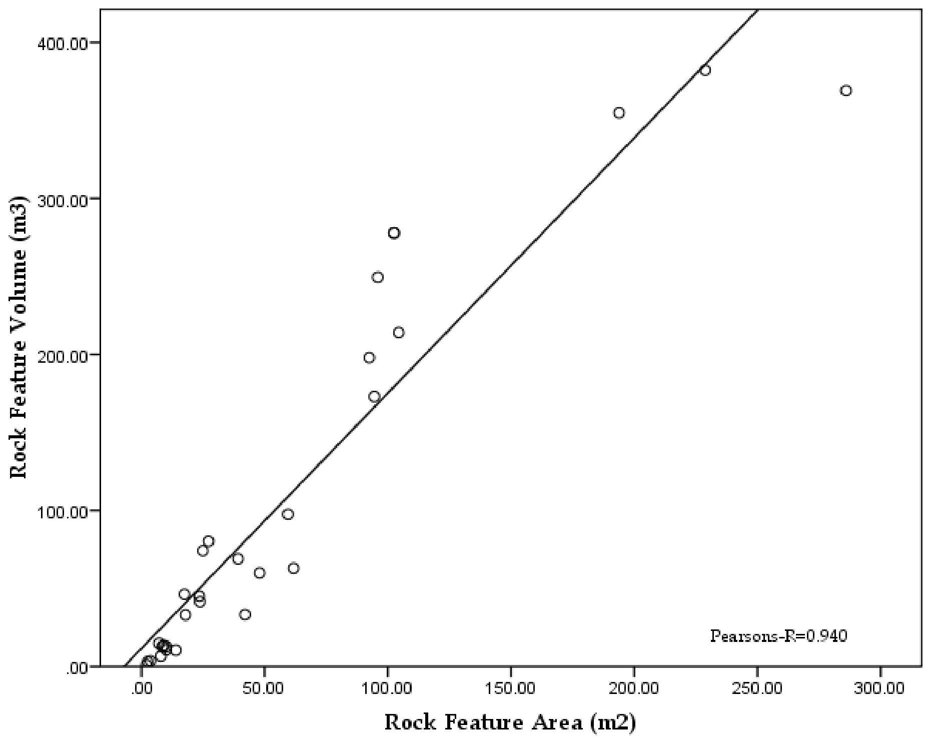

Figure 7.13. Linear regression of rock feature area and rock feature volume.

I evaluate the validity of the volume categories by examining how other variables pattern when the sample is divided by size. I explore whether the rock features could have been built by different social groups, such as families, households, and communities. Differences in labour investment could be related to more labour required for certain aspects of feature construction such as the amount of infill, number of rocks, and size of rocks, and different methods of construction associated with larger or smaller features, such as freestanding, chinking, stacking, and cap stones. Larger features would be terraces, have more infill, more rocks, and larger overall sizes of rocks. Larger features would have different construction patterns compared to smaller features. I evaluate whether or not these expectations are borne out in the data below, based on the size categories established by dividing the sample by volume (Figure 7.14).

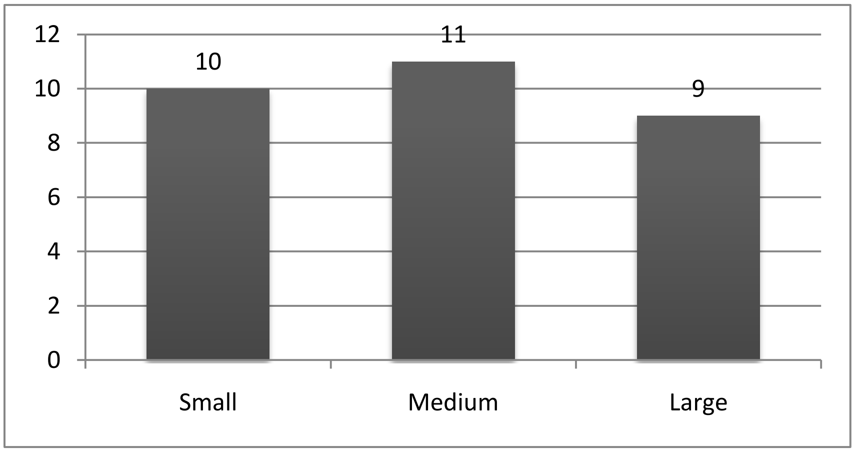

Figure 7.14. Bar chart showing the number and proportion of rock feature size categories.

Discrete Variables[18]

Terrace features with large amounts of infill are likely to have a greater labour requirement; therefore, large features should be more likely to be terraces and have infill. Figure 7.15 shows that the larger the feature, the more likely it is to be a terrace. Within small features, 70 percent (n=7) are non-terraces, whereas for medium features, 73 percent (n=8) are terraces. All large features (n=9, 100 percent) are terrace features. A similar pattern emerges in the infill variable, which is not surprising, given the larger the feature, the greater the percentage of infill, although there are some exceptions to this pattern. The clearest pattern is in the large features, where all (n=9, 100 percent) show 100 percent infill (Figure 7.16). The proportion of infill for small features, on the other hand, varies considerably, with 30 percent (n=3) showing 0-25 percent infill, while 20 percent (n=2) show 100 percent infill.

[18] Cross-tabulations for all analysis in this section can be found in Appendix 5.

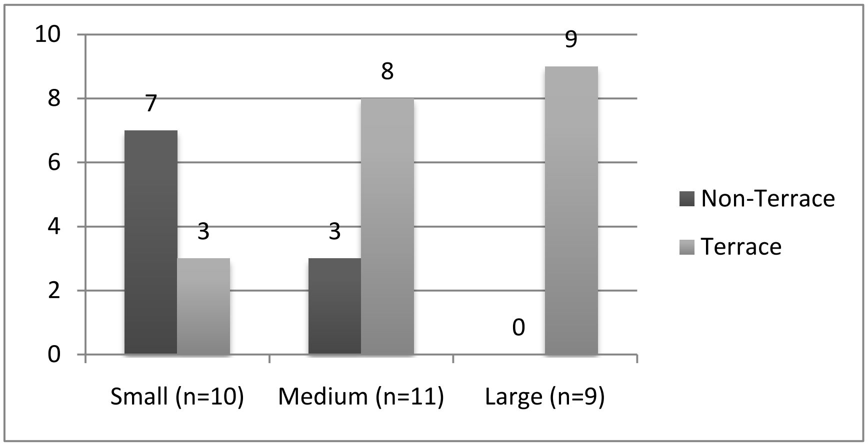

Figure 7.15. Bar chart of rock feature size categories by terrace/non-terrace.

Medium features tend to show 100 percent infill (n=7, 63.6 percent), but two (18 percent) have 0-25 percent infill. Another element of the features that may require greater labour investment include the number of rocks in each feature, assuming a greater number of rocks, required more labour.

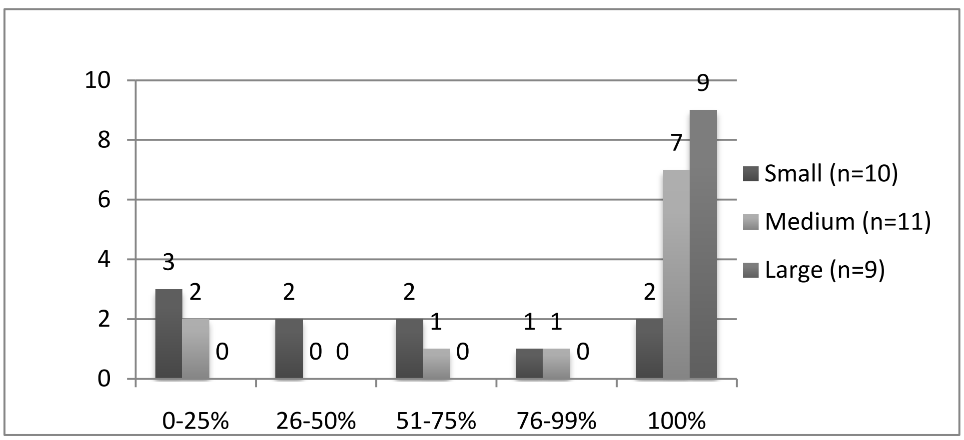

Figure 7.16. Bar chart of rock feature size category by percentage of infill.

More labour investment is related to rock size, measured by clast. Therefore, larger features are expected to have more rocks, larger rocks, or both. Looking at the number of rocks within the different size categories, this pattern is not clear (Figure 7.17). Instead, all feature sizes tend to have number of rock values greater than 20 and less than 200. Small features do have the greatest percentage of features with 20 or fewer rocks (n=3, 30 percent), but the only features with more than 200 rocks are medium features (n=2. 18 percent), not large as expected.

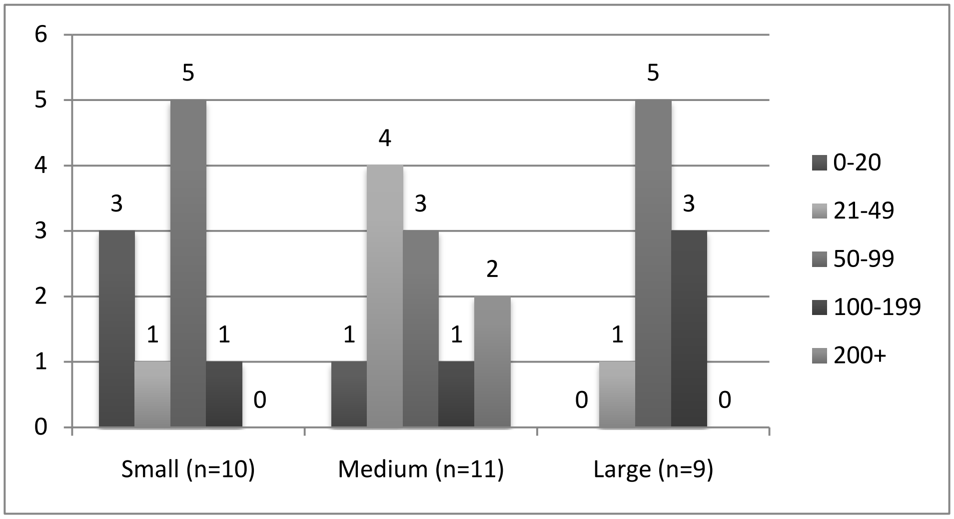

Figure 7.17. Bar chart of rock feature size by number of rocks.

Features within the large size category are more likely to have 50 or more rocks than other categories (n=8, 90 percent), but it appears that the number of rocks may not be directly related to the size of the features. Dividing a sample size of 30 into 16 clast groups is of little utility. A bar chart of the breakdown of clast shows the variation (Figure 7.18). Having so many categories with so little data prohibits the identification of any correlation between size of rock features and size of the rocks used to construct them. I merged the clast categories from 16 down to 3: features that have majority cobbles, features that have majority boulders, and features that have majority large boulders. This allows for better comparison between the different categories and reveals some patterns about the relationship between the size of features and the size of rocks.

The patterns within the data are not exactly as expected. Figure 7.19 shows that large features are more likely than medium or small features to be constructed out of large boulders, with 44 percent of large features (n=4) falling into that category, compared with 36 percent of medium features (n=4) and 20 percent of small features (n=2).

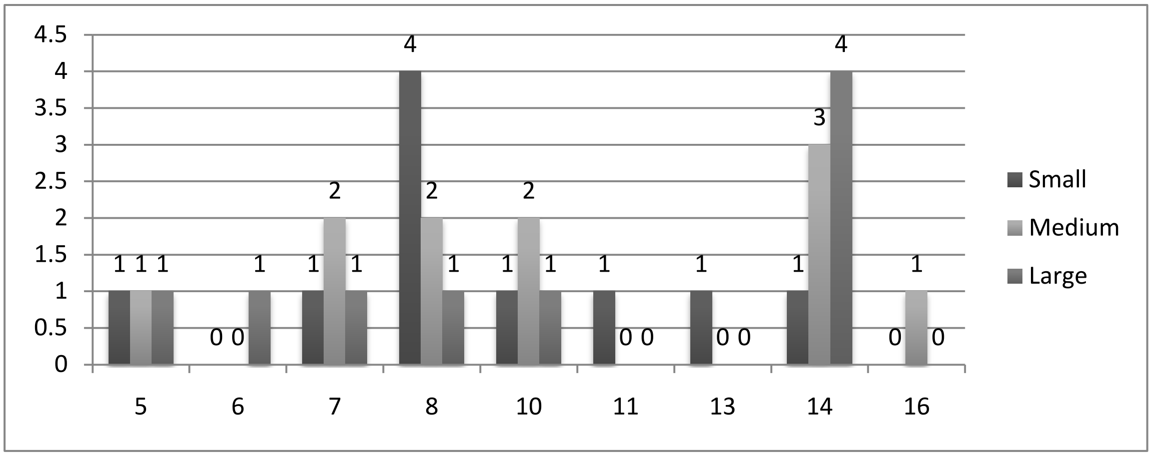

Figure 7.18. Bar chart of rock feature size categories by all clast categories.

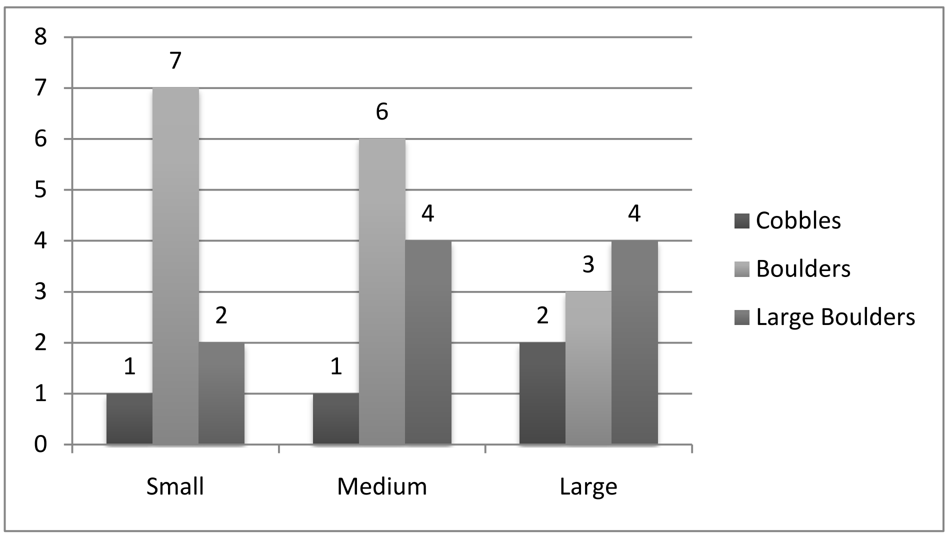

Figure 7.19. Bar chart of rock feature size by modified clast.

Large features are more likely to be constructed out of cobbles than the other categories, with 22 percent (n=2) being built out of majority cobbles. There is an additional method to examine overall size of rocks in the rock features. I recorded an attribute that noted the primary construction materials, such as angular boulders, based on a visual assessment of the overall appearance. Breaking clast down into categories does not capture the difference between a feature built entirely out of cobbles and one built out of a combination of cobbles, boulders and large boulders. I present the primary material attribute below to see if the patterning is different than the clast variable

(Figure 7.20).[19] Overall, the primary materials variable shows a similar pattern to clast, with less variation in the smaller features and greater variation in the larger features. Small features are constructed out of boulders (n=7, 70 percent) and large boulders (n=3, 30 percent). Large features are likely to be constructed out of boulders (n=3, 33 percent) or very large boulders (n=4, 44 percent), but the only feature with cobbles as the primary material is a large feature.

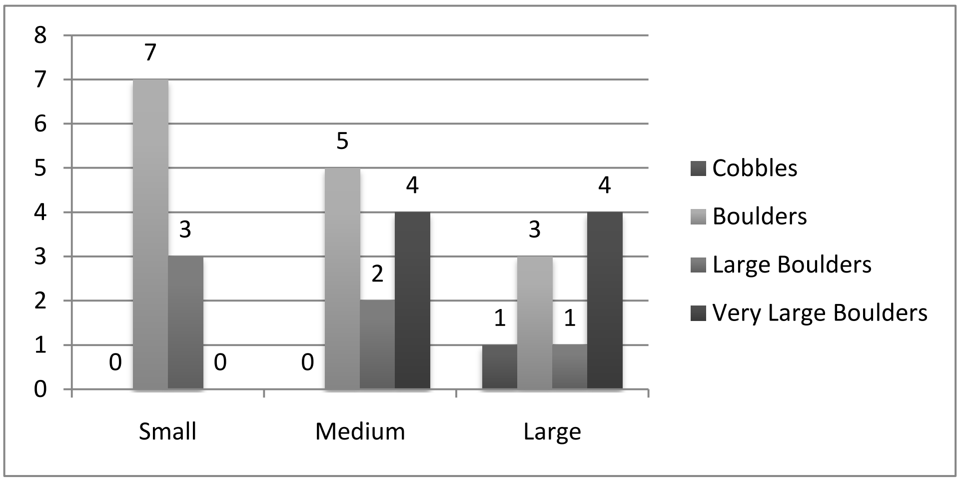

Figure 7.20. Bar chart of rock feature size by primary material.

These data indicate that the size of rocks may not be related to the size of rock features, and imply that even large features could be built without the necessary labour to move very large rocks.

Comparing freestanding versus non-freestanding features within each size category indicates construction. As seen in Figure 7.21, all of the large features (n=9, 100 percent) are not at all freestanding, and the smallest features are most likely to be freestanding, with 50 percent of the small features (n=5) being 1-99 percent freestanding. The only fully freestanding feature is in the medium size category (n=1, 9 percent) but most of the medium features (n=9, 82 percent) are not at all freestanding.

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[19] I originally recorded rounded boulders and angular boulders as distinct categories (see Ch. 4). For this discussion, I put these categories together, so there are only four levels instead of the original five. Because I am interested in size and not shape, no data precision was lost.

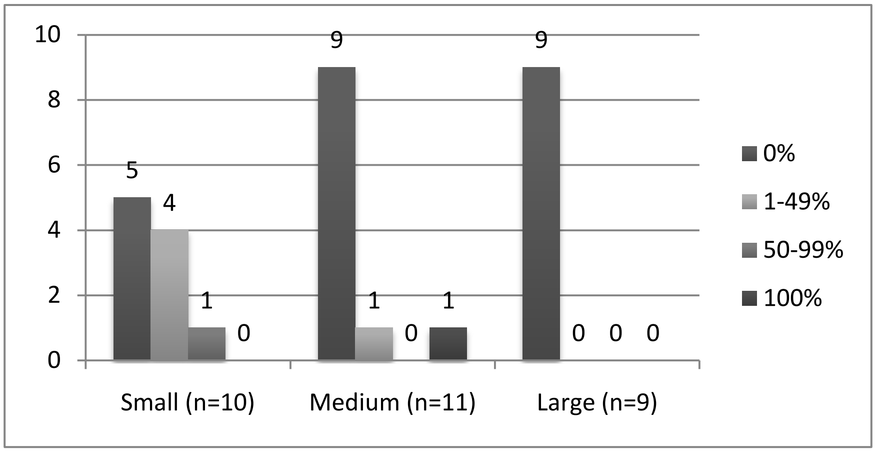

Figure 7.21. Bar chart of rock feature size by freestanding.

Another construction method that might have distinct patterning depending on the size of rock features is whether or not they are built using chinks for stability. While chinking is quite common throughout the entire sample, larger features are more likely to show chinking than smaller features (Figure 7.22). All large features (n=9, 100 percent) are built using chinking, while 72 percent of medium features (n=7) and 70 percent of small features (n=7), also have chinking. Small features are most likely to not have chinking (n=3, 30 percent), but overall, most features are built using chinking as a means to increase stability.

The presence/absence of cap stones indicates different forms of construction. When comparing different size categories, larger features, being terraces, are also more likely to have cap stones (Figure 7.23). Not all large features have cap stones, and two small features (20 percent) do have cap stones. Medium features are almost equally as likely to have cap stones (n=5, 46 percent) as they are not (n=6, 55 percent). The overall trend, however, is that a greater proportion of features have cap stones as size increases.

The final discrete variable that may show differences depending on the level of labour investment in the rock features is the tightness of stacking (Figure 7.24). It is possible that certain size categories will be more or less tightly stacked.

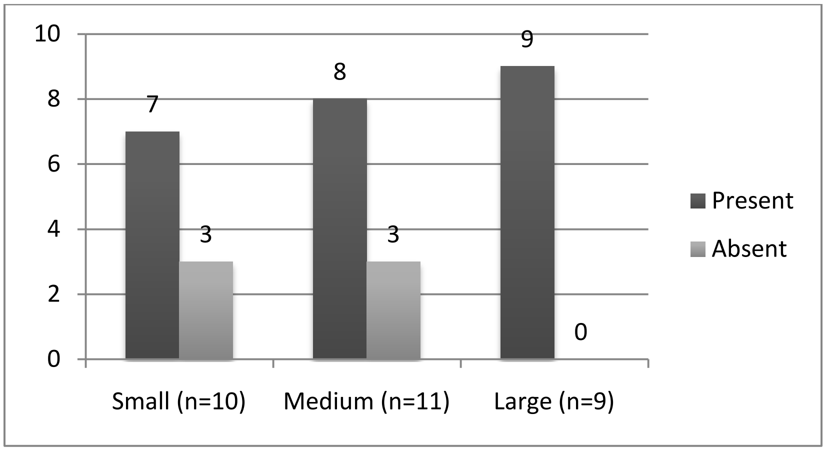

Figure 7.22. Bar chart of rock feature size by chinking.

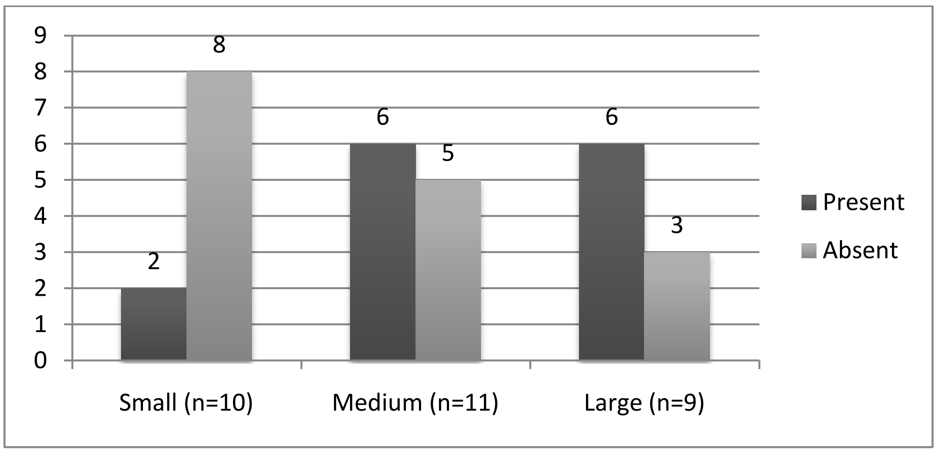

Figure 7.23. Bar chart of rock feature size by cap stones.

When the data are compared, no clear pattern emerges, although large features have less variation, clustering around the middle three stacking types and with a majority (n=5, 55.6%) being medium stacked. Medium-sized features show the greatest variation from loose to tight, with the only tightly stacked feature falling into this size category (n=2, 9.1%). Small features are also quite varied in stacking patterns. Overall, the tightness of stacking is not noticeably correlated with the size of rock features, although again the small sample size limits confirmatory testing. Having divided up the sample, I returned to measures of width, area and volume, to see whether this categorization was effective in addressing the rough areas of the data.

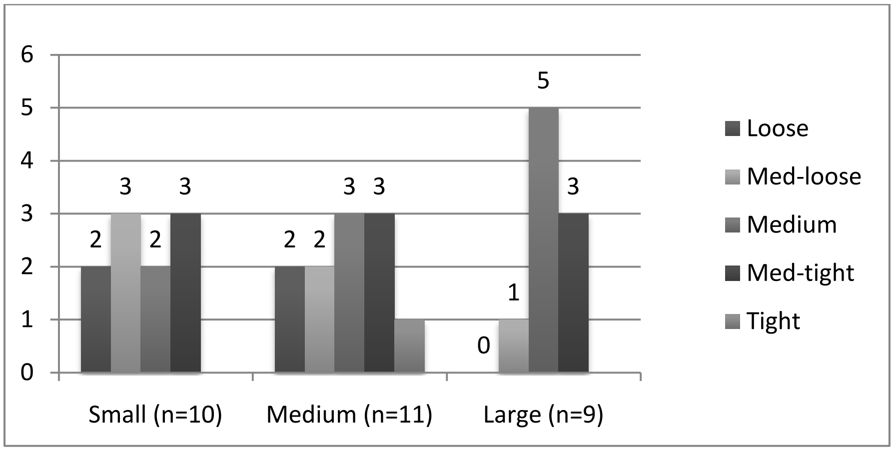

Figure 7.24. Bar chart of rock feature size by stacking.

When split into groups depending on labour requirement, all three variables become smoother than in the original analysis presented in Chapter 6. Volume formed the basis for the division between categories and a boxplot (Figure 7.25) shows that there are clear breaks between small, medium, and large features. Figure 7.25 shows that the volume distribution in each category appears to be quite smooth, but there are some differences in the shape of the distribution amongst the categories. The other variables, width (Figure 7.26) and area (Figure 7.27), are less smooth than volume, but do show a similar pattern, where large features have greater widths and areas than smaller features, as seen by comparing the median values in Table 7.4.

All three categories have evident skew for both width and area. Small features have negative skew in width and area, with the lower IQR value being larger than the upper IQR value (Table 7.5). Both medium and large features show positive skew, where the upper IRQ is larger than the lower IQR. This skewness is most apparent in the area variable for large features, where the lower IQR is 7.3 m^2 and the upper IQR is 108.8 m^2. In this case, there are three different categories, and a couple of the variables show overlap within the divisions created by the volume variable.

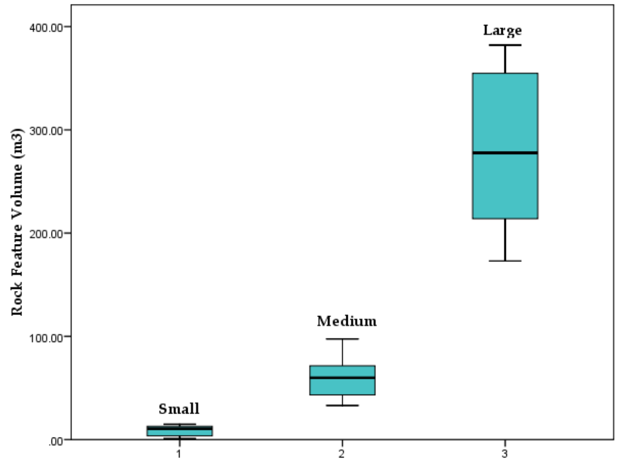

Figure 7.25. Boxplot comparing volume of rock features based on proposed size and labour investment categories.

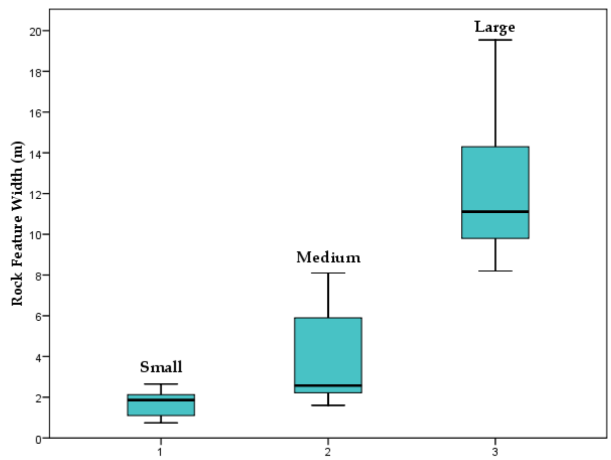

Figure 7.26 Boxplot comparing width of rock features based on proposed size and labour investment categories.

Testing whether the samples within the categories are drawn from different populations becomes more important when there is potential overlap in the values, so I ran width, area and volume of size categories through a Kruskal-Wallis non-parametric test for three or more samples. The results indicate that all three variables are statistically significant, with width at p=0.006, area at p=0.001, and volume at p=0.004, allowing me to reject the null hypothesis that these samples were drawn from the same population.

Table 7.4. Comparison of Measures of Centre and Spread of Categories of Size.

Width (m)	All (n=30)	Small (n=10)	Medium (n=11)	Large (n=9)
Mean	5.81	1.72	3.94	12.63
Median	2.61	1.86	3.84	11.11
Range	18.80	1.91	6.5	11.34
IQ Range	7.32	1.08	4.9	6.06
SD	5.25	0.61	2.37	3.8
Area (m^2)				
Mean	58.68	7.45	34.98	114.55
Median	26.04	8.17	27.20	102.50
Range	283.99	11.85	44.34	193.55
IQ Range	85.08	6.71	24.47	116.12
SD	7.04	3.77	16.05	72.69
Volume (m^3)				
Mean	107.58	8.92	58.42	277.29
Median	53.07	10.53	59.91	277.78
Range	381.13	13.81	64.50	209.18
IQ Range	189.05	9.63	32.65	155.95
SD	122.47	4.98	20.69	76.96

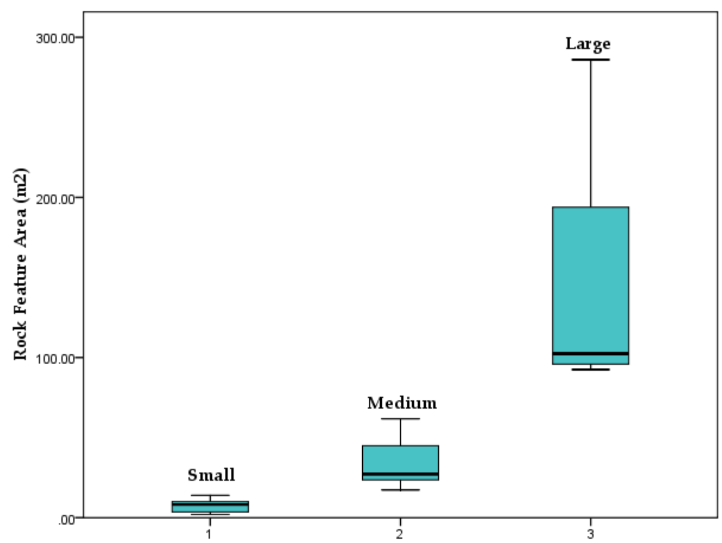

Figure 7.27. Boxplot comparing area of rock features based on proposed size and labour investment categories.

Table 7.5. Five-number Summaries for Continuous Variables of Size Categories.

Width (m)	**Small (n=10)**	**Medium (n=11)**	**Large (n=9)**
Upper Hinge	2.15	6.8	15.46
Upper IQR	0.29	4.23	4.35
Median	1.86	2.57	11.11
Lower IQR	0.79	0.67	1.71
Lower Hinge	1.07	1.9	9.4
Area (m^2)			
Upper Hinge	10.04	47.93	211.34
Upper IQR	1.87	20.73	108.84
Median	8.17	27.2	102.5
Lower IQR	4.84	3.74	7.28
Lower Hinge	3.33	23.46	95.22
Volume (m^3)			
Upper Hinge	13.06	74.13	361.88
Upper IQR	2.53	14.22	84.1
Median	10.53	59.91	277.78
Lower IQR	7.1	18.43	71.86
Lower Hinge	3.43	41.48	205.92

Discussion of Labour Investment

Distinguishing between different sizes of rock features may be a means to access how much labour was invested in each feature and how people mobilized that labour for social purposes. Based on the analysis above, features in the various size classes do show internal patterning, supporting the hypothesis that these are valid categories, and the continuous variables show that the three categories are not drawn from the same population. A larger sample size will be required in the future so confirmatory statistical tests of association can be performed, but preliminary results are encouraging. If some features take more labour than others to construct, the questions arises whether this can be correlated with social action, agency, and identities. One possibility is that different social groups were responsible for constructing certain sizes of rock features. I explore this possibility to see if it is a reasonable explanation for the variation in the sizes of the rock features in the Lower Fraser River Canyon.

Small: Family-level Features?

Small features, with volumes under 20 m^3, may be the result of labour concentrated within a small group, or even an individual. If small features were only built by small groups, they are unlikely to be built out of large rocks that would require coordinated community labour. The term family, when applied to Coast Salish communities, does not necessarily mean a nuclear family of father, mother and children. However, there is an intermediate level of social organization between the household and the individual. Small groups of immediate kin might live within a larger household group. These kin groups might occupy a single pit house, or own specific fishing locations in the Canyon. Suttles (1987:20) notes that "one conjugal family working alone had the instruments for equal access to most types of resources," so it is in this context that I consider the role of a family group in constructing a small rock feature.

In general, small or "family-level" features are constructed with fewer overall rocks than larger features, as well as with smaller clasts of stone, although there is considerable variation in the size of stones between different family-level features. Most are not constructed using cap stones. Only three of 10 (30 percent) are terrace features, by far the lowest percentage relative to other categories. Features that may have been the result of family labour are more likely to be freestanding than non-family features, with half of the features being at least partially freestanding, and containing less than 50 percent infill. All of this indicates a lower level of labour investment in small features, but making the interpretative leap from small amounts of labour investment and the action of families requires further research. Nevertheless, building small features would not necessarily need the action of a very large group to accomplish.

Medium: Household Level Features?

Features with volumes between 30 m^3 and 100 m^3 required more labour to build than those with smaller volumes. This could manifest in two ways – first, an individual or small group could spend more time on one feature, or second, a larger group could be involved. Distinguishing between these two types of labour can be difficult, but one possible variable to consider is the size of rocks, assuming that once rocks reach a very large size, more than two or three adults would be required to manoeuvre the stone. If this were the case, perhaps the household would be engaged in the construction of a rock features. Features in this category show the greatest level of variation. Many of the percentages seen in this category mirror the percentages of the sample as a whole and are not particularly informative. There are no distinct patterns in variables such as clast, forms of stacking, presence of cap stones and number of rocks; instead, the numbers are fairly evenly distributed between the categories. The category of household features may only be relevant as a size category and does not distinguish other elements of the rock features or types of labour investment. It may also mean that different forms of labour organization were used to build features that fall into this category, so I cannot correlate the level of labour investment with a particular social group. This contrasts with the small and large categories, because those ways of grouping the sample do help to illustrate some new patterns within the data.

Large: Community Level Features?

Features in the large category, hypothesized to require community-level labour organization, show some distinctive patterns. Among the most striking is that all of the largest features are terraces associated with village sites, have 100 percent infill, and show chinking. Larger rocks on average are used, but the majority show a medium level of stacking. The number of rocks contained in these features clusters between 20-200 rocks, although this only takes into account the stones visible on the face of the features. Large features also show the most common occurrence of cap stones, indicating that the creation of a flat surface was intended. Overall, large features are unlikely to be built by a small group of people over a long period of time, since many contain rocks that are 1 m or greater in diameter. The distance rocks would have to be moved is unclear, but even with the use of levers and pulleys, co-ordinated group labour would be required to place large stones on top of terraces. Thus, large features may be the result of a community or village working together to create large terraces on which to build plank houses. The association of these large terraces with village sites (Figure 7.28) supports the idea that members of many households within the village would have to join forces to build these large-scale constructions.

The correlation between the volume of a rock feature and the amount of people involved in its construction is not straightforward, with issues such as the size of rocks being an important consideration. The method of classification only refers to the approximation of labour investment, but does not necessarily capture important elements of the activities that would have taken place at these features, nor does it capture the difference between a lot of people building a feature in a short period of time and a small group of people building a feature over a long period of time

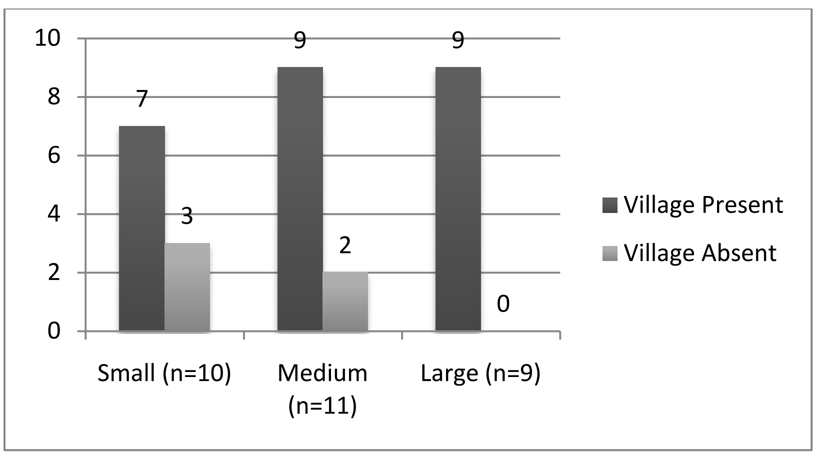

Figure 7.28. Bar chart of rock feature size by village association.

. A large feature built out of small rocks could be the result of a few people working over a longer period of time. I did not explicitly measure the features with rocks that are too large to be moved by an individual or small group of individuals, because that threshold is not well established. Reviewing the photos of the features provides some possible features that have large rocks that are over a metre in length. However, without knowing the amount of people it would take to move these large rocks, it is difficult to correlate these features with labour categories. Further work to refine these categories is necessary before any inferences about social or political organization can be made.

One final method for estimating labour investment is architectural energetics, or the estimate of the amount of person-hours or person-days required to construct large scale architectural features (Abrams 1987; Abrams and Bolland 1999; Hard et al. 1999). Applying energetic measures to the past requires experimental building of similar forms of rock features, a project that was beyond the scope of this research. A similar form of terrace features, however, was constructed via experimental methods in Cerro Juanaqueña in Chihuahua, Mexico (Hard et al. 1999). The terrace features at this site had evidence of similar forms of building practice, methods, and materials. Experimental terraces were built with local stone, ranging from 20-40 cm in diameter (Hard et al. 1999:136). Some terrace features were topped with sediment. The final labour measures were 1.15 person hours per cubic metre of stone, and 7.1 person hours per cubic meter of sediment. Combined together, the feature labour investment was 1.9 person hours per cubic metre of finished terrace. Many of the rock features are constructed out of rocks larger than 20-40 cm, so this may be an underestimate. Most of the rocks used in the experimental measures were also from within a 350 m radius of the feature (Hard et al. 1999:137). If larger stones were required to be moved longer distances, the labour estimate would also increase. While not a perfect correlate, the labour estimates from terraces at Cerro Juanaqueña may provide a rough estimate of the amount of person hours required for rock features in the Lower Fraser River Canyon.

I applied the measures from (Hard et al. 1999) to the features in the lower Fraser River Canyon. For all terrace features, I used 1.9 hours of person labour per cubic metre as an estimate, because most of these were filled in with soil. If plank houses were constructed on these terraces, a soil cap would be expected. For non-terrace features, I applied the estimate of 1.15 person-hours per cubic meter. Using these estimates, the rock feature that would have taken the least time to build, RF-T16, could have been constructed in about one hour. The rock feature that would have taken the most time to build, RF-T73, would have taken 726 person-hours to construct. The issue with energetic measures is that it is difficult to determine whether this represents one person working for 726 hours or 145 days, based on a six hour work day (Hard et al. 1999: 139), or 145 people working for one day. However, considering that some of the stones weighing up to ten tonnes would take more than one person to manoeuvre and that many of the rocks used in the Lower Fraser River Canyon have a larger diameter than 20-40 cm, it appears likely that many of the larger features were a group effort. If larger features were a household effort, it might be possible to relate the household labour pool with terrace construction. For example, if a household had 20 individuals who could constitute the labour force to build a terrace, they would need to work for 7.25 days to build the largest of the rock features.

A social group or set of individuals may have been responsible for coercing or ordering these features to be built, an issue which relates back to how agents interact with social structure. People who had more power to influence labour investment in large features may have had more power to alter the social structure, affecting how visitors to the Lower Fraser River Canyon perceived communities and households that lived there. Building a rock feature could also have an impact on how a household was viewed by their neighbours. Some of the features with the largest stones, such as RF-T63 and RF-T76, are visible from the river, possibly indicating that some features were built to signal to visitors. Movement of large, monumental stones can convey a message of power, depending on the social context in which these monuments were constructed and the audience for which they are intended (Robb 1998).

This categorization scheme fails when attempting to resolve differences between features that fall between the smallest and largest features, and in explaining how these features related to activity. The patterns within the household group generally mirror the patterns in the combined sample and are not informative. A final concern with dividing features based on the amount of labour involved is that it does not address a key question about the rock features – what were they used for? I address this question in the following section.

Hypothesising Rock Feature Function

Understanding the use of the rock features in the Lower Fraser River Canyon requires a historically-situated analysis of what people were doing, the types of technology used, and what these features meant to people. Drawing on the historical context of the Lower Fraser River Canyon, I describe a possible range of functional uses of the rock features, using this to expand our understanding of the meaning of these features. To speak only of function in terms of behavioural aspects of society (e.g. fishing or defending against raiders) is to underplay the ways in which these objects impacted the experiences of people in the landscape on a much broader scale, but this is a necessary step in interpretation.

The uses proposed here are designed to help explain some of the patterns observed in the data exploration that are not well captured by the size distinction. In addition, they are based on a reading of the literature and conversations with people on the ground. I propose three major uses of rock features: (1) salmon fishing and fish processing; (2) defense; and (3) bases for the construction of plank houses. There may have been additional uses, including burial mounds, spiritual markers, lookouts, etc., so the uses described below can only describe elements of the sampled rock features and may not be representative of all rock features.

