THE MOUNTAINS AND ROCKS ARE FOREVER: LITHICS AND LANDSCAPES OF *SKWXWÚ7MESH UXWUMIXW*

THE MOUNTAINS AND ROCKS ARE FOREVER: LITHICS AND LANDSCAPES OF *SKWXWÚ7MESH UXWUMIXW*

By
Rudy Reimer/Yumks, BA, MA

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Author: Rudy Reimer/Yumks, BA, MA (Simon Fraser University)

Supervisor: Dr. Aubrey Cannon

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Abstract

This dissertation contributes to Indigenous archaeology, particularly along the Northwest Coast, the Coast Salish region and the territory of the Squamish Nation. I examine the regional archaeological sequence and provide an Indigenous perspective of time and space of Squamish Nation territory. Closer examination of this region's archaeological record focuses on the occurrence of suitable igneous tool stone sources and their use over the past 10,000 years. A full understanding of these lithic sources comes from three different perspectives Squamish Nation culture, the archaeological and geological records.

I propose that lithic sources are important places of the Squamish Nation cultural landscape and that the distributions of certain material types is linked to Squamish Nation place names and oral histories. Expanding this concept outward, I consider the distribution of the occurrence of these materials from 25 archaeological sites ranging from sea level ocean shore to mountainous alpine contexts. I then examine lithic source materials and artifacts from these sites on a visual and chemical basis (X-Ray Fluorescence) to illustrate the varying importance of certain lithic materials across Squamish Nation territory. Resulting analysis demonstrates that these materials have varying spatial and temporal distributions that relate to predominant themes of Squamish Nation oral history, concepts of Transformation and Mythical Beings. Material distributions, place names, oral history related to the region's archaeological record are discussed under different theoretical frameworks of the Northwest Coast building from culture history, processual, post processual, and humanist perspectives cumulating at a Indigenous perspective of lithic sources and flaked stone artifact distributions.

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Chapter One:

Skwxwú7mesh Uxwumixw K'eksin ti siya't-shn/The *Skwxwú7mesh Uxwumixw* World in Context

1.0 Introduction

O Siyám en siyits, I chen tl'ik, Yumks kwe in sna,* Skwxwú7mesh *Snachim, Chi' yak mesh, Snauq Uxwumixw, Rudy Reimer holatin Snachim, an wanaxws ten skwalwen, chen ts'its'ap' ya'kwnexw kwekw'in'!

Respected people and friends, my *Skwxwú7mesh* ancestral name is Yumks. This name comes from two villages in our territory, the first of which is Cheakamus, north of the town of Squamish, and the second is the area now known as Vanier Park, in Vancouver, British Columbia. My English name is Rudy Reimer, and I carry both these names with pride for my ancestors!

From my cultural teachings, I have learned that individuals who carry an ancestral name on behalf of their families and kin are responsible for upholding that name and the culture that surrounds it. In doing so, one carries the name in high regard and gives it meaning through actions and behaviour both within and outside the culture. To introduce myself as I have done above is to do things right. Now that you know who I am and where I come from, I can relate to you in an appropriate, respectful manner.

In this dissertation, I hope to convey some knowledge of my culture by recounting my personal experiences (archaeological, anthropological and otherwise) and "being 'of' rather than 'from' the landscape". Over the past 18

years, I have excavated, surveyed and analyzed lithic materials from a wide range of sites in *Skwxwú7mesh Uxwumixw* (Squamish Nation territory). In this time, my perspective on the creations of my ancestors has changed. I have come to know what the wide range of lithic materials means to me as an Indigenous archaeologist informed by a *Skwxwú7mesh Uxwumixw* youth, knowledgeable community members and elders. Throughout my archaeological career in *Skwxwú7mesh Uxwumixw*, I have taken culture-historical, processual and post-processual approaches to the interpretation of lithic raw materials and the implements made from them. I have presented the results of my thoughts and analyses using these various theoretical and methodological approaches to people of the *Skwxwú7mesh Uxwumixw* and archaeological communities. Yet none of these approaches has provided a full description or explanation of what these materials actually mean to modern-day archaeologists and *Skwxwú7mesh Uxwumixw* people and what they meant to our ancestors.

After exploring a wide range of literature on the various attempts to blend high-level archaeological theory with lithic data, I still found that both the data and the interpretations stemming from them fall short of explaining what those materials meant to their users. Similarly, I found that blending certain preferred theoretical perspectives with knowledge and experience of my Indigenous background also fails to accomplish what I was trying to achieve. Here, I will put aside certain incompatibilities between those perspectives and present an Indigenous way of knowing history and landscape as they relate to lithic material

sources and their wider distributions. This dissertation puts Indigenous archaeology—archaeology done by, with and for an Indigenous community, in this case the *Skwxwú7mesh* and our Coast Salish relations—into practice. A *Skwxwú7mesh* perspective on the archaeological record offers many benefits to interpreting the past: access to specific cultural knowledge that non *Skwxwú7mesh* do not have, greater consideration and understanding of intangible evidence (i.e. oral history and place names) as it relates to the archaeological record and the inclusion and culturally appropriate use of the *Skwxwú7mesh* language. It is only with an Indigenous perspective that the meaning and role of lithic materials to *Skwxwú7mesh Uxwumixw* and other Coast Salish cultures can come to light.

This work has been a revelation to me and the way I now view landscape, especially compared with the way I once did. I now recognize that there are detailed histories about where certain lithic raw materials come from, and these have changed my understanding of their distributions. As I begin this dissertation, I embark on a journey that explores the meaning of lithic sources and what they mean to me, as informed by my *Skwxwú7mesh Uxwumixw* cultural teachings. An Indigenous perspective on lithic sources and materials fosters a unique approach. Culturally informed by the people who have inhabited the local region for thousands of years, I can translate cultural knowledge and language to outsiders, bringing specific cultural meaning to archaeological sites and the lithic materials found within them. An Indigenous perspective does not draw upon a

cross-cultural approach, complex statistical analysis or the study of “other” cultures, nor does it seek to compare *Skwxwú7mesh* culture with any other. Additionally, rather than focusing on economic value, density or modes and stages of reduction or technological organization, I investigate what these materials meant to the people who actually sought them out, shaped them into implements and used them in certain contexts that facilitated the maintenance of social ties throughout the region.

1.1. Statement of the Problem, Approach and Organization

Lithic materials are a major part of the archaeological record of *Skwxwú7mesh Uxwumixw.* They are found at almost every site in the region, from inter-tidal zones to high-elevation mountaintops. Yet, archaeological understanding of lithic sources—their location, degree of use and regional distributions—is deficient. To date, Northwest Coast archaeology has lacked a regional lithic characterization study that links multiple types of lithic materials to an Indigenous perspective. This is likely because historically Northwest Coast research is founded in cultural-historical and processual approaches that concentrate on specific aspects of the archaeological record, such as temporally diagnostic artifact types or technological change. Ultimately, the Indigenous knowledge needed to address social-ideological aspects of the archaeological record of the Northwest Coast has not been fully integrated in archaeological interpretation.

Some archaeologists would approach the regional analysis of lithic materials by using a visual approach (Andrefsky 1998:40-41; Odell 2004:28-32), a geochemical approach (Shackley 2008) or a combination of both to identify materials and postulate about their place of origin. On the Northwest Coast and adjacent interior Plateau, correct visual identification of lithic materials can be successful if it takes a standardized approach (Andrefsky 1998:40-41; Pollard et al. 2007:3-17) that considers of wide range of variables, including the materials' occurrence in the archaeological record and cultural knowledge tied to their place of origin. Geochemical techniques are typically employed in the study of one or two types of lithic material, such as obsidian (Fladmark 1984; Nelson 1975) and chert (Hayden et al. 1996). Yet, focusing on only one or two types of lithic materials ignores the variability of typically more abundant lithic materials like dacite, basalt and andesite (Bakewell 1998; Mallory-Greenough 2002; N. Smith 2004). Unfortunately, all these approaches to characterizing lithic materials have produced large amounts of data in relative isolation from one another, though some have proven useful in formulating hypotheses about intra- and inter-group trade and exchange (Carlson 1994; Hayden and Shulting 1997).

I will approach this problem by combining archaeological, geological and Indigenous perspectives as they pertain to multiple lithic sources (obsidian, dacite, andesite and basalt) and their distributions in *Skwxwú7mesh Uxwumixw*. I take the stance that lithic materials are more than mere resources, that sources and materials derived from them are charged with meaning and purpose. This is

similar to the approach taken in Richard Bradley's (2000) work *Archaeology of Natural Places,* where he maintains that the *pieces of places* carry important symbolic meaning tied to the place from which they came. Both within and beyond *Skwxwú7mesh Uxwumixw,* cultural knowledge regarding powerful places was charged with mythical and spiritual power, imbuing lithic materials with social meaning and value. In certain cases, agents who had access to those places knew that they possessed something that not all could attain. Through their knowledge of the locations and histories related to lithic sources, these individuals held positions of status and influence based on their ability to access, extract, work and shape lithic materials into recognizable implements. These acts of manufacturing followed and respected a well-known Northwest Coast artistic tradition: that the material decides the form and shape of the implement being made. These products were then transported away from the material source, back to a home village and finally outward to Coast Salish society. The social significance of certain lithic materials would come from a variety of factors, including visual appearance, suitability for tool manufacture and location of its source, but most importantly from its association with specific *Skwxwú7mesh Uxwumixw* place names and the oral histories that detail those places. Furthermore, certain lithic source locations—islands, canyons or high-elevation mountaintops—are special locations because they are considered by most in *Skwxwú7mesh Uxwumixw* society as alien and wild and are often places where supernatural beings dwelt or where ancient history unfolded. Some of these

areas were not accessible to all within society; thus only a select few who had spiritually trained near or in these regions could access them. They knew of the properties and qualities of materials that came from different places, places imbued with supernatural power and long-term history.

As I will demonstrate, these associations between lithics, landscape and people form the context of use and distribution of these materials over the past 10,000 years. These *pieces of places* (Bradley 2000) from several lithic sources carried with them the history and meaning of each individual locale. This connected the people of the *Skwxwú7mesh Uxwumixw* to those places through unique relationships closely shared with other *Skwxwú7mesh* people and more distant Coast Salish groups. It is these multiple relationships between people and places, and between people and peoples, that give social meaning to lithic raw material sources and influence their distribution among regional archaeological sites. They are integral historical markers for how numerous Coast Salish groups have come to know and perceive landscape.

1.2 Research Questions

I have three fields of inquiry in this dissertation: geological, archaeological and Indigenous cultural knowledge. All are aimed at investigating the nature of procurement, treatment and use of various lithic materials from *Skwxwú7mesh Uxwumixw*. Addressing these issues allows for insight into *Skwxwú7mesh Uxwumixw* landscape knowledge, what lithic materials were used for subsistence activities, the degree of mobility of past people, the degree of trade and exchange

between local and outside groups and the role lithic materials had in the various forms of social interaction between *Skwxwú7mesh Uxwumixw* and other Coast Salish Nations. My research questions are separate but interrelated, and to answer them I blend Indigenous knowledge with geology and archaeology. Before I specifically address my research question I provide, in Chapter Two the regional archaeological background of *Skwxwú7mesh Uxwumixw*. Following this, I present a *Skwxwú7mesh* Indigenous perspective of time and space as it relates to the archaeological record.

1.2.1 Research Questions Related to Lithic Sources

In Chapter Three, I outline the volcanic eruptive history of *Skwxwú7mesh Uxwumixw* and consider how this geological history relates to the distribution of lithic sources. More specifically, I ask how the geological occurrence of lithic materials relates to *Skwxwú7mesh Uxwumixw* place names and central themes in local oral histories.

Examination of the entire eruptive history of the Garibaldi volcanic belt is beyond the scale and scope of this dissertation as it encompasses an area well beyond *Skwxwú7mesh Uxwumixw*. To narrow down this topic, I focus on the extent and limits of lava flows containing distinct lithic-type materials that are typically known to be suitable for stone tool manufacture. I do this via examination of geological literature, including the Geological Survey of Canada data and geological maps illustrating where certain lithic materials occur. To

confirm this, I undertook surveys of lava flows to test the flaking properties of lithic materials found at each source.

Yet, to gain a holistic understanding of lithic sources in *Skwxwú7mesh Uxwumixw*, the inclusion of Indigenous knowledge is integral. In Chapter Three, I also address the cultural significance of lithic sources in *Skwxwú7mesh Uxwumixw*. More specifically, I present the *Skwxwú7mesh Uxwumixw* place name(s) for each lithic source and inquire about the associations of those place names in the oral histories with particular places linked to them. I use ethnographic literature, traditional land use and occupancy maps and my own cultural knowledge and personal experiences at each source.

1.2.2 Research Questions Related to Archaeological Lithic Material Distributions

Moving away from geological questions to archaeological concerns, in Chapters Four and Five, I move toward addressing the spatial and temporal distribution of lithic materials throughout *Skwxwú7mesh Uxwumixw*. In Chapter Four, I ask how accessible and useful each lithic source is. Do certain lithic materials dominate spatially and temporally? Furthermore, do the materials that dominate site assemblages reflect activities for specialized or everyday uses? Finally, did *Skwxwú7mesh Uxwumixw* ancestors treat materials that occur infrequently in the archaeological record differently or in the same way as more common materials?

Source materials collected during field survey are visually assessed for a number of attributes related to technological characteristics (flaking quality,

nodule size) and their geochemical signature. Source materials are then compared with archaeological assemblages recovered from previous excavations and additional sites examined during my dissertation research. I use a standardized visual assessment methodology checked by geochemical analysis as a guide in quantifying the occurrence of each distinct material type at archaeological sites with associated radiocarbon ages.

1.3 Archaeological Approaches to Regional Lithic Material Distributions

Colin Renfrew's (1969) seminal work on obsidian distributions in the Mediterranean, in which he linked lithic materials to economic wealth that stimulated cultural contact between groups, is widely acknowledged as the earliest and most influential application of lithic chemistry in archaeology. By plotting the occurrences of lithic materials against their distance from a known set of sources, Renfrew produced graphs illustrating three functional zones. Those areas close to the source or source area, where material was abundant, could be termed a supply zone; areas farther away, where materials were less abundant, would be supply or trade centres; areas farthest away, where the lowest frequency of materials occurred, were considered use and discard zones.

Over the next three decades, numerous archaeologists inquired into the mechanisms of the movement of lithic materials (Webb 1974:357-383), the standardization of lithic characterization data (Ives 1975:235-236) and the reporting of results in various graphic formats (scatter plots, regression analysis and contour trends) that could convey the extent of a trade network and its

symmetry (Earle and Ericson 1977; Ericson and Earle 1982; Olausson 1988). These different graphing formats could illustrate the direction and methods by which lithic materials moved from source to site. For example, the shapes and gradients of these graphs could show whether sites in the source area/supply zone have indications of technological specialization, social boundaries or the presence of socio-political elites. These factors often illustrate whether a particular site's occupants had direct access to a source of lithic material or if they needed to trade for materials through a series of networks (Torrence 1986).

Due to its unique chemical signature, restricted distribution and ease of visual identification, obsidian is the most widely characterized lithic material on the Northwest Coast (Nelson 1975). From north to south, a range of obsidian sources have been subject to chemical characterization, including Sumez Island by Erlandson et al. (1992), Mount Edziza by Fladmark (1984, 1985) and Godfrey-Smith (1985), Anaheim Peak/Rainbow Mountains by Nelson and Will (1971), Mount Garibaldi by Reimer (2000, 2003) and two sources in the Washington Cascades by McLure (1989) and Mierendorf (1999). All of these studies have contributed to geochemical "fingerprinting" of lithic sources using X-Ray Fluorescence (XRF) and serve well to construct a baseline of comparative data.

Other attempts to characterize the occurrence of obsidian on the Northwest Coast occur at a site level, including studies by Carlson (1994) and James et al. (1996). The latter produced raw data outputs of XRF elemental peaks from 11 sources of obsidian in British Columbia, which are useful as a

library of basic elemental peak profile interpretation of chemical data. Carlson's (1994) coast-wide summary of the use and trade of obsidian examined 1302 artifacts from 122 sites dating from the 9500 years Before Present (BP), with the aim of mapping the distributions of source materials and determining spatial and temporal patterns. He found that a wide range of geographically dispersed obsidian sources were in sporadic use along the entire Northwest Coast during the period of 9500–6000 years BP. Later, between 6000 and 4000 years BP, the coast-wide obsidian trade and use expanded rapidly, a pattern that held until 2500 years BP. After 2500 BP, he found that the obsidian trade on the Northwest Coast became smaller and more localized in scale. Carlson accounts this to the period between 4000 and 3500 years BP, where he sees the coast-wide use and trade of obsidian becoming restricted to local sources. Carlson attributes this to the rise of social elites and the beginnings of the potlatch system.

What archaeological studies of Northwest Coast lithic sources and their material distribution lack is a standardized approach as outlined by Steven Shackley (1998, 2008) for the United States Southwest. Shackley identifies seven key ways to improve the utility of regional data sets:

1) identification of the research problem and the problem area;

2) geological background research and visual sorting of archaeological lithic materials;

3) mapping of primary sources and secondary deposits to help address issues of variation within any lithic source;

4) determination of which characterization technique is best suited to the particular lithic material, followed by use of that technique on multiple samples from primary and secondary source contexts;
5) use of statistical discriminate analysis to match source material to artifacts;
6) presentation of the data meaningfully at accepted International Standards, and
7) sharing of the results of any analysis.

While pragmatic and useful, all these approaches to lithic characterization still lack suitable or fully developed theoretical frameworks for the interpretation of results. To incorporate such data into a regional framework, an understanding of the social structure of the region's cultural groups is needed. This adds the human element to aspects of trade and exchange that many scholars (Renfrew 1969; Earle and Ericson 1977; Ericson and Earle 1982; Torrence 1986; Carlson 1994) allude to, but do not fully address.

1.4 Anthropological Approaches to Coast Salish Social Organization

The first attempt to document Coast Salish social structures was the classic cultural-ecological approach formulated by Wayne Suttles (1960, 1963, 1968 and 1987) and William Elmendorf (1971). They framed Coast Salish territories in relation to the resources contained within them, characterized as being of great abundance and subject to variable geographical and temporal distributions. Some resources were only seasonally available (e.g. salmon and herring), whereas others fluctuated over several years (e.g. mountain goat and old growth cedar). Understanding resource availability partially helps to

characterize Coast Salish socioeconomic relations, since Coast Salish groups established inter-marriage ties with other groups partly to overcome seasonal or long-term fluctuations in resources. The establishment of social ties occurred at potlatches, where the links between people, families, villages and cultural groups were maintained and eventually became widely recognized. Over time, in numerous villages, these ties allowed for the exchange of ancestral rights and associated material culture, promoting the creation of long-lived social groups.

Kathleen Mooney's (1976) investigation of Coast Salish exchange systems expanded on Suttles's and Elmendorf's model by examining modern-day peoples. She found that social distance (i.e. social class and ethnicity) determines the character of economic exchange between groups and that the frequency of interaction occurs more often between people living closer to each other, be they direct family or not. Furthermore, as genealogical distance increases, fewer exchanges occur.

Using social network analysis, Bruce Miller (1989) expanded on Mooney's (1976) work by studying reciprocity and the degree of centralization and spatial distribution of Coast Salish societies in western Washington State. Social network analysis considers three forms of exchange—generalized, balanced and negative—determined by spatial distance. For a group at the centre of a social network, exchange of materials will be general and localized. Moving outward from an established social network, exchange becomes more balanced, manifesting itself through the co-utilization of resources and establishment of

marriage ties. Furthest away from the centre of a social network exchange, materials move through ritualized prerogatives, economically valued trade, the formation of coalitions and, ultimately, those people entirely outside the social network who are regarded as negative social relationships or unknown people.

B. Miller suggests that interaction is not random, but the degree to which exchange is centralized depends on how well communities communicate and interact with one another. His findings agree with models by Suttles (1960, 1968, and 1987) and Elmendorf (1971) but broaden our understanding of the variable forms and scales of social exchanges in Coast Salish cultures.

B. Miller demonstrates that Coast Salish groups have a centralized social network (ancestral villages) where they conduct generalized exchange. Beyond this, Coast Salish people link themselves through ecological (natural resources) and geographical considerations (waterways as travel routes and mountains as barriers). The outermost reaches of social interaction spheres is when Coast Salish people become non-centralized and conduct balanced exchange, usually based on marriage ties, which enable people to access or co-utilize a resource. Moreover, Coast Salish people use fully negative exchange, where barter for materials or access to them is through ritual, pure economic trade or the formulation of coalitions.

Cultural-ecological models are limited since they view Coast Salish social networks only in relation to tangible economic resources and do not incorporate social factors. Thus, to consider the socially intangible aspects of lithic materials,

it is useful to consider Jay Miller's (1999) "anchored radiance" model that integrates spiritual, economic and political factors into the relations between people, places and power. In this model, he includes notions of individual people, their role in a household and village and how their movement between settlements helps maintain their links throughout their world. Each individual possesses a combination of body, mind, soul and spiritual allies. While families and kin gather around household hearths and express their immediate connections to each other, they also access other households and villages through travel. Yet, the spiritual bonds to a household or village anchor people to that place. The strength of a person's spiritual bond determines their radiance of influence and how far they could travel. Travel beyond one's "anchored radiance" relies on ties through marriage, ritual rites and trade. Thus, in this model, very large settlements provided a centre of cultural cohesion and are considered high status. Inhabitants of these large villages were able to maintain a wide sphere of influence through regular exercise of social ties with other settlements.

As in J. Miller's model, Dorothy Kennedy's (2000, 2007) work on the role of inter-marriage networks in Coast Salish society explores construction of kinship ties. She examines how groups configure their identity and how this determines relations. Specifically, she found that social units in Skwxwú7mesh Uxwumixw territory not only relate to each other through expressions of social status, but also expand outward to other Coast Salish groups through marriage. A key factor in relations within and beyond their culture is how *Skwxwú7mesh*

Uxwumixw people emphasize the rights and privileges associated with ancestral names tied to specific places. Kennedy insightfully points out that a Coast Salish person needs a combination of kinship, an ancestral name, residence in a home village and an investment of labour to play a part in the regional Coast Salish social sphere. Thus, important families had estates that drew ancestry from First Ancestors, providing ancestral rights to resources and places, rights related to both corporeal and ethereal assets.

Schaepe (2009) recently explored these cultural anthropological models of Coast Salish social organization from an archaeological perspective. He examined the placement and arrangements of several house-pit sites along the Fraser River and found that over time those villages shifted from heterarchical to hierarchical social organization. This shift resulted in villages becoming larger and more centralized hubs of socio-economic interaction. By 550 calendar years BP, this shift from a corporate to a network mode of relations was widespread, and Schaepe (2009) successfully links cultural ecological models of social organization with archaeological data.

1.5 Purpose of the Study

The main purpose of this study is to examine the cultural meanings of lithic sources and come to a socio-cultural understanding of the ways those materials are manifest in archaeological sites throughout *Skwxwú7mesh Uxwumixw*. This is not achievable solely by focusing on lithic sources themselves, separate from the regional archaeological record, nor is it possible through a typical “sourcing”

or “characterization” approach that simply links a source to a site and its artifacts. Here, I consider the cultural meaning of lithic sources, their location and degree of access and the qualities—economic and otherwise—necessary to understand why certain lithic materials were used in the past and distributed throughout the archaeological record. Building from this, the main objective of this research is to provide a nuanced understanding of lithic materials as more than just tools and implements with unique chemical signatures, to demonstrate how they are also social signatures.

1.6 Calling for an Indigenous Perspective on Lithic Sources and Materials

My application of Indigenous archaeology in this research meaningfully integrates cultural knowledge and personal experience with scientific geochemical data sets. My aim is to shift the focus of these ways of knowing from “separate but equal” to an integrated whole where oral history validates archaeology and archaeology validates oral history equally. No matter how we approach the use of our data sources to answer research questions, we ultimately further our knowledge about the past. An Indigenous perspective brings a cultural understanding of the use, distribution and roles of lithic materials in social and ideological ties of the lives of Coast Salish peoples of the southern Northwest Coast.

To tackle the problem of integration, one must first acknowledge the difference between a Western scientific perspective and the *Skwxwú7mesh*

Uxwumixw worldview and cultural understanding of the past. Our ancestors passed down our history orally and through being “of” the landscape. For numerous generations, our ancestors left traces of their livelihood at locales we now call archaeological sites. These remnants of our ancestors’ activities are indicators of cultural teachings, be they for everyday life (hunting, fishing, plant gathering or spiritual training) or important ways of knowing and remembering long-term history that welds everyday practice to long-term social and ideological structure. To the *Skwxwú7mesh* people, our ancestors can possess human, animal, plant or landscape features, which is impossible in a Western scientific worldview. To us, these numerous forms of ancestral beings have their own individual characteristics, they are all included in our ancient history and the more recent past and they also exist in the present; hence, our history has great influence in our day-to-day lives. We do not separate culture from nature; rather, as we are “of” our territory we are also “of” each other (Figure 1.1), unlike a Western scientific worldview, in which human beings are seen as separate and unique from other life forms. More specifically, to the people of the *Skwxwú7mesh Uxwumixw*, those artifacts, features and floral and faunal remains that make up the majority of archaeological sites are the essence of the actions of our ancestors. By remembering the past through direct experience, oral history and archaeology, we may revisit our history in a cyclical sense; these acts of remembrance are the ways we come to observe and know things. Unlike a

Western scientific worldview, which teaches the past through written sources, our history is the *temixw*, the landscape.

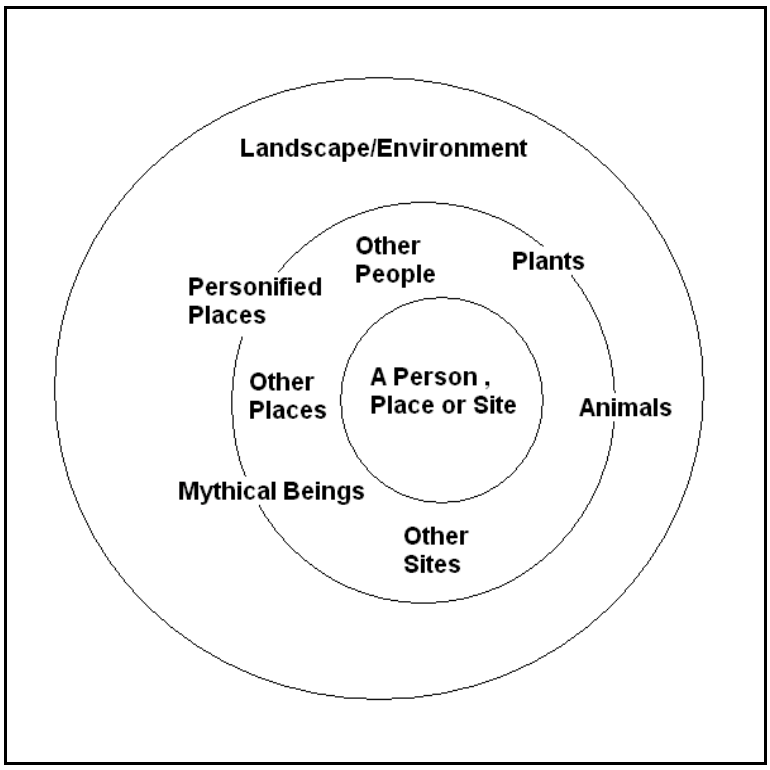


Figure 1.1: Skwxwú7mesh Uxwumixw worldview.

Acknowledging that the ancestors exist in many forms allows us to gain a deeper understanding of the archaeological record. For Indigenous people, interacting with the ancestors occurs continuously since they are all around us. Yet, one has to go beyond basic acknowledgement of the ancestors and delve deeper to become "of" the landscape. When we experience the landscape in a meaningful way, we come to associate powerful places where supernatural beings live with important histories. These histories guide us in our everyday lives and offer us timeless lessons. Through years of landscape experience, one gains

ta swa7s tsits'ap (specialist knowledge) of such places, their qualities and the properties that make up their essence. These places are typically marked with *Skwxwú7mesh Uxwumixw* place names, associated stories and songs and are often places of especially good and abundant resources. *Skwxwú7mesh Uxwumixw* place names are deeply descriptive, in contrast to typical Western scientific place names, which often commemorate an individual person or specific event.

Over thousands of years, this interaction with the ancestors has resulted in the formation of what we now call the archaeological record. We, as archaeologists, are able to find, excavate and analyze materials from locales we call sites. For example, DiRu 15 and DiRu 16 are two archaeological sites located on the Sunshine Coast, near Gibsons, B.C. Cultural materials from these sites inform archaeologists that they fit into certain spatial and temporal frameworks and provide evidence of an extensive woodworking industry. *Skwxwú7mesh* people, however, rely more on intangible aspects of cultural heritage, such as place names and oral history. Thus, the ways we, as Indigenous people, interpret and understand sites can differ greatly from those of archaeologists. Yet, meaningful integration of oral history and archaeology can be done through a *Skwxwú7mesh* perspective. Spending the time with culturally knowledgeable *Skwxwú7mesh* people on the landscape allows us to recognize the connections and meanings behind the location of archaeological sites, place names and the tales about them. To *Skwxwú7mesh* people DiRu 15 and DiRu 16 are

archaeological sites, but they are also named *Chekwelhp* and *Schenk*. *Chekwelhp* is an origin place, *Schenk* an important ancestral village, where sacred masks, canoes and other cultural materials were made. These links tie living descendants to important places, making them responsible for upholding their family history and passing it along to future generations. By recognizing these connections, archaeologists and Indigenous people can work together to create new and exciting histories and give meaning to places.

To demonstrate this, throughout this dissertation I use a wide range of *Skwxwú7mesh Snachim* language words, followed by an English translation. I also include these terms in an appendix-dictionary for reference (Appendix 1). I do this to stress the significance of place names through their links to the wider oral history and traditions of the territory and its past. True understanding of the links between the histories of one place and another can only happen when one travels throughout *Skwxwú7mesh Xay Temixw* (sacred lands) with the knowledge and recognition of place names. On a local scale, knowledge of place names refers to links between villages, resource-gathering locales outward to large landscape features such as rivers, islands and mountains. These links provide contextual knowledge that expands to encompass an entire territory. Only by the continual use of the *Skwxwú7mesh Snachim*, can one appropriately contextualize those terms so that their meanings eventually become easily recognizable to the traveller and the reader. To further help the reader, I also present information

about places and sites in three different ways: archaeological and geological maps and landscape photos.

Throughout this dissertation, I aim to contextualize Indigenous approaches to the study of lithic materials together with scientific approaches. My inclusion of the geochemical study of lithic materials from *Skwxwú7mesh Uxwumixw* aims to remove such studies from archaeometric isolation. While many studies of lithic chemistry on the Northwest Coast (Nelson 1975; Carlson 1994; N. Smith 2004) fundamentally present the results of where certain lithic materials come from and draw possible connections between different groups, I approach this undertaking on multiple scales and through many approaches. On the largest scale, I present the different ways of knowing lithic sources in *Skwxwú7mesh Uxwumixw* by combining geological, archaeological and *Skwxwú7mesh Uxwumixw* Indigenous knowledge. Moving down in scale, I define and employ a series of standardized variables to visually characterize materials from lithic sources. Then, I use visual characterizations to match lithic materials from 25 archaeological sites to potential sources.

Yet, in taking an Indigenous perspective to lithic sources and the archaeological record of *Skwxwú7mesh Uxwumixw* I do not wish to marginalize myself from the mainstream of Northwest Coast archaeology. While many theoretical and methodological considerations are advanced by Indigenous archaeology, Nicholas (2010:233-252) calls for seeking its end. He claims that we

must begin to meaningfully integrate Indigenous perspectives into mainstream archaeology, and I agree.

While my Indigenous perspective on the archaeological record of *Skwxwú7mesh Uxwumixw* is an example of implementing an Indigenous perspective into Northwest Coast archaeology, I wish to integrate my results into the broader understanding of the region's ancient past. Therefore, I end my study on the smallest scale, by geochemically characterizing lithic source materials and similar-looking lithic artifacts from archaeological sites. I do this to compare and combine Indigenous and Western scientific perspectives with my lines of data on different scales. By examining lithic materials on these scales, I will create a comprehensive description of their occurrence and distribution, from source to site and artifact back out to their role in past socioeconomic relations.

1.7 Indigenous Archaeology and the Use of Cultural Knowledge

The attitude of Indigenous people toward archaeological interpretations is more often than not negative (Ferguson 1996:63-79; Watkins 2000, 2005). This is mainly because Indigenous peoples view their history in an entirely different way from archaeologists, through oral historical experiences and traditional narratives about their people, the places they lived and travelled and the numerous lessons contained within a known and defined territory (cf. Harris 2005:33-41; Million 2003:52-68, 2005:43-55; Reimer 2007; Siegfried 2006; Watkins 2000, 2003, 2005; Yellowhorn 2002). Indigenous accounts are also very personal; they include place names, the names of people and of other beings. One way to

address the lack of interest of Indigenous people in archaeology and meaningfully integrate oral history is through the practice of Indigenous Archaeology (Ferguson and Colwell-Chanthaphonh 2006; Lyons and Reimer 2008).

Nicholas and Andrews (1997), Watkins (2000) and Lyons and Reimer (2008) define Indigenous archaeology as "archaeology done by, with or for Indigenous peoples"; yet to Indigenous peoples it is much more than this (Atalay 2006a:269-279, 2006b:280-309; Lippert 2006:431-440). Indigenous archaeology tends to focus on critiquing the Western scientific aspects of archaeology or its colonial-evolutionary focus (C. Smith and Wobst 2005:5-16; L. Smith 1999). At times, Indigenous archaeology tends to be overly theoretical (Nicholas 2004a, 2004b), with little or no direction to research problems and questions (McGhee 2005, 2008). No one in an Indigenous community is eager to hear that their perspective is like a Marxist, gendered, processual or post-processual paradigm; what they want to hear is their story, not someone else's story. Indigenous archaeology is also a means by which archaeology can begin to de-colonize its practice and interpretations of the past (McNiven and Russell 2005; Nicholas 2005; C. Smith and Wobst 2005; Wobst 2005; Zimmerman 2005). De-colonizing archaeology is achievable through community-driven projects that often result in alternative ways of interpreting the past (Ferguson and Colwell-Chanthaphonh 2006; Nicholas 2006; Watkins and Ferguson 2005). The rise of Indigenous archaeology in North America has stirred debate surrounding ethical practices,

repatriation of artifacts, reburial of human remains, treatment of material culture (Fine-Dare 2002; Riding In 1992; Watkins 2003, 2005) and the shifting of methodological and theoretical focus toward a holistic approach (Ferguson and Colwell-Chanthaphonh 2006). A cornerstone of Indigenous archaeology is the acknowledgement of and focus on the use of oral history and traditions as a form of data on par with other sources (Ferguson and Colwell-Chanthaphonh 2006; Million 2003; Yellowhorn 2002).

Yet, archaeology continues to marginalize oral history and traditions, due to the lack of explicit criteria for their evaluation and the assumption that they lack validity. To some, the use of these sources is considered a tenuous exercise, and oral history and traditions are treated as tertiary data in formulating theoretical constructs and interpretations (cf. Mason 2000:239-266; McGhee 2008). Yet, when brought to the fore through an Indigenous perspective, detailed cultural knowledge can greatly enhance our interpretations of the past (Echo-Hawk 2000; Ferguson and Colwell-Chanthaphonh 2006; Watkins 2000, 2005). It is how we decide to use oral history that determines the way in which we envision our data. For example, cultural-historical interpretations typically focus on a small number of diagnostic artifact types, whereas oral history would inform archaeology on a whole tool kit for fishing, woodworking or weaving. In processual approaches, it is often assumed that there is limited variability in certain site types, such as fish traps and clam gardens. Yet, when informed by oral histories, the scale of interpretation may change greatly from the identification of a single device for

catching fish to the consideration of the concept that peoples of the Northwest Coast practised sustainable fisheries through selective harvesting of salmon and other fish species. Thus, oral history is a vital link between people and sites and develops our understanding in regards to the ways we interpret the archaeological record. A recent example of this is Elroy White's (2006) research on stonewall fish traps in his home territory of the Heiltsuk Nation on the central coast of British Columbia. He found that current community elders and leaders possessed integral ancestral links to various fish trap sites (White 2006:84-133). Their knowledge allowed White to conclude that the variable arrangements of fish traps targeted specific fish species (White 2006:133,134, 137).

I take the stance that oral histories are reliable forms of data, especially when understood within a cultural context. Oral histories are a series of observations that relate to ecological messages of when and where to gather resources; they remind people of codes of conduct, as well as from where one draws ancestry and identity. This supposition is not unfounded, since I have played a personal role in the maintenance and creation of *Skwxwú7mesh Uxwumixw* history. Most recently, this occurred during a ten-year-long project called *Ust'am,* or Witness.

1.8 To *Ust'am*/Witness

Ust'am is a ceremony, oral history in action, used in many contexts, from the everyday interaction of trade and exchange to very special occasions and events such as potlatches for naming, weddings, funerals and winter dances (Figure 1.2). One common attribute is that certain key and respected people (typically those with ancestral names) within the gathering are to Witness the events. When asked to Witness, they take on the responsibility of their ancestral name, take account of the proceedings and pass along that information to others who are not present. When asking people to Witness, the hosts usually call upon people from farthest afield, thus making sure the news travels as widely as possible. If any dispute arises about the events that took place during the ceremony, those who were called as Witnesses can be called back later to recount the events as they remember them. The community and interested parties can listen and gauge for themselves what the correct sequence of events was and thus resolve any standing dispute to ownership, resource use, personal names or kinship ties.

Hence, to test the validity of an oral history, one can go into a community or communities, ask knowledgeable community members, elders and respected people about almost any given aspect of their history. You would get a range of opinions and answers, but an overall account of what went on at any particular time would arise from these enquiries. These consistent explanations of oral

history then become oral traditions, which are key to understanding the essence of places and their histories.

In 1996, *Telálsemkin Siyám*/Chief Bill Williams, a hereditary chief of the *Skwxwú7mesh Uxwumixw*, *Xwexwselkn*/John Clarke, a globally renowned mountaineer, and *Sla'nay' Sp'a'kw'us*/Nancy Bleck, an environmental/media photographer, initiated the *Ust'am*/Witness project. The aim of the project was to ignite interest in environmental concerns and rejuvenate aspects of *Skwxwú7mesh Uxwumixw* territory and culture. During the ten years of this project, people from around the globe "Witnessed" the environmental degradation of *Skwxwú7mesh Uxwumixw*.

During this time, cultural, legal and public pressure rose to the point where large-scale resource-extraction developments ceased. The areas of our territory that *Ust'am* had sought to protect were successfully protected. This capacity to surmount federal and provincial governments and large-scale industry using oral history is testament to the strength of cultural knowledge and practice (Xay Temixw 2001). I strongly believe that the validity of oral history is addressable by understanding how oral history is passed through Coast Salish society. I place great importance on the process of Witnessing in this dissertation, as it is the means through which I and other *Skwxwú7mesh Uxwumixw* remember our history, how we choose to retell this history to each other and people outside our culture. The basis of oral history and tradition is Witnessing. Throughout this

dissertation, I am conveying to you how I have Witnessed lithic sources and archaeological sites within *Skwxwú7mesh Uxwumixw*.

Figure 1.2: Witness ceremony in the Elaho Valley.

1.9 Scope, Limitations and Organization of Chapters

The scope of this dissertation is large. As implied throughout this chapter, it includes summary and synthesis of multiple forms of knowledge, notably cultural, archaeological and geological. It encompasses the study area of *Skwxwú7mesh Uxwumixw* and beyond (Figure 1.3). The boundaries of *Skwxwú7mesh Uxwumixw* (1992) start in the south in Vancouver, B.C., at *Elksen* (Point Grey) east to *T'item'tsn* (Port Moody) and all the waters that drain into

Burrard Inlet and Indian Arm (Figure 1.3). It is marked on the west at *Sta'kaya* (Roberts Creek near Gibsons), then extends north to include all of the drainages into Howe Sound and its islands and the *Skwxwú7mesh* (Squamish), *Yelhi'xw* (Ashlu), Elaho, *Chi'yakmesh* (Cheakamus) and *Ma'mxem* (Mamquam) Rivers. Modern cities and towns, including Vancouver, Lions Bay, Britannia Beach, Squamish and Whistler, are present in our territory. In total, our territory measures 6732 square kilometres.

Chapter Two narrows the scope of my research by focusing on the archaeological background of *Skwxwú7mesh Uxwumixw* territory. Of the currently known 215 archaeological sites in *Skwxwú7mesh Uxwumixw,* I limited myself to a sample of 25 sites. Sites included in my analysis either have a range of lithic materials, have 14C dates associated with them or simply provide additional geographic coverage. Throughout this chapter, I also link the themes of Transformation and Mythical Beings to Indigenize the archaeological understanding of chronology and spatial occurrence of site types within *Skwxwú7mesh Uxwumixw*.

In Chapter Three, I concentrate on narrowing the scope of my research to the cultural and geological background of lithic sources throughout *Skwxwú7mesh Uxwumixw* with the aim of determining which outcrops of tool stone were utilized in the past. I then organize lithic sources into the culturally important themes of Transformation and Mythical Beings. My investigations into

lithic sources are limited to those that were used for flaked stone tool production and do not include ground stone industries.

In Chapters Four and Five, I move to a combined visual and chemical analysis of lithic materials from the 25 sites chosen for analysis. Visual characterization follows a standardized approach to characterizing each lithic source and the lithic artifacts derived from them. This allows for exploration of the relationship between a source's accessibility and its abundance in the archaeological record. Furthermore, I investigate the treatment of each lithic material in the sites used in my study. I limited my visual analysis of lithic artifacts to a visually representative sample of 1500 of the 25,637, or 17% of the artifacts recovered from the 25 sites included in this investigation. Geochemical analysis of 206 samples serves as an additional check of the accuracy of my visual assessments.

Finally, in Chapter Six, I discuss the results from an Indigenous perspective and the roles of Transformation and Mythical Beings in lithic material distributions. This discussion will draw upon long-term history and structural themes that link place names, oral history and traditions to lithic sources and archaeological sites along the southern Northwest Coast.

1.10 Significance of the Study

The main contribution of this research will be to provide a *Skwxwú7mesh Uxwumixw* perspective on the archaeological record of our territory. It explores the recent past by recounting very specific events, the not-so-recent past by

recounting more general events and the long-ago past by recounting key structural elements of *Skwxwú7mesh Uxwumixw* history. This research is an opportunity to combine two seemingly opposing worldviews, especially as they pertain to concepts of time and place, and it will challenge the assumptions that they hold of each other. Furthermore, this research suggests how we can recover and/or rediscover Indigenous experiences of landscape and how traditional knowledge and cultural practices relate to lithic sources and their distributions.

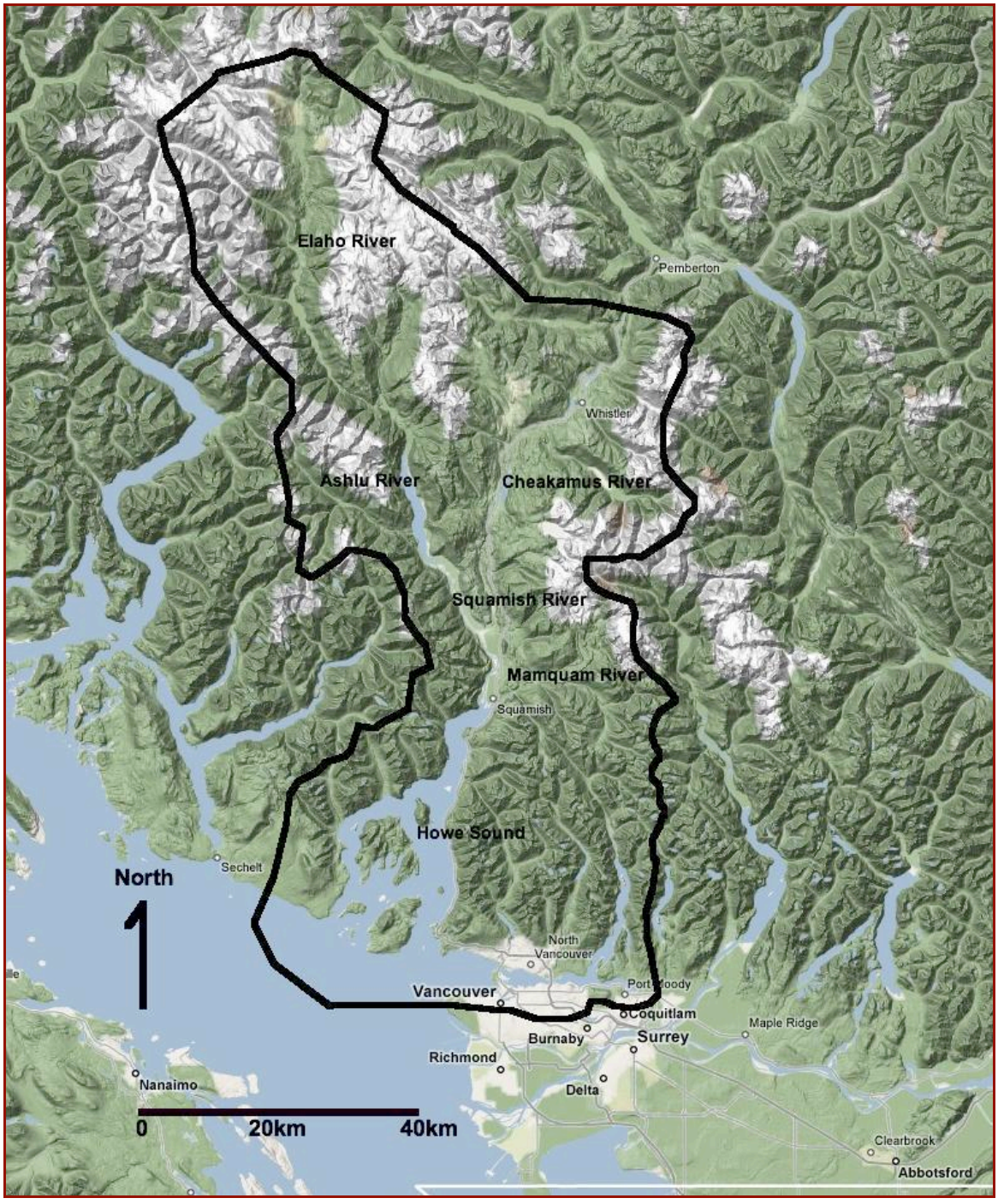


Figure 1.3: Skwxwú7mesh Uxwumixw.

Chapter Two:

Sḵwxwú7mesh Uxwumixw Archaeological Sites

2.0 Introduction

In this chapter, I start by presenting the current archaeological understanding of *Skwxwú7mesh Uxwumixw*. Then I illustrate how an Indigenous perspective can transform this understanding into a holistic perspective that acknowledges the ancestors, making archaeology culturally meaningful. To begin this process, one must first recognize that the earliest archaeological investigations in the region were by the ancestors of the *Skwxwú7mesh Uxwumixw*. Until now, this explicit acknowledgement is absent from the archaeological literature. From an Indigenous perspective, it is entirely logical that pre-contact *Skwxwú7mesh Uxwumixw* people knew that their ancestors lived in and used numerous areas of our territory. They left behind an abundance of evidence to demonstrate their presence. These localities manifest as old villages or resource locations; they are often marked with *Skwxwú7mesh Uxwumixw* place names and carry associated oral history. In the distant past, ancestors of *Skwxwú7mesh* people would have come across traces of even older landscape use. Anyone travelling through their territory would know and remember these locations from generations of use and occupation.

2.1 History of Archaeological Research in *Sḵwxwú7mesh Uxwumixw Temixw*

Contact with Europeans coincided with a decline in land use, and this decline continued until very recently, when *Skwxwú7mesh Uxwumixw* people began to re-assert their presence throughout our lands by revitalizing knowledge and use of the territory (Xay Temixw 2001), including archaeological research. In recent history, the Squamish region has been the subject of numerous archaeological investigations by academic researchers (Charlton 1971, 1974, 1980; Coupland 1991; Hanson 1991; Lepofsky et al. 2007; Trost 2005; Winram 1975; Wright 1996), cultural resource management (CRM) companies (Apland 1980; ARCAS 1993; 1998a, b, c, 1999 a, b and c, 2000, 2002; Bussey 1992; Freisen 1980; Golder 1999, 2003, 2004; Hall 2004, Hall et al. 2007; Howe 1981, 1982; May and Lucas 1976; Merchant 2001; Merchant and Rousseau 1994; Millennia 1998; M. Mitchell 1991; Quirolo and Ham 1990; Witt and Howard 1998) and most recently by *Skwxwú7mesh Uxwumixw* people (Reimer 1998, 2000, 2003, 2004, 2005, 2006, 2007, 2009; Reimer and MacDonald 2008).

The archaeology of *Skwxwú7mesh Uxwumixw* has been subject to varying levels of investigations for the past 25 years, including a limited set of academic survey and excavation reports, along with numerous CRM surveys (see references above). Over the past 15 years, I have been involved in almost all aspects of this research. Yet, there is no regional synthesis of all these data and investigations in *Skwxwú7mesh Uxwumixw,* leaving this region rarely considered in broader regional archaeological syntheses. Therefore, in this chapter I will

present a synthesis of *Skwxwú7mesh Uxwumixw* archaeology from both academic and CRM reports. Following this, I will present a *Skwxwú7mesh* understanding of the archaeological record, including an Indigenous understanding of chronology, sites and places, and discuss how they link together.

From the late 1980s through the 1990s, ARCAS Consulting Archeologists Limited conducted a number of investigations at the request of the *Skwxwú7mesh Uxwumixw* (ARCAS 1999a). In this systematic research, they test excavated 10 sites throughout *Skwxwú7mesh Uxwumixw* and established a skeleton radiocarbon chronology spanning the past 4000 years. Additionally, they conducted a wide-scale archaeological survey, locating numerous sites in Burrard Inlet and Howe Sound and along the Squamish, Ashlu, Elaho, Cheakamus and Mamquam River Valleys. On Gambier Island, a series of mitigative excavations by ARCAS (1998c) illustrated stratigraphic depth and recovered diverse lithic assemblages. In 2002, ARCAS test excavated EaRu 5, a rock shelter site where they found well-preserved stratified deposits and a specialized lithic assemblage related to hunting and territorial defence.

More recently, I have conducted a substantial amount of academic research within *Skwxwú7mesh Uxwumixw* (Reimer 1998, 2000, 2003, 2004, 2005, 2006, 2007, 2009; Reimer and MacDonald 2008). This research has greatly expanded the number and type of sites identified within *Skwxwú7mesh Uxwumixw* and has contributed to a better understanding of the pre-contact

occupation of the region and the nature of resource use, settlement patterns and *Skwxwú7mesh Uxwumixw* perceptions of landscape. Furthermore, this research has extended the radiocarbon chronology back into the early Holocene and established later period site occupations enduring into the very recent ethnographic and post-contact period (Reimer 2009).

2.2 Current State of Archaeology in *Sḵwxwú7mesh Uxwumixw*

Currently, there are 215 known archaeological sites within *Skwxwú7mesh Uxwumixw*. A culture-historical sequence developed from a number of excavations across the region spans the last 10,000 years (ARCAS 1999a; Hall et al. 2007; Reimer 2000, 2003, 2005, 2006, 2007). This sequence fits generally with regional syntheses of archaeology in the southern Northwest Coast presented by Ames and Maschner (1999), Borden (1970, 1975), Carlson (1983), Fladmark (1983), Matson and Coupland (1995) and D. Mitchell (1971, 1979, 1990), who suggest a procession of six broad culture types during pre-contact times along the southern coast of British Columbia. These culture types are: the Old Cordilleran culture or Pebble Tool tradition (ca. 9000 to 4500 years BP), the Charles culture (ca. 4500 to 3300 years BP), Locarno Beach (ca. 3500 to 2500 years BP), Marpole (ca. 2500 to 1400 years BP) and the Gulf of Georgia (ca. 1400 years BP to contact). This temporal sequence has been formulated through the investigation of numerous site types, including shell middens, villages, culturally modified trees, fish weirs, canoe runs, human burials, cache pits, lithic scatters, historic cabins and traditional resource use sites. In the next sections, I

present a more detailed discussion of the radiocarbon dates from these sites, section 2.3 is from an archaeological perspective and the remaining sections of this chapter present an Indigenous point of view.

2.3 An Archaeological Perspective on the Radiocarbon Chronology of *Skwxwú7mesh Uxwumixw Temixw*

Below are a number of graphics showing the overall radiocarbon chronology for archaeological sites in *Skwxwú7mesh Uxwumixw* (Figures 2.1 to 2.7) and separate sections showing this sequence divided by subareas of the territory, including Burrard Inlet, Howe Sound and the Squamish River Valley (Figures 2.2 to 2.4). Overall, 25 out of the 215 currently known archaeological sites in *Skwxwú7mesh Uxwumixw* have associated radiocarbon dates (Figures 2.5 to 2.6). These sites are the focus of this study. Eight are in Burrard Inlet, nine in Howe Sound and eight in the Squamish River Valley. Sites in Burrard Inlet and Howe Sound have multiple radiocarbon dates associated with them, whereas those in the Squamish River Valley tend to have only a single 14C date associated with them. Discussion of radiocarbon dates throughout this dissertation is in uncalibrated 14C dates.

In Burrard Inlet, occupation is continuous for the past 4000 years, whereas in Howe Sound initial occupation is as early as 8500 BP, and in the Squamish River Valley it is as early as 7100 BP. In Howe Sound, based on available radiocarbon dates, occupation appears to become more continuous after 4000 BP and in the Squamish River Valley at around 2000 years BP. It is likely that

occupation of all areas began in the early Holocene and continued into post-contact times; yet dramatic sea level fluctuations, changing river geomorphology and a lack of survey for additional early- and middle-period sites likely minimize the archaeological visibility of these sites. Additional data on radiocarbon dates are in ARCAS (1993, 1999), Charlton (1980), Coupland (1991) and Reimer (2004, 2005, 2006, 2007, 2008).

