

CHAPTER 11

Choppers in Context at the Mccallum Site

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Introduction and Background

Since the pioneering research of Charles Borden, cobble choppers have fascinated archaeologists working in the southern half of the Northwest Coast. These artifacts, although also referred to as “pebble tools” in the literature (e.g., Carlson 1996), generally conform in size to “cobbles” as defined by the Wentworth scale. Although choppers have been found throughout the lower Fraser River region, they are often recovered in secondary contexts (e.g., on the ground surface, in mixed deposits, intertidal zones) that allow only limited interpretations of their age and function. Intact stratified deposits containing large numbers of choppers, especially those associated with intact features, are relatively rare.

Archaeological assemblages composed of a relative abundance of cobble tools are one of the hallmarks of early to mid-Holocene aged sites in the southern Pacific Northwest. Such sites are commonly grouped into the “Pebble Tool Tradition”, which highlights its coastal distribution and origin (Carlson 1996) or the “Old Cordilleran Culture”, which gives greater importance to the interior distribution (Matson and Coupland 1995). Based on inferences from global contexts and a review of sites in Southern BC and Washington state, Roulette (1989; also Hamilton and Roulette 2002) surmised that these “cobble chopper sites” are wood harvesting and processing sites used repeatedly by people living in nearby field camps and permanent settlements.

In this chapter, we present information on our investigations at the Mccallum site (DhRk 2), located in the central Fraser Valley sub-region (Figure 1). The Mccallum site is one of several archaeological sites in the Lower Fraser region that contain an abundance of cobble chopper tools. Since the 1940s, archaeologists knew this site as a protohistoric settlement (Lepofsky 2008; Smith 1947). However, our investigations demonstrated that the site is a well-preserved mid-Holocene settlement with a lithic industry dominated by cobble choppers and flakes struck from them. Intact stratigraphy, the remains of a small structure, well preserved faunal and botanical remains, and well-dated contexts, provide a window into understanding the technological, social, and economic contexts of cobble

choppers sites. These data also allow comparisons of the Mccallum settlement to other similar sites in the Fraser Valley. The current paucity of investigated and dated mid-Holocene sites on the Northwest Coast, and the almost non-existence of securely dated high-density cobble chopper sites, makes the Mccallum site of extreme archaeological importance.

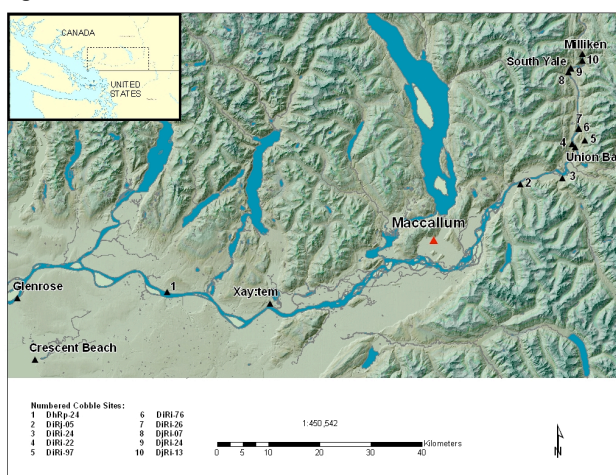


Figure 1. Map of the Fraser Valley sub-region showing location of the Mccallum site (DhRk 2) at the base of Mt. Aggasiz, and other sites (Glenrose, Xaytem, Milliken, South Yale, and Union Bar) with abundant cobble choppers.

Mccallum Site Name and Setting

Many names have been applied to the Mccallum site. The Halkomelem name for the site location has not been confirmed, but may be associated with the late period village named Tsítsqem (“fine slivers of the Douglas-fir [bark]” or “hazelnut [pod]”) (McHalsie 2001). The name “Mccallum” was given to the site after the settler owners. Their family name, as recorded in the BC Archives, is as spelled here. However, the name on the road sign which provides access to the site, various government documents, and published archaeological works (e.g., Smith 1947) provide many variations on the original spelling of the family’s name.



Figure 2. A view of the Mccallum site terrace with the Fraser Valley and Mount Cheam in the background, looking southeast.