Distinguishing between the three uses is not based on a single variable but instead considers differences in a range of variables. These are not mutually exclusive or exhaustive categories – a terrace built for a dry rack could become a useful place for defense and vice versa. However, my interest here is to attempt to uncover intention –

what did people in the past anticipate as a primary use for these features? While this is a challenging task, some aspects of the rock features may point to certain uses, including how far they are from the river, which direction they face, how big they are, and whether they are high enough to physically protect members of the community from attack. After examining several different possibilities for use, I discuss those features in the sample that do not meet any of the expected criteria and what this means for analysis based on strictly physical characteristics.

Analysis of Usage Patterns

I divided up the data into categories based on proposed uses of the rock features (Figure 7.29). I describe the rationale for selecting features along with the results of the analysis in each section below.

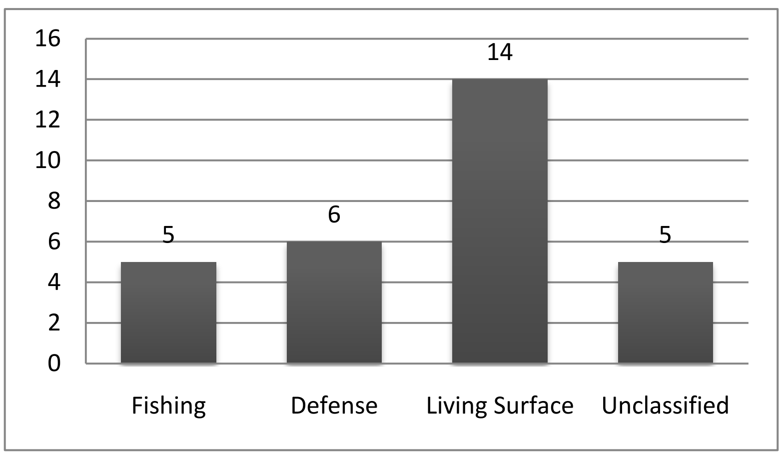

Figure 7.29. Bar chart of rock feature use.

The rock features in the categories are compared based on the following variables: size, freestanding, terrace/non-terrace, river view and river view direction, infill, fire-altered rock, artifacts, historic materials, cap stones, and association with village locations. I use graphs and charts in each usage section to illustrate patterns, with cross-tabulations in Appendix 5, and raw data in Appendix 3. I examine whether or not these categories were effective in smoothing some of the roughness in the continuous data of width, area, and volume.

Fishing and Fish Processing

Fishing is a dominant theme for the entire Canyon. Two explanations are possible for the specific relationship between these rock features and the fishery: first, these could have been the base for the construction of drying racks (Figure 7.30); and second, these could have been designed to create flat areas (terraces or platforms) near the river on which to stand while fishing.

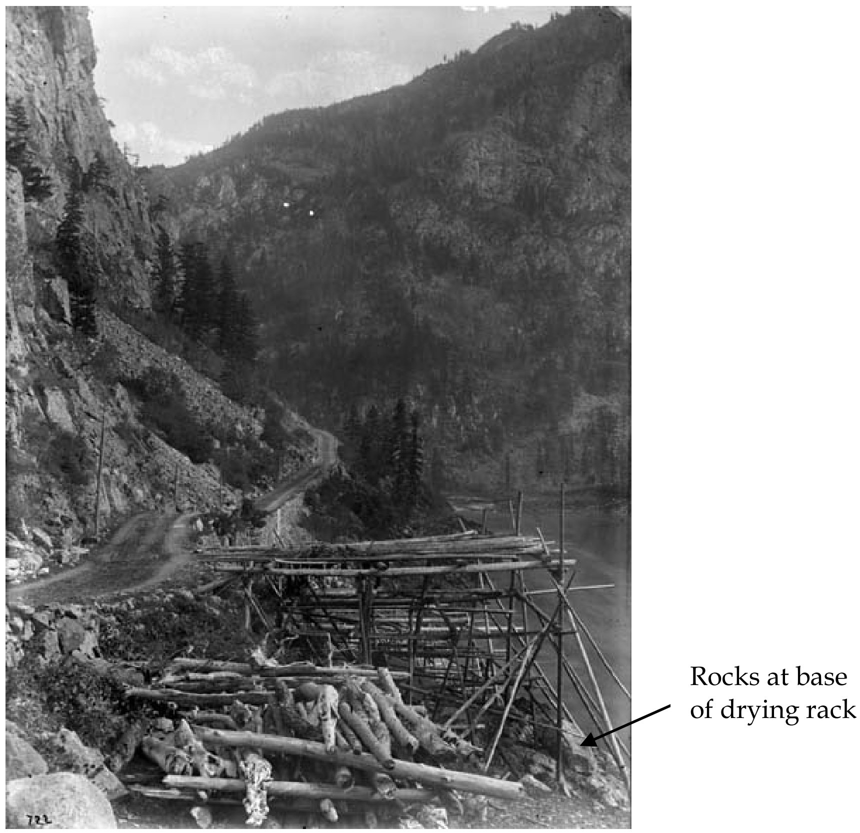

Figure 7.30. Photo from the Canada Archives (PA-009216) showing a dry-rack in the Canyon in 1879. Note the rocks used to stabilize posts at the base of the dry-rack feature.

Fishing with a dip net is dangerous at the best of times, so creating a stable, level surface is desirable, since much of the landscape directly adjacent to the river is steep and treacherous. Dry rack platforms require a flat area up to 30 m^2, must be stable enough to support posts that formed the rack frame, and should be situated adjacent to the river where there is enough wind to dry the salmon. Modern drying racks are constructed on high points near the river, often at the top of steep slopes. Features set back away from the river, and out of the wind, would be poor places to build a drying rack.

In exploring the data, I selected features that were terraces, were not freestanding, had river view of some form, and had less than 30 m^2 in area. Only four out of the sample of 30 terraces have characteristics suggesting they could have been bases for dry racks. Three additional features did fit the criteria (RF-T01, RF-T02, RF-T14), but were eliminated. RF-T01 and RF-T02, discussed in the living surface section below, may have originally been part of one feature, and this also fits criteria for the location of a plank house, fronting the remnants of an ancient pithouse village location. RF-T14 is at the base of a very high rock bluff that would almost completely block any wind to the location and would not be a practical location for wind-drying. The remaining features, RF-T03, RF-T06, RF-T07, and RF-T04 (Table 7.6), are all small terraces at exposed points ranging from 15-35 m above mean river level.

Table 7.6. Possible Fishing Features.

Rock Feature	Type	Area (m2)	Freestanding	River View	Meters above river
RF-T06	Terrace	2.45	26-50%	Yes	21.72
RF-T03	Terrace	3.62	0%	Yes	15.23
RF-T07	Terrace	8.48	0%	Yes	21.73
RF-T04	Terrace	17.38	0%	Yes	26.1
RF-T17	Stone Enclosure	0.99	76-99%	Yes	0

None are at obstructed locations, so the areas would be sufficiently windy, and all of these locations have access to the river to bring fish up for drying. While there do not appear to be any features in the sample that created flat areas for dip net fishing, there is one known feature at DjRi-14, discussed in Schaepe (2006), which could have served the dual purpose of both a defensive structure and a fishing platform. Future research should include this feature in the sample to allow for comparison.

In the sample, one feature -- RF-T17-- may have been used for a different type of fishing practice than other fishing features. RF-T17 is an outlier in the sample, with the smallest overall area, made almost exclusively of rounded river rock, and is a type of its own – a semi-circular stone enclosure. RF-T17 is not a wall, nor a terrace, and would be inundated by the river during the freshet. In the field, I discussed possible uses with Larry Hope, one of the field assistants and member of the Yale First Nation. He suggested it was a form of fish trap, where the sides would help create an eddy in the river, trapping the fish and allowing them to be more easily caught. Because there is no soil associated with the feature, it is difficult to tell how old it is or who built it. However, one artifact – what appears to be a pecked sling stone – was found just upslope from the feature. Including RF-T17 as a fishing feature, 17 percent of the features sampled (n=5) are potentially related to fishing or fish processing.

Almost all fishing related features fall into the small category of labour investment and are terrace features (n=4, 80 percent). While all of these features have a river view, those views are either upriver or across the river – no fishing features have downriver views (Figure 7.31).

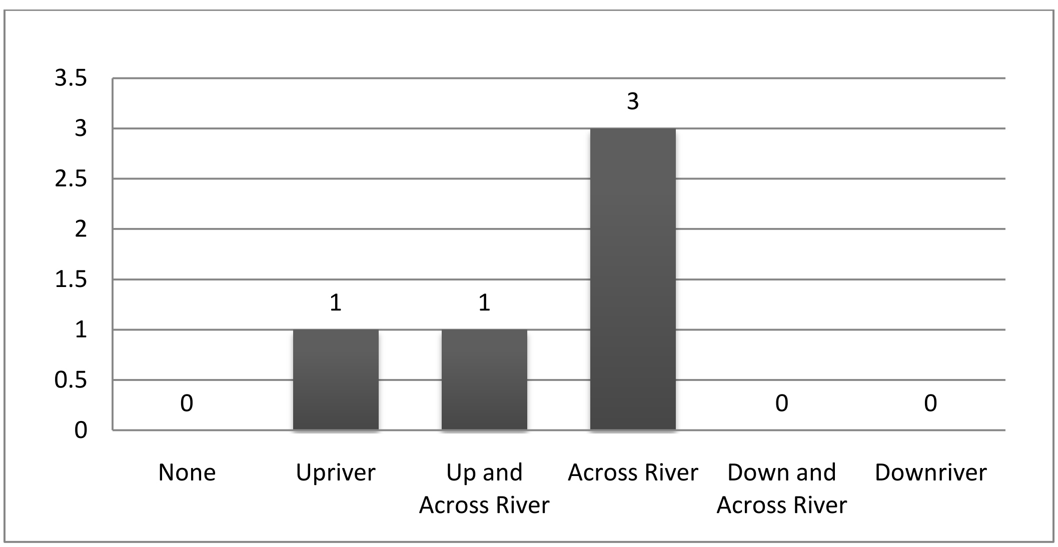

Figure 7.31. Bar chart showing the direction of river view for fishing features.

Most have less than 75 percent infill (Figure 7.32) and are less than 49 percent freestanding (Figure 7.33). Four of 5 (80 percent) of fishing features are associated with ancient village locations, but most do not have cap stones (Figure 7.34).

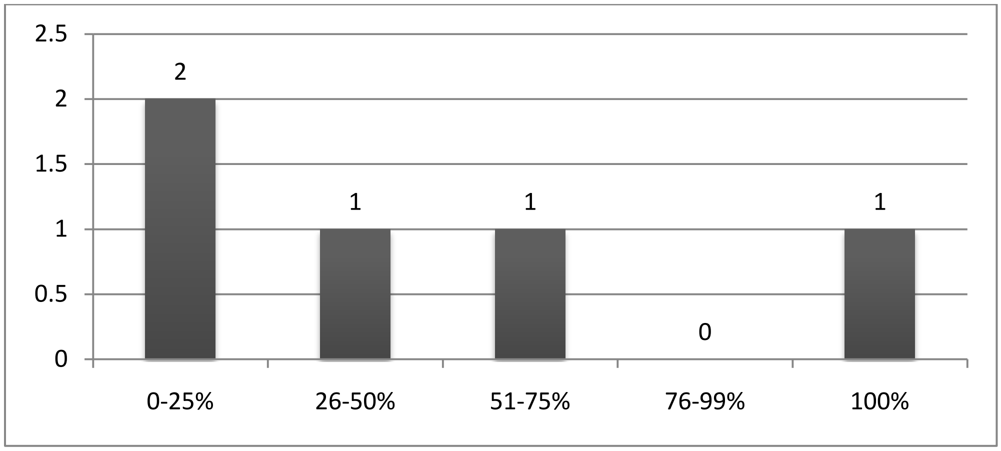

Figure 7.32. Bar chart of fishing features by percentage of infill.

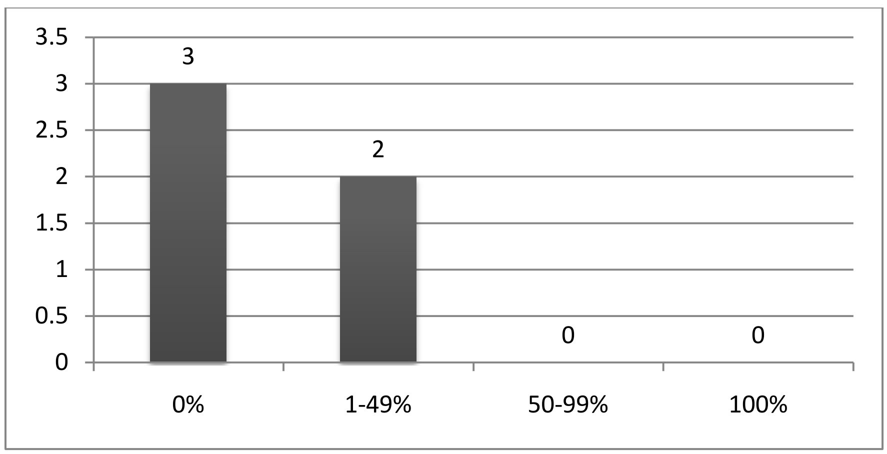

Figure 7.33. Bar chart of fishing features by percentage freestanding.

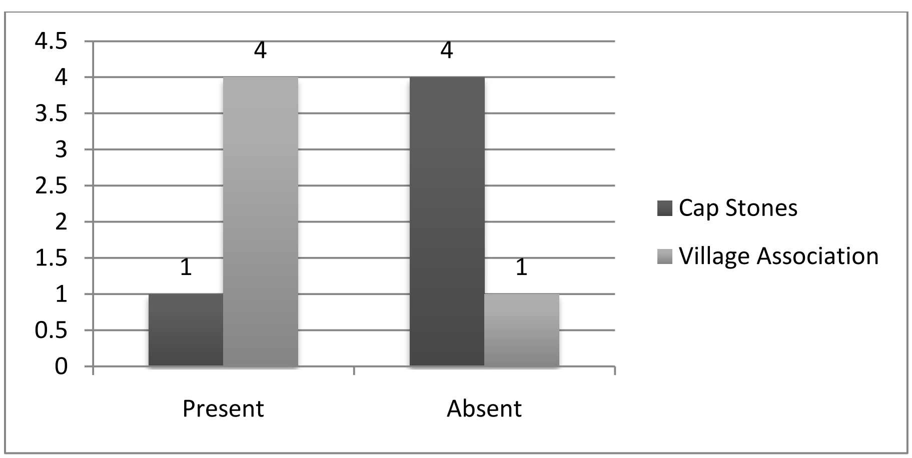

Figure 7.34. Bar chart showing fishing features by cap stones and village association.

None were associated with fire-altered rock; however, the majority of fishing-related features are associated with both pre-contact and post-contact artifacts, indicating potential continuity of use of fishing locations through time (Figure 7.35)

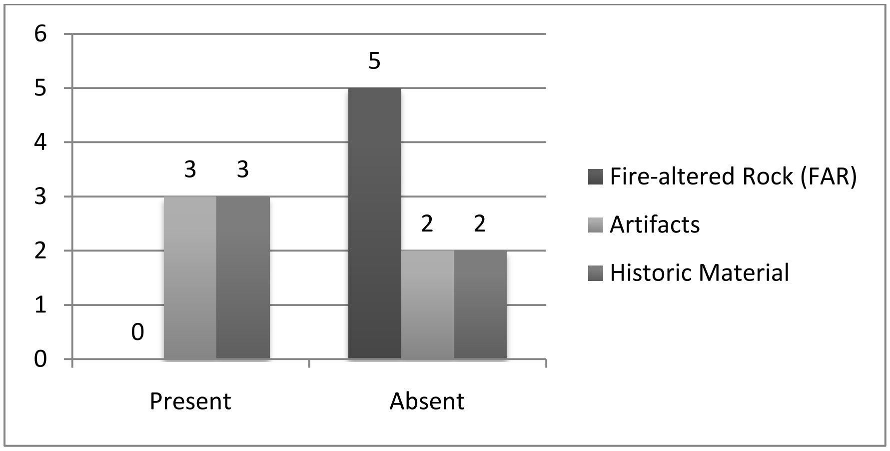

Figure 7.35. Bar chart of fishing features by associated cultural material.

Defense

Whether rock features were built to protect the community from attack can be evaluated by exploring their physical characteristics - the direction they face, their proximity to other features, whether or not they are freestanding, and how far they are from the mean river level. This indicates whether the features actually work to ensure the safety of members of the community based on the types of warfare that were practiced. Unfortunately, this does not take into account the use of these structures as the base for wooden palisades or fences, since this part of a defensive structure would not preserve. Even this basic evaluation of the physical aspects of the rock features, however, does not fully address the question of defensibility. The act of building cannot be separated from the creation of meaning, and even a feature that appears to be impractical for defense has a symbolic impact on community members and outsiders.

Seven features (23 percent) are fully or partially freestanding (Figure 7.36), two of which appear to have other purposes as discussed above, so are not included here. This leaves five features (17 percent) whose primary function was likely defensive: RF-T63, RF-T18a, RF-T18b, RF-T85a/RF-T85b and RF-T64 (Table 7.7). RF-T85b, while not freestanding today, is in direct association, and was once connected to, RF-T85a, so it is included as a potential defensive structure, bringing the total number of defensive features to six. One interesting characteristic of all of these features is their direct association (<5 m distance) with other rock features.

Table 7.7. Possible Defensive Features.

Rock Feature	Type	Freestanding	River View	Meters above river	Direct association with other features
RF-T18a	Wall	Partial	Down and across river	18.67	Yes
RF-T18b	Wall	Partial	Downriver	17.95	Yes
RF-T63	Linear Alignment	Yes	Down and across river	16.05	Yes
RF-T64	Retaining Wall	Partial	Downriver	14.44	Yes
RF-T85a	Retaining Wall	Partial	Downriver	11.04	Yes
RF-T85b	Retaining Wall	No	Downriver	11.93	Yes

Defensive features have small or medium levels of labour investment and none are terraces. Most are partially freestanding, although the level of infill varies (Figure 7.37). All defensive features have a river view, face downriver, and are associated with ancient village locations (Figure 7.38). Only one (20 percent) shows the use of cap stones as part of the construction (Figure 7.38).

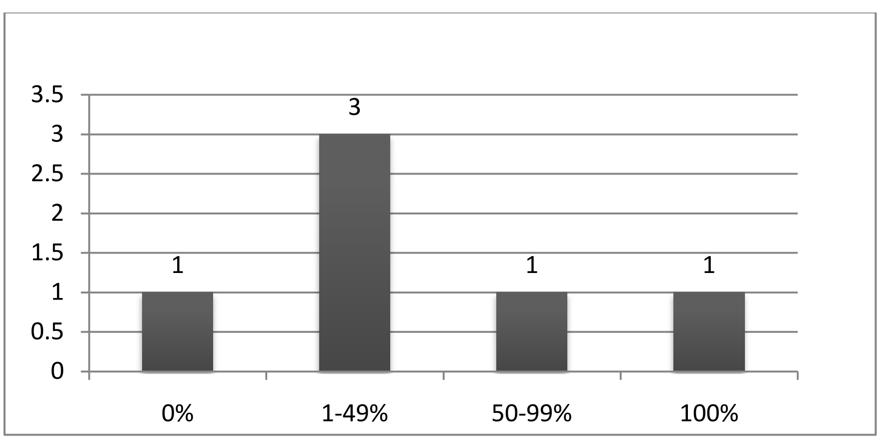

Figure 7.36. Bar chart of defensive features by percentage freestanding.

This pattern supports the idea that these features would be used to observe activity downriver, potentially to warn inhabitants of oncoming attacks. Only one (17 percent) has an artifact and none have historic materials or FAR (Figure 7.39).

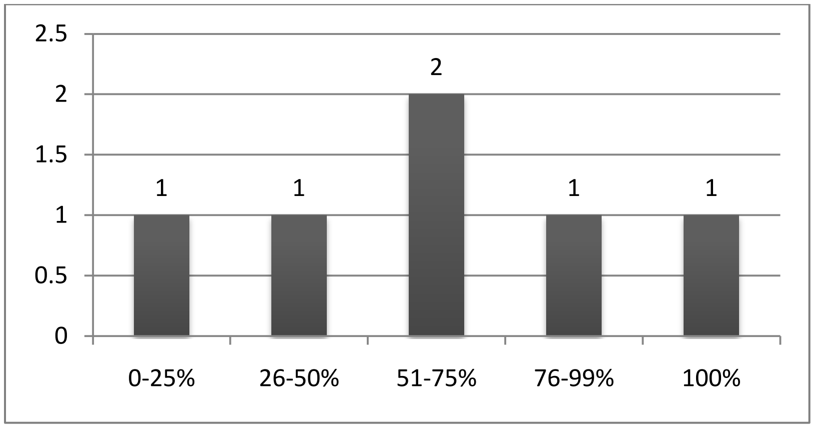

Figure 7.37. Bar chart of defensive features by percentage of infill.

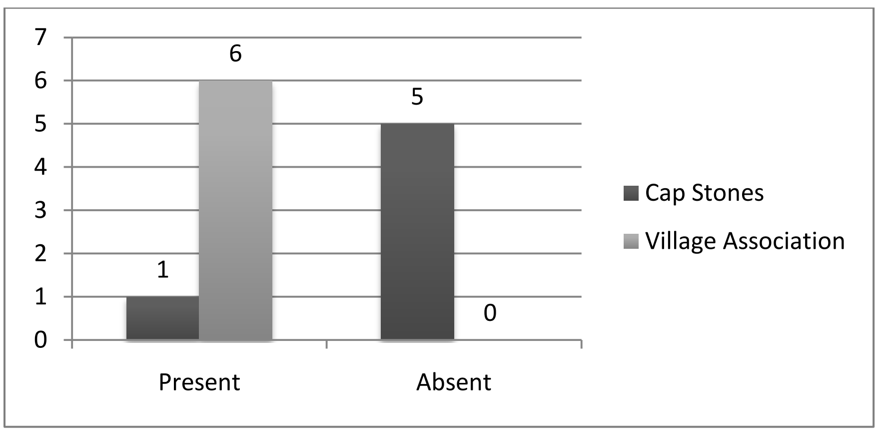

Figure 7.38. Bar charts showing defensive features by cap stones and village association.

Figure 7.39. Bar chart of defensive features by associated cultural material.

RF-T63 is unusual and unique among the sample of potential defensive features because it consists of nine large boulders ranging in diameter from approximately .9 m-1.3 m, and forms a line across the top of a steep bluff (Figure 5.34). These large boulders are chinked with small rocks for stability and have a maximum height of 1.75 m. If this location was used as a lookout, the person on watch would have to crouch or lay down to be completely concealed, but there would still be space to see downriver between the large rocks. Wooden structures may have enhanced the rock alignment, but with no soil remaining, archaeological evidence for a palisade at this location is lacking. The location and design of this feature make it the most clearly defensive feature in the entire sample.

Living Surfaces

Another possible function for many of the rock features in this study is bases for a plank house or simply to create flat living surfaces in very steep topography. This can be evaluated by exploring whether features create flat surfaces suitable for a range of living activities. Establishing whether an area was used as a living surface is an important question in Northwest Coast archaeology, and requires looking at the stratigraphy for cultural layers, usually dark, compact layers that indicate continuous use of the area as a house floor (Ames et al. 1992). Comparison of terrace surface dimensions with those of known plank houses might indicate whether or not the terraces were built and used as house platforms. On the Columbia River, the average size of a plank house at different sites from the area averages from 27-135 m^2 (Hedja in Ames et al. 1992). Other archaeological examples from the area include the Mauer house, measuring 38.5 m^2, and a house at Scowlitz, measuring 187 m^2 (Lepofsky et al. 2009; Schaepe et al. 2001:40-42). In addition, Simon Fraser describes a house at Yale in 1808 measuring 46 ft. (14 m) by 23 ft. (7 m), which would have covered an area of 98 m^2 (Fraser 2007:119). Any terrace feature with an area greater than 30 m^2 is considered here as a possible house platform (Table 7.8).

Table 7.8. Possible Living Surfaces.

Rock Feature	Type	Width(m)	Area(m^2)	Volume(m^3)	Freestanding	Artifacts
RF-T66	Terrace	6.8	39.17	68.94	No	No
RF-T89	Terrace	0.79	42.00	33.18	No	Yes
RF-T74	Terrace	2.54	47.93	59.91	No	Yes
RF-T69	Terrace	7.02	59.46	97.51	No	No
RF-T68	Terrace	10.84	92.47	197.88	No	No
RF-T05	Terrace	9	94.5	172.94	No	No
RF-T35	Terrace	8.2	95.94	48.67	No	No
RF-T01/RF-T02[5]	Terrace	14.3	102.5	277.78	No	Yes
RF-T21	Terrace	9.8	104.37	30.57	No	No
RF-T75	Terrace	11.11	193.87	354.78	No	Yes
RF-T73a/b[6]	Terrace	19.54	336.47	561.91	No	Yes

[5]The area measure for RF-T01 and RF-T02 was taken from the site map created with a total station and takes into account an area of slump between the two features that is littered with boulders, fire-altered rock and some lithic material. Due to the nature of the slump, I assume that the features were once connected, so the measure includes the proposed flat area behind the intact features and the slump.

[6]I combined these two features by multiplying maximum length (RF-T73b) by maximum width (RF-T73a).

Dividing up the living features from other features relies on differences in width. Defining the specific activities taking place on these features, however, requires large-scale excavation, since determining archaeological living surfaces is difficult without below-ground exploration. Fourteen features (47 percent) are terraces with areas measuring greater than 30 m^2. All of these features are associated with villages, and RF-T66, RF-T68, RF-T69, and RF-T01/02 "front" a village. This pattern was seen with plank house depressions elsewhere along the Fraser River (Schaepe 2009). RF-T01/02, located on the east bank of the river at DjRi-2(S), is very similar in dimension (98 m^2 versus 102.5 m^2) to the plank house noted by Simon Fraser in 1808 in this same area, so it is possible that this rock feature could have formed the base of a house of similar size.

Several patterns emerge when data from living platforms are compared with the other categories. All of these features are terraces and fall into either the medium or large categories of labour investment (Figure 7.40). The only features in the entire sample without a view of the river fall into the living platforms category (n=8, 57 percentage) and those with river views show an equal division of upriver (n=3, 21 percent) and downriver (n=3, 21 percent) views (Figure 7.41). FAR is found at 50 percent of living platforms (n=7), comprising 88 percent of all features associated with FAR in the overall sample.

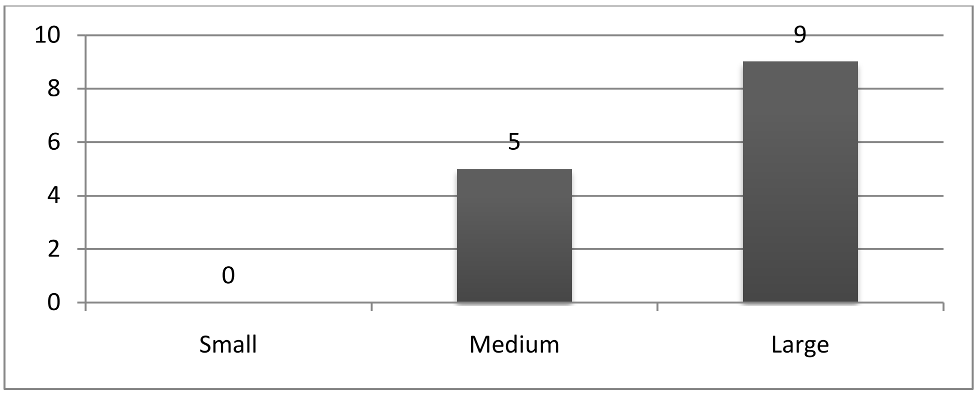

Figure 7.40. Bar charts showing living features by rock feature size.

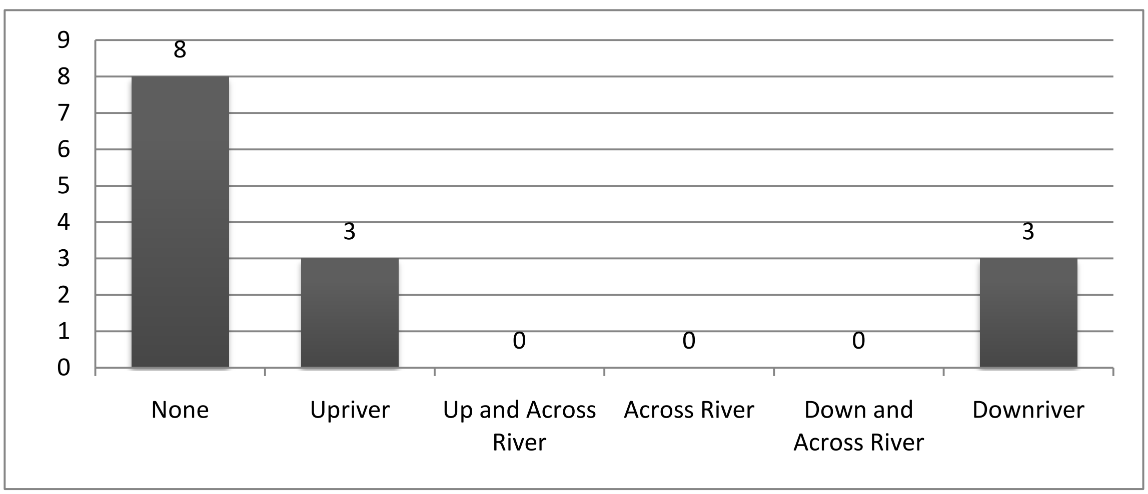

Figure 7.41. Bar chart showing the direction of river view for living features.

Association of living features with artifacts and historic materials is less common than with FAR, at 43 percent (n=6) and 36 percent (n=5) respectively (Figure 7.42). The presence of cap stones is far greater among living platforms than other types of features (n=10, 72 percent), supporting the hypothesis that living features were designed to have a flat, even, and stable top (Figure 7.43). All living features are associated with village locations, an expected pattern if they were used as bases for plank houses (Figure 7.43).

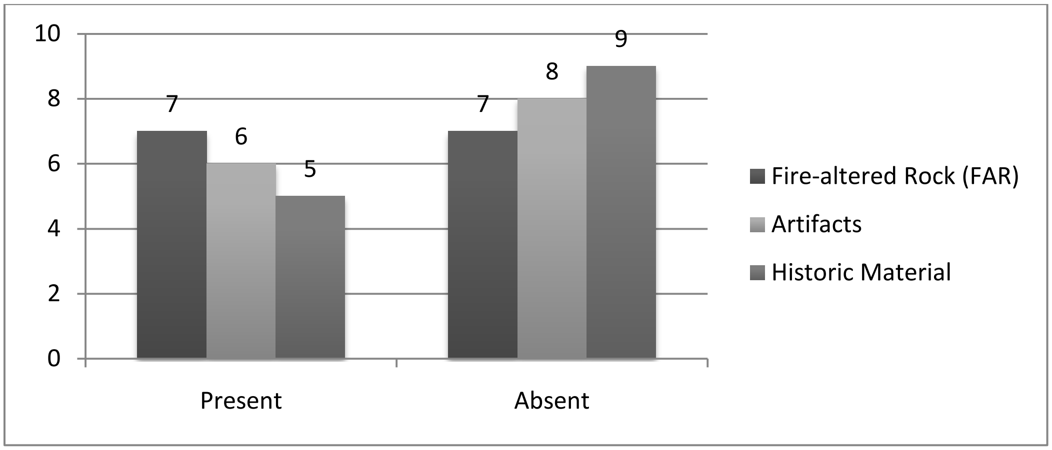

Figure 7.42. Bar chart of living features by associated cultural material.

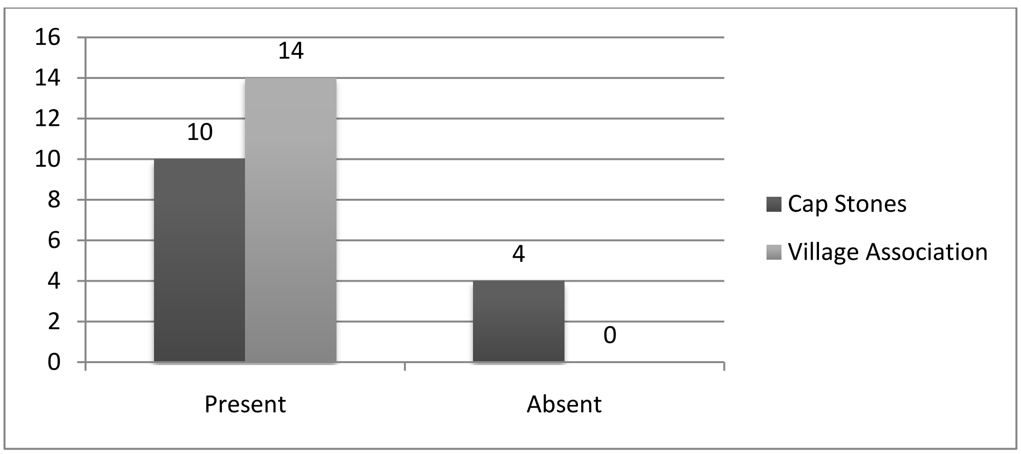

Figure 7.43. Bar charts showing living features by cap stones and village association.

RF-T73a/b, RF-T74 and RF-T75 are part of a terrace complex behind a large rock outcrop (see Chapter 5 for a description) Due to their location behind a bluff, these features are unlikely to have been used for wind-drying. While their secluded *location* is defensive, there is no ability to see raiders coming, so it is unlikely that they served a defensive *function*. Based on these factors, plus the large size of these terrace platforms, I argue that most likely they formed the bases for plank houses.

Ownership Markers

There are still five features in the sample (16.7%) whose possible primary function does not fit into patterns in the data explored in Chapter 6 and refined above (Table 7.9). Marking the landscape in prominent and enduring ways, whether or not an intentional outcome of the building a feature such as a house platform, is legacy of all rock features in the region.

Table 7.9. Unclassified Features.

Rock Feature	Type	River View	Freestanding
RF-T10	Retaining wall	Downriver	No
RF-T11	Wall	Downriver	No
RF-T14	Terrace	Up and across river	No
RF-T16	Retaining wall	Downriver	No
RF-T76	Terrace	Up and across river	No

While western conceptions of land and property are not applicable to this particular cultural context, there are many archaeological examples of walls and enclosures that have been used to control access to places (Keeley et al. 2007). Even if the function rock feature is not to build an ownership marker, it could be perceived as a physical assertion of ownership of territory when visitors aggregated in great numbers during the fishing months.

Marking territory in a permanent and overt way may have been a function of all rock features, regardless of their primary use. I suggest that this is an interesting parallel with the practice of marking the entrance to village locations with large, carved posts throughout the Northwest Coast (Grier 2006; Stewart 1993). Carved posts were observed as part of houses and burial features in the Lower Fraser River Canyon by Simon Fraser (Fraser 2007:119-120). Rock features could also have served as markers in a similar though less ostentatious way, displaying the rights of families where houses were not necessarily visible from the river.

The five unclassified features have several characteristics that distinguish them. First, they are either small (n=2, 40 percent) or medium constructions (n=3, 60 percent). Both terraces and non-terraces occur within the sample, but none of them are freestanding. All have a river view of some kind, with little preference for down or upriver (Figure 7.44).

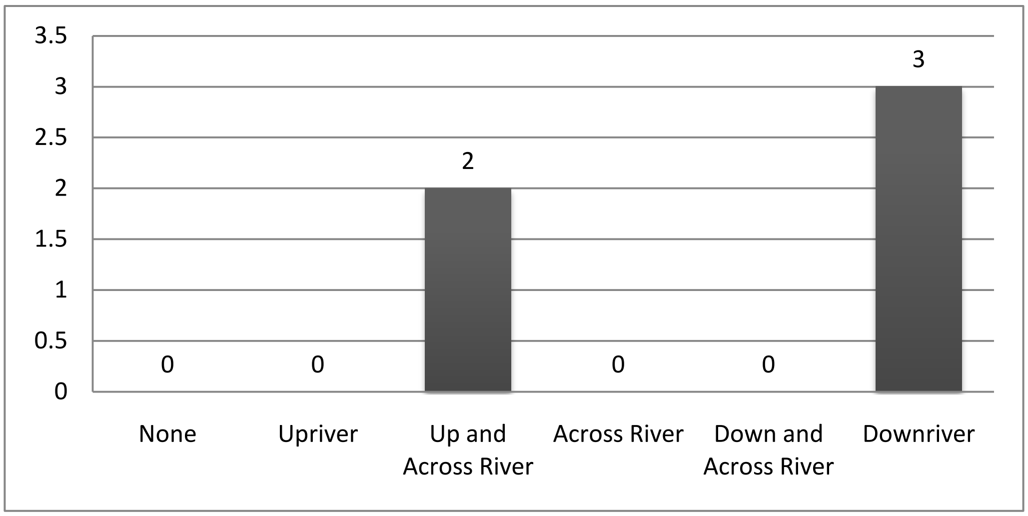

Figure 7.44. Bar chart showing the direction of river view for unclassified features.

Two (40 percent) have almost no infill, while 3 (60 percent) have 100 percent infill (Figure 7.45), showing variation within this particular category. One feature (20 percent) is associated with FAR, two (40 percent) are associated with pre-contact artifacts, while four (80 percent) are associated with post-contact material (Figure 7.46). Eighty percent of these features (n=4) are not associated with village locations and only one (20 percent) has a cap stone (Figure 7.47).

RF-T10 and RF-T11 are on a steep slope below a modern dry rack and surrounded by modern refuse. There is a limited downriver view from this location, and the features are far enough above the river and not on an obvious pathway to restrict access to a site. They are not associated with an ancient village and do not create a flat area where a dry rack or house platform would be built. However, they do permit navigation along a rocky slope, perhaps forming trail routes. Of all of the "unexplained" features, RF-T76 (Figure 7.48) is the largest, constructed of the largest boulders of any feature in the sample; some weighing an estimated 10 tonnes (discussed in Chapter 5).

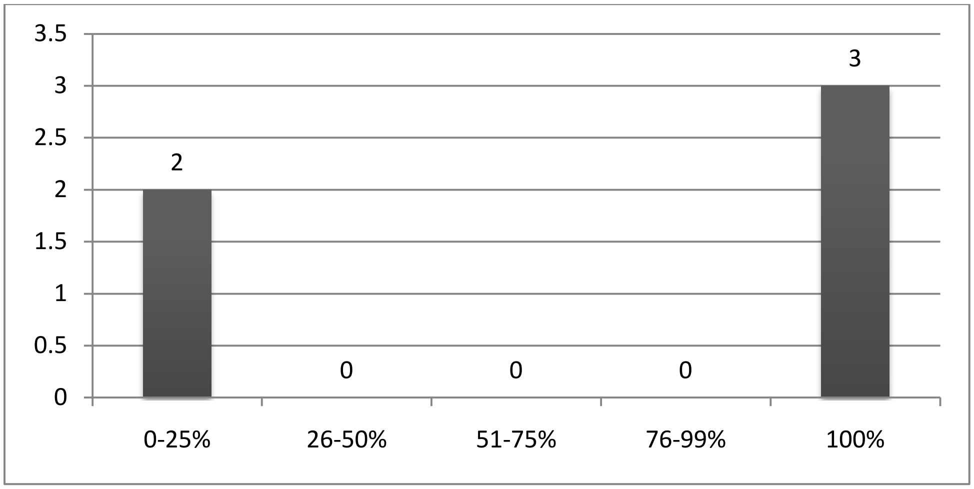

Figure 7.45. Bar chart of unclassified features by percentage of infill.

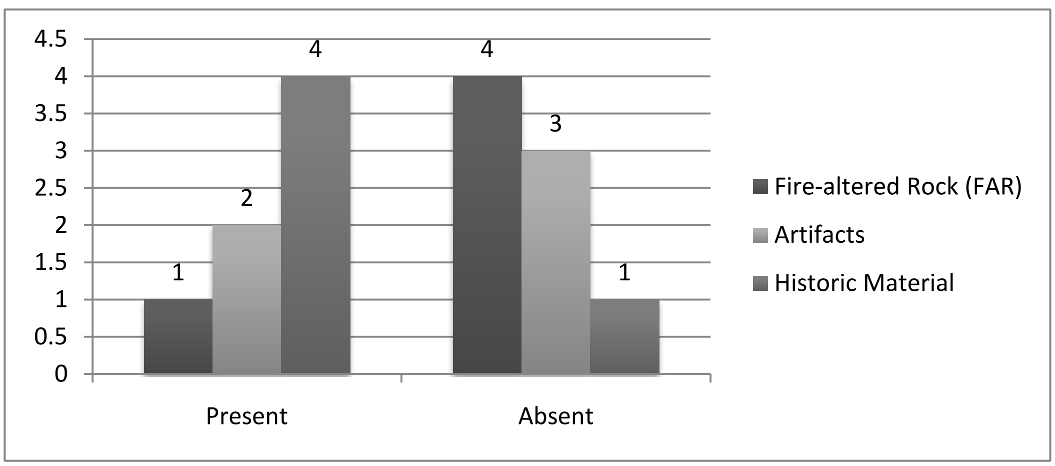

Figure 7.46. Bar chart of unclassified features by associated cultural material.

