CHAPTER 27

Ground Stone Celt Production and Use in the Lower Fraser River Region

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Introduction

Archaeologists have long regarded ground stone celts as important artifacts in the Northwest Coast culture area. These distinctive stone tools have figured prominently in culture histories (Borden 1968; Matson and Coupland 1995; Mitchell 1971), they are considered to be direct evidence for intensive woodworking traditions (Borden 1954, 1968, 1970; Carlson 1996), and regarded as an important valuable commodity acquired and widely distributed through interregional trade and exchange (Blake 2004; Burley 1980, 1981, 1989; Grier 2003; Mackie 1995) (Figure 1). It seems appropriate then, given the significance of these three issues to the later prehistory of the Lower Fraser River, to have a firm understanding of the morphological and mineralogical variation, and the spatial distribution of ground stone celts and production debris resulting from their manufacture. This chapter presents an overview of recent research regarding production and use of celts, with implications for exchange, interaction, and status relationships among peoples who lived along the lower reaches of the Fraser River from Boston Bar to Marpole.

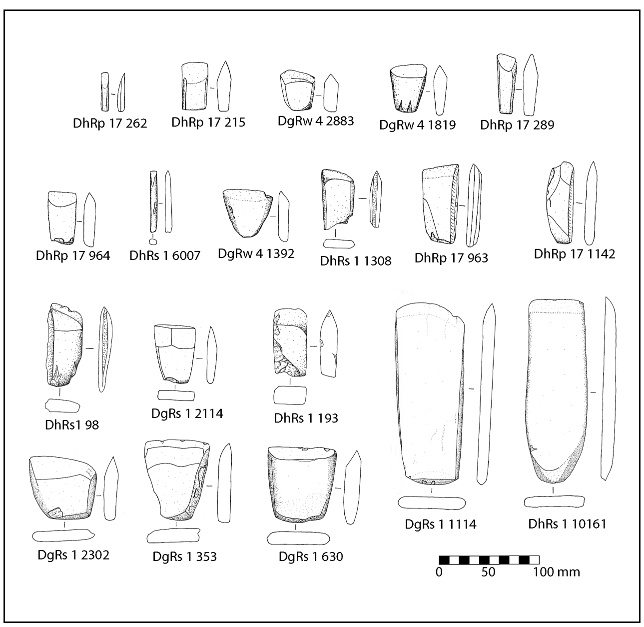

Figure 1. Examples of Ground Stone Celts from sites in the Lower Fraser River Region.

Ground stone celts reliably occur in the archaeological record by ca. 3500 BP, but do not become numerous until about 2500 BP (Morin 2012). On the Lower Fraser River, they were made of a variety of 'celt stones', including nephrite/jade, serpentinite, chlorite, quartzite and 'basaltic' alluvial stones. Pre-contact period inhabitants of the Lower Fraser differed from other Southwest British Columbia groups in that they produced the majority of their celts locally, and also produced celts for export as commodities.

A number of sites in the Hope locality provide excellent evidence for the entire production and use sequences of ground stone celts, while sites lower downstream exclusively contain evidence for completed celt use and consumption to exhaustion. Most imported finished celts likely originated from both the Hope locality, and from the Lytton-Lillooet localities in the Mid-Fraser region. In this chapter, I summarize my mineralogical and spatial analyses of ground stone celts and production debris from sites in the Lower Fraser region.

A Brief History of Celts

Ground stone celts appear rather suddenly in the archaeological record of the Lower Fraser around 3500 BP, albeit in very low numbers, and they are largely made of a type of rock – nephrite – that had never been culturally exploited during the first 7000 years of occupation of the region. The standard archaeological inference for their appearance is that they mark the origins and florescence of intensive woodworking traditions of the ethnographic Northwest Coast (Borden 1954, 1968, 1970; Carlson 1996), and I find no compelling reason to disagree with this assumption.

The earliest widely reported dates associated with ground stone celts in the Lower Fraser region are from the Pitt River site (DhRq 21) at ca. 4100 BP (Patenaude 1985). I have been warned by a number of archaeologists that the early deposits at this site were badly mixed with overlying deposits (R. Carlson pers. comm. 2009; R.G. Matson pers. comm. 2009). There are no ground stone celts in any other Charles Culture (ca. 4500 to 3500 BP) assemblages, even those such as Mauer (LeClaire 1976; Schaepe 2003) and Xaytem (Mason 1994) which all have large assemblages of artifacts and evidence for substantial architecture (Chapter

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25). Celts made of ground giant California mussel shell (*Mytilus califonianus*) do occur regularly in Charles Culture (and later) assemblages (e.g., St. Mungo, DgRr 2 and Crescent Beach, DgRr 1) and are likely functional equivalents of later ground stone celts (Matson and Coupland 1995:103). These ground mussel shell celts would have been imported to the Lower Fraser region from the outer coast of Vancouver Island or Washington, as they do not occur in the protected waters of the Salish Sea (Harbo 1997; Rickets *et al*. 1985). As antler wedges are also common in Charles Culture components of Glenrose and St. Mungo (Matson and Coupland 1995:103), it is clear that intensive heavy woodworking technology existed earlier than the Locarno Beach Phase (ca. 3500 to 2500 BP), but given the apparent later increase in the number of wedges and introduction of ground stone celts, it appears that heavy woodworking became much more of an integral component of material culture during the Locarno Beach Phase.