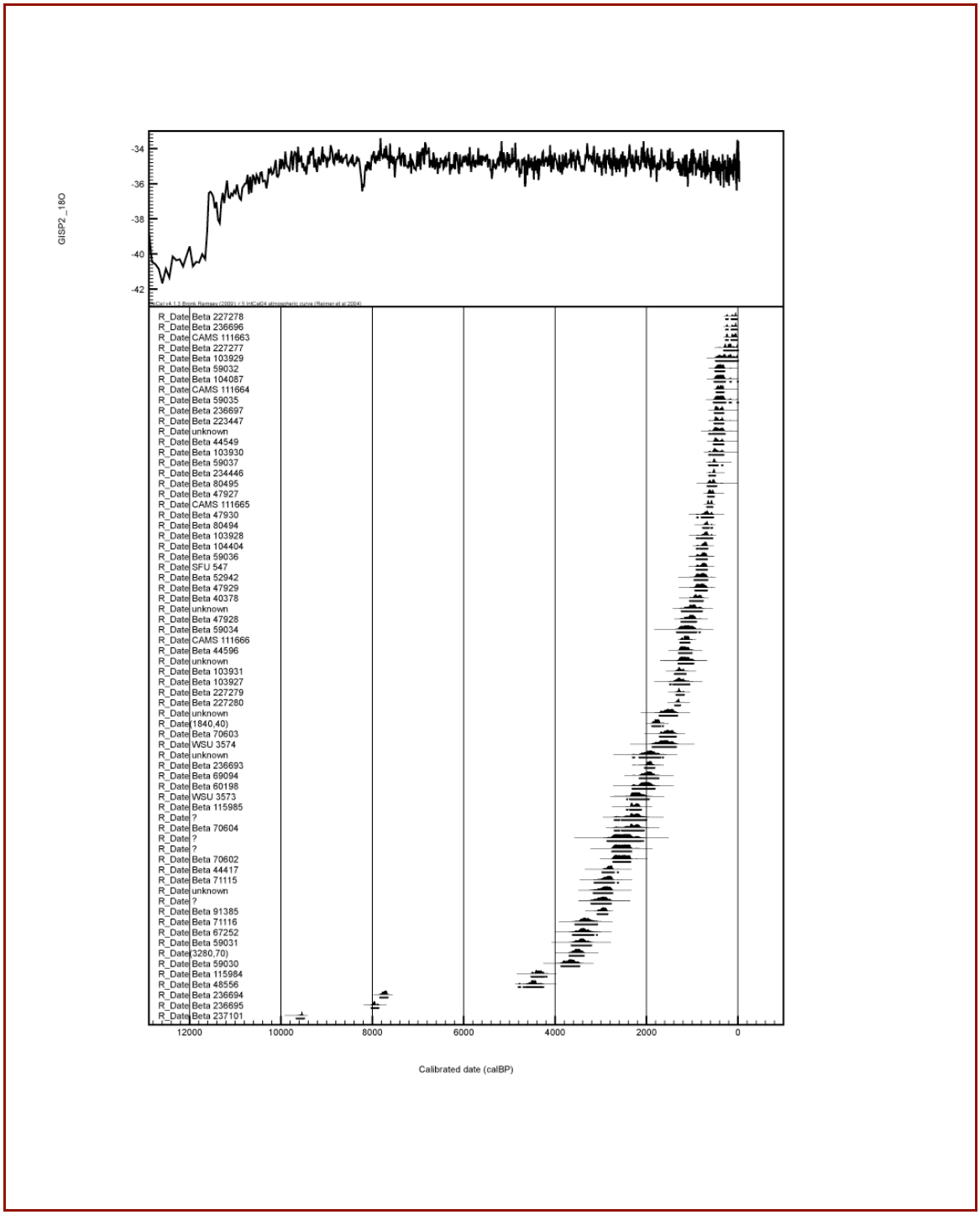


Figure 2.1: All archaeological sites in *Skwxwú7mesh Uxwumixw* with 14C dates.

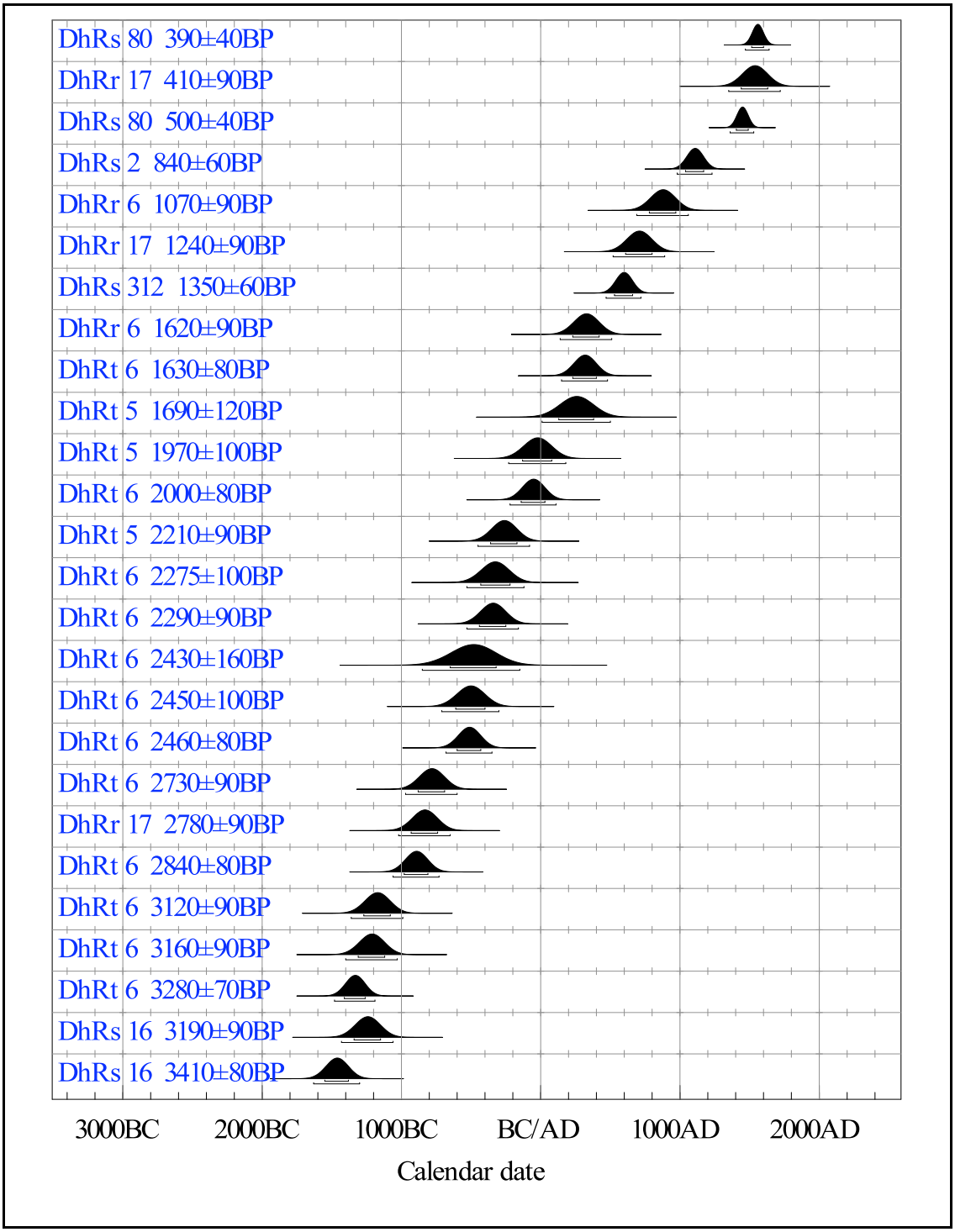


Figure 2.2: Archaeological sites in Burrard Inlet with 14C dates.

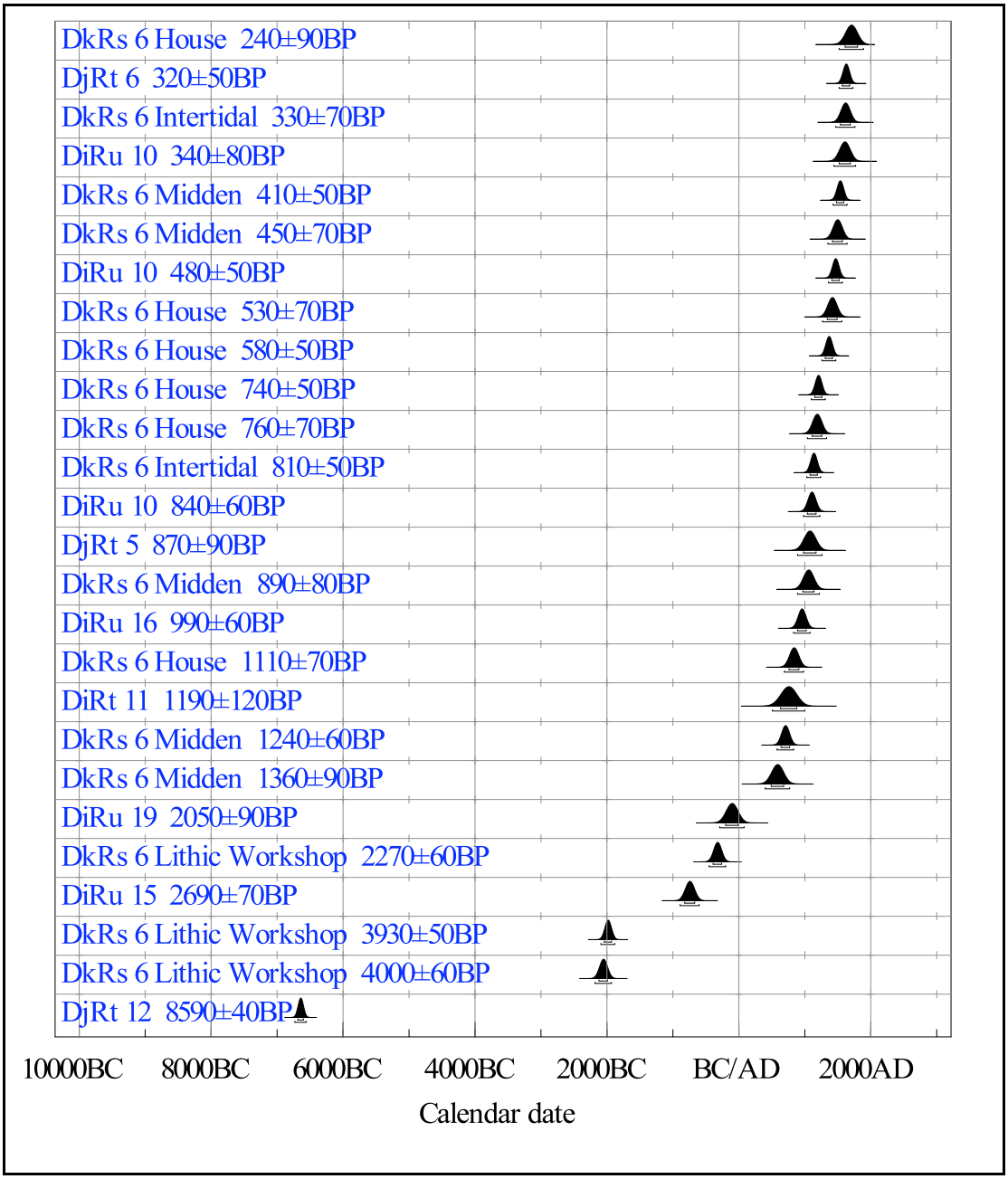


Figure 2.3: Archaeological sites in Howe Sound with 14C dates.

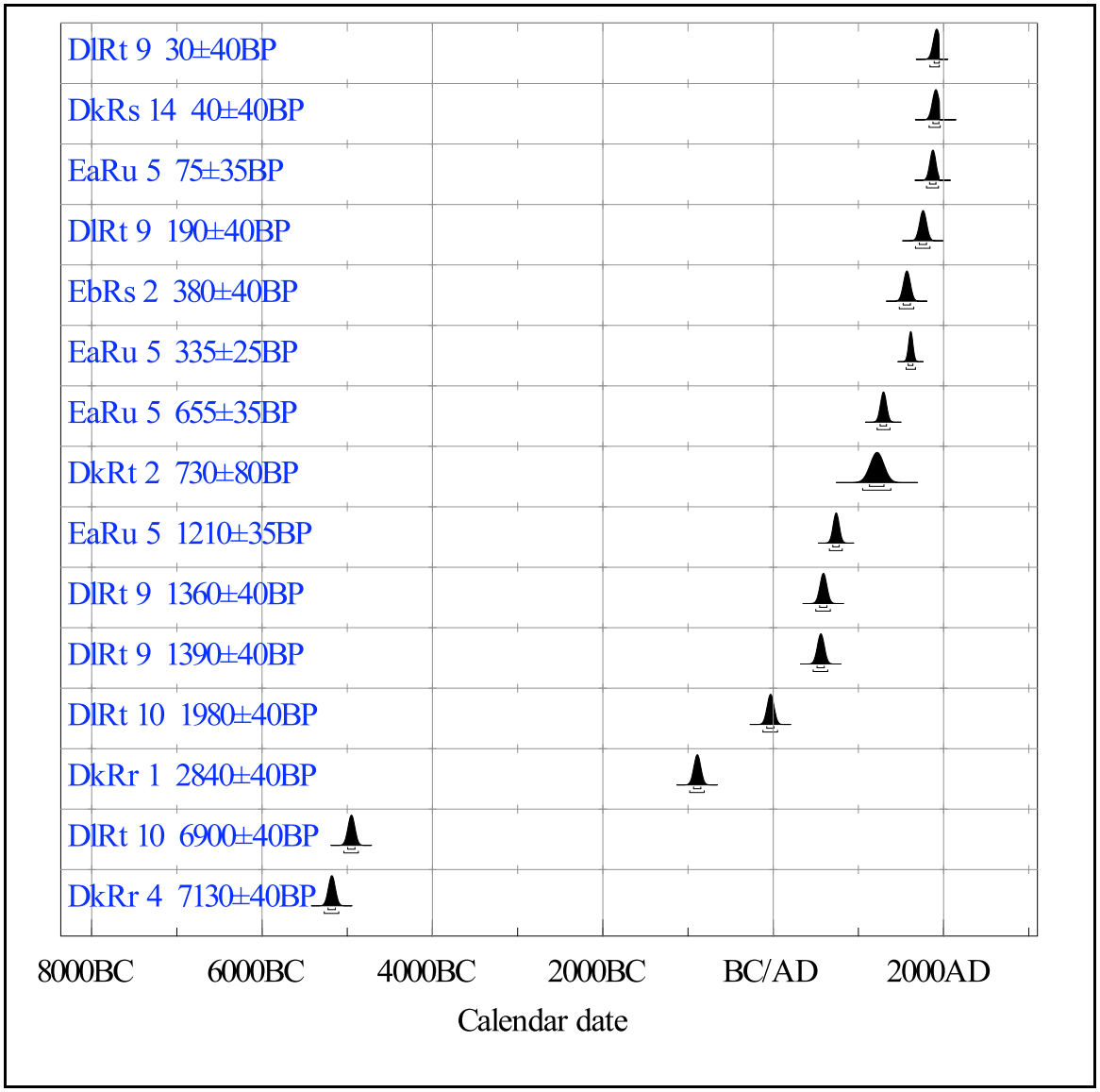


Figure 2.4: Archaeological sites in the Squamish River Valley with 14C dates.

2.4 Establishing a *Sḵwxwú7mesh Uxwumixw* Chronological Framework

Previous examinations of the antiquity of Northwest Coast and Coast Salish oral history have shown reliable associations between cultural and paleoenvironmental data. For example, Budhwa (2002) and McMillan and Hutchings (2002) tested the accuracy of oral histories of Native groups in the Pacific Northwest concerning catastrophic palaeoenvironmental events (volcanic eruptions, earthquakes, landslides, tsunamis, floods and other natural disasters). Independently, these studies found that both general accounts and specific oral histories are accurate when compared with geological data. In addition, they both demonstrated continuity and reliability of oral history over the past 7500 years for numerous groups on the Northwest Coast.

Using a different approach, Duncan McLaren (2003, 2006) has convincingly demonstrated the long-term practice of social memory among Coast Salish peoples. His study of Coast Salish oral histories (2003) found that they are consistent across many groups, stretching over long periods of stability. Later, McLaren (2006) found that the long-term persistence of Coast Salish social memory is reflected in archaeologically observable tool-making activities, resource procurement activities and settlement patterns. He concludes that archaeologists must consider long-term social memory when constructing temporal sequences and positing periods of cultural stability or change.

Considering the accomplishments and approaches of these scholars, I follow a similar arrangement that blends paleoenvironmental data with

archaeological and *Skwxwú7mesh Uxwumixw* cultural information in the formulation of an Indigenous understanding of time (Table 2.1). This Indigenous understanding of chronology is consistent with the Indigenous worldview in that it encapsulates both time and place and considers the relations of humans to the non-human world, including real and mythical beings (Figure 1.1). At the same time, this temporal arrangement meshes with previously defined archaeological time periods and geological events, such as late Pleistocene to early Holocene glaciations, subsequent sea level changes, river geomorphology, fluctuating tree line limits and changing climatic conditions.

While I do not mean to depict time in a linear fashion as presented in Table 2.1, I do not mean to alter the *Skwxwú7mesh Uxwumixw* worldview of time and place shown in Figures 1.1. *Skwxwú7mesh* people who live in the present still visit places that are archaeological sites associated with *Sxwexwiyam* (mythical time), *Xaay Xays* (time of transformation) and *Syets* (recent time and memories), contributing to continual cyclical understanding, use and remembrance of these places. In the next section, I will demonstrate how these time periods link to places by defining and classifying archaeological sites in *Skwxwú7mesh Uxwumixw* from an Indigenous perspective.

Table 2.1: *Skwxwú7mesh Uxwumixw* time and place, culture history and paleoenvironments.

Age BP	**Skwxwú7mesh Uxwumixw Timeframe**	**Cultural History**	**Sea Level Position**	**Position of Squamish River**	**Glacial and Tree Lines**	**Climatic Conditions**
Present	*Syets* or Recent Time (Events easily remembered)	Historic	0m	Current Position	Alpine Glaciers Retreating	Current Conditions
					Retreat of Little Ice Age Glaciers	Warmer
		Late			Little Ice Age	Wetter
500						
900						
1000						
				Confluence of the Cheakamus River	Tiedemann Ice Age Retreat	Warmer
2000		Marpole				
3000	*Xaay Xays* or	Locarno			Tiedemann	
3300	The Age of Transformation				Ice Age Advance	Wetter
4000	(Transformers set things right	Charles			Garibaldi Ice Age Retreat	Warmer
6000	and the world became stabilized)		-5m	Confluence of the Ashlu River	Garibaldi Ice Age Advance	Wetter
6800			-9m		Establishment of Coastal	Hypsithermal
7000	*Sxwexwiyam* or					Dry and
8000	Mythical Time (Time when		-25m		Forests 120-90m Higher	Warm Conditions
9000	things were in		0m		Tree lines	Warmer
10000	chaos)	Old Cordilleran	+30m		Glacial Ice Retreat/Pine and Scrub Forest	
11000			+55m	Confluence of the Elaho River	Full Ice Age	
12000+			+85m			Dry and Cold

2.5 An Archaeological Perspective on Site Types in *Sk̲wxwú7mesh Uxwumixw Temixw*

The dated sites listed in the previous section cover all areas of *Skwxwú7mesh Uxwumixw* and range from high-elevation alpine lithic scatters to mid-elevation rock shelters to riverine fishing camps and ocean-side villages and middens. Table 2.2 (below) summarizes site data by region, including site type, the relationship of the *Skwxwú7mesh Uxwumixw* name with an English translation, radiocarbon date ranges, overall site area, and the nature of the site deposits. Figures 2.5, 2.6 and 2.7 show locations in the Squamish Valley, Howe Sound and Burrard Inlet regions. A basic description of each of these sites is in Appendix 1.

I define a village site based on several criteria; the most important being *Skwxwú7mesh* cultural knowledge, place names and any ethnographically recorded descriptions. Archaeologically, village sites tend to be large in size and positioned in strategic or resource-rich locations with deeply stratified deposits indicating long-term habitation. A village also typically possesses a variety of archaeological features such as house depressions, multiple hearths, post and stake moulds, processing areas (charcoal staining, fire-altered rock concentrations), associated midden (shell- and non-shell-bearing deposits) and workshop areas (dense artifact concentrations). Additionally, village sites contain abundant flora and fauna materials providing multiple seasonal indicators and diverse artifact assemblages. Based on these criteria, eight of the 25 sites in this

analysis are villages: three in Burrard Inlet, four in Howe Sound and one in the Squamish River Valley.

Sta'mis (DkRs 6), located at the head of Howe Sound, is an important site in this analysis. It is central to *Skwxwú7mesh Uxwumixw*, marking the transition from mainly terrestrial to marine environments. Extensively excavated by ARCAS (1999), it was found to preserve layers of occupation that lasted for over 4000 years. A large rock bluff protects the cultural deposits at this site from the constant change in geomorphology of the Squamish, Mamquam and Sta'mis Rivers. This stable location allowed its inhabitants to monitor the movement of goods in and out of the Squamish Valley and into Howe Sound. The site contains several houses, extensive midden deposits and a specialized lithic workshop. The stratigraphic house deposits at this site indicate that individual houses expanded and contracted several times over 2000 years. The midden deposits are both rich and diverse in faunal remains, while the lithic workshop shows consistent use of several kinds of lithic materials for over 4000 years. Collectively, these multiple site components represent what D. Mitchell (1979) termed a village aggregate, defined based on ethnographic accounts that describe Coast Salish people from many villages coming together to access seasonal resources and to maintain regional social ties at a single location.

A seasonal camp is usually smaller than a village site and is found at or near important resource localities (clam beds, mouths of creeks and rivers). Typically, seasonal camps consist of moderately deep, stratified deposits with a

limited number of features (usually hearths). Alternatively, incorporated into landforms such as rock shelters, seasonal camps can contain diverse artifact assemblages and specific seasonal indicators (flora and fauna). Eleven of the sites in this analysis are seasonal camps: two in Burrard Inlet, five in Howe Sound and four in the Squamish River Valley.

A temporary camp is a small discrete site, typically located away from villages and seasonal camps and found in good camping locations (i.e. flat, well drained ground with access to water and other resources). Scattered over the land surface, with little or no stratified deposits, temporary camps possess limited numbers of artifacts and ephemeral features (single-use hearths or small drying racks). The mid- to high-elevation locations are usually indicators of seasonal use. Six of the sites in this analysis are temporary camps: one in Howe Sound and five in the Squamish River Valley, with none occurring in the Burrard Inlet area.

2.6 Establishing Site Types from a *Sḵwxwú7mesh Uxwumixw* Perspective

To stamp the archaeological record of *Skwxwú7mesh Uxwumixw* with an Indigenous identity, I will now link the *Skwxwú7mesh* understanding of history to the sites and time frames of the region. Here, I incorporate the real and mythical worlds in which Indigenous peoples exist and emphasize our cyclical sense of time. Temporally, they are the *Sxwexwiyam, Xaay Xays and Syets* periods.

Sxwexwiyam sites refer to places, object or features (non-material or material) that are associated with mythical beings. They are very old, dating back to when the world was in a state of chaos. Archaeologically, these sites can include *smant* (lithic sources), pictographs depicting mythical beings and sites at mid to high elevation that are directly associated with ancient events or their remembrance. These places can also be linked to the habitat of mythical beings and spirited places where humans once interacted with animals, plants and landscape features.

Xaay Xays sites are places, objects or features (non-material or material) associated with the time when the world was "being set right" by the Transformer brothers during their travels across *Skwxwú7mesh Uxwumixw*. Archaeologically, these sites can include *smant*, *smekw'a7a'l* (burials and burial grounds), *temixw* (landscape features, such as *smanit* (mountains), *eskwekp* (hills) and pictographs depicting Transformation events. *Xway'xway* sites and locations are associated with the origin of the sacred *Xway'xway* mask and the regalia, songs, dances and ceremonies associated with it.

Syets sites are objects and places that represent common everyday activities by people and include *Uxwumixw* (villages or houses), camps and resource procurement areas. These also include what is commonly termed teaching or traditional-use sites, where activities passed down from generation to generation took or take place. They are sites closely tied to the people inhabiting them, as they put cultural knowledge into daily practice, making them "of" the

landscape. Ceremonial sites are locations where ceremonial events such as *Ust'am* or Witnessing ceremonies happened, but they are also where ceremonial regalia is placed and or stored. Place Names are site localities that mark the landscape with recognized *Skwxwú7mesh Uxwumixw* place names or *Xay Temixw* (2001) land use designation.

2.7 Chapter Summary

The result of applying an Indigenous perspective to the archaeological record of *Skwxwú7mesh Uxwumixw* is that the archaeological sites used in this study now link to the *Sxwexwiyam, Xaay Xays and Syets* periods. Lithic materials from these sites are also associated with the prominent themes of *Skwxwú7mesh Uxwumixw* oral history: Transformation and Mythical Beings. Outlining this framework is both necessary for an Indigenous archaeology but also useful for determining the next step of analysis—the visual and chemical characterization of lithic materials from the 25 sites discussed in this chapter. Next, I will determine the links between this Indigenous understanding of site types and periods and the lithic materials found within them.

Table 2.2: *Skwxwú7mesh Uxwumixw* archaeological sites examined in this study.

Site Type	Site	Snachim	Translation	Theme	14C BP	Area (m²)
Squamish Valley						
Village	DkRs 6	*Sta'mis*	At the Head	Mythical Being	4000-580	299,000
Seasonal Camps	DkRt 2	*Upeniwa*	Ten Trees	Transformer	730	75
	DlRt 9	*Nepit'l*	Deer Origin Place	Transformer	1410-60	10,000
	EaRu 2	*P'uy'am*	Blackened from the Smoke	Transformer	n/a	7500
	EaRu 5			Transformer	1210-75	4000
Temporary Camps	DlRt 10	*Sauph*		Mythical Being	6900-1980	250
	DlRt 11	*Sauph*		Mythical Being	n/a	300
	DkRr 1	*Chíchshem st'ena'tch*	Outer Hunting Area	Mythical Being	2840	8400
	DkRr 4	*Chíchshem st'ena'tch*	Outer Hunting Area	Mythical Being	7130	500
	DkRs 14	*Chíchshem st'ena'tch*	Outer Hunting Area	Mythical Being	40	2000
Howe Sound						
Villages	DiRt 1	*Ch'axa'y*	Sizzling Water	Transformer	n/a	10,000
	DiRu 15	*Schen'k*	Steadying something from behind	Transformer	2690	14,000
	DiRu 16	*Ch'kw'elhp*		Transformer	990	27,200
	DjRt 6	*Tsi'tsusm*	They had a big Potlatch There	Transformer	320	6250
Seasonal Camps	DiRt 11	*Ch'a'7elsm*	Some Kind of Little Fish Always Goes There	Transformer	1190	418
	DiRu 10	*St'a'p'as*	Mink's House	Transformer	840-340	4000
	DiRu 19	*Chaich-ph*		Transformer	2050	450
	DjRt 5	*Kw'emkw'em*	Go Ashore from a Canoe	Transformer	870	1500
	DjRt 12	*Tl'etl'ch'a'lkm*	To Stalk Up On Something	Transformer	8590	400
Temporary Camps	DjRt 3	*Lhaxwm*		Mythical Being	n/a	800
Burrard Inlet						
Villages	DhRr 6	*Temtemi'xwtn*	Lots of Land Place	Transformer	1620-1040	6000
	DhRr 18	*Spucka-nay*	White Rock	Transformer	n/a	6500
	DhRr 20	*K'iya'xn*	Stockade	Transformer	n/a	11,000
Seasonal Camp	DhRs 16	*Eslahan*	Head of the Bay	Transformer	3410-3190	30
	DhRt 6	*Kwekw7u'pay'*	Lots of Wild Crabapple Trees	Transformer	3280-2460	200,000

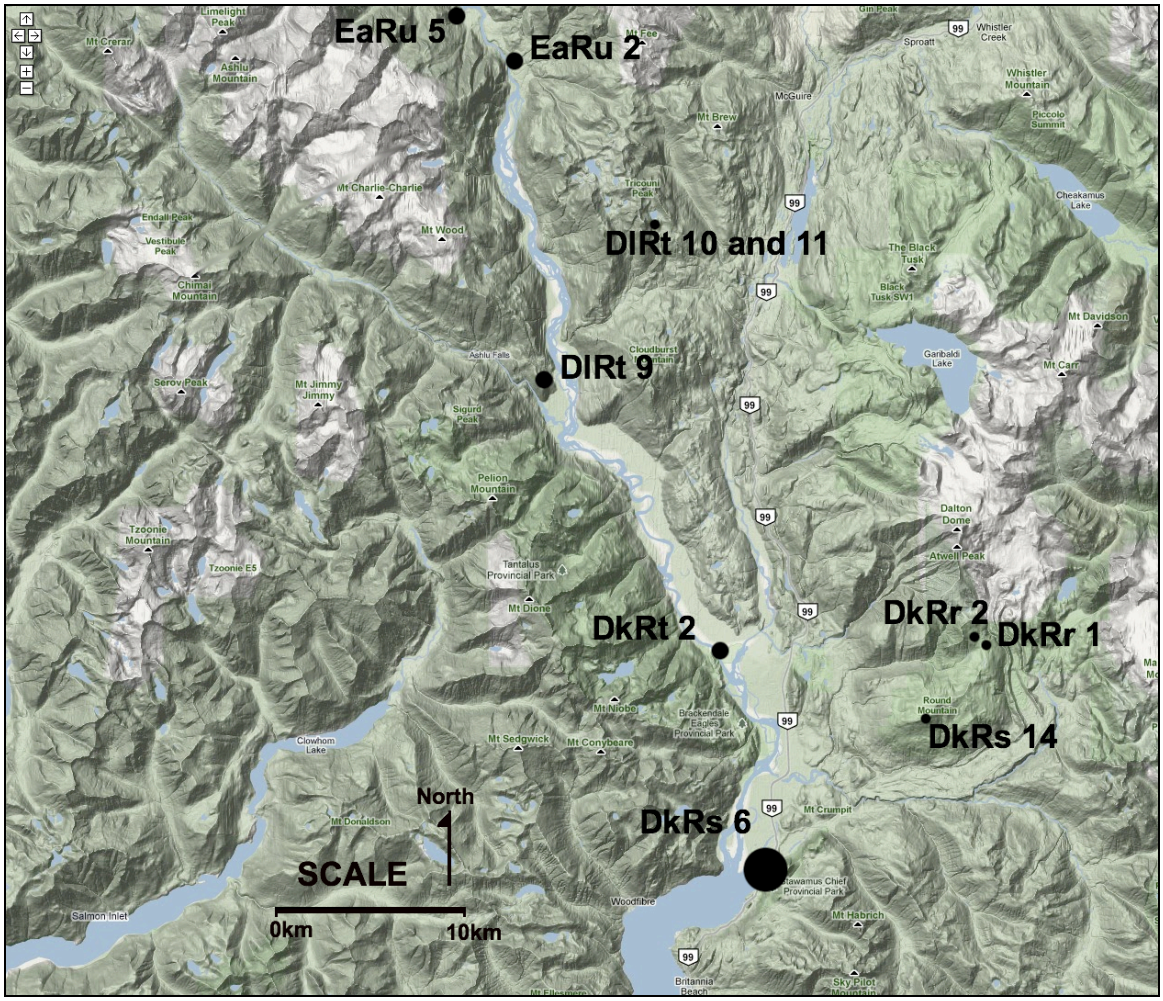


Figure 2.5: Location of archaeological sites in the Squamish River Valley.
Note that villages are represented by the largest dots, seasonal camps by medium size dots, and camps by the smallest dots.

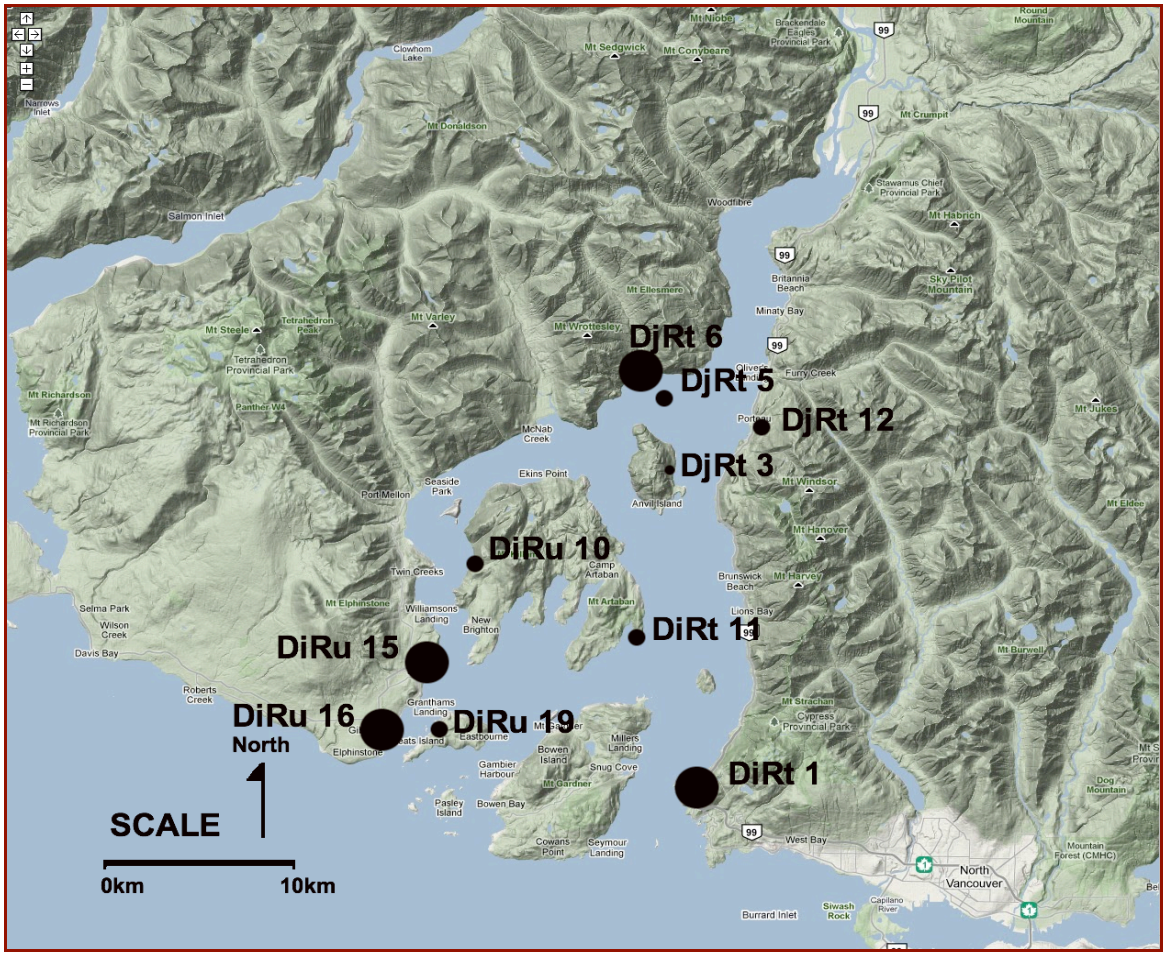


Figure 2.6: Location of archaeological sites in Howe Sound.
Note that villages are represented by the largest dots, seasonal camps by medium size dots, and camps by the smallest dots.

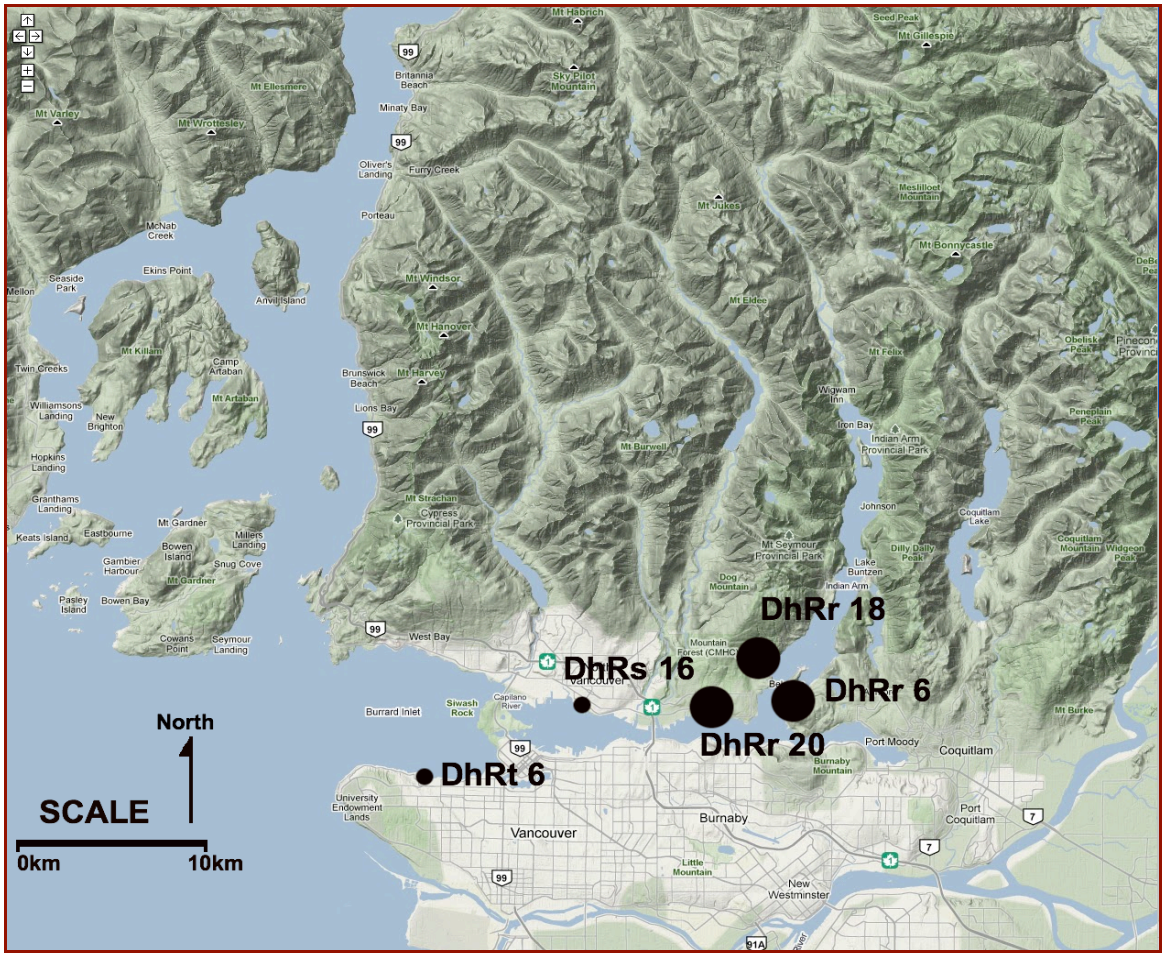


Figure 2.7: Location of archaeological sites in Burrard Inlet.
Note that villages are represented by the largest dots, seasonal camps by medium size dots, and camps by the smallest dots.

Chapter Three:

Cultural and Geological Background of Lithic Sources in *Skwxwú7mesh Uxwumixw* Territory

3.0 Introduction—An Indigenous Perspective on the Biophysical Attributes of *Skwxwú7mesh Uxwumixw*

People of the *Skwxwú7mesh Uxwumixw* consider themselves part of a larger *k'eksin ti siya't-shn*. This is our term for the world and universe, created by the *Chilh siyam*, the Supreme Being. Anthropologists know this world as the Northwest Coast and us as the "Squamish," one of the Coast Salish–speaking peoples. We see ourselves as the *Skwxwú7mesh Uxwumixw,* or the Squamish Nation. Our *Xay temixw,* or sacred land, is on the southern part of this foreign-defined area. We define our home by its massive *xaxmin smanit* (glacier-covered mountains), along with its many *stakw, swa'7elt and xachu7* (rivers, creeks and lakes) that drain into numerous *s7a'tsnach* and *kwa txwnu'wu7ts* (bays and inlets). Upon our *temixw* and in our *stakw* there are many resources used for *s7ilhn* and *t'uyt* (food and medicine) as well as *smant* (stones) for making tools and *sle'wey'* (inner cedar bark) for making a multitude of household implements such as *xwilem* (rope) and *sitn* (baskets).

Our social and political structure is complex; it is centred on family and *lam'* (long house). In the old days, within a *lam'* many *nexwyiyulhtnor* (hearths) marked where families conducted daily activities such as *tsiyelstn* (sharpening) a *lhach'tn* or an *sxwmats'tsten* (knife or spear), repairing a *texwe7ch* (bow),

fletching *ts'emaal* (arrows) or weaving baskets and blankets. In the evenings of the winter months, village youth learned the differences between *syets* (true stories) and *sxwexwiyam* (legends).

In front of a *lam',* a number of inter-tidal *chi'yak* (fish traps) were constructed by inhabitants of the village, marking their ties to the many species of salmon people. This is where people could easily *miyach* (harpoon) *sts'ukwi* (fish) and process them with *kw'ich'tn* (fish knives). As one travels away from the *stakw* and *lam'* up the *stakshen* (steep shore), one encounters a *smek'a7a'l* (graveyard) surrounded by a forest dominated by *kwaytsay* (hemlock) and *xapayay* (red cedar) trees with an understory of *ptalwan* (ferns). Moving inland and upslope, you can observe the patterns of vegetation change with *k'elhmay* (yellow cedar) and *ch'sahy'* (Douglas fir) becoming the dominant trees surrounded by an understory of *u'sa7* (mountain blueberries). One may also find an *xwp'a7a'ysus* (cave) or a *Xesh-shn* (a deadfall trap). More likely one would encounter a group of men using *ntelchis* (stone hammers) with *xwe7it* (wedges) and *haltin* (chisels) to harvest *k'elhmay* for making *snexwilh* (a canoe) or *sk'emel* (paddles).

Continuing upslope, one needs a *t'chach,* or walking pole, or even *tl'alxn,* or snowshoes, to travel high into the *smanits* (mountains). High elevation areas were usually *nema',* or forbidden, to most people, as they hold *sna7m,* or spiritual power. Only those with spiritual guides and knowledge could go to these places. They were the realm of *sxw7umtn* (Indian doctors); *kwtsi7ts* (ritualists) went there to gain knowledge, and *esyew'* (seers) went to predict the future.

3.1 Place Names, Oral and Geological History of Lithic Source Locations

Before describing lithic sources of *Skwxwú7mesh Uxwumixw*, I will contextualize the multi-layered cultural information relating to these locales within the region's ethnic and geological histories. One has to appreciate that *Skwxwú7mesh Uxwumixw* culture has an intimate understanding of the size, environmental diversity and the extreme degree of vertical relief of its territory. An integral aspect of this vast body of knowledge is the locations of lithic materials. Each of these sites is marked with a *Skwxwú7mesh Uxwumixw* place name to which I add the *Skwxwú7mesh Snachim* term *smant* (stone), as in *Nch'kay' smant.* In essence, those materials are "of" that place (Figure 3.1). Furthermore, surrounding each distinctive lithic source is an associated oral history, or histories, that offers insight into the source's meaning and use.

The eruptive history of the Garibaldi volcanic belt is geologically recent, 1.6 million years to 200,000 years ago. The numerous eruptions from many volcanoes, side vents and domes produced a large number of lava flows with a diverse range of lithic types (Brooks and Freile 1992; Bye et al 2000; Mathews 1951, 1952; Green et al. 1988, Green 1991; Kelman et al. 2001, 2002a and b, Kelman et al. 2008). As I will show, the location and quality of these various lithic material sources plays a strong role in their use and distribution. I focus my discussion on the Mount Cayley and Garibaldi areas (Figure 3.2) of the larger Garibaldi volcanic belt, as they are directly associated with *Skwxwú7mesh Uxwumixw*.

3.2 Themes in *Skwxwú7mesh Uxwumixw* Oral History as Related to Lithic Sources

In this chapter, I present the pertinent information regarding lithic sources in *Skwxwú7mesh Uxwumixw*, moving north to south over the landscape. Discussion of six lithic sources will start with accounts of the *Skwxwú7mesh Uxwumixw* place name, its translation and meaning through its associated oral history. To aid in conveying the cultural information on these sources, I include landscape photos for each. I present the current geological understanding of each source, including maps, to convey the different ways of perceiving landscape. Additionally, for each source I present a brief summary of its archaeological significance and describe a number of its attributes, notably access and terrain, type of exposure, extent, abundance, typical nodule sizes and ease of quarrying. I also allude to the attributes of individual lithic materials found at these sources, including their colour, grain size, texture, phenocryst size and density as they all relate to the fracture quality. In the past, *Skwxwú7mesh* people sought lithic materials with conchoidal fracture qualities—i.e., those that have a predictable breakage pattern. Detailed consideration of lithic source and material attributes is discussed in Chapter Four.

Lithic sources are specific locales where important aspects of *Skwxwú7mesh Uxwumixw* history took place and with which *Skwxwú7mesh* people formed special relationships. Understanding their associations through an Indigenous perspective is critical to any examination of their use and regional distribution. Learning through experiencing them, I have found that each of these

lithic sources is associated with one of two dominant themes of *Skwxwú7mesh Uxwumixw* history: Transformation and Mythical Beings. Thus, I propose that these themes are related to the occurrence of lithic sources and the rationale for their use.

Culturally, I have come to Witness these themes through years of cultural education, including the examination of *Skwxwú7mesh Uxwumixw* place names and oral histories. In doing so, I have discovered the links of my cultural knowledge to the regional archaeological record through a series of archaeological investigations (Barnett 1955; Bouchard and Kennedy 1976a and b, 1986; Hill-Tout 1897, 1900, 1978; Kupiers 1967, 1969; Matthews 1955; Squamish Nation 1992). The first theme associated with lithic sources is Transformation. To people of the *Skwxwú7mesh Uxwumixw,* Transformation relates to the actions and travels of the *Xaay Xays,* or Transformer Brothers, sent by the Creator “to set the world right.” The second theme associated with lithic sources is Mythical Beings such as Thunderbird, the Wild People and Sea Serpents.

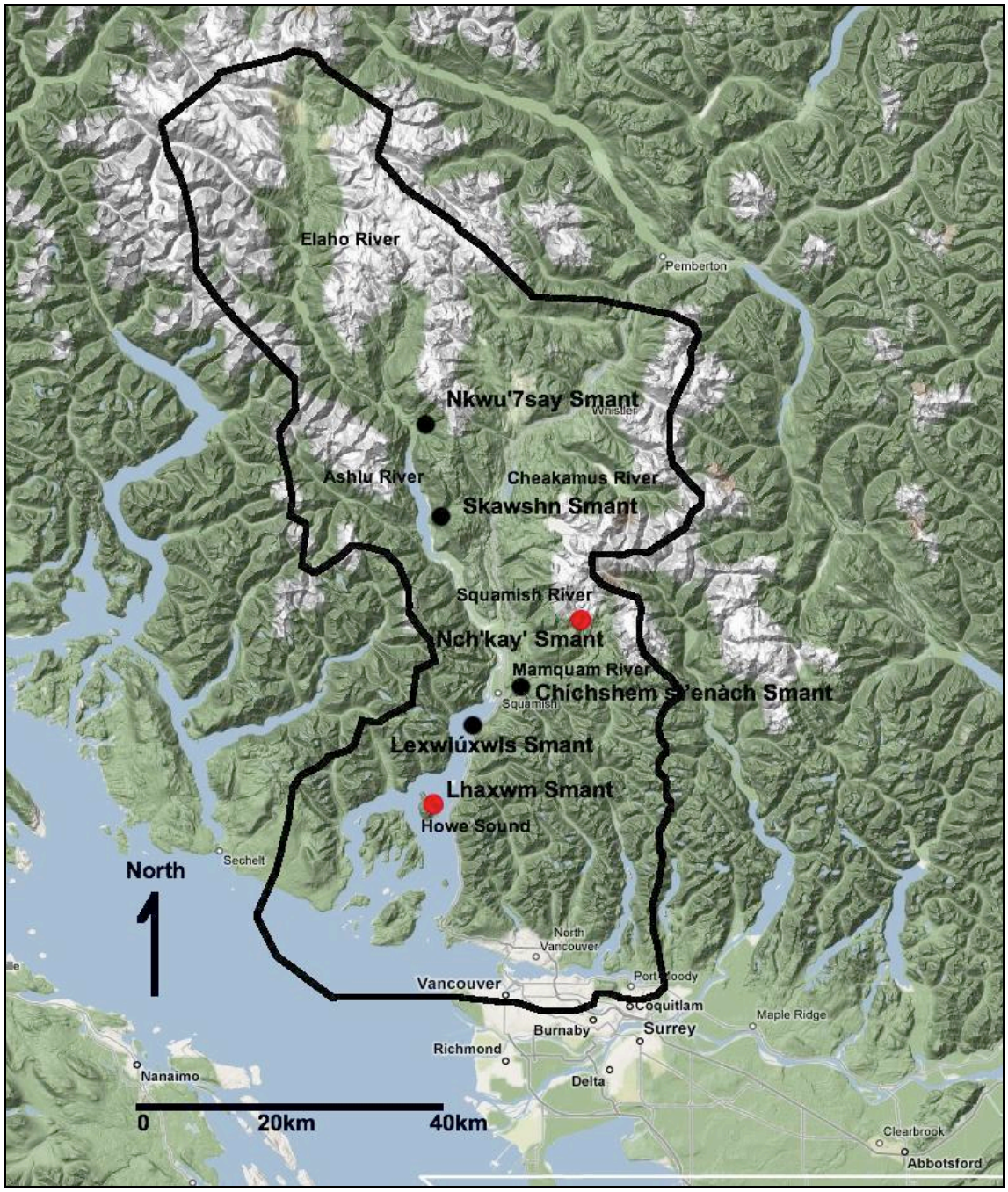


Figure 3.1: The occurrence and distribution of lithic sources in *Skwxwú7mesh Uxwumixw*.
Note: lithic sources marked in black are associated with Transformation, and those in red are associated with Mythical Beings.

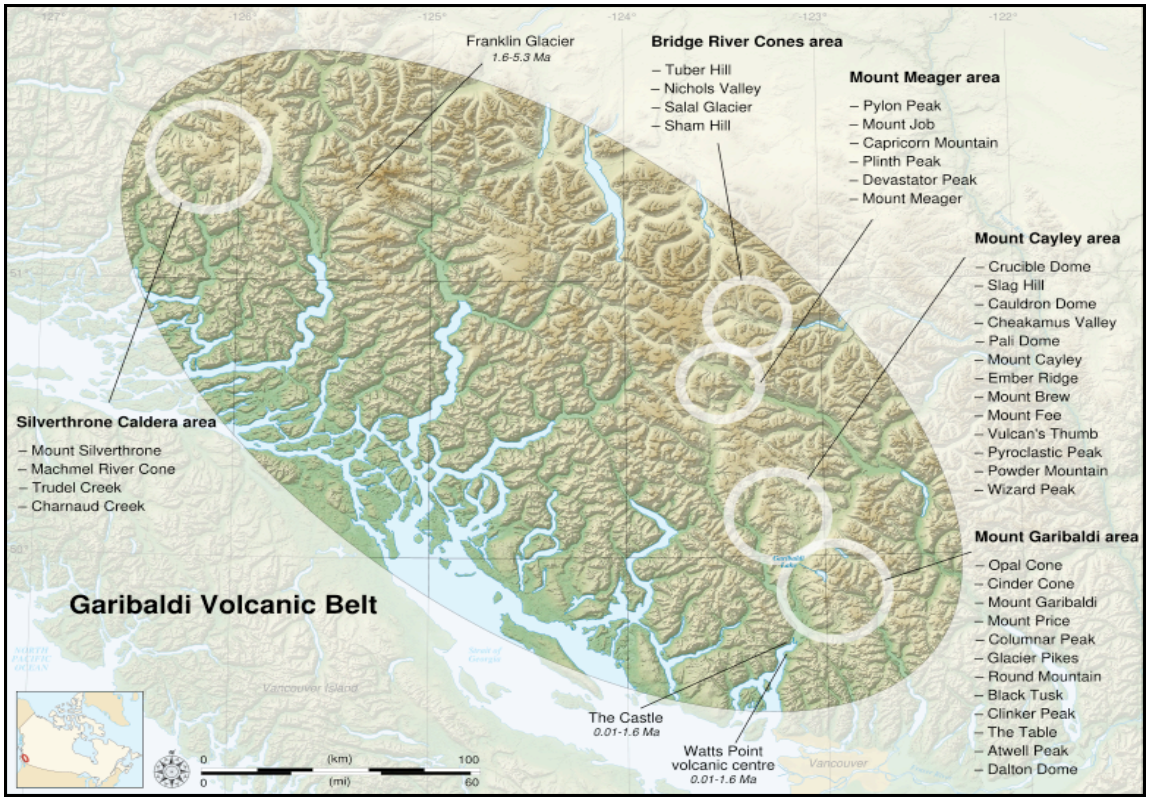


Figure 3.2: The Garibaldi volcanic belt.
Retrieved November 11, 2008 from
http://images.google.ca/imgres?imgurl=http://upload.wikimedia.org/wikipedia/commons/thumb/4/4b/Mount_Cayley.jpeg

3.3 Lithic Sources Associated with Transformation

Among the people of *Skwxwú7mesh Uxwumixw*, the theme of Transformation carries multiple meanings. It refers to changes that occur on several scales, from the changes of day to night to the extremes of the seasons and the fluctuations and scheduling of resources. Others are changes that occur throughout life, from youth to adolescence and adulthood, such as building a house and developing skills over a long period.

Yet, to those with knowledge of their place and history, Transformation means primarily the travels of *Xaay Xays* throughout the territory. *Xaay Xays* were four brothers, the eldest being the most powerful and the youngest the least experienced. Their travels occurred in the distant past. In these times, animals, plants, the land, waters and people could all speak to one another and change their physical forms. For example, mountain goats far up the Elaho River Valley could remove their skins and become people, and deer on the slopes of Buck Mountain could do the same. In this distant past, the world was in a state of chaos; many descendents of these early *Skwxwú7mesh* people tell of floods, areas of fiery earth and of many different "ways of doing."

It is in this ancient, chaotic setting that the *Xaay Xays* brothers, sent by the Creator to "set the world right," began their journey at *Elksen,* or Point Grey in present-day Vancouver. From there they travelled throughout Burrard Inlet, up Howe Sound and the Squamish and Cheakamus River Valleys, where they taught people, animals, plants and things the proper ways of the world. Eventually, they travelled to the northern sections of *Skwxwú7mesh Uxwumixw*, where they passed into the territory of the *Lil'wat*, our interior neighbours, and were not seen again.

During the *Xaay Xays'* travels throughout *Skwxwú7mesh Uxwumixw*, they performed numerous Transformations. When they encountered people acting strangely or doing things in a wrong way, they transformed them into stone. Other times, they changed people into valuable resources such as cedar, beaver or

deer. All these beings became the ancestors of the people of the *Skwxwú7mesh Uxwumixw*. One important aspect of those beings that were transformed into stone is that they also became a very important and fixed resource: suitable lithic raw materials, known as *Nkwu'7say Smant, Skawshn Smant, Chíchshem st'enàch Smant* and *Lexwlúxwls Smant*. While other beings also changed to stone, not all were suitable lithic raw material. These beings became important landscape features, such as mountains, creeks and lakes that serve other purposes to the *Skwxwú7mesh* people. They provide links between history and places. Upon visiting them, *Skwxwú7mesh Uxwumixw* youth are taught the reasons why they should behave properly. These permanent landscape fixtures serve as strong reminders and convey a sense of the reality of creation and Transformation events. Therefore, to the people of the *Skwxwú7mesh Uxwumixw* landscape is not only physical, but also very spiritual and tied to a long distant past. One illustrative example is a pictograph showing the *Xaay Xays* during their journey through *Skwxwú7mesh Uxwumixw* passing by Furry Creek on the eastern shore of Howe Sound (Figure 3.3).