This feature would have required a large, coordinated labour force to construct. It is not a house platform because the overall area is not large enough based on the criteria established; it is not freestanding, and the placement of the rocks flush with bedrock behind indicates that the feature was not likely built to be freestanding.

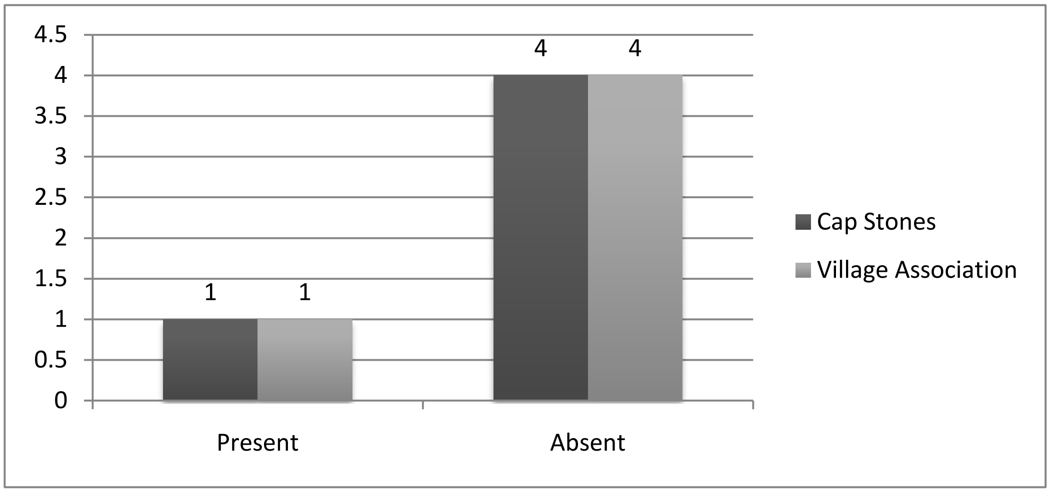

Figure 7.47. Bar charts showing unclassified features by cap stones and village association.

Figure 7.48. RF-T76 - a possible ownership marker (different view from Figure 5.34).

It provides a restricted upriver view, lacks a downriver view, and does not have the width nor is situated in a windy enough location to have functioned as a dry rack. What, therefore, is a monumental wall doing here? This 3 m tall, immense rock feature might have had a major impact on a visitor to this location, whether friendly or hostile. It is possible that people who built the village and managed access to it created a marker that any visitor could not miss when they landed their canoe on the beach and made their way up the path to the village above. RF-T76 best exemplifies the role of these features in marking territory and declaring permanent ownership.[20]

Continuous Variables

When dividing the sample based on usage, I re-examined the continuous variables to see if the rough parts of the data could be accounted for based on these categories. The results indicate that while the data are less rough than the sample as a whole, there are still areas of concern in terms of both level and spread of the data (Table 7.10). Expanding the sample to increase the numbers in each category would be necessary to evaluate the validity of the patterns seen in the continuous data.

The category with the largest mean width, area and volume is living features, whereas the category with the smallest mean width, area, and volume is fishing features. In most cases, the mean and median are closer together within usage categories, with some large standard deviations in several cases, such as the volume of fishing features, where the mean is 15.27 m^3, the median is 10.65 m^3, and the standard deviation is 17.83 m^3.

Skewness is present in some of the use categories, although the width variable is the least skewed, with similar lower and upper IQR values in all four categories (Table 7.11). Area and volume within defensive features show a strong positive skew throughout the data, while area and volume for living features show a negative skew (Table 7.11). The unclassified category shows the largest amount of variation in width, with a far outlier (Figure 7.49), while area of living surfaces has three outliers but no far outliers (Figure 7.50). Considering the lack of consistency in many variables within the unclassified category, the large variation within the continuous data is expected

[20] Another striking example of the role of these constructions in marking the landscape in the Canyon is the feature that runs along the bluff base at DjRi-14, where pieces of monumental walls have been built over a 200 m stretch of the river below a major village location.

Table 7.10. Comparison of Measures of Centre and Spread of the Entire Sample and Use Categories.

Width (m)	All(n=30)	Fishing(n=5)	Defense(n=6)	Living(n=14)	Unclassified(n=5)
Mean	5.81	1.59	2.19	10.02	2
Median	2.61	1.60	2.14	9.4	1.9
Range	18.80	1.65	0.74	17	2.66
IQ Range	7.32	1.08	0.69	5.21	1.47
SD	5.25	0.65	0.32	4.51	0.95
Area (m^2)					
Mean	58.68	8.40	14.66	110.80	15.81
Median	26.04	8.48	11.96	95.22	17.84
Range	283.99	14.93	15.85	246.85	25.17
IQ Range	85.08	10.68	14.79	70.17	21.47
SD	7.04	5.95	7.20	74.11	10.97
Volume (m^3)					
Mean	107.58	15.27	21.64	201.30	40.63
Median	53.07	10.65	13.15	205.92	33.01
Range	381.13	43.16	38.45	348.94	79.25
IQ Range	189.05	26.25	32.91	229.58	69.29
SD	122.47	17.82	17.00	122.48	35.31

Based on the boxplots below, volume is the smoothest of the continuous variables, although there is a far outlier in the fishing features category (Figure 7.51). Overall, this method of dividing up the features is not as effective in smoothing the data as dividing by labour investment, but does account for some of the rough areas seen in the overall sample. Smaller numbers of features within each group accounts for some of the greater variation observed in different functional categories. I tested these variables using the Kruskal-Wallis non-parametric test for three or more samples. Testing whether the samples within the categories are drawn from different populations addresses the problem that these might be arbitrary. The results indicate that all three variables are statistically significant, with width at p=0.000, area at p=0.000, and volume at p=0.000, allowing me to reject the null hypothesis that these samples were drawn from the same population.

Table 7.11. Five-number Summary of Continuous Variables of Use Categories.

Width (m)	Fishing	Defense	Living	Unclassified
Upper Hinge	2.13	3.56	12.17	2.77
Upper IQR	0.53	0.42	2.77	0.87
Median	1.60	2.14	9.4	1.9
Lower IQR	0.55	0.26	2.43	0.61
Lower Hinge	1.05	1.88	6.97	1.29
Area (m^2)				
Upper Hinge	13.72	23.52	126.75	26.04
Upper IQR	5.24	11.56	31.53	8.2
Median	8.48	11.96	95.22	17.84
Lower IQR	5.44	3.22	38.64	13.27
Lower Hinge	3.04	8.74	56.58	4.57
Volume (m^3)				
Upper Hinge	29.56	42.37	297.03	77.19
Upper IQR	18.91	29.22	91.11	44.18
Median	10.65	13.15	205.92	33.01
Lower IQR	7.34	3.69	138.47	25.11
Lower Hinge	3.31	9.46	67.45	7.9

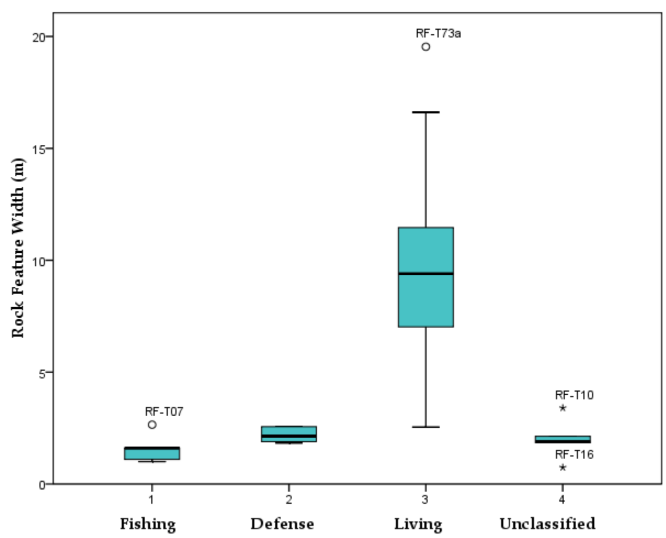

Figure 7.49. Boxplot comparing width of rock features based on use categories.

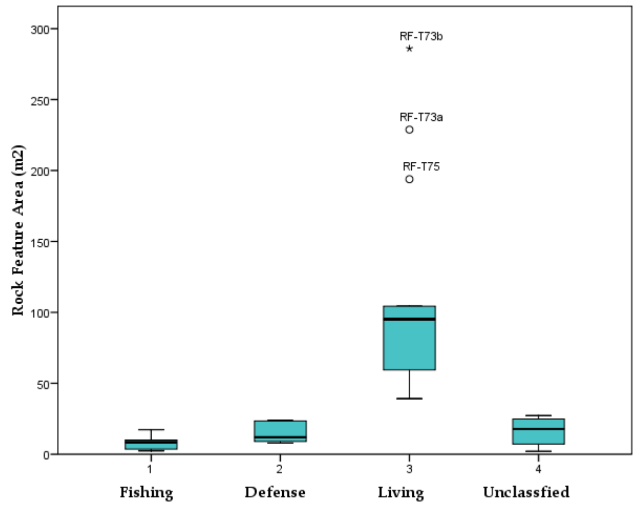

Figure 7.50. Boxplot comparing area of rock features based on use categories.

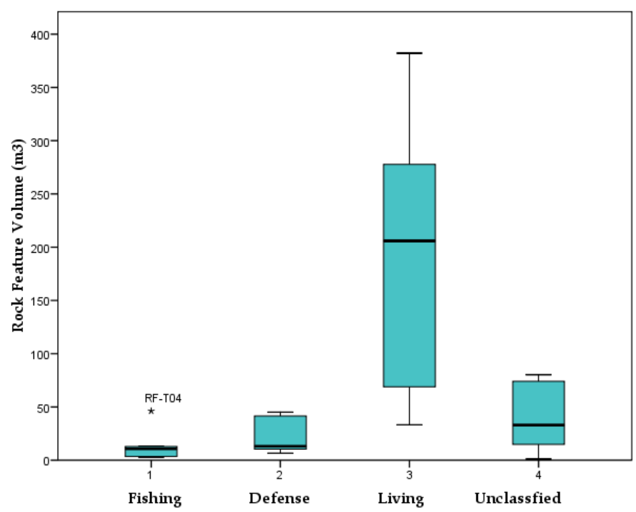

Figure 7.51. Boxplot comparing volume of rock features based on use categories.

Discussion of Usage Patterns

While dividing features into types based on proposed uses does not account for all the variation present in the sample, it is useful to examine the possible activities that may have been associated with rock features in the Lower Fraser River Canyon. The three main categories of use – fishing, defense, and living – are supported by the data in several ways. First, all the proposed defensive features front village locations, tend to be freestanding, face downriver to see raiders and do not contain artifacts associated with everyday activities. Fishing features have river views but are mostly non-freestanding terraces, containing both pre-contact and post-contact objects. Living features are terraces that may or may not have a river view, are associated with villages and comprise the entire portion of the sample that is associated with community level labour investment. The remaining features cannot be classed based on the three uses defined above. Future work should target these features to shed light on their potential purposes.

Discussion

The main goal in this chapter was to address three central questions about the rock features – what types are there, how much labour was required to construction them, and what they were used for – through the analysis of the attribute data explored in the previous chapter. For the first two questions, I set up a series of expectations about the validity of types and sizes of rock features, then evaluated whether the expectations were met in the data. Where possible, I tested the observed relationships to see if they were significant. Use required a different approach, where I proposed uses based on ethnographic correlates from the region and divided up the sample by determining which attributes matched with those proposed uses.

Overall, the expectations of the data were met for terrace vs. non-terrace features, and two variables that could be tested for significance, the presence of cap stones and the association of terrace features with village locations, were statistically significant. Based on the size of the current sample, this typology, which distinguishes terrace versus non-terrace features, is a reasonable means to classify rock feature structure. The sample should be expanded to include more examples of different forms of features, which would allow for identification of different types and determine what kinds of features are true outliers.

I measured labour construction by using volume, where several breaks in the data suggested possible categories. This resulted in three size classes: small, medium, and large. Examining other discrete and continuous data for this division resulted in clear patterns within small and large features, but the medium-sized features show a lot of variation. It is not yet possible to correlate size categories with different social groups, but large features would require greater labour investment and potentially community co-ordination. This would have implications for the nature of how labour was controlled and organized in this landscape and is an important future direction of rock feature research.

Determining uses of rock features was one of the main goals of this thesis, considering that many of these features were not previously identified. My approach to understanding function was based on some ethnographic correlates of potential uses for features within the Lower Fraser River Canyon – fishing, defense, and living platforms. I examined discrete variables to distinguish these three uses, concluding that some variables appear to be associated with different uses, while others are not. Other possible explanations exist, but an increased sample is required to expand the number of possible uses of the rock features.

Several features do not fit within the three proposed use categories, but the unclassified features may point to an impact that the building of features may have made on visitors to a landscape that is the central focus of major seasonal aggregation. I suggest that many rock features, regardless of their intended function, could have played a role in marking durability or permanence on a landscape that was always a contested place. This has implications for the types of identities that were enacted by people, as active agents engaged with social structures, when they were building the rock features.

To explore this idea further, I need to look beyond the individual features to examine how they relate to one another throughout the landscape. Rock feature function at an individual level only captures one scale of meaning inherent in their construction. People were also choosing to locate these features at specific locations throughout the broader cultural landscape. I address the broader context of spatial relationship and large-scale landscape modification in the next chapter to illuminate their interconnectedness as part of a cultural landscape.

8: DEFENSIBILITY AND VIEWSHED OF ROCK FEATURES: A LANDSCAPE APPROACH

Introduction

In this chapter, I use various forms of spatial analysis, including space syntax and viewshed, to examine the defensibility of rock features and rock feature sites. This builds from the previous chapter considering how features relate to each other and to the cultural landscape of the Canyon. This chapter is an evaluation of the hypothesis that the rock features were built for as part of a defensive network. Part of the decision-making process by agents during the construction, whether conscious or unconscious, worked to create spatial patterns in the material culture. Where the first features were built may have had an impact on how future rock features were built, and spatial locations could have had an impact on other members of society.

First, I apply the Defensive Index, developed by Martindale and Supernant (2009), to the 25 mapped rock features (Figure 8.1). The mapped sites include all features associated with ancient village sites. In addition, all proposed defensive features noted in Chapter 7 are included in this analysis. I analyse a mapped location without rock features to see if the building of rock features had an impact on the overall defensibility of sites. I then conduct cumulative viewshed analysis on the sites and the rock features individually and collectively using ESRI ArcView 9.3. I conclude by examining what we can learn from these analyses, including the advantages and limitations of spatial approaches to the cultural landscape of the Lower Fraser River Canyon.

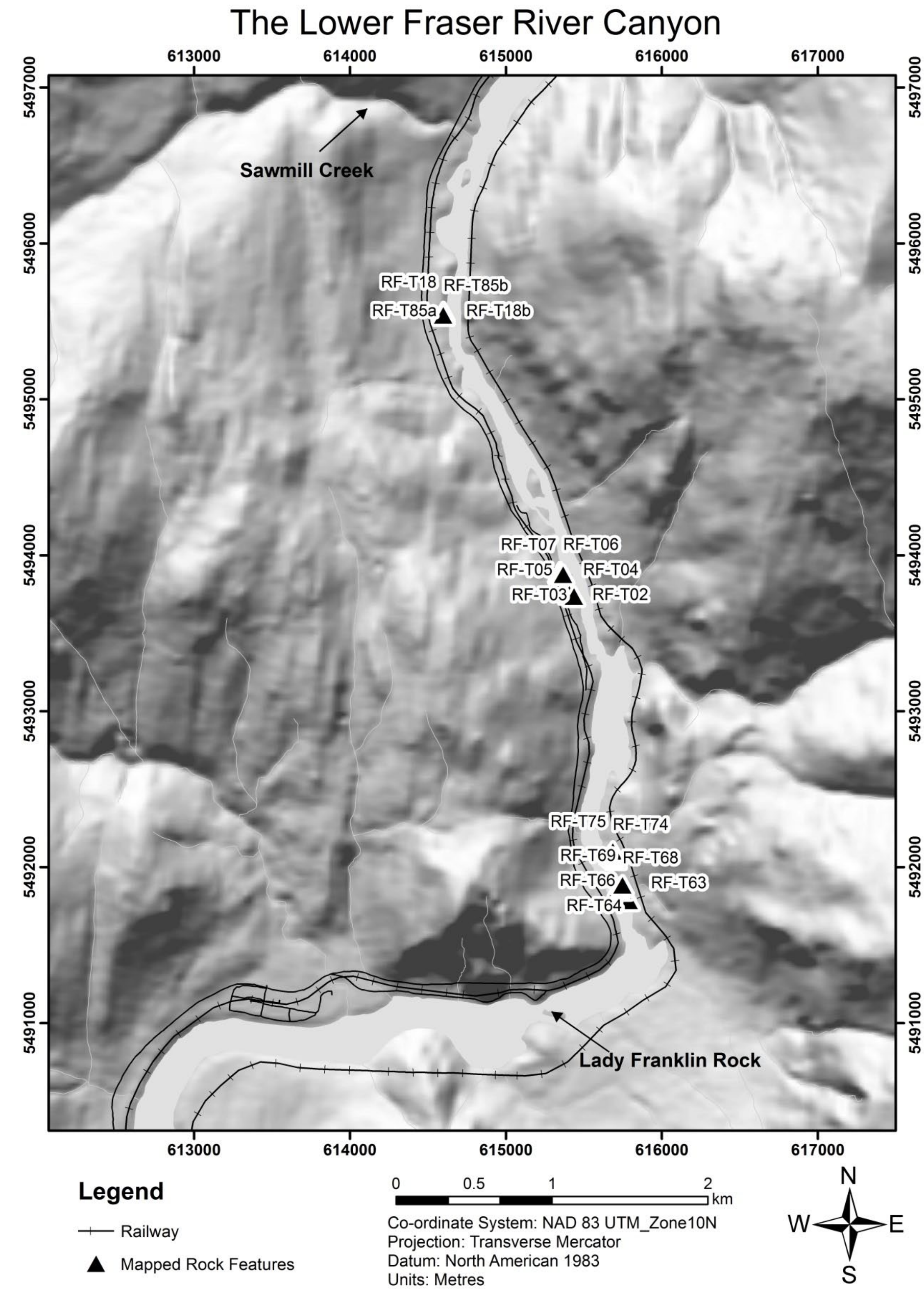

Figure 8.1. Location of mapped rock features.

Defensive Index Measures

Quantifying defensiveness of the cultural landscape is a means to evaluate the role that rock features may have played in protecting communities in the Lower Fraser River Canyon from damaging attacks by raiders from up or downriver. In 2008, Martindale and I developed an index to quantify elements of defensibility of sites on the Northwest Coast.[21] We divided types of defensibility into two general categories – architectural and landscape – that distinguish between enhancements made to the built environment and the act of selecting locations for settlement that increase the possibility of defense. Both involve conscious acts of members of communities and indicate a concern with keeping people and property out of the hands of attackers. In many ethnographic and archaeological examples, architecture is used to enhance a defensive location (Keeley et al. 2007). We combined these two types of defensibility into a Defensive Index based on measuring commonly evoked archaeological criteria assumed to be a factor in site defensibility: (1) visibility; (2) elevation; (3) accessibility; and (4) area (Martindale and Supernant 2009:194-196; Moss and Erlandson 1992). Each variable is expressed on a scale of 0-1, and all four variables are summed to create an index value with a high of 4. Due to the idealized nature of the scale, an index value of 4 is virtually impossible to achieve, so defensive sites are defined as having index values of 1.75 or higher (Martindale and Supernant 2009). Sites with some indication of defensibility range between 1-1.74, while sites below 1 are not considered defensive.

Visibility

Visibility measures the unobstructed view from a site based on the arc of circumference. This value increases with increased ability to see attackers approach the site, so a value of 1 would be a site that has 360° visibility – people on site could see

[21] This section of the discussion is adapted from the article *Quantifying the defensiveness of defended sites on the Northwest Coast of North America*, authored by Andrew Martindale and me, published in the *Journal of Anthropological Archaeology* 2009 28(2):191-204.

attackers coming from any direction. In the Lower Fraser River Canyon, most sites can only be reasonably approached via by river.

Table 8.1. Definitions of Individual Variables in the Defensive Index.

Values:	Unit of measure	Description	Calculation
Visibility (V_L)	degrees <100 m (land)	Arc of circumference that offers clear visibility in excess of 100 m across land.	V = V_{100}(degrees of visibility in excess of 100 m over land) / P(degrees of approach around site)
Visibility (V_W)	degrees <100 m (water)	Arc of circumference that offers clear visibility in excess of 100 m across water.	V = V_{100}(degrees of visibility in excess of 100 m over water) / P(degrees of approach around site)
Elevation (Ev)	from land (m)	Elevation difference from approach routes to the highest point of the site.	E =E_v (degrees of elevation difference)/90^o
Approach (P_L)	degrees: Land	Arc of circumference that offers access to the site (not considering any defensive features like walls, ditches, etc.) across land.	P_L = 360-P(degrees of approach around site)/360
Approach (P_W)	degrees: Water	Arc of circumference that offers access to the site (not considering any defensive features like walls, ditches, etc.) by water.	P_W = 360-P(degrees of approach around site)/360
Access (T)i	Degrees	Arc of circumference that is accessible to the site through thresholds without significant impediment.	T= T(degrees of access through thresholds)/P
Area (A)	m^2	The estimated area of the site.	A = Site area / 500,000

Scaling cliffs and mountains before attacking an enemy was an unlikely tactic in this steep-sided terrain (Schaepe 2001b). Except for a few cases, the contribution of visibility over land to the defensive index is effectively zero. We accounted for this in the initial study by calculating this variable based on the degrees of the arc of circumference from which it would be possible for attackers to approach the site. Areas where the site cannot be approached are subtracted from 360° to arrive at a value that represents the relevant degrees of approach for any particular site. For example, if a site can be approached from half its circumference, and all 180° of approach can be seen by people on the site, the value of visibility would be 1. Measures for visibility for each site in the Canyon can be found in Table 8.2.

Table 8.2. Defensive Measures for All Mapped Sites in the Lower Fraser River Canyon.

Borden	Approach in Degrees: Land	Approach in Degrees: Water	Visibility in Degrees >100 m (land)	Visibility in Degrees >100 m (water)	Elevation from shoreline (m)	Elevation changes (m)	Degree limited access	Degrees Access	Area in m2
DjRi-2 (N)	0	180	0	210	0	26	30	90	3,480
DjRi-2 (S)	0	90	0	110	0	22	30	90	2,150
DjRi-13	0	270	45	145	0	26	20	80	3,750
DjRi-21	30	280	30	80	0	18	0	60	2,870
DjRi-46	0	155	30	155	0	18	55	105	1,185
DjRi-62	60	20	90	0	0	16	45	35	5,440
DiRi-14 (village)	0	140	0	30	10	10	70	70	4000
DiRi-14 (redoubt)	0	140	0	100	10	40	130	10	1900

Elevation

Elevation is noted as a key aspect of defensibility in many archaeological studies, as it prevents easy access to sites, and also gives defenders an advantage over their enemies (Moss and Erlandson 1992). A height advantage is particularly effective with short-range spears, arrows and other projectiles. In the Defensive Index, we measured elevation change across the site. A site with a large elevation change from the point of approach, such as the river, to the point of access at the site boundary, would produce a high index measure of elevation. For sites in the Canyon, the measure is from river level to the highest point in the site, measured in degrees/90°.

Approach and Access

Portals and doorways into a place constitute accessibility, defined as the places where a person can move from outside to inside that place. A simple count of the points of access, however, obscures the differences in *threshold*. For example, two sites might each have one point of access. The first site sits on a flat beach and can be accessed from any angle, while the second site sits on top of a large rock bluff that also has one access point – a narrow pathway leading up the bluff. Counting the portals, in this case, would put these two sites in the same category, obscuring the defensive advantage of the second site. To capture differences more effectively, we use a combination of two measures: approach and access. Approach measures the portion of the circumference where attackers can get to the outside of the site. We divide the degrees of approach by the degrees of circumference where access is possible: i.e., where one can go from the outside to the inside of the site. For most sites, the degrees of approach are greater than the degrees of access. Access is more likely to be controlled by architectural enhancement, whereas approach is more often a factor of local geography. Rock features, regardless of overall purpose for which they are built, do inhibit access when they are placed on the boundaries of the site or along trail routes.

A large plank house placed at the front of a village would serve to limit access to the rest of the site, because the area where the wall of the house is situated is approachable but not accessible. Sites in the Lower Fraser River Canyon generally have less than 360° of approach. In a few cases, such as DjRi-2, the nature of the landscape behind sites is difficult to determine because of the history of modification.. Approach by land is effectively zero for most sites.

Area[22]

Area—the size of a site—has an impact on access but also on defense. Larger communities, while often targets for raiding, are a greater challenge to attack because they have more defenders. A large site with restricted access indicates more concern with defensiveness than a small site with the same restricted access. Area for each site was measured in m^2 by polygon from site maps in ArcMap 9.3.1.

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[22] In order to keep Area on a scale of 0-1, we originally determined a maximum site size for the study area (1,000,000 m^2) and divided all others by that measure. Sites of that size do not occur in the Fraser River Canyon, so for this particular study, the maximum area was considered to be 500,000 m^2, still a considerable overestimate. With numeric rounding, this shift had a very small impact on the overall defensive index measure.

Control Sample

I used a site on which I had originally flagged several rock piles only to later discover their natural origins (Figure 8.2), as a control sample for the Defensive Index measurement. While this feature seems stacked, it is in fact a large piece of cracked bedrock and portions of the feature are still partially attached to one another. I spent three days creating a site map at that location before deciding that the features could not be part of the sample, but the site provided me with a control sample.

Figure 8.2. Natural rock feature at DjRi-21

Because the defensive index conflates architectural and landscape elements, I wondered what would happen if I calculated the defensive index in an area that could be considered defensive but does not have rock features, and then compared it to other rock feature sites. This would help to test whether the defensive index placed higher weight on the defensibility of locations and whether or not it captures architectural elements. If the index only measured the defensibility of the place where the site was situated, I would expect a high value even without rock features. If the index took into account both location and architectural elements, I would expect this site to have a lower index value than other sites in the sample.

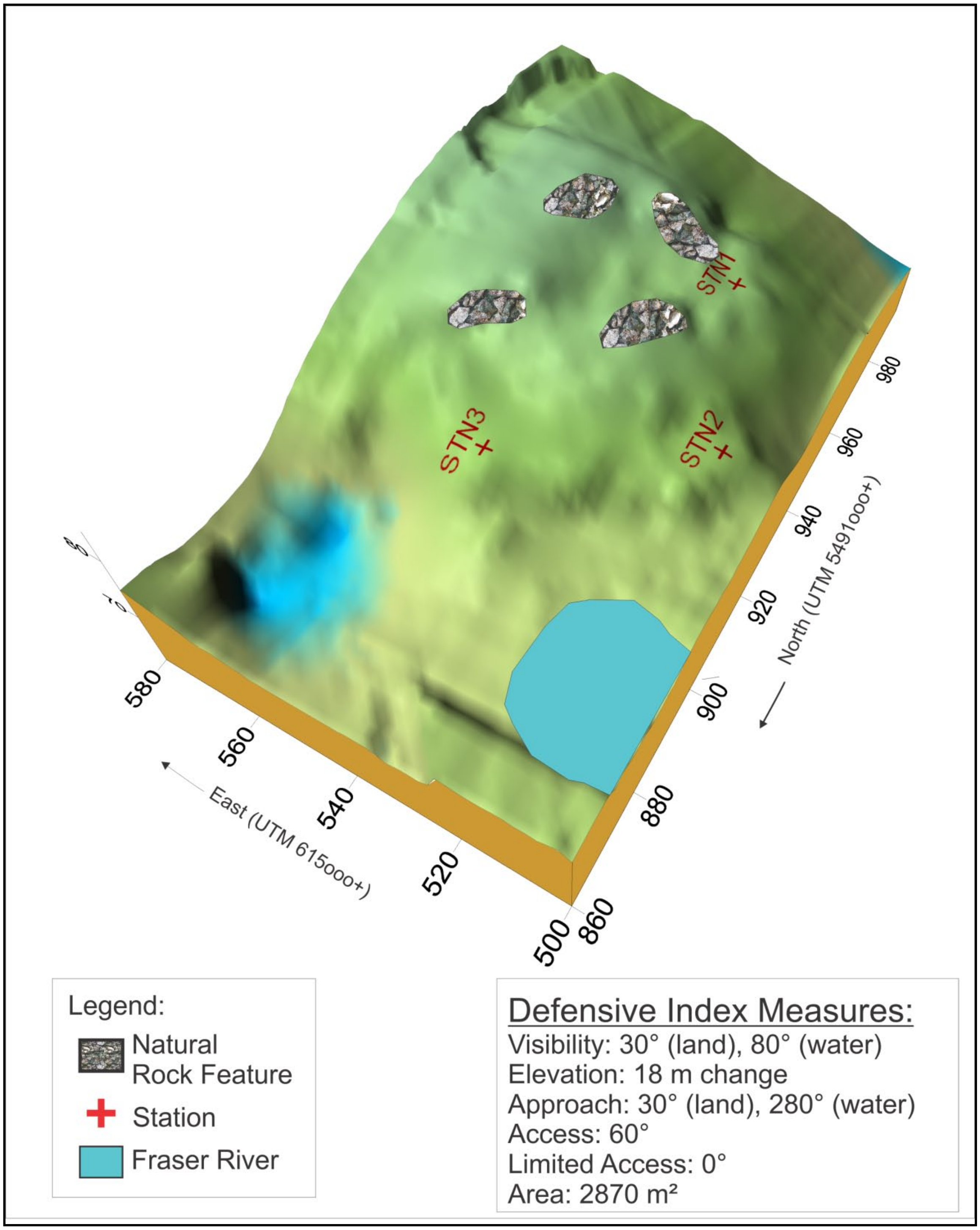

Figure 8.3. Site map of DjRi-21 showing defensive index measures.

DjRi-21

DjRi-21 is situated on an outcrop above a location where a large village site used to exist, now largely destroyed by the CP railway running through the area. The site fronts a late pre-contact village site and provides a view both up and downriver, so I expected to find rock features at the location. While there are some natural wall-like features, these lack the clear stacking patterns and regularity present in many of the other features in the sample. Some which appear to be stacked rock features are bedrock breaking apart in an angular fashion. Since I had anticipated this to potentially be a defensive location, I calculated an index value of 1.04 (Table 8.3). Based on the results of our comparative study, a defensive index of this level falls into the mid-range of 1-1.75, so it is not an explicitly defensive site.

Test Samples

For the rest of the sites in the Lower Fraser River Canyon, the measures of defensibility range from 1.41 (DjRi-13) to 1.84 (DjRi-2N), as seen in Table 8.3.

Table 8.3. Defensive Index Measures Based on Numbers Presented in Table 8.2.

Borden	(V) Visibility (deg)/approach	EV angle	(E) EV angle/90	(C) approach-access/approach + (360- approach/360)	(A) Area calculation	DI=V+E+C+A
DiRi-14 (village)	0.21	11.310	0.126	0.556	0.004	0.9
DjRi-21	0.35	18.595	0.207	0.473	0.003	1.04
DjRi-13	0.70	20.647	0.229	0.477	0.004	1.41
DjRi-2 (S)	1	33.690	0.374	0.375	0.002	1.75
DjRi-46	1	27.897	0.310	0.446	0.001	1.76
DjRi-62	1	13.917	0.155	0.670	0.005	1.83
DjRi-2 (N)	1	30.018	0.334	0.500	0.003	1.84
DiRi-14 (redoubt)	0.71	57.995	0.644	0.770	0.002	2.13

These measures were lower than a site in the Lower Fraser River Canyon that we measured as part of our initial study – a portion of the site DjRi-14, which has an index value of 2.13. I include it here because it is a rock feature site and is relevant to this discussion.[23] However, while the sites I mapped do not match this level of defensibility, they do show an increased concern for defensibility when compared to an unmodified location such as DjRi-21. Each site has several elements that enhance defensibility, but all have small areas. I now present some of the details of each site that contribute to the defensive index measure and discuss the role of the rock features in limiting points of access.

Defensibility of DjRi-2(N)

With the highest index value – 1.84 – of any site mapped during the project, DjRi-2(N)has good potential views both up and downriver, but the downriver view is limited by a large rock outcrop just downriver from the site (Figure 8.4). Due to the configuration of the site, visibility both up and downriver is only possible from one spot. The site has a higher range of visibility than many others in the Canyon and is enhanced by limited access relative to approach. There are several locations where the site can be approached by canoe, but only two locations where landing those canoes is possible. Approach to the site is limited to the two canoe landing areas. Due to disturbance of the land behind the site, it is difficult to evaluate the extent to which land approach would have been possible in the past. Rock features are built at the summit of the approach locations, so if they function to restrict access, then access is limited from both directions. Assuming that approach would have to be where canoes would land and warriors disembark, the elevation change from the river level (approach) to the village (access) is a measure of the ability of the villagers to defend the location.[24] Even though the site is relatively small, it is defensible, both due to the geography and to the residents' enhancements.

[23]While I did not map the site during the course of my project, a previous team had mapped the site and provided me with much appreciated access to the data (Schaepe et al. 2006).

[24] This is true for all sites situation in locations where attacks would typically come from waterways, and the elevation of sites (as long as they are less than 100 m distant from the body of water) becomes an important consideration.

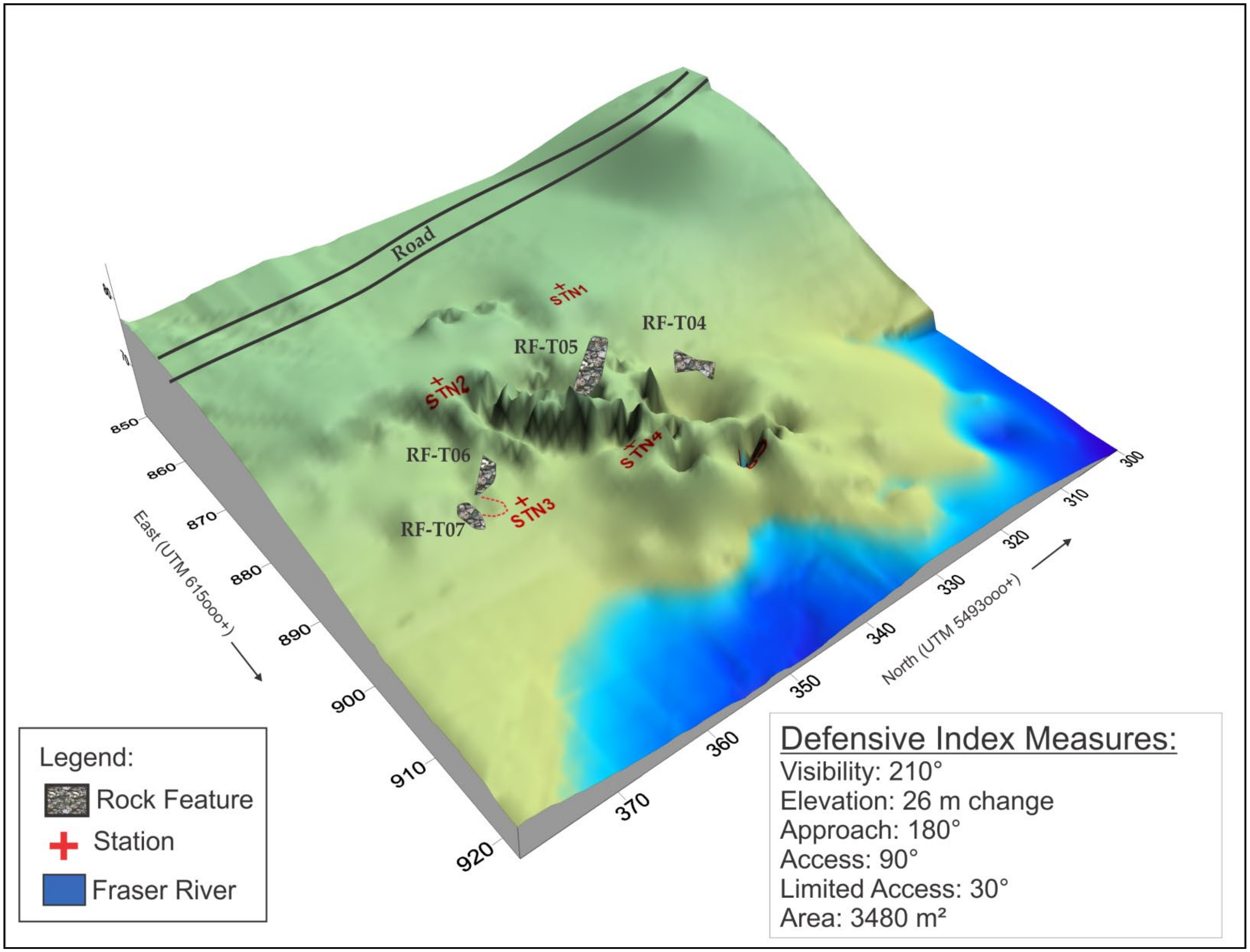

Figure 8.4. Site map of DjRi-2(N) showing defensive index measures.

Defensibility of DjRi-2(S)

One hundred metres from DjRi-2N, DjRi-2(S) has a slightly lower index value of 1.75, although this falls into the range of sites that are defensive (Figure 8.5).While similar in defensibility to the upriver portion, it has different factors contributing to this high index value, because site can only be approached by water from downriver. Directly upriver from the site is a large rock outcrop that has a sheer-sided drop to the river level, and does not allow for any form of site access. It also inhibits an upriver view from the main portion of the site, but the top of the rock bluff would have made an ideal lookout. Visibility is calculated as limited, since the defensive index only contains measures of visibility from the site itself, not from associated lookout locations. The location contains three rock features, only two of which are large enough to limit access – RF-T01 and RF-T02.

As discussed in the previous chapter, these two features appear to have been connected in the past to create a rectangular platform on which to build a plank house. While not a strictly defensive feature, building a plank house at this location, at the top of the slope from the main canoe landing, would serve in a similar fashion to a defensive wall (Angelbeck 2009). To access the village from behind (the upslope side), the attackers would have flank the plank house and possibly would be vulnerable to the defenders. If raiders were attempting to gain access to the village location for plunder, they would have to traverse this easily defensible area. Elevation change from the river to the high point of the site is considerable. The site is 22 m from mean river level and the intact portion of the site is quite small.

Prior to the road construction, more house pit features were noted and it is the site of an ancient village (Carlson 2001c; Naxaxalhts'i 2007). The north and south portions of the site, therefore, would be the points of access for a large, highly defendable village, but without knowing the extent of village site, it is not possible to include the true site area in the calculation.

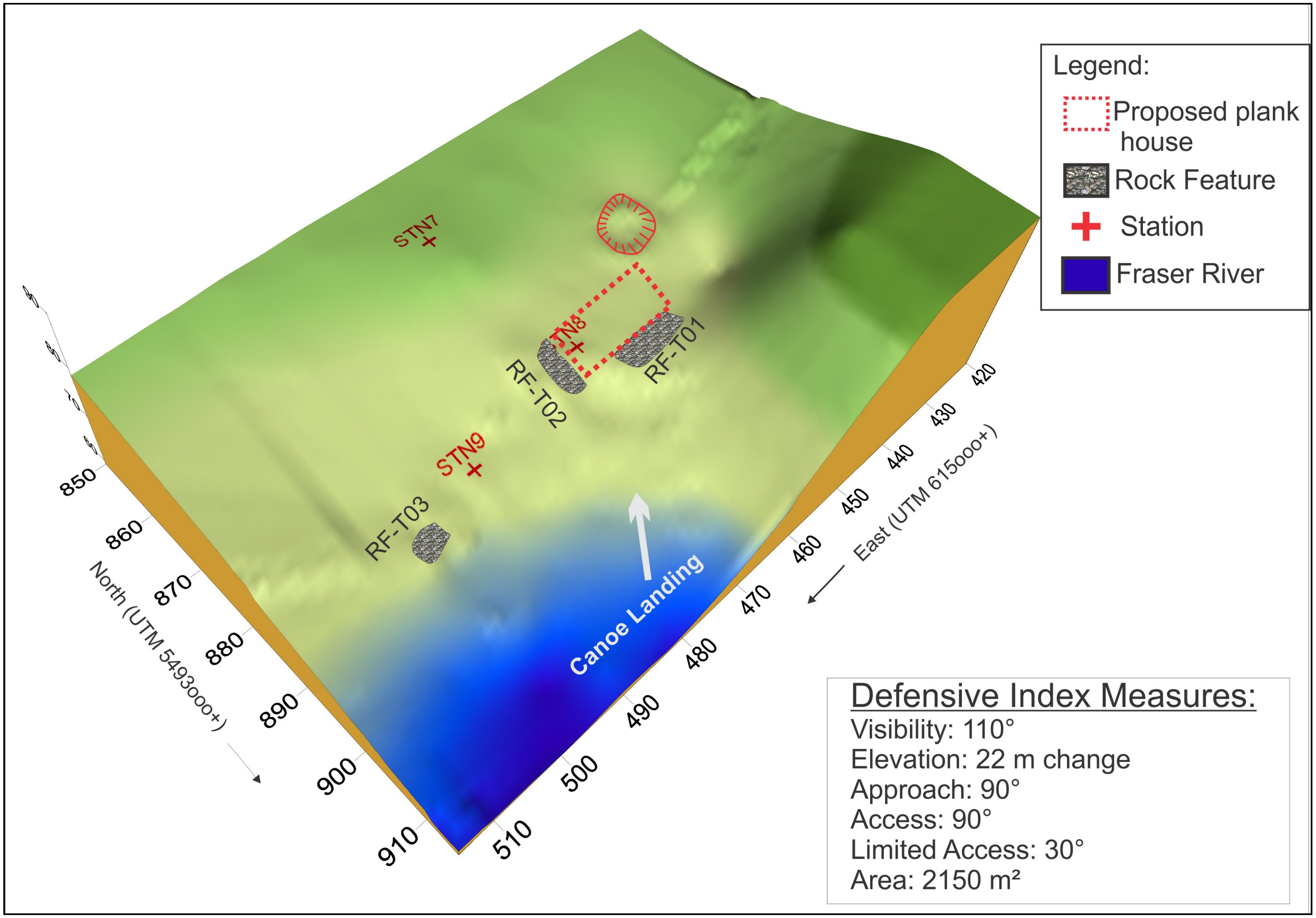

Figure 8.5. Site map of DjRi-2(S) showing defensive index measures.