Both regionally and locally, ground stone celts are found in the earliest components of Locarno Beach Phase assemblages such as the Locarno Beach site (DhRt 6) (ca. 3100 BP), Musqueam Northeast (DhRt 4) (ca. 3000 BP), DhRp 52 (ca. 3500 to 3000 BP), and the problematic Pitt River site (ca. 3300 BP). It is perhaps not random that earliest sites containing ground celts, DhRp 52 and Pitt River lie only a few kilometers from one another. At this point it appears that the earliest solid evidence for ground celt use in southwest B.C. is from sites around the confluence of the Pitt and Fraser Rivers.

Variable Mineralogy of Lower Fraser Celts

Visually identifying mineralogy of stone celts is often difficult. Mackie's (1995) pioneering research into ground stone celts produced many useful insights, but his classification of celt mineralogy was based on visual inspection alone. A significant confounding issue first identified by Mackie (1995:49-55), was that a considerable proportion of these celts appear to have been intentionally heat-treated. Heat-treating or thermal alteration of nephrite causes it to become slightly harder, with some loss of toughness (resistance to fracture), and causes it to immediately become opaque (it is usually translucent), and darker towards shades of very dark green to black (Beck 1981). Moreover, a wide range of color changes have been observed in experimental heat-treatment of nephrites from different sources at different temperatures (Moore 2010). Suffice it to say, heat-treatment of nephrite often further confounds accurate visual identification of celt mineralogy.

The first geochemical analysis of stone celts in this region was carried out by McGinity (2007), who examined specimens from a number of sites along the Lower Fraser River using a Near Infrared Spectrometer (Portable Infrared Material Analyzer - PIMA). McGinity found that a variety of rocks were used to produce stone celts in the region, and that individual sites have variable proportions of celt stone material composition. McGinity's (2007) research, in conjunction with a (Brown *et al.* 2008) literature review of all reported nephrite celt production debris (sawn cores and fragments), indicates there is obvious marked spatial separation between the major celt-producing and celt-using localities in the Lower Fraser River region. Celts were clearly being produced by people living in one area and exchanged to those living elsewhere. Building on this previous line of research, my investigations explored prehistoric exchange of stone celts in British Columbia, relying on an NIR spectrometer (Terraspec) for carrying out mineralogical assays on over 2000 artifacts and sourcing approximately 830 nephrite artifacts from all major repositories including the Royal British Columbia Museum, the University of British Columbia, Simon Fraser University, the Canadian Museum of Civilization, the Museum of Vancouver and numerous other smaller museum and private collections.

Near Infrared (NIR) spectrometry relies on the particular pattern of light/heat absorption and vibration in materials and can be used to accurately identify the material composition of an unknown object. It is most effective on organic materials but can be used to identify many hundreds of rocks and minerals (Clark *et al.* 1990; Clark 1999; King and Clark 1989). This technique has been applied in agriculture, pharmacological, and food science for decades (Bokobza 1998; Casale *et al.* 2008; McDevitt *et al.* 2005; Osborne 1993), but only recently in archaeology (Beck 1986; Curtiss 1993; Emerson *et al.* 2013; McGinity 2007; Parish 2011; Wiseman *et al.* 2002; Zhang *et al.* 2007). NIR spectrometers can be portable, the technique is non-destructive, and it provides near-instant results. Raw material confirmation in NIR analysis attained by matching the spectra of an unknown sample that of sample known identity in a spectral library (Kemper and Lucheta 2003). The results of my NIR analyses of artifacts (celts, celt fragments, sawn cores, and celt production debitage) from archaeological sites along the Lower Fraser River were converted into a georeferenced database using ArcGIS to represent patterns in celt production and utilization.

Ground Stone Celt Production on the Lower Fraser

Nearly all celts from the Lower Fraser River region were made by either: sawing celt blanks or performs from alluvial and fluvial pebbles, cobbles or small boulders, and then grinding those into celt form; or grinding suitably sized and shaped natural pebbles into celt form. I have observed no evidence for celt production by flaking and then grinding techniques in the Lower Fraser River region (Mackie 1995:52). Tell-tale signs that celts were produced via sawing technique include: sawn grooves on celts, septa or snapped lateral margins of celts, and extremely regular, flat, parallel faces of the celt body.

Because most celts were produced via sawing technique, the distribution of sawn cores from which celt-blanks were removed provides the best line of evidence for identifying centres of celt production. Within the study area, there are a large number of pebble-cobble sized sawn cores in the vicinity of Hope, and extremely little evidence of sawn celt production downstream from Katz. Almost all of these sawn cores retain portions of rounded, smooth cortex, suggesting they were subjected to alluvial transport by the Fraser River, and were likely collected or 'quarried' in the gravel bars and islands that are common from Hope to Katz (Leaming 1978; Morin 2012, 2015a).