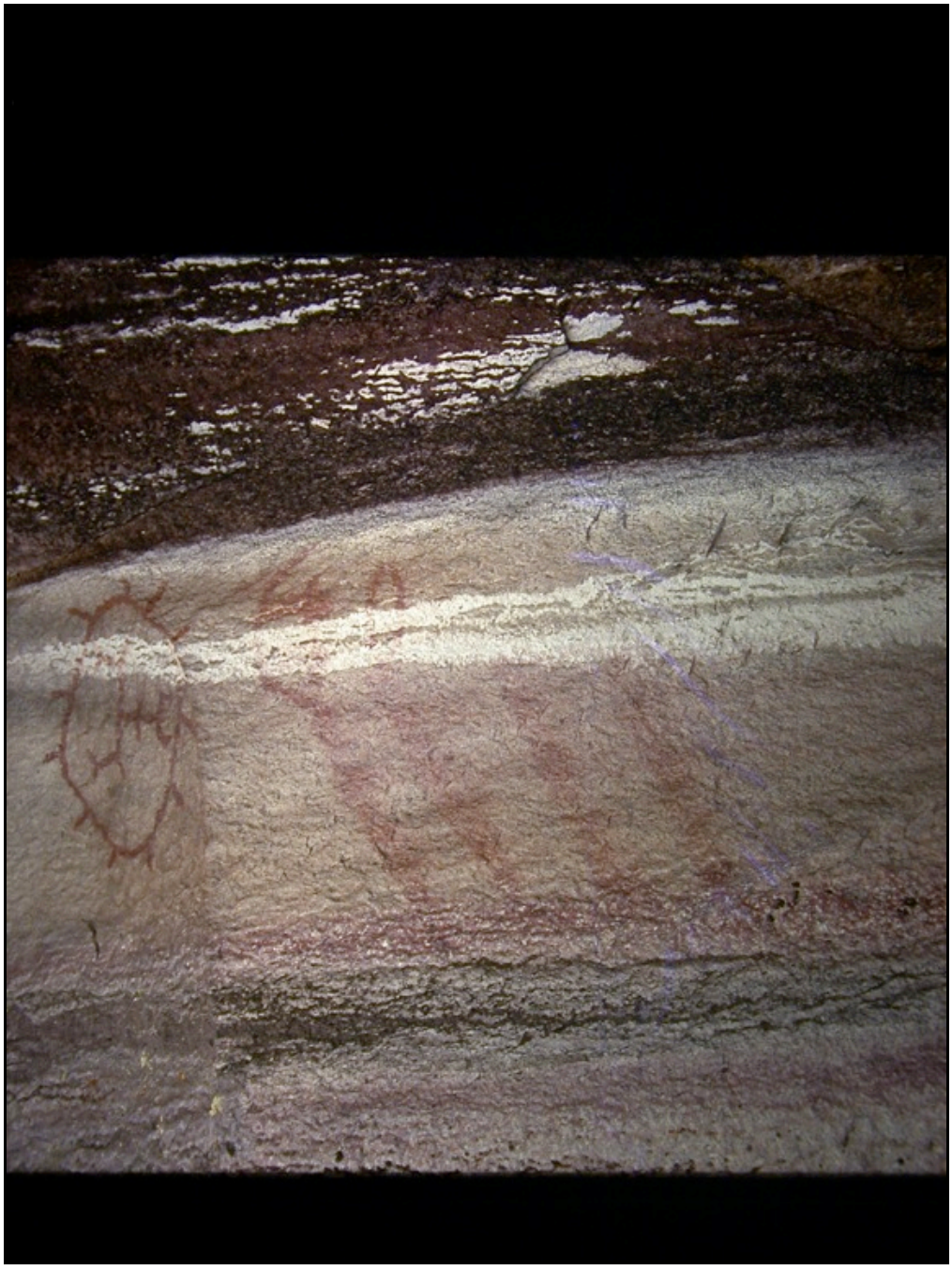


Figure 3.3: Pictograph image at DjRt 2, Furry Creek, eastern Howe Sound.

3.3.1 *Nkwu'7say Smant*

Nkwu'7say is the "place of spring salmon;" it is also known as Shovelnose and Turbid Creeks, which flow off the slopes of *Sxel'tskwu'7,* or Mount Cayley (Bouchard and Kennedy 1986:409-410). In the *Skwxwú7mesh* oral history of the *Xaay Xays*, this is the place where the people received instruction from the Chief of the Spring Salmon. First, he taught them how to properly fish for salmon, then how to conduct the salmon ceremony (welcoming back the salmon people to the waters of the territory) and finally how to properly treat parts of the salmon to ensure their return to *Skwxwú7mesh Uxwumixw* waters (Hill-Tout 1978:85-90).

There are two village sites in the *Nkwu'7say* area. *P'uy'am'*, near the confluence of the Squamish and Elaho Rivers and Turbid Creek, was once a large village. This is evident in the translation of its name, "blackened from smoke," referring to the many fires used to warm the houses and to smoke dry salmon, deer and mountain goat meat (Bouchard and Kennedy 1986:402-408). This translation also bridges the early *Skwxwú7mesh Uxwumixw* history and geological history describing a place of fire and ice, with surrounding mountains having "a smoky appearance." *Ch'ékch'eks,* or "dirty at the mouth," was a village at the mouth of Shovelnose Creek along the Upper Squamish River. People from these two villages, known to be spiritually powerful and resourceful, hunted deer and mountain goats in the surrounding mountainous terrain and fished in the nearby fast-flowing rivers and creeks (Matthews 1955).

Geologically, the Shovelnose Creek bed is long and extensive (Figure 3.4), containing slide and eroded deposits from Mount Cayley and Mount Fee, two sections of a large composite volcano within the Garibaldi volcanic belt (Kelman et al. 2008). These large volcanic cones produced a wide range of rock types. Specifically, dacite cobbles are widely dispersed but easy to gather along the *Nkwu'7say* creek bed. Close to both the villages of *P'uy'am'* and *Ch'ékch'eks*, one can commonly find water-worn rounded cobbles that have a fair fracture quality, ranging from 10 to 20 centimetres in size. Being at a bottom of the valley where *Nkwu'7say* drains into the Squamish River, the terrain surrounding this source is easily accessible and has abundant visible exposures of eroded lithic material along the *Nkwu'7say* creek bed, making this location desirable for lithic material acquisition (Figure 3.5).

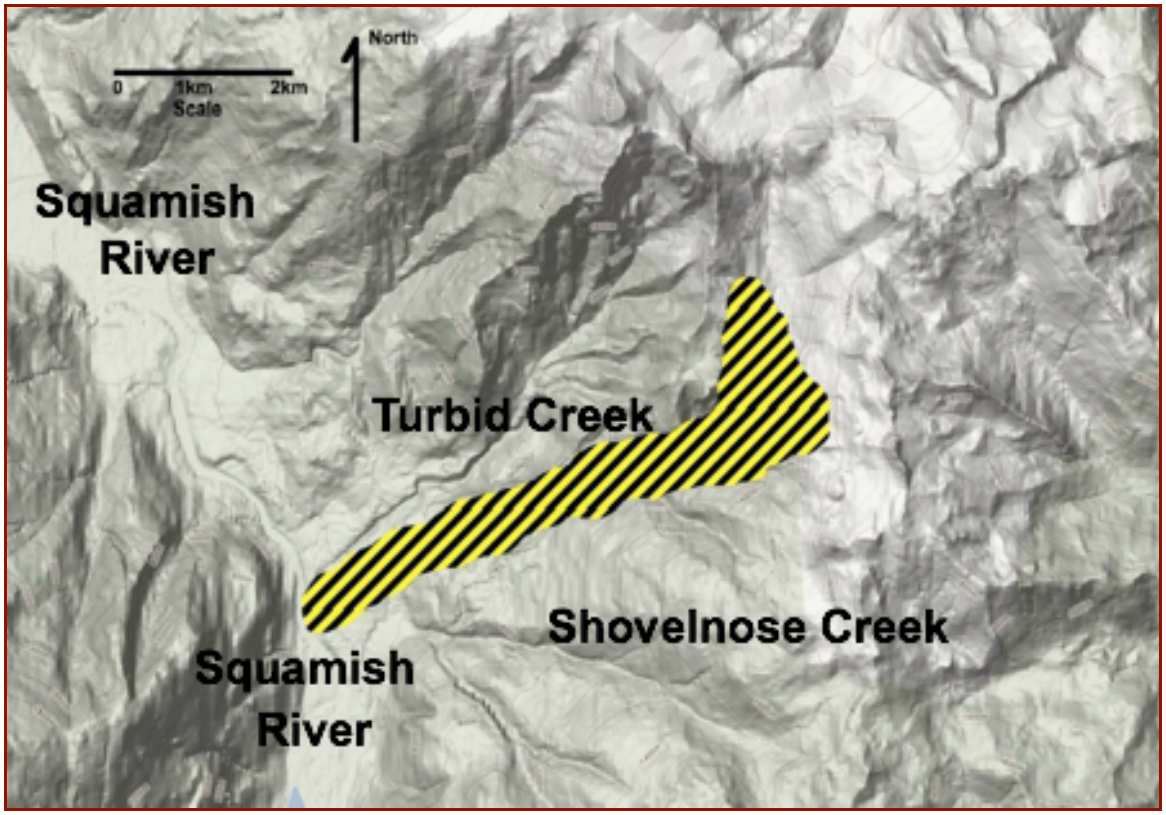


Figure 3.4: The geological occurrence of *Nkwu'7say Smant*.

Figure 3.5: The *Nkwu'7say Smant* source.

3.3.2 *Skawshn Smant*

The village and burial ground *Skawshn* (foot descending) is located near the outlet of High Falls Creek into the Squamish River. The area was once heavily forested with transformed ancestors, manifest as large cedar trees allowing for the manufacture of high-quality river canoes. The inhabitants of *Skawshn* were renowned woodworkers and recognized for travelling quickly up and down river systems (Bouchard and Kennedy 1986: 401-402). The accomplishments of *Skawshn* carvers provide ancestral ties to this area and a constant awareness of how to properly treat cedar. Imbued with the essence of

the ancestors, cedar is highly respected in traditional *Skwxwú7mesh* teachings. The ancestors, not a preconceived design, guide carvers. The act of carving ancient cedar is a sacred pursuit, in which carvers believe their wood and work is a transformed ancestor associated with their village's burial ground.

Yelhi'xw was once a village at the confluence of the Squamish and Ashlu Rivers. It is associated with *Nepit'l,* or Buck Mountain, a place where the Transformers changed a man into a deer, creating an animal for the *Skwxwú7mesh* people to use (Bouchard and Kennedy 1986: 400). It is also a place where the Creator of the *Skwxwú7mesh* people passed down codes of conduct on how to live a proper life, making this a place of spiritual training (Hill-Tout 1897:85-90). Geologically, the material in the bed of High Falls Creek is a dacite, eroded from a high-elevation lava flow (Kelman et al 2008). With several exposures, this material is abundant and easy to access along the entire length of the creek, making this source an easy place to gather material (Figure 3.6). Traversing this area, one could easily find water worn cobbles ranging in size between 10 to 25 centimetres (Figure 3.7).

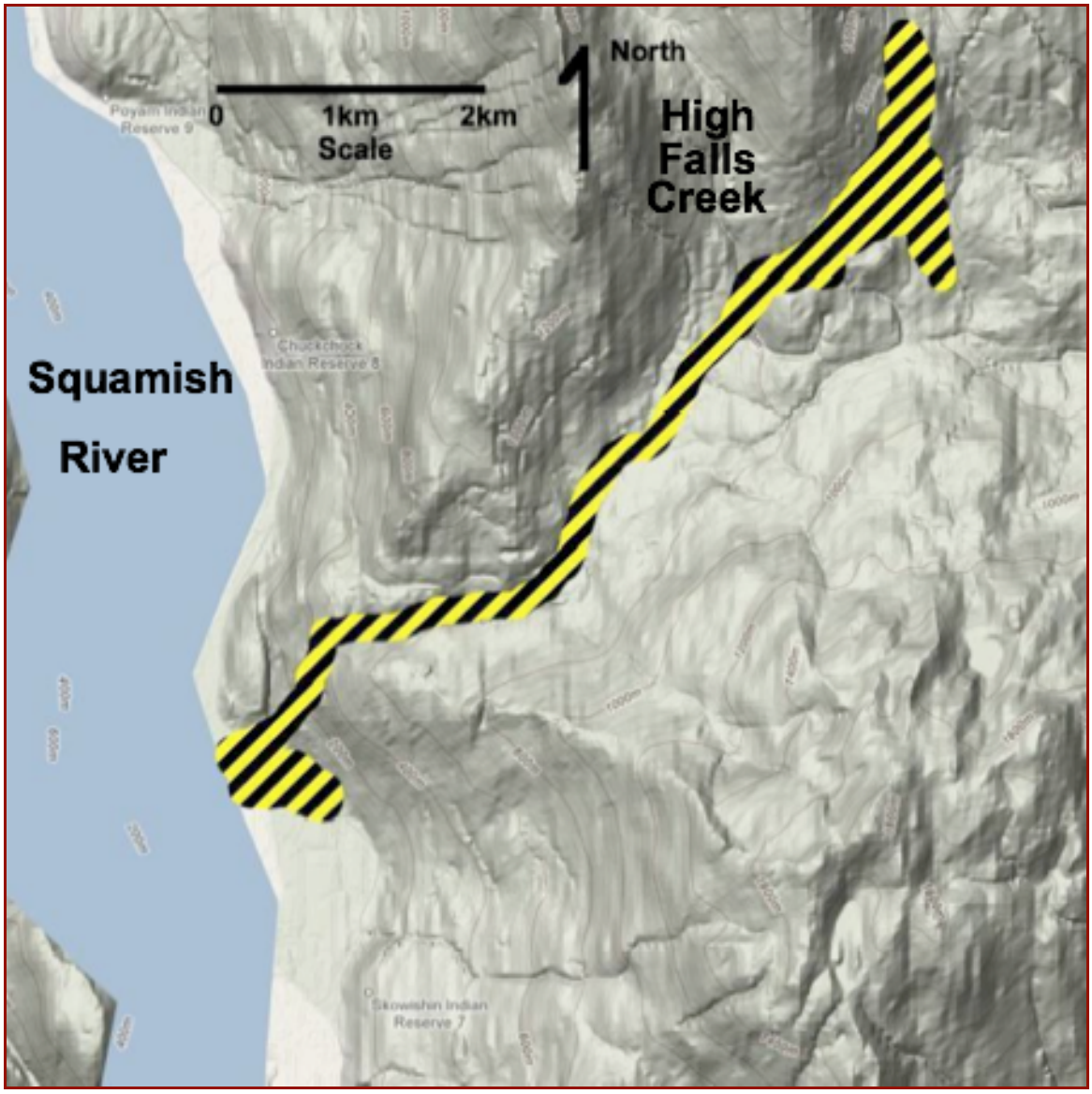


Figure 3.6: The geological occurrence of *Skawshn Smant*.

Figure 3.7: The *Skawshn Smant* source.

3.3.3 *Chíchshem st'enàch Smant*

Chíchshem st'enàch, or Ring Creek, is a tributary of the *Ma'mxem,* or the Mamquam River (Bouchard and Kennedy 1986:355, 348). This is where strong young men from the villages of *Kaŵ'tíń* (creek running down), *Siyích'm* (always full) and *Wik'm* (open mouth) would train for spirit power. They would twist vine maple and heat rock for their purification in sweats. The rock they used is similar in appearance to pumice and originated in the Ring Creek lava flow (Bouchard and Kennedy 1986: 348-355).

The Ring Creek lava flow is the most recent evidence of volcanic activity near Mount Garibaldi. It is the result of an eruption of the Opal Cone, a side vent of Mount Garibaldi, between 10,700 and 9300 years BP (Brooks and Freile 1992). The lava flow was highly viscous and very large, running southwest for 18 kilometres, and is 2.5 kilometres at its widest and over 200 metres thick (Bruno et al. 2007) (Figure 3.8). Visually, this material resembles fire-cracked and fissured basalt and possesses poor fracture qualities. Moderately accessible, with a number of primary and secondary exposures, this material is abundant along the length of this source, with nodules ranging from 10 to 25 centimetres in size with a highly weathered appearance (Figure 3.9).

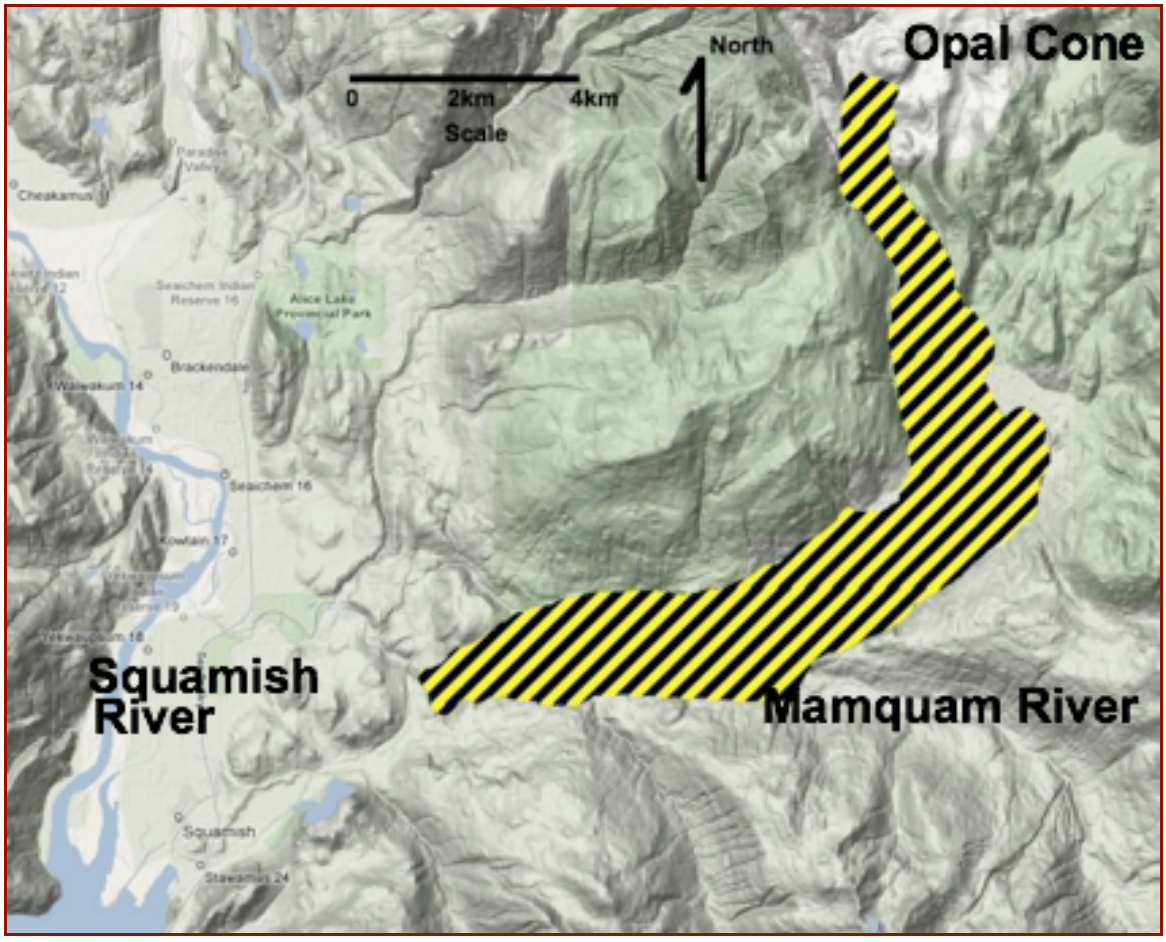


Figure 3.8: The geological occurrence of *Chíchshem st'enàch Smant*.

Figure 3.9: The *Chíchshem st'enàch Smant* source.

3.3.4 *Lexwlúxwls Smant*

To the *Skwxwú7mesh*, Watts Point is *Lexwlúxwls* (or Mount Currie people). On the northern shore of this landform are distinctive rocks representing Mount Currie people waiting for a canoe ride to *Sta'mis* at the head of Howe Sound (Bouchard and Kennedy 1986:262-263, 307-319). The Transformers saw them resting and thought they appeared lazy from eating starfish; the Mount Currie people had thought it was an octopus (a taboo food). The Transformers turned them to stone since these particular individuals did not have the work ethic to get themselves to their homeland, north of *Skwxwú7mesh Uxwumixw* (Hill-Tout 1978:85-90). Viewed from above and at a distance, this landform resembles a human lying down, resting, arms on chest and head pointing outward into Howe Sound (Figure 3.10).

Geologically, Watts Point is a lava flow located only 10 kilometres south of the town of Squamish that resulted from an eruption beneath glacial ice (Figure 3.10). Instead of forming a tuya (a table-topped mountain created by a volcanic eruption and lava flow underneath glacial ice), the eruption formed a high, dome-shaped feature with columnar jointed rectangular dacite rock (Bye et al. 2000). This large lava dome has multiple primary exposures and is easily accessible by land and water. Found in numerous large columnar joints, outcrops of suitable lithic material are abundant over a large area, with nodules ranging in size from five to 30 centimetres (Figure 3.11).

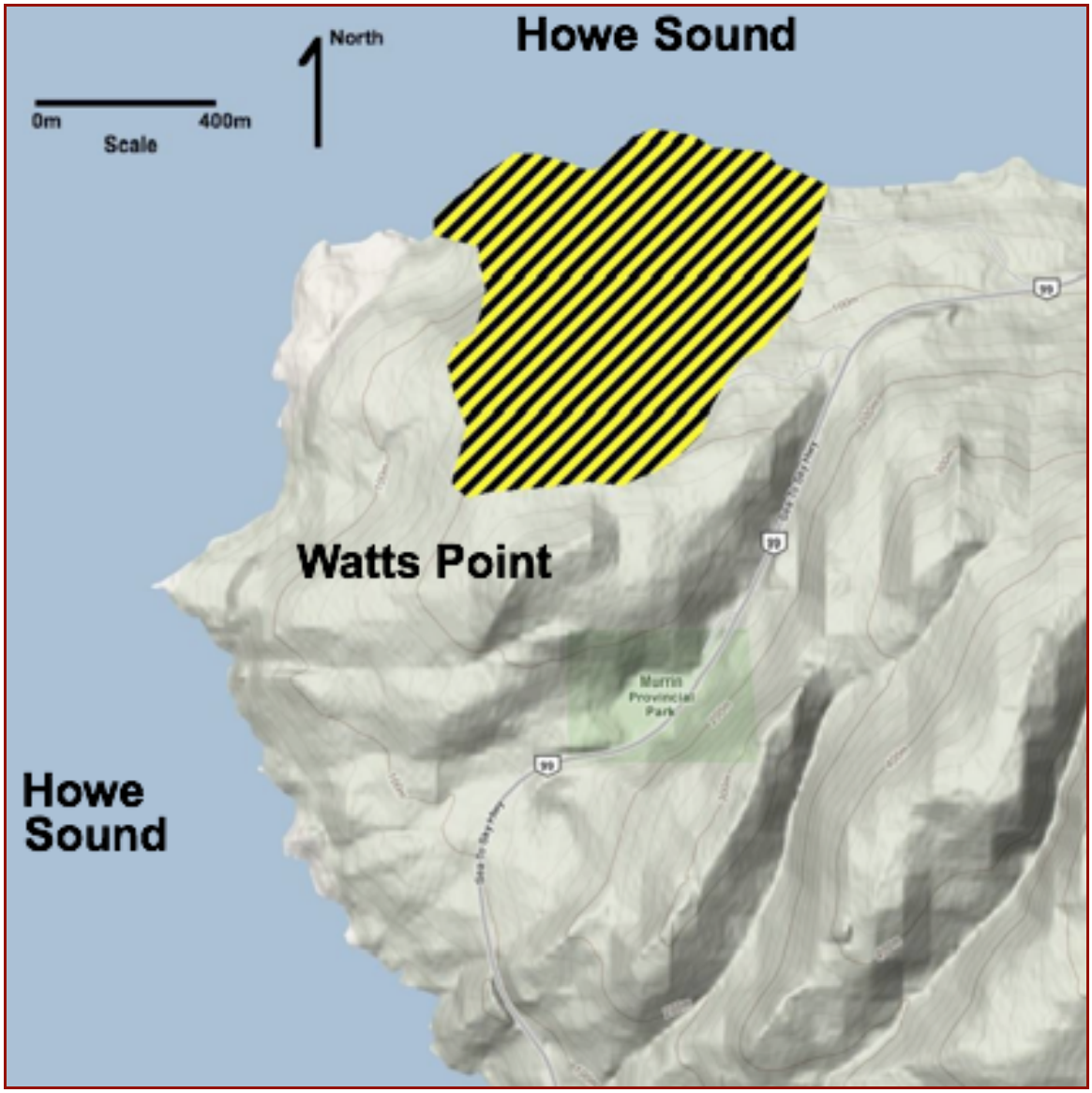


Figure 3.10: The geological occurrence of *Lexwlúxwls Smant*.

Figure 3.11: The *Lexwlúxwls Smant* source.

3.4 Lithic Sources Associated with Mythical Beings

As with Transformation, there are several themes related to Mythical Beings. To the *Skwxwú7mesh* people, Mythical Beings are called *Stl'alkm* and co-inhabit our *temixw*. These beings dwell in remote, hard to access places and are often very prominent and impressive when viewed at a distance. The beings can be human-like, or animal-like, bird-like, insect-like, snake-like and amphibian-like. Viewed by the people of the *Skwxwú7mesh Uxwumixw* as extraordinary, all these beings possess supernatural powers.

Stl'alkm are the *Smàýlilh* (Wild People), *Skwikwtaymish* (Small People), *Lhelekwines* (the One Who Takes Out Your Chest), *Kalkalilh* (the Cannibal Woman), *Kw'ukchtk* (Hit Low), *Ninch'ashen* (One Leg), *Kwushu'* (Wild Pig), *In7inyaxa7en* (Thunderbird), *Ch'inkw'u* (Magical Snake), *Elkay* (Snake Like Creature), *Sinulhkay* (the Double-Headed Sea Serpent) and *Epenshen* (a Magical Red Salamander). Some *Stl'alkm*, are known to be helpful to humans, others dangerous, while others are never seen, only heard or smelled. Of these *Stl'alkm*, the *Smàýlilh* (Wild People) and the *In7inyaxa7en* (Thunderbird), respectively, are associated with the ability to change themselves or the world around them.

The *Smàýlilh* (Wild People) can change their appearance and shape, appearing as humans, dogs or trees. They have wolves as pet dogs and are known to dwell in areas high in the mountains, far away from *Skwxwú7mesh Uxwumixw* villages. Encounters with them usually take place in the deep forest, or near waterfalls, lakes or other places imbued with spiritual power. Such places typically exist on the large islands in Howe Sound or along the territorial borders of the *Skwxwú7mesh Uxwumixw*. The steep slopes of Anvil Island are one area where the *Smàýlilh* dwell. Located in the middle of Howe Sound, this island is also a transformed serpent and is difficult to reach, since it receives the brunt of cold winter winds from the Squamish River Valley to the north.

Thunderbird could flap its wings to produce thunder and open its eyes to shoot lightning at its prey or enemies. Obsidian occurs where Thunderbird's

lightning hit the earth. Thunderbird had two main perches in *Skwxwú7mesh Uxwumixw*: one atop Black Tusk, near Whistler, and the other across the Cheakamus River Valley atop Mount Cayley. To the *Skwxwú7mesh,* each perch is *T'ak't'ak mu'y'in tl'a in7iny'a'xe7en,* or the Landing Place of Thunderbird. While training for spiritual power, a young man ventured up toward the area of the Black Tusk. In a high-elevation meadow, he found a number of Thunderbird feathers, and when he picked them up, Thunderbird began to flap its wings and shot lightning from its eyes. The young man ran, tossing feathers as he went until he had discarded all of them, and only then did the thunder and lightning above him stop. He had not yet prepared himself enough to handle the power associated with a feather of the Thunderbird.

Thunderbird could also help people in times of great need, such as after the Great Flood, when it gave to a man a fish trap, a chisel and a wife—all the things that people needed to repopulate the land. Thunderbird also carried large rocks across the territory and placed them in spots where the *Skwxwú7mesh* people could use them, places known to archaeologists as rock shelters. Most important for understanding lithic sources is the occurrence of obsidian in the upper reaches of Ring Creek, a spot where several Thunderbird lightning strikes occurred long ago (Figure 3.12).

Figure 3.12: Thunderbird pictographs at EaRu 9.

3.4.1 *Nch'kay' Smant*

Nch'kay' (dirty place) applies to the volcano also called Mount Garibaldi and the Cheekeye River that flows off its western slopes (Bouchard and Kennedy 1986: 369-373). The Cheekeye River is always dirty due to the large amount of glacial water and runoff from such a large mountain. The most prominent peak in the region, it is where the *Skwxwú7mesh* tied their canoes during the Great Flood (Matthews 1955). After the flood, a young man was exploring the newly exposed land when Thunderbird came to his aid. Given a wife, a fish trap and a chisel, he was able to find his way in the area and repopulate the *Skwxwú7mesh*

Uxwumixw. These people became the inhabitants of the *Chi'yakmesh,* or fish weir place valley and its villages (Bouchard and Kennedy 1986: 360-365).

Mount Garibaldi is 10 kilometres north of Squamish and is 2678 metres high. Geologically, Mount Garibaldi is the most prominent volcanic feature in the entire volcanic belt. A large strato-volcano with a remnant cone and many side vents, it has produced numerous lava flows (Matthews 1952, Kelman et al. 2002). One of these deposits is *Nch'kay' Smant,* or Garibaldi obsidian (Figure 3.13). Found only in the high-elevation upper reaches of Ring Creek, access to any suitable exposure and extraction of *Nch'kay' Smant* is very difficult and only possible during the summer months. Moderately abundant and occurring in medium- to large-sized nodules, this material possesses excellent fracture qualities (Figure 3.14).

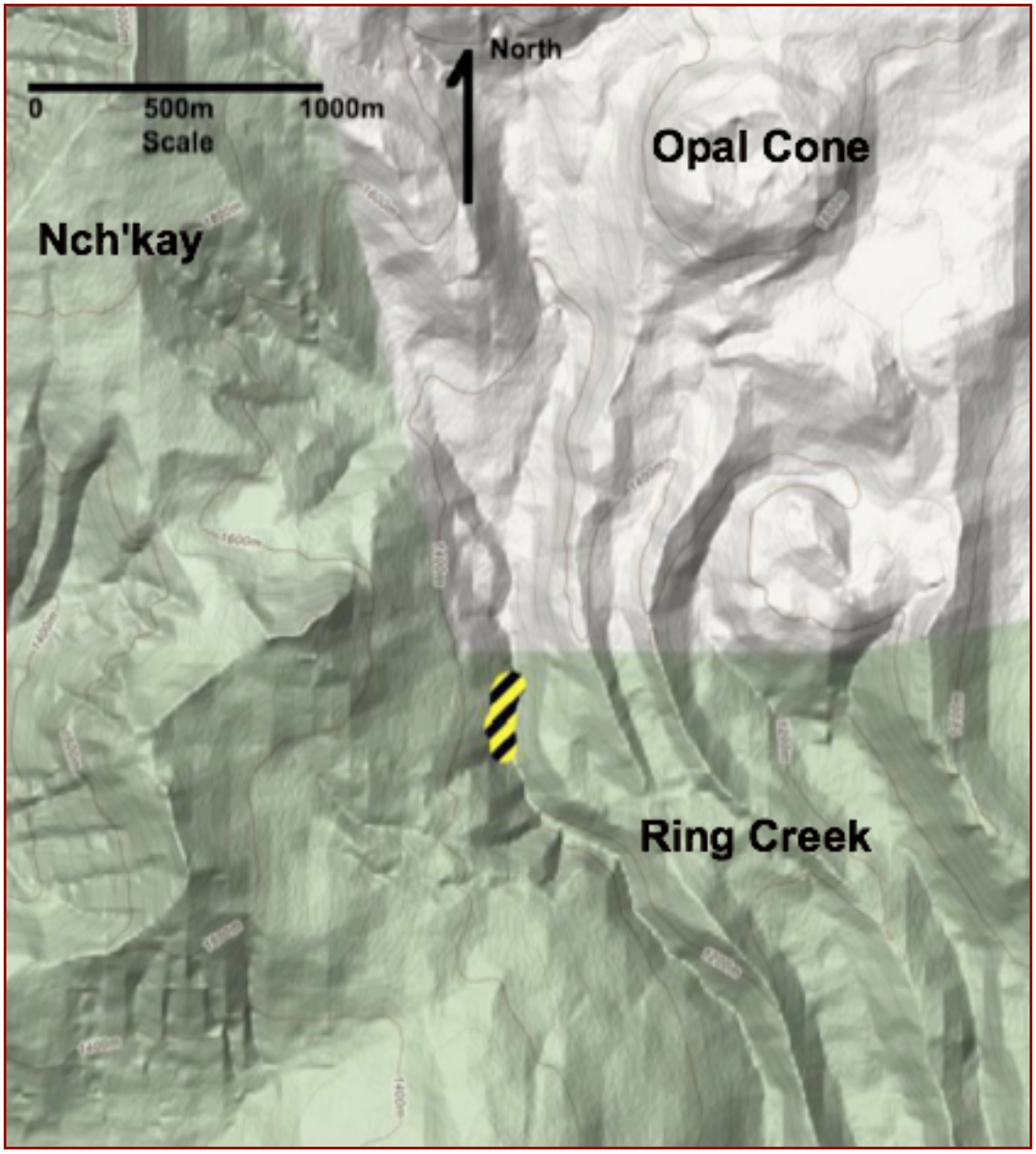


Figure 3.13: The geological occurrence of *Nch'kay Smant*.

Figure 3.14: The *Nch'kay Smant* source.

3.4.2 *Lhaxwm Smant*

Lhaxwm, or Anvil Island, is also associated with *Stl'alkm,* or supernatural creatures (Bouchard and Kennedy 1986: 252-254). More specifically, *nínch'ashn* (or One Leg) lived in the forest of this island (Bouchard and Kennedy 1976a:125), hopping around making a thumping sound that attracted hunting dogs to an untimely fate. Also living on *Lhaxwm* were *Smàýlilh* (Wild People), who have had encounters with *Skwxwú7mesh* people who camp on its shores (Bouchard and Kennedy 1976:121-122; Reimer 2007). Near the summit of the island lived a huge snake. Its powers made people feel nauseous and pass out, and its

presence made the rock on the island green (Bouchard and Kennedy 1976a: 127).

Geologically, Anvil Island is located in north central Howe Sound and is mostly comprised of the Gambier Assemblage, an arc of locally rifted volcanic materials. In its lowest bedrock outcrops are very ancient (Jurassic to Cretaceous in age) fragmented volcanic rocks, most notably andesite (Figure 3.15). The strong currents and powerful winds in this area of Howe Sound make Anvil Island difficult to reach. The primary exposure of lithic material at this source is restricted to a small creek bed on the eastern slopes of the island where cobbles are moderately abundant. This material occurs in medium sized nodules, 10 to 30 centimetres in size, and has excellent fracture qualities (Figure 3.16).

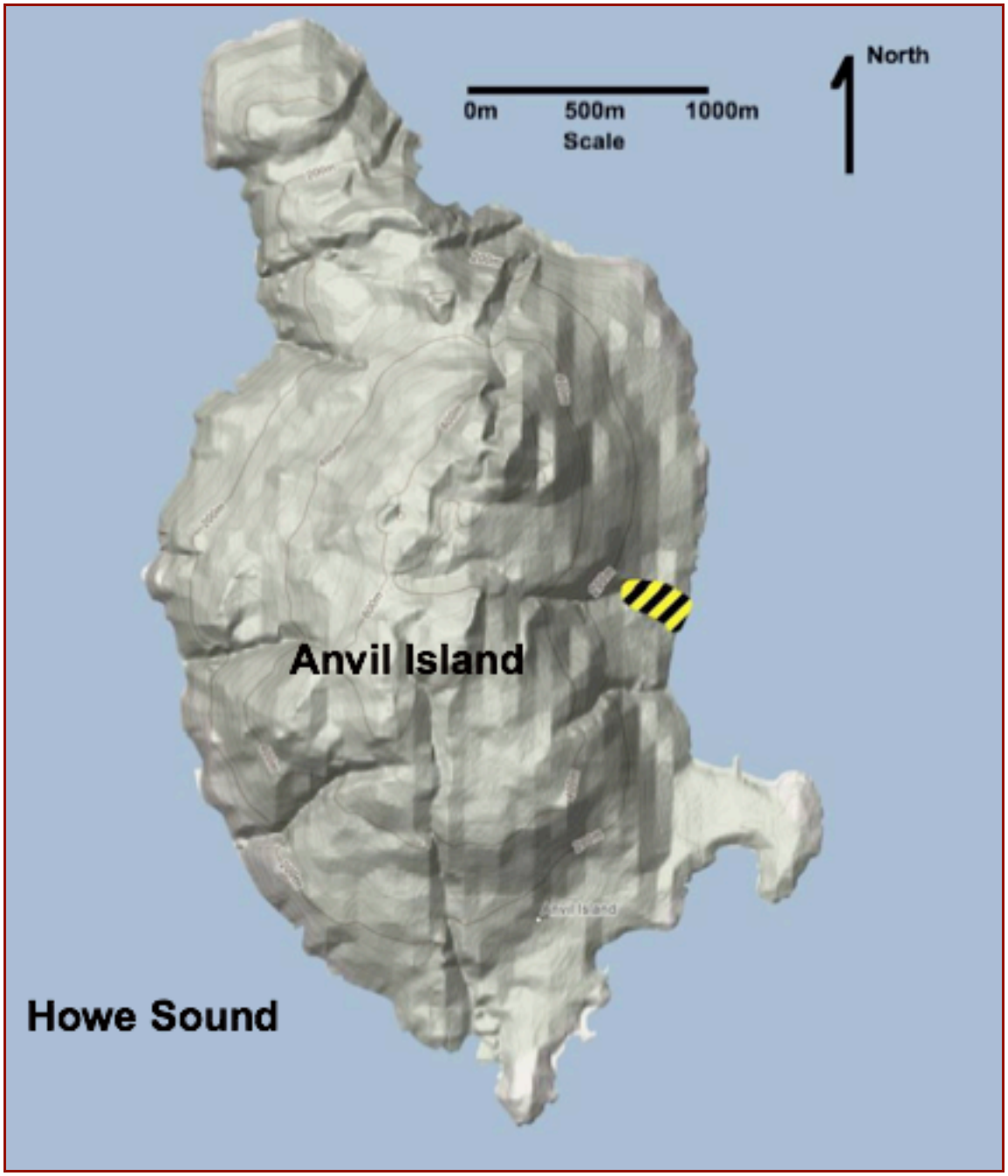


Figure 3.15: The geological occurrence of *Lhaxwm Smant*.

Figure 3.16: ***Lhaxwm Smant.***

3.5 Chapter Summary

In total, there are six igneous lithic sources located throughout *Skwxwú7mesh Uxwumixw*. Their locations range from low-elevation valley bottoms, and the ocean side contexts up to high-elevation mountain slopes. Four of these sources, *Nkwu'7say Smant, Skawshn Smant, Chíchshem st'enàch Smant* and *Lexwlúxwls Smant* are associated with the theme of Transformation. These sources are located close to known villages and are easy to access on foot or by canoe, but the quality of these materials tends to be less desirable for formal tool manufacture. The remaining two, *Nch'kay' Smant* and *Lhaxwm Smant,* are associated with Mythical Beings. These sources are located far away

from known settlements and are difficult to access. The quality of the materials at these sources tends to be excellent and well suited to formal tool manufacture. In the next chapter, I will discuss these correlations in more detail, focusing on how the location and technological aspects of these materials relates to their occurrence and distribution in the regional archaeological record.

Chapter Four:

Distributions of Lithic Sources and Materials throughout *Skwxwú7mesh Uxwumixw*

4.0 Introduction

Having established the geological and cultural importance of six lithic sources, I now move to their visual and chemical characterization. As stated in Shackley's (1998, 2008) seven steps of standardized characterization of lithic materials, this is required for understanding the materials' archaeological occurrence. Therefore, I will first explore and describe the subjective characteristics of lithic sources and material derived from them. I then explore and describe the subjective characteristics of lithic artifacts to determine a visual match to source. I term these descriptions as subjective, as some lithic materials may share visual characteristics. To circumvent this, my descriptions will follow a standardized approach that other archaeologists can use when working in *Skwxwú7mesh Uxwumixw*. Next, I will test whether my visual characterizations are correct using X-Ray fluorescence (XRF). The combination of visual and chemical analysis will make my characterizations comparable to that of other researchers. Finally, I will discuss the potential implications of these results and the spatial and temporal distributions of lithic materials throughout *Skwxwú7mesh Uxwumixw* and beyond.

4.1 Sampling Lithic Materials from *Skwxwú7mesh Uxwumixw* Sites

Considering the great differences in the extent of excavation, variable density of material culture and use of different recovery techniques at the archaeological sites included in this analysis, the need for a suitable sampling strategy to select lithic materials for analysis is critical. Therefore, I organized lithic samples for analysis by using a two-stage process. Step 1 examines the properties of lithic sources and materials, and step 2 examines the matching of those results to artifacts.

Step 1 involved a regional scale field survey that visually classified the physical characteristics of lithic source localities and hand samples selected along their length. During the surveys, I consistently applied the same set of criteria to each source and acknowledged potential variation within source materials. Step 2 examines matching lithic source properties to materials occurring in the archaeological sites chosen for analysis, as listed in Chapter Three. This approach allows for the understanding of the cultural significance of these lithic materials within *Skwxwú7mesh Uxwumixw*: It documents where lithic materials occur, the potential ways they were transported from their source to a site, accumulation rates and potential associations with either Transformation or Mythical Beings.

4.2 Visual Characterization of Lithic Source Materials

Investigating geological outcrops, lithic sources and archaeological sites throughout *Skwxwú7mesh Uxwumixw* included the use of a characterization scheme similar to those used by other researchers. I used a combination of Doleman et al. (2008:243-273) and Wilson's (2007:338-411) approaches that considers the description of lithic source locations and the materials derived from them. Thus, my first area of focus is the consistent description of landscape variables at each source (e.g. terrain, size and extent). My second area of focus is the consistent description of geological or archaeological hand sample variables. Each variable is rated from 1 to 3, with 3 being most favourable and 1 being the least desirable to anyone seeking stone for making tools (Tables 4.1 to 4.4) Samples of each lithic material are shown in Figures 4.1 to 4.6.

Figure 4.1: ***Nch'Kay' Smant.***

Figure 4.2: ***Lhaxwm Smant.***

Figure 4.3: ***Nkwu'7say Smant.***

Figure 4.4: ***Skawshn Smant.***

Figure 4.5: ***Chchshem st'enach Smant.***

Figure 4.6: ***Lexwlúxwls Smant.***

4.2.1 The Subjective Qualities of Sources and Materials

Whereas other archaeologists seldom consider the subjective qualities of lithic sources, I decided to assess the physical properties of individual lithic sources as part of my field study. I used six variables: the degree of *access/terrain*, the type of *exposure* each source offers, the *extent* (overall size) of each source, the *abundance* of lithic material at each source, the average *size of nodules* suitable for tool manufacture and the type/cost of *quarrying* material from any given exposure. During my lithic source surveys, I assessed the quality of each variable and assigned it a value of 1 to 3. An overall weighed score for

each source is the total of these values and divided by six. Thus, the source considered the most attractive for material acquisition and use has the highest score.

Access/terrain is the proximity to a settlement, landscape cover and cultural knowledge. Thus, proximate sources are generally more accessible than those that are at greater distances from major settlements. In densely forested or remote high-elevation contexts, vegetation cover and season are controlling factors in the accessibility of lithic sources. Knowledge of a source location and the route to the location also affect accessibility. A controlling variable for accessing a lithic source is the type of terrain surrounding it. While a source may be close to a village or seasonal campsite, seemingly making it accessible, the terrain around it may be difficult to traverse (e.g. steep and exposed slopes, uneven and broken ground) or paddle to (e.g. strong currents and/or windy and narrow waterways). *Exposure* type ranges from being directly at a source with favourable primary deposits manifest as exposed lava flows, down to secondary talus slopes and eventually the least favourable tertiary deposits in creek beds, and alluvial fans, where it is more difficult to access and obtain material.

The *extent* of a lithic source is an important factor in determining how a lithic material is used. Extensive sources (50 to 200 metres+ in area) are easy to access and possess a range of materials that vary in both size and quality from which to select. Accessed less frequently due to their size, which ranges from

moderate (10 to 50 metres in area) to small (<10 metres in area); smaller lithic sources also tend to have lower quality material for selection.

The *abundance* of a lithic material at a source is associated with its exposure and extent. For example, a source may have abundant raw material, but is constrained to a small area, such as a discrete outcrop. Conversely, a large, well-exposed lava flow may have its raw materials scarcely distributed along its length, a result of being reworked in glacial moraines or landslide deposits. A highly abundant source has over 10 useable nodules per square metre, whereas a moderately abundant source has five and a scarce source has only one or two.

The *size of available nodules* is a product of type of exposure and weathering. Raw material taken directly from a source will be large and have little to no weathering, whereas medium to small nodules will be found reworked in slope deposits, river beds and creek beds. A large nodule would be the size of a large cobble (15 to 20 centimetres in diameter) or boulder (20 centimetres+ in diameter), a moderately sized nodule would be the size of a medium- to small-sized cobble (10 to 15 centimetres in diameter) and a small nodule would be the size of a medium- to large-sized piece of gravel (five to 10 centimetres in diameter).

The overall general *cost of quarrying* (Table 4.2) or extraction of suitable material is another key element affecting lithic selection. Quarrying or gathering suitable material might involve hard quarrying (extensive excavation, use of large

tools and the organization of labour) of material from a lava flow or moderate digging underground. Easy quarrying (gathering eroded material off the ground or face of a bluff) and gathering loose materials would involve less work and likely result in the collection of more material.

4.2.2 Visual Characteristics of Lithic Artifacts

Modern-day flint knappers consider several factors in gauging the quality of lithic material for use in the manufacture of stone implements (Whittaker 1994). These factors are likely similar to those considered by ancient stone workers of the southern Northwest Coast and include five variables: colour, grain size, texture and the size and density of phenocrysts. These are critical factors of a lithic material's fracture quality (Crabtree 1972; Whittaker 1994). Fracture quality is one of the most important criteria to lithic workers. Lithic materials that possess excellent fracture quality would have been highly sought after, as they worked in a predictable fashion, making them favourable for manufacturing formal tools. Materials that fracture poorly would have been less desirable for formal tool manufacture and used only for expedient purposes.

Typically, the colour of lithic materials is a visual property used as the initial basis for identification of lithic material type. The colour of lithic material can vary between a weathered surface (cortex) and a surface freshly exposed by active erosion or human testing. Since numerous possible sources of lithic material exhibit typical shades of grey to black, I consider freshly exposed surfaces to define colour, as I presume would have been the case in the past.

Assessment of rock texture or grain size is accomplished through the examination of a freshly exposed surface. Fine-grained materials are those greater than one millimetre and only distinguishable using x10 magnification, whereas those that are medium to coarse have grains that are visible to the naked eye (one to 10 millimetres). The texture of a lithic material relates to how the stone formed and cooled and is a factor in its suitability for stone tool manufacture. Lithic materials that cooled quickly and near the earth's surface are referred to as aphanitic rocks, which possess internal textures moderately favourable to tool manufacture. Materials that cooled down extremely fast, due to the presence of cold water or ice, have no crystalline structure or visible grains. They are termed glassy and are most favourable for stone tool manufacture. Phenocrysts are crystalline structures larger than the main groundmass of a lithic material. The number and size of phenocrysts in a lithic material are properties that lithic workers would have visually assessed in the past. The size and density of phenocrysts would have been an important consideration affecting the predictability of fracture patterns.

For each variable discussed above, I assigned sample a value of 1 to 3, with 1 being poor, 2 moderate and 3 excellent. Tallying these scored variables resulted in an overall score, which was then divided by five resulting in an overall rank of fracture quality (Table 4.4).

The weight of lithic source and lithic material variables in visual characterization is in Tables 4.1 and 4.3. Using the results of Tables 4.2 and 4.4

as a guide, I matched lithic artifacts from the 25 sites chosen for analysis to a source. Examining materials in this manner allowed me to sort lithic source materials and artifacts, which at first glance had been visually similar, into separate groups.

Table 4.1: Source *Smant* attributes.

Access/Terrain	**Value**
Hard	*1*
Moderate	*2*
Easy	*3*
Exposure Type	**Value**
Tertiary	*1*
Secondary	*2*
Primary	*3*
Extent	**Value**
Small	*1*
Medium	*2*
Extensive	*3*
Abundance	**Value**
Scarce	*1*
Moderate	*2*
Abundant	*3*
Size of Nodules	**Value**
Small	*1*
Medium	*2*
Large	*3*
Cost of Quarrying	**Value**
Hard	*1*
Moderate	*2*
Easy	*3*

Table 4.2: Source *Smant* attributes results.

Material	**Access/ Terrain**	**Exposure Type**	**Extent**	**Abundance**	**Nodule Size**	**Quarrying**	**Overall Quality**
Nkwu'7say	3	2	3	3	2	2	2
Skawshn	2	2	3	2	2	3	3
Chíchshem st'enàch	2	2	2	2	2	2	4
Lexwlúxwls	3	3	3	3	3	3	1
Lhaxwm	1	3	1	2	2	1	5
Nch'kay'	1	3	1	2	2	1	6

Table 4.3: Material *Smant* attributes.

Colour	**Value**
Difficult	*1*
Moderate	*2*
Easy	*3*
Grain Size	**Value**
Coarse	*1*
Medium	*2*
Fine	*3*
Texture	**Value**
Poor	*1*
Moderate	*2*
Good	*3*
Phenocryst Size	**Value**
Large	*1*
Medium	*2*
Small	*3*
Phenocryst Density	**Value**
High	*1*
Medium	*2*
Low	*3*
Fracture Quality	**Value**
Poor	*1*
Fair	*2*
Excellent	*3*

Table 4.4: Material *Smant* attributes results.

Material	**Colour**	**Grain Size**	**Texture**	**Phenocrysts Size**	**Phenocrysts Density**	**Overall Quality**
Nkwu'7say	1	3	3	3	3	3
Skawshn	2	2	2	2	3	4
Chíchshem st'enàch	3	1	1	1	2	6
Lexwlúxwls	1	2	2	2	2	5
Lhaxwm	3	3	3	3	3	2
Nch'kay'	3	3	3	3	3	1

4.3 Independent Assessment of Visual Characterization

Although almost any archaeologist can use my classification scheme to visually assess lithic source and artifact materials, an independent check is required. Understanding a visual classification system ensures its appropriate application, creating consistent and reproducible results. This is mainly due to some archaeologists' limited or selective use of geological nomenclature as it pertains to lithic materials and their visually definable characteristics. For example, "black coarse-grained basalts" or "fine-grained red cherts" are lithic materials defined by both colour and texture. Furthermore, some incorrectly use pheonocryst size and density when assigning value to grain size, even though these are two independent variables. Correct visual assessment of lithic materials requires more than one or two attributes. Thus, for an independent check of the consistency of my visual characterization of *Skwxwú7mesh Uxwumixw* lithics, I sought the expertise of a geologist, Duncan Findlay (2008), a PhD candidate at the School of Geography and Earth Sciences, McMaster University.

He examined a sample of over 1500 pieces of lithic material from *Skwxwú7mesh Uxwumixw* lithic sources and archaeological sites and classified them using my visual characterization scheme. Our mutually independent classifications were consistent nine times out of ten. We were consistently able to visually identify lithic source and artifact materials from *Nch'kay', Lhaxwm, Chíchshem st'enàch* and *Skawshn Smants* obtained from various archaeological sites from across *Skwxwú7mesh Uxwumixw*. Yet, we were inconsistent in visually

identifying lithic source and artifact materials from *Nwu'7say* and *Lexwlúxwls Smants*. We were able to attribute this to the fact that these two materials have very similar visual characteristics, creating some overlap in assigning artifact to source.

4.4 Results of Visual Characterization of Source Materials

Visual assessment and ranking of lithic materials reveals an interesting broad pattern, where sources associated with the theme of Transformation (*Nkwu'7say, Skawshn, Chíchshem st'enàch* and *Lexwlúxwls*) rate higher than those associated with Mythical Beings (*Lhaxwm* and *Nch'kay'*). All the materials associated with Transformation are in areas that are easy to access and may be transported by anyone on foot or in a canoe; they are exposures that allow easy gathering of materials, are highly abundant, are mostly large in extent and have medium- to large-sized nodules for tool manufacture. However, these materials are not well suited for formal tool manufacture, as their cortex type, phenocryst size, density and fracture quality are relatively undesirable.

Materials associated with Mythical Beings are in areas that are difficult to access and transport from. They are not very abundant, lack exposure and are present in smaller nodule sizes than those associated with Transformation. Yet, these materials have less cortex and less weathering, making them more visible, and they have small phenocrysts occurring in low densities and possess excellent fracture qualities. These materials are difficult to quarry because of their

location: *Nch'kay'* is located in a high-elevation alpine area, whereas *Lhaxwm* is on a steep and difficult-to-access island in central Howe Sound.

Given my visual identification methodology, I have a high degree of confidence in assigning a sample of lithic material from an archaeological site to its source. I expanded the application of this visual identification guide to artifacts from 25 archaeological sites from across *Skwxwú7mesh Uxwumixw* (Tables 4.6, 4.7 and 4.8). Data for Tables 4.6, 4.7, and 4.8 can be found in ARCAS 1993, 1998; Hall et al. 2006; Lepofsky et al. 2007; Reimer 2000, 2003, 2005, 2006, 2007, 2008, 2009; and Sources 2011.

Table 4.6: Results of visual identification of lithic materials in archaeological sites in the Squamish River Valley.

Site Type	Site	Transformer or Easy Access				Mythical Beings or Difficult Access	
		Nkwu'7say	Skawshn	Chíchshem st'enàch	Lexwlúxwls	Nch'kay'	Lhaxwm
Villages	DkRs 6 Midden	0	0	107	1114 (22)	0	4 (2)
	DkRs 6 House	0	0	696	5698 (50)	14 (7)	29 (12)
	DkRs 6 Workshop	0	0	20	7415 (43)	116 (116)	76 (76)
Seasonal	DkRt 2	0	58	0	0	0	0
Camps	DlRt 9	0	2740 (11)	6	0	2 (2)	0
Temp.	DlRt 10	0	6 (1)	0	0	0	0
Camps	DlRt 11	0	15	0	0	0	0
	EaRu 2	12 (3)	0	0	0	0	0
	DkRr 1	0	0	0	0	2634 (2)	0
	DkRr 2	0	0	0	0	19 (4)	0
	DkRr 4	0	0	0	0	14 (10)	0
	DkRs 14	0	24	0	0	0	0
Total per material type with # formal tools in parentheses		12 (3)	2843 (12)	829 (0)	14227 (115)	2799 (141)	109 (90)
Grand Totals per Transformer/Mythic Beings Group with # of formal tools in parentheses		17911 (130)				2908 (231)	

Table 4.7: Results of visual identification of lithic materials in archaeological sites in Howe Sound.

Site Type	Site	Transformer or Easy Access				Mythical Beings or Difficult Access	
		Nkwu'7say	*Skawshn*	*Chíchshem st'enàch*	*Lexwlúxwls*	*Nch'kay'*	*Lhaxwm*
Villages	DiRt 1	0	0	0	10 (2)	0	0
	DiRu 15	0	0	0	660 (8)	2	0
	DiRu 16	0	0	0	38	0	1 (1)
	DjRt 6	0	0	2	29 (6)	2 (2)	1 (1)
Seasonal	DiRu 19	0	0	11	389 (4)	3 (3)	3 (3)
Camps	DiRt 11	0	0	9	239 (11)	1 (1)	1 (1)
	DiRu 10	0	0	0	244 (7)	0	0
	DjRt 12	0	0	0	18 (2)	1 (1)	0
Temporary	DjRt 3	0	0	0	1	0	5 (5)
Camps	DjRt 5	0	0	0	170 (18)	0	8 (8)
Total per material type with # formal tools in parentheses		0 (0)	0 (0)	22 (0)	1788 (58)	9 (7)	19 (19)
Grand Totals per Transformer/Mythic Beings Group with # of formal tools in parentheses		1810 (58)				28 (26)	

Table 4.8: Results of visual identification of lithic materials in archaeological sites in Burrard Inlet.