A larger site area would increase the index measure and likely push the overall defensive index measure value higher. Even without this, DjRi-2(S) is at the index threshold we established for determining which sites show a major concern for defensibility.

Defensibility of DjRi-46

DjRi-46, the smallest site in the sample, represents another gateway location, where rock features are situated at a possible entrance to a village (not mapped) located behind a large bluff (Figure 8.6). This site has a defensive index of 1.76. I used the areas adjacent to the clustering of rock features as a site boundary, although this site potentially extends behind the large rock bluff. Visibility downriver from this location is very good, while the upriver view is almost entirely blocked by a large rock bluff with shear sides forming a cliff directly upriver.

Schaepe (2001b) considered DjRi-46 as a defensive site and notes the location of rock features at points of access. During subsequent fieldwork, one of the rock features was found to be a natural bedrock outcrop, but the others have been built up along the major pathway up from a canoe landing. An additional canoe landing is located upriver from the initial landing, but as illustrated by steep terrain upriver in Figure 8.6, the topography at the upper landing is much steeper than the downriver landing and would be easier to defend. The area between the two canoe landings is too steep to allow for easy landing of a canoe and is difficult terrain to traverse, especially with the speed or stealth necessary for a successful attack. Elevation change over the site, is average, but it has the smallest access measure of the rock feature sites, excepting DjRi-14. Overall, therefore, while the geographic location of this part of DjRi-46 is not the most highly defensive site in the sample, enhancements to the site increase defensibility.

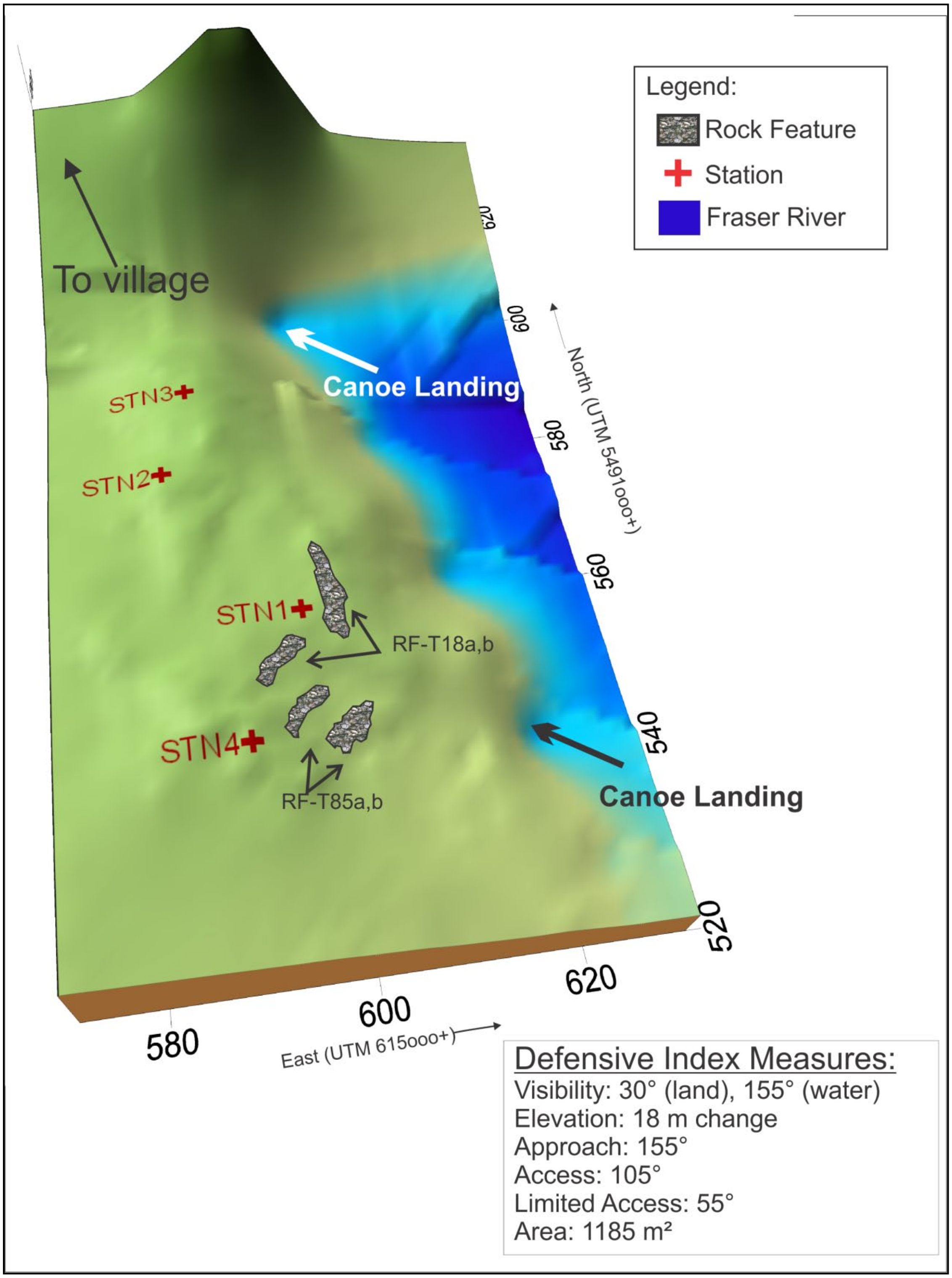

Figure 8.6. Site map of DjRi-46 showing defensive index measures.

Defensibility of DjRi-13

With a defensive index of 1.41, DjRi-13 is the least defensive of the test sites in the sample, although it is still more defensible than the control sample (Figure 8.7). Rock features are situated on two rock bluffs, each of which has a possible canoe landing location beach at their base. The downriver landing is a bay underwater for the freshet but a large sandy beach the rest of the year. Approach to the site would be possible from this side, especially considering that the upriver landing area is in a location with a swift current. While two features are located on the downriver bluff, including the linear boulder alignment RF-T63, the three features on the upriver bluff are more substantial in construction and are more likely to play a role in limiting site access.

Visibility from this location provides unobstructed views both downriver toward DjRi-14 and upriver toward DjRi-2(S), particularly from RF-T63 and RF-T68, yielding the highest combined land/river visibility in the sample (except for the control site – DjRi-21). This area is more open than other test sites, so the high visibility partially offsets the high approach. Both bluffs are quite steep where they meet the river, leading to a large overall elevation change across the site, but the defensibility is reduced because both bluffs can also be easily approached from behind. Of the five rock features, only RF-T69 and possibly RF-T66 have any real potential to limit access to the site. RF-T63 and RF-T68 are at the high points of both bluffs and serve to increase overall visibility; in fact, they might be best classified as lookouts.

One aspect of defensibility not well captured by the defensive index is the role of areas such as lookouts, because seeing raiders coming without being seen can be an effective early warning system to allow people to congregate near easily defendable locations. Considering overall spatial relationships *between* sites is a better way to understand the role of lookout locations.

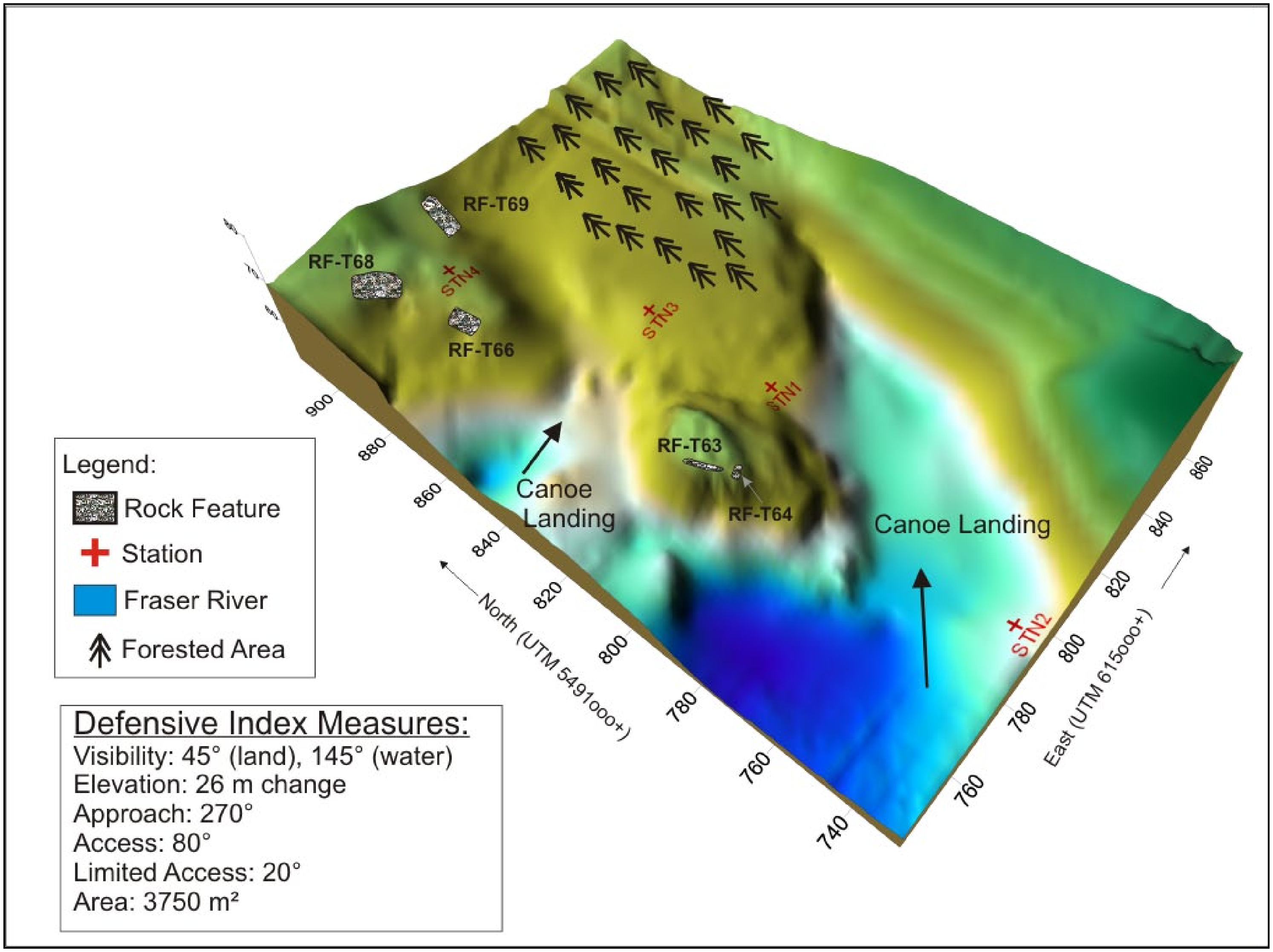

Figure 8.7. Site map of DjRi-13 showing defensive index measures.

Defensibility of DjRi-62

DjRi-62 lies upriver from DjRi-13 between two large bluffs with no current river view, although with some clearing of trees and brush, an upriver view would be possible (Figure 8.8). If the area around the site was clear while people were living there, there is some visibility across land toward DjRi-13. While the bluff on the west side that blocks the river view is quite steep, it is navigable and would provide an unobstructed view downriver from the top. No rock features were found on the top of the bluff to indicate a lookout, but this does not preclude the use of the bluff for that purpose. The defensive index for this site is 1.83, quite high despite the visibility. The lack of visibility is offset by the lack of both approach and access to the site.

The main point of approach to the site via water is by means of a path leading up from the river, as indicated in Figure 8.8. The first component of the site any unfriendly invaders would encounter is RF-T76, an imposing rock feature that also serves to make the approach more difficult. This narrow pathway increases the site's overall defensibility provides a height advantage. Almost the entire elevation change across the site is concentrated along this narrow path, at the top of which is defined by the presence sits RF-T74, a linear structure that could have been a plank house base but does limit access to the site platform terrace. Approach from land is possible, but limited by the presence of RF-T73, which even as a base for plank house platform terrace --not a strictly a defensive structure,--would have served to force attackers to move around this location to gain access to the rest of the site. This site is a good example of balancing the benefits of a view of oncoming attackers with the importance of keeping the site itself concealed and controlling points of access. It contrasts well with the nearest site, DjRi-13, which employs the reverse strategy, emphasizing visibility while sacrificing control of access.

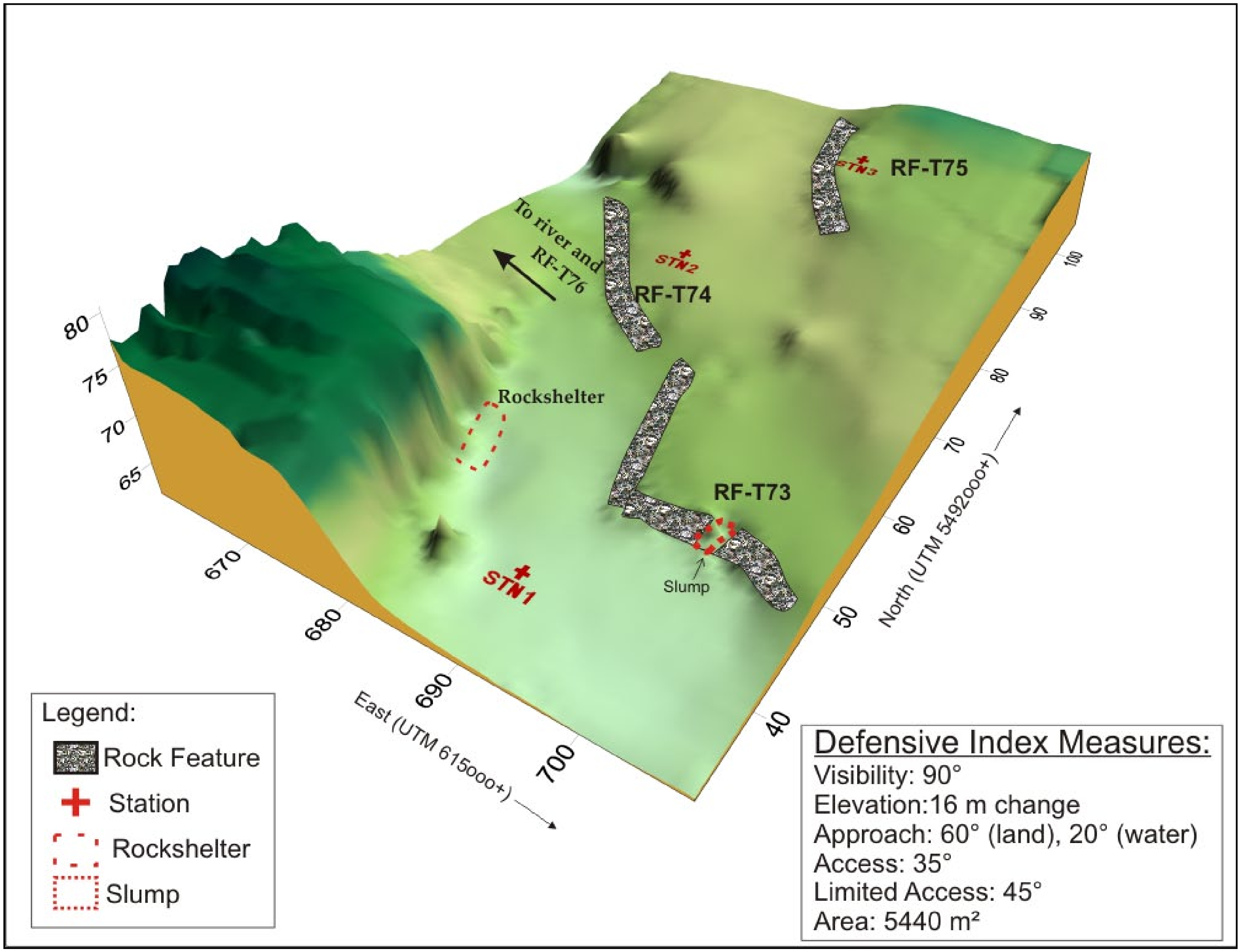

Figure 8.8. Site map - DjRi-62 showing defensive index measures.

Defensive Index Discussion

All five mapped sites in the Lower Fraser River Canyon, with the exception of DjRi-13, have defensive high index values relative to other major village locations throughout the Northwest Coast. In our e sample of sites (Martindale and Supernant 2009), we determined that sites with defensive index measures over 1.75 showed a primary concern for defensibility, whether through the selection of defensible topographic features or by the enhancement of those sites through the construction of rock structures to limit access to adjacent villages. Four of five sites mapped have defensive index values of 1.75 or higher, with one site having a mid-range DI of 1.41, indicating that village locations in the Lower Fraser River Canyon have a strong emphasis on defensibility. While the control site did have a mid-range defensive index at 1.04, the other sites are higher, supporting the idea that both physical topography and architectural enhancement make sites defensible. The features themselves, however, do not necessarily have to be built to serve primarily as fortifications in order to enhance the ability of people to defend their home. A lack of obvious defensive fortifications, therefore, does not preclude a site from having a high defensive index value.

Quantifying defensibility in this manner raises questions about the nature of defense and whether a site needs to function to qualify as defensive. As I have attempted to emphasise throughout these analyses, examining the quantitative nature of material remains of past human life can only illuminate meaning and agency when the material is seen as inextricable from the cultural context in which it was created, modified and used. A site may measure high on an index that uses arcs, degrees, and metres to classify how people could move onto and through these sites, but this may not indicate how these sites were perceived by both the inhabitants and visitors, whether friendly or unfriendly. To understand the life history of these complex features, we need to consider multiple variables (Walker and Lucero 2000) and consider the “intertwined relationship between material and social transformations” (Dobres 2000:128). With this in mind, I examine the relationship between rock feature sites in the rest of this chapter.

Spatial Analysis: GIS

I apply a GIS-based analysis to explore the potential interconnectedness of the sites with rock features at a landscape scale. I calculate site viewshed, or what other sites and areas can be seen from the site. I also evaluate which other rock feature sites can be seen from each location to test Schaepe’s (2006) hypothesis that all the sites in the Canyon formed a line-of-sight network, where signals could travel from the entrance of the Canyon to the far reaches of the territory. I then compare the overall viewshed of mapped rock feature sites to the viewshed of the individual rock features to see if there are any differences. Before the analysis, I review the application of viewshed analyses to archaeological datasets, noting some of the benefits and drawbacks.

GIS analyses have come under strong critique since their widespread adoption into archaeology for being a reproduction of a view of space that is disconnected, western and focused on seeing as a primary means of experiencing the world (Lake and Woodman 2000; Thomas 1993). As a method, GIS has limitations in what it can say about past experience, but GIS analyses can to be tailored to address archaeological concerns. It cannot be applied *carte blanche* to past landscapes as a means to understand the human experience of the past, but nor should these suite of tests be dismissed because some claim they “inhibit our understanding of the past in serious ways” (Thomas 2004:171). Any method of analysis has limits on what it can illustrate about the lives and experiences of people in the past, but GIS can help to examine and understand socially important aspects of past landscapes.

Viewshed Analysis

Viewshed analyses use algorithms that analyse raster data, in which spatial information is coded in a series of cells forming a grid, such as digital elevation model data (DEM). The algorithms can be used to calculate the field of view from a particular cell that contains spatial information about the area within that cell (i.e. which other cells can be "seen" from that point), and to determine the line-of-sight or intervisibility (i.e. which cells can be connected by a straight line) of two or more locations on that raster. From an archaeological perspective, viewshed can been used to determine whether two sites are connected by a line-of-sight, or whether a certain prominent landscape feature, either natural or cultural, can be seen from various points on the landscape. Since it is based on a mathematical representation of the landscape, this method does not account for a variety of different elements within that landscape, including height of the observer, curvature of the earth, and vegetation. Many archaeological approaches have grappled with these gaps (Conolly and Lake 2006; Llobera 1996, 2001, 2007; Wheatley and Gillings 2000, 2002), identifying four main issues with visibility analyses on GIS-based data (Conolly and Lake 2006:230-233):

1) Computational – inaccuracy of algorithms, lack of accounting for the curvature of the earth within GIS software, poor quality of underlying data for the analysis.
2) Experimental – inaccuracy in how visibility is calculated at the edge of datasets (edge effect), problems in considering reciprocity, or whether sites can be seen from one another, and sensitivity, particularly the ability of the analysis to resolve changes at long distances.
3) Substantive – lack of reconstruction of paleoenvironment, paleovegetation such as tree cover, contrast, height of the observer, and assumptions of the visual acuity of the observer.
4) Theoretical – the uncritical conflation of view with meaning, or the idea that if something can be seen, it is important, and visualism, or the emphasis on seeing as the dominant sense.

Viewshed analyses might best be considered a form of exploratory data analysis (Aldenderfer and Maschner 1996), allowing us to explore spatial relationships between landscape features that might otherwise be obscured or imperceptible, rather than providing firm answers to archaeological questions. Greater processing power and the availability of both GIS software and multi-processor computers has led to a widespread adoption of what is sometimes termed a "push-button" viewshed analysis that can provide results without critical engagement with the underlying issues of the assumptions made in the process.

A good example of the application of spatial approaches is the work of Llobera, who attempts to integrate Gibson's concept of landscape affordances (Gibson 1977) into a framework used to investigate social production, *habitus* and structure through GIS (Llobera 2001:1007). Affordances, in a landscape sense, are "what it offers the animal, what it provides or furnishes, either for good or ill" (Gibson 1977:127). While this could be seen as somewhat deterministic, Llobera equates affordance with an individual's perception of places, interpreting this concept in a phenomenological sense of experience, particularly of areas of power difference as defined through "topographic prominence" (Llobera 1996:1007). Llobera uses GIS methods to determine which areas of the landscape have topographic prominence at various radii from important points and correlates prominences with the position of various barrow locations in the English countryside (Llobera 2001). His application of viewshed, while founded on the assumption that visually prominent locations would have been notable to people in the past (for a discussion of why this is not always the case, see Fitzjohn 2007), brings in social concepts of agency and structure to what can otherwise be an essentialising tool.

Here, I have chosen *cumulative viewshed* to determine whether or not the rock feature sites in the Lower Fraser River Canyon are intervisible. A cumulative viewshed measures "times seen" for each cell in the raster and allows me to find patterns of reciprocity (intervisibility) between sites, as well as overall visible areas in the Canyon that can be seen by an individual looking outward from any site. I compare intervisibility of sites and viewshed from individual sites against the entire population of raster population of cells that represent the landscape in order to evaluate whether these rock features are were deliberately placed enhance either people's ability to see other sites or to optimize the view from a vantage point. Even though the visual realm of the Canyon was only one element that past people living in the Fraser Canyon experienced, many contemporary peoples with ancestral connections to the landscape emphasise the importance of prominent, readily visible locations as connected in their myths, oral histories, place names, and identities (Naxaxalhts'i 2007). A consideration of the roles of visually prominent places in the region, therefore, is not without foundation.

Methods

Several steps are required to prepare data for cumulative viewshed analysis, including preparation of the DEM and the identification of important points on the landscape from which to measure viewshed. I acquired a DEM for the Lower Fraser River Canyon using a resolution (cell size) of approximately 19 m from GeoBase Canada[25]. While adequate for this analysis, the viewshed calculations would be more precise with greater spatial resolution. This DEM was drawn in ArcMap 9.3 and viewshed was calculated for each of the mapped sites. For each site, I initially included an elevation offset (increase) of 1.7 m to account for typical assumptions of the height of a standing observer. I calculated the same viewshed using a much lower offset of only 0.15 m, under the assumption that people living at these sites might want observe other sites without necessarily being seen themselves. This would simulate the view of someone in prone position. When I compared these results of these two different viewing offsets, I found that the viewshed was the same, indicating that offset viewing height (standing vs. prone) was not a major factor affecting viewshed.

[25] http://www.geobase.ca/geobase/en/index.html

To avoid edge effects, where distortion can occur at the edges of the map, I set the maximum viewable radius to 5 km. Vegetation likely affected viewshed, but I could not take this into consideration because there are no existing robust reconstructions of paleovegetation in the area. After generating a viewshed map for each mapped site, showing a binary raster indicating which cells are visible from the site and which are not, I combined the individual viewshed maps into one master viewshed map. This was then compared to the cumulative viewshed of all rock features, including those not on the mapped sites. By comparing these two maps, I can observe differences in overall viewshed of individual rock features versus sites. I test these results using a Kolmogorov-Smirnov one-sample test to see if rock features or sites are placed to enhance visibility. In the following discussion, I outline the results from the individual sites before discussing the implications of the cumulative results.

Site Intervisibility

The images of the viewshed maps comprise Figure 8.9 through Figure 8.14, summarised in Table 8.4. Rows indicate whether another site can be seen from the site; for example, DjRi-13 can see DjRi-62.

Table 8.4. Site Intervisibility Showing which Sites have Views to Other Sites.

	DjRi-14	**DjRi-13**	**DjRi-62**	**DjRi-2(S)**	**DjRi-2(N)**	**DjRi-46**
DjRi-14	-	No	No	No	No	No
DjRi-13	No	-	**Yes**	No	No	No
DjRi-62	No	**Yes**	-	No	No	No
DjRi-2(S)	No	No	No	-	Yes	No
DjRi-2(N)	No	No	No	**Yes**	-	**Yes**
DjRi-46	No	No	No	No	No	-

Table 8.4 shows that five of the six sites have at most only one other site visible by a viewer from their location, except DjRi-14 which cannot be seen by people from any other site. Furthermore, if we consider that DjRi2 N and S are adjacent to one another, intervisibility is expected. Only someone at DjRi2 (N) can see and be seen from another site (DjRi-2S).

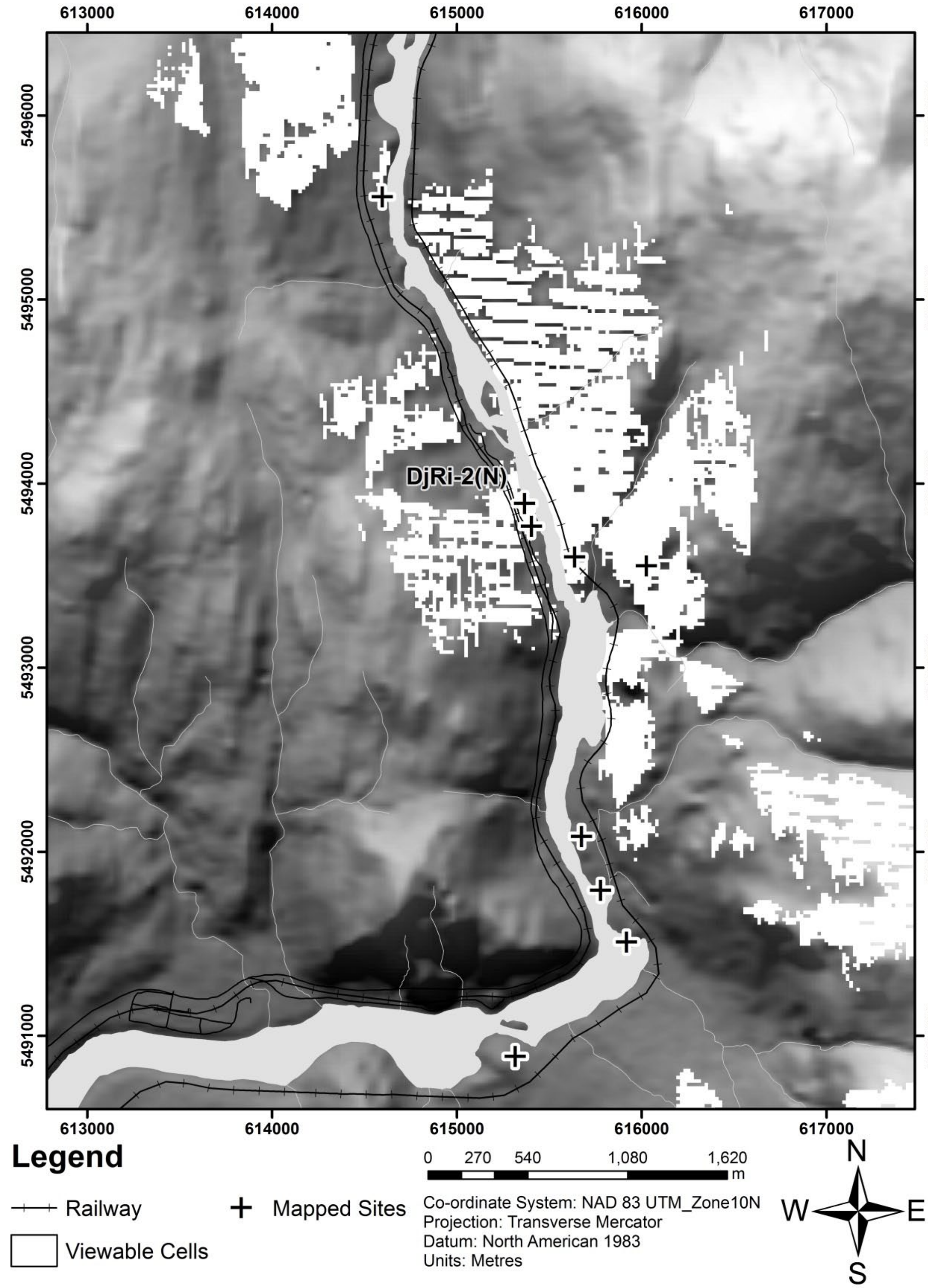

Figure 8.9. Viewshed of DjRi-2N. White cells represent the cells that can be seen by a viewer at the site.

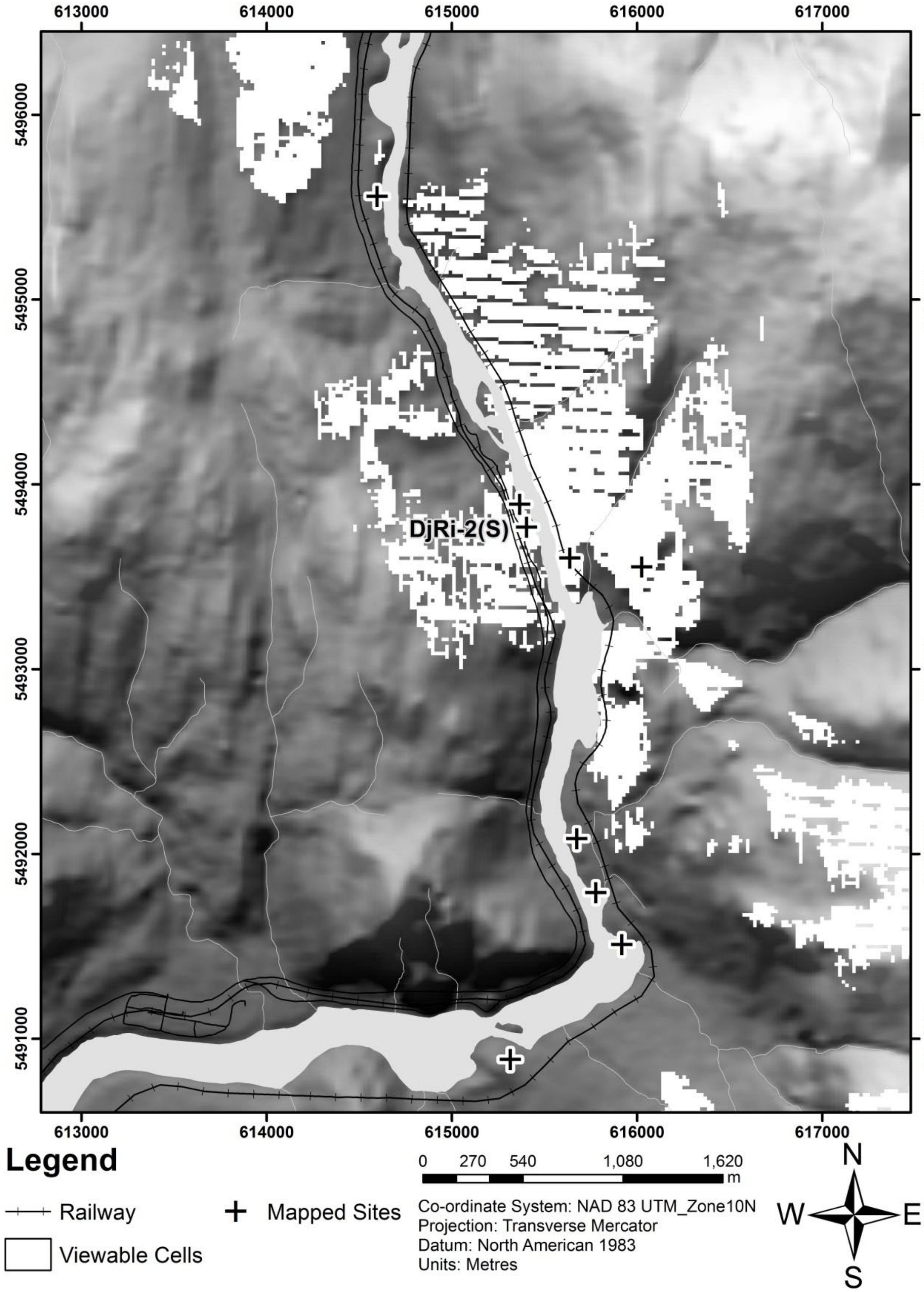

Figure 8.10. Viewshed of DjRi-2S. White cells represent the cells that can be seen by a viewer at the site.

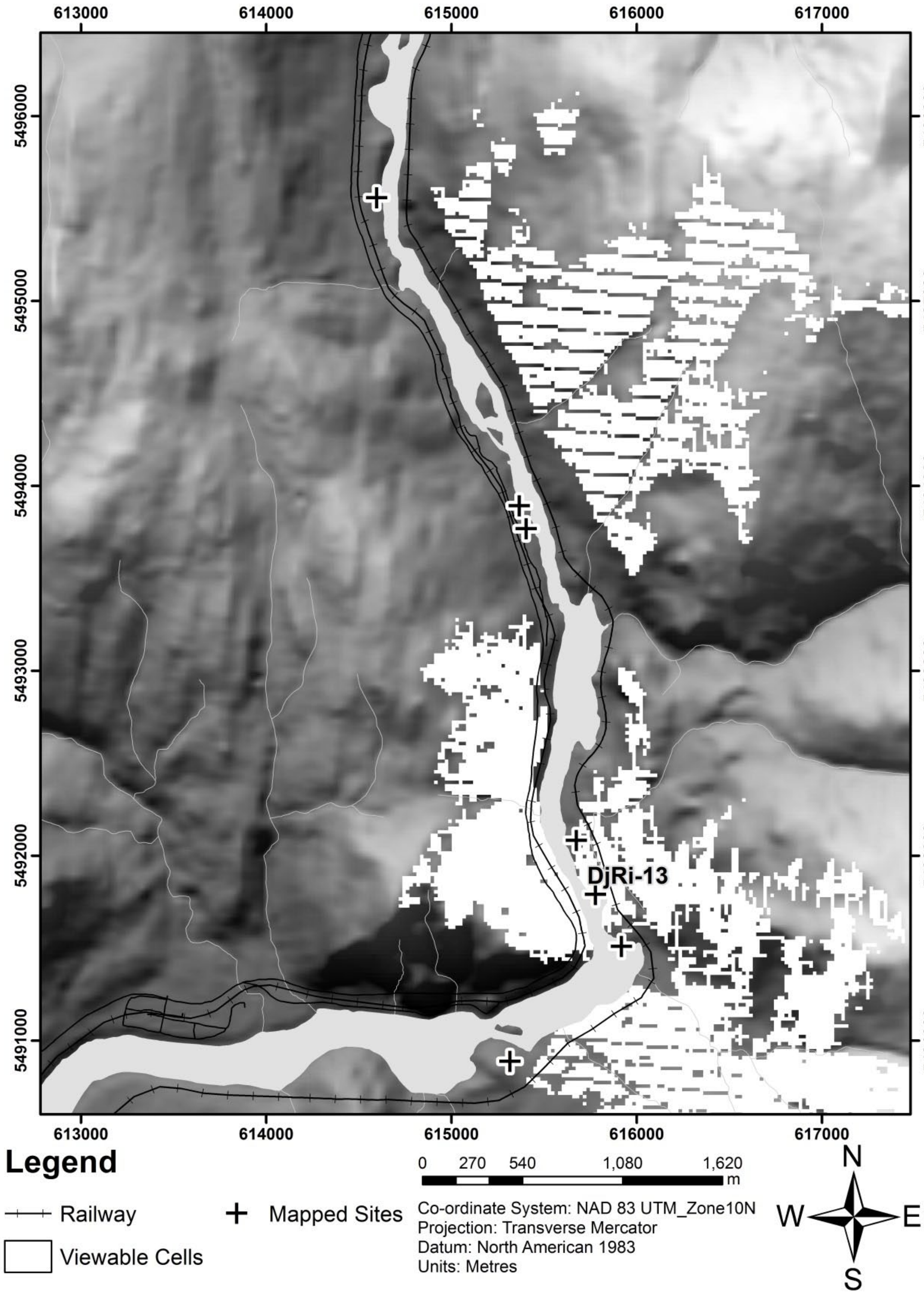

Figure 8.11. Viewshed of DjRi-13. White cells represent the cells that can be seen by a viewer at the site.

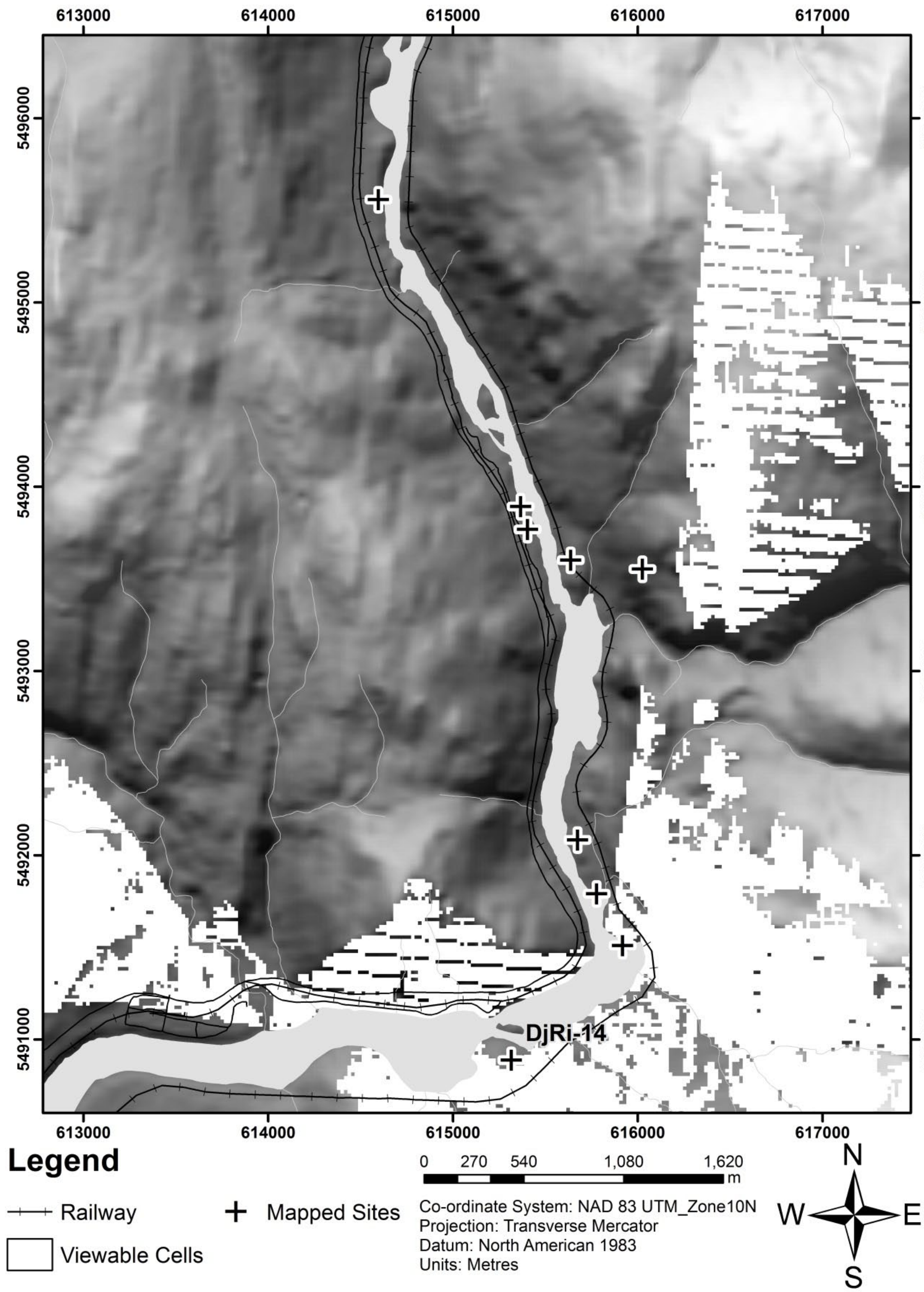

Figure 8.12. Viewshed of DjRi-14. White cells represent the cells that can be seen by a viewer at the site.