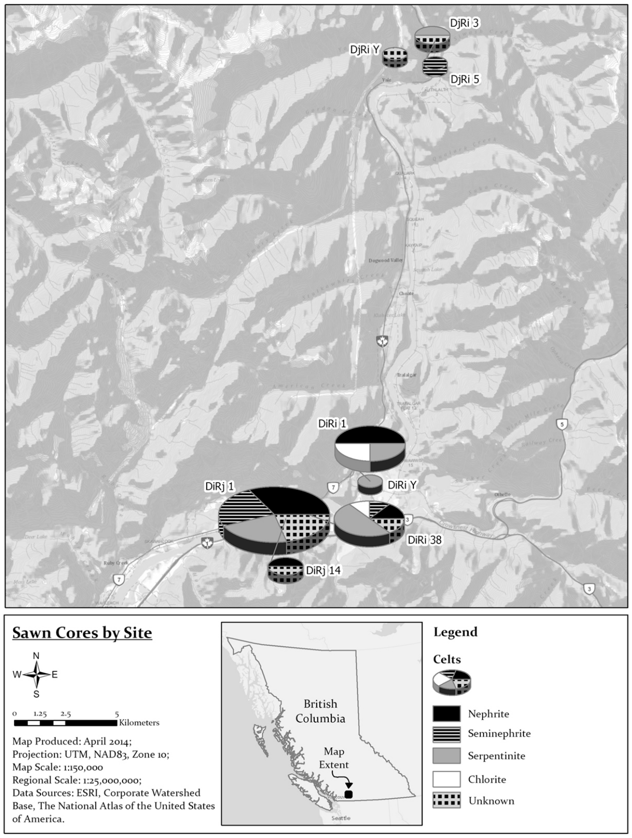

Figure 2. Distribution and mineralogical assignment of Sawn Cores on the Lower Fraser River.

A suite of rock types were selected from the gravel bars of the Fraser River and sawn in this manner, including nephrite, seminephrite, serpentinite, chlorite, and unknown or 'basaltic' materials. In the Lower Fraser River Region, sawn cores made of nephrite always comprise a minority of the assemblage of sawn cores. A single sawn nephrite core from Port Douglas, near the mouth of the Lillooet River at the north end of Harrison Lake is the only exception to this trend. The Hope Bridge (DiRi 1), Flood (DiRi 38), Pipeline (DiRj 14), and Katz (DiRj 1) sites have yielded assemblages containing the most complete and convincing evidence for celt production in the region. There are also a substantial number of sawn cores and schist saws from unknown sites and poorly documented contexts in the Hope vicinity (Table 1). The Katz-Hope vicinity appears as the primary celt production centre for the Lower Fraser region (Figure 2). When viewed inter-regionally, however, this production centre is overshadowed by celt production further upstream in the Mid-Fraser from Lytton to Lillooet, where the volume of evidence for celt production is much larger than at Katz-Hope, and was more specialized towards production of high-quality nephrite celts and very large/long nephrite celts (Morin 2016). Given this marked clustering of sawn cores around Hope, it appears that unworked nephrite cobbles and boulders were not exchanged beyond the Hope locality, nor were they collected by non-local peoples and transported downstream to be worked in their home communities.

I suspect that the vast majority of nephrite celt stone was collected during the winter and early spring months by local inhabitants when water levels are low. While Alexander (1992:161) suggests that nephrite could have been gathered during the late summer salmon fisheries along the Fraser, I suggest this would be a highly unfavourable time to locate nephrite because the river levels are rather, and most gravel bars are inundated (Morrison *et al.* 2002). Instead, the preferred seasons of alluvial nephrite procurement for local 'rock hounds' are late winter and early spring, because river levels are very low exposing substantial gravel bars, and the river continually redeposits more nephrite from major sources further upstream (Leaming 1978). For these reasons I suggest that this was carried out by individuals living in villages close to the Fraser River during this season of otherwise limited subsistence activity.

I briefly review the spatial distribution and the results of mineralogical analyses of sawn cores from four significant sites on the Lower Fraser: Hope Bridge, Flood, Katz and Pipeline, because they provide the best evidence for celt production and are critical for understanding exchange systems involving these artifacts. Sites along the Fraser upstream from Hope in the Yale locality contain very little evidence for celt production (e.g., Esilao [DjRi 5] and Milliken [DjRi 3]) (Figure 2; Table 1), and it is only upstream near Lytton that sawn cores are found.