Site Type	Site	Transformer or Easy Access				Mythical Beings or Difficult Access	
		Nkwu'7say	*Skawshn*	*Chíchshem st'enàch*	*Lexwlúxwls*	*Nch'kay'*	*Lhaxwm*
Villages	DhRr 6	0	0	0	280 (212)	2 (2)	0
	DhRr 18	0	0	0	371	2 (2)	333 (6)
	DhRr 20	0	0	0	0	0	5 (1)
Seasonal	DhRs 16	0	0	0	39 (4)	0	0
Camps	DhRt 6	0	0	9	1330 (115)	35 (3)	25 (3)
Total per material type with # formal tools in parentheses		0 (0)	0 (0)	9 (0)	2020 (331)	78 (7)	726 (10)
Grand Totals per Transformer/Mythic Beings Group with # of formal tools in parentheses		2029 (331)				804 (17)	

4.5 Results of Lithic Material Distribution Based on Visual Identification

Overall, patterns of lithic materials occur in much higher numbers and densities in the Squamish River Valley than in Howe Sound or Burrard Inlet. This is a reflection of the fact that almost all the known lithic sources in *Skwxwú7mesh Uxwumixw* territory are located inland, making access to them easier for people inhabiting the Squamish River Valley. Lithic materials occurring at archaeological sites in the Squamish River Valley and Howe Sound tend to be from local sources associated with Transformation. One exception is *Lexwlúxwls Smant*. Material from this source appears throughout Howe Sound and Burrard Inlet, but at only one site (DkRs 6) at the head of Howe Sound in the Squamish River Valley. Materials from lithic sources associated with Mythical Beings occur in lower numbers and densities than those associated with Transformation, but they are present in all areas throughout *Skwxwú7mesh Uxwumixw*.

Another general pattern is that villages (DkRs 6, DiRt 1, DiRu 15, DiRu 16, DjRt 6, DhRr 18 and DhRr 20) and seasonal camps (EaRu 5, DkRt 2, DlRt 9, DiRu 19, DiRt 11, DiRu 10, DjRt 12, DhRs 16 and DhRt 6) tend to have more abundant and denser accumulations of lithic materials. This is a basic reflection of longer-term accumulations, in contrast to single or shorter-term use of temporary camps. For example, DkRs 6 has a dedicated lithic workshop area, manifest as dense accumulations, and a separate component of the larger site complex (i.e. house and midden deposits). Temporary camps (DlRt 10, DlRt 11, EaRu 2, DkRr 2, DkRr 4, DjRt 3, and DjRt 5) tend to have lithic materials

restricted to one or two types consistent with short periodic visits. An exception to this is one temporary camp (DkRr 1) located very close to the high-elevation alpine *Nch'kay* lithic source. As a lithic workshop, this site has a very high density of lithic material resulting from a series of repeated seasonal uses over millennia. Closer examination of the use and treatment of lithic materials at the DkRs 6 workshop shows a marked difference in the use of materials associated with Mythical Beings and Transformation. Materials associated with Transformation are used for more expedient purposes, whereas *Nch'kay'* and *Lhaxwm Smants* are used almost solely for formal tool manufacture (Table 4.6).

Lithic source materials associated with Transformation occur at almost a 6:1 ratio to those associated with Mythical Beings in the Squamish River Valley region. This rises dramatically in the Howe Sound region, where the ratio is 62:1, but decreases to 4.4:1 in Burrard Inlet. Clearly, across *Skwxwú7mesh Uxwumixw* territory lithic materials associated with Transformation have higher everyday practical value than those associated with Mythical Beings.

Exploring this further, Tables 4.6 to 4.8 allow us to compare the use and treatment of lithic materials through the overall occurrence of lithic materials at sites, with the number of formal tools found in each site assemblage.
This provides a rough guide as to how each lithic raw material fits within the region's technological orientation. Again, those materials associated with the theme of Transformation occur in higher numbers than those associated with Mythical Beings. Additionally, materials associated with Transformation tend to

be used for everyday expedient manufacture of pebble tools, cobble cores, utilized flakes, flake tools, scrapers, drills, notches, knives, bifaces and projectile points, whereas materials associated with Mythical Beings tend to be focused on specialized formal tool production of microlithis, microblades and projectile points or bifacial/pressure flaking. To summarize the differential treatment and use of lithic materials from area to area of *Skwxwú7mesh Uxwumixw,* Table 4.9 presents the ratio of pieces of lithic material occurring at archaeological sites used in this analysis to the number of formal tools in its assemblage.

Table 4.9: Ratio of lithic materials to formal tools in *Skwxwú7mesh Uxwumixw.*

Area/Theme	Transformation	Mythical Beings
Squamish Valley	138:1	13:1
Howe Sound	31:1	1:1
Burrard Inlet	6:1	47:1

Overall, lithic materials associated with Transformation are much more abundant across *Skwxwú7mesh Uxwumixw*, reflecting source locations that any *Skwxwú7mesh* person could use and easily access. Conversely, lithic materials associated with Mythical Beings occur much less frequently. Three interesting patterns resulting from this analysis suggest important differences in the cultural and economic significance of lithic raw material sources.

First, in the Squamish River Valley we see a very high ratio of lithic materials to formal tools for the materials associated with Transformation, whereas the same ratio for lithic materials associated with Mythical Beings is ten times lower. If data from DkRr 1 (a lithic workshop near the source of *Nch'kay'*

Smant) were removed from this analysis, this ratio for Mythical Beings lithics in this region would be even lower. These ratios clearly reflect that lithic materials associated with Mythical Beings are treated in a much different manner; i.e., they are used for formal tool manufacture and for tool maintenance/conservation and recycling, unlike materials associated with Transformation.

In comparison with the Squamish Valley, there is an even more pronounced difference in the treatment of the two types of material in Howe Sound, where the ratio of lithic materials to formal tools is 31:1. This is a strong reflection of the same pattern seen in the Squamish River Valley: that Mythical Being lithics are more often used for formal tool manufacture than are Transformation lithic materials. Yet, there is a difference in the use and treatment of lithic materials in Burrard Inlet. Here, a reversed phenomenon is observed: formal tool manufacture is associated with lithic sources of Transformation.

A number of factors can contribute to this, notably the increased distance from sources in Howe Sound and the Squamish Valley. Furthermore, other than random beach cobbles or very small outcrops, Burrard Inlet lacks suitable lithic sources. This would require people traveling to and inhabiting Burrard Inlet to import, stockpile and use more lithic material associated with Transformation than those associated with Mythical Beings. Moreover, other Coast Salish groups who seasonally used Burrard Inlet potentially had different views and treated lithic materials from *Skwxwú7mesh Uxwumixw* in other ways.

To summarize, in my evaluation of lithic source locations, the quality of material at each source and the archaeological evidence for their occurrence and treatment in the region, a general pattern seems to hold: that lithic materials associated with Transformation had everyday economic use (hunting, fishing, food processing), and while those associated with Mythical Beings served similar purposes they also held additional cultural value. Possible exceptions to this are lithic materials in Burrard Inlet, but I will expand on that later. Materials associated with Transformation are far more abundant and used for expedient everyday activities. Lithic materials associated with Mythical Beings occur as formal tools, or the bi-products of making those tools, and appear in sites far less frequently than those associated with Transformation.

Clearly, this illustrates that the ancestors of modern-day *Skwxwú7mesh Uxwumixw* people treated materials from sources linked with Transformation and Mythical Beings differently. This is partially because the location of these sources, as those associated with Transformation are located in easily accessible places, whereas those associated with Mythical Beings are in difficult to reach places. Yet, to fully understand these distributions, one also needs to consider the cultural knowledge and history associated with each source location and acknowledge that these factors played a significant role in who had access to a lithic source, as well as when and why a source was used in the past. While the overall distribution of lithic materials associated with Mythical Beings is much wider than those associated with Transformation, the former materials occur far

less frequently. If the value of lithic materials associated with Mythical Beings is not simply practical and economic but is influenced by social factors, then what role did various lithic materials play in *Skwxwú7mesh Uxwumixw* /Coast Salish social structure?

These patterns and the questions they provoke are a strong reminder that we cannot impose our modern archaeological ideas of what materials were most useful to peoples in the past. Often theories of what materials are the most efficient or optimal do not consider how cultural preferences affect technological organization. For example, we need to consider the potential for ownership rights to lithic sources, restricted access to certain places, the corporeal and incorporeal costs associated with obtaining materials and any social stigma attached to certain lithic materials or their sources.

The main reason for many archaeologists not considering the social role of lithic materials is that most lithic material is fine grained and micro to cryptocrystalline in texture, making the use of either a basic or context-specific visual classification problematic (N. Smith 2004). Using macroscopic classifications alone, one can assign a material to a broad category (such as the catch-all categories of vitreous basalt or chert), but further classification is generally not possible unless some knowledge of the surrounding region's geology is applied. By understanding the potential source locations of lithic materials occurring at a site, one can refine material classification by observing

the geological context in which lithic materials formed and occur (Mallory-Greenough et al. 2002).

However, this approach can still result in either a list of possible source locations or the misclassification of materials. For example, many artifacts are often small and difficult to match to a source, leading to the creation of numerous lithic types that ignore both formal visual and chemical variation within a source and between sources, all compounding accurate assignment of materials.

4.6 Geochemical Analysis of Lithic Materials from *Skwxwú7mesh Uxwumixw* Territory

While I have visually distinguished lithic materials from multiple sources and linked them potentially to archaeological sites throughout *Skwxwú7mesh Uxwumixw*, not every archaeologist will be able to do so. I have geological training and years of experience analyzing materials from both my study region's sources and archaeological sites. To circumvent this, I used a standardized set of characteristics and a source of independent confirmation that others will be able to utilize in assessing lithic materials from *Skwxwú7mesh Uxwumixw.* Yet, to be certain about the origin of lithic materials occurring in any archaeological site in *Skwxwú7mesh Uxwumixw* and beyond, visual analysis alone will not suffice. Lithic materials from other sources not considered in this study, both from within and outside of *Skwxwú7mesh Uxwumixw* have similar visual attributes. For example, potentially misidentified obsidian from the Copper Ridge and Kingcome

Inlet obsidian sources and undocumented basalt/dacite sources could originate from either *Nch'kay'* or *Lexwlúxwls Smants.*

I had the opportunity to utilize X-Ray Fluorescence (XRF) analysis on my samples, and undertook the exercise just to see whether this could provide a more consistent and reliable attribution of materials to source than was possible through quick visual inspection. I also hope this method will allow other archaeologists researching on the Northwest Coast to utilize my visual classification guide along with their own chemical analysis and compare data sets from the lithic sources and archaeological sites they investigate. This offers an added degree of confidence in the characterization of artifact assemblages and regional distributions of lithic materials along the Northwest Coast.

I used XRF, as it offers comparable results to other forms of chemical analysis (e.g. Instrumental Neutron Activation Analysis and Inductively Coupled Plasma Mass Spectrometry) but offers several benefits to researchers and Indigenous communities as it is non-destructive, provides fast results and is now portable. All these benefits allow for real-time analysis and near instant acknowledgement of the elemental characteristics of a sample (Bruker 2009; Shackley 1998). This will also allow me and other researchers to trace lithic materials to their exact origin rather than an assumed locality. A full description of how XRF works is in section 4.9.

As the library of geochemical data expands from *Skwxwú7mesh Uxwumixw* and beyond, it will allow for tracing the movement of materials across

a landscape so that trade networks and the social practices of material acquisition, use and discard can be understood better. By comparing data sets of lithic geochemistry, all archaeologists researching in the region will be able to discover potential links between sites and places not previously considered. To make any geochemical analysis valid and meaningful, one must comply with the *provenance postulate*, first stated by Weigand et al., "that there exist differences in chemical composition between different natural sources that exceed, in some recognizable way, the differences observed within any given source" (1977). This is achievable by following a standardized set of steps outlined by Neff (2000) who states that if sources are localized and easy to identify—e.g. obsidian flows and other lithic outcrops—then sampling and resulting analysis of raw materials from those sources can create a series of statistically characterized reference groups or libraries. All my lithic sources outlined in Chapter Three meet these criteria. Therefore, I selected a total of 206 lithic samples for X-Ray Fluorescence (XRF) analysis, 46 from lithic source locations within Skwxwú7mesh Uxwumixw territory and 162 artifacts from sites in the Squamish Valley (n=94), Howe Sound (n=50) and Burrard Inlet (n=18) (Tables 4.10 to 4.13). Choice of artifacts for analysis follows observed qualities I outlined in section 4.2.2, colour, grain size, texture, phenocryst size and density.

4.7 Sampling Lithic Source Localities in *Skwxwú7mesh Uxwumixw* Territory

On a large scale, volcanic flows in the Garibaldi Volcanic belt are chemically similar to one another. To characterize each visually distinct flow, I sampled several outcrops along their length and depth in an attempt to capture the potential chemical variation within each source. Analysis of these samples determined the potential homogeneity or heterogeneity within each source and how to discriminate chemical signatures between them. For each lithic source, I collected a variable number of samples summarized in Table 4.10. Samples from sources vary according to factors of access and time in the field.

Table 4.10: Summary of samples from lithic sources for XRF analysis.

Transformation *Smant*	**Number of Samples**
Nkwu'7say	9
Skawshn	9
Chíchshem st'enàch	3
Lexwlúxwls	9
Mythical Beings *Smant*	
Nch'kay'	8
Lhaxwm	8
Total	**46**

4.8 Sampling Archaeological Contexts

Nineteen archaeological sites with stratified deposits and radiocarbon dates were chosen for analysis as they provide both spatial and temporal control for determining potential changes in the use of lithic materials (Tables 4.11 to 4.13). Selection of samples for XRF analysis came from securely dated stratigraphic contexts. For example, DiRu 10 on Gambier Island in Howe Sound, excavation unit #1, has two radiocarbon dates located in different strata (Figures 4.7 and 4.8). These contexts are layer B, level 3, dated to 340±80 BP and from a rock dump feature, level 12, dated to 840±60 BP. Examination of lithic level bags from these contexts determined the maximum range of visually distinct materials chosen for XRF analysis. To further ensure this, additional selection of lithic materials came from layers and levels above and below radiocarbon-dated contexts. Identifying similar securely dated contexts for 19 other sites included in this analysis allows for consistent sampling that matches my visual classifications.

For the six unstratified or securely dated sites, I used a different sampling strategy (Tables 4.11 to 4.13). Instead of sampling through a stratigraphic profile, I selected materials from across the site surface. Again, in choosing materials for analysis I always considered two factors: first, informal estimation of the diversity of lithic materials at the site and, second, assessment of whether those materials occur in separate clusters of lithic materials. For example, at DlRt 11, an alpine site along the Squamish-Cheakamus Mountain divide, I selected materials

occurring in two separate clusters, one at the north end of the site, the other at the south (Figure 4.9). Using these approaches, I address the amount of excavation and density of lithic materials from each of these sites. Those sites with more excavation and dense accumulations of lithic materials (e.g. DkRs 6) provided more samples for analysis than sites with shallow or surface deposits (e.g. DkRr 2).

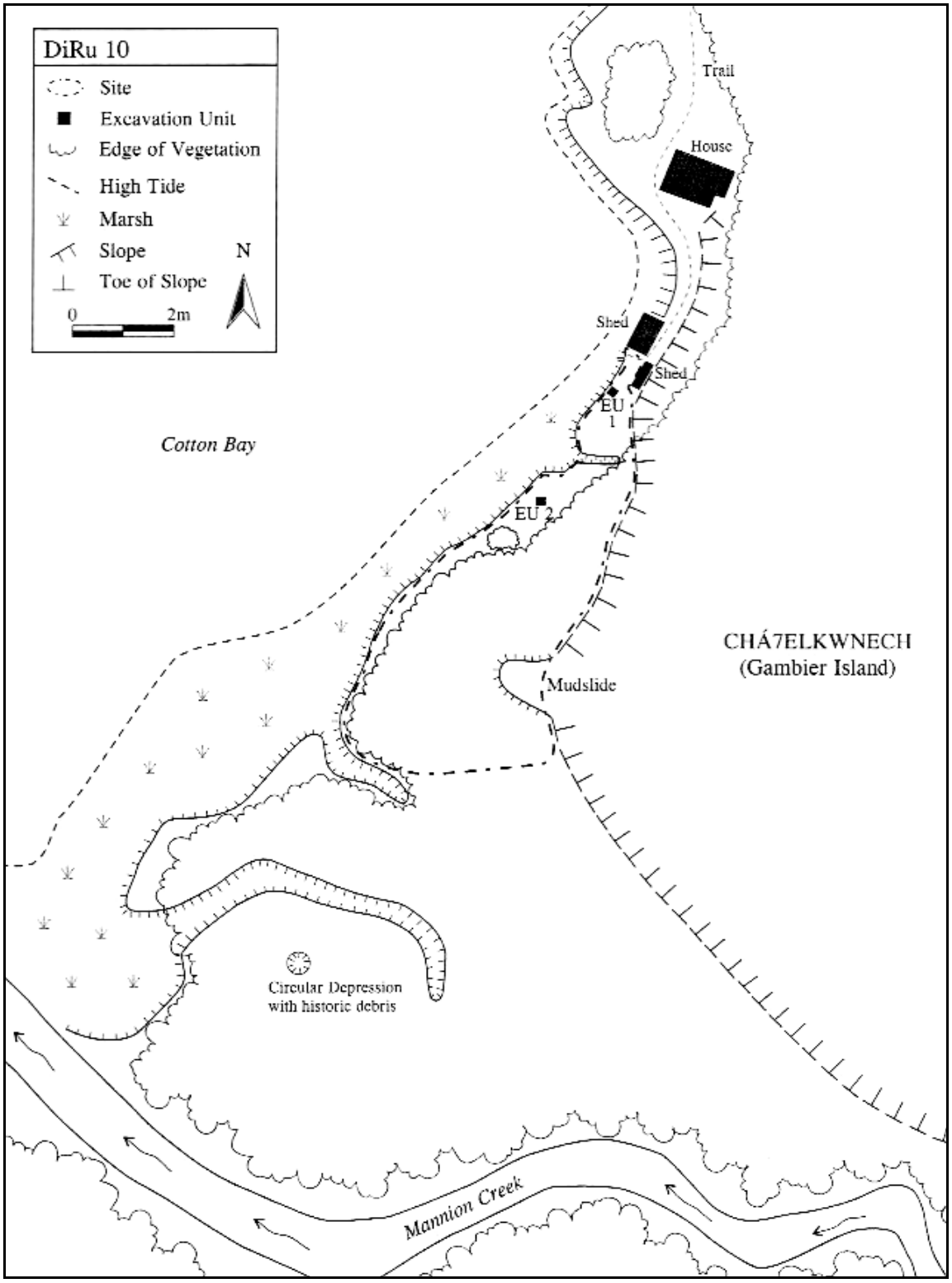


Figure 4.7: Site map of DiRu 10.

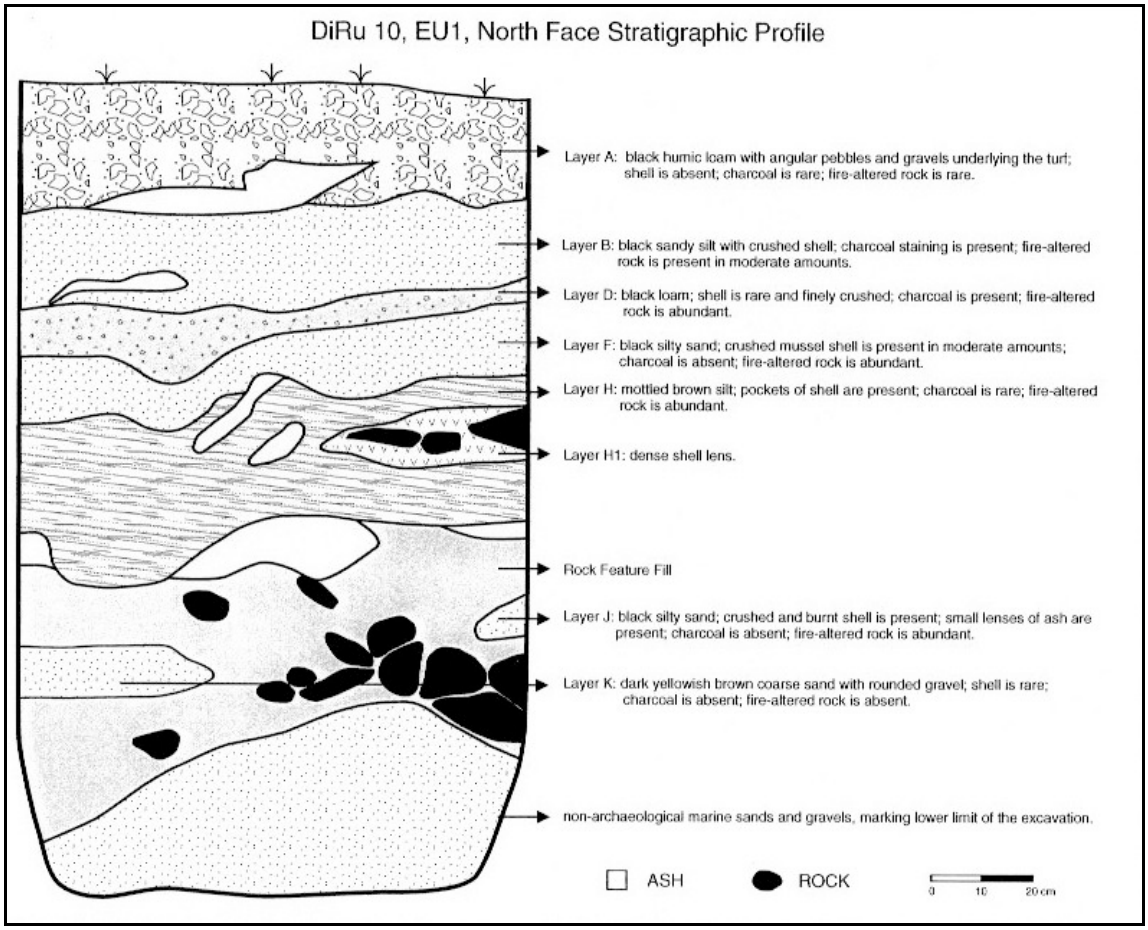


Figure 4.8: Stratigraphic profile of EU#2 at DiRu 10.

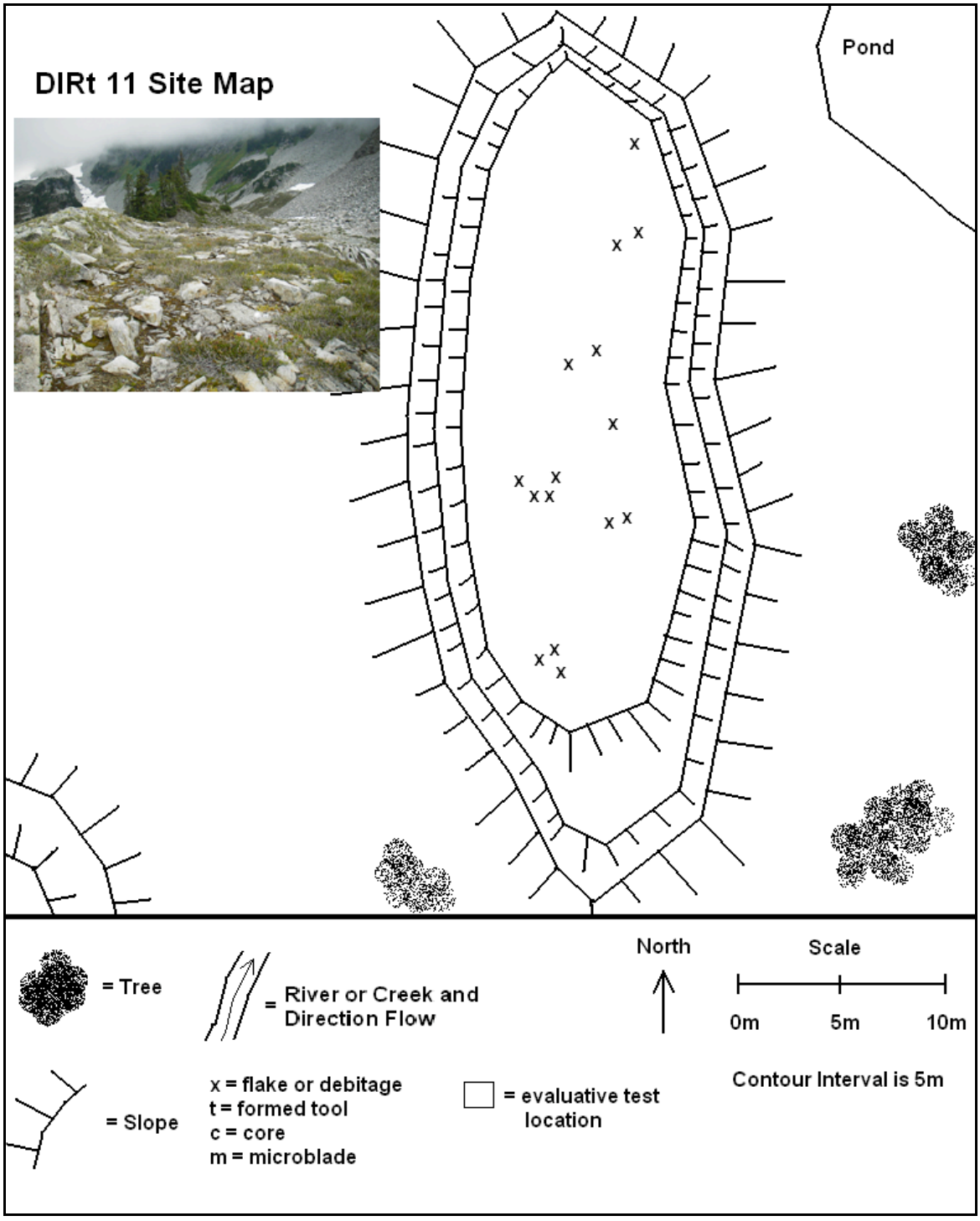


Figure 4.9: Site map of DlRt 11.

Table 4.11: Archaeological sites in the Squamish River Valley selected for XRF analysis.

Site	Site Name/Place	Unit	Layers	Levels	# of Samples
DkRs 6	*Sta'mis*-Midden	2	B, D, E	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	22
DkRs 6	*Sta'mis*-House	5	A-d, A, B, C	2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, 16, 17	19
DkRs 6	*Sta'mis*-Workshop	4	A, B, C, I	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	25
DkRt 2	Fergie's Landing	1	D, E	3, 5	2
DlRt 9	Ashlu Rock Shelter	1 and 2	A, B, C	1-4	8
DlRt 10	Tricouni Lake	Surface	n/a	n/a	4
DlRt 11	Tricouni Lake	Surface	n/a	n/a	2
EaRu 2	Turbid Creek	Surface	n/a	n/a	2
EaRu 5	Elaho Rockshelter	1	A and B	1 and 3	2
DkRr 1	Elfin Lakes	1, 2, 3	B	1, 3	4
DkRr 4	Mamquam Ridge	Surface	n/a	n/a	2
DkRs 14	Paul Ridge	Surface	Cluster 1, 2	n/a	2
Totals					**94**

Table 4.12: Archaeological sites in Howe Sound selected for XRF analysis.

Site	Site Name/Place	Unit	Layers	Levels	# of Samples
DiRt 1	Horseshoe Bay	Surface	n/a	n/a	2
DiRu 15	Hopkins Landing	1	B and C	5, 7, 11, 15	6
DiRu 16	Cheakwelhp	1	2, 3, 4	10, 12	6
DjRt 6	Potlatch Creek	1, 2	A	3, 5, 6	4
DiRu 19	Plumper Cove	1	A, C, D	3, 4, 5, 6, 10, 11	6
DiRt 11	Halkett Bay	1	B, D	2, 5, 6, 7, 8	6
DiRu 10	Mannion Creek	1	B, H, J	5, 8, 12, 14	6
DjRt 12	Porteau Cove	1	B	2, 3	4
DjRt 3	Anvil Island	Surface	n/a	n/a	4
DjRt 5	Defense Island	1	A, B	2, 5	6
Total					**50**

Table 4:13: Archaeological sites in Burrard Inlet selected for XRF analysis.

Site	Site Name/Place	Unit	Layers	Levels	# of Samples
DhRr 6	Belcarra Park	A8	A, B, C	3, 4, 12, 13	6
DhRr 18	Cove Cliff	Surface	n/a	n/a	3
DhRr 20	Burrard IR 3	Surface	n/a	n/a	3
DhRs 16	Mission IR	2, 3	B, C	4, 6	3
DhRt 6	Locarno Beach	ST#8	A, B, C	5, 10, 16	3
Total					**18**

4.9 How X-Ray Fluorescence Works

X-Ray Fluorescence (XRF) is widely used in archaeology as a technique to characterize the chemical composition of numerous forms of material culture, most notably obsidian and other lithic types such as basalt, dacite, andesite or rhyolite (Pollard et al. 2007). The following description of the technique is based on Bruker (2009), Colby and Speakman (2009), Craig et al. (2007), and Pollard et al. (2007).

In X-Ray Fluorescence Spectroscopy, an X-ray tube emits X-rays that first strike the surface of a sample and then are either absorbed by individual atoms or simply scattered throughout the sample material. When X-rays are absorbed, transferred energy goes into the electrons around each element's nucleus, ejecting some from the inner shells (K and L) and leaving vacancies in those shells, creating, in turn, an unstable atom. This is the "photoelectric effect." The atom responds by drawing electrons from its outer shells (M, N, P and so on), to replace the inner shell vacancies, returning to a stable condition. X-ray energy emissions occur when this replacement occurs, equivalent to the energy difference between the two states. Since each element in the periodic table has

its own energy level, each will emit its own set of energies, thus enabling us to measure, non-destructively, the elemental composition of a sample.

Until very recently, XRF research was limited to dedicated facilities with large instruments. Recent advances in micro-sizing instrumentation, including computers and miniature X-ray tubes with thermoelectrically cooled detectors, make it possible to construct a portable XRF instrument. These instruments are termed Portable XRF (PXRF), Field-Portable XRF (FPXRF) and Handheld XRF (Bruker 2009; Colby and Speakman 2009; Craig et al. 2007). I used a Bruker AXS Tracer III-V Handheld X-Ray Fluorescence Spectrometer in this analysis.

The instrument is equipped with a rhodium X-Ray tube and a silicon-based detector. It can operate at variable power settings and has an approximate resolution of 170eV FHWM for 5.9 keV X-rays. This range of power settings enables the instrument to simultaneously detect multiple elements on the periodic table from sodium (Na) to uranium (U) and count their densities at 1000 times per second. Analyses of lithic materials from *Skwxwú7mesh Uxwumixw* territory were conducted at the recommended instrument settings provided by Bruker (2009), at 40 keV, 10UA utilizing a 0.76 millimetre copper filter and a 0.0305 millimetre aluminum filter in the X-ray path for a 300-second (five-minute) live time count. Bruker recommends these energy settings and filters for focused analysis of a particular suite of elements known to be useful for characterizing lithic materials, particularly obsidian. The length of analysis ensures the outputs of peak intensities of raw concentrations of these elements are accurately and precisely

measured, smoothing the area underneath each peak intensity curve. The spot size on the instrument is four millimetres in diameter, which allows for analysis of small to larger-sized artifacts. Peak intensities for 11 elements in my XRF analysis of lithic materials from *Skwxwú7mesh Uxwumixw* territory included several elements. I examined manganese (Mn), iron (Fe), cobalt (Co), nickel (Ni), copper (Cu), zinc (Zn), rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr) and niobium (Nb) and calculated their ratios to the Compton peak of rhodium (Bruker 2009; Colby and Speakman 2009). Appendix 3 lists the raw data of these analyses. Analysis of each sample from source localities was on three different clean and flat surfaces. This allows for the X-rays emitted from the instrument to enter each sample (up to 200um), constantly ensuring precise and accurate results.

4.10 XRF Analysis of *Skwxwú7mesh Uxwumixw* Lithic Sources

For each sample, XRF analysis produced a raw elemental spectrum, then imported from the Tracer III-V software to another computer program, ARTAX. The ARTAX program allows for smoothing of peak data and calculation of elemental concentrations under each peak. Each sample's raw elemental peak concentration is then exported to Microsoft Excel, where data for all sources are compiled onto a single spreadsheet. Standard reporting of XRF elemental results includes basic statistical measures, mean, standard deviation, minimum and maximum for each source material; these are presented in Table 4.14.

Before importing each elemental spectral file into JMP 7, a statistical analysis program, each file in Excel requires table flipping (transposing). In this format, JMP 7 can easily examine a series of bivariate plots of each element used in the analysis of *Skwxwú7mesh Uxwumixw* lithic sources.

Table 4.14: Basic Elemental Statistical Data for *Skwxwú7mesh Uxwumixw* Lithic Sources.

Element	Mn	Fe	Co	Ni	Cu	Zn	Rb	Sr	Y	Zr	Nb
Nkwu'7say Smant **(N=9)**											
Mean	131.8	14088.2	233.7	746.1	57.4	116.3	155.7	22511.7	111.6	2673.6	30
SD	29.9	1037.8	45.3	37.2	19.9	21	26.7	1922.7	32.8	224.1	28.9
Min	92	12323	158	683	38	85	112	19227	59	2281	nd
Max	166	15394	292	795	94	149	197	25057	166	2996	71
Skawshn Smant **(N=9)**											
Mean	196.2	20671.8	397.8	747.4	58.8	114.7	110.1	15611.1	159.7	2194.6	39.4
SD	31.1	2616.5	58.1	30.5	19.3	15.1	24.2	1658.8	38.9	205.2	25.5
Min	133	16184	316	696	38	94	71	13205	106	1960	6
Max	235	23841	496	791	89	145	149	17542	226	2408	80
Chchshem st'enach Smant **(N=3)**											
Mean	132	11707.7	199.7	746	117	102	169.3	12818.3	133.3	2116.7	63
SD	35.9	1829.3	57.1	43.6	63.6	18.2	72.1	3768.3	8.1	347.2	48
Min	91	9596	136	699	55	81	111	9246	126	1763	15
Max	158	12809	246	785	182	113	250	16756	142	2457	111
Lexwlúxwls Smant **(N=9)**											
Mean	109.1	11619.8	230.1	770.9	72.4	104.4	254.8	9820.6	158.6	2469.1	51.9
SD	28.9	717.7	41.3	46.2	21.2	17.2	38.4	569.7	31.7	166.8	18.7
Min	61	10816	160	718	40	84	198	8819	114	2223	17
Max	152	12856	282	867	103	135	290	10618	208	2734	75
Lhaxwm Smant **(N=9)**											
Mean	195	14613.1	283	743.1	47.8	126.3	731.3	2676.6	533	2533.8	93
SD	29.9	1371.8	57.8	43.2	30.1	15.7	127.2	140.8	83.3	177.9	39.2
Min	149	13178	224	699	16	104	547	2512	451	2214	53
Max	247	16534	399	811	108	153	873	2929	665	2709	149
Nch'Kay' Smant **(N=9)**											
Mean	99.6	3712.9	30.2	774.8	38.1	78.9	452.3	4709.7	123.9	1976.6	64.6
SD	35.1	1386.9	23.8	79.5	11.3	12.3	52	391.3	34.8	297.7	32.4
Min	18	2735	1	583	19	62	359	3776	57	1563	27
Max	134	7187	62	844	53	106	510	5038	175	2530	122

In JMP 7, exploration of the variation of lithic source materials began with principle component analysis (PCA). PCA takes the obtained raw concentration values for each element analyzed in XRF and narrows them down to a smaller number of variables, in this case two. PCA accounts for most of the variance in the observed variables and plots results on an axis to illustrate the degree of variance. Principle component analysis was successful in discriminating lithic sources from one another with a cumulative Eigen value of 61.354% for the first two components (Figure 4.10). Analysis in JMP 7 of additional components did not reveal any clearer patterning. Yet, to fully explore the discrimination of lithic source materials from one another I undertook further analysis of specific elements, first using a loading plot to observe which specific elements push and pull each source from one another.

Number	Eigenvalue	Percent	Percent	Cum Percent
1	3.7341	33.946		33.946
2	3.0149	27.408		61.354
3	1.2369	11.245		72.599
4	0.9487	8.624		81.223
5	0.8041	7.310		88.533
6	0.4963	4.512		93.045
7	0.3486	3.169		96.214
8	0.2244	2.040		98.254
9	0.0958	0.871		99.124
10	0.0589	0.535		99.660
11	0.0374	0.340		100.000

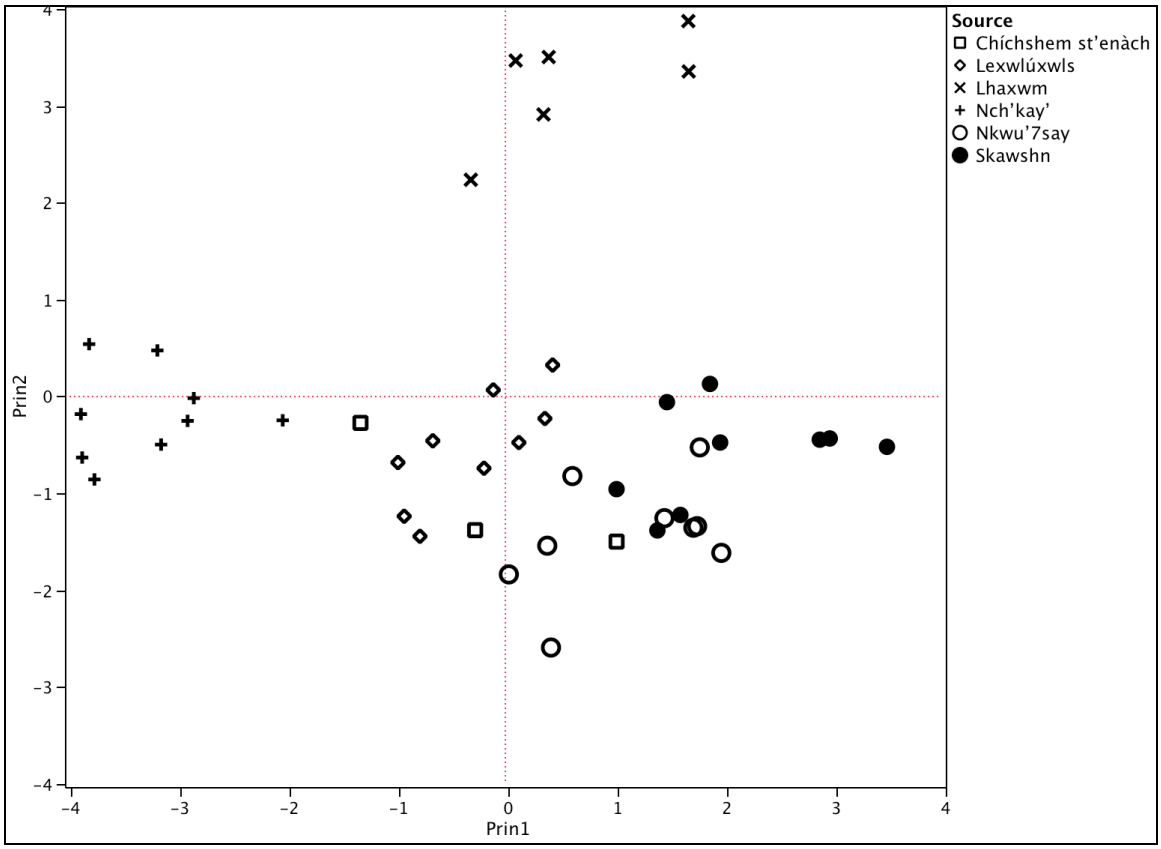


Figure 4.10 Eigen-values and results of Principle Component Analysis on *Skwxwú7mesh Uxwumixw* lithic source material.

In many studies of archaeological obsidian (e.g. Carter and Kilikoglou 2007, Colby and Speakman 2009, Dillian 2006, Nelson 1975, Shackley 1998, 2008) and other igneous materials, five trace elements, rubidium (Rb), strontium (Sr), yttrium (Y), zirconium (Zr) and niobium (Nb), can discriminate closely related materials from one another. These trace elements help determinate the nature of each lava flow's deposition and petrogenisis. In Figures 4.11 and 4.12, I first used loading plot of my elemental data to find that Y and Sr are key trace elements that are useful for discriminating source materials from each other. I then use a bi-plot of Y by Sr to illustrate the results of my XRF analysis of lithic source materials from *Skwxwú7mesh Uxwumixw*. Each lithic source is marked with a distinct icon and separately labelled. Figures 4.11 and 4.12 also demonstrate that almost all lithic source materials from *Skwxwú7mesh Uxwumixw* are geochemically discernible from each other, and in the case of the bi-plot with a 95% confidence. The main exception is *Chíchshem st'enàch Smant,* which overlaps with all other sources except *Lhaxwm*, yet material from this source is clearly visually distinct from any other material within *Skwxwú7mesh Uxwumixw* (with a light grey colour, fissured and eroded surfaces and coarse grain crystalline structure). Therefore, the overlapping geochemical results with *Lexwlúxwls* and *Skawshn Smant* in Figure 4.12 do not hinder the accurate assignment of the provenance of source or artifact materials, when visual characterization is a part of a characterization methodology.

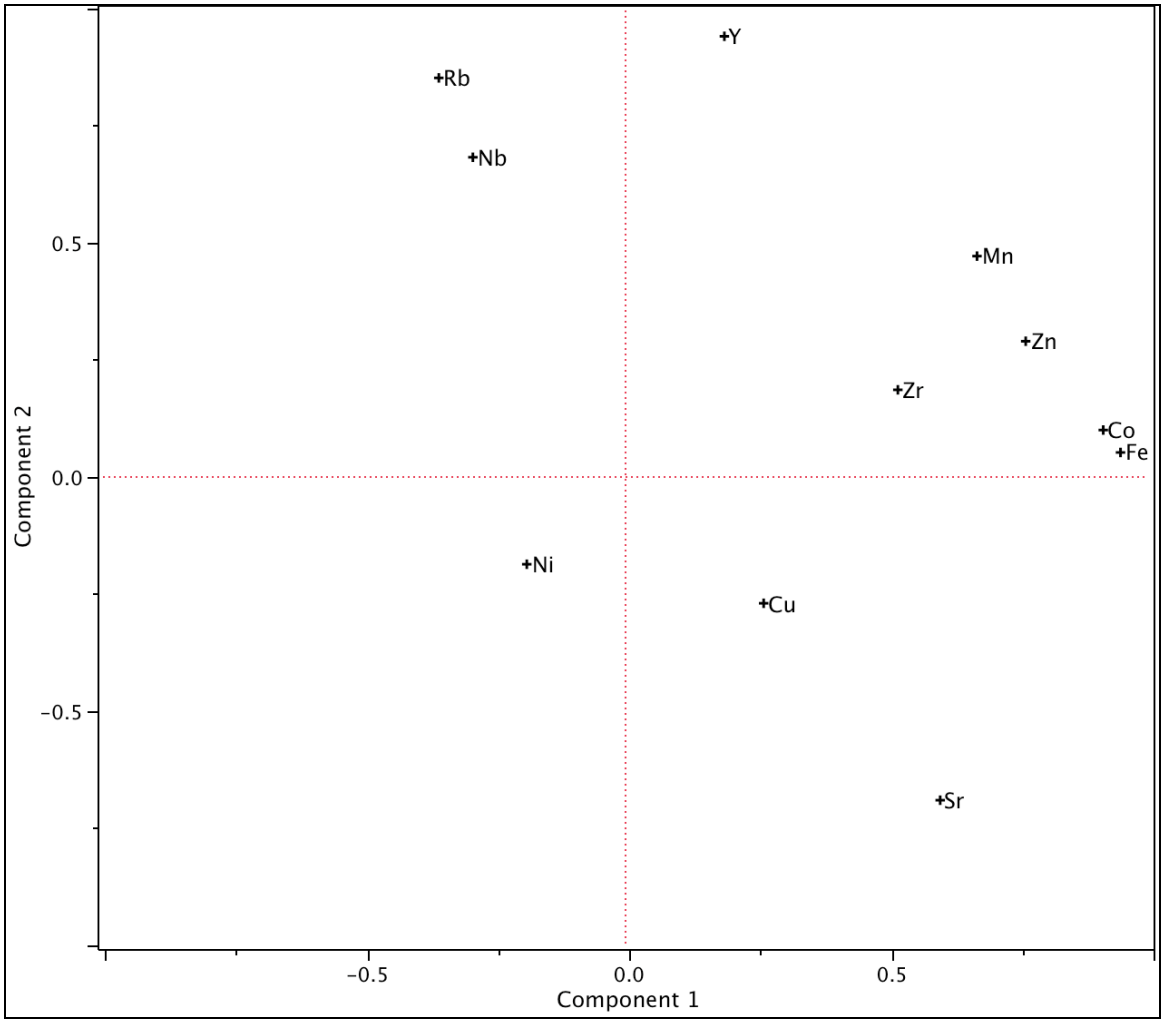
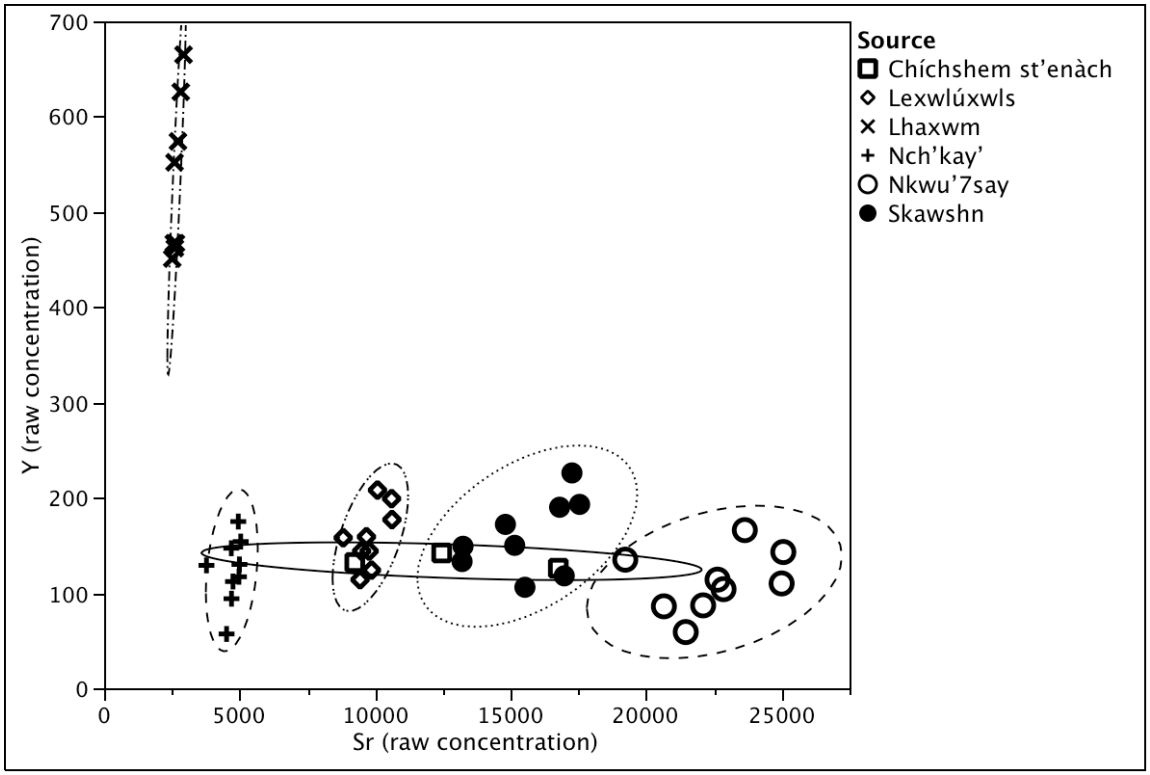


Figure 4.11: Loading plot of *Skwxwú7mesh Uxwumixw* lithic source material elements, note Y to the top center and Sr to the bottom right.



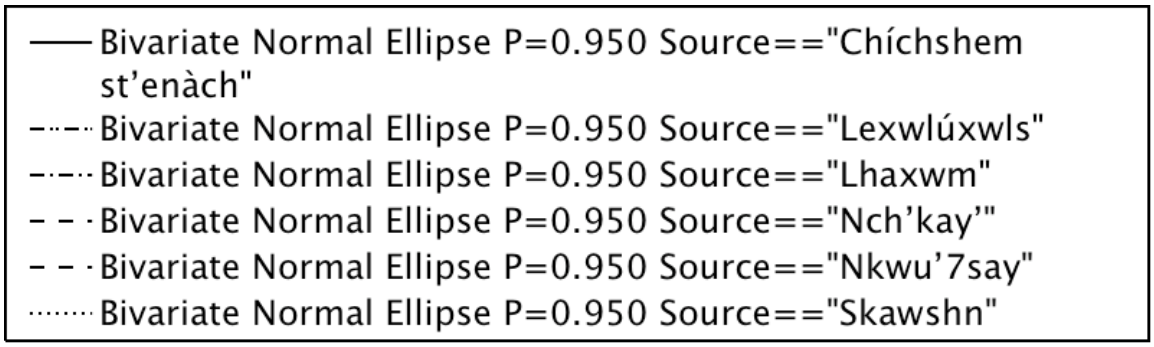


Figure 4.12: Bivariate Yttrium (Y) by Strontium (Sr) plot of *Skwxwú7mesh Uxwumixw* lithic source material.

4.11 Results of XRF Analysis of *Skwxwú7mesh Uxwumixw* Lithic Artifacts

The methods used for processing lithic source data are the same for the characterization of lithic artifacts from *Skwxwú7mesh Uxwumixw,* but no artifacts were broken. Instead, artifacts chosen for analysis had flat and as clean as possible surfaces. Raw data for these analyses are in Appendix 4. As with lithic source materials, PCA explores the variation occurring in artifact materials. Yet, as the results in Figure 4.13 show, the pattern of discrimination found in PCA of source materials are not as successful in the plot of artifact materials, with a cumulative Eigen-value of 47.122%. Additional exploration of additional components in JMP 7 did not reveal clearer patterning. Source material samples are shaded lighter (red) than artifact samples (black). Overlap in my PCA analysis attributes to lithic materials originating from the same volcanic belt. This warranted the additional exploration of individual elemental data. Further exploration of XRF artifact data as a loading plot in Figure 4.14 and a bi-plot in 4.15 demonstrate that lithic artifact materials from *Skwxwú7mesh Uxwumixw* are geochemically discernible from each other. This elemental data plot uses the same trace elements found in source data and in the Loading Plot, and strontium (Sr) and yttrium (Y) in the bi-plot.

The results of these analyses are complied for comparison in Table 4.15, where an overall 92% of my visual assignments match with the sources identified using XRF. The majority of the 8% discrepancy between my visual assessment and XRF results is attributable to one material type, *Skawshn smant*. I will

expand on this later. Furthermore, samples that fall outside of group ellipses were from small artifacts with irregular surfaces, emphasizing variation in material or creating inaccurate readings during XRF analysis. My XRF analysis could not acquire a complete chemical signature for these small artifacts. Five samples, not assignable to any source, are beyond possible variation of source/artifact materials.

Number	Eigenvalue	Percent	Percent	Cum Percent
1	3.0814	28.013		28.013
2	2.1020	19.109		47.122
3	1.4017	12.743		59.865
4	1.0458	9.507		69.372
5	0.9058	8.235		77.606
6	0.6682	6.075		83.681
7	0.6548	5.953		89.633
8	0.5017	4.561		94.195
9	0.3888	3.534		97.729
10	0.1906	1.733		99.462
11	0.0592	0.538		100.000

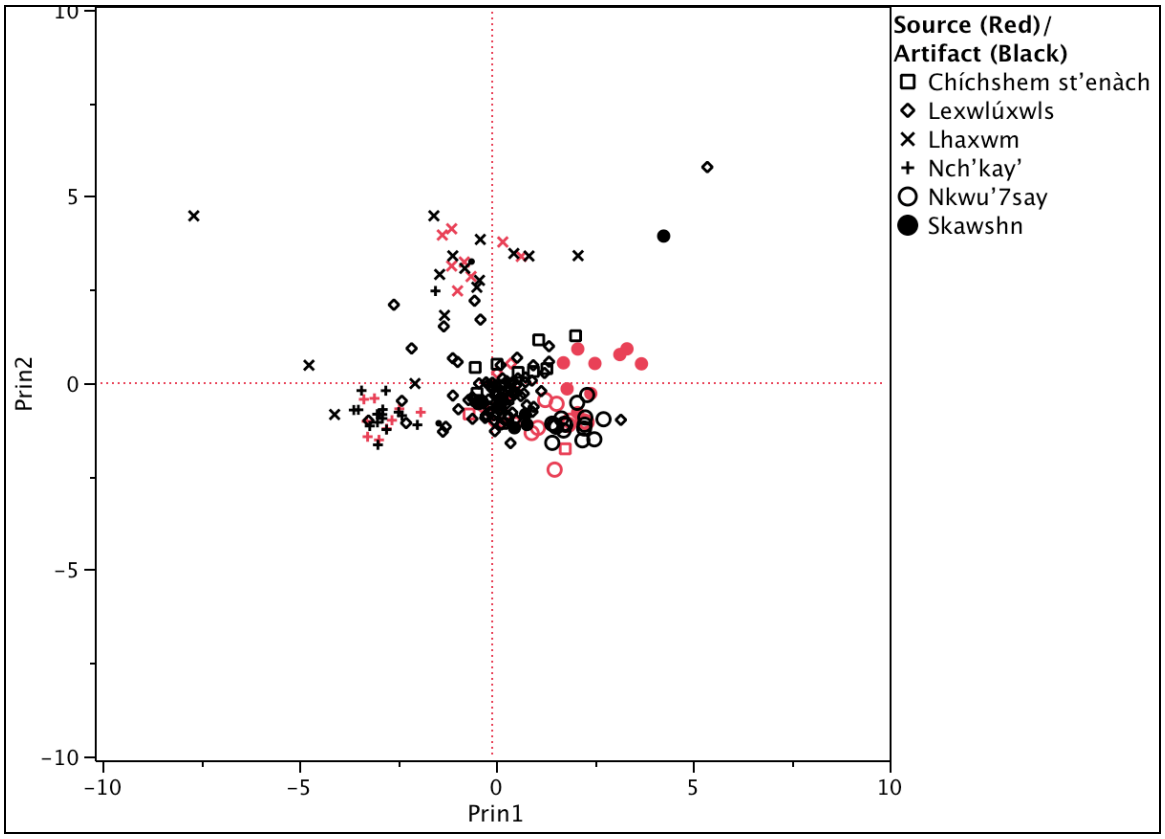


Figure 4.13: Eigen-values and Principle Component Analysis of *Skwxwú7mesh Uxwumixw* lithic source and artifact materials.