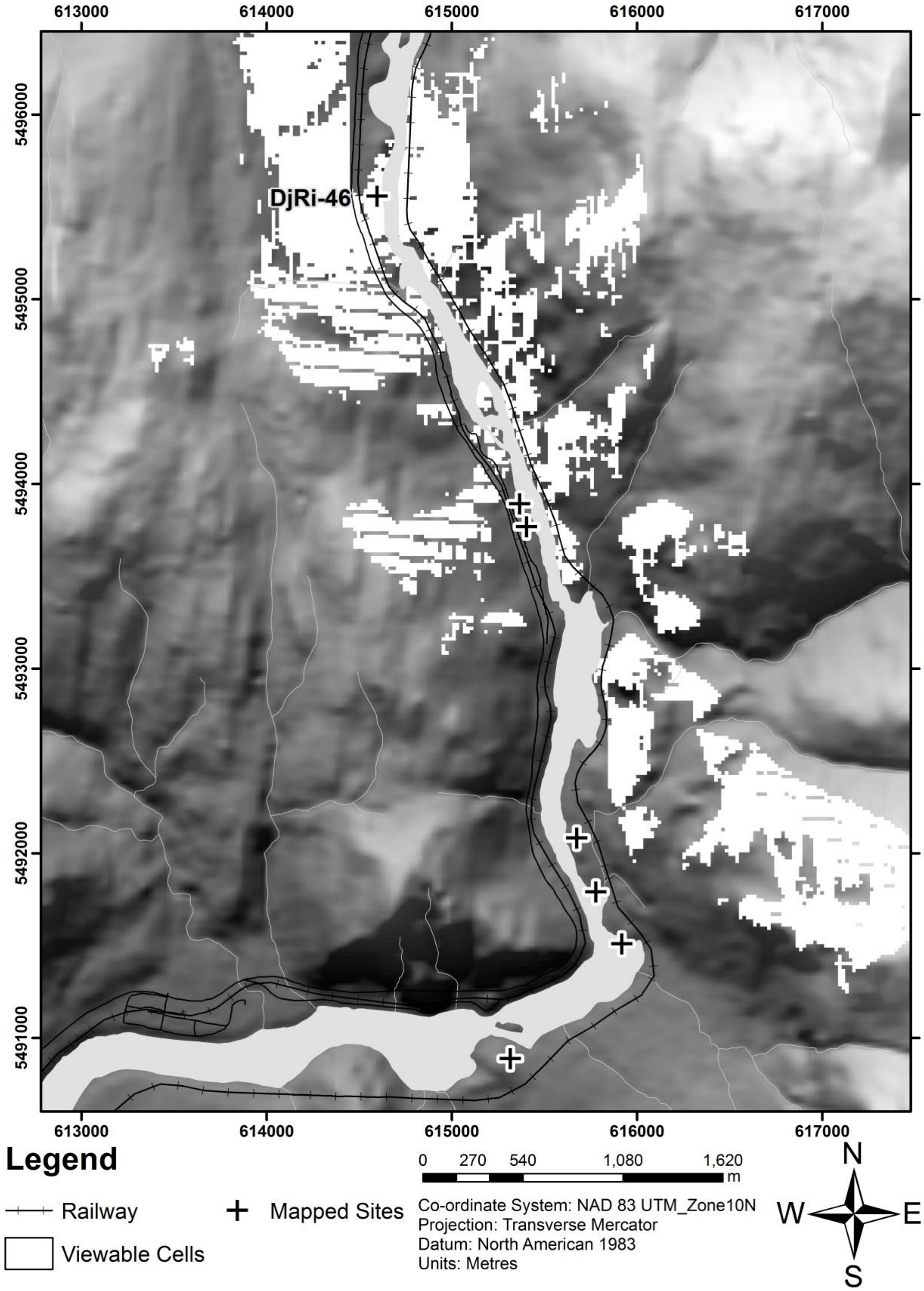

Figure 8.13. Viewshed of DjRi-46. White cells represent the cells that can be seen by a viewer at the site.

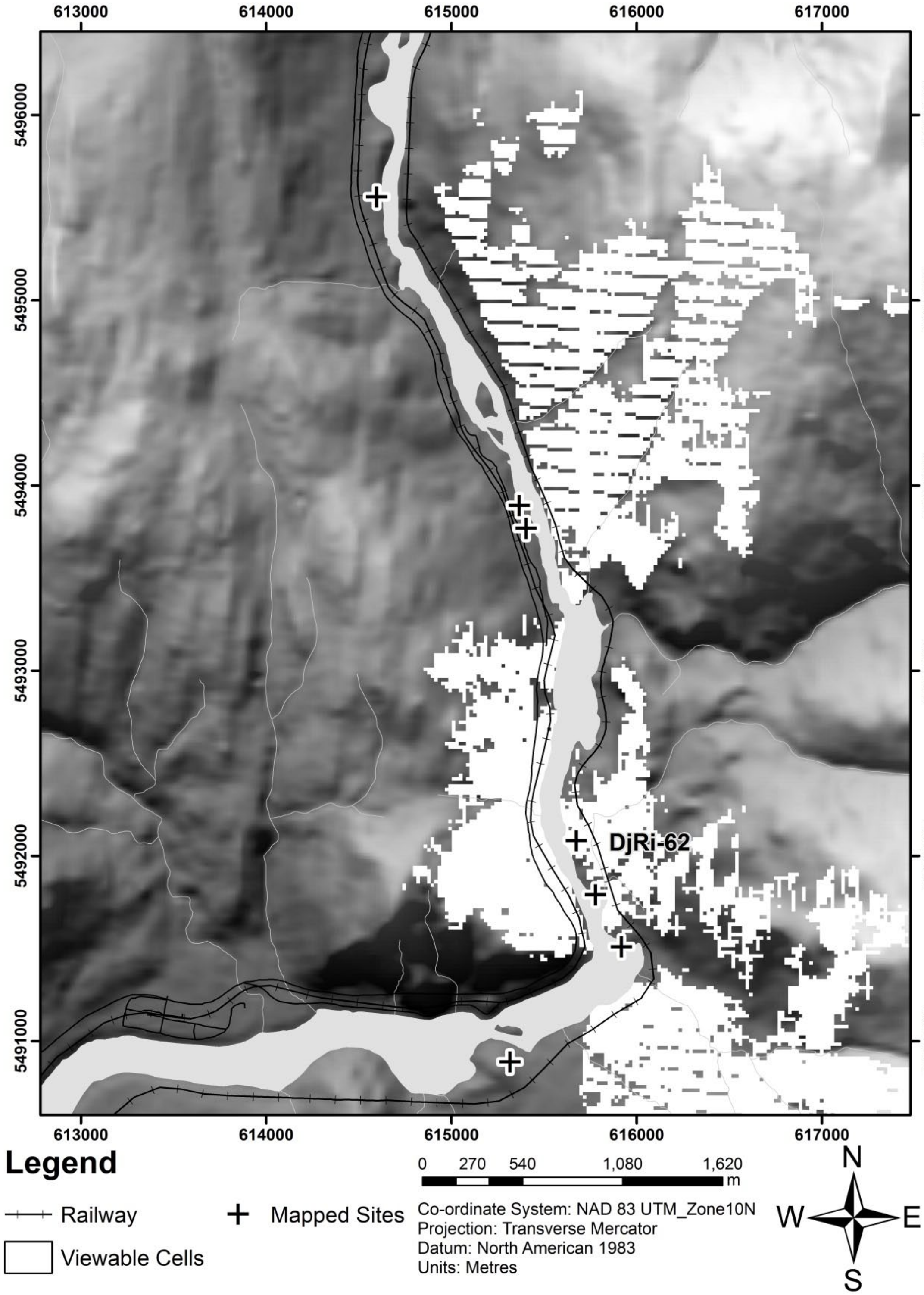

Figure 8.14. Viewshed of DjRi-62. White cells represent the cells that can be seen by a viewer at the site.

Because of the nature of the landform, an individual standing on DjRi-46 *cannot* see an individual standing at DjRi-2(N). In the literature on viewshed, this is an issue known as a lack of reciprocity and relates to offset and angles of visibility. Intervisibility is often assumed in archaeological reconstructions of viewshed, but this lack of reciprocity in visibility underscores the need to run viewshed from both locations to get a better picture of the relationships between sites. With a more complete map, it is likely that DjRi-14 has a larger viewshed, since the current map does not cover the upriver portion of the bluff that contains a number of rock features. I discuss the relationship between sites moving upriver from DjRi-14 to follow the defensive network proposed by Schaepe (2006:698), which would have served as an early warning for raiders coming from downriver. Visibility from sites upriver to those downriver is considered more important for signalling than vice versa. Therefore, if someone standing at a site upriver can "see" someone standing at a site downriver, but the person at a site downriver cannot see someone standing at a site upriver, this is less problematic than the opposite.

From DjRi-14, no other rock feature sites are visible. Downriver portions near Yale are visible, so future research should take into account the relationship between DjRi-14 and other archaeological sites in downriver areas. The current viewshed from DjRi-14 does include most of the mapped area of DjRi-21. Since DjRi-21 is associated with a village location, even though there are no remaining cultural rock constructions, it is likely that this area would have been part of a signalling network. Viewshed from DjRi-13 supports this idea – no portion of DjRi-14 as mapped is visible from someone at this location. Several cells adjacent to DjRi-14 are visible, indicating that there may be portions of the DjRi-14 that could be seen by a viewer at DjRi-13. With a more complete map, if this was confirmed, it would mean that a signal of some form could be seen from DjRi-13. Although they are in close proximity, only a few cells on the extreme upriver portion of DjRi-21 are visible from DjRi-13, so it is possible that DjRi-14, although further downriver, is a more probable candidate for a location with line-of-sight visibility from DjRi-13. DjRi-62 and DjRi-13 are intervisible, which is not unexpected considering their proximity. Vegetation cover obscures the area between these two sites, but due to recent impact on the path that connects the two locations, it is difficult to reconstruct the ancient landscape. More work on paleoecology and landscape transformations is necessary before the intervisibility of these two sites can be confirmed.

Signals from DjRi-62 could be seen from DjRi-13, supporting the defensive network hypothesis. The view from DjRi-62 is quite limited, with only DjRi-13 visible from this location. No upriver rock feature sites can be seen, and *no rock feature sites upriver can see DjRi-62*. When looking at the viewshed maps, it appears that it is in this area that the line-of-sight breaks down. Sites upriver (DjRi-2S/N and DjRi-46) are disconnected from downriver sites because there is no intervisibility. One of the most central localities in the Canyon was not included because I had not been able to map it. I refer here to DjRi-3 and DjRi-5, known as the Milliken/Asleaw locality – two sites that are adjacent on the landscape and had been excavated extensively in the late 1950s and early 1960s (Mitchell and Pokotylo 1996). One rock feature, not part of the sample, was found in this area during survey, and as I reviewed the literature on the excavation at Milliken, I came across two additional references rock features deeply buried in the stratigraphy of this very old site:

> A 1.2 m long wall of rocks, from two to four tiers high, had its base at or just below the surface of Zone G deposits. Its purpose could not be determined. Similar structures in the upper levels of the site seem to have served as retaining walls. (Mitchell and Pokotylo 1996:72)
>
> A rock "wall," approximately 46 cm high and 10 to 15 cm thick extends for 60 cm along the interface of Zones D and C. (Mitchell and Pokotylo 1996:74)

This establishes a very long history for this form of rock construction in the Canyon. Zone G dates to 8150 BP, while Zone D is related to the Mazama volcanic eruption around 6700 BP (Mitchell and Pokotylo 1996). It also shows that at several layers of periods at this important site's history, rock constructions were present. The one rock feature located during the survey was a small retaining wall in an area where it would not have afforded much of a view. The dearth of rock features at this location may be the result of the lack of survey coverage on the front of the bluff where rock features are most likely to have been located. Most other village locations in the Canyon do have associated rock features. I have therefore used the points for DjRi-3 and DjRi-5 as another location from which to calculate viewshed (Figure 8.15).

These viewsheds are based on single points or cells in the raster, whereas all the other sites are based on collections of points. I present the results of the intervisibility analysis that accounts for both DjRi-3/5 and DjRi-21(Figure 8.16) in Table 8.5. As illustrated in the table, a viewer at DjRi-3/5 can see and be seen by more sites than any other mapped locality in the Canyon. It serves to connect DjRi-13 and DjRi-62 with DjRi-2N/S and even DjRi-46, and is reciprocally visible with sites both up and downriver. DjRi-2(S) is intervisible with DjRi-3/5 but no other mapped rock feature sites downriver. A viewer at DjRi-2N can see and be seen from DjRi-2S, so these sites can be considered reciprocally visible, where a person standing at one site can see the other and vice versa.

Table 8.5. Site Intervisibility including DjRi-21 and DjRi-3/5.

Site	DjRi-14	DjRi-21	DjRi-13	DjRi-62	DjRi-3/5	DjRi-2(S)	DjRi-2(N)	DjRi-46
DjRi-14	-	**Yes**	No	No	No	No	No	No
DjRi-21	**Yes**	-	**Yes**	**Yes**	No	No	No	No
DjRi-13	No	**Yes**	-	**Yes**	**Yes**	No	No	No
DjRi-62	No	No	**Yes**	-	**Yes**	No	No	No
DjRi3/5	No	No	No	**Yes**	-	**Yes**	**Yes**	No
DjRi-2(S)	No	No	No	No	**Yes**	-	**Yes**	No
DjRi-2(N)	No	No	No	No	**Yes**	**Yes**	-	No
DjRi-46	No	No	No	No	**Yes**	No	No	-

While it is to be expected that DjRi-2N and DjRi-2S would be intervisible, being within about 150 m of each other, they are separated by a fairly large bluff that limits more extensive visibility.

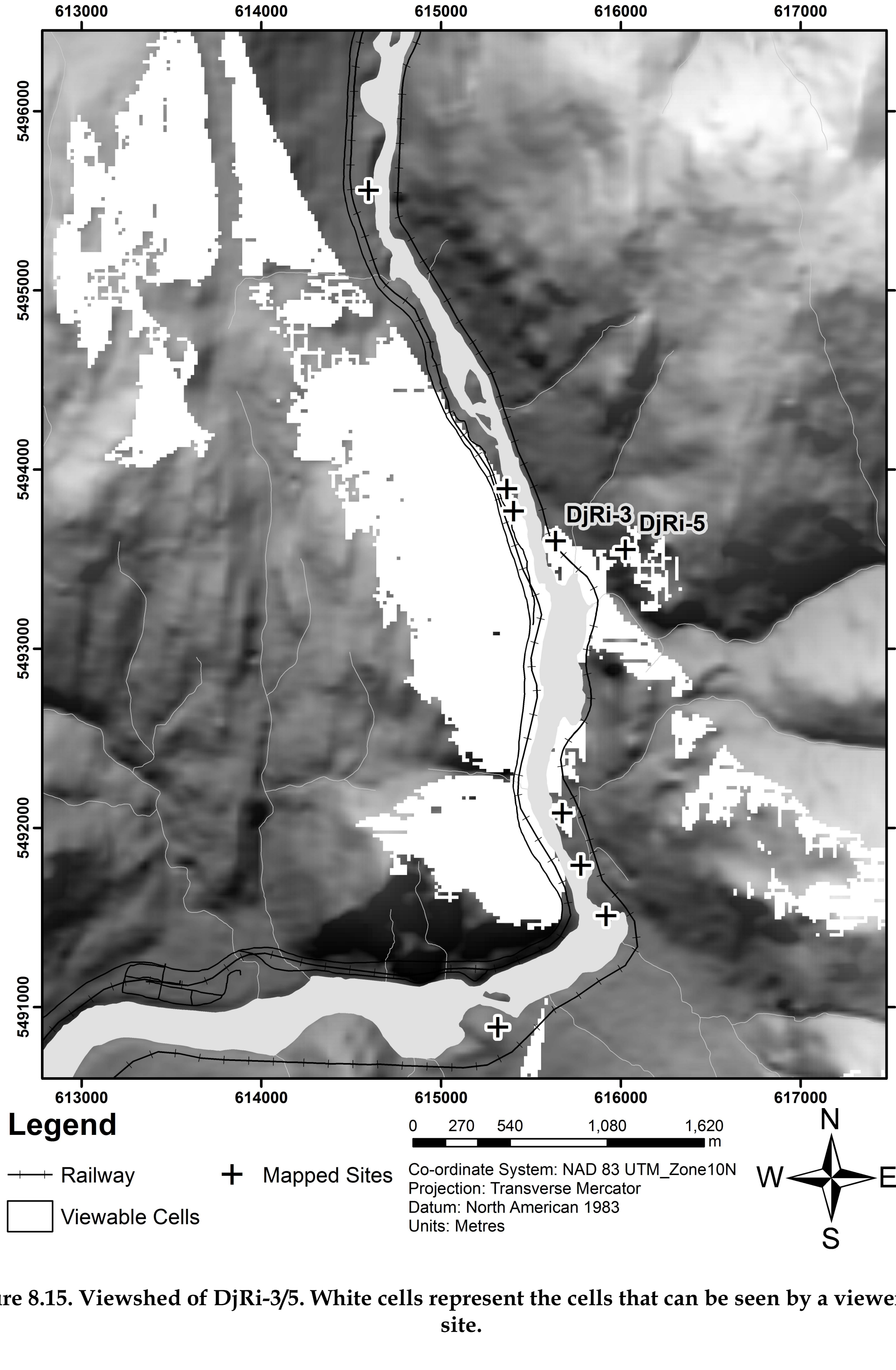

Figure 8.15. Viewshed of DjRi-3/5. White cells represent the cells that can be seen by a viewer at the site.

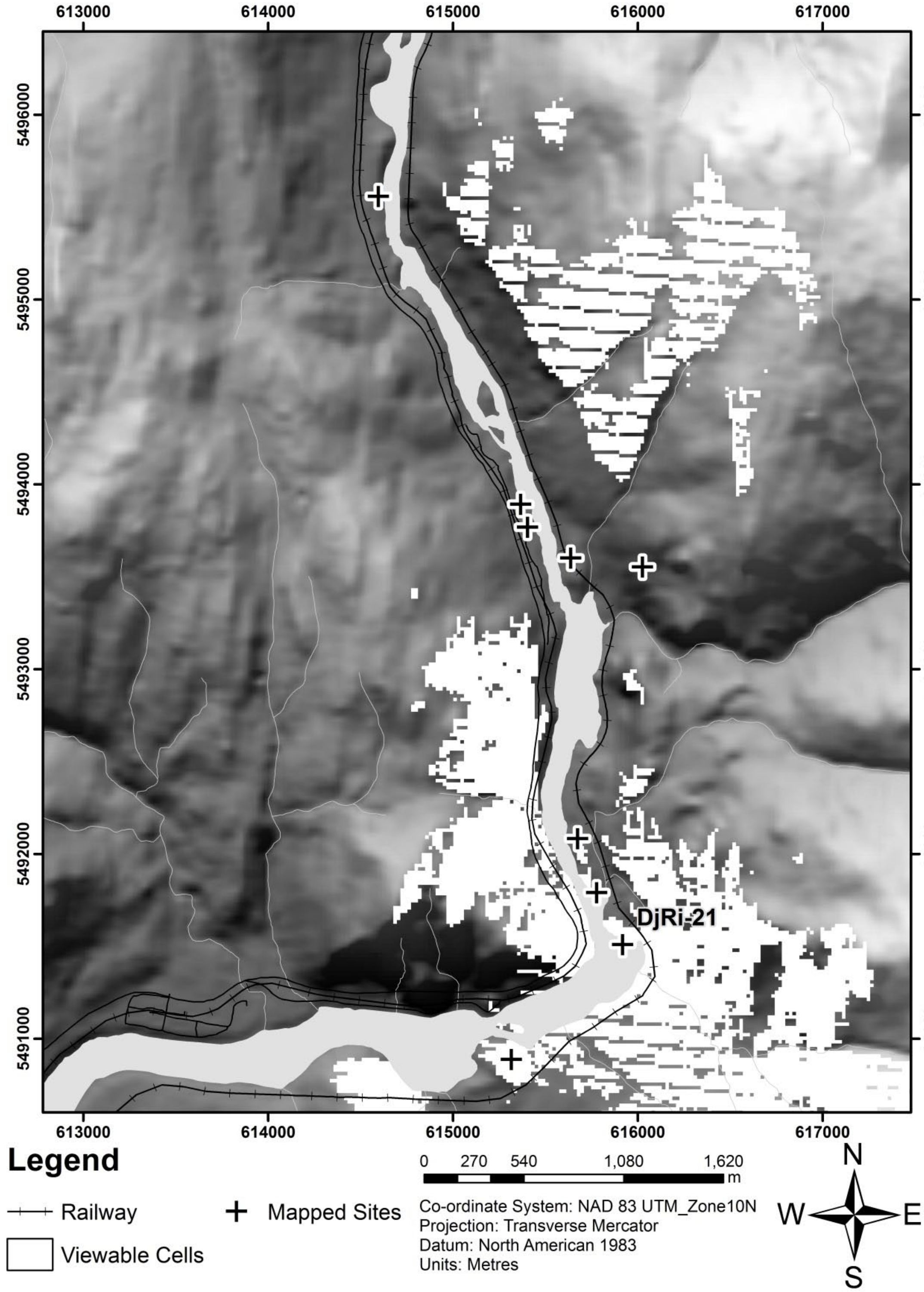

Figure 8.16. Viewshed of DjRi-21. White cells represent the cells that can be seen by a viewer at the site.

From DjRi-2(N), two other mapped sites are partially visible, including DjRi-2S and DjRi-46. Only small portions of DjRi-46 are visible from DjRi-2(N), so not all the rock features themselves may have been visible from this site, but enough of the site could be seen to allow forms of signalling to be sent from DjRi-46 to DjRi-2N, although this would mean that a warning would be sent from upriver, not downriver. This location is intervisible with DjRi-3/5, emphasising the role of these sites in the communication network (Figure 8.17).

The farthest site upriver in my sample, constituting the final point in this exploration of intervisibility of mapped rock feature locations in the Lower Fraser River Canyon, is DjRi-46. An individual standing at DjRi-46 does not have a view of the next rock feature site downriver. This means that while someone standing at DjRi-2N could see someone at DjRi-46, the opposite is not true. If signalling comes from downriver to upriver sites, this seems like a breakdown in the system. However, as seen in the viewshed map, DjRi-46 has a clear view of DjRi-3/5, demonstrating that this location played a central role in connecting the entire Canyon, potentially allowing signals to be sent from DjRi-14 to DjRi-46 and back again (Figure 8.17).

After examining each individual site viewshed, I then summed the results to create a cumulative viewshed map, showing a range of visibility for all sites, including DjRi-21 and DjRi-3/5. Figure 8.18 shows that most areas of the Canyon are visible from the combined viewshed. There are only a few areas, both on the river and on the banks, which are not visible from any of the sites in the sample, including the area just upriver from DjRi-62, as well as the area south of DjRi-2S/N. Viewshed coverage upriver of from DjRi-46 is limited, indicating that seeing upriver was not a primary concern. I compare the cumulative site map with the viewshed of all rock features, whether at village sites or not, in the next section.

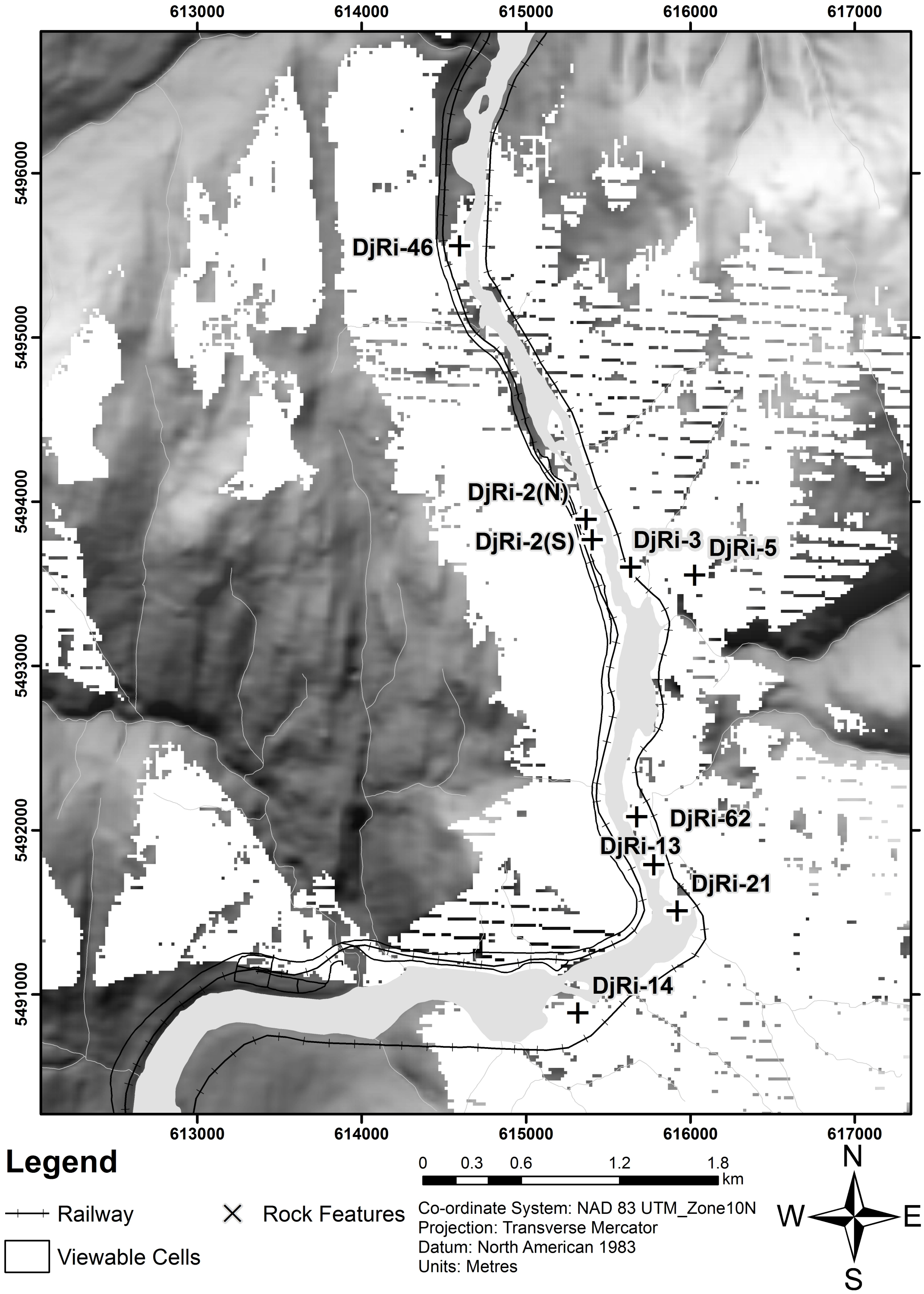

Figure 8.17. Combined map of the cumulative viewshed of all sites. White cells represent areas that can be seen by a viewer at one or more sites, resulting in the viewable area of the Canyon.

Rock Feature Intervisibility

An analysis of the intervisibility of all known rock features in the Fraser Canyon will give a clearer picture of the visible nature of the landscape. To this end, I created a database with all the rock features in the sample, most of which have reasonably accurate UTM coordinates. Since many of these the site location coordinates were estimated with a hand-held GPS, they are prone to greater error than the corrected site maps. Since the resolution of the base DEM is 19 m, most rock features are assumed to fall in the correct cell of the raster. Three rock features at DjRi-14 included in the sample were not mapped using GPS, since satellite reception in that area of the Canyon is very poor. As I wish to include these in the consideration of rock feature intervisibility, I selected several cells in the region based on my notes and reconstructions of where they are most likely located, along with two additional known rock features. This brings the total number of features in the database to 32. These were then plotted in ESRI ArcMap 9.3 and a cumulative viewshed analysis was run of these features, illustrated in Figure 8.18.

The majority of the cells near the river, along with the majority of the extent of the river itself, can be seen from one or more rock features in the Lower Fraser River Canyon. This map does not explicitly indicate intervisibility, but it does show that if any community was using these rock features, nearly this entire section of the Canyon would be either directly or indirectly connected to the network of visibility represented by the viewshed. In addition, the combined rock features have a different viewshed than just the sites alone. It is possible that some features were constructed to enhance this interconnectedness between locations. To examine the differences between overall site viewshed and rock feature viewshed, I overlay these two rasters in ArcMap and created a representation where the cells visible from one viewshed but not the other are highlighted. Figure 8.19 and Figure 8.20 are two images illustrating the differences between the amount of area that can be seen from the sites and the amount of area that can be seen from the rock features.

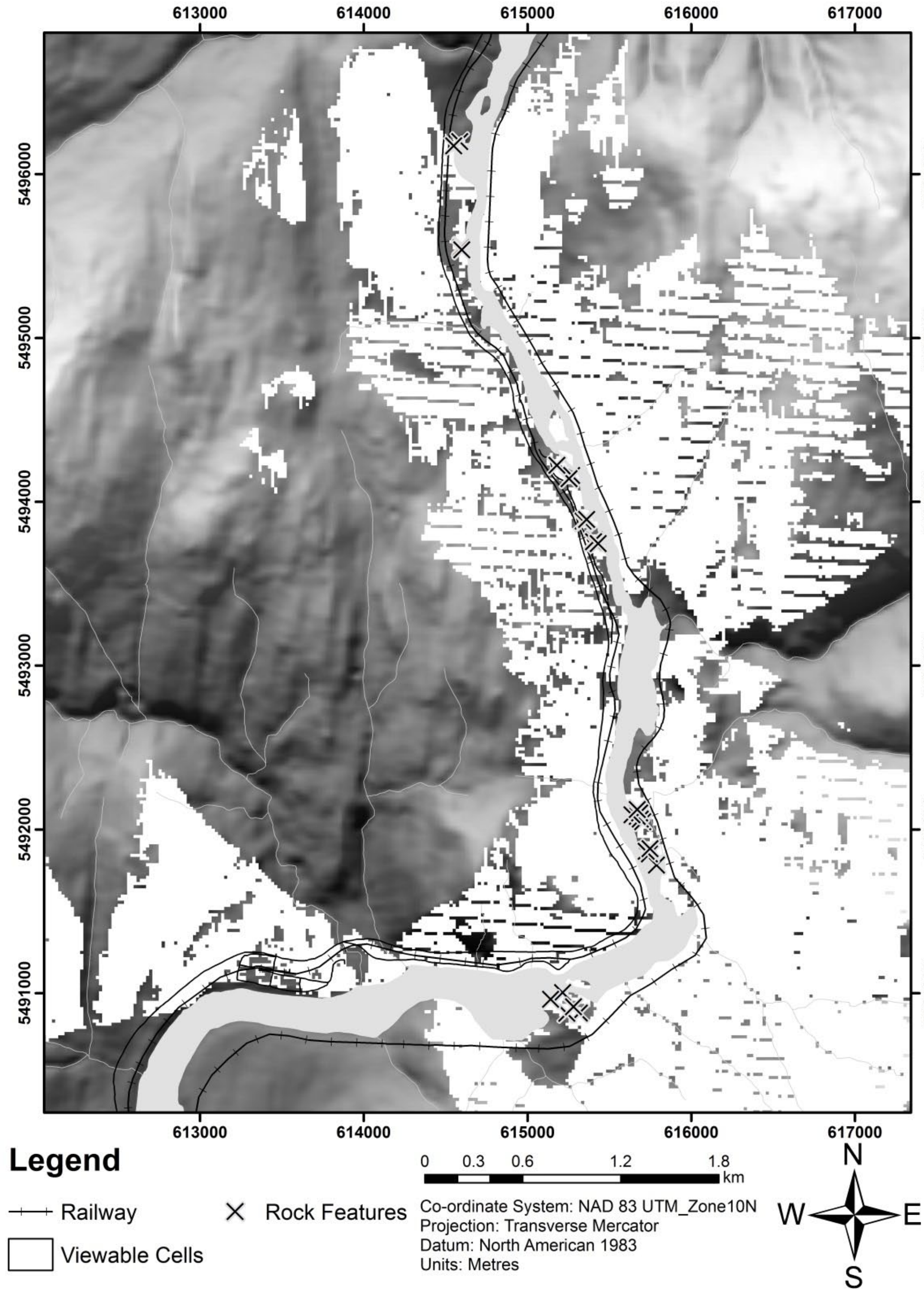

Figure 8.18. Combined map of the cumulative viewshed of all rock features. White cells represent areas that can be seen by a viewer at one or more features, resulting in the viewable area.

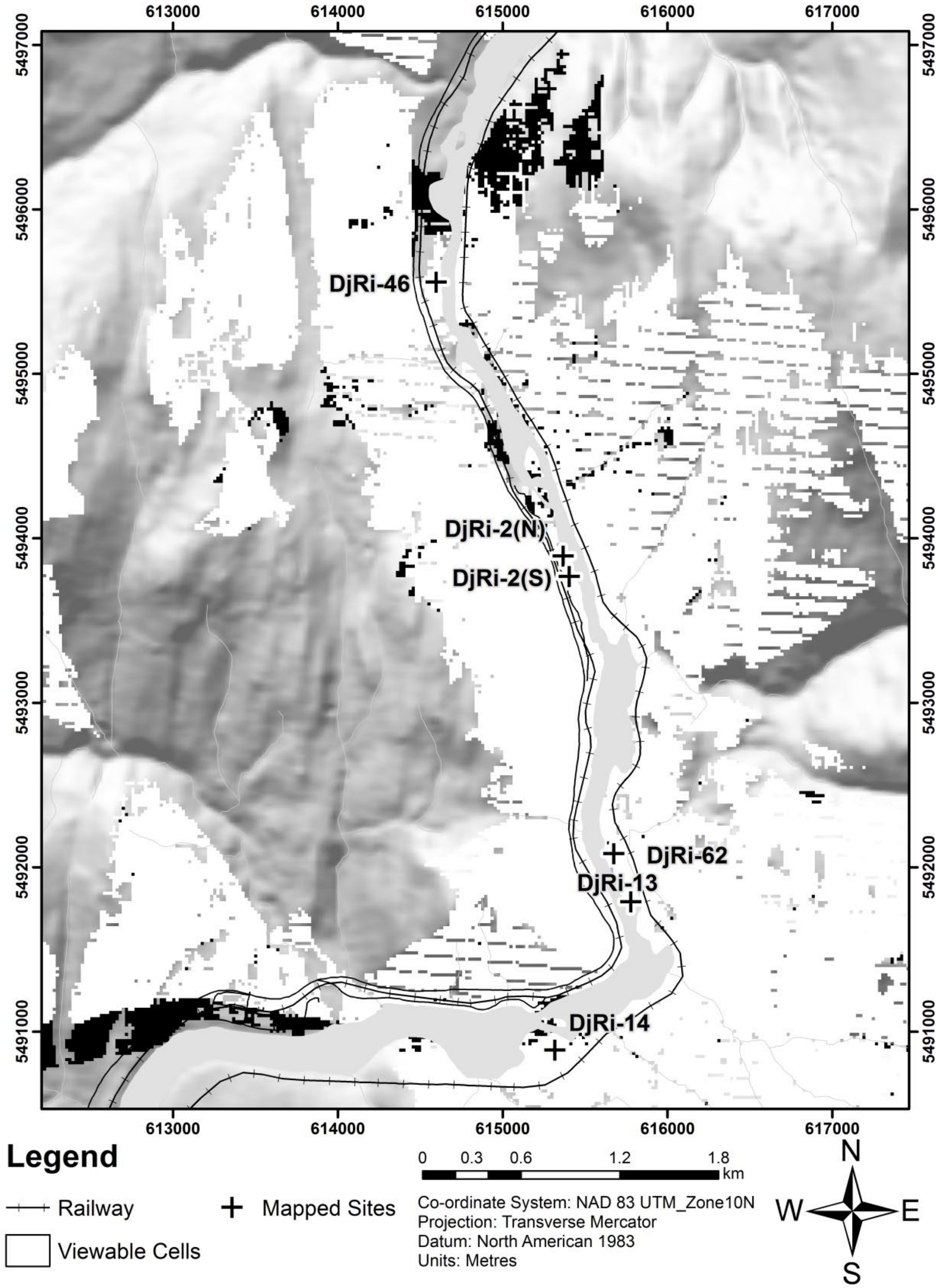

Figure 8.19. Site viewshed (white cells) over rock feature viewshed (black cells).

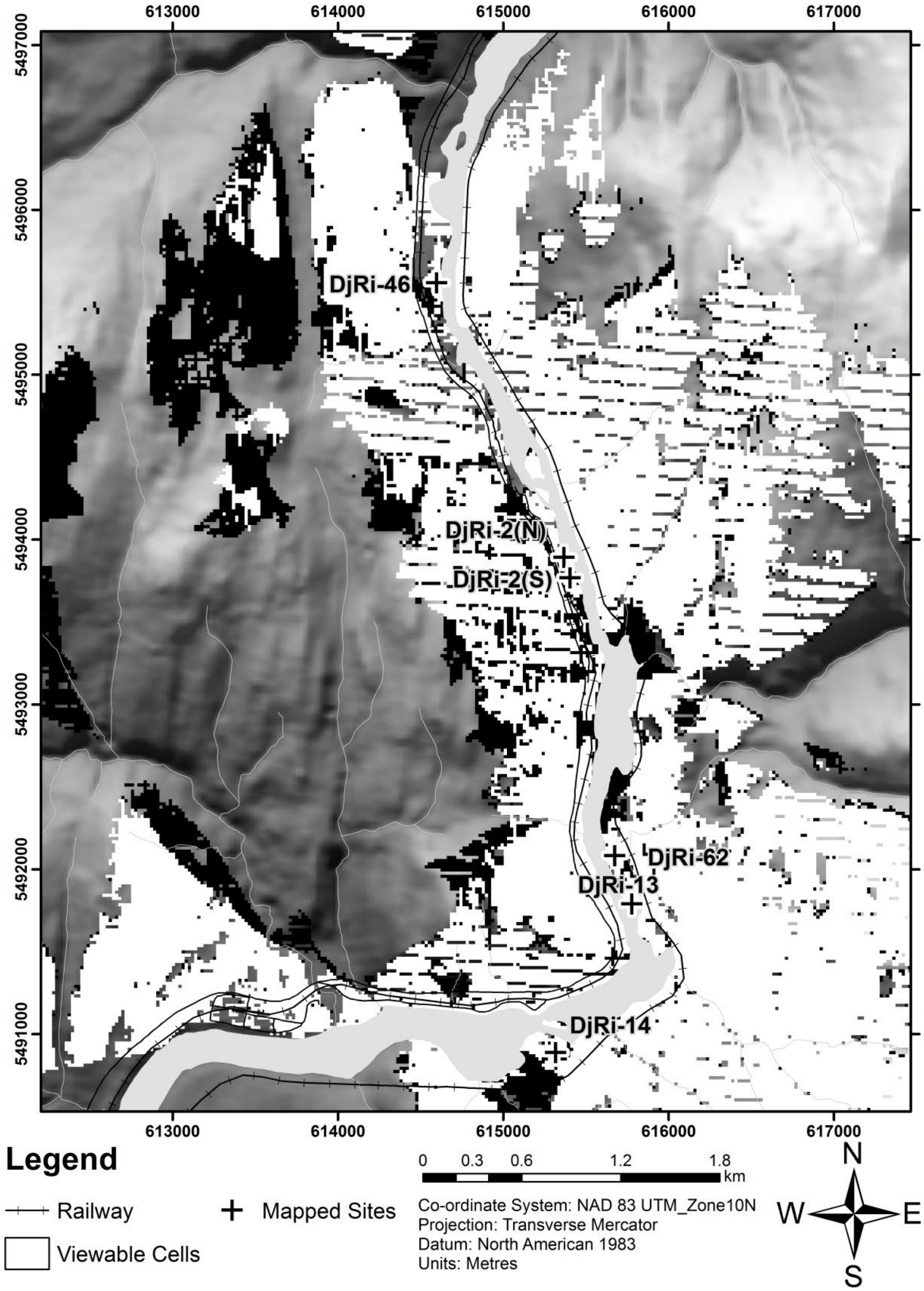

Figure 8.20. Feature viewshed (white cells) over site viewshed (black cells).

The grey background represents cells not visible from either sites or rock features. Figure 8.19 shows areas that *can be seen from rock features but not village sites* while Figure 8.20 indicates areas that *can be seen from sites but not rock features.* Overall, the viewsheds of areas adjacent to the river are quite similar, but when comparing them, there are several locations that cannot be seen at viewers from village sites but can be seen by viewers at rock features. When taken together, these two viewsheds cover a very large portion of the Lower Fraser River Canyon.