There is ample evidence of a center of sawn celt production on the Fraser River near its confluence with the Coquilhalla River near Hope. At the Hope Bridge site sawn cores, sandstone or garnet schist saws, and nephrite debitage occur in abundance. The Hope Bridge site contains the largest quantity of reported nephrite debitage (about 300 pieces of surface collected nephrite-like debitage) of any site identified. Analysis of a small sample of this debitage (n=10) indicates that 90% of it is indeed nephrite. Of the 8 sawn cores from Hope Bridge, four are nephrite, two are chlorite, and two are serpentinite (Figure 2; Table). The nearby Flood site has also yielded sawn cores, sandstone saws, and considerable quantities of nephrite debitage. The Flood site assemblage has about 70 pieces of debitage reported to be made of nephrite. Upon analysis, only about 40% of this debitage was confirmed to be nephrite. NIR analysis indicated that only one of the eight sawn cobbles from the Flood site is made of nephrite (Figure 2; Table 1). The Pipeline site is only a short distance downstream from Flood, and also contains evidence for sawn celt production. There are two surface collected sawn cobble cores from the Pipeline site: one is nephrite and the other an unknown material (Figure 2).

Table 1. Analyzed sample assemblage of sawn cores from the Lower Fraser River.

Site Name	Borden Site Number	Total Sample Sawn Cores	Total Nephrite Sawn Cores	Direct Associated Dates	Estimated Date Range For Site Occupation
Milliken	**DjRi 3**	2	0	None	**9000 - 600 BP**
Esilao	**DjRi 5**	1	0	None	**6000 BP to contact**
unknown	**DjRi Y**	1	0	None	
Hope Bridge	**DiRi 1**	8	4	None	**~2500 BP to contact**
Flood	**DiRi 38**	8	1	**1300 +/-100 BP (GaK-5429)**	**~2300-1300 BP**
unknown	**DiRi Y**	1	0	N/A	
Katz	**DiRj 1**	19	7	**2262 +/-36 BP (AA-70615); 2356 +/-33 BP (AA-70611)**	**~2600-300 BP**
Pipeline	**DiRj 14**	2	1	None	**~6300-700 BP**
unknown	**DhRk Y**	1	1	N/A	
unknown	**DhRp Y**	1	0	N/A	
unknown	**DhRlm Y**	2	0	N/A	
unknown	**DR Y***	7	2	N/A	

*Reported as 'Lower Fraser' without known provenience.

A short distance downstream from Pipeline is the Katz site, which has yielded the largest number of sawn cores (n=19) attributable to any individual site assemblage in the entire Pacific Northwest. A large assemblage of nephrite debitage (n=109), and numerous sandstone saws, have been recovered from both excavated contexts and surface collections (Hanson 1973; Lenert 2007). About 48% of the debitage previously reported to be nephrite from Katz was confirmed to be nephrite upon subsequent NIR analysis (Morin 2012). Of 19 sawn cores, only seven were confirmed to be nephrite, and the rest were seminephrite (n=4), serpentinite (n=4), and unknown materials (n=4). Katz is also significant in that it is the only site in the entire PNW with radiocarbon dates closely associated with sawn nephrite cores (Lenert 2007). Both cores are rather small (570 g and 112 g) and both were recovered from housepit contexts dating to 2262+/-36 BP (AA-70615) and 2356+/-33 BP (AA-70611) (Lenert 2007). Other fragments of worked nephrite recovered from Lenert's (2007) housepit excavations at Katz range from about 2400 BP to 2100 BP. There are a number of other cores and ground fragments of nephrite and other materials recovered from Hanson's (1973) earlier excavations at Katz that are dated with much looser temporal association in contexts dating about 2700 to 2400 BP. Well-dated evidence for nephrite celt production at Katz dates to about 2400 BP to 2200 BP. Downstream from the Katz, sawn nephrite cores appear to be very rare, and there are only three sawn cores made of serpentinite and unknown materials that have been reported with any provenience information (Figure 2).

In sum, it is probable that communities in the Hope locality specialized in sawn celt production in excess of their own needs, and worked items were exchanged primarily westwards (downstream) towards the Salish Sea, and secondarily upstream into the Fraser Canyon. It is also clear that in the past, indigenous peoples, like modern rock hounds, regularly misidentified cobbles as being made of nephrite, and after sawing initial groves into them, they were often discarded. While the earliest celts can be reliably dated to about 3500 BP, the earliest sawn cores date to at least 1000 years later. This can probably be best explained by both the general rarity of sawn cores – there are only about 150 reported for the entire Pacific Northwest and only four are from dated context – and ground stone celts are quite rare until 2500 BP. Evidence for sawn nephrite celt production on the Mid-Fraser from Lytton to Lillooet greatly eclipses this Hope-Katz production centre. Sites closer to the mouth of the Fraser, like Marpole, Glenrose and Port Hammond obtained their celts in variable proportions from both the Hope-Katz center and the Lytton-Lillooet localities.

Celt Use on the Lower Fraser River

Ground stone celt use on the Lower Fraser River conforms to a more geographical widespread pattern of reliance on a range of celt stones that also includes the Salish Sea region, but is distinct from the Canadian Plateau, West Coast of Vancouver Island, and Central Coast (Morin 2015b). In the Lower Fraser and Salish Sea regions, celt assemblages are comprised of nephrite, seminephrite, unknown 'basaltic' materials, smaradigite, chlorite, and quartzite in approximately that rank order of abundance. Although the proportion of stone types used for celts varies considerably along the Lower Fraser River, in cases with greater that four celts, nephrite celts comprise the largest percentage, typically comprising 40-60% of assemblages, and only in few cases lower than 25%. Despite the greater distance from both major celt production zones and sources of nephrite, on the Salish Sea the proportion of nephrite celts in assemblages is actually greater compared to the Lower Fraser River.