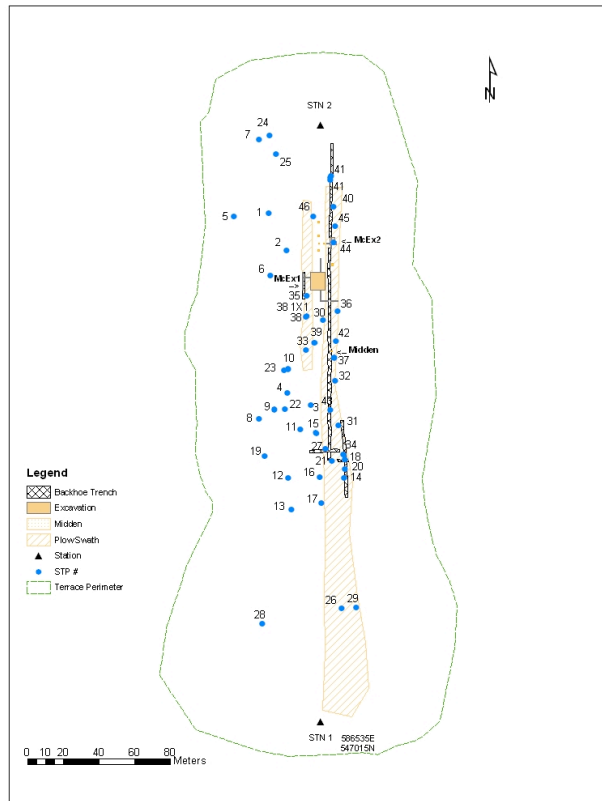


Figure 3. Map of the Mccallum site terrace showing location of plow swaths, backhoe trenches, and areas excavated.

The Mccallum site is located on a late glacial river terrace at the base of Mt. Aggasiz in the Fraser Valley near the town of Aggasiz (Figure 2). The terrace is composed of glacially deposited sands and gravels overlain by aeolian silts (Luttmerding and Sprout 1967), and its western aspect has been largely removed by a large gravel extraction operation. Along the northern end of the terrace is a now-seasonally dry streambed where numerous, glacio-fluvially

deposited cobbles are exposed. This is likely the source of the raw lithic materials used for the cobble tools. While isolated artifacts extend over much of the terrace surface, the cultural deposits are most dense in a 200 m x 50 m strip along the eastern edge of the terrace. (Figure 3).

Today, the Harrison River flows behind Mt. Aggasiz, but sometime in the past it flowed straight south from Harrison Lake and connected with the main Fraser River channel immediately east of the terrace (Figure 1). This area is now an expansive farm field. An organic layer lying on river cobbles 4.0 m below the ground surface in the farm field produced a date of 5600-5470 cal BP (Table 1). This indicates the Fraser River had shifted its course southward away from the terrace by this time and that the channel was in-filling with organic matter and sediment. This channel shift ~5600 BP likely resulted in the site being abandoned soon after (Table 1).

Table 1. Radiocarbon age determinations from the Mccallum site.

Sample Lab No.	Context	Material Dated	Conventional Date	Cal. BP date (2 sigma)
Beta 194649	Midden	charcoal	5250 ± 40 BP	6170-5920
Beta 194650	Base of cultural depression in McEx2	charcoal	4920 ± 50 BP	5740-5590
Beta 203432	Organic layer on river cobbles 4 m BS on flat below terrace	Uncharred organic material	4840 +/- 40 BP	5600-5470

Before the shift in the river course, the Mccallum terrace would have been an ideal place to live. The terrace is well drained, and because it is 12 m above the Fraser River floodplain, would not have been seasonally inundated. In addition to the lithic raw materials available, the inhabitants could take advantage of easy access to littoral and aquatic riverine resources associated with the slough and main Fraser River channel in the floodplain below the site. A small freshwater creek at the north end of the site that flows a good part of the year would have provided easy access to drinking water. The forested terrace and slope to the immediate north provided fuels, plants for food and raw materials, and habitat for a variety of animals.

Field and Laboratory Methods

We used several strategies to determine the nature and extent of deposits at the Mccallum site. These included tractor-disking two large swaths to a depth of ~10 cm, excavating a backhoe trench on the north-south axis of the site, and excavating 57 judgmentally placed shovel test throughout the terrace (Figure 3). We focused our more intensive excavations on the areas which had the greatest surface concentration of artifacts or subsurface features, in particular the plowzone in an 8 x 10 m block (McEx1), a

small semi-subterranean structure (McEx2), and in a midden exposed in the backhoe trench. We screened all material through ¼ inch mesh and collected 2-liter flotation samples from all intact cultural deposits. The flotation samples provide a controlled sample of fauna and microdebitage (1.0 – 2.0 mm) and plant remains (> 0.425 mm). The analyses followed standard procedures used for paleoethnobotanical and zooarchaeological remains (see Lepofsky and Lenert 2004).