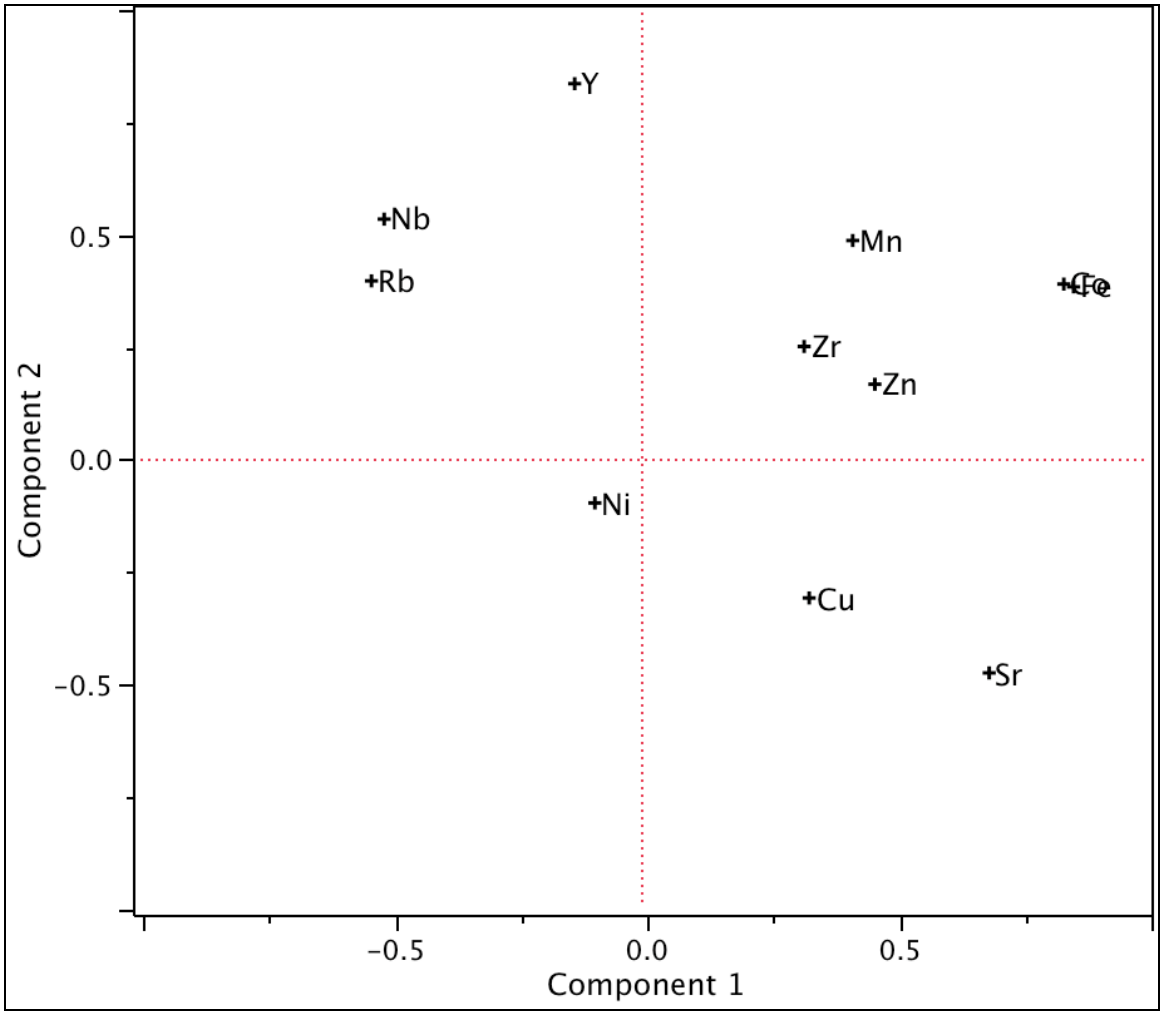
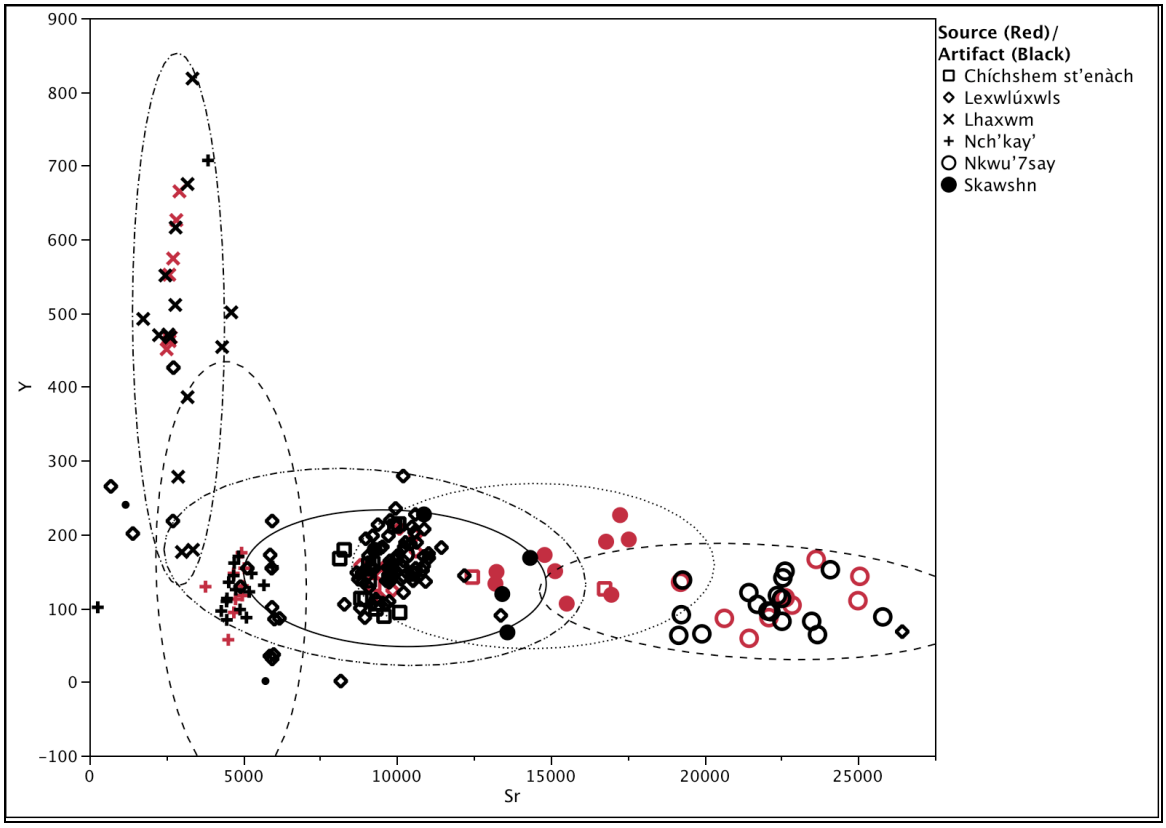


Figure 4.14: Loading plot of *Skwxwú7mesh Uxwumixw* lithic source material elements, note Yttrium (Y) to the top left and Strontium (Sr) to the bottom right.



Bivariate Normal Ellipse P=0.950 Name("Source (Red)/Artifact (Black)")=="Chíchshem st'enàch"

Bivariate Normal Ellipse P=0.950 Name("Source (Red)/Artifact (Black)")=="Lexwlúxwls"

Bivariate Normal Ellipse P=0.950 Name("Source (Red)/Artifact (Black)")=="Lhaxwm"

Bivariate Normal Ellipse P=0.950 Name("Source (Red)/Artifact (Black)")=="Nch'kay'"

Bivariate Normal Ellipse P=0.950 Name("Source (Red)/Artifact (Black)")=="Nkwu'7say"

Bivariate Normal Ellipse P=0.950 Name("Source (Red)/Artifact (Black)")=="Skawshn"

Figure 4.15: Bivariate Yttrium (Y) by Strontium (Sr) plot of *Skwxwú7mesh Uxwumixw* lithic artifact material.

Table 4.15: Percent agreement between visual and XRF identification.

Region and Site	Number of Samples	Percent Agreement
Squamish River Valley		
DkRs 6 Midden	22	91%
DkRs 6 House	19	95%
DkRs 6 Workshop	25	92%
DkRt 2	2	50%
DlRt 9	10	70%
DlRt 10	2	0%
DlRt 11	2	0%
EaRu 2	2	100%
EaRu 5	2	100%
DkRr 1	4	100%
DkRr 2	2	100%
DkRs 14	2	50%
Total	*94*	*80%*
Howe Sound		
DiRt 1	2	100
DiRu 15	6	100
DiRu 16	6	83%
DjRt 6	4	100
DiRu 19	6	100
DiRt 11	6	100
DiRu 10	6	100
DjRt 12	4	50%
DjRt 3	4	100
DjRt 5	6	100
Total	*50*	*94%*
Burrard Inlet		
DhRr 6	6	67%
DhRr 18	3	100%
DhRr 20	3	100%
DhRs 16	3	100%
DhRt 6	3	100%
Total	*18*	*89%*
Grand Total	**162**	**92%**

4.12 Issues between visual and chemical identification

XRF analysis revealed a greater degree of chemical variation in artifact assemblages than was expected. While it is difficult to account for the entire degree of variation of chemistry in these materials throughout all of *Skwxwú7mesh Uxwumixw*, I have three possible explanations. First, I may find greater variation in the chemistry of source materials with additional analysis. Second, the variation I found in archaeological contexts might no longer exist at the source, as people in the past collected those materials and transported them to archaeological contexts. Third, chemical variation in the lithic artifact assemblages is analyzed to the degree that it represents potential chemical alteration from post depositional and/or recovery processes. This may include site sediments still present on the analyzed materials, as XRF analysis can only penetrate into a sample up to 200 um. Furthermore, samples may be subjected to contamination during post-excavation handling (i.e., the cleaning/cataloguing of artifacts with chemicals, handling of materials by multiple lithic analysts, mixing of different lithic materials in collection bags), potentially skewing my chemical analysis results.

The 92% agreement between visual and chemical assessments of lithic materials throughout the regional archaeological record of *Skwxwú7mesh Uxwumixw* is adequate and serves as a preliminary baseline for regional comparison of lithic materials occurring in the archaeological record.

It also serves as a basis for discussion of altering the current understanding of lithic material distributions on the southern Northwest Coast. Some researchers on the southern Northwest Coast do not even consider the possible source of lithic materials (Charleton 1980; Morin 2004), whereas others make assumptions (Lepofsky et al. 2007) that lithic materials are of local origin (e.g. cobble beach scatters/small outcrops) and do not consider the possibility that they come from distant sources. However, considering local cultural knowledge, and taking a combined visual and geochemical analysis approach, offers insight into the actual occurrence and distribution of lithic materials. In addition, accounting for incorrect visual classification of lithic material from archaeological contexts may help other archaeologists working in the region who lack my familiarity or training. Therefore, my combined visual and chemical analysis accurately maps the distribution of lithic materials throughout *Skwxwú7mesh Uxwumixw*. I hope that this will allow other archaeologists to gain a better understanding of their occurrence along the southern Northwest Coast.

In the following sections, I wish to explore the 8% of cases in which my visual and chemical identifications were at odds. While 8% may initially seem a low figure, one must consider its regional context. As mentioned in Chapter One, 25,637 pieces of flaked lithic material derive from the 25 sites included in this study. These sites date to various periods and occur in many dramatically different locations. Of the 25,637 lithic artifacts at these sites, I visually assessed 1500 of them and conducted XRF analysis on only 206. If I am incorrect 8% of

the time in my assessment of 206 samples in XRF analysis, this figure warrants further exploration to the entirety of the flaked tool assemblages for the sites considered in this research. Eight percent of 25,637 equals the potential incorrect assignment to source for 2051 lithic artifacts, a significant number. To address this, I will demonstrate how I can extrapolate from the eight percent incongruence in my visual and geochemical data. Doing so will substantially alter my graphic illustrations of the occurrence and distribution of lithics materials throughout *Skwxwú7mesh Uxwumixw* and discussions of them. First, I reviewed my visual and XRF data for the sites and artifacts that I incorrectly assessed. A summary of these sites and materials is presented in Table 4.16.

Table 4.16: Summary of Incorrectly Assessed Lithic Materials.

Site	Frequency Incorrectly Assessed	Percent Change
DhRr 6	1 of 5 *Lexwlúxwls Smant* to *Skawshn Smant*	20%
DhRr 6	1 of 5 *Lexwlúxwls Smant* to *Nkwu'7say Smant*	20%
DiRu 16	1 of 5 *Lexwlúxwls Smant* to *Nkwu'7say Smant*	20%
DjRt 12	2 of 4 *Lexwlúxwls* to *Skawshn Smant*	50%
DkRs 6	5 of 35 *Lexwlúxwls Smant* to *Nkwu'7say Smant*	14%
DkRs 14	1 of 2 *Skawshn Smant* to *Lexwlúxwls Smant*	50%
DkRt 2	1 of 2 *Skawshn Smant* to *Nkwu'7say Smant*	50%
DlRt 9	5 of 8 *Skawshn Smant* to *Nkwu'7say Smant*	62.5%
DlRt 9	1 of 8 *Skawshn Smant* to *Lexwlúxwls Smant*	12.5%
DlRt 10	2 of 2 *Skawshn Smant Lexwlúxwls Smant*	100%
DlRt 11	2 of 2 *Skawshn Smant* to *Nkwu'7say Smant*	100%

Incorrect assessment occurred at 9 out of 25 sites, including sites in the Squamish Valley, Howe Sound and Burrard Inlet. Incorrect assessment occurred in the three most visually similar materials: *Nkwu'7say, Skawshn* and *Lexwlúxwls Smants*. I took the percentage difference for each site and lithic material

incorrectly assessed and projected that figure onto the entire assemblage, resulting in numerous pieces reassigned to a new source. For example, 20% of the materials at DhRr 6 visually assessed as *Lexwlúxwls Smant* are now assigned to either *Nkwu'7say Smant* or *Skawshn Smant*. This results in 112 of the 280 pieces of lithic material at this site now assigned to another source. As a more accurate picture of the occurrence and distribution of lithic materials across a range of sites from my study area, dramatic changes in their regional interpretations need consideration. In the next sections, I will apply the spatial and temporal changes resulting from XRF analysis for each subregion of *Skwxwú7mesh Uxwumixw* and then turn to some of the implications this has regarding the nature of lithic material use in each of these areas.

4.13 Correcting Visual Assessment with Chemical Results in the Squamish River Valley

To account for my misidentifications in the Squamish River Valley, I took data from Table 4.6 and transferred it into a bar chart, as seen in Figure 4.16. Using the percentage change for sites and materials in the Squamish River Valley in Table 4.15, I altered data in Figure 4.16, resulting in Figure 4.17. Notable changes are in the frequencies of *Nkwu'7say, Skawshn* and *Lexwlúxwls Smants,* including a more accurate representation of their occurrence and distribution. A comparison of Figures 4.16 and 4.17 clearly illustrates the differences between classifying lithic materials by visual and geochemical means.

At DkRs 6, a total of five samples visually assessed as originating from *Lexwlúxwls Smant* actually appear, based on chemical characterization, to originate from *Nku'7say Smant*. At both DkRs 14 and DkRt 2, one of two samples visually assessed, as *Skawshn Smant* appears to be from *Lexwlúxwls Smant*. The largest differences occur at DlRt 9, where five of the eight samples analyzed believed to be from the local *Skawshn Smant* source register in the XRF results as being from *Nku'7say,* and one of these eight is shown to originate from *Lexwlúxwls Smant*. At DlRt 10 both samples examined were believed to come from *Skawshn Smant* and actually appear to come from *Lexwlúxwls Smant*, while at DlRt 11 both samples visually assessed as being from *Skawshn Smant* may actually be from *Nkwu7'say Smant*.

The most common errors in the attribution of artifacts to sources can be found in *Nkwu'7say* and *Skawshn Smant,* where geochemical assessment almost entirely reverses my visual assessment results (*Lexwlúxwls Smant* is only slightly affected by chemical assessment correction). The main reason for these differences is the apparently incorrect visual assessment of lithic materials at an excavated rock shelter, DlRt 9. Chemical results indicate that *Nkwu'7say Smant* played a much more important role in the Squamish River Valley region than I expected. This is likely attributable to the high quality and abundance of this material in this area and the seasonal movement of people within the Squamish River Valley to other areas of *Skwxwú7mesh Uxwumixw*.

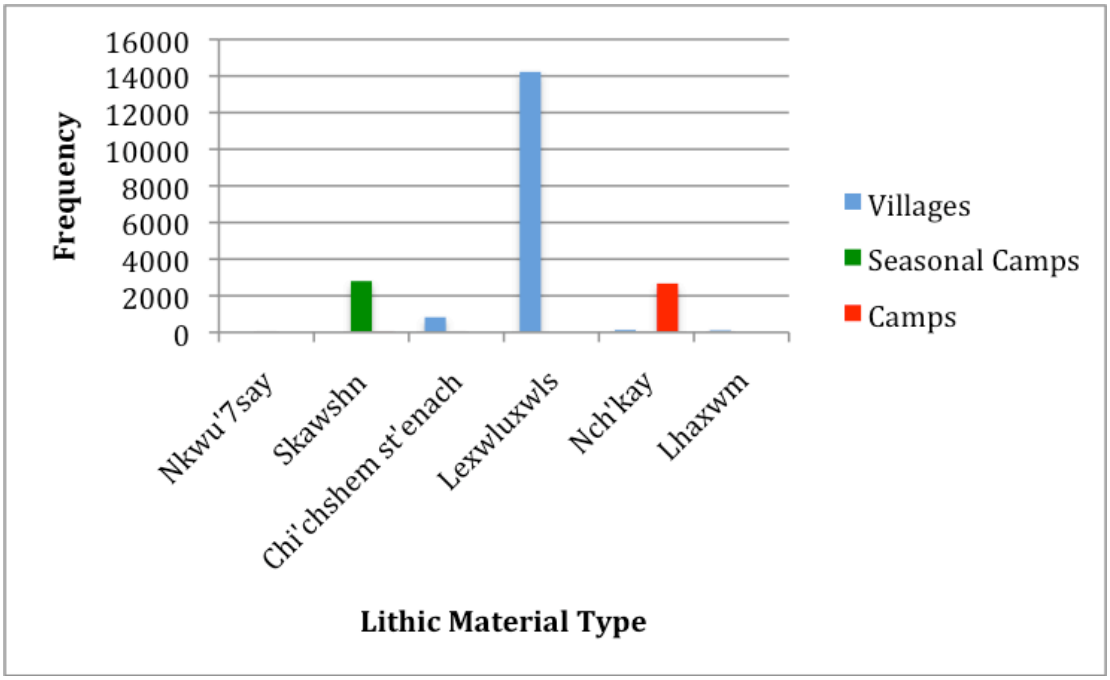


Figure 4.16: Visual assessment of lithics in the Squamish Valley.

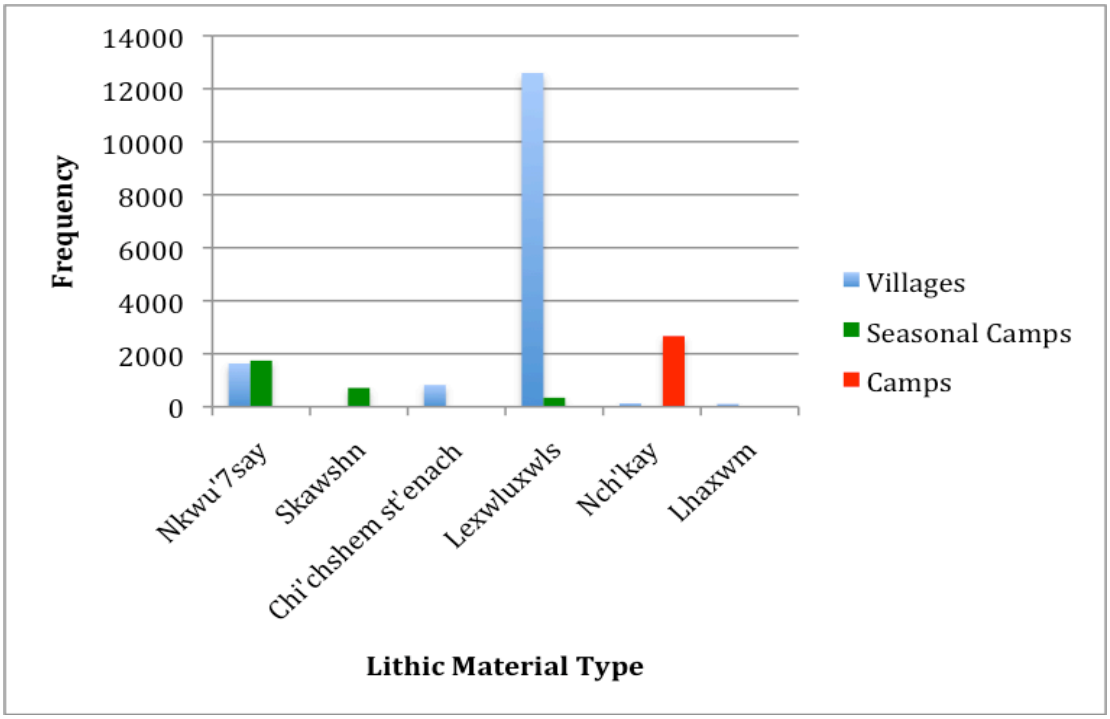


Figure 4.17: Visual assessment of lithics in the Squamish Valley corrected with chemical data.

4.14 Spatial Distribution of Lithic Material in the Squamish River Valley

The Squamish River Valley region has the highest amount of lithic materials in *Skwxwú7mesh Uxwumixw*. This is not surprising as those sites also occur closest to all sources. A general pattern is that lithic sources and materials associated with Transformation occur in domestic contexts (i.e. villages and seasonal camps), whereas those associated with Mythical Beings occur in non-domestic or wild contexts (i.e. camps). Lithic materials associated with Transformation appear in the archaeological record as expedient tools (cobble tools, scrapers, utilized flakes) or, as in the case of *Chíchshem st'enàch Smant,* as heating stones in cooking, drying and smoking contexts. An exception to this is the low occurrence of *Nkwu'7say Smant* at DlRt 10 and DlRt 11, two alpine sites at the southern end of the divide between the Squamish and Cheakamus Rivers. This material was likely taken along as part of a mountain goat hunting trip, such as those described ethnographically, which start in alpine areas above the source of *Nku7'say Smant* and then move south along the Squamish-Cheakamus divide (Bouchard and Kennedy 1986).

Materials associated with Mythical Beings occur as formal tools or aspects of maintaining them (e.g. pressure flakes or bifacial thinning flakes). The exception to this is at DkRr 1, a lithic workshop close to the source of *Nch'kay Smant.* Lithic material at this site occurs in two different use contexts, one for application in the surrounding alpine environment and the other for shaping of cores and large flakes, suitable for transport to lowland contexts (Reimer 2000,

2003). Other sites around DkRr 1 have a lower density of lithic materials but also contain large flakes and cobbles reduced to implements and cores suitable for long distance transport (ARCAS 1999a; Reimer 2000, 2003). These materials then appear in low-elevation archaeological sites as finished tools or as part of formal tool manufacture and maintenance, such as pressure flakes and recycled tools (ARCAS 1999a; Reimer 2000, 2003).

Yet, somewhat contrary to this, in the Squamish River Valley region *Lhaxwm Smant* occurs only at a single site: DkRs 6, a large village at the head of Howe Sound (ARCAS 1999a and c). The presence of this material here is explained through the village's association with places, such as Howe Sound and the island of *Lhawxm*, where the great warrior from *Sta'mis* chased and killed the Two-Headed Sea Serpent, and from where this material originates (Hill-Tout 1900; Reimer 2006).

4.15 Temporal Distribution of Lithic Materials in the Squamish River Valley

The only lithic material used during *Sxwexwiyam* times in the Squamish River Valley region is *Nch'kay Smant* (Figure 4.18), found at an alpine site, DkRr 4, deep in the Coast Mountain range (Reimer and MacDonald 2008). This hunting site consists entirely of a scatter of microblades, microblade core fragments and a small hearth. The site is close to the source of *Nch'kay Smant*, but it is likely that this material does occur at other *Sxwexwiyam* archaeological sites yet to be found, tested or excavated.

From the *Xaay Xays* and through to the *Syets* eras (Figure 4.18), the occurrence of *Nch'kay Smant* increases over time in terms of number of sites and artifacts, especially at the village of *Sta'mis* (DkRs 6) at the head of Howe Sound (ARCAS 1999a and c; Reimer 2003). Throughout *Xaay Xays* times, all lithic materials except *Skawshn Smant* appear in the archaeological record with substantial amounts of *Nkwu'7say* and *Lexwlúxwls Smant* dominating site assemblages in the form of expedient tools (ARCAS 1999a and c; Reimer 2004, 2005, 2006, 2007). This is not surprising given that both *Nkwu'7say* and *Lexwlúxwls Smant* sources are strongly associated with the actions of the Transformer Brothers and are located near village sites. The occurrence of *Lhaxwm Smant* during this period indicates the initial use of this material, but at a lower intensity than other lithic sources and materials. Furthermore, *Lhaxwm Smant* does not occur at inland sites. This suggests that its association with Mythical Beings, in these cases sea serpents, determines its occurrence and use as formal tools in marine contexts. (ARCAS 1999a and c; Reimer 2006).

With the exception of *Lhaxwm Smant* (Figure 4.18), there is extensive utilization of lithic materials occurring in the *Syets* period (ARCAS 1999a; Reimer 2009). This suggests strong cultural continuity, as this pattern mirrors earlier use of lithic materials across *Skwxwú7mesh Uxwumixw*. The abundance of *Nch'kay' Smant* during this period is in large part due to a high-density lithic workshop assemblage (DkRr 1) excavated near this source (ARCAS 1999a; Reimer 2000, 2003).

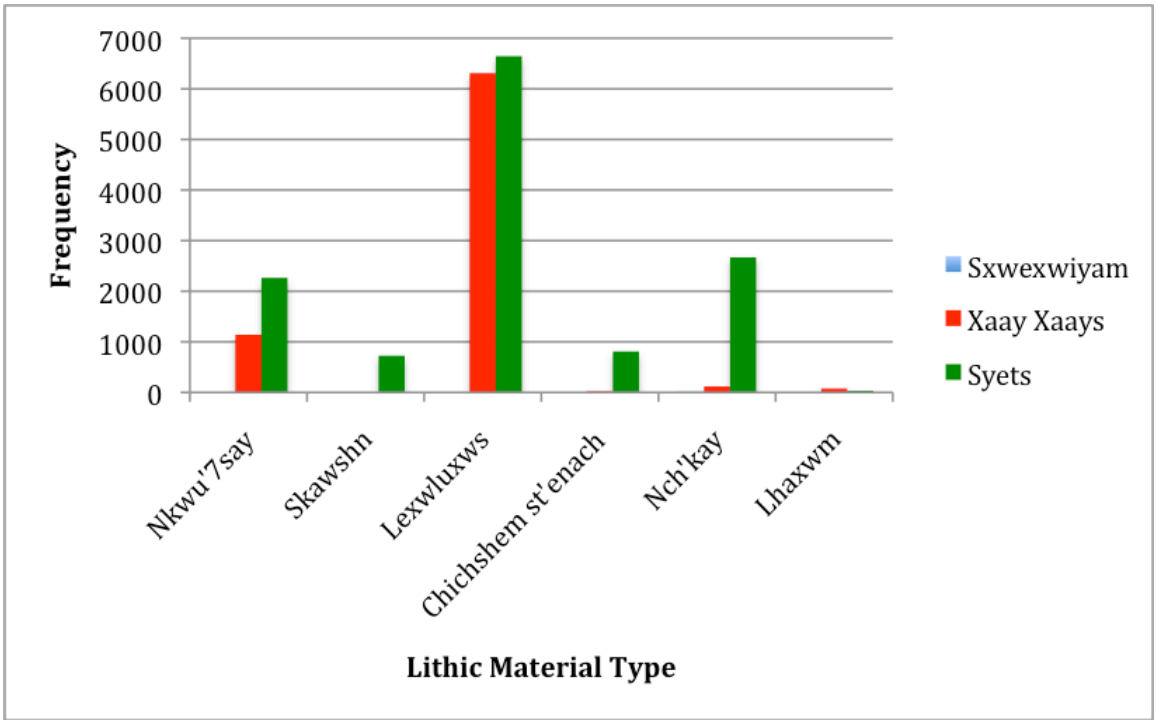


Figure 4.18: Temporal distribution of lithic materials in the Squamish Valley.

4.16 Correcting Visual Assessment with Chemical Results in Howe Sound

To a lesser degree than in the Squamish River Valley, some incorrect visual assessment of materials occurred in Howe Sound (Table 4.12, Figure 4.19). At DiRu 16, one of the five samples analyzed by XRF that had been visually assessed as *Lexwlúxwls Smant* actually originated from *Nkwu'7say Smant*. At DjRt 12, two of the four samples visually assessed as *Lexwlúxwls Smant* came from *Skawshn Smant* (Figure 4.20). The implications of these differences is that visual assessment determined that both *Nkwu'7say* and *Skawshn Smant* materials are absent from Howe Sound. With chemical analysis,

I could determine that these materials *do* actually occur in Howe Sound (Figures 4.19 and 4.20).

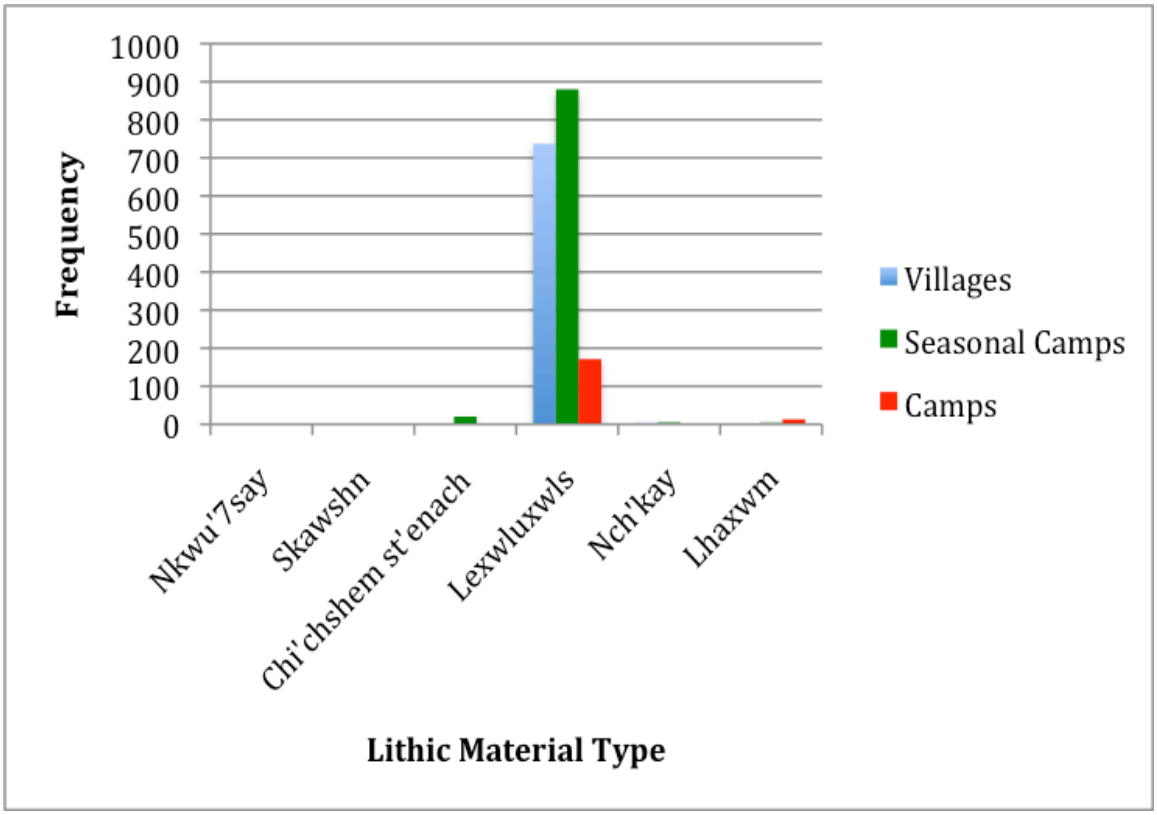


Figure 4.19: Visual assessment of the distribution of lithic materials in Howe Sound.

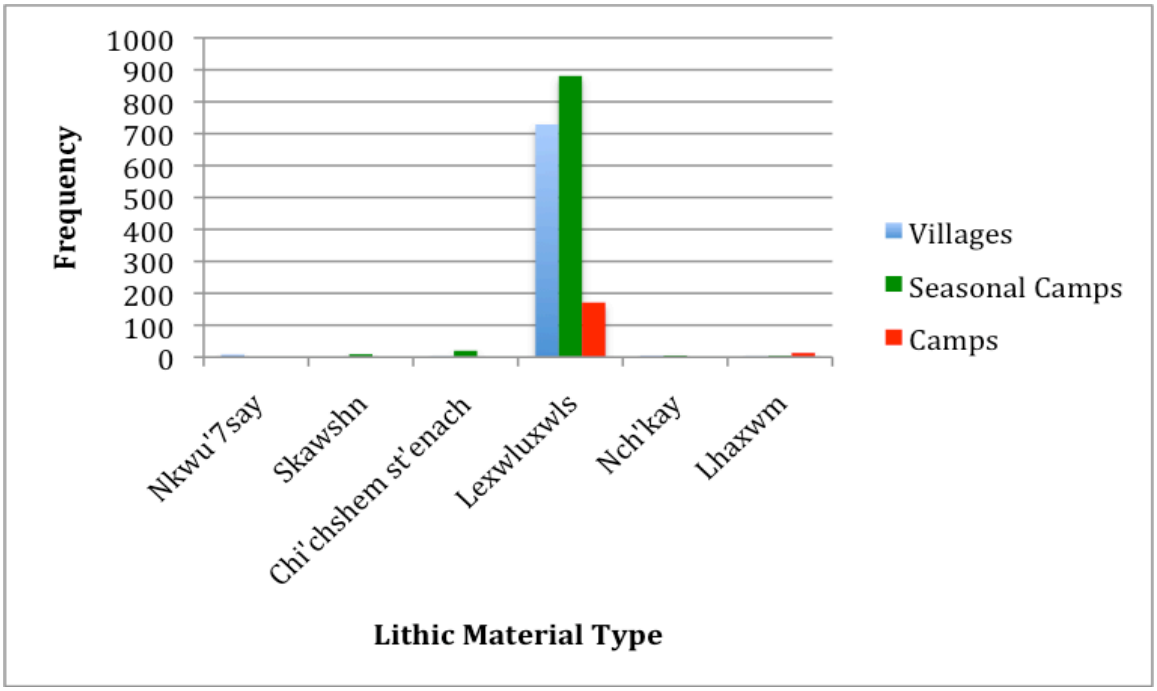


Figure 4.20: Correction of the distribution of lithic materials in Howe Sound using XRF results.

4.17 Spatial Distribution of Lithic Materials in Howe Sound

Overall, Howe Sound has the smallest amount of lithic materials recovered (Figure 4.15), despite having the greatest number of tested and excavated sites of the three regions discussed in this analysis (ARCAS 1998a and b; 1999a,b, and c). Similar patterns to those seen in the Squamish Valley are apparent in the Howe Sound region, reflecting the fact that *Skwxwú7mesh* people utilized the closest lithic sources available. As a result, material from *Lexwlúxwls Smant* dominates lithic assemblages in the Howe Sound region at all site types (Figure 4.21) and is manifest as expedient tools.

The other lithic materials associated with Transformation are mostly found in domestic contexts of villages and seasonal camps and have similar use

trajectories as expedient tools or heating/cooking implements seen in the Squamish River Valley. While these materials occur in small numbers, they do illustrate links between upriver *Skwxwú7mesh Uxwumixw* villages and settlements in Howe Sound. Lithic materials associated with Mythical Beings, however, occur at very low frequencies at all site types in the role of formal tool manufacture and/or maintenance (Figure 4.21).

These occurrences are in part a reflection of past archaeological research focusing on excavating village and seasonal residential camps and for the most part ignoring short-term camps. An exception to the potential significance of this effect may be *Lhaxwm Smant* and the site closest to its source, DjRt 3. This area has only been subject to a brief surface collection, but I strongly suspect that if this site were to be test excavated (along with other temporary camps in Howe Sound, particularly Anvil Island) it would result in the recovery of more of this material.

While the majority of lithic materials in the Howe Sound region show local procurement, the presence of materials from other localities, as shown by XRF corrected results, may well illuminate some social aspects of historical *Skwxwú7mesh Uxwumixw* land use. The presence of lithic materials from the Squamish River Valley in the Howe Sound area offers evidence for tracing both ethnographically described seasonal movements and resource use of *Skwxwú7mesh Uxwumixw* people. Seasonal movements documented by Barnett (1955), Matthews (1955) and Kennedy (2000, 2007) include entire households

paddling by canoe from upriver (Squamish, Elaho, Ashlu, Mamquam and Cheakamus Rivers) winter villages, through Howe Sound to spring and summer seasonal camps and villages throughout this region and farther south to Burrard Inlet.

4.18 Temporal Distribution of Lithic Materials in Howe Sound

Only small amounts of lithic material dating back to *Sxwexwiyam* times from *Shawshn* and *Nch'kay Smant* have been found, and they have only been found at a single archaeological site DjRt 12 (Figure 4.21). This site is a set of two small rock shelters close to Porteau Cove on the eastern shore of Howe Sound. The site is 85 metres above modern sea level, and according to reconstructed sea level sequences (established by Reimer n.d.) the site was in a waterfront context at the time of its use. Additional archaeological survey along an elevation contour between 80 and 120 metres above modern sea level would likely yield early Holocene sites in the Howe Sound region.

Fluctuating sea levels during early to mid-Holocene times and a lack of focused archaeological research are likely reasons for the lack of archaeological sites dating to *Xaay Xays* times (Figure 4.21). As with attempting to locate early Holocene archaeological sites in Howe Sound, focusing search efforts on raised beach terraces along the mainland shores and on the many islands in Howe Sound may result in finding additional sites dating to the *Xaay Xays* period. Not surprisingly, by the *Syets* time period all materials but *Skawshn Smant* occur in the Howe Sound area (Figure 4.21).

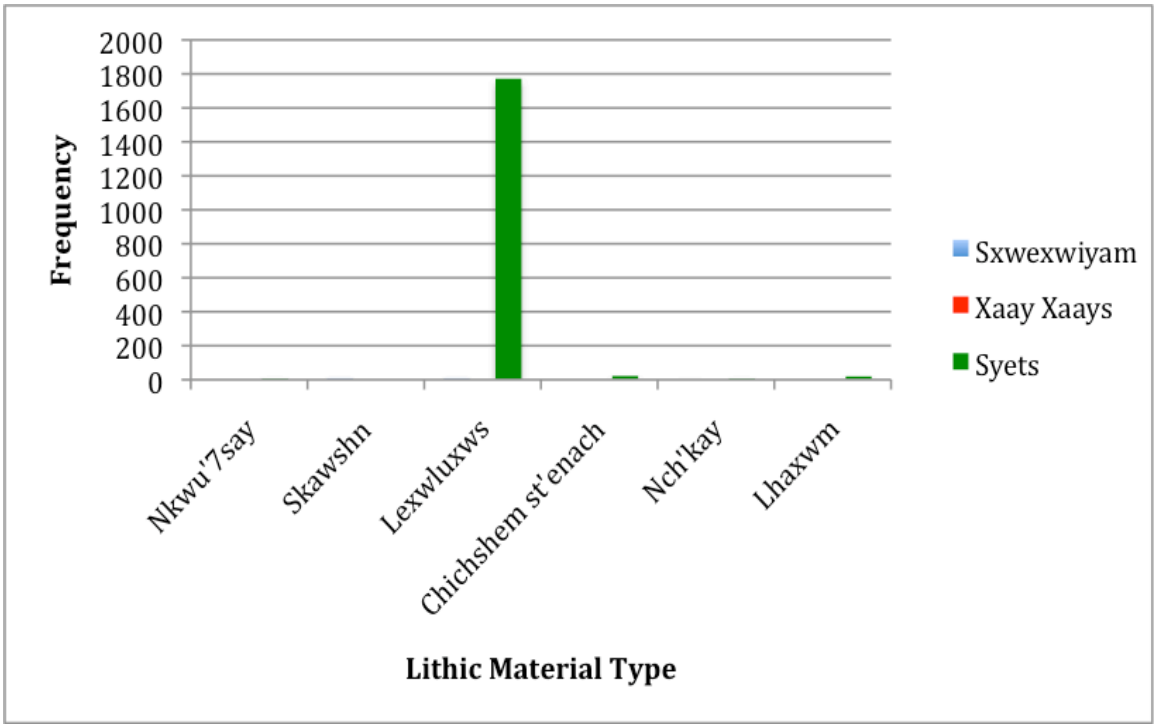


Figure 4.21: Temporal distribution of lithic materials in Howe Sound.

4.19 Correcting Visual Assessment with Chemical Results in Burrard Inlet

As with lithic materials incorrectly identified in the Squamish River Valley and Howe Sound, correction for visual characterization data for Burrard Inlet is by chemical assessment and analysis data (Figures 4.22 and 4.23). This shows evidence of *Skwxwú7mesh Uxwumixw* people inhabiting and utilizing Burrard Inlet. This is particularly evident at DhRr 6, where two of the five visually assessed samples believed to be from *Lexwlúxwls Smant* are from *Skawshn* and *Nkwu'7say Smants* (Figure 4.23). As with other areas, Burrard Inlet has a marked difference between visual and chemical assessment. Visual assessment found that both *Nkwu'7say* and *Skawshn Smant* did not occur, but XRF analysis found

that they do. This strongly indicates seasonal movement of people from the upper Squamish River Valley to Burrard Inlet as far back as 3000 years ago to sites such as DhRr 6, an ethnographically and archaeologically described village site.

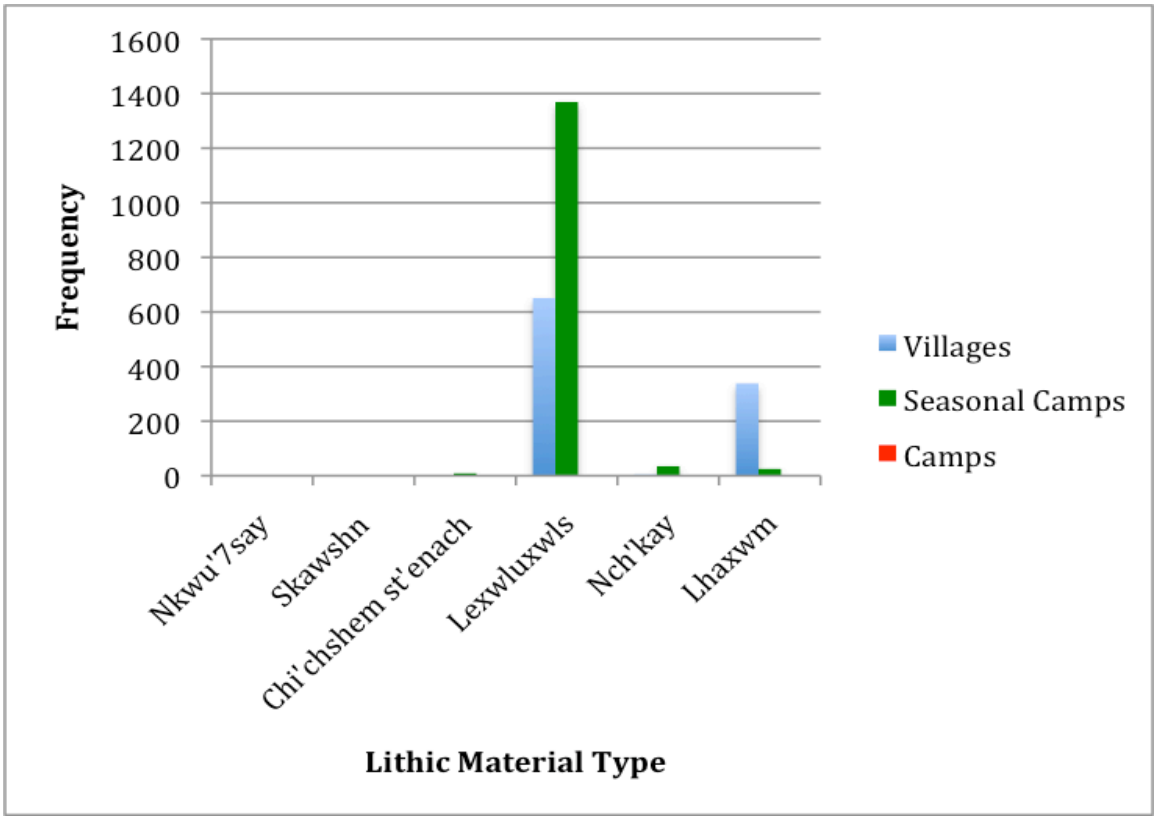


Figure 4.22: Visual assessment of the distribution of lithic materials in Burrard Inlet.

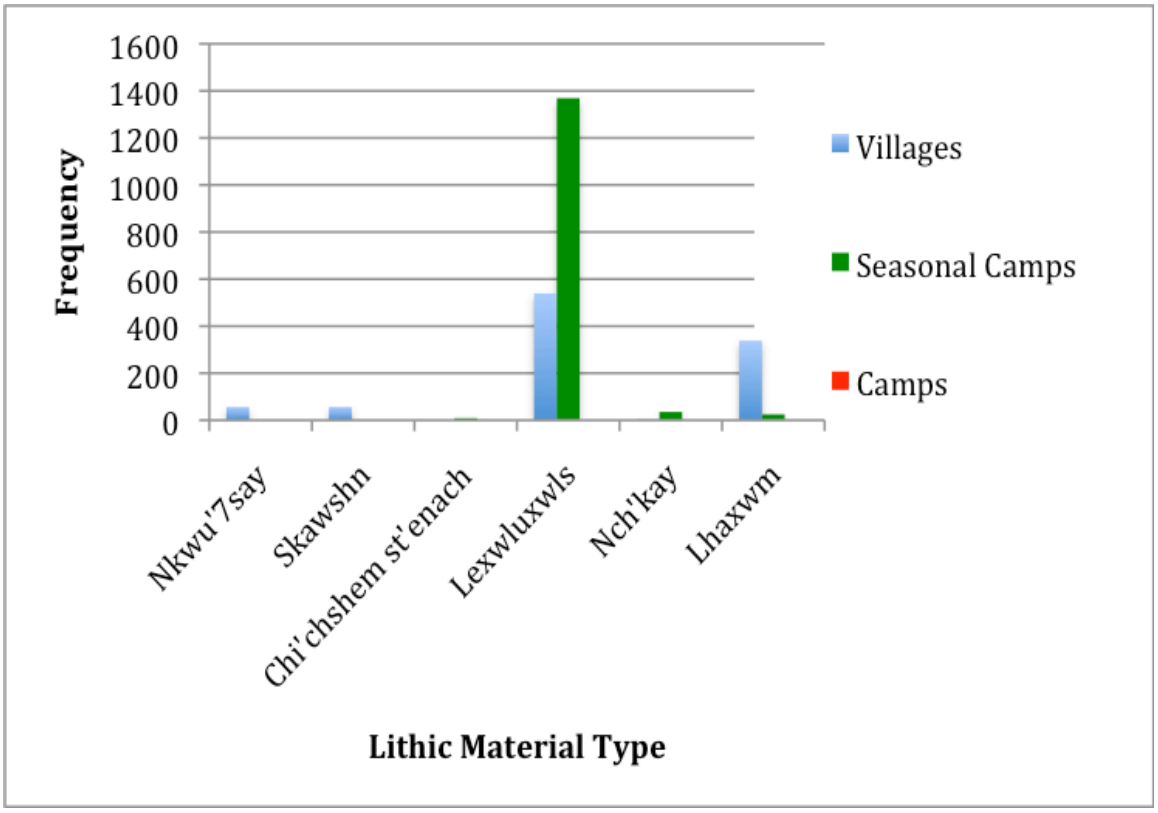


Figure 4.23: Correction of the distribution of lithic materials in Burrard Inlet using XRF results.

4.20 Spatial Distribution of Lithic Materials in Burrard Inlet

The distribution of lithic materials in Burrard Inlet is restricted to low-elevation village and seasonal campsites, reflecting the focus of academic research at these site types and along shorelines and river or creek mouths (Reimer 2003). Many of these sites have also been subject to various salvage projects initiated because of residential and industrial development (cf. ARCAS 1993). It is difficult to gauge the true spatial distributions of lithic materials in this region.

As in the Squamish River Valley and Howe Sound areas, those materials associated with Transformation tend to occur in the domestic contexts of villages and seasonal camps and are manifest as expedient tools or as heating/cooking implements. Interestingly, lithic materials associated with Mythical Beings also occur in substantial quantities in Burrard Inlet, reflecting a slightly different view and treatment of these materials (Figure 4.23). It is possible that the occurrence of *Nch'kay Smant* at villages and seasonal camps in Burrard Inlet is an indication of sharing this material at ceremonial events linked to establishing relations with the landscape and its resources. Due to its association with powerful beings, this material may have held high social capital with other visiting Coast Salish groups, who not only sought locally available resources in Burrard Inlet but also high status links to non-local exotic resources such as *Nch'kay' Smant*. I will discuss this further later in this and the next chapter.

The high occurrence of *Lhaxwm Smant* at a single site (DhRr 20) in Burrard Inlet (Lepofsky et al. 2006) is due to a unique factor of lithic sources in *Skwxwú7mesh Uxwumixw*. Whereas visual and chemical examination indicated that this material originates from *Lhaxwm Smant,* personal field and lab reassessment and one of its site investigators (Jessie Morin per comm. 2009) found that it actually comes from bedrock outcrop adjacent to DhRr 20. This outcrop is part of a widely distributed geological formation defined as the Gambier assemblage. Each individual outcrop of the Gambier assemblage possesses a similar visual appearance and geochemical signature to the

Lhaxwm Smant source (Cathie Hickson per comm. 2008). The remaining material occurring at seasonal camps in Burrard Inlet is visually and geochemically defined as actual *Lhaxwm Smant*.

4.21 Temporal Distribution of Lithic Materials in Burrard Inlet

Currently, the shorelines of Burrard Inlet have no archaeological sites dating to the *Sxwexwiyam* period (Figure 4.24). This is most likely due to early to mid-Holocene sea level fluctuations. Yet, a small number of undated campsites have been located along the shorelines and outlets of several large lakes on the north shore of Burrard Inlet. Wright (1996) hypothesized that those sites date to the early period of Northwest Coast archaeology. He based this claim on those sites' tool types, lithic materials and paleoenvironmental context. Thus, these sites have the potential to date to the *Sxwexwiyam* period.

Only two sites date to the *Xaay Xays* period in Burrard Inlet (DhRt 6 and DhRs 16) and both are seasonal camps (Figure 4.24). *Lexwlúxwls Smant* dominates the lithic assemblages from these sites. Only small amounts of lithic material associated with Mythical Beings are present. By the *Syets* period, all lithic materials occur throughout Burrard Inlet, with those materials associated with Transformation dominating most sites (Figure 4.24). Interestingly, the occurrence of *Nch'kay Smant* declines from the previous *Xaay Xays* period, whereas use of the local material appearing similar to *Lhaxwm Smant* increases (as discussed above at DhRr 20). At this time, we see the first occurrences of *Nkwu'7say, Skawshn* and *Chíchshem st'enàch Smant* in Burrard Inlet. The

dominance of materials associated with Transformation over those associated with Mythical Beings is an indication of increased sedentary settlement in Burrard Inlet during this period. However, the distribution of lithic materials in Burrard Inlet may be a simple reflection of research focused on seasonal camps and village sites, such as DhRt 5, DhRt 6, DhRs 16, DhRr 6, DhRr 18 and DhRr 20. Transformation materials are easier to access, are more abundant and used in everyday expedient tasks, such as woodworking and resource processing. By the *Syets* time period, there is a clear preference for lithic materials associated with Transformation occurring in domestic contexts. Archaeologists investigating sites in Burrard Inlet generally agree that they share cultural aspects of settlement patterns and resource use recorded in the ethnohistorical period (ARCAS 1993 and 1999; Coupland 1991; Charelton 1980; Lepofsky et al. 2007). Burrard Inlet has a total of at least 14 ethnographically recorded village sites and at least an equal number of seasonal camps (Bouchard and Kennedy 1986).

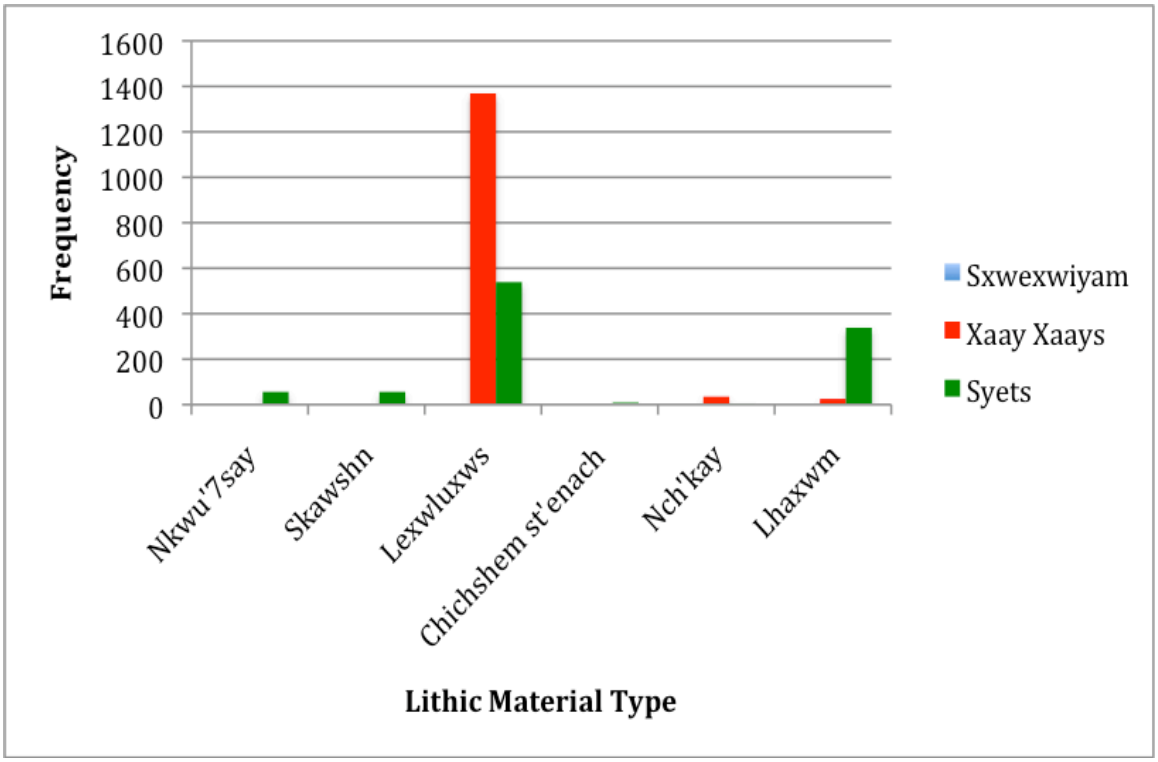


Figure 4.24: Temporal distribution of lithic materials in Burrard Inlet.

4.22 Chapter Summary

This chapter has focused on applying a standardized framework to combine both visual and XRF analysis to lithic materials from across *Skwxwú7mesh Uxwumixw*. I have shown that combining these approaches not only meshes well with *Skwxwú7mesh* knowledge of lithic sources and places of the landscape, but also paves the way for future studies in other areas.

Visual examination of both the source and individual artifacts outlines aspects of ancient *Skwxwú7mesh* cultural knowledge that link to how past people fashioned and used their implements. Combining this with XRF analysis allows for detailed mapping of their occurrence and distribution. The spatial and

temporal data presented here only begin to address the vast scope of work yet to be done.