In terms of abundance, the largest assemblages of celts on the Lower Fraser River are from sites near the mouth of the Fraser, some 140 km distant from Hope. Marpole (DhRs 1) has over 100 celts recovered from excavated contexts, and more than 200 more from surface collected contexts. This is approximately equal to all known ground stone celts as from all of Washington State, and more than twice as many as reported from Katz (n=54) where celts were clearly being manufactured in considerable numbers. Sites near the confluence of the Pitt and the Fraser Rivers, such as Port Hammond (DhRp 17) and Carruthers (DhRp 11), have also yielded large assemblages of excavated celts (n=48 and n=66 respectively) (Crow-Swords 1974; Rousseau *et al.* 2003). Aside from Katz, most recovered celt assemblages in the eastern Fraser Valley are rather small by comparison. For example, the Flood site has yielded 25 celts, and

Scowlitz (DhRl 16) 19 (Lepofsky *et al.* 2000), and these are by far the largest excavated assemblages of celts in the region; all other excavated sites aside from Katz have yielded fewer than half as many celts. The current data clearly indicate that celts are much more abundant around the Fraser Delta compared to the Fraser Canyon, and as early as 1968 Charles Borden (1968:23) provided an explanation for this pattern:

> "Conspicuous by their paucity in the canyon sites are heavy duty woodworking tools which are so common in Fraser delta deposits of the last 2000 years. The contrast in the incidence of such tools may reflect the difference in house types in the two regions. The large planks for the coastal houses were split from cedar logs with wedges and stone handmauls, tools which were not required in readying the timbers and other structural materials for semisubterranean lodges."

Given the dramatic increase in archaeological research in this region over the last 50 years, especially with respect to housepit villages (Graesch 2007; Lenert 2007; Lepofsky *et al.* 2000, 2009; Ritchie 2010; Schaepe 2009; VonKrogh 1980), Borden's hypothesis still remains the most viable. Specifically, if pit houses were the preferred type of winter dwelling in the eastern Fraser Valley for much of the last 3000 years, then people would have not needed celts to make them. Instead, these eastern Fraser Valley celts were probably primarily used in canoe manufacture. I also suggest that the unusually large number of celts found at sites such as Marpole, Port Hammond, and Beach Grove (DgRs 1) reflect the economic specialization of those communities in canoe manufacturing. More specifically I suggest that elites living at Marpole, Port Hammond and Beach Grove sponsored specialist woodworkers to make canoes for themselves and surrounding communities.

It is also interesting to review the distribution of large (>15 cm long) celts. I argue that these large celts non-functional were a distinctive type of prestige technology (Hayden 1998) that were likely exchanged among elites via different spheres of conveyance than smaller functional celts (Darwent 1998; Morin 2015b). These 'property celts' (Emmons 1923) are abundant on the Canadian Plateau, but scarce on the Lower Fraser. Following standard 'distance decay' models (Renfrew 1977), if these large 'property celts' were indeed the original size of celts before being worn down through use and resharpening, one would expect them to be most numerous and abundant near celt production locations such as Hope (Mackie 1995). Instead, the exact opposite pattern is observed. There are no such large celts reported from the Hope vicinity, and only two such celts have been found between Boston Bar and the confluence of the Harrison with the Fraser River. Seven such large celts (>15 cm long) from the Fraser Delta were identified and analyzed. If we only consider celts greater than 20 cm long, this pattern is even more pronounced, with no known examples along the Fraser River from Boston Bar to the Pitt River, and only a single example each from near the Pitt River and from near the Marpole sites. There are multiple lines of evidence to suggest that most of these large celts were produced in the Mid-Fraser region rather than around Hope (Morin 2012, 2015b, 2016). I interpret these distributional patterns to indicate that large 'property celts' were viewed to be functionally different from smaller celts, and were exchanged via a different mode of conveyance. Simple 'distance-decay' models or 'fall-off curves' do not adequately capture the social implications of celt exchange in Southwestern B.C.

Celt Technology and Culture Change

In the following sections, I shift the discussion to description celt production and use according to culture-historical units. I combine Borden's (1968) "Canyon Sequence" to the more widely recognized tripartite sequence of Locarno Beach, Marpole and Gulf of Georgia phases. Variation in celt morphology is based on dated celts from both within and beyond the Lower Fraser region (Salish Sea) due to small sample size, but I employ it here to demonstrate temporal changes in celt morphology.

Locarno Beach Phase (3500 to 2500 BP)

There are very few reliably dated assemblages containing celts from Locarno Beach Phase (3500 to 2500 BP) components, and they contain only a small number of celts. In the Lower Fraser River, the only Locarno Beach Phase assemblages containing ground stone celts are the Pitt River site (Patenaude 1985) and DhRp 52 (Chapter 16). Assemblage composition is somewhat variable, but broadly conforms to the general trends outlined above for the Salish Sea/Lower Fraser River regions in general, but nephrite only comprises 42% of the assemblage of celts from DhRp 52, and only 25% of the Locarno Beach Phase component celts from Pitt River (Figure 3) (Morin 2012). This data indicates that the ground stone celt industry during the Locarno Beach Phase was relatively unspecialized, and people found non-nephrite celt stone perfectly acceptable for making celts.