Lithic artifacts were analyzed from all excavated site contexts. For the debitage, we identified raw material type and initiation facets to determine the type of percussor/hammer that was used for reduction (Hayden and Hutchings 1989). All other artifacts (tools and cores) were categorized based on regional artifact typologies developed by Haley (1987) and Schaepe (1998). After Hamilton and Roullette (2002:25-28), we further classified all choppers into three categories, beaked, broad-bitted, and “other.” This classification scheme is based on a modified version of Borden’s (1968) criteria for classifying cobble choppers. Beaked forms (Borden’s types Ic, II, VI and VII) exhibit concave margins that converge to pointed work-ends or bits that serve as gouging implements for digging into wood, possibly for scoring trough-like grooves or making holes (Hamilton and Roullette 2002:26). Broad-bitted cobble tool forms (Borden’s types “sharp Ia”, Ib, “dull Ic”) exhibit broad-edged working-ends and are thought to have functioned much like a celt (adze blade) for planning and chopping. “Other” specimens include all other Borden types that do not fit comfortably into these first two categories. We also attempted to follow Haley’s typology (1987, 1996) to identify reduction sequences in the cobble chopper assemblage, but we were only able to loosely match Mccallum site cobble tools to those delineated by Haley. Lepofsky and Lenert (2004) and Lepofsky (2008) provide further details on the methods and results of the Mccallum site investigation.

Results

Lithic Analysis

Our surface collections, exploratory test pits, backhoe trench, and more intensive excavation units revealed that the pre-contact period use of the terrace was extensive, but generally not intensive. With a few notable exceptions, cultural deposits across the terrace were composed of low densities of lithic artifacts. The assemblage is dominated by various kinds of choppers, cores, edge-modified flakes, and cobble chopper rejuvenation and resharpening flakes and primary cobble flake/spall tools (Figure 4). Choppers were continuously distributed across the site (approx. one chopper per 1m²). The widespread distribution of choppers indicates that they were expedient tools; they were used and then discarded because the raw materials were readily accessible and the tools were easy to manufacture. The abundance of rejuvenation flakes indicates that the functional edge of some choppers was refurbished.

The assemblage of lithic artifacts (N= 4500) is typical of others dating to the early to mid-Holocene. Temporally diagnostic artifacts include an abundance of cobble tools, leaf-shaped bifaces, contracting stem bifaces, and a possible microblade core (Figures 5 and 6). Contracting-stem points have been recovered from early Holocene occupations in the south Coast (Carlson 1979; Matson 1996), but seem to be more prevalent in contexts dating to the mid-Holocene. Microblade technology is present in southern coastal sites dating from about 7,000 years ago to the late Holocene (Carlson 1990:68).

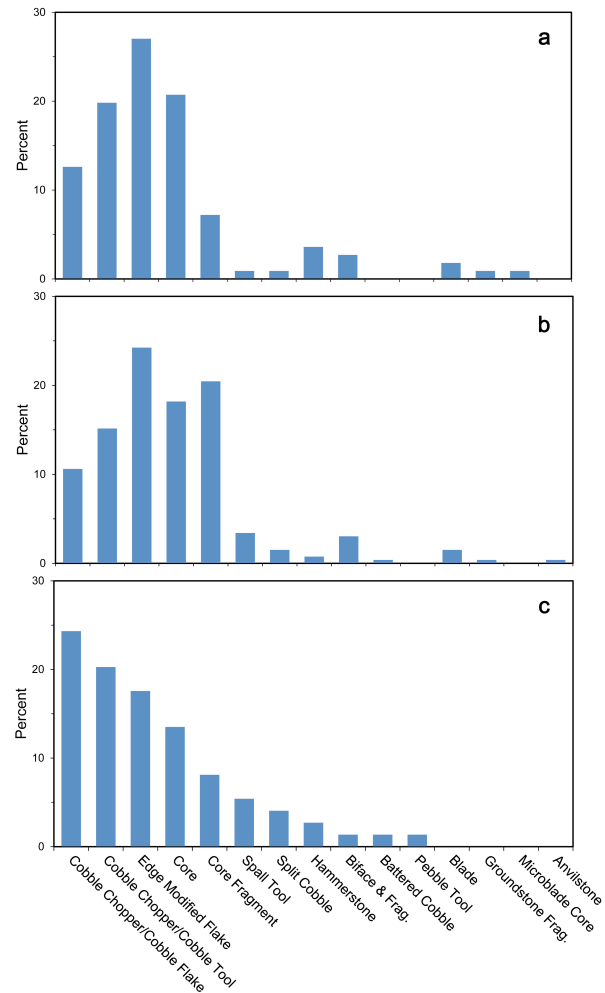


Figure 4. Relative proportions of lithic artifacts recovered from (a): McEx1; (b): McEx 2; and (c): Midden. Lithic waste is not included.