The combined visual and chemical analyses of lithic materials from across *Skwxwú7mesh Uxwumixw* elucidate some patterns that I will discuss fully in the next chapter, focusing on how these spatial and temporal distributions might be interpreted through various anthropological, archaeological and Indigenous perspectives. I will explore how lithic materials associated with Transformation mesh well with socioeconomic models of Coast Salish organization, whereas those associated with Mythical Beings offer insight into aspects of Coast Salish ideology. I will also discuss how both groups of lithic materials offer understanding of the diversity of lithic material acquisition and technological orientation throughout *Skwxwú7mesh Uxwumixw* and beyond.

Chapter Five:

Discussion of Variable Perspectives of Lithic Landscapes

5.0 Introduction

Having presented Indigenous, archaeological and geological views on the occurrence and distribution of lithic materials from six different sources in 25 sites in *Skwxwú7mesh Uxwumixw,* I will now discuss my results in a regional context. Using these results, I will then move the dialogue from basic description to explanation through a number of theoretical perspectives, including cultural ecology, processual, sociocultural and Indigenous lenses. While my ultimate perspective favours an Indigenous stance, I do not mean to disregard other perspectives. I consider these perspectives as well, for I wish to illustrate that their deliberation offers nuances that bring Indigenous perspectives closer to the mainstream of Northwest Coast archaeology.

5.1 *Skwxwú7mesh Uxwumixw* Lithic Materials in a Regional Context

Through the 25 sites I used in this analysis, I have been able to address assemblages from a diversity of landscape contexts ranging from high-elevation quarries and camps, to mid-elevation rock shelters, river-valley and ocean-side seasonal camps and villages (Figures 5.1 and 5.2). In my fieldwork, I aimed to add to the number of recorded seasonal and temporary campsites in my study region, yet that proved challenging. Not only are there limited numbers of cultural materials typically present at these sites, but also it is also difficult to obtain 14C dates from them. Presently, village sites tend to dominate the archaeological

record of *Skwxwú7mesh Uxwumixw,* illustrating the need for data from other site types. Yet, the quality of data I have been able to compile during this research is substantial. It includes many areas and site types usually ignored by Northwest Coast archaeology, such as upriver sites and sites located in mid- to high-elevation contexts. Furthermore, I have added data from sites not usually included in academic publications or CRM consulting reports, such as oral history, place names, traditional knowledge and geochemical analysis.

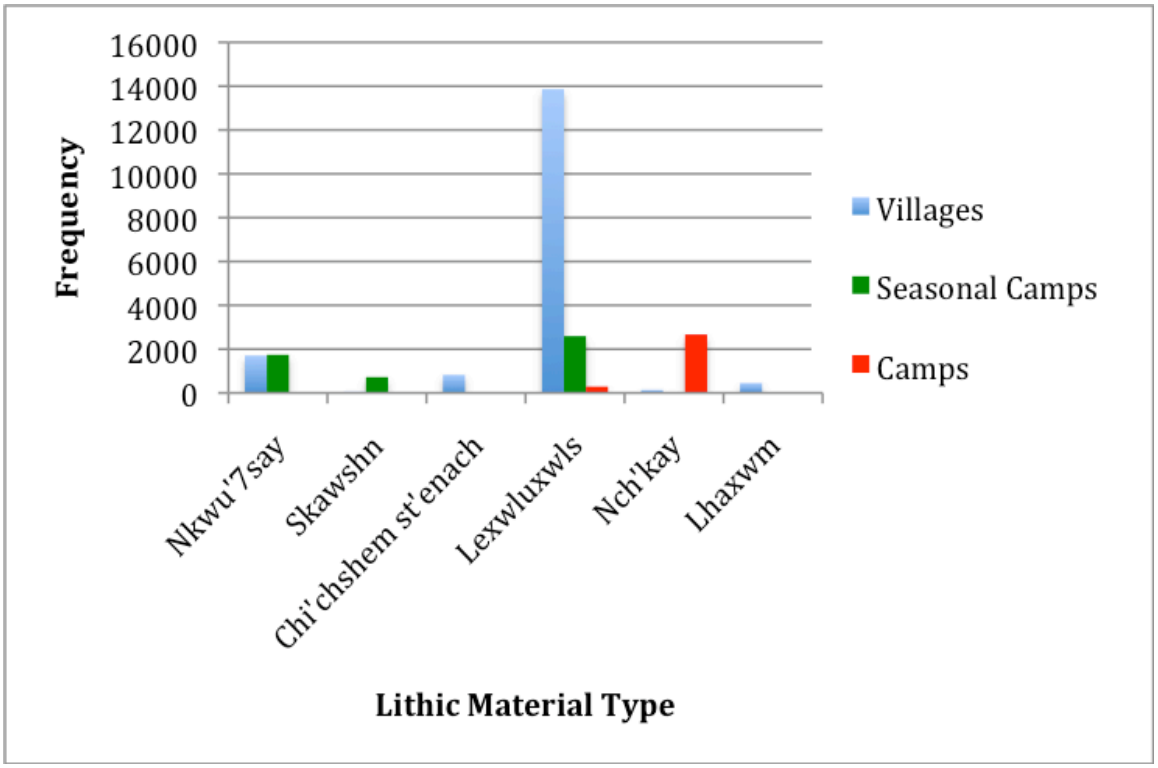


Figure 5.1: Spatial distribution of lithic materials throughout *Skwxwú7mesh Uxwumixw*.

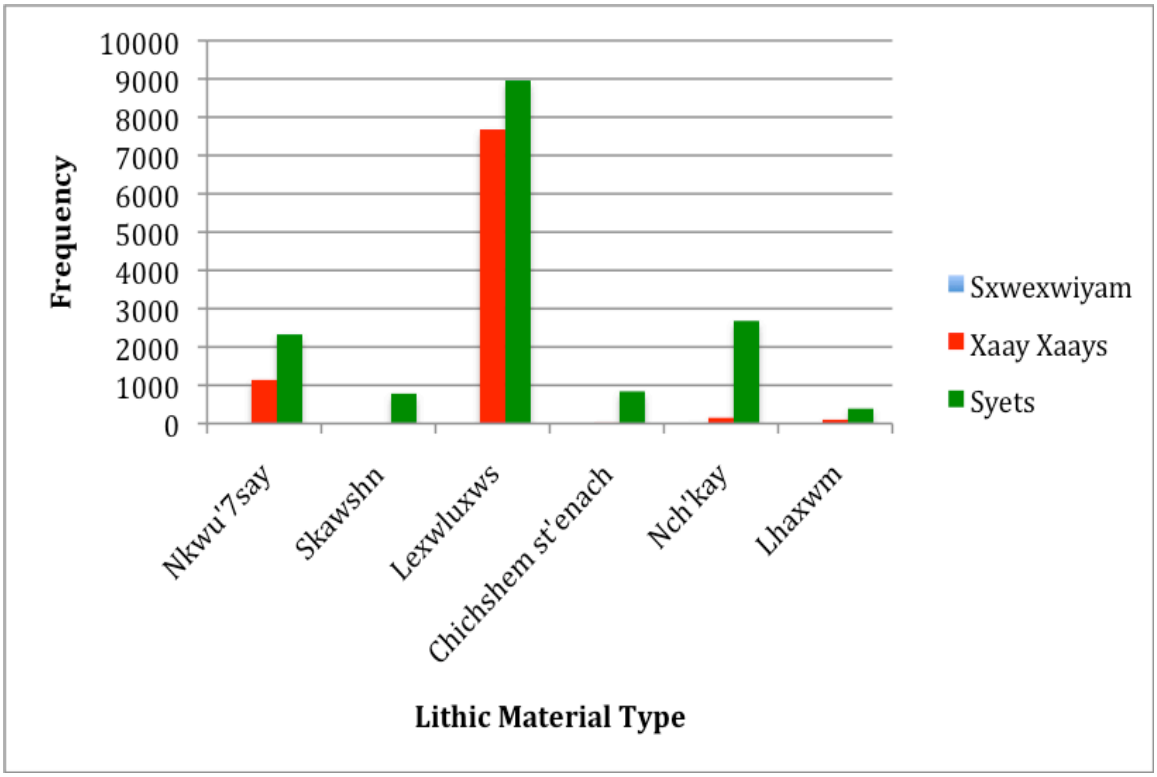


Figure 5.2: Temporal distribution of lithic materials throughout *Skwxwú7mesh Uxwumixw*.

The addition of data from temporary and seasonal camps from all areas in *Skwxwú7mesh Uxwumixw* would help to make my interpretations more robust. This will be the focus of future and on-going research. Clearly, additional sites from the *Sxwexwiyam* and *Xaay Xays* time periods are needed from all areas of *Skwxwú7mesh Uxwumixw*. For now, I will draw upon examples of current and previous research in areas adjacent to *Skwxwú7mesh Uxwumixw,* including *Sechelt, Sliammon, Musqueam, Katzie* and *Klallum* territories, where various lithic materials that originate in *Skwxwú7mesh Uxwumixw* have been identified.

Archaeological investigations in these areas have identified lithic materials exotic to those regions, notably *Nch'kay'* and *Lexwlúxwls Smants*. My discussion will focus on their occurrence and distribution outside of *Skwxwú7mesh Uxwumixw*.

Current research in Sechelt Territory (to the north of *Skwxwú7mesh Uxwumixw*) has focused on documenting ancestral villages and seasonal campsites linked to the ethnohistorical seasonal movement of Sechelt people from the head of Jervis Inlet (Deserted Bay and Vancouver Bay) to the area around the modern town of Sechelt, as documented by Homer Barnett (1955). Controlled excavations and site testing have occurred at eight sites (six villages and two seasonal camps), and each has yielded *Nch'kay' Smant* in quantities of fewer than a dozen pieces per 1 x 1 metre excavation unit (Peter Merchant, pers. comm. 2009).

Farther north, along the Sunshine Coast in Sliammon territory, *Nch'kay' Smant* occurs in small quantities, found in a series of test excavations around the modern town of Powell River (Dana Lepofsky, pers. comm. 2009). Also occurring in these sites' deposits are three other types of obsidian. One, previously called Unknown Central Coast B, is now attributable to a source, located at the headwaters of Kingcome Inlet. Part of the Mount Silverthorne volcanic complex, the still undocumented Unknown Central Coast A and C sources are likely located at the headwaters of Rivers and Knight Inlets. Materials from these sources make up substantial components of lithic assemblages in the Powell

River area, marking the northern extent of the distribution of *Nch'kay' Smant* (Carlson 1994; Lepofsky, pers. comm. 2009).

To the south is the well-known Marpole site in southern Vancouver, DgRs 1, where Charles Borden (1970) noted the likelihood of ancient plank houses. I documented (1998, 2000, 2003) a large quantity of *Nch'kay' Smant* in that site's assemblage. Several hundred pieces of this material occurred in a single 5 x 5 metre wide and 20-centimetre-deep layer at this site. I interpret this as a single depositional event, given that a range of tools, cores and variable sized flakes and debitage have been found in this context. If this deposit is a single depositional episode, I view it as being associated with *Skwxwú7mesh* people exchanging this lithic material for access to the Musqueam mouth of the Fraser River sockeye salmon fishery. Furthermore, ethnohistoric accounts found in Homer Barnett (1955:67-68) pointed out that sockeye salmon was not available in *Skwxwú7mesh Uxwumixw* waters and geologically the closest source of obsidian is *Nch'kay' Smant.* The high occurrence and density of this material at a centrally located seasonally resource rich site (Burley 1979, 1980:63-65) suggests that its use was in the context of a first salmon ceremony. This is a common cultural trait among Coast Salish groups to maintain access to resources not available in their home territory and reaffirm kinship ties (Suttles 1960).

Farther up the Fraser River, in Katzie territory, a series of mitigative excavations in the Pitt Meadows area have yielded dozens of pieces of *Nch'kay*

Smant, suggesting the possibility of a similar exchange of lithic material for access to vast field plots of wapato (Tanja Hoffmann, pers comm. 2009 and Simon Kaltenrider, pers comm. 2009). At the head of Harrison Lake, another mitigative excavation of a house pit village near the modern town of Port Douglas revealed the easternmost known occurrence of *Nch'kay' Smant*. Morgan Ritchie (2010:29, 70, 109, 110-111, 184) argues that because of ethnohistoric accounts (Hill-tout 1904: 316), this is a place where visiting groups paid tribute of material goods to the Chehalis for access to resources (i.e. salmon) in their territory. Further geochemical analysis of lithic materials along the Fraser River at sites such as Glenrose Cannery, DgRr 6 (Matson 1976) and St. Mungo, DgRr 2 (Ham et al. 1986) may add significant temporal depth to this picture of the uses of various lithic materials throughout the Coast Salish world.

The only geochemical research that has focused on non-obsidian materials in other areas of the southern Northwest Coast has an uneven history. Ed Bakewell (1991, 1993, 1998) and Bakewell and Irving (1994:29-37) made a case that the majority of lithic assemblages excavated in the San Juan Islands and Puget Sound (Stein 1992, 2003) are macroscopically, petrographically and chemically the same as *Lexwlúxwls Smant*. However, this research entailed little or no effort to identify any potential local sources. Currently, a University of Washington PhD student, Amanda Taylor, is investigating this issue by surveying for a possible alternative source location (Taylor, pers. comm. 2007). Other recent research on lithic materials from the Olympic Peninsula by Kim Kwarsick

(pers. comm. 2008) has identified over 40 pieces of *Lexwlúxwls Smant* in archaeological site assemblages, including a Clovis projectile point from Whidby Island (Kwarsick and Grier, pers. comm. 2009). These sites range from river valley bottom sites to high-elevation alpine camps. The materials analysis confirms previous geochemical research by Bakewell (1996).

Together, these studies exemplify standardized visual and chemical characterization of lithic materials by some Northwest Coast archaeologists. Their research contributes significantly to the study of seasonal movements, resource use and the fluctuations of cultural interaction in this region. This pattern is especially true since the number of sites under investigation is constantly growing on the southern Northwest Coast. Furthermore, academic archaeologists are beginning to appreciate the value and extent of previous archaeological research on lithic geochemistry done along the Northwest Coast (Carlson 1994, Fladmark 1984, Hobler 1983, Nelson 1975). These pioneering works provided a foundation that has allowed current studies, such as this dissertation, to begin to synthesize large data sets on a regional scale.

5.1 A Cultural Ecological Perspective

Through the cultural-ecological lens, explanation of the variable spatial occurrence of lithic materials throughout *Skwxwú7mesh Uxwumixw* is the result of *Skwxwú7mesh* people having seasonally abundant resources spread among the Squamish River Valley, Howe Sound and Burrard Inlet. This would result in locally available lithic materials having a limited distribution, as *Skwxwú7mesh*

people would not have to venture far for staple foods. However, in years of resource shortage occasional food shortfalls occurred. By accessing a neighbouring territory through kinship relations, *Skwxwú7mesh* people could make up for these periodic shortfalls.

In this perspective, lithic materials from sources within *Skwxwú7mesh Uxwumixw* hold economic value, as they were used for barter to access another Coast Salish group's resource base. Looking at the location of lithic sources and the distributions of those materials, we see lithic materials from the Squamish Valley and Howe Sound moving south into Burrard Inlet and beyond. Not surprisingly, this pattern fits with the ethnographically recorded seasonal round of *Skwxwú7mesh Uxwumixw* people (Barnett 1955; Suttles 1990; Thom 2009) (Figure 5.3). Ethnographically, people from villages in the Squamish River Valley and Howe Sound would congregate at *Sta'mis* for spring fishing, then move to Burrard Inlet villages for the summer to early fall months. In these movements, lithic materials would be brought from winter villages with additional material stockpiled from the *Nkwu'7say, Chíchshem st'enàch* and *Lexwlúxwls* sources and transported south by canoe for use at summer villages, seasonal and temporary camps and for trade with distant kin from southern Coast Salish groups. Transport of material from the *Nch'kay'* and *Lhaxwm* sources occurred, but in smaller amounts, because of the inaccessibility of these materials until the late summer months, when alpine snow had melted and northerly winds died down.

Archaeologically, we see this manifest as lithic materials from the *Nkwu'7say, Chíchshem st'enàch* and *Lexwlúxwls* sources (in the Squamish River Valley) appearing at villages and seasonal camps in Burrard Inlet. The spatial and temporal distributions of lithic materials documented throughout this dissertation seem to suggest that the ethnographically known and described pattern is of the seasonal movements of *Skwxwú7mesh Uxwumixw* people have been consistent for at least the past 4000 years.

While this is a pragmatic way of describing lithic material distributions at various points in the past, there is little room for discussion of social structure since this perspective is, for the most part, environmentally and economically determined. What cultural ecology ignores is the cultural meaning of lithic materials. It also imposes a Western view of the divide between culture and nature and does not fully account for an Indigenous understanding of social relations within and between Coast Salish groups. Therefore, while such models may serve as a useful starting point, as they can help account for the spatial distribution of lithic materials in *Skwxwú7mesh Uxwumixw* over time, they do not consider lithic material access and use.

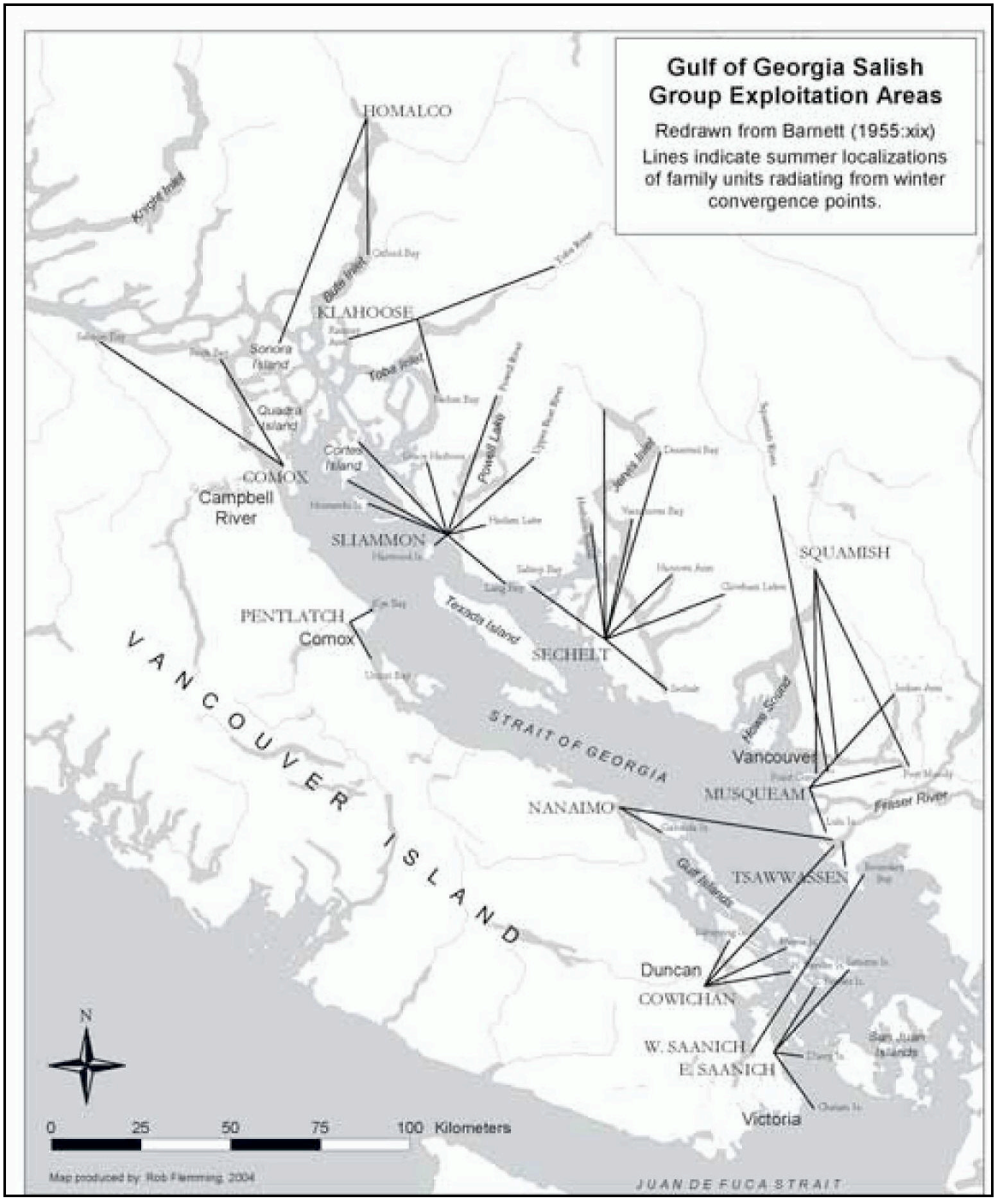


Figure 5.3: Coast Salish seasonal movements (from Thom 2009 adapted from D. Mitchell 1979).

5.2 Processual Perspective

Typical processual archaeology approaches in Northwest North America toward lithic materials are in Rousseau (1992) for the Plateau and N. Smith (2004) for the Northwest Coast. Each of these researchers considers lithic raw material properties within an optimal foraging framework in which access to sources and uses of materials determines the cost of energy. Energy in these models impacts the ease of access to a source and lithic materials and assumes they come only from outcrops close to a site (N. Smith 2004). The physical properties of lithic raw materials frequently include: material density, hardness, toughness (durability), resiliency and flakability (see Grieser and Sheets 1979:293-296 for definitions). A physical property of a tool stone determines the role any particular lithic raw material plays within a culture system. For example, the harder and more durable a lithic material is the more suited it is to the processing of hard contact materials (bone, antler or dense wood). These qualities make certain types of lithic materials more reliable and, thus, more highly sought after (Rousseau 1992).

Applying this perspective to lithic materials from *Skwxwú7mesh Uxwumixw* is at first easy and intuitive. For example, one would expect the easiest to access and most abundant material *Lexwlúxwls Smant,* to dominant archaeological assemblages, as it does. Yet, as discussed in Chapter Four, there are potential dichotomies in the scales of analysis when considering the use of multiple lithic sources. On the one hand, a macro-scale analysis of a lithic source offers insight

into the frequency and density of its use. Yet, there are often problems when considering multiple sources and the cultural meanings of each source. Physical access to a lithic source is not the only property that needs exploration when considering regional distributions. On the other hand, the analysis of hand samples is good for determining the role of certain lithic materials in individual or collective archaeological sites' technological organization but it ignores the cultural understanding of how those materials came to be. As also demonstrated in Chapter Four, visual characterization of lithic materials can serve as a useful starting point for mapping out where and when certain lithic types occur, but in focusing solely on the visual properties of a hand sample of lithic material, a processual approach cannot assign cultural value on any lithic material.

5.3 Social-Anthropological Perspectives

A cultural-anthropological or humanist approach would view the distribution of lithic materials within *Skwxwú7mesh Uxwumixw* as manifestations of the ways various *Skwxwú7mesh Uxwumixw* and Coast Salish family groups related to each other (Figure 5.4). From this perspective, the relationship between people and peoples determines social distance. The closer an individual or family is to a lithic source, the more likely they are to become an integral node of a larger network of lithic material distributions, as opposed to someone else originating from far away. People from a village with a nearby lithic source would have long-term historical ties to that place and possess a sense of its history and meaning. For a Coast Salish person to participate in this distribution system, they

would have to have a combination of kinship that linked them to places and an ancestral name from an established family, be a resident of that family's home village and provide an investment of labor to that family and village (Figure 5.4).

This approach is useful to archaeologists as it explains the accumulation of lithic materials over time in the places people interact the most—villages and seasonal campsites. From an archaeological perspective, it is possible to measure the scale of a village's social distance over time by tracing the occurrence of the lithic materials found closest to that village. That is, the extent of a lithic material's distribution would be an indication of how well the nearest village links with other villages and groups (that may or may not have had their own lithic source). This would be an archaeological measure of that village/family's *anchored radiance* as envisioned by J. Miller (1999) or the integrated inter-marriage network as described by Kennedy (2007). In these models, the larger a group's population base the larger the social network in which they would play a part. Further, the more social interaction a family had with people from other groups, the greater familiarity those people would have with each other's languages, leading to regionally focused social interaction.

While these models account for varying degrees of social interaction and include local ties to places and resources, they do not fully account for the specific nature of kinship in Coast Salish society. They do not include the details of Indigenous meaning and understanding of places, both at and away from home villages. They also lack a sense of antiquity that an archaeological

perspective brings to the examination of lithic distributions and regional interaction; they do not consider how lithic materials can be analyzed culturally and scientifically to trace their unique histories. Similar to rock art sites (Chippendale and Nash 2004), lithic material can also provide a degree of insight into past social and ideological meanings of place, but it carries meaning as a portable *piece of a place*.

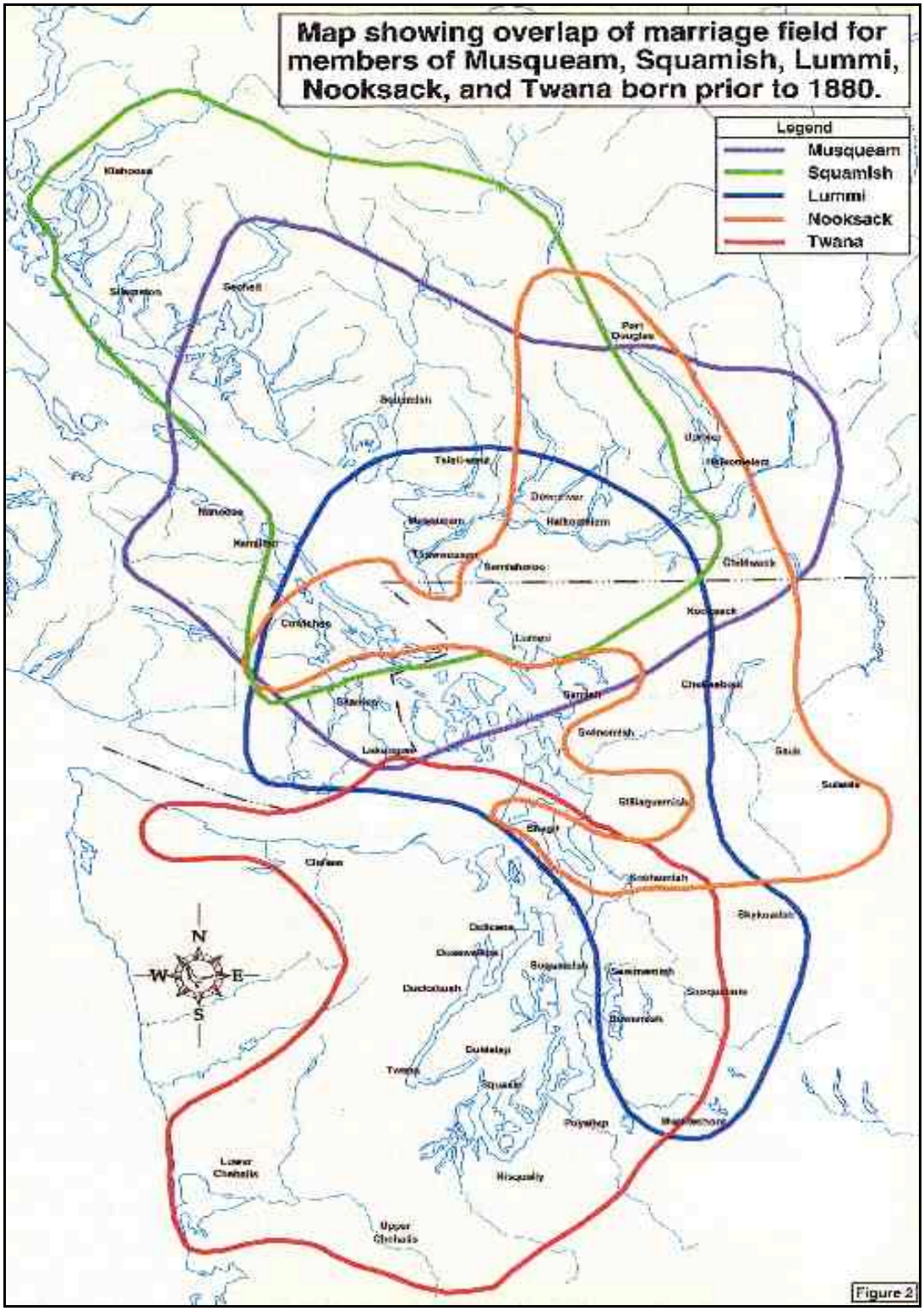


Figure 5.4: Ethnohistoric Coast Salish inter-marriage networks (from Kennedy 2000).

5.3 Indigenous Archaeology—the Interconnectedness of Ancestry, Generation, Substance, Memory and Land

In Chapter One and throughout this dissertation, I point out what is missing from discussions relating to the occurrence and distribution of lithic materials in the regional archaeological record. To help develop an Indigenous perspective of lithic sources and their distributions, I have approached integrating cultural and scientific data related to their place of origin and the nature of the archaeological sites in which they occur in a holistic way. To begin presenting an Indigenous understanding of these phenomena, I will draw upon concepts developed by Tim Ingold (2000), including ancestry, generation, substance, memory and land. Each of these conceptual terms is useful to help explain the "meshwork" of Indigenous understanding of meaning in lithic materials and their distributions. These terms can also help explain what is missing from North American perspectives in anthropology and archaeology. In an Indigenous perspective, the focus is on the interconnectedness of culture and nature, things and places, the natural and the supernatural, the personal and the cultural (Figure 1.1).

For Indigenous peoples, acknowledging these connections sustains the relations between the domestic, natural and supernatural worlds (Reimer 2007). As an example, the ancestors of the modern-day *Skwxwú7mesh Uxwumixw* people used lithic materials associated with Mythical Beings and Transformation as a means to communicate socially with their immediate kin, their extended relations in different villages, at seasonal and temporary camps and ultimately different Coast Salish groups. In maintaining such ties, they are "of" that place,

but they also link themselves to other places, becoming part of the long-term regional history, thus connected to broader physical, spiritual and social landscapes.

Individual *Skwxwú7mesh Uxwumixw* people draw our ancestry from the places our parents lived, we are "of" places, not "from" them. Thus, when I began this dissertation in the Squamish language I followed that protocol to explain to you who I am, and from this you can determine how we are related. I pointed out that my ancestry is from two *Skwxwú7mesh Uxwumixw* villages, *Chi'yakmesh* and *Sen'a'kw*. If I had lived thousands of years in the past I would have been "of" those places and been entitled to access places and resources around them for everyday domestic uses and spiritual purposes. By having ancestry in these places, I could choose to live at either place during the various seasons of the year, typically in the Squamish River Valley in the fall and winter and in Burrard Inlet during the spring and summer. I argue that lithic sources were locales to which access restrictions would apply and ancestral rights would be invoked in order to access and use them. Thus, my family would have access to *Nch'kay, Lexwlúxwls* and *Lhaxwm Smant* sources of material. I have summarized the names, translations, locations and associated lithic sources for each known *Skwxwú7mesh Uxwumixw* village in Table 5.1.

When we examine the meaning and history associated with lithic source locations, we must look to the people of the closest *Skwxwú7mesh Uxwumixw* villages who possessed ancestral ties to the sources, because they were "of"

those places. They can draw upon memories regarding the numerous generations who used the substances (in this case lithic material sources) around that place, forming taskscapes (Ingold 2000:190, 194-200). These traditional ways of knowing and associating one's position within the local context allows individuals to know their place in relation to other people and peoples and to the natural and supernatural beings around them. Thus, these meanings and histories are embedded in lithic materials, as they are *pieces of places* important to *Skwxwú7mesh Uxwumixw* long-term history.

On a family or village scale, *Skwxwú7mesh Uxwumixw* people are descended from their direct ancestors (parents, aunts, uncles, grandparents, etc.) through ancestors far back in time who, in turn, are tied to the First People of the *Skwxwú7mesh Uxwumixw* or other early people who were transformed into mountains, rocks, plants and animals. These ancestors interacted with one another through inter-marriage, but also had many supernatural encounters that can broaden our concept of ancestry. This is how we are all related and how we know and understand our territory (Reimer 2009). Through this way of knowing, we identify with lithic sources, the materials derived form them, and how they associate with individual people, families and villages. Therefore, overall archaeological distributions of these materials are not only indications of long-term historical use and occupation of a territory, but they can also inform us about how those people, families and villages associated with each other and with people outside of their immediate kinship group.

Yet, not everyone in a family or village could access places and resources associated with the ancient events in *Skwxwú7mesh Uxwumixw* history. One must draw upon memories of how one relates to these substances or know of the essences of places and resources. This knowledge, handed down through rituals, occurs in *Ust'am* ceremonies or during spiritual and physical training (see Chapter One). Thus, where and how people are tied to landscape partially determines when and why they can access certain places and resources.

Now that I have outlined the relationships of ancestry, generation, substance, memory and land from a *Skwxwú7mesh Uxwumixw* Indigenous perspective, you, the reader, can begin to understand and acknowledge the interconnectedness of such a worldview. I will now develop this discussion by showing how lithic materials fit into the Transformation–Domestic Spaces and Mythical Beings–Wild Spaces associations. Table 5.2 presents a summary of how the forms of *Skwxwú7mesh Uxwumixw* history are associated with the realms of Transformation and Mythical Beings.

The ancestors of the *Skwxwú7mesh Uxwumixw* acknowledged these connections and utilized lithic materials from sources in specific ways: those associated with Transformation tend to occur mostly in domestic contexts, whereas those associated with Mythical Beings occur mostly in non-domestic contexts. As I will discuss in more detail in the following sections, whether lithic materials were associated with Transformation or with Mythical Beings determined what role those materials played in maintaining *Skwxwú7mesh*

Uxwumixw and Coast Salish social relations between people and peoples and people(s) and places. Following each discussion, I provide a short story summarizing the cultural meaning and role of a lithic source in *Skwxwú7mesh Uxwumixw* associated with either Mythical Beings or Transformation.

Table 5.1: *Skwxwú7mesh Uxwumixw* villages and associated lithic sources.

Skwxwú7mesh Uxwumixw Village	**Translation**	**Location**	**Associated Lithic Source**
P'uy'am	Blackened from smoke	Elaho River to Turbid Creek	Nkwu'7say
Ch'ékch'eks	Dirty mouth	Chuck-Chuck and Shovelnose Creeks	Nkwu'7say
Yelhi'xw		Ashlu River	Skawshn
Skawshn	Foot descending	High Falls Creek	Skawshn
Xwakw'a'yak'in	Furthest upriver	Squamish River Valley	Skawshn
Yekw'ts	Upstream side from mouth	Squamish River Valley	Skawshn
Chi'yakmesh	Fish weir place	Cheakamus River Valley	Nch'kay'
Pukway'u'sm	Having a moldy face	Squamish-Cheakamus Confluence	Nch'kay'
Skemi'n	Underground house	Squamish-Cheakamus Confluence	Nch'kay'
Wiwk'm	Open Mouth		Chíchshem st'enàch
Siyích'm	Already full	Squamish River Valley	Chíchshem st'enàch
Kaw'ti'n'			Chíchshem st'enàch
Sta'mis		Head of Howe Sound	Lexwlúxwls/ Nch'kay'/ Chíchshem st'enàch
Tsi'tsusm	Potlatch Village	Potlatch Creek	Lexwlúxwls/ Lhaxwm
K'i'k'elxn	Little Fort	Port Mellon	Lexwlúxwls/ Lhaxwm
Schen'k	To Keep Steady	Gibsons	Lexwlúxwls/ Lhaxwm
Ch'kw'elhp		Gibsons	Lexwlúxwls/ Lhaxwm
Ch'axa'y	Sizzling Noise	Horseshoe Bay	Lexwlúxwls/ Lhaxwm
Xwmelch'stn	Fish Rolling	Mouth of the Capilano River	Lexwlúxwls/ Lhaxwm
Slha7an'	Head of the Bay		Lexwlúxwls/ Lhaxwm
Xa'7elcha	Creek	Lynn Creek	Lexwlúxwls/ Lhaxwm
St'itsma	Little River/Good Fishing Spot	Seymour River	Lexwlúxwls/ Lhaxwm
			Lexwlúxwls/ Lhaxwm
Temtemi'xwtn	Lots of Land Place	Belcarra Park	Lexwlúxwls/ Lhaxwm
A'tsennach	Bay	North Shore of Burrard Inlet	Lexwlúxwls/ Lhaxwm
Kna-nah-moot	Appeared out of the creek	New Brighton Park	Lexwlúxwls/ Lhaxwm
Xway'xway	Mask Place	Stanley Park	Lexwlúxwls/ Lhaxwm
Sen'a'kw	Inside Village	Granville Island	Lexwlúxwls/ Lhaxwm
Skw'a'yus	Village	Yew Street Vancouver	Lexwlúxwls/ Lhaxwm
Iy'a'l'mexw	Good Land	Jericho Beach	Lexwlúxwls/ Lhaxwm

Table 5.2: How *Skwxwú7mesh Uxwumixw* history relates to realms of existence.

Form of History	Realms	
	Transformation	Mythical Beings
Sxwexwiyam		X
Xaay Xays	XX	
Syets	X	

5.3 Lithic Materials as a Way to Relate to Mythical Beings and the Spirit World

As demonstrated elsewhere in this dissertation, lithic materials from difficult-to-access sources are associated with Mythical Beings. These sources are places where Mythical Beings dwelt, notably *In7iny'a'xe7en* (Thunderbird) on the dominant mountain peaks of *T'ak't'ak mu'y'in tl'a in7iny'a'xe7en* (Black Tusk), *Nch'kay* (Mount Garibaldi) and *Sxel'tskwu'7* (Mount Cayley) for *Nch'kay Smant* (Figures 5.5 to 5.7) and the *Smàýlilh* (Wild People) and *Elkay* (Sea Serpents) on the steep-sided slopes of *Lhaxwm Smant* (Figure 2.7). These areas were not accessible to everyone, since reaching them required years of physical training, spiritual training and family-specific local knowledge. Going to these places signaled that one was able to move beyond the corporeal realm into the ethereal and successfully interact with the beings that dwelt there. Knowing how to move from the everyday domestic realm into the supernatural world meant that one had Transformed from a regular human being in the real world that is known and predictable to an altered being faced with the unknown and unexpected. People who could do this drew their ancestry from ancient *Sxwexwiyam* times, back to

the times of the First People, who lived in a world where people, animals, plants and the earth could speak to each other.

Figure 5.5: ***T'ak̲'t'ak̲ mu'y'in tl'a in7iny'a'xe7en*** **(Black Tusk).**

Figure 5.6: *Nch'kay* (Mount Garibaldi).

Figure 5.7: *Sxel'tskwu'7* (Mount Cayley).

In every generation, only a small number of people gained such physical and spiritual strength, making visits to the *Nch'kay'* and *Lhaxwm Smant* sources even more infrequent. During the *Xaay Xays* and *Syets* time periods, social interaction with the mythical realm increased. Over the same time, ancestors of the *Skwxwú7mesh Uxwumixw* became heavily engaged in the regional Coast Salish social network evidenced by the dramatic increase in the occurrence and distribution of lithic materials associated with Mythical Beings, notably *Nch'kay' Smant* (Reimer 2000, 2003, 2005, 2009). Through Witnessing, both social and

spiritual interactions link people together, providing a widespread customary sense of history and meaning of places.

Yet, those who did access these places brought back the substance or essence of those places. Lithic materials associated with the qualities of *Sxwexwiyam* history serve as a sign that one had removed oneself from the real world and into the supernatural. People who could do this were the mediators between the domestic and wild spaces. They were not only able to access a Wild Place; they were able to bring something back from it. The occurrence of mythical materials in the archaeological record is a sign of someone who had a supernatural presence and power. Acknowledgment of the presence of these lithic materials was a consistent recollection and reaffirmation of a known and shared ancient history, buried deep in collective memory. Contacting Mythical Beings through physical and spiritual training, the *Skwxwú7mesh Uxwumixw* ancestors maintained long-term social and ideological ties to these beings and their dwelling places.

Those who earned access to these sources brought materials back to their home villages and kin, where the *pieces of places* served as objects with agency. Witnesses were made aware of the ties that those people had with powerful places, rooting their ancestry deep in time. Control of material associated with Mythical Beings allowed some individuals to control access to resources through supernatural control. By extension, they were also able to control people and govern relations between groups because of the supernatural associations of

these materials. By moving these materials (and their essence) from their source, these individuals could expand their influence outward to other villages and more distant kin in the Coast Salish world.

My examination of the spatial and temporal occurrence of lithic materials associated with Mythical Beings in the regional archaeological record shows an irregular occurrence. These materials have different life histories than other lithic materials that were not meant for specialized production (i.e. mass production of bifaces or blades). They have distinct depositional trajectories ending up as small concentrations at villages, seasonal camps and rock shelters and are also associated with burials.

The significance of villages lies in their status as social hubs, where the greatest degree of social interaction with people from other *Skwxwú7mesh Uxwumixw* villages and Coast Salish groups took place (though this did not preclude interaction at seasonal and temporary camps). If large-scale excavations were to take place at similar large villages, I suspect excavators would find large quantities of *Nch'kay' Smant*. A village, geographically and socially linked to a source, would have an abundance of material (raw and prepared cores, tools and debitage) within its deposits. Others not associated with a source or being of a different Coast Salish group, however, would have significantly less material (only finished or recycled tools and small amounts of debitage) (Table 5.2). At fall-winter villages with close links to a lithic source, I propose that people utilized their lithic materials in ritual contexts. During ritual

events and larger-scale potlatches, use of lithic materials from *Nch'kay'* and *Lhaxwm Smant* reenacted for Witnesses an individual's encounters with Mythical Beings, which legitimized ancestral ties, linked people over numerous generations and confirmed continued access to resources.

Typically found only at temporary camps near their sources, both *Nch'kay'* and *Lhaxwm Smant* occur as roughly hewn nodules, made ready to transport back to a home village. In seasonal camps and villages, they do appear as parts of formal tools (bifaces, projectile points, microblades), but in low numbers or as reduction/recycling of formal tools (biface thinning flakes, pressure flakes). I attribute this treatment of lithic material to the actions of people taking pieces of it away from the non-corporeal, difficult-to-access world into the everyday physical world. Considering these factors, I believe the occurrence of these materials is the result of ritual display and discard during and after winter ceremonial gatherings. Confirming this would require careful recording of the occurrence of these materials at village sites throughout the southern Northwest Coast region. Further evidence of differential use and deposition occurs in several burials along the southern Northwest Coast. Interments at DhRw 199 and DhRw 204 on Gabriola Island (Curtin 1998), DgRw 4 or the False Narrows site near Nanaimo (Burley 1989) and DiSe 7 (Hickcock et al. 2010) contain *Nch'kay' Smant* implements (microblades and flake tools) in close association with red ochre and quartz crystal fragments, suggesting that these interments are shamanic. At other notable sites, such as the well-known but under-analyzed Marpole midden, DhRs

1 and *Sta'mis* at the head of Howe Sound, DkRs 6, large quantities of *Nch'kay'* Smant have been recovered (ARCAS 1999a; Reimer 1998, 2006). This unusually large amount of *Nch'kay' Smant* so far away from its source may represent intentional stockpiling of this material for use in a winter potlatch or ceremonial event.

5.4 *In7inyaxa7en Smant* (Thunderbird Stone)

Yumks sat near the fire inside the longhouse. It burned brightly from the well-dried and cut wood just placed in it. The sounds of the *In7inyaxa7en* song beat throughout the entire house, shaking it as the drums and voices rose in unison. He had forgotten the power of his family and people.

He had recently returned from many years out in the wilderness. He had been in several *Kwa kwayx welh-aynexws* (wild spirit places) during his *Payakentsut* (warrior training), training both physically and spiritually and gaining insight into the properties of many things throughout the territory. When he had first left his home village, he had to get used to surviving on his own; finding food and shelter eventually became easier as the months passed. First, he had traversed upriver and along a number of smaller tributaries and then upslope into an area that had few trees but dense, low-lying vegetation. His travels eventually took him up and over mountain ranges past lakes, waterfalls and glaciers. During his travels in this mountainous terrain, he found something, and only now was he ready to share it with his kin. Upon his discovery in the high country, many days travel from his home village, he felt a sense of the ancient history embedded in

the landscape. Yet, one place stood out from the others, a place where the great *In7inyaxa7en* lightning had hit the earth.

During battles with evil beings attempting to harm the *Skwxwú7mesh* people, *In7inyaxa7en* could shoot lightning from its eyes. The place where he had found the rock—black-green-grey in colour with small white inclusions and incredibly sharp when worked—was such a place. The rock was at the bottom of a great split in the earth with no vegetation around it. It was a place where *In7inyaxa7en* had done battle.

Eventually, Yumks decided to return to his home village, but first he went and collected some *In7inyaxa7en* rock. He had a strong belief that his spiritual training and knowledge of place would prevent *In7inyaxa7en* from attacking him for removing a collection of stones. It was the reaction of his people when he brought these rocks back to his village that he questioned. This made him feel unsure; it had been years since he had been in contact with anyone. During his years of training, small groups of hunters had spotted him. Quick reactions and intimate knowledge of the mountainous landscape allowed him to elude them, since contact would endanger his spiritual training.

Travelling back in the direction of his home village, he began to see signs of human activity: rock shelters with paintings, hunting and fishing camps, trees with either their bark or planks of wood collected from them. At one point, a young family spotted him from across the river and the people ran, possibly believing that he was a *Smàýlilh* (Wild Person). This added to his unease. He

realized that his hair was very long, his body physically fit; his lack of human smell and failure to speak likely contributed to the young family's fear. He stopped, bathed in a nearby creek, cut and tied his hair back, quickly carved a walking stick and arranged his shoulder pack. He was becoming human again.

When he had arrived at his home village, people came out of the long houses to see what the commotion was. His family was happy to see him. Some others were shocked while still others were apprehensive. Some thought he had perished; others did not even know him since they were too young to recall his presence. The village leaders asked him about his experiences, and he replied that he would share his teachings with the people and their lives would become better.

As Yumks worked the rock beside the fire inside the long house, the light glinted off its keen edges, catching the eyes of all inside. The light from the fire made it shine and flash like lightening. It now came to their realization; the power of *In7inyaxa7en*, safely brought to them, was now in their presence. It would protect them, help them and, in so doing, increase their collective power among other groups. *In7inyaxa7en* had provided the *Skwxwú7mesh Uxwumixw* people with a great gift.

5.5 Lithic Materials as a Way to Transform the World

Four of the six lithic sources presented in this study are linked with Transformation: *Nkwu'7say Smant, Skawshn Smant, Chíchshem st'enàch Smant* and *Lexwlúxwls Smant*. While they are linked with the power of the *Xaay Xays*

brothers and powerful ancestors, these sources would have been accessible to almost everyone and, thus, linked with going about certain types of day-to-day activities. These materials also carried with them the lessons associated with the acts of Transformation. For the various sources throughout *Skwxwú7mesh Uxwumixw,* I will provide examples of how their meanings are associated with aspects of resource procurement and processing.

The place of *Nkwu'7say Smant* has a prominent position within the larger history of Transformation. When the four *Xaay Xays* brothers were near the end of their travels throughout *Skwxwú7mesh Uxwumixw,* they decided to teach the people of *Skwxwú7mesh Uxwumixw* how to properly treat the salmon people. Their lessons to the *Skwxwú7mesh* people included when and where they could fish for each species and how to process the bones and flesh of the salmon people. If they did it properly and with respect, the salmon people would always return to *Skwxwú7mesh Uxwumixw* waters. Accordingly, this place is held in high esteem by the *Skwxwú7mesh* as it links the land, in this case a lithic source, with cultural lessons on how to maintain the health and abundance of salmon runs in the Squamish River system.

People who drew their ancestry from the nearby villages of *P'uy'am* and *Ch'ékch'eks* could readily access this lithic source. For hundreds of generations, these people used this material in the fall and winter for the day-to-day harvesting and processing of salmon from the Squamish River. In the spring and summer months, the people of these upriver villages travelled south to Burrard Inlet and

took material from *Nkwu'7say Smant* with them. Use of this material in fall and winter at upriver villages carried the memory of the Transformation events related to salmon (spawning, hatching, leaving the river and eventually returning, harvest and change via proper processing and cooking). Brought to different places of *Skwxwú7mesh Temixw* throughout Burrard Inlet and beyond in the spring and summer, these events became shared history.

The *Skawshn Smant* is associated with a different form of transformation from other sources that relate to the travels of the *Xaay Xays* through *Skwxwú7mesh Uxwumixw*. Known as the location of a very old village, it is aptly described as "being soft under foot" due to the constantly changing channels of the Squamish River and High Falls Creek (Bouchard and Kennedy 1986). This place relates to the Transformations from life to death, of the *temixw,* or beings, that come out of it, including cedar. Inhabitants of this village drew their ancestry from the burial ground close to their village. Their ancestors had Transformed over numerous generations into the area's surrounding rock and earth and stands of large old-growth cedar trees. These materials made people of this village famous. They used the stone and cedar to carve long river canoes, transporting large amounts of goods up and down the Squamish River system. For the people of this village, the traditional teachings associated with the proper carving of cedar were particularly prevalent; treating the wood with reverence and respect was due to the belief that the ancestor/wood and not the carver determined what the piece of wood would be made into.

These long-term memories embedded in the landscape tied the people of this village closely to the surrounding land. The close associations between local ancient ancestry and the *temixw* explain why lithic material from *Skawshn Smant* occurs only sparsely in the regional archaeological record. This lithic material is meant to perform specific work, carving wood of shared ancestry from its place of origin, it did not travel far from its source.

The *Chíchshem st'enàch Smant* source is associated with a different form of Transformation; one related to heat and change that has two different cultural manifestations. The location of this source of lithic material relates to a large area used for physical and spiritual training but also the changing of qualities of foods by cooking. In the *Sxwexwiyam* period, the *Skwxwú7mesh* people experienced an event when the earth burned. Our oral history links the eruptive history of this place with the lava flow that emerged from the Opal Cone approximately 10,000 years ago. This material is thus associated with heat and changing the world. Since the lava flow cascaded down the Ring Creek Valley, hundreds of generations have used this material as part of both physical and spiritual training (in sweat lodges and as body anchor stones in lakes and streams). The material also holds heat extremely well for cooking purposes. Artifacts of this material occurring away from villages and seasonal camps thus mark places where men engaged in physical and spiritual training, whereas at villages and seasonal camps women used this material as cooking stones. Archaeological distributions of this material indicate that it is more strongly associated with domestic contexts

of villages and seasonal camps than young men's wilderness training for physical and spiritual power.

The *Lexwlúxwls Smant* source has a prominent place in the larger history of the travels of the *Xaay Xays* brothers and their acts of Transformation. It is a place almost in the middle of *Skwxwú7mesh Uxwumixw* that everyone would have seen and travelled by at some point in their life. The memories of what the *Xaay Xays* brothers did to a group of *Lexwlúxwls* people at this location are powerful reminders of fundamental *Skwxwú7mesh* teachings: be friendly and humble when meeting new people, eat foods that are not taboo and work hard every day for your family and community. Not following these teachings would result in people being turned into to stone, forever remembered for the wrong things.

People from the numerous villages in Howe Sound and Burrard Inlet had a shared ancestry, allowing them to access this lithic source on a regular basis. This pattern is evident for hundreds of generations of *Skwxwú7mesh Uxwumixw* people, since this material has dominated lithic assemblages throughout these areas for the past 5000 years. Material from the *Lexwlúxwls Smant* source was both abundant and easily accessed. It appears at numerous sites and site types (villages and seasonal and temporary camps) throughout the Squamish River Valley, Howe Sound and Burrard Inlet. Accessing this source would have occurred first in the spring and summer by people from villages close by. These materials then moved in the fall and winter to other village locations within

Skwxwú7mesh Uxwumixw. Eventually, through the interactions with other people over a number of seasons this material moved beyond *Skwxwú7mesh Uxwumixw*.

This pattern continues farther south to the Fraser River and Puget Sound areas (Bakewell 1996). As discussed in Chapter Four, Kwarsick (2008) sampled and analyzed lithic materials from several archaeological sites in Olympic National Park in Washington State and found that almost all the lithic materials present at those sites originate from *Lexwlúxwls Smant*. These sites are seasonal and temporary camps ranging from river valley localities up to high-elevation sites in the Olympic Mountains (Kwarsick 2008) and span the past 12,000 years.

5.6 Teachings at *Lexwlúxwls*

At the village of *Sta'mis*, Cha-nult roughly shook his nephew Dha-muck awake. It was early in the morning; the sun was just beginning to bring its first light to the land on a cool spring day. The last of the past winter's snow was melting, and the remaining stores of food gathered last year were almost gone. Dah-muck was in his teens, spending more time with his extended family than his parents and siblings, learning the proper "*Skwxwú7mesh* ways to do things" from his uncles and older male cousins. He rose, stretched his sore muscles and noticed he was very hungry and still tired. His uncle Cha-nult told him to hurry up and threw him a piece of smoke-dried fish as they left their house.

They walked down to the beach, followed by the village dogs, eventually reaching his uncle's dugout cedar canoe. Dah-muck wondered if they would be

going upriver to check if the spring salmon were running. He asked his uncle this; his uncle replied that it was too early yet. His uncle told him the first time to fish would soon come—they had to wait for the butterflies to arrive. *Skwxwú7mesh* people allowed the first run of spring salmon to run its course. This was the *Skwxwú7mesh* way of showing respect to the salmon people, since the first run of salmon cleared and prepared the way for other salmon.

Dah-muck and his uncle Cha-nult paddled south; it was easy going since the tide was slack and the outflow of the Squamish River pushed them southward, yet they had to tack the current to keep from going too far west. Dah-muck wondered where they were going: to troll for rockfish? Hunt birds? Or would they go ashore and hunt deer? Yet, his uncle told him to paddle toward a large and imposing rock bluff on the east side of the bay south of their village.

Dah-muck had looked at this place from a distance a number of times. In his youth, the village elders had told him that if he did not behave and eat the food given to him he would end up as the stone bluff that marked this place. As they approached, his uncle told him to stop paddling. He told him this was a place where the *Xaay Xays* used their power. Dah-muck knew that the *Xaay Xays* were four brothers that were sent by the Creator to “set the world right” and could change people into stone, plants or animals. His uncle told him that this was the place where the *Xaay Xays* used their power on some *Lexwlúxwls*. Dah-muck had only once before heard of the *Lexwlúxwls*. They were the northern neighbours of the *Skwxwú7mesh* people, and they had different “ways of doing.”

His uncle continued the history by saying that the *Lexwlúxwls* had travelled far over to Vancouver Island, where they traded things from their territory to their distant kin on the islands. On their return visit, they became very tired and decided to stop at this spot. They were also very hungry and ate a starfish—a taboo animal to *Skwxwú7mesh* people—off the rocks at low tide. This made the *Lexwlúxwls* drowsy, and they eventually fell asleep on the rocks and their canoe drifted away. It was at this time the *Xaay Xays* paddled by and spotted the *Lexwlúxwls* sleeping on the rocks with the tide coming up. They woke the *Lexwlúxwls* up and asked them why they were there, so far away from their home *temixw*. They responded they were tired and only wanted to sleep and be left alone. The *Xaay Xays* responded, “You cannot stay here!” The Lexwlúxwls did not listen, so the *Xaay Xays* turned them into stone. This stone is now the rock bluff they looked at.