From this arises a hypothesis about the selection of locations where sites are built that needs to be tested – were rock features built in locations to enhance their visibility? Whether sites are purposefully placed to see other sites is an element of causality that can be tested, following Wheatley (1995) and Kvamme (1988), by considering the site points as a sample of locations, where the Lower Fraser River Canyon as a whole can be considered a population. For this test, cells where sites are located are considered a sample of all cells in the raster, which is the population. A cumulative viewshed is the subject of the test, where a series of viewsheds are summed to indicate for each cell the number of "times seen." These constitute a sample of the overall "times seen" for the entire population, or all the cells in the raster image. A Kolmogorov-Smirnov (K-S) one-sample test can be used in this case to compare the cumulative distribution of the sample to the cumulative distribution of the "population" – all the cells in the raster – with the following hypotheses (adapted from Wheatley 1995:173):

> H_0: Sites are distributed irrespective of other sites that are visible
>
> H_1: Sites are not are distributed irrespective of other sites that are visible

Given that the population is not likely to have a normal distribution, the K-S one-sample test is appropriate (Fletcher and Lock 2005:91-92), as it measures the maximum expected difference between the cumulative distribution of the sample and the overall population.

I conducted a K-S test in PAST[26] on the site distribution and the rock feature distribution, comparing the sample with the values returned for the entire raster. For the mapped sites, n=8 and D_{crit} = 0.435. As illustrated in Figure 8.21, the maximum difference in the cumulative distribution of sites versus the population is 1. This difference is significant (p=0.000) and we can reject the null hypothesis.

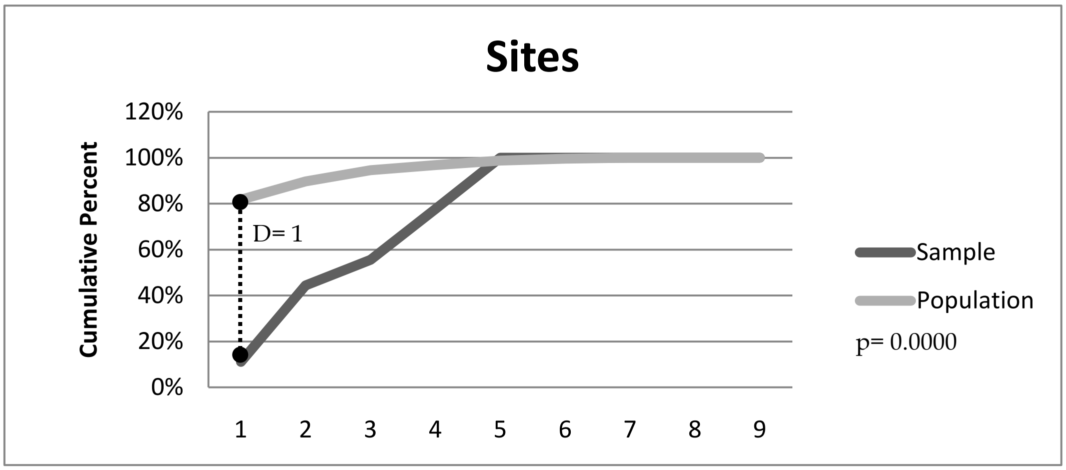

Figure 8.21. Kolmogorov-Smirnov one sample test results for distribution of site visibility.

The rock feature sample is larger than the site sample, with N = 32 and D_{crit} = 0.237. When looking at the differences in cumulative distribution (Figure 8.22) there is large value of *D* at 1 (p=0.000), so for the rock feature sample, the null hypothesis can also be rejected. These results support the idea that sites and rock features were placed on the landscape based on how many other sites/features are visible, meaning their distribution is not random and this pattern is highly unlikely to have occurred by chance.

GIS Analysis Discussion

While there are both pragmatic and theoretical issues with GIS analyses, the results can show patterns on the landscape that may otherwise be obscured, and allow us to evaluate hypotheses based on our experience of the landscape.

[26] PAST is an open-source statistical software package designed for paleontology (http://folk.uio.no/ohammer/past/)

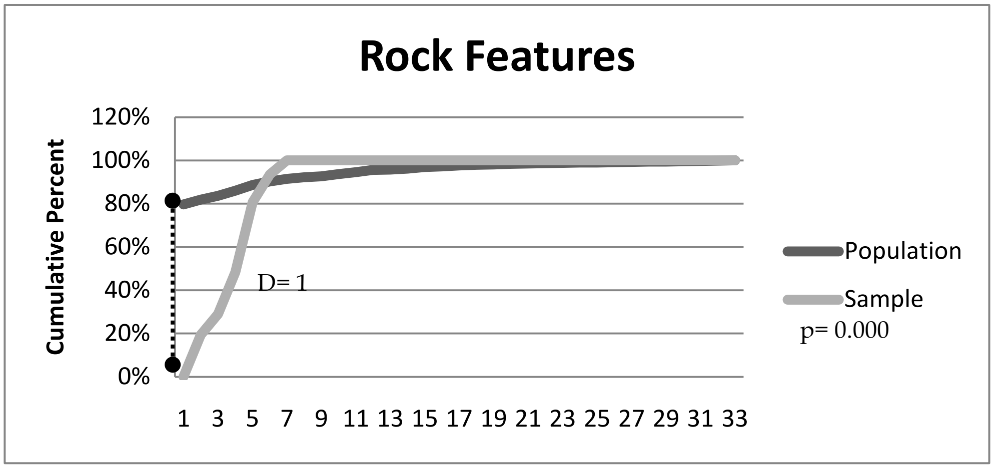

Figure 8.22. Kolmogorov-Smirnov one-sample test results for the distribution of rock feature visibility.

Having visited all the sites in the study area, I had a sense that the viewshed would be extensive, and that rock features, not just sites, were placed to allow the entire Canyon to be visible. What did appear unexpectedly out of the cumulative viewshed was the importance of one site that was not mapped and without an extensive rock feature complex -- DjRi-3/5. Without the DjRi-3/5 locality, sites in the Lower Fraser River Canyon are not intervisible. DjRi-3/5 connects the downriver portion of the study area to upriver sites. In addition, the hypothesis set forward by Schaepe (2006) that these features were connected by a line-of-sight is also supported by the cumulative viewshed analysis. It would be theoretically possible to send a signal from DjRi-14 to DjR-46 via the sites included in this analysis, but there is no specific archaeological evidence available to indicate that signals were sent. Further research is needed to explore evidence for signalling and to confirm the possibility that this network was primarily defensive in nature.

The results show that visibility may have been an important factor in where sites were located on the landscape, but there are some areas where the data need to be refined. First, the quality of data limits my confidence in the results, as a DEM with only 19 m may not capture the nature of the variation in a landscape that with such steep slopes and abrupt elevation changes. In the future, I will revisit these analyses with a higher resolution DEM, preferably <2 to 5 m, and with a better models of paleovegetation. This should allow for a more nuanced consideration of the role of the height of the observer, and whether sites could also be seen if the observer is prone. DjRi-3/5 should also be mapped and explored further, since this is a key location in the landscape of the Lower Fraser River Canyon. Without knowing whether rock features do exist at this important location within the Canyon, I cannot draw any conclusions about the apparent lack of rock features at a central place in the upper portion of the landscape. The analysis is also incomplete as I have only included rock features in my sample that have attribute data. Revisiting the other rock features identified in the Canyon with a high-precision GPS unit is an important future step, since this would also allow for a larger sample to test against the overall population.

Implications of the Analysis for Defensibility

Overall, the analyses presented in this chapter indicate that rock features were placed on the landscape in ways that inhibited movement and emphasise visibility. Their location enhanced the defensibility of the Canyon, because an area such as DjRi-21, where there is an expansive view but no rock features, was less defensible than sites upriver with defensive features. Conversely, a Canyon-wide network of visibility is not complete without a site that currently lacks evidence of intact rock features: the DjRi-3/5 locality. The importance of taking a landscape perspective on defensibility is highlighted by these results, because without expanding the concept of defensibility beyond a functional analysis of each individual feature, my interpretation would have been that rock features do not serve to provide protection against attackers. Combining both the Defensive Index and the viewshed analysis has led to a different conclusion about how village sites were selected and constructed to protect and potentially control access to the Lower Fraser River Canyon.

9: ROCK FEATURES AND THE COAST SALISH BUILT ENVIRONMENT

Built rock features in the Lower Fraser River Canyon have implications for several elements of Coast Salish life and present the opportunity to address broader theoretical questions about the nature of building practice among societies without permanent centralized political organization. Having analyzed the rock features at several scales, I now place these features within the broader cultural and theoretical framework to consider patterns of landscape modification, identity formation and maintenance, social and political networks, and the practice of warfare among the Coast Salish. I return to theoretical principles of agency and landscape outlined in Chapter 2, to enquire how rock features related to identities at different spatial scales. I explore the concept of the Coast Salish built environment, outlining the various methods of construction and landscape marking that took place along the Fraser River and throughout the Gulf of Georgia area. I consider how building practice may enforce or modify the existing social and political affiliations of Coast Salish peoples in the context of the seasonal aggregation in the Lower Fraser River Canyon, arguing that management of culturally vital resource locations may have been an important factor in building rock features at those locations. I discuss how the nature of Coast Salish warfare is implicated in the organization of sites on the landscape of the Lower Fraser River Canyon and examine what this means for both intra- and intergroup conflict. Finally, I look at the complex nature of identities, arguing that the construction and ongoing use of rock features had an impact on how certain identities were enforced, potentially transforming the broader structures of society. Here, I evaluate the extent to which rock features were part of the management and mediation of social relationships, meanings, identities, and conflicts in the Lower Fraser River Canyon through time

The Coast Salish Built Environment

There have been many attempts to connect individual and group agency to material remnants of actions preserved in the archaeological record (Gardner 2004; Martindale 2009; Owoc 2005; Pauketat and Alt 2005), some of which have relied on elements of the built environment or the cultural landscape (Llobera 1996) as a methodology to connect past material culture with the creation and maintenance of identities, discussed in detail in Chapter 2. The majority of these studies have employed a wide range of archaeological, historical, iconographic and ethnographic information to interpret past identities reflected in the archaeological record. Such studies usually focus on societies with centralized political organization, a powerful elite class and clear distinctions between different groups within these material remains (Bernardini 2005; Franklin and Fesler 1999; Hall 1991; Schortman and Nakamura 1991).

Intentional modification of the land through building and construction practices is one part of the dialectic between agent and structure by which the cultural landscape is constituted, the results of which can change the way people perceive not only the land but their own place within that space, as outlined in Chapter 2 (Knapp and Ashmore 1999). The remnants of that modification, from the erection of monuments (Bender 1993b) to the creation of permanent markers of movement (Cummings and Whittle 2003; Edmonds 1999), have been used by archaeologists to explore how both the identities of individuals and their shared cultural values and experiences were tied to the landscape. Scholars now recognize "the vital importance of the built environment on the social lives of people" (Fisher 2009:439). Areas of the landscape that receive "special attention" through modification or marking often indicate "socially significant features on the landscape," from transitional zones to prominent landforms and areas of mythical significance (Ashmore and Knapp 1999:15). A key concept here is the *built environment*, defined as "any physical alteration of the natural environment...through construction by humans" (Lawrence and Low 1990:454), where the products of human action on the landscape are theorized to illuminate ecological, functional, social and symbolic aspects of the culture. This connects with the idea of the cultural landscape outlined in Chapter 2, since the built environment can encompass durable landscape features that are created or materially modified by intentional human activity, which can then impact social structures, either to enforce or transform the status quo. The builders and buildings create a realm of meaning beyond just the function of a structure or its symbolic qualities (Robb 1998). Analyzing the products of building can also expose "how and why people manipulate the built environment to suit specific social needs and desires" and "how built form in turn enhances or inhibits behaviour" or belief systems within society (Lawrence and Low 1990:464).

While public architecture and monuments of complex state societies have been the major focus of studies of the relationship between the built environment, the physical landscape, and the control of human labour through unequal power dynamics, recent research has explored these topics within smaller-scale societies (Pauketat and Alt 2005). On the Northwest Coast, analysis of architectural form has been inferred from remains such as house depressions, house floors and post holes, because wood, the primary building material, does not preserve in the damp, acidic soil over long time scales (Ames 1996, 2006; Ames et al. 1992; Coupland 1985; Coupland et al. 2009; Graesch 2007; Grier 2001; Lenert 2007; Lepofsky et al. 2009; Martindale 2006; Sobel et al. 2006). Since the features in the Canyon are built from stone, they preserve a portion of history of landscape modification not found in the same form anywhere else on the Coast, thus presenting an opportunity to investigate the role that building may have played in the movement of people, the assertion of ownership and negotiation of social relations in the region. As I describe below, the movement of stone and earth for various forms of building is not without precedent in Coast Salish society.

Three major types of building have been the topic of past research among Coast Salish peoples: (1) houses and households; (2) burial mounds and cairns; and (3) defensive architecture, including trench embankments, stockades, and rock features. Each of these has been argued to relate to the process of claiming identities, enforcing ownership, defining territories, or reflecting social status within Coast Salish society (Angelbeck 2009; Lepofsky et al. 2000; Lepofsky et al. 2009; Mathews 2006; Thom 1995). Building practice is therefore related to the dialectic between agents and the broader social structures, where the construction of the built environment has the potential to effect long-term social change or to reinforce the status quo. To what extent do rock features, as part of the built environment, correspond with or challenge our conceptions about the relationship between social identities, ownership, and territoriality of the Coast Salish? All of these factors are relevant for understanding the rock features in the Lower Fraser River Canyon in the broader context of the Coast Salish world and relating elements of the built environment to identities and territories marked on the landscape by active agents.

Houses and Households

The remains of houses have been considered the material correlate of the key social group in Coast Salish life – the household. Much recent attention has been directed to the role of households on the Northwest Coast, since the archaeological remains of houses have been used to examine differences in social rank, status and community organization (Ames 1996, 2006; Ames et al. 1992; Coupland 1985; Coupland and Banning 1996; Coupland et al. 2009; Graesch 2007; Grier 2001; Lenert 2007; Lepofsky et al. 2009; Martindale 2006; Schaepe 2009; Schaepe et al. 2001; Sobel et al. 2006). A household was considered a primary means of affiliation among Coast Salish peoples and usually consisted of a series of families that may or may not have been linked via kinship. Kinship and family belonging defined a Coast Salish person's social status, rights to resource locations, and rights to hereditary powers related to naming, spirit, and place (Suttles 1958). The household was a means whereby individuals placed themselves within the social structures of Coast Salish society (Elmendorf 1971; Suttles 1960). An individual's place in a household, therefore, provided a venue where interaction with social structure was possible and where agency could be enacted. If a person became dissatisfied with the household, he or she could move to a different household to which they were connected by kin and "households [were] basic groups of people active as agents of practical knowledge influencing community formation" (Schaepe 2009:41). In the ethnographic period, households were also the highest means of political allegiance for individuals within a village, since villages were more a cluster of households than any specific cohesive group (Suttles 1960).

A household was a way to structure the division and deployment of labour that was foundational to the day-to-day life of people in Coast Salish territory. Production of food surplus, craft items, and other goods has been associated with households on the Northwest Coast (Coupland 1985). Labour organization may have extended beyond the household to broader kin-based connections, creating what Miller (1989) termed *corporate groups*. This relates to building practice, because the house structure itself can be an extension and representation of the identities of the people who built it, considering the large amounts of labour necessary to build and maintain plank houses (Ames et al. 1992).

Houses built by households were symbols, visible markers on the landscape that would have been seen at some distance, depending on the location. Grier (2006) claimed that houses were the main monuments of Coast Salish peoples, used by elite members of the household to promote social order and display symbolism representing elite identity, often through the display of external house posts. He noted that "aspects of construction, design, and symbolic embellishment...sent political messages that served to legitimize and entrench household hierarchies" (Grier 2006:144). High-ranking household members used houses to signal ownership and enforce power relationships. Houses were the location of potlatches, where hereditary rights were bestowed and passed on in public performances to ensure their legitimacy and allow others to recognize certain family's and kin-group's rights to access important locations on the landscape (Carlson 2007). Construction of houses, according to Grier (2006:148), was "social order in action."

Burial Mounds and Cairns

Building monuments associated with the dead, either as actual internments or markers, is a common practice for many people throughout history. The landscape of ancient Coast Salish is no exception, with burial mounds and cairns beginning to mark places where the dead are buried as early as 1500 BP (Lepofsky et al. 2000; Mathews 2006; Thom 1995). Prior to this date, internment took place in shell middens. This shift from midden internment to more visible mounds and cairn burials, followed by above ground interments post-1000 BP, has been associated with shifts in social organization (Thom 1995), where elites within society used above-ground burials to display symbols of wealth, status, and power.

Burial mounds were present in the Fraser Valley from at least 1500-1000 BP, with the best evidence coming from the Scowlitz site (Lepofsky et al. 2000:393). One possible use for the rock features in the Lower Fraser River Canyon, therefore, could be burial structures. There are a few reasons why I did not include this possibility in my analysis. First, most of the structures within the sample do not fit known ethnographic and archaeological accounts of burial practices. Burial mounds and cairns tend to have circular or rectangular collections of rocks, whereas the sampled features tend to be terraces or retaining walls in dimensions, layouts, and placements that do not correlate with known cairn or mound features from neighbouring locations. Several features in the overall number, however, may have a role as burial cairns and require further investigation.

Second, burial places are culturally sensitive. I did not ask for nor receive permission to test the possibility that these were burial locations. In the future, the potential role of the rock features as bases for burial platforms could be tested with excavation, but that would require careful collaboration with local communities about proper protocols. The contemporary political dynamics in the Lower Fraser River Canyon would likely prohibit work on potential burial locations. In Chapter 10, I discuss the incident where other human remains were located during the course of another archaeological project and how that exacerbated the ongoing conflict over ownership of the Canyon. For now, therefore, the question of whether these were burial locations remains unanswered.

As a form of major landscape modification, burial mounds and cairns are an interesting correlate for built rock features in the Lower Fraser River Canyon. Two different types of burial monuments were constructed in Coast Salish territory: burial mounds and cairns. Thom (1995:34) notes that rock burial cairns were more common on the islands in the Gulf of Georgia, while earthen burial mounds were more common along the Fraser River. Many earthen mounds covered internal rock cairns in which individuals were buried. Based on data from the Scowlitz site, located at the confluence of the Fraser and Harrison Rivers, burial mounds sometimes involved moving large amounts of earth, with volumes ranging from 1-166 m^3 (Lepofsky et al. 2000:405), although most measured less than 9 m by 9 m. The largest of the mounds found at Scowlitz was excavated and found to contain an adult male in a stone cairn with extensive burial offerings, suggesting that the person was a high status individual (Lepofsky et al. 2000:406). The date for this mound is approximately 1400 BP (Lepofsky et al. 2000:407), falling into the overall time period where mounds and cairns appear throughout the Coast Salish world. A smaller boulder cairn excavated nearby contained seven infant teeth with no burial inclusions (Lepofsky et al. 2000:407), contributing to the idea that status may have been inherited during this time period. Mounds and cairns were found on this site and extended over an area of 2 km^2 and to an elevation of 300 m. The largest mound was placed in a prominent spot on the main residential terrace of the site, but many of the other features were not placed to be seen from the river, so visibility from the outside was not necessarily a factor in their construction (Lepofsky et al. 2000:409).

On Vancouver Island, prior to intensive colonial settlement, burial cairns were commonplace (Mathews 2006:52). Rocky Point was preserved from destruction and hundreds of burial cairns mark places of internment. Similar to the Scowlitz complex, these cairns were not necessarily built to be visible to outsiders, as they are not located on places of topographic prominence and are generally not visible from the water (Mathews 2006:211). Mathews (2006:215) suggests that the cairns were built for an internal audience, or the members of the local group who would walk through the landscape that would evoke memories of their ancestors. The placement of these cairns may relate to Coast Salish village and kin relationships, because the internal nature of the cairns may point to the need to remind people within the village of their allegiances to ancestors and at the same time document the social differences among the living. If the household, not the village, was the centre of the political and social life of Coast Salish peoples, then perhaps powerful members of certain households were responsible for building the mounds and cairns, standing as testament of the power of that household through time. This is where the building practices of cairns and rock features may be most similar, and this interpretation implies that the rock features in the Canyon may not just be a marker to outsiders, but to insiders as well. I explore this idea further below.

Defensive Constructions

Throughout Coast Salish territory, defensive sites are common, including villages with stockades or palisades, trench embankment sites, lookouts, refuges, and rock fortifications (Angelbeck 2009:170-215). The rock features in the Lower Fraser River Canyon have been explicitly linked to landscape modification to enhance defensibility (Schaepe 2006), so it is important to understand how rock features connect to other forms of defensive architecture throughout the Coast Salish world. Defensive sites are widespread throughout Coast Salish territory and many other areas of the Northwest Coast by 1500 BP (Angelbeck 2009:157; Supernant 2004), corresponding with the appearance of burial mounds and cairns.

Several different types of defensive sites were built in Coast Salish territory. Fortified villages were permanent settlements bounded by defensive features such as walls or fences (Angelbeck 2009; Moss and Erlandson 1992). Trench embankments appear to have been unique to the Gulf of Georgia region and were typically associated with nearby settlements (Angelbeck 2009; Mitchell 1968). These structures were trenches fronted by large fences behind which warriors and others could retreat when attacked and were built on bluffs, rocky headlands, and peninsulas (Angelbeck 2009). Angelbeck (2009:190-213) argued that the trenches functioned in a similar fashion to moats around castles in Europe, creating both a barrier and a tactical advantage for people inhabiting the villages. Unlike some of the other forms of defensive sites in Coast Salish territory, trench embankments were major earthworks requiring labour organization (Angelbeck 2009:216), because sometimes the whole village was involved in their construction.

Lookouts, refuges, and underground houses are relevant for the discussion of rock features because they illustrate the difference between fortifications that were meant to be seen and defensive features that were meant to conceal either village members or warriors. Lookouts, while located on high elevation spots with broad views (Angelbeck 2009:179), were often most effective when they were not easily discernable from afar. Refuges and underground houses were explicitly designed to hide members of the community and protect them from raids and subsequent enslavement. Sometimes defensive features were designed both for protection and to signal to attackers that the members of the village or household are prepared and able to defend themselves, while other times the defensive features were designed to hide individuals that would be the targets of raids. Visibility and defensibility do not necessarily go hand in hand. The Coast Salish landscape does not only contain overt markers of territory and ownership, but also features with purposes and meanings that may have been internal.

Rock Features and the Coast Salish Built Environment

While the types of rock features found in the Lower Fraser River Canyon are not common elsewhere in Coast Salish territory, their construction is not unprecedented, given the other elements of the built environment found throughout history in this area. The rock features may have been a way to inscribe ownership, territory, and power on the landscape. Several factors relate rock features to other forms of the built environment that are used to demonstrate political affiliation, status, power, and the ability of a household or village to defend itself against attack.

The results of my analysis suggest that many of the rock features may have been used as flat, level bases on which to build plank houses. Plank houses were the most widespread form of building in the Coast Salish world and the households responsible for their construction used the physical structure to show the power and success of the families who lived there (Grier 2006). A plank house with a rock feature base may have been used by households to demonstrate their success. Not all areas where plank houses were built in the Canyon had rock features at their base (Schaepe et al. 2006). Not all households may have had the capacity or the prerogative to construct rock features as bases for plank houses. Schaepe (2009:264) correlated the size of houses with labour investment, arguing that larger houses had greater social, economic, and political value. A plank house with a rock base would take more labour to construct than a plank house without a rock base, suggesting that the members of that household could command the necessary labour force and display their power in the building.

Another outcome of building a rock feature as a base for a plank house could have been to leave a more permanent mark on the landscape during seasonal movement. The ethnographic record contains examples of members of the communities packing up their plank houses and moving to other locations to collect resources throughout Coast Salish territory (Carlson 2001c; Duff 1952; Suttles 1960). While the Canyon was a location of seasonal aggregation for part of the year, it is possible that at other times, the plank houses could have been dismantled and moved elsewhere. A rock foundation for a plank house would serve to leave a permanent marker on the landscape even when members of that household were away from home, reminding others of an absent household's claim to space.

Burial monuments were another method of marking the landscape in durable, meaningful ways, even if the audience for these features may have been just as much internal to the community as external. This has implications for the role of rock features, because some of the features would not have been visible from the river, meaning that they were not built to impress travellers coming into the territory via the river. Some of the largest of the rock features, such as the house platforms at DjRi-62, are hidden from view. Rock features may have been designed to let other members of the village or the surrounding communities know that the people who built them were powerful. This power could also continue through generations in a similar manner to burial features, because it is unlikely that a feature would only be used by one generation.

The majority of the rock features in this study are in visible locations, and like large burial mounds on prominent places, could serve notice to visitors that the people in the Canyon can command the labour to build durable monuments on the landscape. I identified features that did not fit into the use categories I established from known activities in the Canyon. Burial monuments involve labour investment that does not serve an explicitly practical purpose but is motivated by social and spiritual considerations. Building a monument can give a place strong cultural potency, and the mounds at the site of DjRi-14 (Schaepe, pers comm 2010) illustrate that people living here were marking the landscape in ways that involve the dead. Perhaps the rock features served a similar purpose for households and communities in the past – markers of power and continuity on a contested landscape.

Some rock features convey social power because they display the defensibility of a community. Some of the rock features appear to have been built to provide cover for warriors, and provide a tactical advantage during physical attacks. All of the rock features classified as defensive are freestanding, associated with village locations, and have downriver views, suggesting that the purpose for building them was to ensure the security of the nearby village. This does not capture features that could have served as bases for palisades. Who they were defending against is a more complex and scalar issue, considering the various forms of identity that may have be enacted at different times. I consider this conundrum further in the next section where I discuss the interconnected nature of Coast Salish identities that may have been associated with these rock features.

Even if rock features were not explicitly built for defense, they did serve to enhance the defensibility of the landscape in a functional sense. One issue with measurements such as the defensive index is that it only measures the physical aspects of defensibility and does not take into account the *perception* of defensibility. Other forms of defensive sites throughout Coast Salish territory are clearly visible from a distance (Angelbeck 2009) and signal potential attackers, so landscape modification can be used to create a defensive landscape, where the perception of the defensibility can be strengthened through building. Rock features can be used to emphasise and enhance the defensibility of an already imposing landscape, marking a moment where agents may transform the social structures by building upon existing social identities in material ways. The interpretation of these features as powerful does not consider the possibility of contested meanings, alternative interpretations, and subversions of the status quo that would have been part of the ongoing dialectic between individual agent and the negotiated collective structures developed and modified through history (Robb 1998).

Rock Features and Coast Salish Identities

The title of this dissertation implies that rock features inscribed identities on the landscapes of the Lower Fraser River Canyon. After analysis of the form and spatial distribution of the rock features, I now reconsider the role that these durable features may have played in defining, marking, or transforming identities of people who lived in this region. While rock features might not have explicitly inscribed identities, their construction implies that new meanings could have been generated in these places, providing another opportunity to strategically evoke identities at various scales. Here, I look at specific examples of how different identities may have been mobilised by Coast Salish peoples under different social circumstances, before considering how these might relate to rock feature construction. Identities are ongoing projects that work at various scales (Meskell 2003) along an epistemological spectrum from more to less discursive (Martindale 2009). Figure 9.1 represents the relationship between scales of identity, rock feature function, and social scales. Although we can evaluate cultural identity as collective expressions of negotiated meaning at various scales, the foundation of identity is the individual.

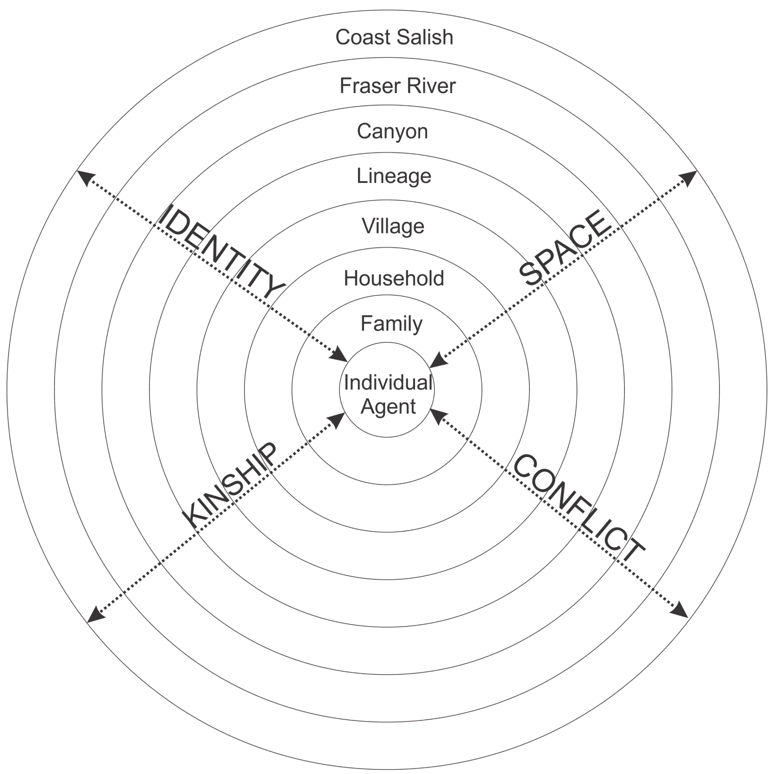

Figure 9.1. Spatial scales of identity among the Coast Salish.

Higher order constructs of identity form from both the discursive negotiations of individuals building social networks and the non-discursive systems of expectation that emerge from practice and tradition. Both the function of rock features and how they represent identities can change at different spatial scales at which their meanings are enacted. I summarize these in Table 9.1 and Table 9.2, focusing on the relationship between rock features and scales of identity.

Table 9.1. Comparison of the Functions of Rock Features at Different Scales.[27]

	Residence	Fishing	Ownership	Internal Defense	External Defense
Individual	Lives in a house with a rock feature, may have helped build it	Place where an individual fishes	Belong to certain places at different scales		
Family	Lives in a house with a rock feature, may have helped build it	Place where the family fishes	Managing access to valuable places	Protecting family members from neighbours or other household members	
Household	Rock feature marks the place of residence	Place where one family of the household fishes	Marking belonging to a place during seasonal movement	Protecting household from neighbours, inscribing power	
Lineage	Right to join a household with a rock feature	Place where linage members have seasonal rights of access	Marking locations where a lineage has rights to access	Feuds between lineages	Call upon lineage for protection
Village	Internal relationships enforced by houses with rock features	Place where wealthy or high status families fish	Marking a village location	Protection against neighbouring villages	Alliance in times of conflict
Canyon	Distinguish Canyon from non-Canyon space by the presence of rock features	Marked fishing places different from unmarked fishing places	Managing Canyon space during seasonal aggregation	Canyon network mobilized when threatened from downriver neighbours	Alliance in times of conflict
Fraser River	Rock features only mark sites on a portion of the river	Places with rock features are valuable resource locations			Alliance in times of conflict
Coast Salish World	Rock features only mark sites in a portion of the Coast Salish world	Places with rock features are desirable locations to gain access to through alliance or marriage			Alliance in times of conflict

[27] Blank cells in the table are areas where the function of rock feature use is either not relevant or unclear.

Table 9.1 looks at the functions of the rock features as outlined in Chapter 7 and presents different interpretations for how the rock features work at different scales of identity. Table 9.2 explores different elements of the theoretical approach of agency and landscape, connecting scalar identities to how rock features can illustrate elements of the dialectic between agent, structure, history and landscape. While more interpretive, this approach allows me to explore meaning beyond function and rational behaviour.

Table 9.2. Comparison of Identities Enacted by Agents at Different Spatial Scales.

	Agency	Structure	History	Landscape
Individual	Conscious or unconscious actions	Status, wisdom, social rules	Personal ancestry, names	Participation in building practice and landscape modification
Family	Collective action	Family status, role in household	Tracing ancestral connection to place through time	Participation in building practice, and landscape modification, inscribing rights
Household	Collective action	Household status, management of people	Continuity of use of a powerful place through time	Marshalling resources to build and modify the landscape
Lineage	Collective action	Rights to access, social ethos of sharing	Ancestral names, associated places	Kin groups connected to landscape modifications
Village	Possible collective action activated when necessary	Possible village collective identity (when necessary)	Continuity of village locations through time	Relationship between different building practices within the village
Canyon	Possible collective action activated when necessary	Social cohesion and identity	Power of the ancestors and mythical beings	Places of power marked by names and stories
Fraser River	Movement of people to other places	Rules of residence and kin reckoning	Shared ancestry and mythology	Places of power marked by names and stories
Coast Salish World	Kin connections, strategic alliances	Rules of residence and kin reckoning	Shared ancestry and mythology	Places of power marked by names and stories

Coast Salish social networks of affinal kin are a major means by which identities are negotiated (Carlson 1997; Harmon 2007; Suttles 1960), a pattern which seems to extend into the past (Grier 2003). Kin relations appear to be more important, in many ways, than specific residential locations, because hereditary rights, histories, and spiritual powers are passed on through generations via kinship ties. Having distant kin ties provided a certain level of mobility for household members, allowing people to leave a situation in which they were dissatisfied and to have access to important resources throughout the territory. That freedom for people to pack up and leave, to vote with their feet, limited the direct power that household leaders had over other free persons in society (Suttles 1987). Leaders were therefore encouraged to ensure their household was successful, which may have been a motivation for the use of rock features as foundations for houses. The act of building a rock feature could have demonstrated the success and power of a household, encouraging individuals to remain in the household group and inscribing a household identity on the landscape.

Households were one level of identity at which conflicts sometimes arose. Angelbeck (2009:225) noted that because of internal conflicts, "defensive strategies were a necessary component of political life for any village, or household, throughout the Coast Salish region." In his review of the ethnographic and ethnohistoric literature on conflict among the Coast Salish, Angelbeck (2009:227) observed that internal battles and feuds were more frequent than external raids. This has implications for the rock features in the Lower Fraser River Canyon, since my analysis of visibility found that rock features themselves were not necessarily a key component of the visibility of sites within the region. If the rock features are not an explicit part of the network of intervisibility, then perhaps their defensibility signalled the power of the village to their neighbours, not just outside enemies.

External threats required households to work together for defense, one of the few times when communities mobilised as a whole for a collective goal (Angelbeck 2009:226; Suttles 1951:277). Defense was perhaps one of the most distinctive examples of identities working at different scales, with defensive sites as a material remnant of collective action for a collective purpose that would influence the perception of a community as strong and powerful. An excellent example of the dual nature of identities that were implicated in conflict is the Battle of Maple Bay, discussed in detail by Angelbeck (2009:229-241). This battle against the Lekwiltok in the 1830s was an example of communities from all around the Coast Salish world, normally in conflict with one another, calling a council of war to create an alliance to defeat the Lekwiltok. Differences were temporarily suspended in the wake of a persistent and dangerous threat. A collective identity was evoked in this moment that allowed all other disputes to be suspended (Angelbeck 2009:241).

Rock features in the Lower Fraser River Canyon may be a material reflection of Coast Salish social structure and scales of identity whereby “there is autonomy first, even conflict and tension, at the smallest scale (brother vs. brother), but bottom-up unity to face larger threats” (Angelbeck 2009:242). At the smallest scale, a rock foundation for a plank house, built by the collective labour of the house, could be a signal of the identities of the members of that household, demonstrating power and status to other households in the village or immediate area (Table 9.1 and Table 9.2). Other forms of rock features may mark the right to manage an important fishing location, displaying permanent stewardship and ownership while creating a means to exclude those who lack access. Moving up the scale, a defensive feature may be the result of the collective action of the village to protect against both internal and external threats. When internal threats are most pressing, a defensive feature could be used to protect against people living in other areas of the Coast Salish world.

The position of many defensive features at locations that face downriver illustrates their use in defending the group from downriver threats, including outsiders. If the primary use of defensive rock features was against internal threats, I would expect defensive features to also be present at upriver locations as well. Two sites that may be an exception to the downriver pattern are DjRi-14 (*X̱elhálh*) and DjRi-2, where rock features that could be used to defend sites are found at both downriver and upriver entrances to villages.

The transition between of a site without a rock feature to a site with a rock feature, through the act of building, leaves a lasting impression on neighbours, friends, and enemies. Changing the built environment with a new form of construction requires an impetus and can lead to a moment where the process of structuration is accelerated. All throughout the Coast Salish world forms of the built environment involving the movement of earth and stone increase around 1500 BP (Angelbeck 2009; Lepofsky et al. 2000). It is likely that the rock features in the Lower Fraser River Canyon are part of a general movement to more overt and durable landscape markers. With changes in building practice, agents have new means to enforce their presence on the landscape, and this altered the social structure by creating a new material means of marking ownership and identities. The appearance of defensive structures and burial mounds or cairns in many areas throughout Coast Salish territory at this time may coincide with greater regional interaction (Grier 2003) and possibly greater movement throughout the territory. If more people began to converge on the Lower Fraser River Canyon at this time, the people living there would have had a reason to mark resource and village sites in distinctive and permanent ways, both to visitors and in response to increasing conflict. While more research is required to confirm the timing of rock feature construction, this pattern is a compelling direction for future research.

Agency, the Built Environment, and Processes of Identity Inscription

> Indeed, one of the most striking features of Coast Salish society is the effort the people put into maintaining a host of identity options; options that can be deployed or operationalized at a moment's notice to serve a range of personal or collective objectives. Sometimes, as during fishing season, what is most important is being able to show that one is a member of a particular extended family with ownership rights to a productive salmon fishing site. (Carlson 2010:10)

I now evaluate the extent to which I am able to address collective and individual identity in the past. The archaeological endeavour to explore identities of people who live in the distant past is fraught with challenges (Dobres and Robb 2005; Dornan 2002; Jones 1997; Meskell 2001, 2003), but we continue to grapple with the relationship between material culture, the built environment, and the actions of agents. I have used framework of agency/practice theory in conjunction with landscape archaeology to argue that tracing changes at various scales in the cultural landscape is a fruitful means to explore changes in the structure of ancient societies, caused by the actions of agents.

Although my archaeological analyses suggest that the rock features are a form of building practice that is unique to the Lower Fraser River Canyon, constructing a rock feature may be related to other forms of building practice throughout the Coast Salish world. What, then, can the rock features illuminate about ancient identities? If we consider the process of identity making as an ongoing project throughout human history (Joyce and Lopiparo 2005; Meskell 2003), it is impossible to remove past material culture from that process in past societies. To reduce objects or buildings to their functional uses ignores how materials are important elements of identity building, ancestral connection, and practice. The major challenge facing archaeologists is *how* material culture relates to identities in any given cultural context. Rock features could be the result of the mobilisation of individual, family, household, or collective identities, and likely all of these at once.

Placing the rock features within the theoretical framework of agency theory and landscapes provides me the opportunity to emphasise that rock features, as the result of physical action of agents in ancient society, cannot be separated from social structures, since:

> Previously structured spaces re-structure subsequent action, at the very least by influencing the orientation of actors to the landscape, but also through understandings of place and history that could have been brought to discursive consciousness when use of space changed. (Joyce and Lopiparo 2005:370)

They are part of the dialectic between agent and structure because people built them in a discursive relationship with a system of beliefs, identities, and meanings. While their practical function may have been part of the motivation for their construction, rock features nevertheless became part of the realm of meaning, encoding social relationships, networks, and identities through time. They became important places for mapping who belongs in a volatile landscape where belonging was perhaps constantly in flux. Considering this dialectic as central to our ability to understand the past moves my analysis beyond function into the realm of meaning (Robb 1998). Rock features played a role in inscribing identities on the landscape, in a similar way to how building households, burial cairns, and defensive structures also inscribed elements of identity.

I suggest that a change in building practice by the actions of agents in dialectic with structure reconstitutes the cultural landscape at various scales through time. Building rock features alters or shifts the set of meanings experienced and understood by people living in, visiting, or attacking the landscape of the Lower Fraser River Canyon. What those exact meanings are is beyond the current scope of the research, but some possible interpretations of how monumental rock features may have been perceived can be accessed by considering how large-scale monuments are often markers of power, ancestry, memory, and strength (Buikstra and Charles 1999; Cummings and Whittle 2003; Edmonds 1999; Knapp and Ashmore 1999; Mathews 2006; Yoffee 2007).

Building or using a rock feature could have marked power, status, ownership, defensibility, and belonging at different scales of identity, directed both inward and outward. Families who managed important fishing locations could use the durability of rock features as a means to administer their rights to determine who had access, allowing kin and denying outsiders from partaking in activities at that location. Households could marshal collective labour to build a stone foundation for their plank house, demonstrating the economic and social success of household members and emphasise inequalities between houses with rock foundations and those without the power to build these large, labour-intensive structures. Villages could display their ability to defend against intra- and inter-community attack through building a defensive rock structure at the entrance to the village, and communities could mobilize a broader network of rock features to defend against raids from outsiders. Many of the rock features likely functioned at multiple scales, depending on the circumstance and the audience, but all of them were implicated in the relationship between groups of agents, whether small families or large communities, and the social structures that constrained and enabled action.