Based on metric analysis of all well-dated Locarno Beach Phase celts, I can say with some confidence they are smaller and shorter (mean length=49 mm) than those of later periods. It is unclear if these celts were originally made smaller than those of later periods, or whether they were simply discarded after being more exhaustively used than those of later periods. The majority of these celts are far too small to have been hafted as adzes, and were much more likely used as chisels. Approximately the same proportion of Locarno Beach Phase celts display clear evidence of being sawn from larger cores (i.e., sawn groves and snapped septa) as do celts of later periods (Morin 2012, 2015c). In sum, while Locarno Beach Phase celts are significantly smaller than those of later periods, they appear to have been made in exactly the same manner – sawn from pebble, cobble or boulder cores.

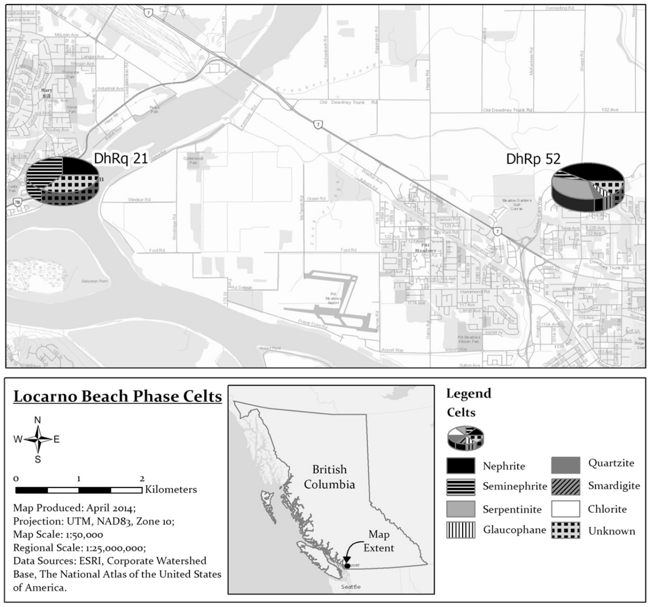

Figure 3. Distribution and mineralogical assignment of Locarno Beach Phase celts.

Marpole Phase (2500 to 1200 BP)

During the subsequent Marpole Phase (2500 to 1200 BP) there is a veritable explosion in both the number of sites and components containing celts, and size of celt assemblages (Morin 2012, 2015c). Some of this increase may be accounted due to increased population densities, and a shift from living pithouses to living in plank houses (Borden 1968; Lepofsky *et al.* 2009). I favor the hypothesis that the professional emergence of specialist woodworkers (carvers and canoe makers) described ethnographically for the Coast Salish (see Smith 1940:49, 141; Suttles 1951:492) occurred during the Marpole Phase, and that these individuals required a suite of celts for their work (see Burley 1980; Carlson 1996).

Generally speaking, Marpole Phase assemblages of celts are comprised of highly variable proportions of nephrite, seminephrite, serpentinite, unknowns, and occasionally quartzite and smaradigite (Figure 4). At Marpole and Port Hammond, the two largest Marpole Phase celt assemblages, nephrite comprises about 55% of celt assemblages, but at Scowlitz and Glenrose it only comprises only 15 to 25% (Morin 2012). Marpole and Port Hammond conform to a general trend of nephrite comprising the majority of celts assemblages from large Marpole Phase sites on the Salish Sea (e.g., False Narrows [DgRw 4], Musqueam North [DhRt 3] and Beach Grove [DgRs 1]). At Port Hammond, a concentration of celts recovered from one portion of the site was interpreted to be a specialized woodworking area – the only reported evidence of such specialization for the entire Northwest Coast (Rousseau *et al.* 2003). It is difficult to argue that the paucity of nephrite in some of these Marpole-aged sites (e.g., Scowlitz and Glenrose) is due to their location, either distant from nephrite sources, major routes of nephrite exchange, because such major village sites occur over the entire Gulf of Georgia/Lower Fraser region, and all are no more than two or three days via canoe from one another. The Scowlitz village site is strategically located at the confluence of the Fraser and Harrison Rivers, but it contains proportionally few nephrite celts. It appears that village location alone can not account for the paucity of nephrite celts at these sites and that other social factors were involved.