The rock bluff was ominous and tall, with parts of its spires looming dangerously over the water and their canoe as they paddled closer. It was black in colour, and to Dah-muck resembled the large post pillars inside their house, but parts of it curved or bent sideways. His uncle told him that this was where their people came to get *smant*, rock used to make the tools they used every day. Dah-muck had always wondered where some of his older cousins got the stone they worked in numerous ways behind their village. He was amazed at how they could shape this material by hitting it and not carving it like his other upriver relatives did.

His uncle showed him how to hew the rock off the bluff face and then handed him the stone hammer he used to gather large nodules of the glassy sharp rock. Dah-muck struck the rock with all his force; a large piece fell off and hit the side of his uncle's canoe before falling into the water. His uncle scolded him for being greedy and not thinking things through before acting. He tried again, and a smaller piece, similar to the one his uncle had hewn, came off the rock bluff into the canoe with no damage. His uncle told him to keep working until the canoe was full of rock. He told him they would use it when they went to visit their relations to the south. They would be happy to see them and use the rock that reminded them all of good work ethic, "the right way to do things" and their shared history from a time long ago.

Chapter Six:

Conclusions

6.0 Indigenizing Archaeological Understanding of Material Culture

I began this research by outlining the geological eruptive history of *Skwxwú7mesh Uxwumixw* and how this history related to the occurrence and distribution of lithic sources and, more specifically, how the geological occurrence of lithic materials relates to *Skwxwú7mesh Uxwumixw* place names and the central themes in our oral history. Next, I demonstrated that the eruptive history of *Skwxwú7mesh Uxwumixw* produced numerous distinct lava flows, with only a few of them utilized as sources for lithic material. Selected and used on the basis of a wide range of technical qualities some possess better qualities but are more limited in quantity.

Each lithic source used by the ancestors of the *Skwxwú7mesh Uxwumixw* has a place name and associated oral history linked to broader themes present in *Skwxwú7mesh Uxwumixw* cultural knowledge, notably Mythical Beings and Transformation. These themes became the framework for assessing lithic material distributions. I found differences in how people accessed and used each lithic source and explained their regional distributions. Furthermore, I recognized that materials dominating site assemblages reflect activities for specialized or everyday uses, and materials occurring rarely in the archaeological record were treated differently than ones that are more common.

I also summarized the geographic locations of the lithic sources used for the past more than 10,000 years in *Skwxwú7mesh Uxwumixw*. Four of the six lithic sources, *Nkwu'7say, Skawshn, Chíchshem st'enàch* and *Lexwlúxwls Smant*, are in locations that make them easily accessible on foot or by canoe. These four lithic sources are also associated with Transformation events that tell of the proper everyday "ways to do things," such as fishing, hunting and processing resources. This combination of access and cultural association made these sources the providers of materials used for numerous expedient and specialized tasks across the landscape, hence their spatial and temporal dominance in the archaeological site assemblages across *Skwxwú7mesh Uxwumixw*.

Two of the lithic sources, *Nch'kay'* and *Lhaxwm Smant,* are difficult to access due to their remote locales (one in a high-elevation alpine context, the other on a steep-sided island). Both are also small and restricted in extent. These two lithic sources, regarded as spiritually charged areas that few people could visit, make these materials spatially and temporally rare in the regional archaeological record of *Skwxwú7mesh Uxwumixw*. When brought back to villages and seasonal camps, these materials serve a different purpose than those associated with Transformation. Used to convey relationships with Mythical Beings, they legitimize ancestry, creating memories through their use in *Ust'am*/Witnessing ceremonies. They sustain links through numerous generations of people associated with specific villages close to these sources.

Furthermore, lithic materials distributed across the Salish world carried the *Skwxwú7mesh* messages associated with Transformation and Mythical Beings.

People who accessed lithic materials in *Skwxwú7mesh Uxwumixw* would do so in the spring and summer and then travel to seasonal and temporary camps. At these locations, a wide range of Coast Salish people gathered, all speaking different languages. In order to interact, they needed a means to understand one another, and only a select few could speak multiple languages. Yet, linguistic familiarity was not enough; people had to establish social links through their genealogies in order for exchange to occur. Therefore, people who had direct access to lithic sources became brokers of those materials, carrying the values of the social messages embedded in them.

When it comes to dealing with others, Coast Salish society bases protocol on determining a person's known and shared histories. Included in this process is exchanging knowledge about one's ancestral name, one's home village, finding any links between families and identifying one's readiness to provide labour in exchange for material. The wide spatial and temporal distribution of *Skwxwú7mesh Uxwumixw* lithics thus presumes an acknowledgement of the history and meaning of these materials across *Skwxwú7mesh Uxwumixw* and beyond. This established who and where the market was for certain types of lithic materials—i.e. who had associations with Transformation and Mythical Beings.

6.1 Implications for Northwest Coast Archaeology

This dissertation is the first regional scale analysis of multiple lithic materials on the southern Northwest Coast. I examined the materials' occurrence and distribution through several theoretical positions, focusing in and out and on various data sources. I found this to be a difficult though rewarding process. By using the best data sources available, I have shown that these seemingly disparate theories and methods can seek answers to the same questions. By blending cultural knowledge with geological and archaeological data, this dissertation has implications for the future of Northwest Coast archaeology. It moves an Indigenous perspective from the margin to the mainstream.

We can no longer view lithic sources and materials derived from them as mere resources, used and discarded at various times in the past. Nor can their selection and use be viewed as only a step in a formal or expedient form of technological organization. These materials are important *pieces of places* that played an integral role in *Skwxwú7mesh Uxwumixw* and Coast Salish social organization, spanning the gap between physical relations and spiritual relations. A major beneficial consequence to Northwest Coast archaeology is that this research also presents the first archaeologically articulated Indigenous understanding of lithic sources and how they can actually help explain the reasons why materials from those sources distribute differentially across a landscape. Imbued with place names, the *Skwxwú7mesh Uxwumixw* landscape reflects a deep, interconnected long-term history, retold here with the distribution

of lithic materials. I view this history and these distributions through the consistent maintenance of social networks and landscape knowledge. They both serve as a rationale for lithic material selection, linking its use to the pursuit of other resources and occupancy of *Skwxwú7mesh Uxwumixw*. These implications all link to the role of *Ust'am* or Witnessing in Coast Salish society, where the meaning of material culture passed from generation to generation and from group to group.

Alternatively, this research redirects the archaeological gaze. I encourage a shift in focus for Northwest Coast archaeology away from areas that have seen significant research and toward those parts of the landscape that have up until now been overlooked. Until very recently, archaeological research on the Fraser River or Gulf Islands served as the basis of archaeological constructs along the southern Northwest Coast. This has begun to change with current research throughout the region, notably in *Sechelt* territory by the University of Toronto and *Tla'amin* territory by Simon Fraser University. The results of this dissertation and those projects will significantly add a more robust understanding to the region's past. However, I add and encourage other researchers to investigate sites other than villages or large seasonal camps so that we can begin to construct a holistic archaeological record in this region that is truly on a landscape scale.

This dissertation is a foundation from which to further develop a nuanced understanding of archaeological settlement patterns, resource use and the ways various Coast Salish groups linked and aligned with each other. My on-going and

future research will continue to build on this base, and I certainly hope that other Northwest Coast archaeologists will do so as well. An important next step in my work is further developing these links within *Skwxwú7mesh Uxwumixw* and investigating how they extend into adjacent Coast Salish territories. Only then can we begin to form a regional landscape perspective of southern Northwest Coast archaeology that begins to synthesize multiple data sets. I look forward to this challenge.

If I were to embark on this research endeavour in another region or to provide advice to another researcher who would take on the challenge, I would stress that in order to understand the distributions of lithic materials on a regional scale, some understanding of an Indigenous perspective is required. Without a sense of local knowledge and how it relates to a cultural group's social structure, one cannot discover the details of how particular groups conceived of or accessed key areas of the landscape. With this knowledge, one can come to know and appreciate the breadth of cultural reasons for how material culture moved throughout a known and defined territory and beyond.

6.2 Final Thoughts

To Indigenous people, lithic sources provide materials that, when shaped into implements, are not only useful as tools but also serve as social signatures. To Indigenous people in the corporeal world, they are *pieces of places* containing histories of interaction with Mythical Beings of the non-corporeal world. Lithic materials associated with Transformation are symbols of tribal identity, accessible

to everyone who had established kinship and a familiar ancestral name; they are materials used for day-to-day activities. All lithic sources are associated with symbols of local identity, where people needed close kinship and an acknowledged ancestral name tied to a home village/area where they invested their labor.

As anthropologists, we can detect these social signatures by combining an Indigenous perspective with archaeology and geology. In using an Indigenous perspective to examine lithic sources and materials from *Skwxwú7mesh Uxwumixw*, I have shown how my ancestors viewed and utilized them in the past. I discovered the ways my ancestors interacted with them, both physically and spiritually. If a cultural perspective is included in the examination of material culture, we can begin to develop a nuanced understanding of how past peoples interacted in the day-to-day corporeal world and related to the incorporeal realm. This makes the products of archaeology and geology meaningful to Indigenous people.

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Appendix 1. *Skwxwú7mesh Uxwumixw* Words and English Translations

Squamish Word	English Translation
Skwxwú7mesh Uxwumixw	Squamish Nation
Skwxwú7mesh	Squamish
Snachim	Language
Uxwumixw	Territory or Land
Temixw	Land/Landscape
Ust'am	Witness
Telálsemkin Siyám	Chief Bill Williams
Xwexwselkn	Mt. Goat
Sla'nay'	Woman
Sp'a'kw'us	Eagle
Elksen	Point Grey
T'item'tsn	Port Moody
Sta'kaya	Wolf
Yelhi'xw	Ashlu River
Chi'yakmesh	Cheakamus River
Ma'mxem	Mamquam River
K'eksin ti siya't-shn	Universe
Chilh siyam	Supreme Being
Xay	Sacred
Xay temixw	Sacred Land
Xaxmin	Glacier
Smanit	Mountain
Stakw	Rivers
Swa'7elt	Creeks
Xachu7	Lakes
S7a'tsnach	Bay
Kwa Txwnu'wu7ts	Inlet
S7ilhn	Food
T'uyt	Medicine
Smant	Stone
sle'wey'	Inner Cedar Bark
Xwilem	Rope

Sitn	Baskets
Lam'	House
nexwyiyulhtnor	Hearth(s)
tsiyelstn	Sharpening
lhach'tn	Knife
sxwmats'tsten	Spear
texwe7ch	Bow
ts'emaal	Arrow
syets	True Stories
sxwexwiyam	Legends
chi'yak	Fish Trap
miyach	Harpoon
sts'ukwi	Fish
kw'ich'tn	Fish Knife
stakshen	Steep Shore
smek'a7a'l	Grave Yard
kwaytsay	Hemlock Tree
xapayay	Red Cedar Tree
ptalwan	Ferns
k'elhmay	Yellow Cedar Tree
ch'sahy'	Douglas Fir Tree
u'sa7	Mountain Blueberry
xwp'a7a'ysus	Cave
Xesh-shn	Deadfall Trap
ntelchis	Stone Hammer
xwe7it	Wood Wedge
haltin	Chisels
snexwilh	Canoe
sk'emel	Paddle
t'chach	Walking Pole
tl'alxn	Snow Shoes
nema'	Forbidden
sxw7umtn	Indian Doctor
kwtsi7ts	Indian Ritualist
esyew'	Indian Seer
Nch'kay'	Mount Garibaldi Dirty Place
Xaay Xays	Transformer Brothers
Lil'wat	Lillooet People
Nkwu'7say	Place of the Spring Salmon
Sxel'tskwu'7	Mount Cayley
P'uy'am'	Squamish Village Blackened From the Smoke
Ch'ékch'eks	Squamish Village Dirty at the Mouth
Nkwu'7say smant	Turbid and Shovelnose Creek Stone

Skawshn	Soft Under Foot
Skawshn smant	Soft Under Foot Stone
Nepit'l	Buck Mountain
Chíchshem st'enàch	Outer Training Area
Chíchshem st'enàch smant	Outer Training Area stone
Kaŵ'tíń	Squamish Village Creek Running Down
Siyích'm	Squamish Village Always Full
Wik'm	Squamish Village Open Mouth
Lexwlúxwls	Mount Currie People
Lexwlúxwls smant	Mount Currie People stone
Stl'alkem	Mythical Beings
Smaylilh	Wild People
Skwikwtaymish	Small People
Lhelekwines	One Who Takes Out Your Chest
Kalkalilh	Cannibal Woman
Kw'ukchtk	Hit Low
Ninch'ashen	One Leg
Kwushu'	Wild Pig
In7inyaxa7en	Thunderbird
Ch'inkw'u	Magical Snake
Elkay	Snake Like Creature
Sinulhkay	Double Headed Sea Serpent
Epenshen	Magical Red Salamander
T'ak't'ak mu'y'in tl'a in7iny'a'xe7en	Landing Place of the Thunderbird
Nch'kay' smant	Dirty Place stone
Chi'yakmesh	Squamish Village Fish Weir Place
Lhaxwm	Anvil Island
Sta'mis	Squamish Village At the Head
eskwekp	Hills
Xway'xway	Xway'xway Mask
Kwa kwayx welh-aynexws	Wild Spirit Place
Payakentsut	Warrior Training

Appendix 2. Archaeological Site Descriptions

To familiarize readers with the sites that form this temporal sequence of Squamish Nation territory, I present a summary of information regarding site names, types and locations. All radiocarbon dates are reported as raw uncalibrated results and associated lab numbers. To add Indigenous geographical meaning to these sites and places, I include the Squamish Nation place name, its translation and meaning. For each site, when possible I provide a site map.

Burrard Inlet

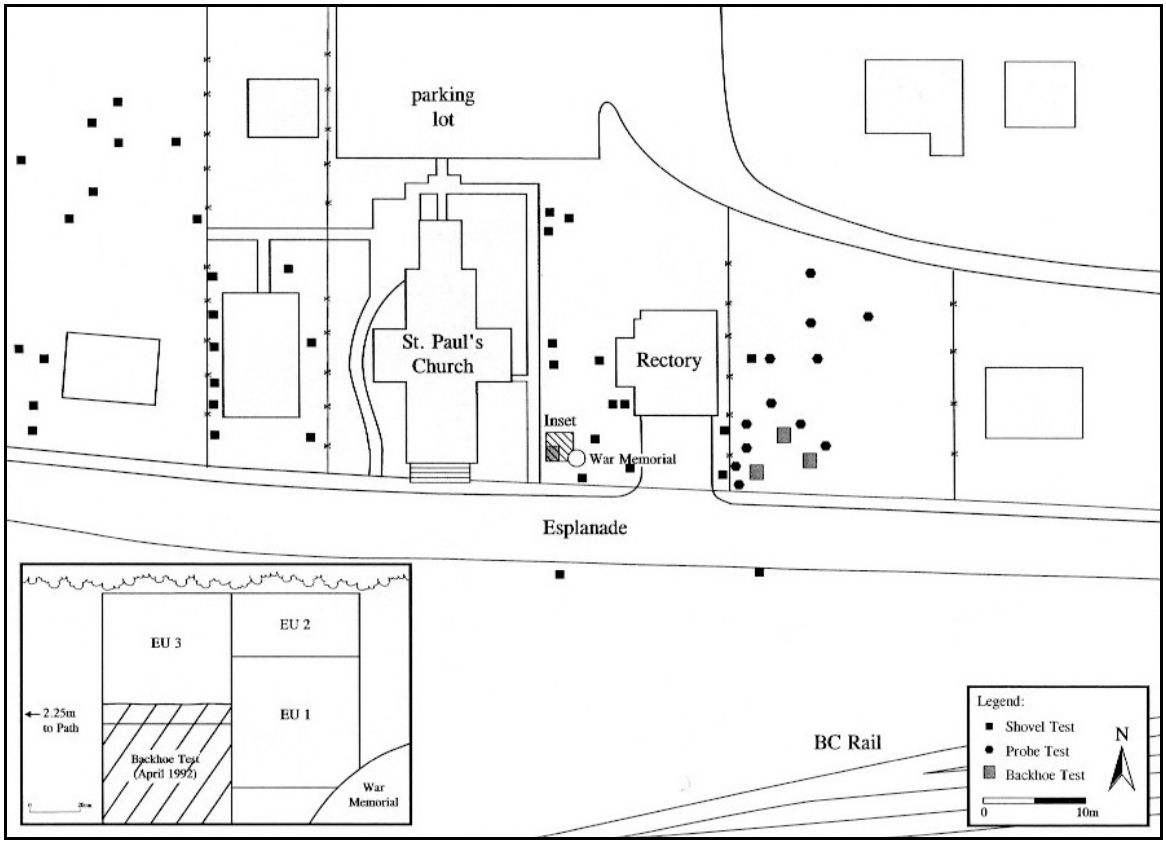
DhRr 6 Tem-tem-temixw or “Place of Lots of Good Land” is located at the entrance of Indian Arm in Burrard Inlet. The site deposits range in depth from surface beach deposits to 1.5 metres along a protected bay. Also known as the Belcarra Park site, this was the location of a village prior to contact with Europeans. The inhabitants of this village had numerous family contacts with Squamish, Tseli-wau-tuth and Musqueam First Nations. DhRr 6 is mostly comprised of shell and midden deposits measuring approximately 150 metres east to west and 150 metres north to south. The site is known to have

human burials, temporially diagnostic lithic materials and radiocarbon dates ranging from the last 3000 years BP. Recent faunal analysis by Pierson (2011) indicates that a wide range of marine resources were used by the sites inhabitants.

DhRr 18 *Spucka-nay* or “White Rock” is located on the north shore of Burrard Inlet and is south of the community of Deep Cove. The site deposits range in depth from 50 centimetres to 2 metres along the landside of a small bay within which is a small islet, white in colour. This rock was once a human, transformed into stone since he was not sure which way to travel along this part of the shoreline. This white rock serves as a useful navigation point when travelling to and from Indian Arm and Burrard Inlet. DhRr 18 is a shell midden measuring 130 metres east to west and 50 metres north to south. This site, known to have human burials and an abundant chipped and ground stone lithic assemblage was recent excavated by Lepofsky et al. (2007). Based on temporally diagnostic artifacts and the site’s strata, they found that the site likely dates to the past 3000 years BP. Site strata show evidence of house-like structures present at this location. Although the faunal assemblage is diverse, it focused on the acquisition of locally available terrestrial and marine species (Trost 2004). Visual identification by Lepofsky et al. (2007) of the lithics present in the site’s deposits indicates use of local sources.

DhRr 20 *K'iya'xn* is located on the north shore of Burrard Inlet on Burrard Band Indian Reserve #3 (Bouchard and Kennedy 1986), and translates to “Fence” or “Stockade.” This fort, built to protect people inhabiting this part of Burrard Inlet from Lekwiltok raiders from the north. The site is comprised of intermittent one- to two-metre deep shell midden deposits, an earthen work mound and human burials, associated with nearby village sites. The site stretches 110 metres east to west along the shore of the inlet and 100 metres north to south.

DhRs 16 *Eslahan* or “Head of the Bay” is located on the northern shore of Burrard Inlet on Squamish Nation Indian Reserve #1 (Bouchard and Kennedy 1986). Once at the outlet of Mosquito Creek, this seasonal camp and village provided important fishing for spring and chum salmon. Radiocarbon dates from this site are 3190±80 and 3410±80 BP (ARCAS 1999a); the site measures 10 metres east to west and three metres north to south and is just over one metre in depth. The site is comprised of intermittent shell deposits and abundant fire-cracked rock and is dominated by a chipped stone tool assemblage, suggesting that this site was a resource-processing locality associated with a nearby village.



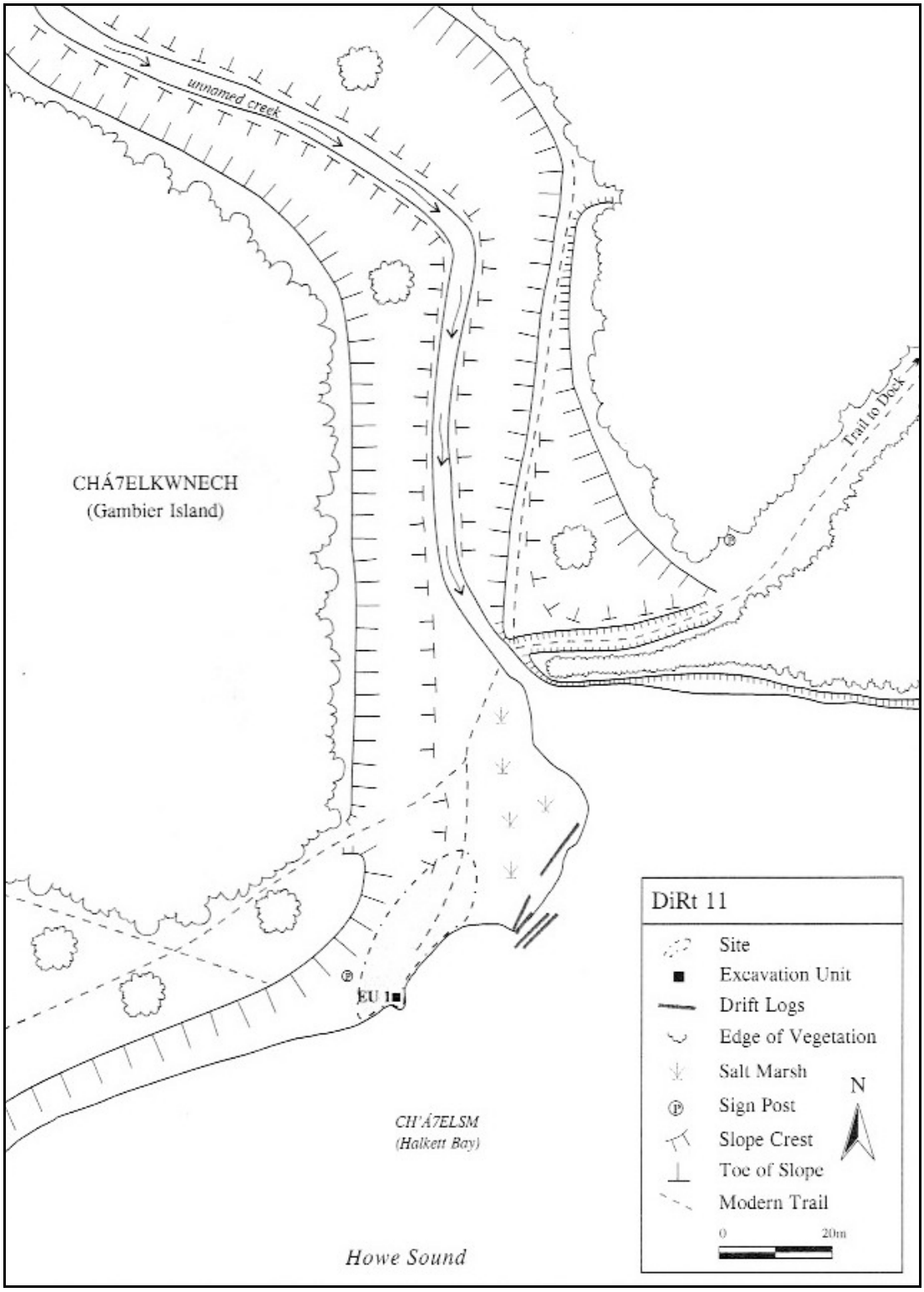
Site Map of DhRs 16.

DhRt 6 Subject to numerous excavations and Archaeological Impact Assessments since the mid 1950s, little remains of the archaeological site at *Kwekw7u'pay',* or “Lots of Wild Crabapple Trees.” This place name obviously refers to the once plentiful crabapple trees that grew here, but more specifically those trees served as a spring seasonal indicator when it was appropriate to harvest the vast amounts of smelt that spawned along the southern banks of Burrard Inlet. Subject to numerous investigations (ARCAS 1993; Borden 1970; Bouchard and Kennedy 1986), DhRt 6 is the largest site in southern Burrard Inlet, measuring 800 metres east to west and 250 metres north to south and is as deep as six metres. Eleven radiocarbon dates from across the site range 2460±80 BP to 3280±70 BP. Faunal analysis from the site indicates that it was once a large spring resource processing site. Residential developmental pressures fragmented the site into several patches of dense to intermittent shell midden deposits, with some sections containing human remains.

Howe Sound

DiRt 1 *Ch'axa'y,* or “Sizzling Water,” is located at the southeastern edge of Howe Sound in Horseshoe Bay (Bouchard and Kennedy 1986). The reference to sizzling water applies to the once abundant herring fishery within this large bay. When the herring spawned at this place, the water appeared to be boiling. Once a village site and shell midden, very little of the original site remains. The site once measured 200 metres east to west and 50 metres north to south, varied in depth from 50 centimetres to 2 metres of shell midden deposits and associated lithic materials (ARCAS 1999a). Residential development and a ferry terminal have greatly impacted the archaeological materials in this locale.

DiRt 11 *Ch'a'7elsm*, or “Some Kind of Little Fish Always Goes There,” is located on the eastern shore of Gambier Island. Located in a key spot in Howe Sound, this locale was a perfect spot to intercept fish moving up and down the sound (Bouchard and Kennedy 1986). Excavated in 1991, the site is radiocarbon dated to 1190±120 BP (ARCAS 1999a). Fauna from the site indicates that it is likely a spring to fall resource camp measuring 38 metres east to west and 11 metres north to south, about 1.5 metres in depth.



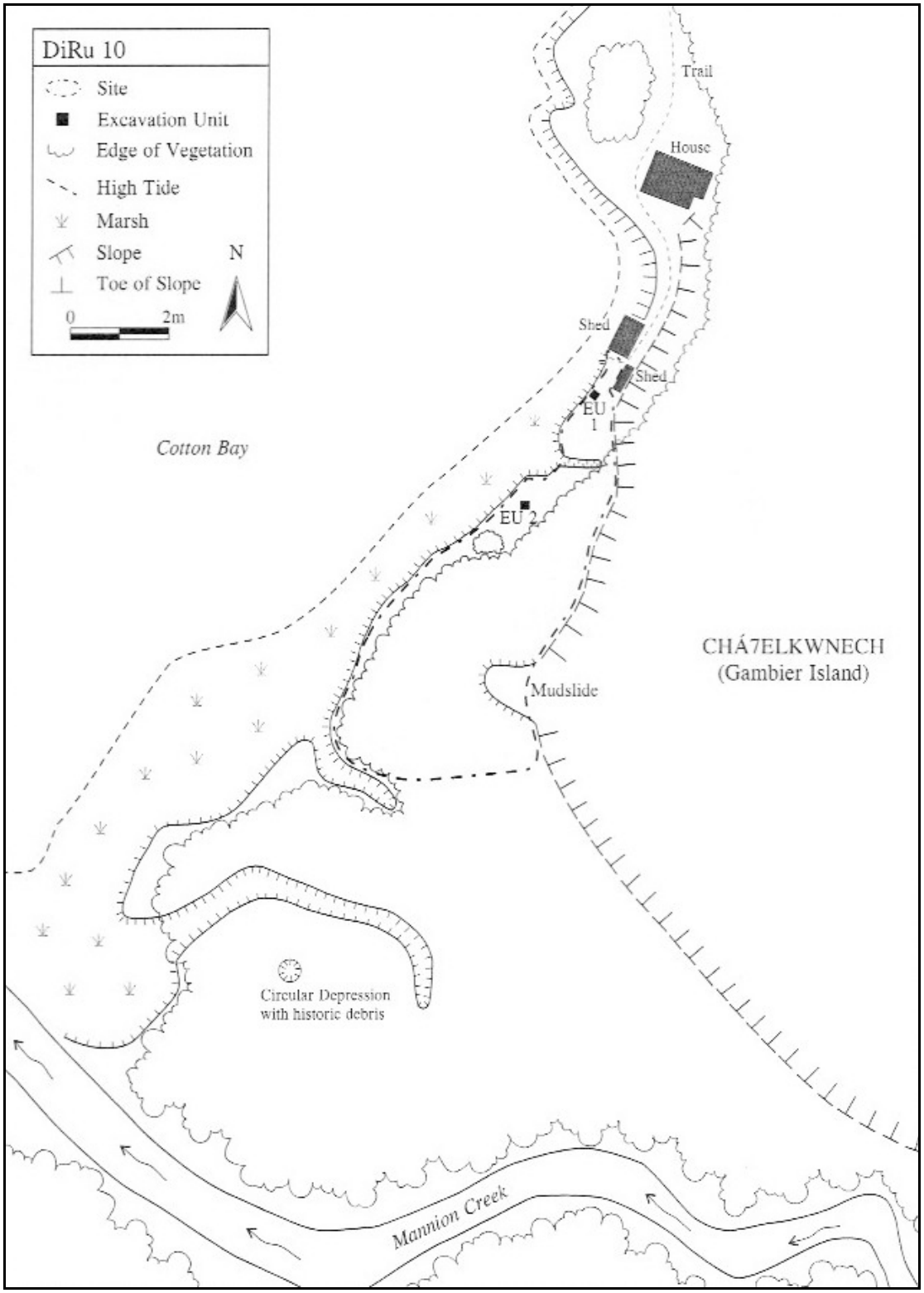
Site Map of DiRt 11.

DiRu 10 Excavated in 1992 by ARCAS (1999), this site has several hearths and resource processing features dating from 340±80 BP to 840±60 BP. From sea level to one metre, asl DiRu 10, or the Cotton Bay site, is located on western Gambier Island and at the mouth of Mannion Creek. A spring to fall resource procurement camp, the site measures 80 metres north to south and 50 metres east to west and is up to 1.5 metres deep.

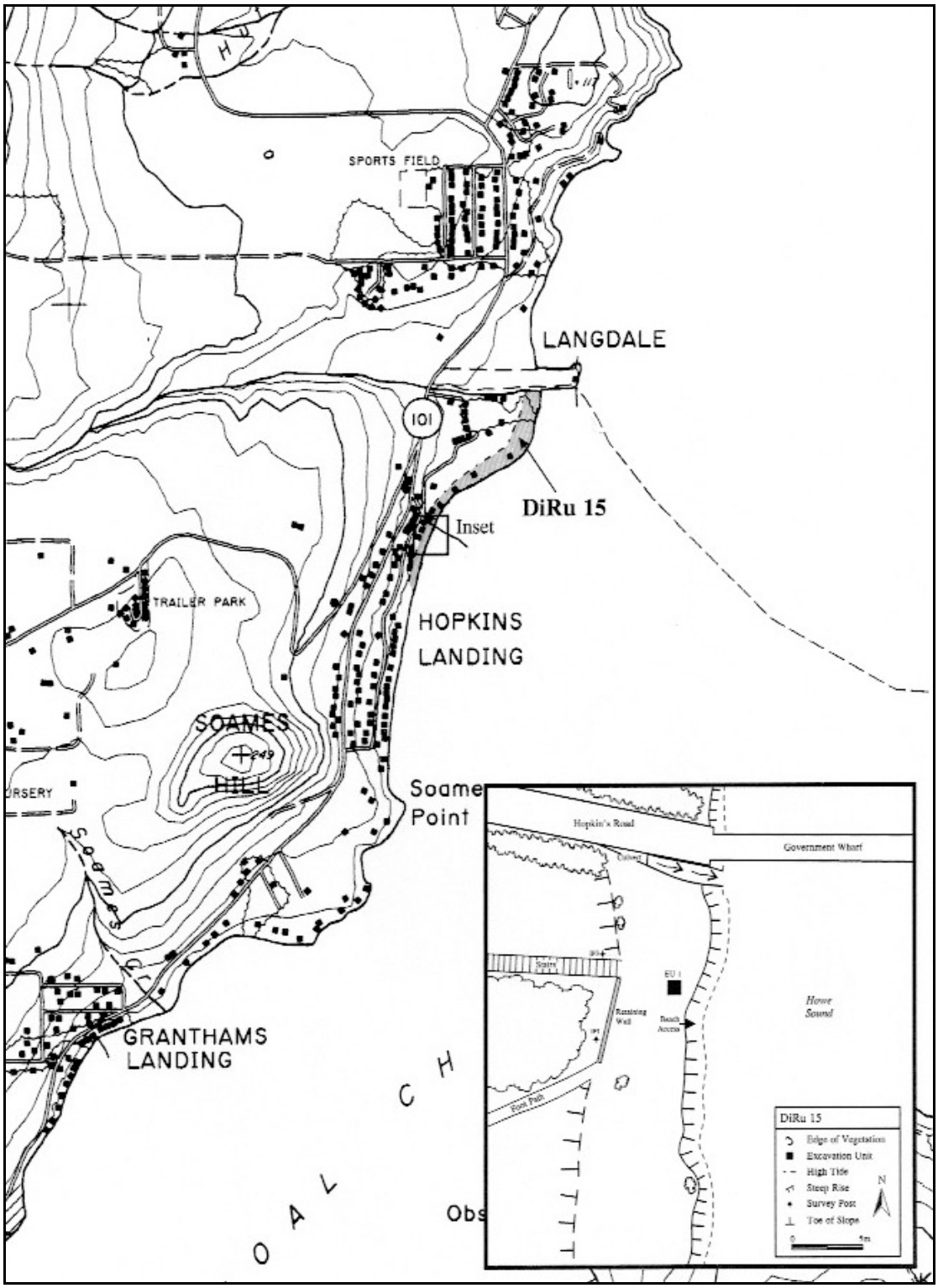
DiRu 15 Excavated in 1991 by ARCAS (1999), the basal part of the site was radiocarbon dated to 2690±70 BP. From sea level to two metres asl, the Hopkins Landing site is located on the southwestern edge of Howe Sound near the modern town of Gibsons. A shell midden site with a diverse faunal assemblage, DiRu 15 is likely part of a village site the site measures 700 metres north to south and 20 metres east to west and is approximately 2 metres deep.

DiRu 16 *Ch'kw'elhp* was excavated in 1990 by ARCAS (1999) and dates to 990±60 BP. This village site is one of the origin places of the Squamish people, as well as a place where powerful shamans lived. These shamans were associated with the sacred *Xway'xway* masks, important in numerous Coast Salish ceremonies. This site is located south of DiRu 15 on the southwestern edge of Howe Sound. DiRu 16 has a diverse faunal assemblage measuring 340

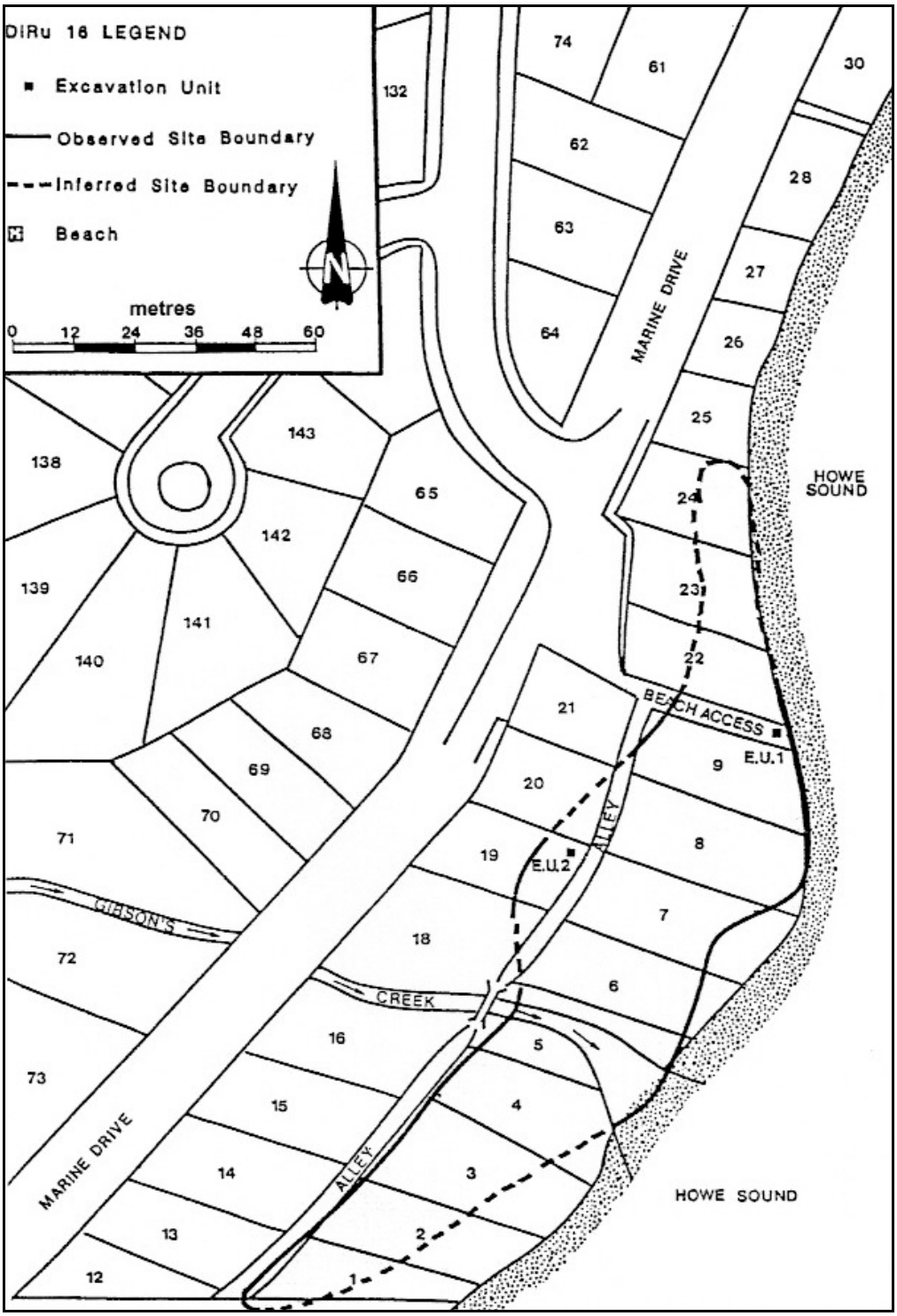
metres north to south and 80 metres east to west and is as deep as 2.5 metres (Bouchard and Kennedy 1986).



Site Map of DiRu 10.


SPORTS FIELD
LANGDALE
101
DiRu 15
Inset
TRAILER PARK
HOPKINS
LANDING
SOAMES
HILL
649
Soame
Point
Soames Cr
GRANTHAMS
LANDING
Hopkin's Road
Government Wharf
Ditch
Stairs
EU 1
Retaining Wall
Beach Access
Howe Sound
Foot Path
DiRu 15
Edge of Vegetation
Excavation Unit
High Tide
Steep Rise
Survey Post
Toe of Slope
N
0
5m

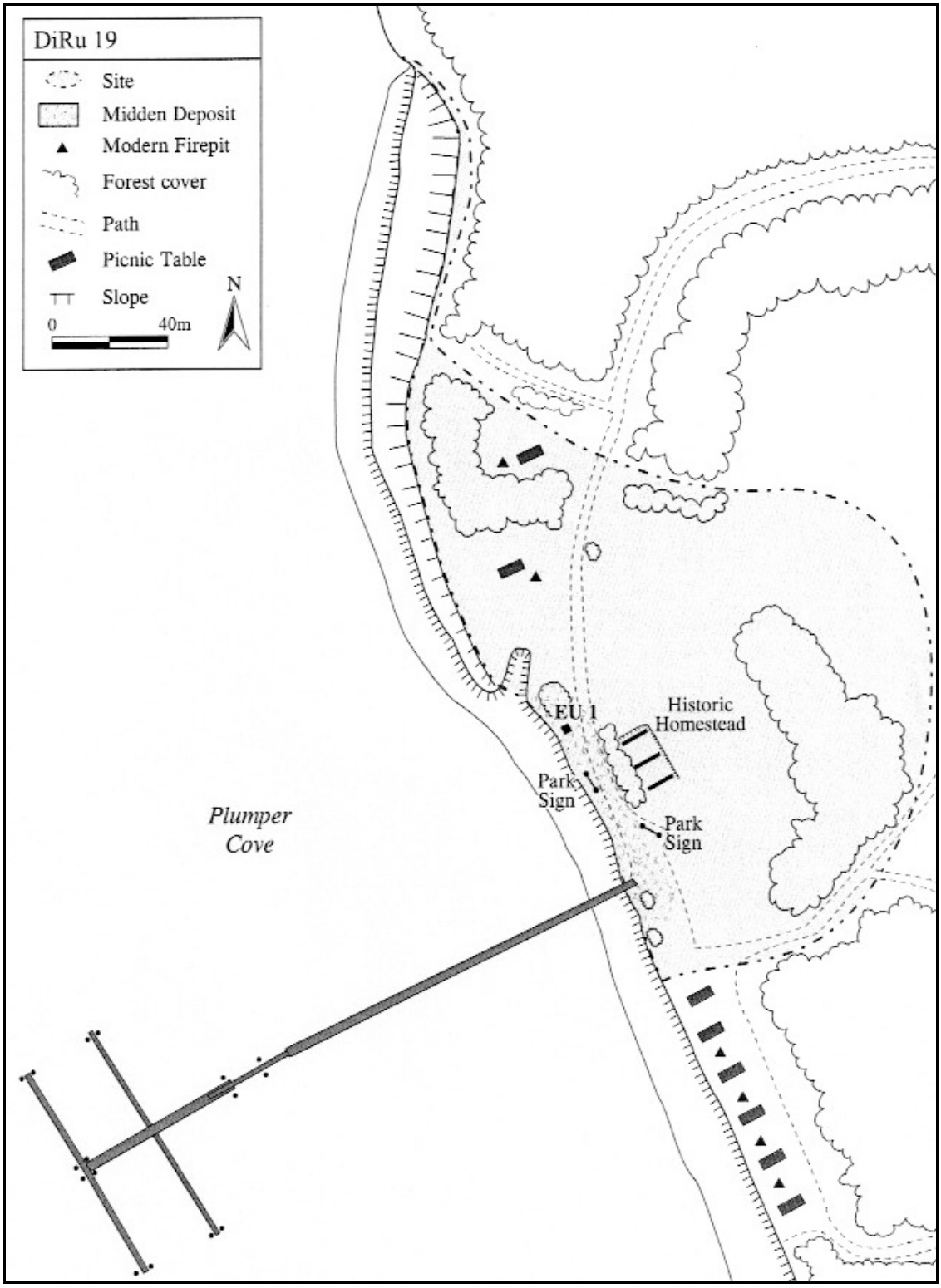
Site Map of DiRu 15.



Site Map of DiRu 16.

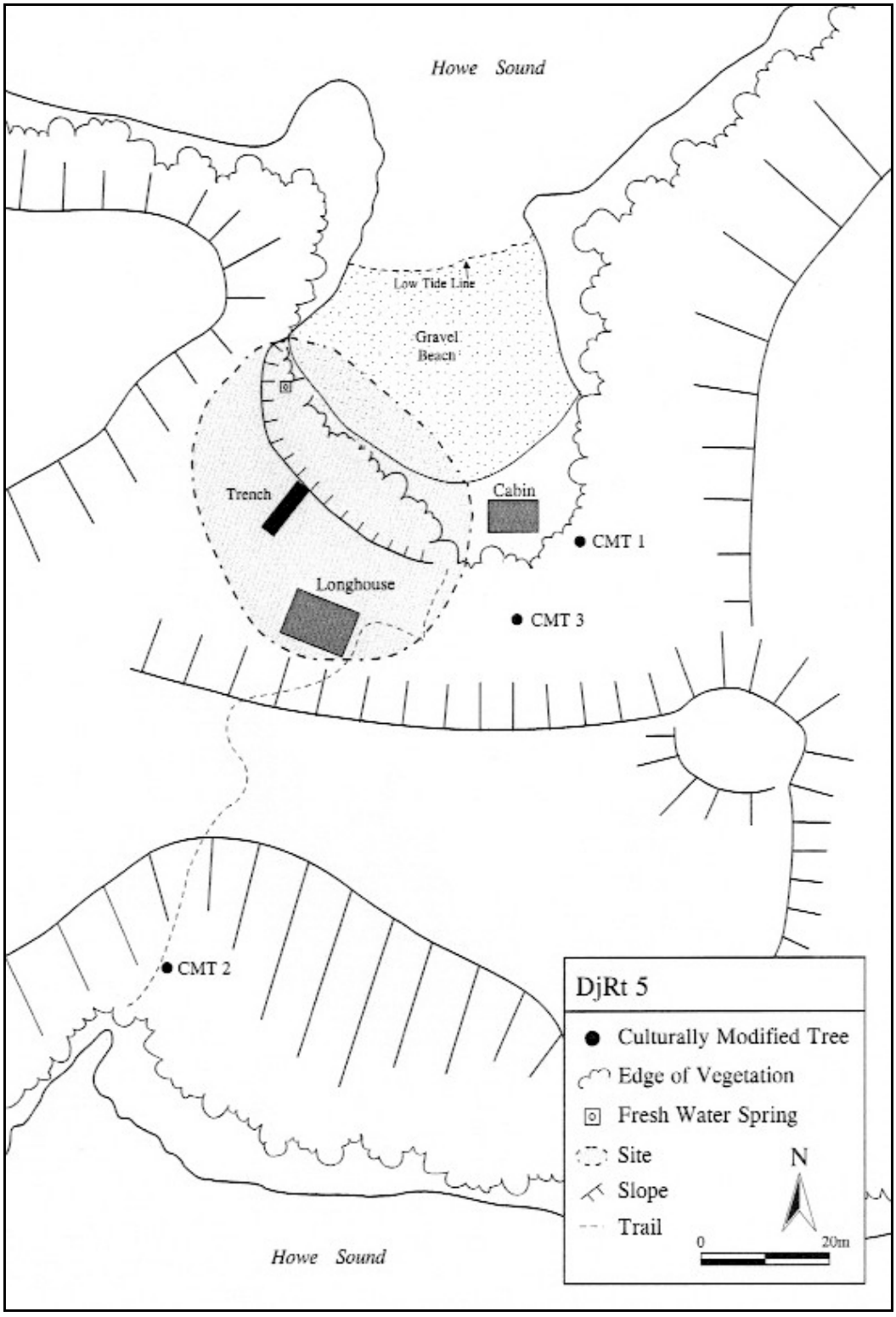
DiRu 19 Excavated in 1992 by ARCAS (1999), *Chaich-ph*, or the Plumper Cove site, radiocarbon dates to 2050±90 BP. Known as a good place to hunt deer, this site is located on Keats Island in southwestern Howe Sound, close to DiRu 15 and DiRu 16. This site has a less diverse faunal assemblage compared with DiRu 15 and 16 and only measures 45 metres north to south and 10 metres east to west, is 1.2 metres in depth and likely represents a spring to fall resource gathering camp.

DjRt 3 On *Lhaxwm* (Bouchard and Kennedy 1986), or Anvil Island, in the centre of Howe Sound is DjRt 3. The island is a place imbued with supernatural power since it is a transformed sea serpent and is where supernatural beings lived. DjRt 3 is a lithic workshop that was used to process andesite material found only on this island. The site measures 40 metres north to south and 20 metres east to west and has minor stratified deposits approximately 50 centimetres in depth. DjRt 3 is mainly a beach scatter with abundant Anvil Island andesite associated with some faunal remains, suggesting spring to fall resource gathering activities.



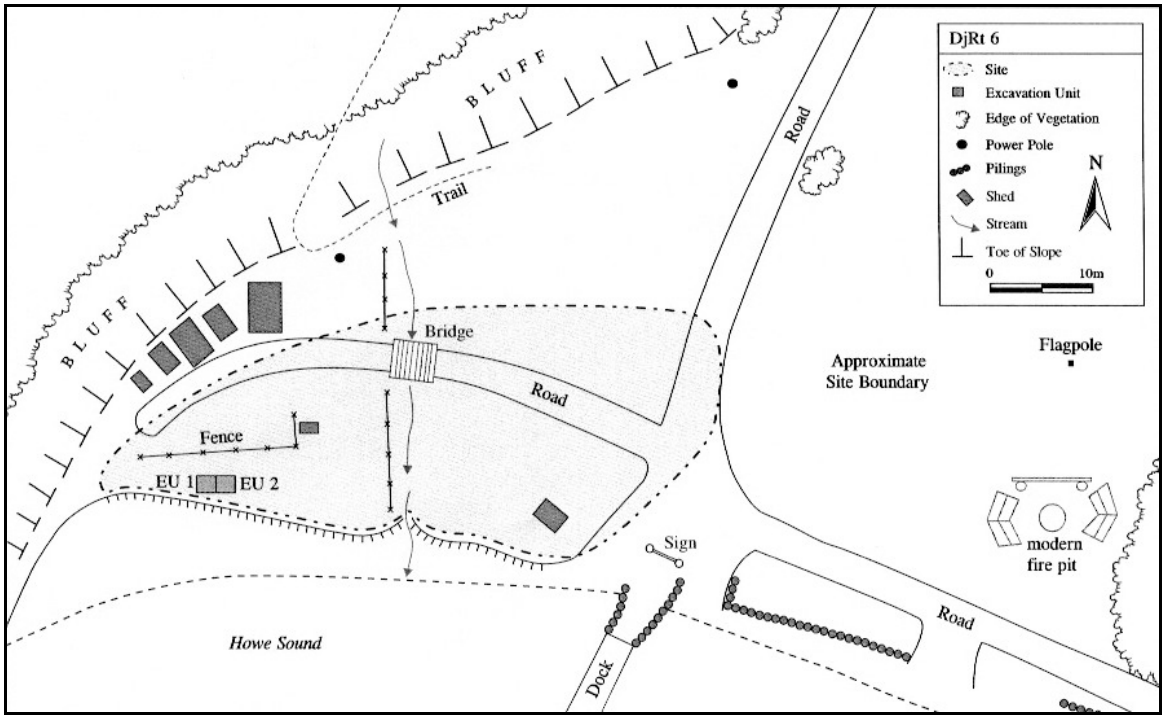
Site Map of DiRu 19.

DjRt 5 Excavated in 1992 by ARCAS (1999), DjRt 5 on *Kw'emkw'em*, or "Go Ashore from a Canoe," is in northwestern Howe Sound (Bouchard and Kennedy 1986). This place name refers to the two small islands resembling canoes, close to the mainland shore. This is also where warriors of the Squamish and Lekwiltok Nations took their weapons and threw them overboard as a symbol to cease hostilities between each group. The basal deposits of this site were radiocarbon dated to 870±90 BP; the site is in a small bay on the north side of the larger of the two Defense Islands. Compromised of shell midden deposits, a beach lithic scatter, culturally modified trees and a historic canoe, the site measures 50 metres east to west and 30 metres north to south and ranges in elevation from modern sea level to 3 metres asl. The limited faunal assemblage but diverse lithic assemblage indicates that this site is a temporary camp or defensive site.



Site Map of DjRt 5.

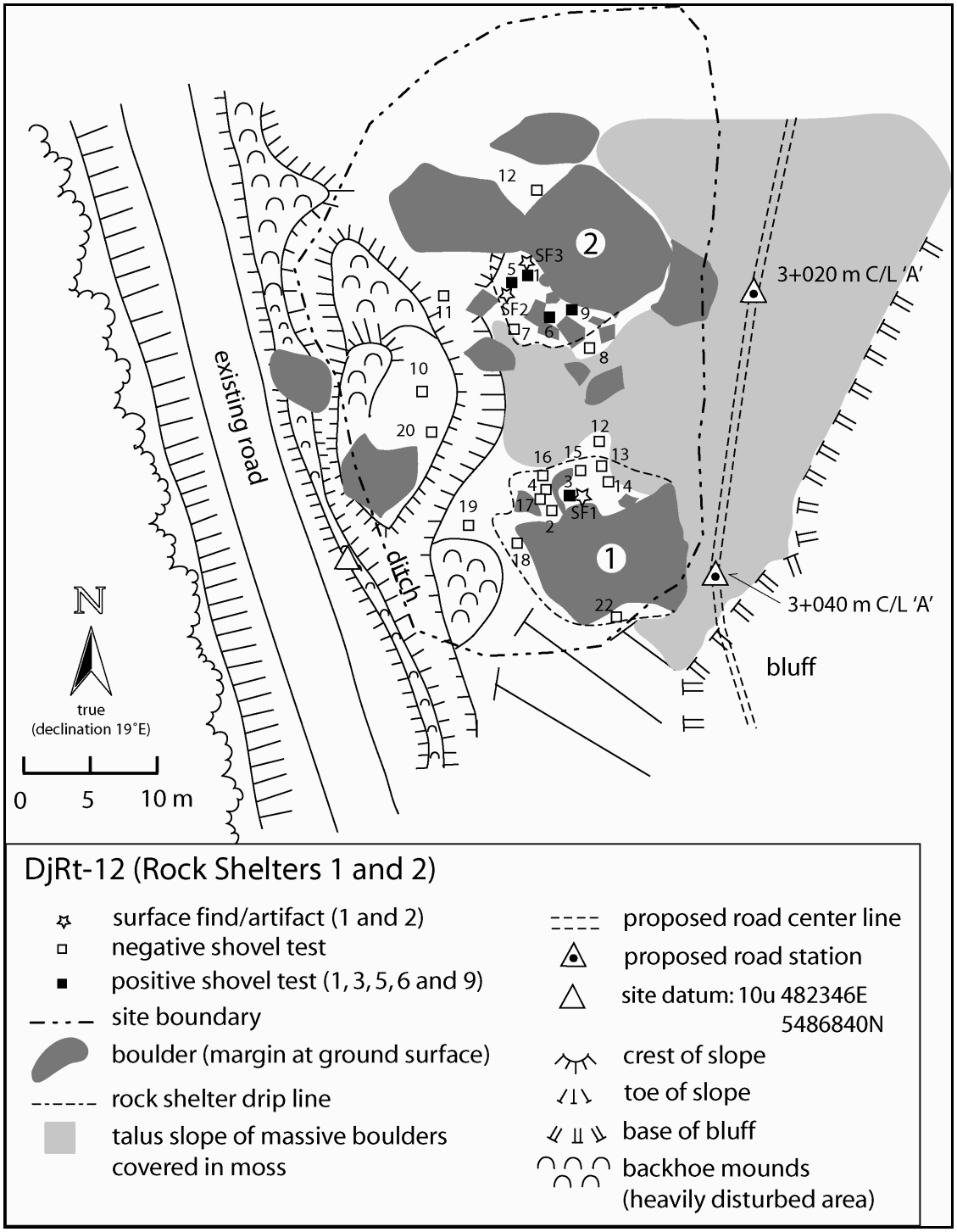
DjRt 6 *Tsi'tsusm*, or “They had a big Potlatch There,” is located at the mouth of Potlatch Creek on the western shore of Howe Sound (Bouchard and Kennedy 1986). The gathering referred to in this place name is where the Squamish and Lekwiltok had a marriage-peace potlatch in order to cease their mutual hostilities. This village has abundant marine and terrestrial resources, enabling it to host such an important historical event. Excavated in 1992 by ARCAS (1999), a feature encountered in the middle strata of the site was radiocarbon dated to 320±50 BP. The site is one metre asl, measures 125 metres north to south, 50 metres east to west and is approximately 1 metre in depth. The strata, artifacts and fauna suggest that DjRt 6 was the location of a village site.



Site Map of DjRt 6.

DjRt 12 *Tl'etl'ch'a'lkm*, or "To Stalk Up On Something," was recorded as a result of an Archaeological Impact Assessment by Hall, Woods and Reimer (2007). It is a set of two boulder rockshelters located 120m asl on the eastern shore of Howe Sound (Bouchard and Kennedy 1986). The place name for this location applies to the excellent hunting for deer, elk and mountain goat along the mountainside slopes of eastern Howe Sound. The rockshelters and associated lithic scatter of this site measures 20 metres east to west and 20 metres north to south. Associated with the early Holocene and higher than present sea levels, the site is radiocarbon dated to 8590±40BP. Associated with this date is a small but diverse faunal

assemblage with terrestrial and marine resources and a lithic assemblage with three different varieties of raw materials.