Inferring Agency in Action: Rock Features as Managers and Mediators

Beyond this strategic mobilisation of identities to enforce rights, however, lies a realm of meaning, constructed by practice, historically embedded in the physical landscape, which implies a broader set of cultural beliefs reified, reinforced, and modified through the actions of people. Archaeology is an anthropology of the past (Gillespie et al. 2003), attempting to resolve the immense complexity of human experiences through time. Agency theory is a framework to understand how individuals in the past engaged with structure to enforce, disrupt, modify, and be strategic in enacting discursive power. Moving beyond the material and symbolic displays of power that the rock features might represent, I consider the possibility that the rock features themselves became a means to resolve conflict, solve problems, and to remind future generations of the importance of structuring social relationships in a way that upholds the cultural values of Coast Salish society. I suggest that rock features may have been mediators and managers of potentially disruptive human action in this volatile landscape.

The Canyon is a place unlike any other in the Coast Salish world, as described throughout this thesis, and arguably is unique on the Northwest Coast. With the migration of fish came the migration of people from all throughout the river drainage and the ocean beyond, following the fish into the Canyon. Thousands of people, whole villages and families, arrived in a place where land is limited; the river is narrow, and the resources abundant. An unprecedented Salishan social milieu was created in this space when aggregation occurred, considering that conflicts between families, households and villages were commonplace (Angelbeck 2009). With a large collection of people came tension between those families and households that were typically at odds, increasing the possible threat of conflict, jostling for position, or even threatening an outright takeover of the Canyon. We might assume that one powerful group would take over and control access to the Canyon, perhaps even using this place as a base for expansion over their neighbours. This does not seem to be a difficult landscape to control and the advantages of access to food resources provided by the Canyon seemingly outweigh those of co-operation.

Why, therefore, is there no evidence of takeover, exclusion, and widespread conflict in the Canyon? My earlier analysis shows that while the rock features enhanced the perceived defensibility of the landscape, they were not built to protect the community against constant attack. One site at the mouth of the Canyon, DjRi-14, may have been the portal to the rest of the Canyon, acting as a place for managing travel and access to the Canyon above, but exclusionary practices appear to have been more implied than enacted. Ethnohistorical documents show that thousands of people moved to this landscape every fishing season because they had kin relations who lived there, not because they had to pay tribute (MacLachlan 1998). Ethnographies illustrate that exclusion could only be exercised to complete outsiders – family members, even distant kin, were not excluded from using the valuable fishing locations (Duff 1952; Suttles 1960). How was this accomplished?

I suggest two elements were at work here, both of which have implications for the importance of built rock features. The first is management. Structuring the landscape in physical ways implies a structuring of social relationships. Rock features marked spaces into which non-residents were allowed, but where they also saw durable modifications of the landscape as a means to structure their interactions with that place. People who were directly engaged with building rock features, or who could claim ancestral connections with the builders, used these potent places to enforce their sense of belonging, standing in contrast with those who were welcome but who did not actually belong. Visitors were contained and bounded by the presence of the rock features, perhaps in a parallel way to how fish were bounded and controlled in the landscape of the Canyon. The site with the greatest number of rock features, DjRi-14, is placed at the very location where the river itself becomes constricted and rock features are a social mimic of the physical geography of this place.

Second, the rock features may have been mediators, playing a bigger role in *preventing* conflict than protecting against it. Coast Salish societies are based on a central principle of sharing, inclusion, and wisdom gained through knowledge and ancestry (Suttles 1987). Warriors, while valuable, were ambiguous characters, and troublemakers were shunned (Angelbeck). This cultural ethos was at the heart of family and household relationships, and while conflict was an everyday part of life, there were social mechanisms to ensure that the infighting did not get out of hand. Imagine, therefore, a time at which the movement of people into the Canyon was increasing to a point where conflicts were arising with regularity and where the normal mediating elements of society were no longer effective. The structure of society and the cultural belief systems at work became threatened with the increasing internal conflicts. In this time, a family built a rock feature at their fishing site. This created a rupture in the dialectic of agent with structure, introducing an innovative way to resolve a possible conflict over that space. The rock feature was not meant to protect the family who fished at that location from harm, but instead served to enforce the rights of that family to fish. The rock feature became both the solution to the conflict as well as a reminder that conflict was possible at any time. Rock features could be used to create both socially meaningful and socially diffusive space that discouraged any one family or one group from taking a dominant role over their neighbours. Rock features served as both physical markers of the cultural ethos of sharing and at the same time reinforced ownership, territory and belonging. This may appear to be a contradiction, but as described above, the scales of nested, entwined meanings constantly at work in human society do not preclude multiple interpretations of material objects at the same moment.

10: ARCHAEOLOGICAL AND CONTEMPORARY IMPLICATIONS OF THE RESEARCH

Introduction

The Lower Fraser River Canyon rock features are a unique form of construction on the Northwest Coast, found in only a few places and not well understood in terms of their use, meaning, and patterning on the landscape. Placing them into their cultural context, however, shows how they fit into the Coast Salish built environment. My thesis has presented the results of field research that provides some basic data for understanding these unusual features. To conclude, I revisit my original research questions to examine what I can now say about their characteristics and spatial patterning. I discuss the implications of my research for understanding the archaeology of the region before connecting these archaeological features to the contemporary practice of identity-making and claiming in the Lower Fraser River Canyon to argue that there is continuity in this landscape of cultural negotiation, dispute, and conflict over central places. While the mechanisms and cultural context of these disputes are not necessarily the same as they were prior to colonization, locations adjacent to the rock features remain vital to the livelihood, identity, and sense of place of contemporary peoples.

Revisiting the Research Questions

Some of my research questions were based on hypotheses about what these constructions may have been used for, while others addressed basic archaeological questions about function, spatial patterning and age. After completing my analysis data, I return to these questions to see which data contribute to our understanding of these areas, particularly now that the number of rediscovered features greatly exceeds the number of features known before this project began.

What types of features are there? How do they relate to one another? What is their patterning on the landscape?

Since only a small number of rock structures had been identified in the Lower Fraser River Canyon, one of the central questions has been to evaluate what types of features are present and how they are patterned. I recorded 82 rock features of cultural origin, a larger number than identified in preliminary research. A variety of different forms of rock construction are found throughout the Lower Fraser River Canyon, from linear walls to large terraces, retaining walls, and stone enclosures. I was not able to analyse all rock features but selected a sample of 30 features. I identified five main types: (1) walls; (2) retaining walls; (3) terraces/platforms; (4) linear stone alignments; and (5) semi-circular stone enclosures. The most frequent feature type is terraces/platforms, 67 percent of the sample (n=20), suggesting that creating flat, stable areas may have been a primary goal of rock construction in the Canyon.

Although these features clustered at village locations, they were by no means limited to villages. Rock structures were found throughout the landscape, often within 30-50 meters of the river, and in various configurations. I examined how much of the Lower Fraser River Canyon was visible from rock features, and found that most of the shore and the river from Lady Franklin Rock to Sawmill Creek are visible from these features when examined as a complex. In addition, the combination of visibility from all rock features was greater than the viewshed from all sites. I tested the patterns observed in the visibility analysis to see if rock features were placed on the landscape irrespective of other rock features being visible, and rejected the hypothesis that they were situated randomly. This provides evidence to suggest that visibility may have been a factor in selecting where to build rock features, although other elements were also likely a consideration in site selection.

How were they built? How long did it take? How many people did it involve?

Major intertidal rock features exist on the Northwest Coast (Caldwell et al. 2010; Menzies and Butler 2007), but there was limited information about the types of materials used, the amount of labour required, or the number of people involved in building rock structures. I considered a scale for archaeological rock constructions developed by Kolb (1997). Using breaks in my dataset, I divided the sample into three size categories and considered whether they could be compared to labour investment from different social groups, such as family, household, and community level building projects. Based on this measure, a majority of the rock features are larger than single family constructions, falling into the household or community levels. The largest features, requiring the greatest amount of labour mobilization, are terrace features that provide suitable platforms on which to build plank houses. While the amount of time and labour investment is not yet clear and would require experimental construction, the evidence suggests that some rock features would require a number of people, working in a coordinated fashion, to build them. Some rocks in the larger terraces, upward of 10 tonnes in weight, would also require the use of some basic machinery such as pulleys and levers, to manoeuvre. The use of such technology is not without precedent on the Northwest Coast, considering that large house, memorial, and marker posts were raised in houses and at village sites elsewhere.

What were they built for? What were they used for?

Although the relationship between what rock features were built for and what they were used for may appear to be closely related, my approach considered their repeated modification, maintenance, and re-use through time. I was able to relate ethnographically recorded cultural activities within the Lower Fraser River Canyon to explore three different possible uses for individual rock features: (1) fishing; (2) defensive walls; and (3) living surfaces. A variety of attributes were used to differentiate features into these categories, the largest of which are terraces of a suitable size on which to build a plank house, consisting of 43 percent of the sample (n=14). Five features in the sample (17 percent) are inferred to be fishing features – four are possible bases for fish drying racks, defined by small terrace features in exposed, windy locations, along with one unusual semi-circular stone enclosure that may be a fish trap. There are also six possible defensive features (20 percent), identified by their prominent location and likelihood of being freestanding in the past.

The function of the remaining five features has not yet been identified. Several of these features appear to be retaining walls, along or at the base of slopes, but create no noticeable terrace. They are also not freestanding and do not appear to provide cover in the event of an attack. My current hypothesis for these, particularly the monumental rock feature at the base of the entrance to one village location, is that they may mark these sites as belonging to a community. Monumental welcome posts at the front of large villages elsewhere on the Northwest Coast were a method to mark the landscape, so this could be a parallel activity using a different medium. Overall, these proposed uses of rock features speak to a much larger building complex than just rock fortifications, indicating that rock features were a part of the everyday lives of people living in the Lower Fraser River Canyon. Further research is necessary to expand upon these uses and gather additional evidence, both archaeological and ethnographic, to test these interpretations.

Are these features defensive? What is the role of conflict in this area and how may it have impacted the building of these features?

Not all rock features were defensive, but the situation is complex. First, some features can be argued to have served a primary defensive function. These are located along pathways to large Late Period village sites (inhabited circa 550-200BP) and appear to have been built to restrict access and give defenders of the site a height advantage over oncoming attackers. These six features show evidence of being partially or completely freestanding in the past, meaning they would have effectively provided cover for the defenders from handheld projectiles. The majority of the sample, however, does not share these characteristics, so cannot be explicitly labelled "defensive features."

An interesting outcome of the analysis related to this question is that a feature does not have to be functionally defensive to increase the defensibility of the landscape. When applying the Defensive Index, a quantitative and comparative measure of defensibility, all but one site in the Lower Fraser River Canyon with rock features measured high on the scale, illustrating a primary concern for defensibility in site selection and modification. I used a site lacking rock features as a sample to confirm that it is not just the landscape itself that provides a high defensive measure, but that the building practices of people in the Canyon enhanced the landscape to improve their ability to defend their village locations. Even rock structures that appear to have been used primarily for other functions, not defense, serve to increase the defensiveness of sites.

I addressed the question of defensibility from a Canyon-wide perspective, using visibility analysis to test whether sites in the Lower Fraser River Canyon were intervisible and connected by a line-of-sight. My results indicate that while not all rock feature sites are intervisible, when other important locations in the Canyon, such as the Milliken locality, are included, the entire Canyon from DjRi-14 to DjRi-46 is connected by a line-of-sight network. This supports the hypothesis that a network between village locations in the Canyon may have existed, where a signal was sent from downriver to upriver in the event that raiders were approaching. While the visibility analysis indicates the possibility for this line-of-sight network, further work needs to be done to find additional evidence. Not all features function as defensive, but many enhance the landscape and may have been specifically chosen so that other sites could be seen from their location, meaning features have defensive qualities beyond mere physical attributes.

When were they built? Was there more than one building event?

The age of these features is important to understanding many other elements of their construction, use, maintenance, and abandonment, yet it is one of the more difficult questions to answer archaeologically. Most rock features, as their name implies, are constructed out of stone with very little soil to obtain material for radiocarbon dating. For several features, I attempted to use a soil probe to see if there was a suitable location to place a test excavation, but consistently hit rock 20-30 cm below the surface. In the one feature where I opened a 50 cm by 50 cm unit, we hit rocks at about 40-45 cm below the surface. Cultural material and charcoal were present in the deposits atop the rock feature, but the context was too disturbed to warrant radiocarbon dating. Other dating methods I investigated included optically stimulated luminescence dating, which was not pursued due to the lack of precision of the method on rocks, and dendrochronology, which resulted in trees being dated on top of rock features. Most trees dated within the past 120 years, indicating only the history of disturbance of this area. One tree on DjRi-14, however, has been dated to the 1780s, illustrating that this feature would have been abandoned by that time. In addition, excavation data from the Milliken site mentions several examples of rock features dating as far back as 8000 BP. Building structures out of rock in the Lower Fraser River Canyon may have a very long history.

One outcome for considering the rock features as part of a broader Coast Salish built environment is the possibility for predicting when rock features may have begun to appear on the landscape. There is a general increase in Coast Salish building practice of several types from the period of 1500-1000 BP, with the appearance of mounds, cairns, and defensive sites. This is compelling for understanding the timing of rock feature construction, because prior to 1500 BP, the only form of monumental building occurring among Coast Salish peoples, as far as we know, were plank houses. Plank houses were occupied in the upper Fraser Valley and Lower Fraser River Canyon at this time and there appears to be evidence for interaction throughout the Coast Salish world by 1500 BP (Grier 2003). Schaepe (2006), based on an analysis of ethnographic and ethnohistoric data, concludes that the features were likely to have been built in the Late Period over the past 500 years, but the only dates that are associated with the rock features are from times after which they would have been abandoned. Considering the other forms of building that increased in other areas of the Fraser River drainage and the Gulf of Georgia, it is possible that the rock feature complex arose during the period between 1500-1000 BP. Once in place, the features may have been expanded or altered during the last 500 years before European contact.

Archaeological Implications

Rock features are ubiquitous on the landscape of the Lower Fraser River Canyon. Built to modify the landscape, likely in practical ways for fishing, defense, and living surfaces, these features have the consequence of marking this space as distinct from other areas of the Coast Salish world. This statement alone has implications for how we view the archaeology of this region, as these structures are not merely specialized fortifications, but played a role in many aspects of ancient cultures. They appear to have been a part of the day-to-day activities of people living in this area. Living in a plank house, even if it only occurred for part of the year, involved a broader range of the experience of people living in the Canyon than protecting communities from attack.

While the presence of built rock features is related to having viable materials to build stable structures, it is interesting that they have only been located in this region of the Coast Salish world. A story told to Ellen Webber in the mid-1890s recounted that raiders were fended off with stones piled in cairns in front of an old village in Coquitlam territory (Harris 1994:595), so it is possible that some of these rock forms had a further range than evident in the archaeological record today. The Lower Fraser River Canyon, however, was and continues to be an area of great importance for Coast Salish peoples.

The Lower Fraser River Canyon fishery was among the most significant salmon fishing locations on the Northwest Coast, due to the ability of people to catch, process, and prepare salmon for storage using technologies of dip netting and wind-drying. A family could acquire a year's worth of salmon in a very short period of time, using the benefits of the local geography that allowed salmon to be caught with relative ease and dried without the need for smoke. Accounts from First Nations and settlers illustrate the pattern of seasonal aggregation, whereby thousands of people from all over the Gulf of Georgia and throughout the Fraser Valley would descend upon the fishery in the Lower Fraser River Canyon for two months in the summer. While it seems likely that the Canyon was densely populated in the late pre-contact period (Carlson 2001c), this influx of people would have greatly increased the short-term seasonal population. The estimates of people travelling to the Canyon are based upon accounts from the Fort Langley Journals, where the Factor recorded the number of canoes from various groups, including the Cowichan, Nanaimo, Squamish, Chemanius and Saanich peoples, heading up to the fishery during the summers of 1827, 1828, and 1829. Considering the devastation that smallpox may have had on the population of the area in 1782 (Harris 1994), the number of people travelling to the fishery prior to this point could have been considerably higher, perhaps even 10,000 or more.

If, as I hypothesise, 10,000-plus people arrived in this seven-kilometre stretch of narrow, steep-sided land in order to fish, the question of who belonged in this valuable area would be paramount. There are different perspectives on how ownership and stewardship over these locations was negotiated in the past, but the most common interpretation is that families managed fishing stations, keeping track of who fished there, the overall capacity of fish camps, and how much fish each family might need (Carlson 2007; Naxaxalhts'i 2007). People, connected through blood or marriage, were permitted access to fishing stations, and marriages were sometimes organized strategically between upriver and downriver families to maximize access. The owners of the locations, however, usually were those who lived in nearby villages in the past

(Duff 1952:78). Suttles (1960:300) notes that access to the most productive resource locations was restricted by property rights and owned by extended families, with control over these sites exercised by individuals. High status individuals were partly distinguished because they would share food, direct food production, but owning both the site and the gear.

> When a leading member assumed a name that harked back to the beginning of the world when the ancestors of the group first appeared on the spot, this not only demonstrated the validity of the group's titles but perhaps also announced in effect 'this is the man in charge of our resources' (Suttles 1960:301)

The rights to fishing stations used to be passed on through public feasts and potlatching, and were typically handed down from father to son. In an area where rights to valuable fishing locations were managed by a head of a family and enforced in the public display of passing on power through naming to the next generation, it seems compelling that a durable physical marker exists on these same locations, particularly in light of the immense seasonal aggregation. Almost all the rock features are located at or near known fishing spots that are still used today. Rock features, as a more durable form of landscape modification, may have been tied to notions of marking ownership of resource locations, households, or villages. While access to fishing locations was permitted to kin, the rock features are a visible marker that someone managed, modified and maintained these locations. It may have also enforced the year-long presence of people at these places, distinguishing residents from visitors through marking village sites with rock features.

At a broader cultural scale, these features are also interconnected beyond just individual fishing stations. They pattern on the landscape in a way that may enhance people's ability to see other rock features, in a similar fashion that village locations are situated in places where other villages are visible. Schaepe (2006:671) hypothesised that this points to a larger "multivillage defensive network aimed at regulating access to the entire Canyon." My analysis provides some elements that support this interpretation, including results of the viewshed which point to a canyon-wide network of visibility. Not all the villages in the network contain rock features, indicating that rock features themselves may not have been central to this network. Intervisibility of villages and rock features may support the interpretation that the Canyon was centrally managed and that inter-village leadership and co-operation was present (Schaepe 2006). Building some of these rock features would have required coordination at a community level. Centralized leadership is disputed in contemporary fishing wars that are being played out on rock structures.

At the broadest scale, the rock features of the Lower Fraser River Canyon may be connected to areas far beyond the Canyon boundaries as established in this thesis. One element of the landscape that I could not adequately address in this thesis for reasons discussed elsewhere is the spiritual dimension of the Lower Fraser River Canyon. Prominent places on the landscape are associated with the activities of mythical beings and there are accounts of spiritual tunnels with entrances and exits within the Canyon (Carlson 2010:7-11). Carlson describes the tunnels as portals connecting disparate points on the landscape into adjacent places. Travelling through the portals involved a dangerous spiritual journey. It is possible, therefore, that some of the rock features built at locations in the Canyon were markers of these dangerous and powerful places.

Contemporary Implications

> Indigenous communities have never been static units. The various options available at any given time have meant that collective identity has always been a somewhat contentious and negotiated matter. Thus, it is possible to say with confidence that collective identity has long assumed a situational salience (Carlson 2003:335)

The question of who belongs in the Lower Fraser River Canyon has perhaps never had a simple answer. As my research has explored, the interplay between physical modification of the landscape with the mediation of access and ownership to desirable fishing locations is complex. The relationship between identity, belonging and ownership is ongoing, as illustrated by contemporary disputes over rights to, and ownership of, resources coalescing in the same areas that played a pivotal role in defining identities in the past. Identities continue to be forged and contested today through various mechanisms, demonstrating tension between tradition and the changing nature of legal means to gain rights to title under a colonial government. This tension between innovation and tradition has been explored by Carlson (2007), who notes that the use of western legal structures by local community members to assert individual ownership of fishing rocks or eddies is resisted by those who wish to maintain more traditional means of defining access. He points to several changes in fishing practice, technology, and the movement of people out of the Canyon as important considerations in these disputes.

People living in the Canyon were encouraged and later forced to move to more arable land during the late nineteenth and early twentieth century after selling fish was banned (Carlson 2001b:58-59). Left with no economic livelihood, people began to leave the Canyon and no longer lived near their fishing rocks. Changes in technologies, including a move from dip netting to gill netting, the shift from primarily wind dried salmon to frozen and canned processing, and the introduction of cars and motor boats impacted how and where people fished. The rocks became less important than eddies on the river, which increasingly came to be seen as owned property (Carlson 2001b). During this shift, new means of defining ownership through colonial structures were used by local community members. This was particularly pronounced prior to the establishment of reserves; there is an example of one family applying to purchase a disputed fishing rock, forcing the government to address the fact that reserves for fishing had not been established (Carlson 2007). This example shows that both parties claiming this fishing rock noted that the conflict had been going on for "the past fifty years" (Carlson 2007:163), indicating that these conflicts were not merely a consequence of social changes, but had a long precedent.

A more recent dispute was over one of the reserves in the Lower Fraser River Canyon, Kuthlath IR3, which belongs to the Shxw'ow'hamel First Nation, currently situated between Hope and Chilliwack along the Fraser River. All other reserves in this stretch of the Canyon are registered with the Yale First Nation, located in the town of Yale at the entrance to the Canyon. Using this, along with additional evidence, the Yale First Nation filed a claim to have the rights for this reserve transferred back to them. During the time when this was before the courts, the Yale First Nation enforced their rights to this area by putting up "no trespassing" signs around the perimeter of the reserve. As discussed in Chapter 4, this was ongoing during my fieldwork, and this reserve contained a third of the rock features I had recently relocated through ground survey. In the middle of the dispute, human remains were found on the site by another field crew, leading to an alleged confrontation between members of the Yale First Nation and the Stó:lō Research and Resource Management Centre in the presence of the RCMP. A few months later, the court passed down a ruling confirming the reserve as belonging to Shxw'ow'hamel – "the Indian Claims Commission…ruled that the 143-hectare Kuthlath Indian Reserve #3 in the canyon belongs not to the Yale but to the Shxw'ow'hamel, a Stó:lō member band, in a dispute dating back to 1918." (Agassiz-Harrison Observer). For the moment, that situation seemed somewhat resolved.

On February 5, 2010, leaders of the Yale First Nation initialled a Final Agreement with British Columbia and Canada, setting the stage for their members to vote to ratify the treaty and send it before the provincial legislature.

> "The Yale people have been in the Fraser Canyon for more than 9,000 years leading up to this moment," said Yale First Nation Chief Robert Hope. "This agreement gives us our life, our freedom and confirms our land. The certainty it brings provides a solid economic foundation upon which to build for future generations of Yale members."(Canada News Release, Feb 5, 2010)

This has the potential to have an impact on the ways in which rights to fishing locations are negotiated in the Lower Fraser River Canyon and was met with serious objection by members of the Stó:lō Tribal Council. At issue now is the concern that Stó:lō people would be denied access to what they see as their traditional fishing locations.

> The Stó:lō Tribal Council is concerned that wording within the yet-to-be ratified agreement may force other downstream First Nations from their traditional salmon fishing sites in the Fraser Canyon or have Stó:lō members, wanting to access those sites, having to ask permission of the Yale chief to cross Yale Treaty Settlement Lands. "They don't have the right to give away your right to fish...they want you to ask permission but you have never had to ask permission of anyone before," said Pennier to the crowd of protestors at Camp Squeah, a conference centre between Hope and Yale. "They are talking about getting some of that land other than existing reserve land so that they can put up no trespassing signs… trying to keep people off." (Rolph 2010 – Hope Standard, Feb 5, 2010)

In response to the initialling of the treaty, the Stó:lō Tribal Council, who represents a large portion of the bands to claim ancestral rights to fishing locations in the Canyon, released a media statement presenting their position. Stó:lō leaders see it as their duty to "protect the Aboriginal title" for families who fish in the Canyon, and claim that the Yale treaty will only serve to exacerbate the conflict over resources in this valuable landscape which will be "fought out on the rock walls of the Fraser Canyon" (Stó:lō Tribal Council Tribal Chief Tyrone McNeil – Stó:lō Tribal Council Media Release, Feb 5, 2010). The Yale responded by noting that the treaty will not give them exclusive rights to access the fishery:

> "The Stó:lō will still have the opportunity to fish in the Fraser Canyon, many will go into the canyon on the larger aluminum boats, others will cross our treaty settlement lands to get to the river. We will make a protocol with the different communities, make some sort of an arrangement for them to cross our land to get to the water and cure the fish in a traditional manner."
>
> "The Stó:lō assert the right to fish" in the canyon, but "they have not been able to prove anything. Times are changing and we have to abide by the general laws set out in this land and trespass is one of them. They have to respect that." – Yale Chief Robert Hope. (Rolph 2010 – Hope Standard Feb 5, 2010)

These areas in question are the same locations that are marked with rock features, and now will be subject to different forms of territorial markers, including signs designed to keep trespassers out of the territory of the Yale First Nation, as defined by their treaty with the colonial government. New mechanisms reflect old disputes, as new laws provide ways for communities to enforce their right to manage and control access to important locations in the Lower Fraser River Canyon.

When considering the overall implications of my research, I also have to consider whether the work, as presented, would be meaningful to the people who inhabit the landscape of the Canyon today. After engaging in fieldwork and analysis of the rock features of this area, I am left with the sense that my work, while attempting to find a neutral middle ground, remains entrenched within western scientific conceptions about archaeological research, analysis, and theory. This was not my goal at the outset of the dissertation, but considering the ongoing political circumstances around ownership and access to the Canyon, I could not find a way to integrate local meanings of the landscape into my analysis without alienating one or the other community. I understand the deep historical and inalienable connection that many people from different Stó:lō and Yale communities have with the Canyon landscape. This has been discussed at length in other publications (Carlson 2001c, 2007; Naxaxalhts'i 2007; Schaepe 2006, 2009) and while I have pointed this out at several places in my thesis, I have not made it a central tenet of my work. I hope that there are elements of my analysis that resonate with local community members and that they see the research as valuable.

Future Directions

In light of current political tensions and ongoing conflict over sites where rock features are located, I hope to take my research in two directions. The first focuses on some of the remaining archaeological questions about these rock features, particularly their age. My anticipated next step, pending community consultation and permission, is to find better ways to date these features. This may involve excavation into one or more to find datable material in more secure contexts than the area just below the surface. Other possibilities include dating buried fluvial sediments (instead of rocks themselves) using Optically Stimulated Luminescence, increasing the scope of dendrochonological analysis by increasing the number of trees dated, and potentially performing some lichenometry on the rock features, although the local lichens may not be the best indicators of age. Dating by association with village locations may also be an avenue to explore, which would involve a non-invasive sampling strategy as described in Schaepe (2009).

Mapping projects need to be expanded; I plan to map all features in the Canyon in three dimensions and plot these onto a high resolution digital elevation model. This will allow for precise analyses of viewshed and open up other possibilities for GIS measures. Based on the results of my analyses, DjRi-3 and DjRi-5 (Milliken/Aselaw) need to be revisited and mapped using the techniques outlined here. Data indicated that this was a central location in the Canyon, even if there was not a lot of evidence remaining for rock features. A full survey of the front of the bluff above the Canadian National Railway tunnel in this area is another necessary step, as the area was too treacherous to traverse during survey. Along with maps, all of the features should eventually be included in the sample, expanding the dataset so we can examine the full range of features and provide a large enough database to run confirmatory statistical analyses. Finally, depending on the political situation, I hope to revisit DjRi-14 to map and record the features at this location. It has the highest intact concentration of rock features of any site in the entire Canyon.

I also hope to explore foundations and consequences of the types of disputes that impacted my research. My experience was not unique, but many archaeologists working in potentially contentious territories often end up working in depth with one community for very valid reasons. This can obscure the complex nature of the relationships between archaeology, history, identity, legal structures and Aboriginal title. While these questions were not central to my research, they have come to the forefront of my thinking after spending time on the ground at these important sites. If communities are willing, I am interested in talking to various community members, academic archaeologists, and consulting archaeologists to find out what they have to say about these issues. My goal in this research is to suggest directions for changes in archaeological practice by identifying factors that contribute to unequal representation of indigenous communities in the production of archaeological knowledge, particularly in disputed territories.

The other major challenge is engaging in "post-colonial" or "decolonized" archaeology when much of the funding, legislative and education structure in which we work remain colonial, as (Barker 2009:325) notes that “Canadian society remains driven by the logic of imperialism and engages in concerted colonial action against Indigenous peoples whose claims to land and self-determination continue to undermine the legitimacy of Canadian authority and hegemony.” Barker (2009:334) further notes that the treaty process in British Columbia, in which some groups have broken off from larger conglomerates of bands to negotiate with the province has been rewarded, demonstrates a “divide and conquer” mentality. Archaeological knowledge is evoked in land claims, but we have to be cognizant of the consequences if the results of our research become another tool in the colonial enterprise, even if our intentions are toward decolonization. As long as colonial government structures determine how territories are defined, indigenous communities will remain subject, as even “the very maps that indigenous people hope will reconcile their claims with the jurisdiction and property claims of the state may in fact subvert indigenous notions of territory and boundaries” (Thom 2009:179). I believe that areas of dispute may be the most fertile ground for us to further explore the power relationships that underlie our archaeological practice and unpack the continued colonial structures that stymie our attempts at returning that power to descendant communities.

Final Thoughts

I came into this project excited to work collaboratively to produce a thesis that would incorporate many different ways of knowing into understanding these mysterious rock features that marked an important landscape to Coast Salish peoples. Ultimately, the contentious nature of the interaction between the Stó:lō Nation/Stó:lō Tribal Council and the Yale First Nation hindered my efforts to build collaborative relationships, causing me to reflect on my own personal ethics and how these results might be mobilized by either group for their political objectives. Identity and belonging are still defined through the relationship to fishing locations, and I do not want to interfere. When two communities claim right to territory where we, as archaeologists, work, we can occupy a less contentious ethical and epistemological space than members from each community, or than researchers who have developed strong collaborative relationships. In my case, both communities were interested in the outcomes of the research - the questions I asked and the areas I was studied were important to community members on both sides of the dispute. I was able to proceed with the research because I was seen as "neutral"--I did not work for one community exclusively and made arrangements to share the results of my research with both communities. I do not refer in this thesis to rock feature locations or other archaeological sites using Stó:lō place names so as not to privilege one contemporary community perspective over another. Even the physical products of my research, such as artifacts, could be held in a "neutral" location at a museum. This was the best practice in my situation, but it did limit the amount of direct intellectual contributions either community could make to my project.

My compromise was to stick to the archaeology as much as possible, letting these remarkable features speak for themselves. They are spectacular – I have never encountered anything of this scale made of stone elsewhere on the Northwest Coast – and the more time we spent surveying, the more amazed I became at the sheer scope of landscape modification that these structures represent. Throughout my analysis, I gained a greater appreciation of the role that these features played in the everyday lives of people, constituting the foundation of the very households for families in the Canyon, the basis for drying racks central to subsistence and economy, and a means to protect their communities against violent attackers. They are also a durable marker of a history of identity making, ownership, and belonging in the Fraser Canyon, situated as they are at fishing stations used for thousands of years, seeing the coming and going of potentially tens of thousands of people. This material legacy has not lost its potency in the wake of an ongoing, although transformed, process of claiming rights to access these places. The rock features stand at those very spots that have been important to local people since time immemorial, attesting to the power of this landscape, past and present.

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APPENDIX 1: HALKOMELEM PLACE NAMES

Stó:lō Halq'eméylem Name	Borden Number	Rock Features	Type	Translation/Meaning
Aseláw	DjRi-5	No	Settlement, spirited, resource	Estloxw (you heard of it, feel it, experienced it), "talk to the spirit", "no harm"
Chelqwéylh		No	Settlement	"At the back" – tseleyeqw (travelling the back road)
Í:yem	DjRi-2	Yes	Resource, transformation, settlement, spirited	Good place for catching salmon, "strong", "lucky place"
Lahits		No	Settlement, spirited, resource	"Something told", what they're doing, where they're going, when they're coming
Leó:s		No	Geographic	"facing each other"
Lexwchéwōlhp		No	Resource	"always cottonwood trees"
Lexwslex	DjRi-21	No	Geographic	"always steep ravine"
Lexwth'istel		No	Geographic; eddy	"always horns" – eddy where drowned deer and elk showed up
Lexwts'okwā:m	DjRi-46	Yes	Settlement, resource	"always skunk cabbage"
Lexwyó:qwem		No	Geographic	"always rotten fish"
Lhalqelo		No	Other; resource	"stop off" – current fishing site
Lheqawtel		No	Fishing site; settlement	"resting area"
Lheq'etáyeq		Yes	Geographic	"spread/stretch legs" – stepping from rock to rock
Lheqwot		No	Resource	"breaking off" – rock bluffs
Lhilwqwels		No	Resource	"place to hook fish"
Popelehó:ys		No	Event; geographic; mountain	"rising up; growing" – mountain kept growing during the flood in order to save people
Q'aleliktel	DjRi-13, DjRi-62	Yes	Settlement, spirited, resource	"go over something"
Q'awa		No	Transformation	"cane" – the Transformer left his cane and it transformed into stone
Qemqémel		No	Resource	Pool below Í:yem – good fishing
Q'iq'eye<u>x</u>		No	Unknown	
Qwechi:melh		No	Unknown	"packing something"
Qwél:es		No	Transformation	"whale" – surfacing whale turned into a large rock
Qweyōxwem		No	Geographic	"whirlpools"

Stó:lō Halq'eméylem Name	Borden Number	Rock Features	Type	Translation/Meaning
Sche'i:l		No	Transformation	"strong lungs"
Sése		No	Geographic	"river washed up and over the rocks"
Si:seqels	DjRi-21	No	Geographic	"always steep ravine"
Stsaletstel		No	Transformation	"chair"; "seat"; "bench" – transformed stone seat
Sx̲wesálh		No	Spirited	"pushing something" – clay burial mounds reported here
Th'ex̲elis		No	Transformation	"showing his teeth" –place where Transformer left scratch marks on rock
X̲elhálh	DjRi-14	Yes	Settlement, transformation, spirited	"hurt"; "injured person"
X̲'eylex̲elamós		No	Unknown	
X̲wox̲welá:lhp		No	Geographic; settlement; spirited	"where willow trees grow"

[28]

[28] All place names, types, and definitions are reproduced from *A Stó:lō-Coast Salish Historical Atlas* (Carlson 2001).

APPENDIX 2: TABLE OF ALL ROCK FEATURES[29]

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T01	Y	DjRi-2(S)	Terrace, platform			This feature was originally connected to RF-T02 but the centre has collapsed. I attempted to clear the centre, but it is quite unstable. Artifacts litter the slope, so I decided to leave it alone for now. I have only included the areas of RF-T01 that is highly visible. It could have been larger at one point. This location would be an ideal spot for a terrace on which to build a longhouse.
RF-T02	Y	DjRi-2(S)	Terrace, platform		large bedrock on the east end of the feature	I began to clear this features but there was so much FCR and a number of flakes that I stopped - it began to seem like I was excavating. This feature was originally connected to RF-T01 but it has collapsed in the centre. I suspect there was a long house associated with it at one time.
RF-T03	y	DjRi-2(S)	Terrace, platform	Downriver and downslope from RF-T01 and T02 with a similar aspect	bedrock at the downriver edge.	Downriver and downslope from RF-T01 and T02 with a similar aspect. Some intact stacking but partially jumbled. A large cedar tree is growing out of the feature.

[29] This appendix contains one continuous table.

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T04	Y	DjRi-2(S)	Terrace, platform		Rows and courses difficult to determine due to disturbance	This feature is unusual in that it is quite jumbled, with rounded rocks and little visible structure. There are several sports where this appears stacked, but it is not nearly as clear as the other features at this location. It is good to include in the sample as an example of the range of features. The disturbance made some of the measurements difficult to confirm.
RF-T05	Y	DjRi-2 (N)	Terrace, platform			This is the first feature encountered walking downslope from STN1. Part of it has been disturbed, possibly to create a pathway down to the river. Part of it has also slumped into a narrow rock gap. This slump is captured in the longer length measure above. Although a platform, this is a very defensible location, as it fills in a gap between bedrock.
RF-T06	y	DjRi-2 (N)	Terrace, platform			Seems to extend down slope from what was originally defined as the feature - it has clearly slumped down. Has a Douglas Fir growing on top (83.9cm in diameter at thickest point). We mapped the portion of the wall that remains intact. The wall has slumped downslope 2.9m with a max width 3.24m.
RF-T07	y	DjRi-2 (N)	Terrace, platform		Adjacent to RF-T06 - between two large pieces of bedrock. Measurements taken from RF-T06 baseline	This feature may have been attached to RF-T06. It appears that on this side of the bluff at DjRi(N), the rock features may have been used to fill in the gaps in the bedrock, perhaps to level ground or for defensive purposes.

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T08	N	DjRi-2 (N)	Terrace, platform			It is likely that T06-T08 comprised a single rock wall at one point in the past, although for measuring purposes I have considered them individually. This feature is made up of very large rocks on the N. edge of a ravine (which may have had a stream cutting through it at one point). This has partially fallen away and is not a particularly clear feature (hence it was not included in the sample). It is also difficult to access due to the steep drop below.
RF-T09	N	DjRi-2 (N)	Terrace, platform	Located at the (Pete's) fish camp		This feature is quite disturbed and it is unclear how much of it is recent v. ancient. It may have been greatly modified by recent activity. It is a terrace (similar to RF-T01 and RF-T02) that sits atop a very rocky slope. GPS did not work at this location.
RF-T10	Y	DjRi-2 (N)	Wall	Located at the (Pete's) fish camp	chinking	This is the first of three features that line the slope below a modern dry rack about 100m upriver from DjRi-2. It has clear stacking and is a nice example of a wall feature. It is not a terrace
RF-T11	Y	DjRi-2 (N)	Wall	Located at the (Pete's) fish camp, above RF-T10	May have once be part of the RF-T12	This feature may have been part of RF-T12 but it has been disturbed, possibly by recent activity. I have somewhat arbitrarily defined this as separate from RF-T12
RF-T12	N	DjRi-2 (N)	Wall	located at the top of the slope above RF-T10, RF-T11		This feature may have been connected to RF-T11 at one point but now has collapsed. It is one of the longer features we encountered in the course of the survey as it wraps around the northern portion of the bluff.

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T13	N		Terrace, platform	200m upriver from Saddle Rock alongside a creek		This feature is slightly suspicious as it is close to the railway - there was considerable moss growth which, when removed, revealed some clear rock construction that is consistent with other known RF's. It does not fit the pattern of other features exactly, as it runs across a stream, not beside it. It is terrace like and it is quite a defensible location near one of the only places to land in the area. It is not close to an habitation areas.
RF-T14	Y		Terrace, platform	5.2 km north of Yale on the south bank of a small (seasonal?) creek running down towards Steamboat Island. There appears to be another feature running along the N. bank, but it has fallen away. Located at the base of a steep bluff.	not far above high water line	This feature is located at a small creek around (north) the bluff from RF-T10-T12. The creek runs into an eddy near a large set of rocks in the Fraser River (Steamboat Island?) and is about 30-40 m S (downriver) from Saddle Rock. This feature, as it is directly adjacent to the creek, could be easily missed (especially as it is largely covered in moss). Clear evidence of stacking appears when the moss is removed. This one is more of a terrace and wraps around a corner. A cobble chopper was found directly below the wall of the E. side facing the river. Although quite unstable, this is a spectacular rock feature. It is nearly vertical with a platform on top of it. There are a lot of smaller rocks wedged into it as well. I do not know what this was used for.