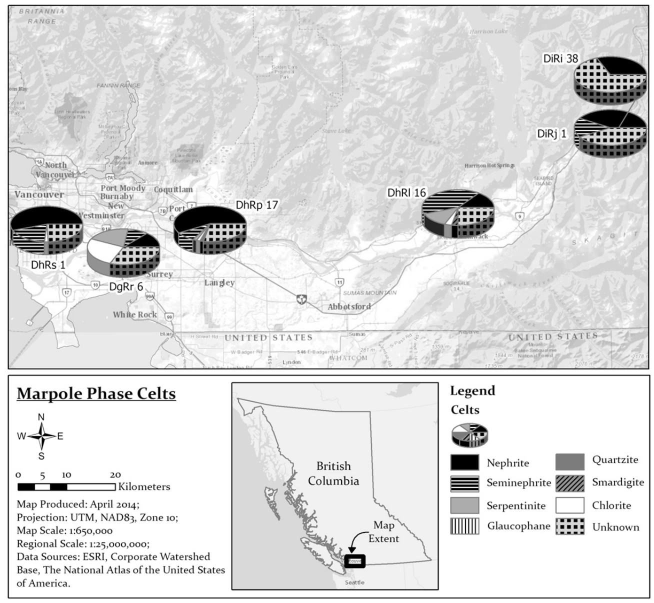

Figure 4. Distribution and mineralogical assignment of Marpole Phase celts.

I suggest that the most plausible explanation for the variable composition of Marpole Phase celt assemblages is related to community level differences in social group connections with people inhabiting nephrite celt producing centres near Hope and Lytton-Lillooet. Namely, I suggest that some Marpole Phase village sites such as Marpole, Port Hammond and Beach Grove had larger populations of elites and woodworking specialists, and people in such communities actively developed and maintained trade/ exchange and social relationships with people in Hope and Lytton-Lillooet localities to regularly obtain nephrite celts (Lepofsky *et al.* 2007; Suttles 1987a, 1987b, 1987c). People in communities lacking elites and woodworking specialists would instead rely on more locally available materials for making celts, such as inferior quality stone, antler, bone and beaver teeth. I suggest that during the Marpole Phase, a two-tier social settlement hierarchy existed composed of communities of the wealthier and well-connected elites and specialists, and other villages were primarily composed of people with lower social status and wealth (Suttles 1987a). I am certain that this pattern extends beyond the Lower Fraser River to the broader Salish Sea region.

Celts are generally larger during the Marpole Phase than during the preceding Locarno Beach Phase, but occur in a much wider range of sizes and forms. Celts up to 18 cm in length have been occasionally recovered from Marpole Phase assemblages, and were almost certainly used as adzes for heavy woodworking. Small celts that are round in cross-section and less than 1 cm wide also appear during the Marpole Phase and were likely used as chisels for fine carving (Morin 2012, 2015c). Given this range of celt forms, I interpret this evidence to indicate variable functional specialization in celts not discernable in celt assemblages from earlier periods. Most Marpole Phase celts are also small and heavily worn (mean length 60 mm), having been discarded late in their use-lives or upon complete tool exhaustion. Also, there is no temporal change in the relative proportion of celts bearing evidence of being sawn from cores throughout this phase. In sum, Marpole Phase celts defy generalized formal descriptions, and instead consist of a range of types related to increased functional and occupational specialization.

Gulf of Georgia Phase (1200 BP to AD 1770)

There are fewer sites containing ground stone celts during the Gulf of Georgia Phase (1200 BP to AD 1770), and they have yielded smaller celt assemblages compared to the preceding Marpole Phase. Generally, selective trends for celt material composition described above for the Lower Fraser region and Marpole Phase also hold for Gulf of Georgia Phase sites. An exception to this pattern is that serpentinite celts occur at fewer sites than in previous periods. There is a dearth of Gulf of Georgia Phase celts in my sample from the Lower Fraser region, but there are a few from Pitt River, Milliken and Esilao sites (Figure 5). The small sample only allows some generalization about celts in the Lower Fraser region during this phase. In the recovered sample from the most recent deposits at the Milliken site (~660 BP) nephrite celts comprise 75% of the assemblage, and are all likely derived from mortuary contexts.

At the adjacent Esilao site, nephrite celts only comprise about 30% of this slightly later assemblage from excavated domestic contexts (housepit). This proportional dichotomy between adjacent sites is intriguing, and it seems that people were buried with only high-quality nephrite celts, while celts of all materials were used and discarded in domestic contexts. In the Gulf of Georgia Phase component at the Pitt River site, nephrite celts only comprise about 40% of the assemblage. This is rather similar to the proportion at Esilao, and reinforces the observed dichotomy of celt assemblage structure between domestic and mortuary contexts. On the Salish Sea, celt assemblage material composition at sites is similarly variable, but most assemblages contain mainly of nephrite celts. Montague Harbor (DfRu 13) is a notable exception, with nephrite only comprising 25% of the celt assemblage.

Celts dating to the Gulf of Georgia Phase are similar to those from the Marpole Phase in general morphology and functional variability, but some differences can be discerned. Gulf of Georgia Phase celts tend to be slightly wider and thicker than Marpole Phase and Locarno Beach Phase celts, although these differences are not statistically significant. Also, a few celts larger than 15 cm long are present in Gulf of Georgia Phase components, but these are only slightly larger than the preceding Marpole Phase. These large celts are clearly part of a phenomenon centered on the Canadian Plateau during the contemporaneous Kamloops Horizon (1200 BP to contact) (Darwent 1998; Richards and Rousseau 1987; Sanger 1969). There appears to be no temporal differences in evidence of celt manufacturing techniques in the Gulf of Georgia Phase compared to previous phases in the Lower Fraser River Region (Morin 2012, 2015c).