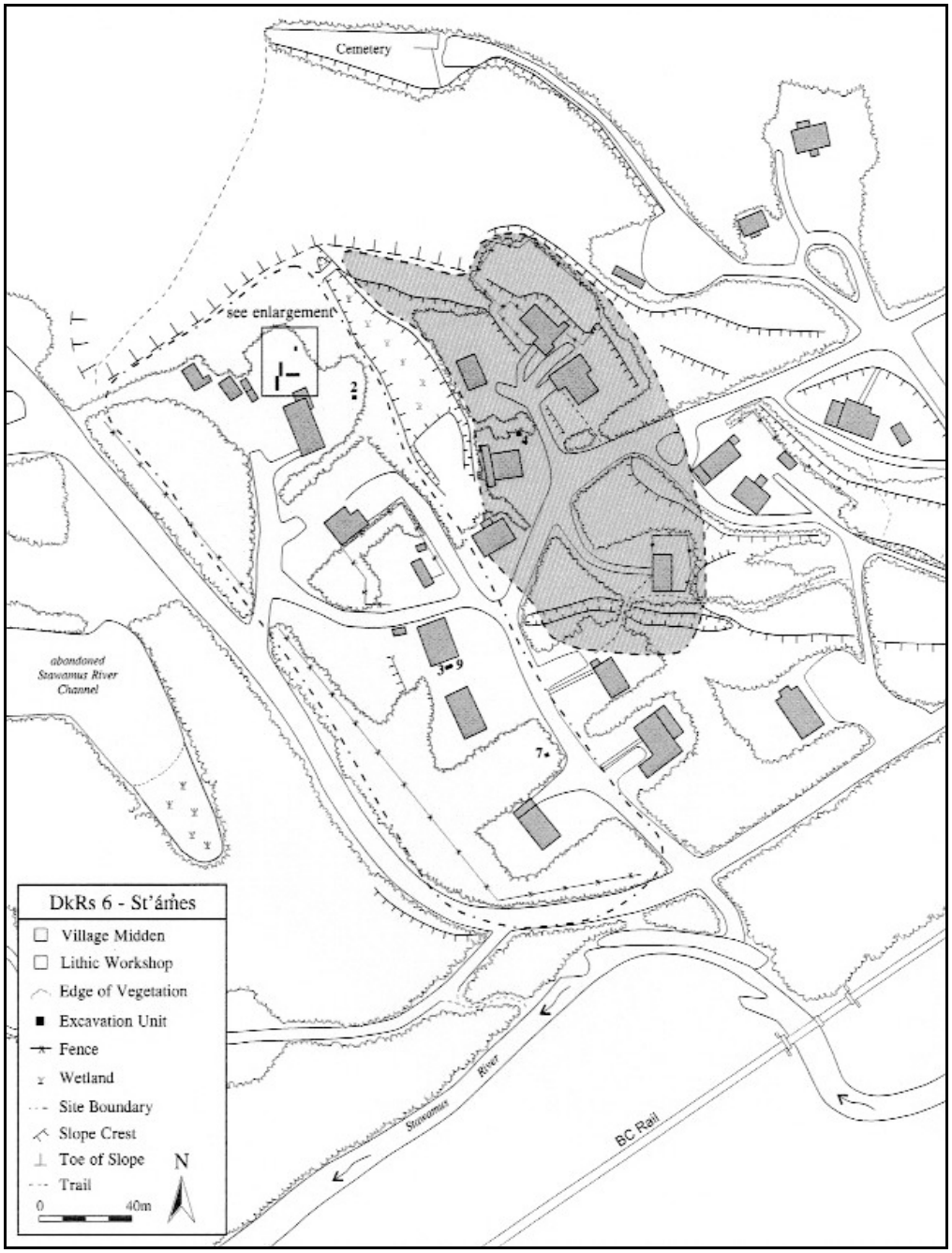
Site Map of DjRt 12.

Squamish Valley

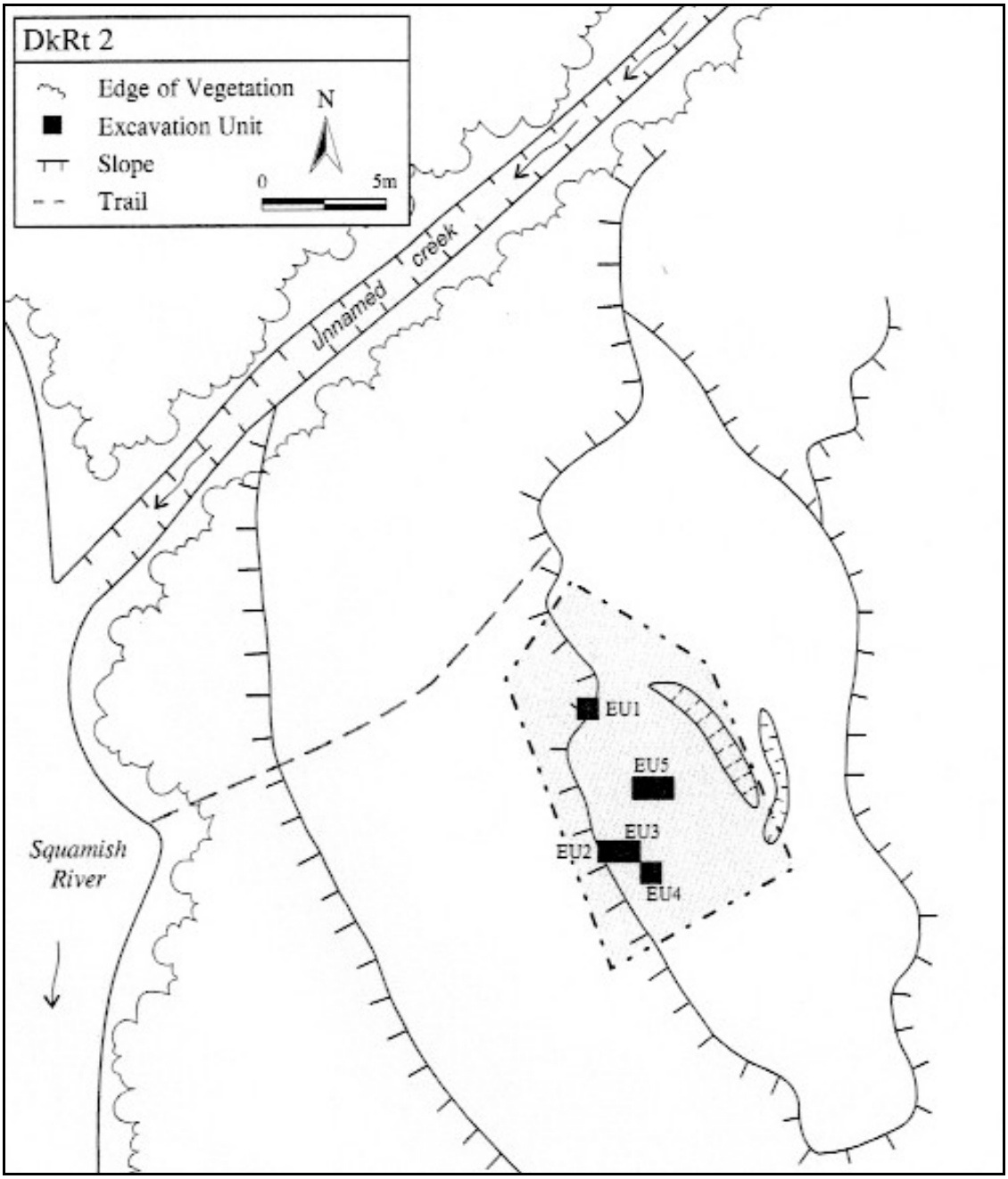
DkRs 6 Excavated in 1994 by ARCAS (1999), DkRs 6, or *Sta'mis* (At the Head), is located at the head of Howe Sound (Bouchard and Kennedy 1986). This village is an origin place of the Squamish people and many powerful figures, such as Hochtalh the serpent slayer, came from this place. There are three sections at this site: a village, associated shell midden and a lithic workshop. The village deposits were radiocarbon dated to 1110±70 BP to 580±50 BP, the shell midden 1360±90 to 890±80 BP and the lithic workshop 4000±60 BP to 2270±60 BP. The entire site measures 230 metres from north to south and 130 metres east to west and ranges in depth from 50 centimetres to two metres.

DkRs 14 Recorded in 2007 by Reimer and MacDonald, DkRs 14 is a large lithic scatter and ochre source. Located on the top of Paul Ridge this sub-alpine site offers and excellent view of the surrounding terrain, camping spots and fresh water. Measuring 100 metres east to west and 25 metres north to south, lithic materials are scattered in three large clusters represented early, middle and late stages of reduction of dacite material. A single 14C date was taken from a surface hearth feature, resulting in 40+40BP and likely represents present day on going culture use of ochre gathering at this location.

DkRt 2 Excavated by ARCAS (1999) in 1992, Upeniwa, or “Ten Trees,” radiocarbon dates to 730±80 BP. “Ten Trees” is located two kilometres above the confluence of the Squamish and Cheakamus rivers, north of the town of Squamish (Bouchard and Kennedy 1986). While covered by old growth forest, one grove of ten large cedar trees grows closely together. Transformed into trees, this grove serves as a reminder to Squamish people to respect cedar since it is “part of the family.” Consisting of mostly lithics and processing features, this site measures 15 metres north to south and five metres east to west at an elevation of 60 metres asl along the banks of the Squamish River. It is still a popular fishing camp to this day.



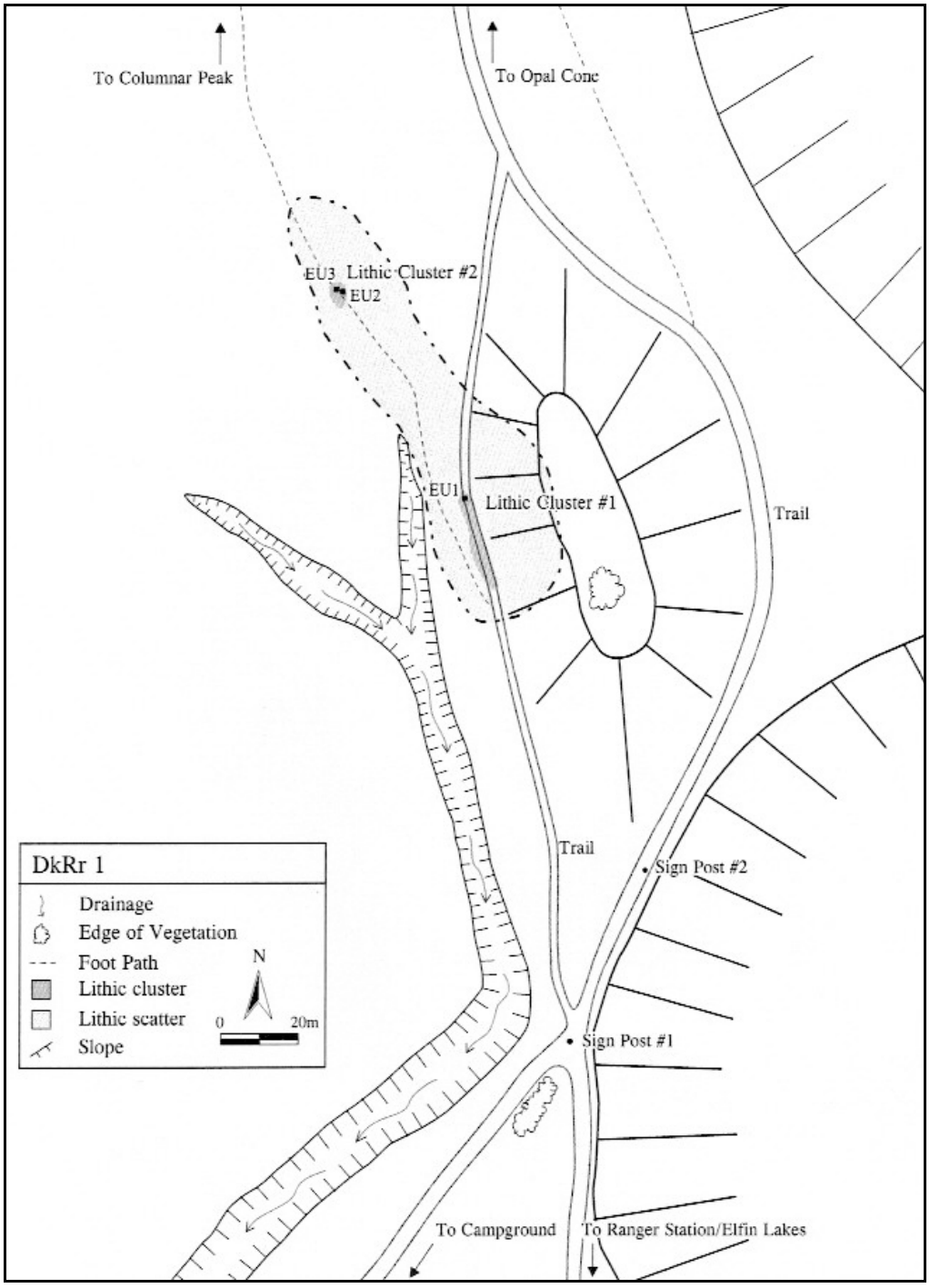
Site Map of DkRs 6.



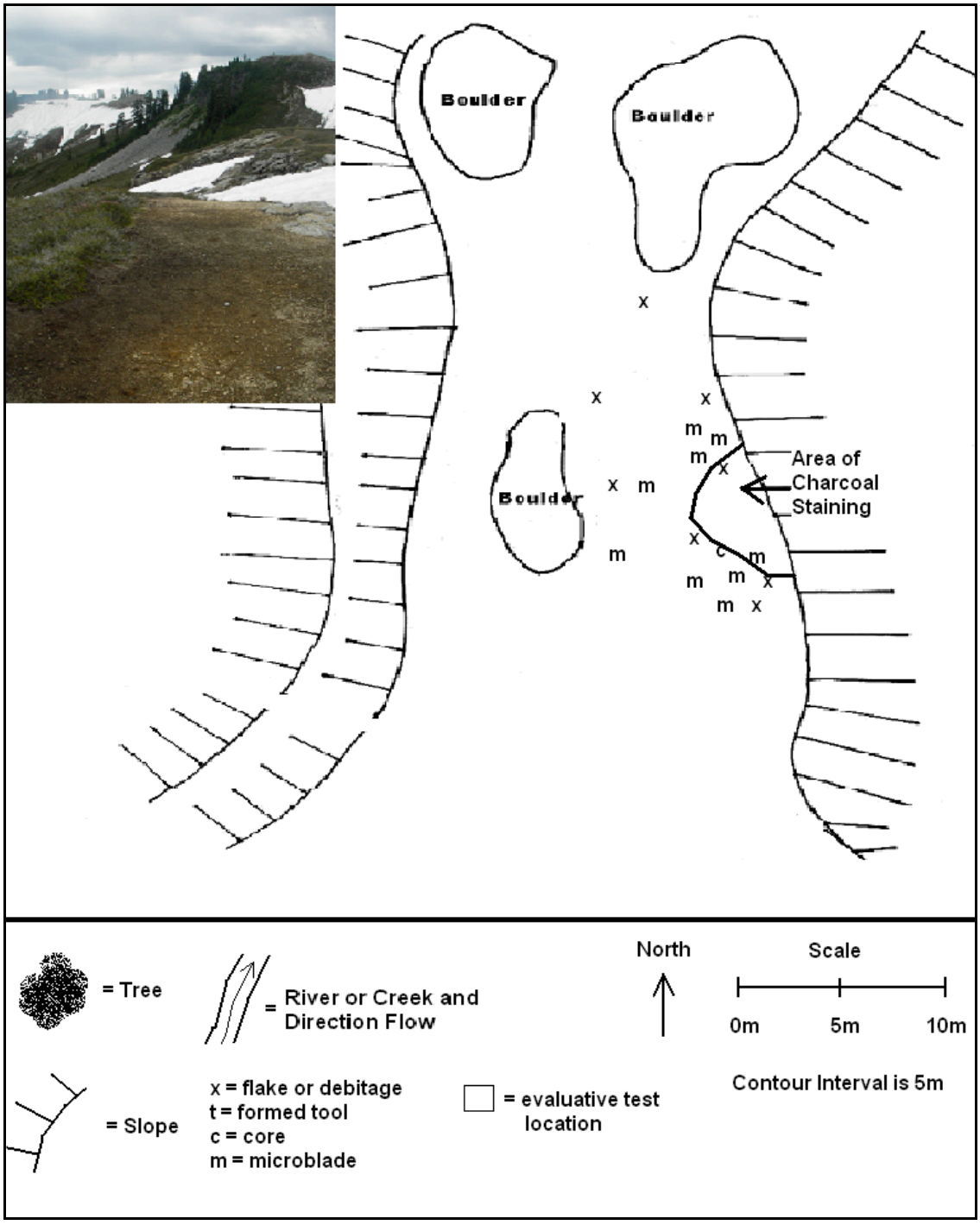
Site Map of DkRt 2.

DkRr1 Excavated by ARCAS (1999) in 1992 the basal deposits of DkRr 1, or *Chi'chshem st'ena'tch* (Outer Hunting Area), were radiocarbon dated to 2840±40 BP. At 1490 metres asl, DkRr 1 is a lithic workshop dominated by varying density clusters of Garibaldi obsidian. The site measures 105 metres north to south, 80 metres east to west and 50 centimetres in the depth with summer to fall occupations only likely due to heavy snow pack during winter and spring months (Reimer 1998, 2000, 2003).

DkRr 2 Investigated by ARCAS (1999) in 1992, DkRr 2 is also associated with *Chi'chshem st'ena'tch*, or “Outer Hunting Area,” but is a smaller version of nearby DkRr 1. At 1650 metres asl and only measuring 10 metres north to south and five metres east to west, with lithic materials only on its surface, this site is likely more of a temporary hunting camp dating to 3000 years BP (Reimer 1998, 2000, 2003).



Site Map of DkRr 1.

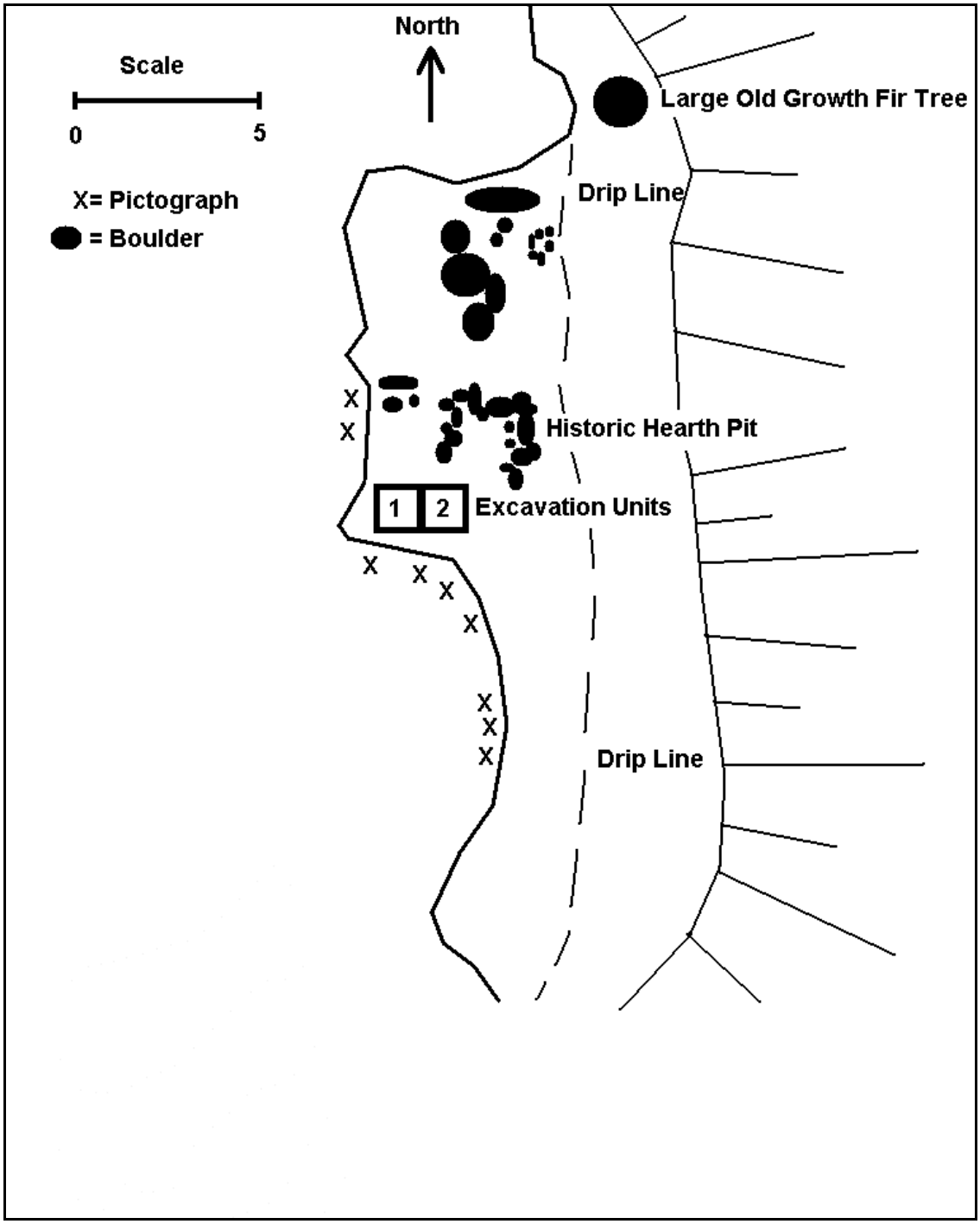


Site Map of DkRr 4.

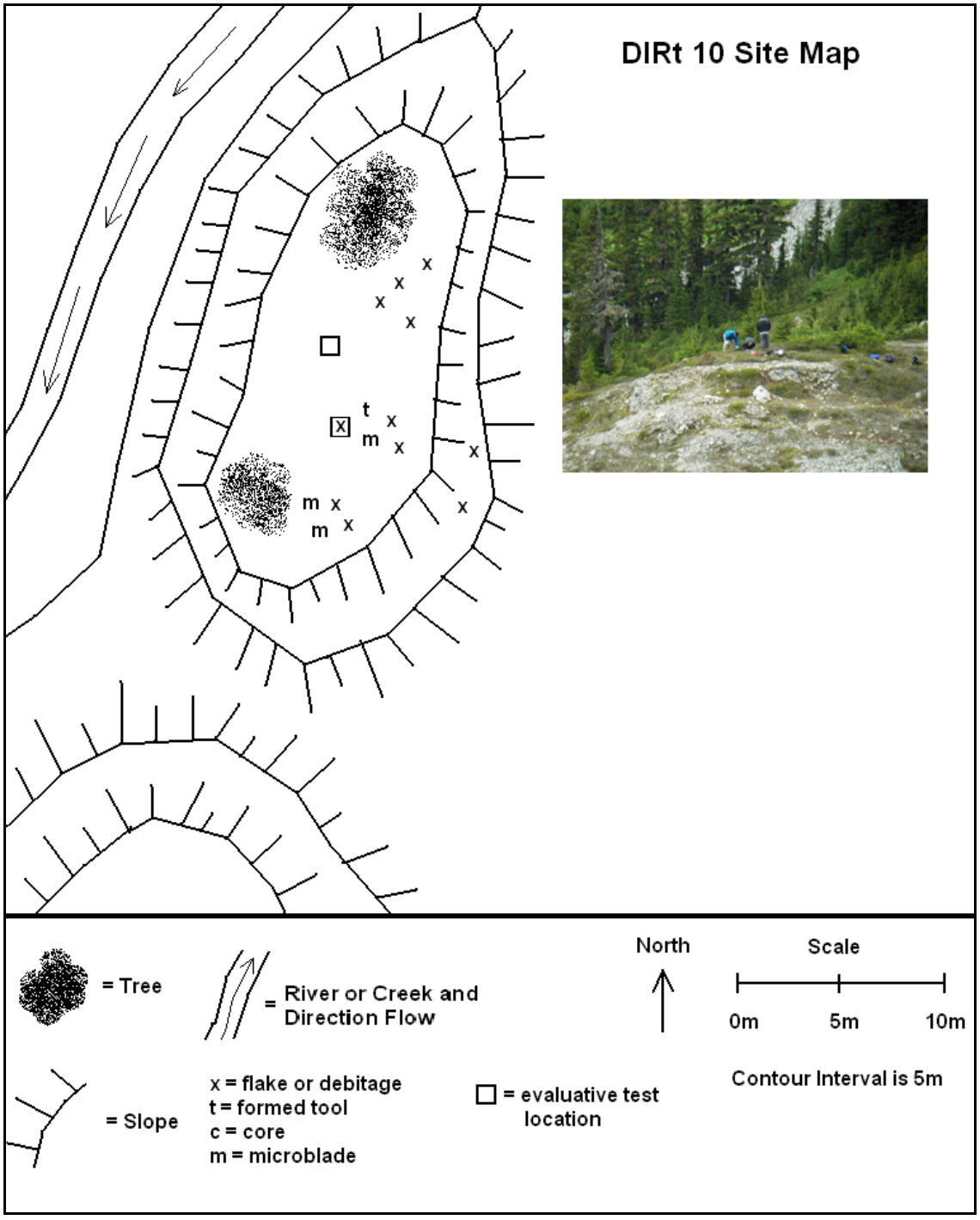
DlRt 9 Tested by Reimer (2006), this site dates from 1410±40 to 60±40 BP. It is located on the slopes of *Nepit'l*, or "Deer Origin Place," (also known as Buck Mountain) (Bouchard and Kennedy 1986). When travelling through this part of Squamish territory, the Transformers encountered a man who was angry at the Transformers for what they were doing, setting the world right. He was sharpening his spear intent on releasing his anger. The Transformers took his spear, broke it into many pieces and placed them on his head and hind legs, changing him into deer. This site is at an elevation of 400 metres asl; it is a medium-sized rockshelter with recent (1930s) historical materials under which are deposits containing a diverse lithic assemblage of five distinct raw materials, an absence of faunal preservation and several overlapping hearth features near the shelter's drip line.

DlRt 10 Recorded by Reimer and Macdonald (2008), this site is located in a large cirque basin, at the outlet of a tarn and on top of a rocky knoll measuring 25 metres north to south and 10 metres east to west. Near clusters of lithic materials at this site, excavation of two evaluative test excavation units found 25 centimetres of in situ sediment deposition. One unit produced no cultural material, but the other contained lithic materials and a hearth feature. The hearth feature, stratified into two occupations, both in situ radiocarbon

dated to 1980±40BP and 6900±40 BP, illustrates long-term use of this locale during summer to fall months. Dacite and glassy dacite materials are found scattered across the surface and buried deposits of this site representing a short-term hunting camp.



Site Map of DlRt 9.



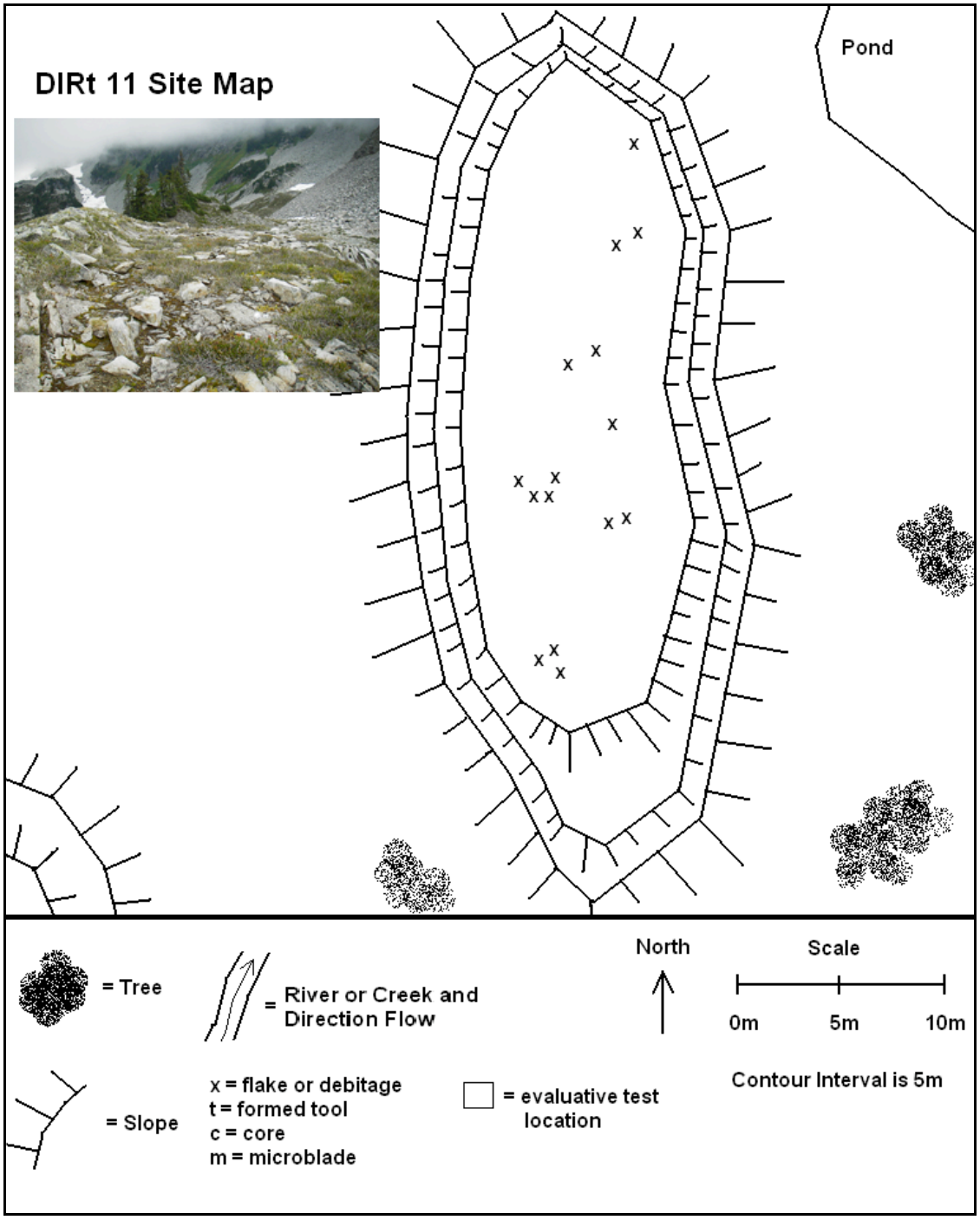
Site Map of DlRt 10.

DlRt 11 Recorded by Reimer and MacDonald (2008), this site is located in a large cirque basin at the outlet of a tarn and on top of a rocky knoll measuring 30 metres north to south and 10 metres east to west. This site is a lithic scatter with only dacite flakes scattered across its surface representing a short-term hunting camp.

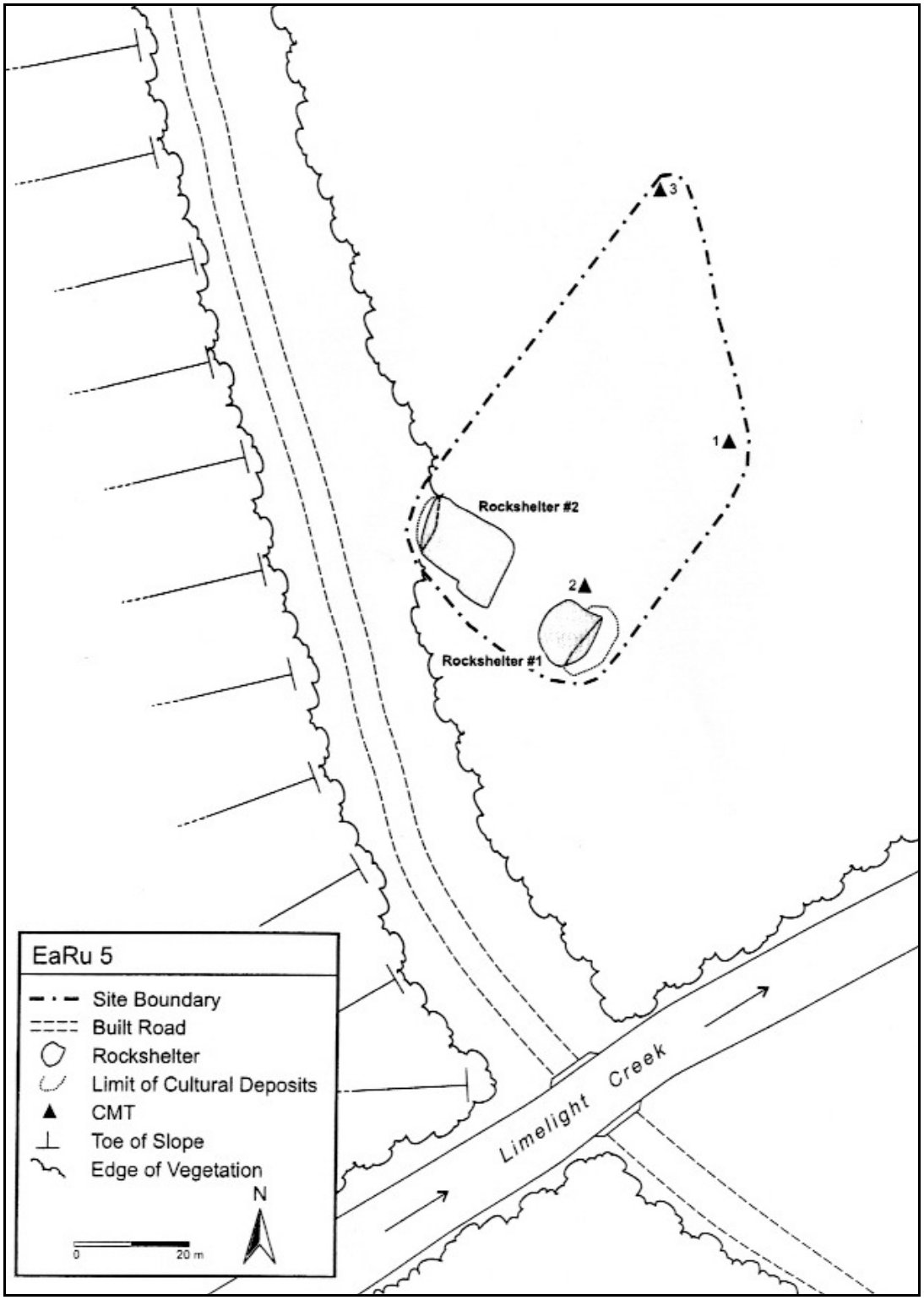
EaRu 2 EaRu 2 is located along a terrace above the Squamish River at 137 metres asl and measures 250 metres north to south and 30 metres east to west (ARCAS 1999a). While no excavation or sub-surface testing has taken place at this site, the lithic assemblage and site location indicate that it is similar to the DkRt 2 site downriver and represents a fishing camp associated with the farthest upriver Squamish Nation village called *Pu'yam*, or "Blackened from Smoke" (Bouchard and Kennedy 1986). Considered high status, the inhabitants of this village were renowned for being great mountain goat hunters.

EaRu 5 EaRu 5 is located at the top of the Elaho River canyon, approximately 62 kilometres north of the Squamish River mouth. It is comprised of two large rock boulder shelters with a site area measuring 50 meters east to west and 30 metres north to south (ARCAS 2002, Reimer 2005). Current day Squamish Nation cultural knowledge mentions that this was an important spiritual and physical training ground. It was also a defensive location, guarding

the Elaho River valley and the entrance to the Squamish River valley. Excavations by Reimer (2005) dated the site to the past 1500 years BP with site deposits containing a wide range of lithic, floral and faunal remains.



Site Map of DlRt 11.



Site Map of EaRu 5.

Appendix 3. XRF Raw Data for *Skwxwú7mesh Uxwumixw* Lithic Sources.

Sample/Element	Mn	Fe	Co	Ni	Cu	Zn	Rb	Sr	Y	Zr	Nb
Turbid 1-1	97	12465	239	715	41	104	112	20651	86	2621	41
Turbid 1-2	131	14922	225	683	41	85	168	23637	166	2746	71
Turbid 1-3	148	14521	192	765	57	136	149	22852	104	2996	18
Turbid 2-1	139	14319	280	758	38	134	167	25057	143	2797	-14
Turbid 2-2	92	12323	235	795	94	111	186	21457	59	2281	-8
Turbid 2-3	166	14548	292	712	82	108	143	24995	110	2683	43
Turbid 3-1	154	14199	201	733	44	149	197	22630	114	2926	56
Turbid 3-2	164	14103	281	776	68	125	131	22099	87	2519	48
Turbid 3-3	95	15394	158	778	52	95	148	19227	135	2493	15
High Falls 1-1	191	21345	345	729	58	99	149	16975	118	1985	12
High Falls 1-2	203	23841	452	785	89	145	97	17542	193	2398	36
High Falls 1-3	216	23403	496	728	45	119	100	17259	226	1960	21
High Falls 2-1	200	20295	455	734	49	111	92	15146	150	1985	52
High Falls 2-2	186	19134	316	772	69	94	71	14805	172	1999	45
High Falls 2-3	235	23427	393	696	38	116	100	16804	190	2386	6
High Falls 3-1	173	18138	377	747	47	120	132	13205	133	2355	80
High Falls 3-2	229	20279	377	745	45	105	127	13240	149	2408	72
High Falls 3-3	133	16184	369	791	89	123	123	15524	106	2275	31
Garibaldi Fine 1	86	3353	42	583	19	67	359	3776	129	1563	122
Garibaldi Fine 2	110	4163	56	765	53	62	510	4991	130	2530	62
Garibaldi Fine 3	113	2939	15	799	39	79	502	4973	117	2064	27
Garibaldi Medium 1	112	3139	1	748	30	76	487	4949	175	2294	82
Garibaldi Medium 2	105	2735	1	844	28	78	382	4517	57	1715	74
Garibaldi Medium 3	18	2832	62	762	43	82	483	4753	112	1816	43
Garibaldi Coarse 1	85	3896	16	832	34	76	452	4699	94	1815	98
Garibaldi Coarse 2	134	7187	54	824	49	106	449	5038	154	1963	29
Garibaldi Coarse 3	133	3172	25	816	48	84	447	4691	147	2029	44
Ring Creek 1-1	91	12809	246	699	55	113	147	12453	142	1763	15
Ring Creek 2-1	147	9596	136	754	114	81	250	9246	132	2130	111
Ring Creek 3-1	158	12718	217	785	182	112	111	16756	126	2457	63
Watts Point 1-1	131	11055	160	718	103	96	290	8819	158	2223	57
Watts Point 1-2	95	11189	195	790	80	88	288	9777	144	2440	65
Watts Point 1-3	91	10816	229	742	77	84	211	9441	114	2227	36
Watts Point 2-1	113	11325	247	867	70	135	207	9677	159	2500	60
Watts Point 2-2	152	12708	282	767	40	112	261	10618	177	2734	75
Watts Point 2-3	61	11587	251	809	76	90	198	9864	124	2462	34
Watts Point 3-1	84	11795	282	746	40	116	290	10085	208	2583	65
Watts Point 3-2	117	12856	232	770	94	120	278	10605	199	2603	58
Watts Point 3-3	138	11247	193	729	72	99	270	9499	144	2450	17
Anvil Island 1	187	13527	295	702	32	140	566	2570	467	2319	132
Anvil Island 2	216	13178	242	811	16	104	547	2512	451	2214	55
Anvil Island 3	183	16467	330	706	79	153	786	2827	626	2709	76
Anvil Island 4	247	16534	399	786	108	126	849	2597	552	2503	58
Anvil Island 5	149	14831	277	699	39	125	817	2608	462	2651	53

Anvil Island 6	214	15257	248	730	38	115	763	2723	574	2662	149
Anvil Island 7	188	13323	224	732	35	114	649	2929	665	2585	132
Anvil Island 8	176	13788	249	779	35	133	873	2647	467	2627	89

Appendix 4. XRF Raw Data from Artifacts in Archaeological Site from across *Skwxwú7mesh Uxwumixw*.

Sample/Element	Mn	Fe	Co	Ni	Cu	Zn	Rb	Sr	Y	Zr	Nb
DkRs 6 EU2 L 10 #570	128	11644	262	782	66	71	246	9617	105	2412	10
DkRs 6 EU2 L15 #612	111	10942	196	752	95	94	198	9193	153	2271	57
DkRs 6 EU2 L2 #372	99	10053	202	774	93	166	331	8959	112	2146	24
DkRs 6 EU 2 L6 #509	124	11351	215	757	56	97	226	11033	174	2593	15
DkRs 6 EU2 L2 #383	180	13929	282	813	43	156	225	11449	182	2575	56
DkRs 6 EU2 L2	143	12035	278	761	69	121	217	9753	135	2202	55
DkRs 6 EU2 L3	97	10303	214	778	31	144	421	9315	99	2166	34
DkRs 6 EU2 L 11 #583	175	14011	346	761	48	113	125	19292	138	2649	6
DkRs 6 EU2 L6	83	11259	219	813	70	130	202	13380	90	1971	13
DkRs 6 EU2 L7 #521	140	12132	281	843	80	150	245	9747	109	2351	36
DkRs 6 EU2 L8 #541	81	11937	257	758	83	101	259	10554	147	2504	32
DkRs 6 EU2 L 14 #608	144	13266	284	787	129	118	253	10601	227	2614	56
DkRs 6 EU2 L 11	129	11463	239	794	60	149	285	9102	137	2107	38
DkRs 6 EU2 L12 #594	86	10834	182	780	75	111	222	10218	121	2238	18
DkRs 6 EU2 L4 #460	120	12748	221	774	45	104	246	10491	210	2663	18
DkRs 6 EU2 L5 #495	123	12495	207	763	50	118	253	10643	189	2572	52
DkRs 6 EU2 L3 #397	148	12924	264	760	34	122	277	10881	170	2607	25
DkRs 6 EU2 L9 #594	166	15055	327	755	85	182	183	26435	68	3062	31
DkRs 6 EU2 L9	76	11502	280	709	60	115	365	10272	173	2599	19
DkRs 6 EU2 L 3 #421	171	10501	226	849	55	105	387	9530	183	2420	22
DkRs 6 EU2 L13 #599	74	11606	180	806	58	93	269	9822	142	2571	28
DkRs 6 EU2 L1 #328	142	11299	267	777	78	113	258	8959	87	2144	7
DkRs 6 EU4 L2 #3710	152	3319	23	783	50	101	512	5138	154	2503	59
DkRs 6 EU4 L1 #3087	88	12451	210	775	78	127	215	9183	105	2396	84
DkRs 6 EU4 L1 #2809	120	3063	50	805	37	136	487	5277	147	1913	34
DkRs 6 EU4 L2 #3709	102	3041	15	835	46	87	493	4691	144	2136	78
DkRs 6 EU4 L1	146	11664	201	816	43	380	547	9582	89	2258	32
DkRs 6 EU2 L10 #10717	128	13068	219	712	53	91	294	9764	155	2390	70
DkRs 6 EU4 L2 #3401	122	12709	286	820	61	125	184	10003	167	2532	33
DkRs 6 EU4 L2 #3402	128	14123	240	782	98	98	273	10600	148	2593	82
DkRs 6 EU4 L2 #3678	231	16777	288	718	37	55	170	2633	467	3983	125
DkRs 6 EU4 L3 #4080	154	2880	24	787	31	63	485	4467	84	2052	51
DkRs 6 EU4 L3 #4106	246	16875	312	711	47	61	187	3193	386	4294	139
DkRs 6 EU4 L3 #4201	124	14661	258	747	37	128	136	22525	82	2683	38
DkRs 6 EU4 L4 34651	79	2760	27	814	42	80	469	4912	129	1859	90
DkRs 6 EU4 L4 #5074	101	11513	261	801	54	117	251	10014	171	2321	24
DkRs 6 EU4 L4	92	2872	1	803	36	74	601	4761	125	1871	102
DkRs 6 EU4 L4	204	15618	281	806	0	102	238	4316	454	2360	105
DkRs 6 EU4 L5 #5520	69	3311	1	798	34	78	493	4849	170	2575	44
DkRs 6 EU4 L5 #6066	109	14670	221	743	66	105	166	22512	113	2743	55
DkRs 6 EU4 L5 #6067	174	15656	377	727	80	111	230	9782	219	2652	90
DkRs 6 EU4 L6 #7151	167	15724	348	751	54	140	233	9084	159	2283	33
DkRs 6 EU4 L6 #7162	80	11050	225	777	79	90	246	9723	141	2305	33

DkRs 6 EU4 L6 #8444	147	3374	61	807	43	85	547	5198	122	2127	41
DkRs 6 EU4 L7 #10165	104	13030	193	745	27	109	243	10214	143	2545	29
DkRs 6 EU4 L 8 #10472	132	12797	258	754	40	193	229	9722	145	2506	44
DkRs 6 EU4 L9 #10615	86	12230	163	755	79	102	293	10146	139	2505	53
DkRs 6 EU4 L9 #10616	102	12080	175	736	65	149	314	9726	198	2316	36
DkRs 6 EU5 L3 #742	163	11288	234	664	56	92	246	9244	153	2216	53
DkRs 6 EU5 L4 #768	151	12132	252	784	45	104	252	10574	203	2461	36
DkRs 6 EU5 L5 #5520	105	3194	39	775	46	71	519	4532	135	2070	155
DkRs 6 EU5 L2 #714	148	10939	227	751	75	103	265	9150	157	2211	29
DkRs 6 EU5 L5 #788	113	11849	195	789	53	110	329	9313	112	2263	48
DjRs 6 EU5 L6 #826	157	13455	214	769	14	123	243	9959	235	2430	29
DkRs 6 EU5 L 6	104	10105	263	793	39	160	554	9219	161	2331	76
DkRs 6 EU 5 L7 #837	157	13267	267	798	49	129	262	10211	164	2626	23
DjRs 6 EU 5 L8 #853	178	12259	207	765	33	99	186	9384	213	2505	22
DkRs 6 EU 5 L9 #11529	219	12083	247	735	33	297	444	9936	211	2316	33
DkRs 6 EU 5 L9 #908	113	11592	171	757	71	111	204	9888	153	2472	79
DkRs 6 EU 5 L9 #909	96	10049	179	709	87	107	334	9090	128	2292	39
DkRs 6 EU 5 #732	167	12930	271	758	44	131	372	8141	167	2095	66
DkRs 6 EU 5 L 10 #919	111	13928	284	716	87	144	139	22625	150	2798	22
DkRs 6 EU 5 L11 #972	116	11342	209	755	59	127	257	10188	157	2500	65
DkRs 6 EU 5 L12 #1104	147	12276	181	763	24	97	308	10446	187	2469	30
DkRs 6 EU 5 L 15 #1018	165	14913	294	725	51	135	252	23491	82	2711	0
DkRs 6 EU 5 L 17 #1047	192	11356	235	669	43	531	562	10091	94	2253	55
Dkrs 6 EU 5 L17 #1079	92	11861	212	743	60	138	224	13428	119	2069	11
DkRs 6 EU 5 L 16 #1023	166	12475	228	754	74	117	211	13595	67	2085	27
DkRt 2 #51	74	10894	178	735	55	110	283	9278	179	2350	41
DkRt 2 #50	140	13358	292	841	51	132	247	23680	64	2731	32
DkRr 1 L2	87	2743	33	782	38	66	438	4899	98	1793	85
DkRr 1 L1	66	2564	20	820	39	80	416	4290	96	1838	33
DkRr 1 L1	197	2861	1	830	16	59	469	5676	131	2082	39
DkRr 1 L3	85	2524	51	823	55	92	412	4474	113	1841	103
DkRr 2 Cluster #1	90	2795	31	804	50	81	490	4710	161	2143	74
DkRr 2 Cluster #2	119	2871	36	761	52	67	482	5107	87	1917	57
DkRs 14 Cluster 2	990	19047	355	784	57	131	177	10881	227	1976	14
DkRs 14 Cluster 1	178	9423	194	717	16	85	197	10933	136	1982	16
DlRt 9 EU1 L0 UF	98	13355	250	711	88	124	209	22376	117	2775	39
DlRt 9 EU1 L1 Scraper	188	13448	354	776	49	150	157	22553	141	2729	34
DlRt 9 EU1 L3 Axe	123	14941	313	780	90	175	201	24099	152	2883	16
DlRt 9 EU2 L4 notch	88	12529	390	805	68	102	228	12195	144	2140	27
DlRt 9 EU1 Surface Point	154	13565	230	800	93	100	114	19168	63	2358	38
DlRt 9 EU2 L1 Point	160	7861	146	729	33	95	1544	6182	86	3686	124
DlRt 9 EU2	88	7634	145	750	63	149	864	5726	1	1959	0
DlRt 9 EU2 L2	163	3236	64	766	52	86	512	5961	156	1865	122
DlRt 9 EU2 L2 Pebble Tool	127	10697	198	745	35	84	153	19252	91	2567	74
DlRt 9 EU2 L3 Biface	210	18214	376	787	35	142	1186	1177	240	2163	103
DlRt 9 EU2 L1	95	9603	155	757	70	132	324	3859	707	2379	118

DlRt 10 #9	76	9502	213	765	67	91	308	5878	172	2045	85
DlRt 10 #5	173	9807	242	766	28	91	272	5943	218	1797	100
DlRt 11 #6	165	13614	238	767	106	159	222	22067	96	2880	29
DlRt 11 #3	145	12323	260	704	63	137	159	19918	65	2449	39
EaRu 2 #1	149	15043	259	789	106	130	93	25803	88	2779	53
EaRu 2 #18	140	14118	269	751	101	126	115	21722	105	2533	16
DiRt 1 #117	118	11687	227	700	46	118	248	9704	155	2428	62
DiRt 1 #116	133	14110	209	747	66	125	271	9818	159	2563	63
DiRt 11 L2 #31	149	11088	262	768	49	124	184	10524	146	2084	37
DiRt 11 L6 #112	125	11972	274	753	114	103	276	10837	151	2600	29
DiRt 11 L5 #44	202	17129	303	774	43	77	115	9076	171	1940	100
DiRt 11 L8 #196	105	14171	288	740	61	65	189	10206	279	2311	29
DiRt 11 L8 #200	210	14977	347	814	57	108	213	10278	189	2646	38
DiRu 10 L12 #124	108	11852	187	828	84	116	319	9772	164	2588	31
DiRu 10 L5 #24	130	15006	242	800	40	122	205	10061	214	2629	41
DiRu 10 L8 #55	100	11942	240	811	48	110	328	8899	136	2379	89
DiRu 10 L5 #223	199	15077	331	718	27	138	558	2469	551	2545	120
DiRu 10 L14 #166	187	12102	218	700	0	100	418	2567	471	2389	116
DiRu 10 L3 #206	129	12955	184	820	72	128	312	10516	138	2485	75
DiRu 15 L7 #204	202	13181	289	720	44	122	351	2263	470	2103	99
DiRu 15 #102	201	11677	277	714	24	143	292	2733	426	1974	80
DiRu 15 #301	122	13141	287	843	60	133	276	10873	157	2420	62
DiRu 15 L5 #97	96	13229	264	738	51	105	303	9946	148	2715	25
DiRu 15 #573	123	11904	215	755	43	110	331	9654	137	2533	62
DiRu 15 #79	84	10977	181	833	55	101	285	9212	198	2461	58
DiRu 16 L12	95	5825	124	714	81	69	655	3368	179	2728	76
DiRu 16 #143	87	10588	157	713	37	94	285	8988	194	2318	27
DiRu 16 #149	101	11041	161	743	43	74	200	8809	100	2246	34
DiRu 16 L10 #116	291	38304	816	736	14	296	429	698	265	2455	105
DiRu 16 L10 #114	137	13289	235	711	53	117	145	22165	95	2588	28
DiRu 16 L10 #115	89	11860	215	662	56	101	282	9459	181	2326	0
DiRu 19 L3	131	10789	196	642	75	121	244	8286	179	1994	10
DiRu 19 L4 #181	93	2648	1	726	1	80	476	4461	109	1870	76
DiRu 19 L5 #238	104	11443	177	755	58	97	321	9030	143	2257	0
DiRu 19 #437	136	3262	38	789	66	92	468	5928	154	2066	41
DiRu 19 L6 #293	133	11873	211	737	46	119	580	9382	106	1957	29
DiRu 19 L11 #498	89	11876	220	771	42	94	275	9816	148	2266	48
DjRt 3 #2	41	8557	126	732	114	139	1047	8175	1	3476	47
DjRt 3 #6	177	13305	312	780	27	128	613	2793	511	2304	89
DjRt 3 #4	164	12297	167	843	63	91	550	1750	492	2360	54
DjRt 3 #3	315	21244	447	782	57	126	206	4616	501	2384	63
DjRt 5 #94	151	12005	211	807	54	70	186	8292	105	1933	91
DjRt 5 #176	160	13668	286	785	64	110	238	9947	213	2567	15
DjRt 5 #183	102	10923	217	746	73	128	549	3192	675	3414	137
DjRt 5 #175	126	13771	180	757	55	82	248	10236	183	2508	68
DjRt 5 L3 #93	175	12108	213	798	52	53	403	3353	818	3320	188
DjRt 5 #182	96	9641	215	810	87	122	288	8695	148	2445	0

DjRt 6 L6 #39	102	12789	278	859	54	145	330	11038	168	2464	28
DjRt 6 L6 #38	96	13313	293	883	60	89	197	14334	168	2413	21
DjRt 6 L5 #69	113	12927	269	695	43	71	225	10529	137	2402	45
DjRt 6 L5 #29	111	10753	170	768	88	206	460	8827	113	2320	40
DjRt 12 ST#9 #2	150	7435	132	804	75	117	1440	5945	31	3416	92
DjRt 12 ST#5 35cm	205	21262	476	748	93	461	1150	1927	296	2349	147
DjRt 12 ST#5 35cm #2	278	25012	521	781	57	484	808	2716	253	2553	104
DjRt 12 ST#9 #1	301	8125	168	733	89	106	1566	5868	35	3351	54
DhRr 6 A8 L4	140	14289	269	745	63	126	205	21448	121	2370	13
DhRr 6 frag A	159	23958	561	683	47	161	654	1456	122	1325	95
DhRr 6 frag B	175	15025	307	671	52	122	134	5994	37	437	23
DhRr 6 broken tool	188	13542	295	751	77	121	242	10888	207	2717	33
DhRr 6 L12	147	11916	205	701	74	95	270	9765	138	2339	44
DhRr 6 A8 L3	18	13339	245	662	0	21	119	272	101	263	24
DhRr 6 A8 L 12	171	11005	196	836	83	91	311	8866	148	2344	26
DhRr 18 #196	9	1627	1	794	33	3	747	2805	616	1838	580
DhRr 18 #196	30	2712	36	799	47	49	701	2887	278	1627	209
DhRr 18 #141	1	3036	1	833	45	23	556	3006	176	2248	114
DhRs 16 #220	137	12130	238	738	40	142	232	10611	154	2464	0
DhRs 16 #175	158	11961	249	740	48	67	465	2716	218	1847	44
DhRs 16 #172	109	10938	182	729	70	123	324	8746	139	2310	37
DhRt 6 57cm	53	7681	181	454	14	72	149	6018	85	1461	12
DhRt 6 140-160	95	6990	106	472	61	86	152	5939	101	1432	45
DhRt 6 100-120cm	69	15042	281	422	33	240	619	1413	201	1486	92