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T15	N		Terrace, platform	Approx. 50-60m upriver and upslope from RF-T14.		This feature is atop a steep slope and runs along a drop down to the Fraser River. It is quite long and not particularly high. Logistically, it is a challenge to reach and manoeuvre around, as several of the rocks are quite loose. There is flat ground on top of the feature and it is very brushy.
RF-T16	Y	DjRi-45	Wall	On a trail down to the river from the Pettis' fish camp		This feature looks like a wall that was filled in by slump behind it. It does create a level surface on the top, but not a large one. It was not built by the current family that fishes at this location. This is one of the few spots in the area where you can get up the trail from the river
RF-T17	Y	DjRi-45	Semi-circular stone enclosure	On the beach S. of the Pettis' fish camp.	at the high water line. Unusual because it has three sides	This feature may be historic because it has rounded boulders and cobbles and some historic refuse. The S. end is one large boulder with some general stacking. There are some metal objects visible on the surface. Larry suggested it may have been a fish trap
RF-T18	Y	DjRi-46	Wall		at the front of a flat terrace and just upriver from RF-T85 and T86	This is a fairly linear feature stretching along the edge of a sharp, steep slope. It looks likely that this would have stood higher at one point (particularly in the centre) and would have been largely freestanding in the past. There are several areas where there is soil accumulation within the feature. Recorded by Schaepe and McHalsie.
RF-T18b	Y	DjRi-46	Wall	Just downriver from RF-T18	med/loose stacking	

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T19	N		Terrace, platform			Small feature with some large rocks, but all of the rocks are reasonably flat. The feature is somewhat jumbled and surrounded by a natural rock slope.
RF-T20	N	On IR3	Terrace, platform	E. side of the bluff above DjRi-14		This is on the back side of the bluff, part way up the path that leads across the top of the bluff.
RF-T21	N	On IR3	Terrace, platform	Top of the path across the bluff		This feature is a short, flat terrace feature right atop the bluff at IR3
RF-T22	N	On IR3	Terrace, platform	Atop the front of the bluff on IR3		Terrace-like feature facing downriver, somewhat disturbed, used to enhance some natural terracing
RF-T23	N	On IR3	Terrace, platform	Atop the front of the bluff on IR3		Terrace-like feature facing downriver, somewhat disturbed, used to enhance some natural terracing
RF-T24	N	On IR3	Terrace, platform	Atop the front of the bluff on IR3		Terrace-like feature facing downriver, somewhat disturbed, used to enhance some natural terracing
RF-T25	N	On IR3	Terrace, platform	Atop the front of the bluff on IR3		Terrace-like feature facing downriver, somewhat disturbed, used to enhance some natural terracing
RF-T26	N	On IR3	Wall	Along the front of the bluff at IR3 near river level		This is the very long, well stacked terrace/retaining wall that runs along the entire base of the bluff (as noted in Schaepe 2006)
RF-T27	N	On IR3	Terrace, platform			
RF-T28	N	On IR3	Terrace, platform			
RF-T29	N	On IR3	Terrace, platform			
RF-T30	N	On IR3	Terrace, platform			

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T31	N	On IR3	Terrace, platform			
RF-T32	N	On IR3	Terrace, platform		2005-F516	
RF-T33	N	On IR3	Terrace, platform		2005-F504	
RF-T34	N	On IR3	Terrace, platform		2005-F509	
RF-T35	N	On IR3	Terrace, platform		2005-F503	
RF-T36	N	On IR3	Terrace, platform			
RF-T37	N	On IR3	Terrace, platform			
RF-T38	N	On IR3	Terrace, platform			
RF-T39	N	On IR3	Terrace, platform			
RF-T40	N	On IR3	Terrace, platform		2005-F507	
RF-T41	N	On IR3	Terrace, platform			
RF-T42	N	On IR3	Terrace, platform			
RF-T43	N	On IR3	Stone-lined CD			
RF-T44	N	On IR3	Stone-lined CD			
RF-T45	N	On IR3	Terrace, platform			Downslope from RF T43
RF-T46	N	On IR3	Terrace, platform			On the North side base of the bluff near the beach
RF-T47	N	On IR3	Terrace,			Towards the beach, N. of RF-T46

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
			platform			
RF-T48	N	On IR3	Terrace, platform			50m N. of RF-T48 along the beach - it may be associated with mining activity - lots of evidence of historical refuse.
RF-T49	N	On IR3	Stone-lined CD			Feature is flagged either as a rock wall or a stone-lined house depression - located near a dilapidated shack.
RF-T50	N	On IR3	Stone-lined CD			Another previous flagged rock-lined depression
RF-T51	N		Natural rock feature	On the next bluff above IR3.		May or may not be a feature - it is quite near the tracks and the old power line. It may have been partially destroyed by the railway or it might just be debris. GPS unreliable but we are taking points where possible.
RF-T52	N		Natural rock feature	Along the back edge of next bluff above IR3 above the railway, facing E.		Along the back of the bluff but clear of the railway debris. It is quite covered in dirt a moss but it fits with what we have seen. A very large fir tree is growing out of the centre of the feature.
RF-T53	N		Natural rock feature			Upslope from RF-T52 - partially collapsed rock feature. Like RF-T52, it is quite overgrown and very mossy. It faces E away from the river, but from the top of the terrace there is a good vantage point downriver.
RF-T54	n		Natural rock feature			
RF-T55	n		Natural rock feature			
RF-T56	n		Natural rock feature			
RF-T57	n		Natural rock feature			

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T58	n		Natural rock feature			
RF-T59	n		Wall?	Between DjRi-21 and DjRi-13		jumbled rock feature - form not clear
RF-T60	n		Wall?	Between DjRi-21 and DjRi-13		large rocks, quite jumbled and unclear
RF-T61	n		Rock table	Between DjRi-21 and DjRi-13		Appears to be a small platform like a table, with a large slab of rock sitting on other rocks. Seems to be deliberately placed and might be a good place for fish processing.
RF-T62	n		Terrace/platf orm	E of the rail traces near where the barrels were pushed down.		
RF-T63	y	DjRi-13	linear boulder alignment		Average length of rocks in the feature is 1.8m, and only 8 rocks comprise the main portion	Unusual feature types as it is long, linear feature consisting of only one row of rocks right along the edge of a steep drop, which although currently dry, is under water for part of the year. There is no vegetation and not much in the way of soil around this feature. Linear rock formation of v. large boulders along the edge of the third bluff up from LFR, within view of the bluffs at/around DjRi-21. We were dropped off underneath this and RF-T64 one morning
RF-T64	y	DjRi-13	linear structured masonry	5m downriver from RF-T63		This is a partially collapsed wall feature with two sides around a bedrock outcrop. It is 5m SE of RF-T63 and is quite a bit smaller. The structure bears resemblance to several other features. Smaller stacked rock formation just downslope and downriver from RF-T63 facing downriver

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T65	n		Terrace/platf orm			Feature along the E. edge of the bluff just above the rock sluices left from mining activity. This is a terrace feature that runs somewhat down the side of the bluff and was likely connected to RF-T66. Not mapped because stacking patterns were not clear enough to confirm that it was a constructed feature.
RF-T66	y	DjRi-13	Terrace/platf orm		Great variation in rock shape and size	This feature is somewhat unclear - it has some stacking patterns and faces downriver. Several characteristics make it likely a constructed feature: it has a sharp break at the front, it shows internal structure and it faces a similar direction to RF-T63, with a similar aspect. Feature along the W. edge of the bluff just above the rock sluices left from mining activity. This is a terrace feature that runs somewhat down the side of the bluff and was likely connected to RF-T65
RF-T67	n					Disturbed feature near the water upriver from RF-T65-T66. There is a basin area behind it
RF-T68	y	DjRi-13	Terrace/platf orm	Overlooking RF-T66 on the side of the bluff	Tightly stacked and has a full aspect downriver	This is a linear, fairly tightly stacked feature. The area behind the feature is quite rocky and it has an excellent view downriver and upriver from the top. There is clear evidence of stacking and chinking. There is a lot of variation between the smallest and largest rocks in this feature. It faces downriver and is quite large. Large, clearly stacked rock feature above RF-T67 - excellent example of a feature,

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T69	y	DjRi-13	Terrace/platf orm	Back from the river between the two bluffs		Linear feature that creates a flat terrace - possible house platform. Only part of it is exposed and we didn't want to excavate it. The height includes an estimate the buried portion. Probing revealed no cultural materials other than a small fleck of charcoal. There is a large Douglas fir growing out of it that is over 1m in diameter. Long, linear feature facing back away from the river. Horse remains were found on the beach below this feature.
RF-T70	n		Cairn?	Back from the river between the two bluffs		Not a natural feature, constructed out of rock - resembles a cairn cut in two.
RF-T71	n		Terrace/platf orm	near the river above where the cable car used to run		Right on the edge of the bluff with a fairly steep drop below. Appears terrace-like but could have been a wall in the past
RF-T72	n		Stone-lined CD	behind the main bluff between DjRi-13 and DjRi-62		Possible stone lined cache pit - not large enough for a pit house. Round in shape
RF-T73a	y	DjRi-62	Terrace/platf orm		Centre area collapsed to show internal structure.	This is one part of a feature that connects to RF-T73b (running N) to create a rectangular terrace. Although on different forms, the should be considered as one feature. It appears that large, flat stones were used to "cap" this feature. Several flake and some FCR have come out of it as well. Large terrace feature with some centre collapse - very good example. This is located behind the large bluff at the N. end of the Gerry Oak Reserve

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T73b	y	DjRi-62	Terrace/platform			This is the other section of RF-T73, running N-S and creating the NW wall of a rectangular platform/terrace. It is partially buried, particularly at the northern portion. Several large "cap" stones have slid down off of this side and the corner joining the two sides is largely collapsed.
RF-T74	y	DjRi-62	Terrace/platform		some chinking	This is a long, linear terrace feature just NW of T73b, on the other side of a rock outcrop. It is possible that RF-T73b and RF-T74 were joined together at one point around this bedrock outcrop. Portions of this feature have slumped, due to 'cap' stones sliding down. Long terrace feature below RF-T73, running perpendicular. It is one of the longer features that we see.
RF-T75	y	DjRi-62	Terrace/platform		very little chinking	This feature creates another small terrace above RF-T74. It is more jumbled than the others at this site, but it does follow a similar pattern of large cap stones, This also has several trees growing right out of it, and the centre collapse may have been caused by a tree fall. Feature above and NE of RF-T74 - another long terrace-like feature.

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T76	y	DjRi-62	Terrace/platf orm	Downslope from RF-T74 near the river edge	chinking	This feature is largely intact with minimal slump. The aspect is somewhat unusual. This is a very tall, monumental boulder with chinking feature, levelling a natural depression between two bluffs. The cap stones are very large: 2.58 X 1.84 X .8 and 2.22 x 1.51 x .98. Feature down towards the river bank from RF-T73-75 - facing upriver but not with an extensive view. There are many large, flat stones in this feature and it shows clear evidence of stacking.
RF-T77	n		Stone-lined CD	above RF-T89, between the two bluffs on the Garry Oak reserve		Stone-lined apparent house depression. Upon returning to the site in 2009, a large tree-fall had destroyed part of the feature.
RF-T78	n		Terrace/platf orm	edge of next bluff north of Garry Oak reserve		Perched atop a steep slope, currently covered in thorn bushes. Partially collapsed but a good view downriver SW.
RF-T79	n		Terrace/platf orm	Above the tunnel near Siwash Creek, downslope from DjRi-5		Long terrace below the pit house village. Less than 1 m high
RF-T80	n		Terrace/platf orm	20m or so downslope from RF-T79		Extends 15-20 m along a slope, levels the ground above and is associated with at least 4 cache pits.
RF-T81	n		Wall	Along the river directly downslope from the north end of the Siwash Creek tunnel.		Very shallow feature, about .5 m high and 1 m deep. Consists of small, flat rocks. A ground slate knife was found nearby.

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T82	n		Terrace/platf orm	20m or so downslope from RF-T82		largely destroyed terrace feature a few meters above the railway tracks at the north end of the Siwash Creek tunnel. Possibly part of a complex with RF-T79 and RF-T80, or possibly associated with building the railway
RF-T83	n		Terrace/platf orm	Bluff just above the Garry Oak reserve		Disturbed feature near the bluff, difficult to get to and not well preserved
RF-T84	n	??				
RF-T85a	y	DjRi-46	wall	downslope from RF-T18, 18b	chinking	This feature is located on a rocky slope. Although it does look stacked, it is somewhat irregular compared to some of the other features. It has very large rocks, somewhat similar to RF-T11 and RF-T12
RF-T85b	y	DjRi-46	wall	above RF-T85	chinking	This feature may have once been a part of RF-T85, but now appears to be a separate feature. I have recorded them separately.
RF-T86	n	DjRi-46	wall	Behind RF-T18		Was originally recorded as a rock feature but appears to be a natural rock bluff that appears to create an outcrop.
RF-T87	n	DjRi-46	Terrace/platf orm	Just south of the main part of DjRi46 with the other rock features, along a small creek		Terrace along the south edge of a small creek - somewhat similar to RF-T14
RF-T88	n	DjRi-46	Terrace/platf orm	Just south of the main part of DjRi46 with the other rock features, along a small creek		Terrace along the north edge of a small creek - somewhat similar to RF-T14

Feature No.	Sample?	Borden #	Feature Type	Location	Other Attributes	Notes
RF-T89	y	DjRi-62	terrace/platfo rm	upriver from RF-T75	very little chinking, one very flat, square rock on top of the feature	This feature is located upriver from RF-T75, back from the river. It is a L shaped terrace, consisting of very large boulders with very little evidence of chinking. The rocks are quite flat overall and have more striations on them - they may be from a different source. It is near the rock lined depression with several large vertical stones.

APPENDIX 3: TABLE OF SAMPLED ROCK FEATURES[30]

RF_FEATURE	RF_TYPE	RF_TerraceY/N	RF_USE	RF_Size	Direction Facing	River View Direction	River View Y/N
RF-T01	Terrace	Yes	Living	Large (combined)	3	2	Yes
RF-T02	Terrace	Yes	Living	Large (combined)	4	2	Yes
RF-T03	Terrace	Yes	Fishing	Small	2	3	Yes
RF-T04	Terrace	Yes	Fishing	Medium	1	1	Yes
RF-T05	Terrace	Yes	Living	Large	1	1	Yes
RF-T06	Terrace	Yes	Fishing	Small	1	1	Yes
RF-T07	Terrace	Yes	Fishing	Small	2	3	Yes
RF-T10	Retaining Wall	No	Unclassified	Medium	2	2	Yes

[30] This appendix contains one continuous table. Due to the restrictions on page size, it is spread out across a number of different pages. All measured variables are included in the table.

RF_FEATURE	RF_TYPE	RF_TerraceY/N	RF_USE	RF_Size	Direction Facing	River View Direction	River View Y/N
RF-T11	Wall	No	Unclassified	Small	2	2	Yes
RF-T14	Terrace	Yes	Unclassified	Medium	1	5	Yes
RF-T16	Retaining Wall	No	Unclassified	Small	4	2	Yes
RF-T17	Semi-circular Stone Enclosure	No	Fishing	Small	1	5	Yes
RF-T18	Wall	No	Defense	Medium	2	6	Yes
RF-T18b	Wall	No	Defense	Small	3	2	Yes
RF-T21	Terrace	Yes	Living	Large	7	2	Yes
RF-T29	Terrace	Yes	Living	Medium	5	0	No
RF-T35	Terrace	Yes	Living	Large	2	0	No
RF-T63	Linear Boulder Alignment	No	Defense	Medium	4	6	Yes
RF-T64	Retaining Wall	No	Defense	Small	5	2	Yes
RF-T66	Terrace	Yes	Living	Medium	6	2	Yes

RF_FEATURE	RF_TYPE	RF_TerraceY/N	RF_USE	RF_Size	Direction Facing	River View Direction	River View Y/N
RF-T68	Terrace	Yes	Living	Large	4	2	Yes
RF-T69	Terrace	Yes	Living	Medium	6	0	No
RF-T73a	Terrace	Yes	Living	Large	4	0	No
RF-T73b	Terrace	Yes	Living	Large	6	0	No
RF-T74	Terrace	Yes	Living	Medium	8	0	No
RF-T75	Terrace	Yes	Living	Large	6	0	No
RF-T76	Terrace	Yes	Unclassified	Medium	7	5	Yes
RF-T85a	Retaining Wall	No	Defense	Small	6	2	Yes
RF-T85b	Retaining Wall	No	Defense	Small	2	6	Yes
RF-T89	Terrace	Yes	Living	Medium	6		No

RF_FEATURE	RF Length (m)	RF Width (m)	RF Height (m)	RF Area (m2)	RF Volume (m3)	Primary Material
RF-T01	5.26	3.44	1.45	102.5 (combined with RF-T02)	277.78 (combined with RF-T02)	Angular boulders
RF-T02	6.2	2.13	2.71	102.5 (combined with RF-T01)	277.78 (combined with RF-T01)	Very large angular boulders
RF-T03	3.29	1.1	0.98	3.62	3.55	boulders
RF-T04	10.86	1.6	2.66	17.38	46.22	Rounded small boulders
RF-T05	10.5	9	1.83	94.50	172.94	Large, angular boulders
RF-T06	2.45	1	1.25	2.45	3.06	Large, angular boulders
RF-T07	3.2	2.65	1.52	8.48	12.89	Angular boulders
RF-T10	8	3.4	2.95	27.20	80.24	Angular boulders
RF-T11	3.34	2.13	2.08	7.11	14.80	Angular boulders
RF-T14	9.39	1.9	1.85	17.84	33.01	Angular boulders and rounded cobbles
RF-T16	2.74	0.74	0.49	2.03	0.99	Angular boulders and cobbles
RF-T17	6.28	1.6	1.06	10.05	10.65	Rounded boulders and cobbles

RF_FEATURE	RF Length (m)	RF Width (m)	RF Height (m)	RF Area (m2)	RF Volume (m3)	Primary Material
RF-T18	9.13	2.57	1.92	23.46	45.05	Large, angular boulders
RF-T18b	5.48	1.83	1.27	10.03	12.74	large angular boulders
RF-T21	10.65	9.8	2.05	104.37	213.96	Angular boulders
RF-T29	7.62	8.1	1.02	61.72	62.96	Very large angular boulders
RF-T35	11.7	8.2	2.6	95.94	249.44	cobbles
RF-T63	9.26	2.56	1.75	23.71	41.48	very large angular boulders
RF-T64	3.54	2.22	0.84	7.86	6.60	angular boulders
RF-T66	5.76	6.8	1.76	39.17	68.94	angular cobble chinks
RF-T68	8.53	10.84	2.14	92.47	197.88	angular boulders
RF-T69	8.47	7.02	1.64	59.46	97.51	angular boulders
RF-T73a	11.71	19.54	1.67	228.81	382.12	very large angular boulders
RF-T73b	17.22	16.61	1.29	286.02	368.97	very large, flat angular boulders
RF-T74	18.87	2.54	1.25	47.93	59.91	very large angular boulders

RF_FEATURE	RF Length (m)	RF Width (m)	RF Height (m)	RF Area (m2)	RF Volume (m3)	Primary Material
RF-T75	17.45	11.11	1.83	193.87	354.78	very large angular boulders
RF-T76	13.52	1.84	2.98	24.88	74.13	very large angular boulders
RF-T85a	4.78	1.89	1.5	9.03	13.55	large angular boulders
RF-T85b	6.77	2.05	0.75	13.88	10.41	angular boulders and cobbles
RF-T89	8.4	5	0.79	42.00	33.18	large angular boulders

RF_FEATURE	RF Num Rocks	RF Clast	RF Sphericity	RF Sphericity 2	RF_FREE
RF-T01	50-99	Mostly boulders, some cobbles	Angular, high-sphericity	Angular, low-sphericity	0%
RF-T02	50-99	Some cobbles, some boulders, some large boulders	Angular, high-sphericity	Angular, low-sphericity	0%
RF-T03	<20	Mostly boulders, some cobbles	Angular, low-sphericity	Angular, high-sphericity	0%
RF-T04	200+	Some cobbles, some boulders	Sub-rounded, high-sphericity	Sub-rounded, low-sphericity	0%
RF-T05	100-200	Mostly large boulders, some cobbles, some boulders	Very angular, high-sphericity	Very angular, low-sphericity	0%
RF-T06	50-99	Mostly large boulders, some cobbles, some boulders	Angular, high-sphericity	Angular, low-sphericity	1-49%
RF-T07	50-99	Mostly boulders, some cobbles, some large boulders	Angular, low-sphericity		0%
RF-T10	100-200	Mostly large boulders, some cobbles, some boulders	Angular, high-sphericity	Angular, low-sphericity	0%
RF-T11	50-99	Mostly boulders, some cobbles, some large boulders	Angular, high-sphericity	Very angular, low-sphericity	0%
RF-T14	200+	Mostly boulders, some cobbles	Angular, high-sphericity	Sub-angular, low-sphericity	0%
RF-T16	20-49	Some cobbles, some boulders	Sub-angular, low-sphericity	Angular, low-sphericity	0%
RF-T17	100-200	Mostly boulders, some cobbles, some large boulders	Rounded, high-sphericity	Well-rounded, low-sphericity	1-49%

RF_FEATURE	RF Num Rocks	RF Clast	RF Sphericity	RF Sphericity 2	RF_FREE
RF-T18	50-99	Mostly large boulders, some cobbles, some boulders	Angular, low-sphericity	Very angular, low-sphericity	1-49%
RF-T18b	<20	Some boulders, some large boulders	Angular, high-sphericity	Angular, low-sphericity	1-49%
RF-T21	20-49	Mostly boulders, some cobbles, some large boulders	Angular, low-sphericity	Angular, high-sphericity	0%
RF-T29	20-49	Mostly large boulders, some cobbles, some boulders	Very angular, low-sphericity	Very angular, high-sphericity	0%
RF-T35	100-200	Some cobbles, some boulders	Angular, high-sphericity	Sub-angular, low-sphericity	0%
RF-T63	<20	All large boulders	Sub-angular, low-sphericity	Very angular, low-sphericity	100%
RF-T64	<20	Mostly boulders, some cobbles, some large boulders	Sub-angular, low-sphericity	Angular, high-sphericity	50-99%
RF-T66	20-49	Mostly boulders, some cobbles, some large boulders	Sub-angular, low-sphericity	sub-angular, high-sphericity	0%
RF-T68	100-200	Some boulders, some cobbles, some large boulders	Sub-angular, low-sphericity	Angular, high-sphericity	0%
RF-T69	20-49	Mostly boulders, some cobbles	Sub-angular, low-sphericity	Angular, low-sphericity	0%
RF-T73a	50-99	Mostly large boulders, some cobbles, some boulders	Angular, low-sphericity	Sub-angular, low-sphericity	0%
RF-T73b	50-99	Mostly large boulders, some cobbles, some boulders	Sub-angular, low-sphericity	Angular, low-sphericity	0%
RF-T74	50-99	Mostly boulders, some cobbles, some large boulders	Very angular, low-sphericity	Angular, high-sphericity	0%

RF_FEATURE	RF Num Rocks	RF Clast	RF Sphericity	RF Sphericity 2	RF_FREE
RF-T75	50-99	Mostly large boulders, some cobbles, some boulders	Angular, high-sphericity	Sub-angular, low-sphericity	0%
RF-T76	50-99	Some boulders, some cobbles, some large boulders	Angular, low-sphericity	Angular, high-sphericity	0%
RF-T85a	50-99	Mostly large boulders, some cobbles	Angular, high-sphericity	Very angular, low-sphericity	1-49%
RF-T85b	50-99	Some boulders, some cobbles, some large boulders	Angular, low-sphericity	Very angular, low-sphericity	0%
RF-T89	20-49	Some boulders, some cobbles, some large boulders	Angular, high-sphericity	Angular, low-sphericity	0%

RF_FEATURE	RF_INFILL_CAT	RF_INTACT	RF_ARTI	RF_FCR	RF_Historic	RF Courses	Chinking	Stacking	Cap Stone	Village Association
RF-T01	100%	Partially Disturbed	Yes	No	No	3	Yes	Med-tight	No	Yes
RF-T02	100%	Partially Disturbed	Yes	Yes	Yes	5	Yes	Medium	Yes	Yes
RF-T03	100%	Disturbed	Yes	No	Yes	3	Yes	Med-loose	No	Yes
RF-T04	0-25%	Disturbed	No	No	No	2	No	Loose	No	Yes
RF-T05	100%	Partially Disturbed	No	No	No	10	Yes	Medium	Yes	Yes
RF-T06	51-75%	Partially Disturbed	No	No	Yes	5	Yes	Med-tight	Yes	Yes
RF-T07	26-50%	Partially Disturbed	Yes	No	No	7	Yes	Medium	No	No
RF-T10	0-25%	Partially Disturbed	No	Yes	Yes	5	Yes	Med-tight	No	No
RF-T11	0-25%	Disturbed	No	No	Yes	4	Yes	Medium	No	No
RF-T14	100%	Partially Disturbed	Yes	No	No	10	Yes	Tight	No	No
RF-T16	100%	Partially Disturbed	Yes	No	Yes	4	Yes	Med-loose	No	No
RF-T17	0-25%	Partially Disturbed	Yes	No	Yes	6	No	Med-tight	No	Yes

RF_FEATURE	RF_INFILL_CAT	RF_INTACT	RF_ARTI	RF_FCR	RF_Historic	RF Courses	Chinking	Stacking	Cap Stone	Village Association
RF-T18	51-75%	Partially Disturbed	Yes	No	No	4	Yes	Medium	Yes	Yes
RF-T18b	51-75%	Disturbed	No	No	No	2	Yes	Med-loose	No	Yes
RF-T21	100%	Partially Disturbed	No	No	No	2	Yes	Medium	No	Yes
RF-T29	100%	Undisturbed	No	No	No	4	Yes	Med-tight	Yes	Yes
RF-T35	100%	Partially Disturbed	No	No	No	12	Yes	Med-tight	No	Yes
RF-T63	100%	Undisturbed	No	No	No	1	Yes	Loose	No	Yes
RF-T64	0-25%	Partially Disturbed	No	No	No	2	Yes	Med-tight	No	Yes
RF-T66	76-99%	Partially Disturbed	No	No	Yes	4	Yes	Med-loose	Yes	Yes
RF-T68	100%	Partially Disturbed	No	No	No	3	Yes	Med-tight	Yes	Yes
RF-T69	100%	Partially Disturbed	No	Yes	No	2	Yes	Med-tight	Yes	Yes
RF-T73a	100%	Partially Disturbed	Yes	Yes	Yes	4	Yes	Medium	Yes	Yes
RF-T73b	100%	Partially Disturbed	Yes	Yes	Yes	3	Yes	Medium	Yes	Yes
RF-T74	100%	Partially Disturbed	Yes	Yes	No	4	No	Med-loose	No	Yes

RF_FEATURE	RF_INFILL_CAT	RF_INTACT	RF_ARTI	RF_FCR	RF_Historic	RF Courses	Chinking	Stacking	Cap Stone	Village Association
RF-T75	100%	Partially Disturbed	Yes	Yes	No	4	Yes	Med-loose	Yes	Yes
RF-T76	100%	Partially Disturbed	No	No	No	5	Yes	Medium	Yes	Yes
RF-T85a	76-99%	Partially Disturbed	No	No	No	2	No	Loose	No	Yes
RF-T85b	26-50%	Partially Disturbed	No	No	No	3	No	Loose	No	Yes
RF-T89	100%	Partially Disturbed	No	Yes	No	2	No	Medium	Yes	Yes

APPENDIX 4: CODING OF ROCK FEATURE VARIABLES

Field	Code	Scale	Type	Description
RF_ID	n/a	n/a	ID	Unique ID for each feature
RF_FEATURE_ID	n/a	n/a	ID	Field ID for each feature
RF_TYPE	1	Terrace	Nominal	Feature type
	2	Retaining Wall		
	3	Wall		
	4	Boulder Alignment		
	5	Semi-circular stone enclosure		
RF_DIR_FACE	1-360	Degrees	Interval	Cardinal direction converted to degrees for a numerical value
RF_DIR_FACE_CAT	1	0-45°	Ordinal	Cardinal direction in exclusive categories
	2	46-90°		
	3	91-135°		
	4	136-180°		
	5	181-225°		
	6	226-270°		
	7	271-315°		
	8	316-359°		

Field	Code	Scale	Type	Description
RF_RIVER_VIEW_DIR	0	None	Nominal	Indicates the direction the feature is facing (not the overall view from the feature)
	1	Upriver		
	2	Downriver		
	3	Across river		
	4	Up and downriver		
	5	Up and across river		
	6	Down and across river		
	7	Up, down and across river		
RF_RIVER_VIEW	0	Absent	Nominal	Determines whether the river can be seen from the feature
	1	Present		
RF_Length		meters	Ratio	Maximum Length of the feature
RF_Height		meters	Ratio	Maximum height of the feature
RF_Width		meters	Ratio	Maximum width of the feature
RF_Area		meters	Ratio	Maximum area of the feature **calculated from (l*w*h)**
RF Num Rocks	1	<20	Ordinal	Estimated number of rocks in a feature
	2	20-49		
	3	50-99		
	4	100-200		
	5	200+		
RF_Clast	1	Mostly cobbles (>200mm)	Ordinal	Geological measurement of the size of rock particles
	2	Mostly cobbles, some boulders		

Field	Code	Scale	Type	Description
		(<200mm)		
	3	Mostly cobbles, some boulders, some large boulders (<1m)		
	4	Mostly cobbles, some large boulders		
	5	Some cobbles, some boulders		
	6	Some cobbles, some boulders, some large boulders		
	7	Mostly boulders, some cobbles		
	8	Mostly boulders, some cobbles, some large boulders		
	9	Mostly boulders, some large boulders		
	10	Some boulders, some cobbles, some large boulders		
	11	Some boulders, some large boulders		
	12	All boulders		
	13	Mostly large boulders, some cobbles		
	14	Mostly large boulders, some cobbles, some boulders		
	15	Mostly large boulders, some boulders		
	16	All large boulders		
RF_SPHERICITY	1	Well-rounded, high sphericity	Nominal	Volume and occurrence of angles of rocks of a feature
	2	Rounded, high sphericity		
	3	Sub-rounded, high sphericity		

Field	Code	Scale	Type	Description
	4	Sub-angular, high sphericity		
	5	Angular, high sphericity		
	6	Very-angular, high sphericity		
	7	Well-rounded, low sphericity		
	8	Rounded, low sphericity		
	9	Sub-rounded, low sphericity		
	10	Sub-angular, low sphericity		
	11	Angular, low sphericity		
	12	Very-angular, low sphericity		
RF_PRIME_MAT	1	Angular boulders	Nominal	Majority of the type of rock in the feature
	2	Large angular boulders		
	3	Very large angular boulders		
	4	Rounded boulders		
	5	Cobbles		
RF_FREE	1	Yes	Nominal	Describes whether the feature is freestanding or backed by something
	2	No		
	3	Partial (less than 50%)		
	4	Partial (50% or more)		

Field	Code	Scale	Type	Description
RF_INFILL	.1 to 1	Percent as a proportion of 1 (1=100%)	Ratio	Describes soil to rock ratio
RF_INFILL_CAT	1	0-25%	Ordinal	Describes soil to rock ratio
	2	26-50%		
	3	51-75%		
	4	76-99%		
	5	100%		
RF_INTACT	1	Undisturbed	Ordinal	Describes whether or not the feature is obviously disturbed
	2	Partially disturbed		
	3	Disturbed		
	4	Undetermined		
RF_VEG_TOP	.1 to 1	Percent as a proportion of 1 (1=100%)	Ratio	Describes amount of the top of the feature is covered in vegetation
RF_VEG_FACE	.1 to 1	Percent as a proportion of 1 (1=100%)	Ratio	Describes amount of the face of the feature is covered in vegetation
RF_ARTI	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of artifacts
RF_FCR	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of fire cracked rock (FCR)
RF_H_GLASS	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of historic glass

Field	Code	Scale	Type	Description
RF_H_METAL	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of historic metal
RF_DRY_RACK	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of modern dry rack
RF_GARBAGE	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of modern garbage
RF_RF	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of another rock feature within 5m
RF_CHAR	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of charcoal
RF_FAUNA	0	Absent	Nominal	From "Assoc Materials" field
	1	Present		Indicates presence/absence of faunal material on or near the feature
RF_COURSES		number of courses present	Ratio	
RF_ROWS		number of rows present	Ratio	
RF_CHINK	0	Absent	Nominal	Indicates presence/absence of chinking
	1	Present		
RF_STACK	1	loose	Ordinal	Indicates how tightly the rocks are stacked together, measured by a visual assessment of the amount of space between rocks
	2	med-loose		

Field	Code	Scale	Type	Description
	3	medium		
	4	med-tight		
	5	tight		
RF_Size1	1	small		
	2	medium		
	3	large		
RF_USE	1	Fishing		
	2	Defense		
	3	Living		
	4	Unknown		

APPENDIX 5: CROSS-TABULATIONS

Terrace Cross-Tabs

Terrace versus Non-Terrace				Total
Village Association		Non-Terrace	Terrace	
No	Count	4	1	5
	% within Terrace	40%	5%	16.7%
Yes	Count	6	19	25
	% within Terrace	60%	95%	83.3%
Total	Count	10	20	30
	% within Terrace	100%	100%	100%
Infill		**Non-Terrace**	**Terrace**	
0-25%	Count	5	0	5
	% within Terrace	50.0%	0%	16.7%
26-50%	Count	1	1	2
	% within Terrace	10.0%	5.0%	6.7%
51-75%	Count	2	1	3
	% within Terrace	20.0%	5.0%	10.0%
76-99%	Count	1	1	2
	% within Terrace	10.0%	5.0%	6.7%
100%	Count	1	17	18
	% within Terrace	10.0%	80.0%	60.0%
Total	Count	10	20	30
	% within Terrace	100.0%	100.0%	100.0%
Freestanding		**Non-Terrace**	**Terrace**	
0%	Count	4	19	23
	% within Terrace	40.0%	95.0%	76.7%
1-49%	Count	4	1	5
	% within Terrace	40.0%	5.0%	16.7%
50-99%	Count	1	0	1
	% within Terrace	10.0%	.0%	3.3%
100%	Count	1	0	1
Total	% within Terrace	10.0%	.0%	3.3%
	Count	10	20	30
Chinking		**Non-Terrace**	**Terrace**	
Absent	Count	3	3	6
	% within Terrace	30%	15%	20%
Present	Count	7	17	24
	% within Terrace	70%	85%	80%
Total	Count	10	20	30
	% within Terrace	100.0%	100.0%	100.0%
Cap Stones		**Non-Terrace**	**Terrace**	

	Terrace versus Non-Terrace			Total
Absent	Count	9	12	21
	% within Terrace	90%	60%	57.6%
Present	Count	1	8	9
	% within Terrace	10%	40%	43.3%
Total	Count	10	20	30
	% within Terrace	100%	100%	100%
Stacking		**Small**	**Medium**	
Loose	Count	3	1	18
	% within Terrace	30%	5%	13.3%
Med-loose	Count	2	4	12
	% within Terrace	20%	20%	20%
Medium	Count	2	8	10
	% within Terrace	20%	40%	33.3%
Med-tight	Count	3	6	9
	% within Terrace	30%	30%	30%
Tight	Count	0	1	1
	% within Terrace	0%	5%	3.3%
Total	Count	10	20	30
	% within Terrace	100.0%	100.0%	100.0%

Size Cross-Tabs

		Size			Total
Terrace		**Small**	**Medium**	**Large**	
No	Count	7	3	0	10
	% within Size	70%	27.3%	0%	33.3%
Yes	Count	3	8	9	20
	% within Size	30%	72.7%	100%	66.7%
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%
Infill		**Small**	**Medium**	**Large**	
0-25%	Count	3	2	0	5
	% within Size	30%	18.2%	0%	16.7%
26-50%	Count	2	0	0	2
	% within Size	20%	0%	0%	6.7%
51-75%	Count	2	1	0	3
	% within Size	20%	9.1%	0%	10%
76-99%	Count	1	1	0	2
	% within Size	10%	9.1%	0%	6.7%
100%	Count	2	7	9	18
	% within Size	20%	63.6%	100%	60%
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%
Number of Rocks		**Small**	**Medium**	**Large**	
0-20	Count	3	1	0	4
	% within Size	30%	9.1%	.0%	13.3%
21-49	Count	1	4	1	6

		Size			Total
	% within Size	10%	36.4%	11.1%	20%
50-99	Count	5	3	5	13
	% within Size	50%	27.3%	55.6%	43.3%
100-199	Count	1	1	3	5
	% within Size	10%	9.1%	33.3%	16.7%
200+	Count	0	2	0	2
	% within Size	.0%	18.2%	.0%	6.7%
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%
Clast Modified		**Small**	**Medium**	**Large**	
Cobbles	Count	1	1	2	4
	% within Size	10%	9.1%	22.2%	3.3%
Boulders	Count	7	6	3	16
	% within Size	70%	54.5%	33.3%	53.3%
Large Boulders	Count	2	4	4	10
	% within Size	20%	36.3%	44.4%	33.3%
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%
Primary Materials		**Small**	**Medium**	**Large**	
	Count	0	0	4	4
	% within Size	0%	0%	11.1%	3.3%
Boulders	Count	7	5	3	15
	% within Size	70%	45.5%	33.3%	50%
Large Boulders	Count	3	2	1	6
	% within Size	30%	18.2%	11.1%	20%
Very Large Boulders	Count	0	4	4	1
	% within Size	0%	36.4%	44.4%	26.7%
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%
Freestanding		**Small**	**Medium**	**Large**	
0%	Count	5	9	9	23
	% within Size	50%	81.8	100%	76.7%
1-49%	Count	4	1	0	5
	% within Size	40%	9.1%	0%	16.7%
50-99%	Count	1	0	0	1
	% within Size	10%	0%	0%	3.3%
100%	Count	0	1	0	1
	% within Size	0	9.1%	0	3.3%
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%
Chinking		**Small**	**Medium**	**Large**	
Absent	Count	3	3	0	6
	% within Size	30%	27.3%	.0%	20%
Present	Count	7	8	9	24
	% within Size	70%	72.7%	100%	80%

		Size			Total
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%
Cap Stones		**Small**	**Medium**	**Large**	
Absent	Count	8	6	3	17
	% within Size	80%	54.5%	33.3%	56.7%
Present	Count	2	5	6	13
	% within Size	20%	45.5%	66.7%	43.3%
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%
Stacking		**Small**	**Medium**	**Large**	
Loose	Count	2	2	0	4
	% within Size	20%	18.2%	.0%	13.3%
Med-loose	Count	3	2	1	6
	% within Size	30%	18.2%	11.1%	20%
Medium	Count	2	3	5	10
	% within Size	20%	27.3%	55.6%	33.3%
Med-tight	Count	3	3	3	9
	% within Size	30%	27.3%	33.3%	30%
Tight	Count	0	1	0	1
	% within Size	.0%	9.1%	.0%	3.3%
Total	Count	10	11	9	30
	% within Size	100%	100%	100%	100%

Use Cross-Tabs

		Use				Total
Terrace		**Fishing**	**Defense**	**Living**	**Unclassified**	
No	Count	1	6	0	3	10
	% within Use	20%	100%	0%	60%	33.3%
Yes	Count	4	0	14	2	20
	% within Use	80%	0%	100%	40%	66.7%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
Size		**Fishing**	**Defense**	**Living**	**Unclassified**	
Small	Count	4	4	0	2	10
	% within Use	80%	66.7%	0%	40%	33.3%
Medium	Count	1	2	5	3	11
	% within Use	20%	33.3%	35.7%	60%	36.7%
Large	Count	0	0	9	0	9
	% within Use	0%	0%	64.3%	0%	30%
Total	Count	4	4	0	2	10
	% within Use	80%	66.7%	0%	40%	33.3%
Infill		**Fishing**	**Defense**	**Living**	**Unclassified**	
0-25%	Count	2	1	0	2	5
	% within Use	40%	16.7%	0%	40%	16.7%
26-50%	Count	1	1	0	0	2
	% within Use	20%	16.7%	0%	0%	6.7%

		Use				Total
51-75%	Count	1	2	0	0	3
	% within Use	20%	33.3%	0%	0%	10%
76-99%	Count	0	1	1	0	2
	% within Use	0%	16.7%	7.1%	0%	6.7%
100%	Count	1	1	13	3	18
	% within Use	20%	16.7%	92.9%	60%	60%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
Direction River View		Fishing	Defense	Living	Unclassified	
None	Count	0	0	8	0	8
	% within Use	0%	0%	57.1%	0%	26.7%
Upriver	Count	1	0	3	0	4
	% within Use	20%	0%	21.4%	0%	13.3%
Downriver	Count	0	3	3	3	9
	% within Use	0%	50%	21.4%	60%	30%
Across River	Count	3	0	0	0	3
	% within Use	60%	0%	0%	0%	10%
Up and Across River	Count	1	0	0	2	3
	% within Use	20%	0%	0%	40%	10%
Down and Across River	Count	0	3	0	0	3
	% within Use	0%	50%	0%	0%	10%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
River View		Fishing	Defense	Living	Unclassified	
No	Count	0	0	8	0	8
	% within Use	0%	0%	57.1%	0%	26.7%
Yes	Count	5	6	6	5	22
	% within Use	100%	100%	42.9%	100%	73.3%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
Chinking		Fishing	Defense	Living	Unclassified	
Absent	Count	2	2	2	0	6
	% within Use	40%	33.3%	14.3%	0%	20%
Present	Count	3	4	12	5	24
	% within Use	60%	66.7%	85.7%	100%	80%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
Cap Stones		Fishing	Defense	Living	Unclassified	
Absent	Count	4	5	4	4	17
	% within Use	80%	83.3%	28.6%	80%	56.7%
Present	Count	1	1	10	1	13
	% within Use	20%	16.7%	71.4%	20%	43.3%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
Fire Altered Rock		Fishing	Defense	Living	Unclassified	

		Use				Total
Absent	Count	5	6	7	4	22
	% within Use	100%	100%	50%	80%	73.3%
Present	Count	0	0	7	1	8
	% within Use	0%	0%	50%	20%	26.7%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
Artifacts		Fishing	Defense	Living	Unclassified	
Absent	Count	2	5	8	3	18
	% within Use	40%	83.3%	57.1%	60%	60%
Present	Count	3	1	6	2	12
	% within Use	60%	16.7%	42.9%	40%	40%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
Historical Materials		Fishing	Defense	Living	Unclassified	
Absent	Count	2	6	9	1	18
	% within Use	40%	100%	64.3%	20%	60%
Present	Count	3	0	5	4	12
	% within Use	60%	0%	35.7%	80%	40%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%
Village Association		Fishing	Defense	Living	Unclassified	
No	Count	1	0	0	4	5
	% within Use	20%	.0%	.0%	80%	16.7%
Yes	Count	4	6	14	1	25
	% within Use	80%	100%	100%	20%	83.3%
Total	Count	5	6	14	5	30
	% within Size	100%	100%	100%	100%	100%