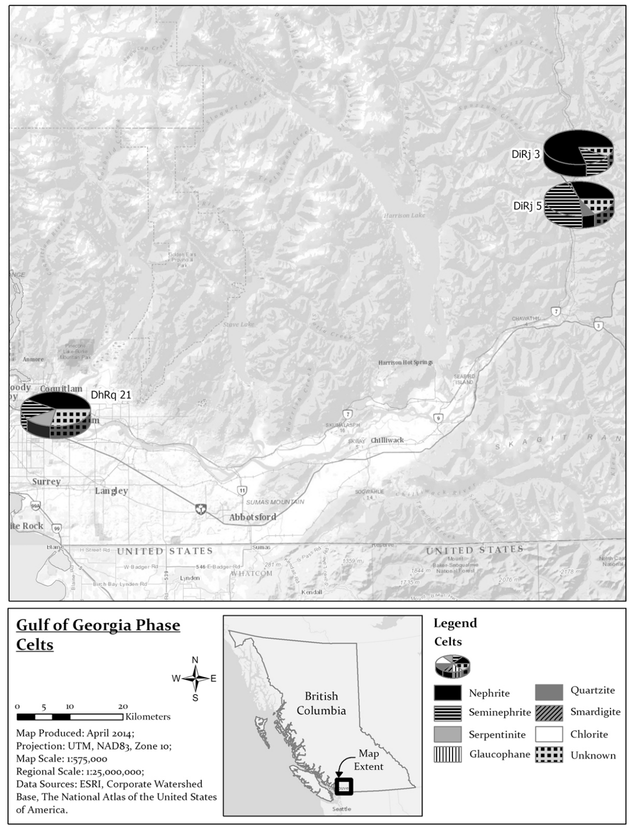

Figure 5. Distribution and mineralogical assignment of Gulf of Georgia Phase celts.

In sum, the current data indicate that there are indeed meaningful morphological, typological, and mineralogical differences between ground stone celts recovered from Locarno, Marpole, and Gulf of Georgia Phase components. For the most part these differences are not dramatic nor temporally diagnostic, but rather represent introduction of new forms or types of celts through time, variable preference for particular celt stones, and variable reliance on nephrite celts produced at either the Hope or the Lytton-Lillooet locality production centres. There is also a rather dynamic history of the intensity of stone celt use through time in the Lower Fraser (Morin 2012, 2015c). I interpret these patterns to reflect a relative measure and directionality of inter-group social and economic interaction among Coast

Salish peoples on the Lower Fraser and the Salish Sea, and their Interior Salish cousins on the adjacent Canadian Plateau.

Summary and Future Research Directions

While the Lower Fraser River and associated watersheds comprise a 'natural' geographic unit inhabited by culturally similar Coast Salish peoples, this region was certainly integrated into wider systems of exchange and interaction both on the Canadian Plateau, the Salish Sea, and beyond, especially with the Mid-Fraser region. With regard to celts, the Lower Fraser is somewhat unique in that it is one of the few regions British Columbia that actually produced and used ground stone celts with regularity over several millennia.

Much of this discussion on celts in the Lower Fraser Region has been entirely descriptive in nature, with limited interpretations and explanations for observed patterns in distribution and frequency through time. The main purpose of this study has been to frame the data to identify patterns of trade and exchange involving stone celts. It is a certainty that ground stone celts made of nephrite, seminephrite, serpentinite and chlorite were produced in abundance in the Hope/Katz locality and exchanged primarily to socially linked communities downstream and throughout the Salish Sea. This evidence for community-level specialization in production of celts for inter-community exchange as commodities runs somewhat counter to dominant characterizations of Northwest Coast households as primarily self-sufficient economic units organized along the 'Domestic Mode of Production' (Sahlins 1972). Instead, based on the evidence of celt production, exchange and use, it appears that communities in particular regions specialized in the production of goods such as celts for export, and were thus integrated in political economies in addition to domestic economies (Earle 2002). Investigations of ground stone celts offer a unique window into the economic organization and social interaction among peoples on the Lower Fraser River over the last 3500 years.

While this chapter relies heavily on mineralogical and metric descriptions of celts and celt production, a number of lines of future research into celts remain to be explored. These include: experimental use-wear studies aimed at differentiating differences between chiseling and adzing motions; reduction sequence studies focused on determining the use-lives, maintenance, and attrition rates of celts made of different materials; make efforts to identify natural occurrences of suitable materials used to make celts and collect samples for analysis; and continue to promote and use material sourcing techniques during analyses. I suspect that similar detailed mineralogical and distributional studies of other highly curated artifact types, such as hand-mauls, stone beads, and steatite pipes, would yield analogous results to those described for celts. More specifically, I am confident that such studies will provide evidence for greater economic specialization and interaction in Pacific Northwest societies than has been generally appreciated.