Ground stone artifacts comprise a small percentage of the Mccallum site lithic assemblage and are also consistent with other mid-Holocene aged components. Two highly polished, leaf-shaped, contracting-stem, ground stone points made from flat, lenticular-shaped pebbles of indeterminate raw material were recovered from McEx 2 (Figure 6:k,l). These are similar in form to a ground stone biface recovered from the St. Mungo phase deposits (~5500 – 3800 BP) from the Glenrose Cannery site (Matson 1996:120), as well as to

ground slate points from the nearby Scowlitz site (Lepofsky, unpublished data). At Glenrose, the deposits are not radiometrically dated and thus do not allow a solid temporal comparison with the McCallum assemblage. In addition to the two ground stone bifaces, one unifacially chipped ground slate fragment was found just below the surface in McEx 2 at the McCallum site. Small pieces of ground stone were also recovered from early Glenrose Cannery site deposits (Matson 1996), but ground slate knives do not appear in the local sequence until later in prehistory (post ~2500 BP).

The abundance of choppers at the McCallum site indicates that woodworking was common. It is generally accepted among researchers worldwide (e.g., Hayden 1977, 1978; Troeng 1993), and on the Northwest Coast (e.g., Matson and Coupland 1995; Matson 1996; Roulette 1989) that chopper tools are associated with harvesting and processing of wood and other heavy-duty work such as butchering animal carcasses. We agree with these functional interpretations for the McCallum site chopper assemblage, but do not rule out the possibility that they were also used for working hides (Hayden 1977:183).

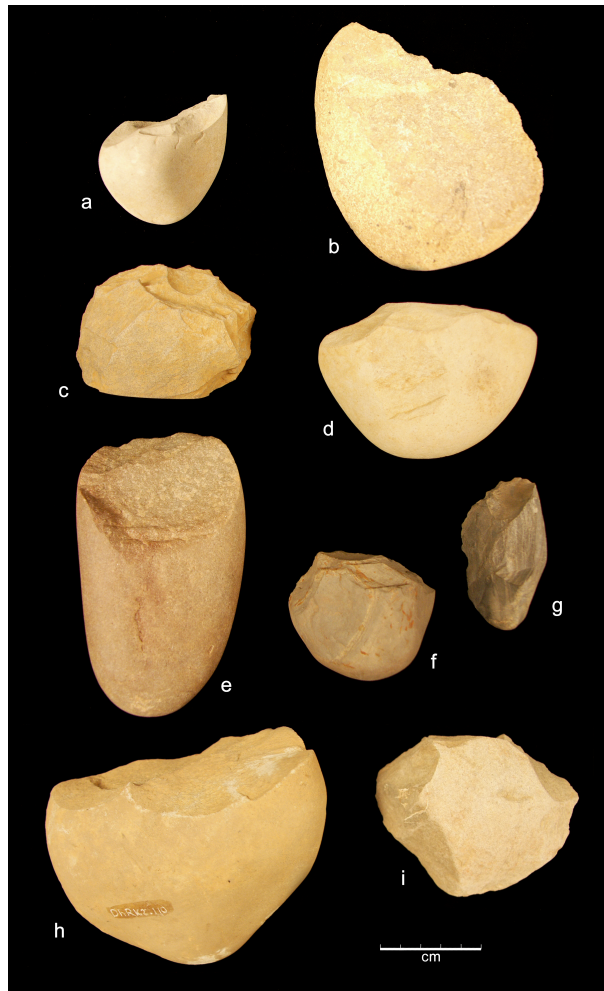


Figure 5. Assorted cobble chopper forms: (a-b): beaked; (c-i): broad-bitted.

Despite low typological diversity in the McCallum artifact assemblage (Figure 4), a range of tasks is suggested. The flakes struck from the cobbles were likely utilized for a wide variety of tasks. These tasks include processing/butchering animal carcasses and hides, peeling or scraping root foods, cutting up fish, light duty hide-working, processing plant resources to produce clothing, mats, and baskets, and cutting and carving wood or antler.

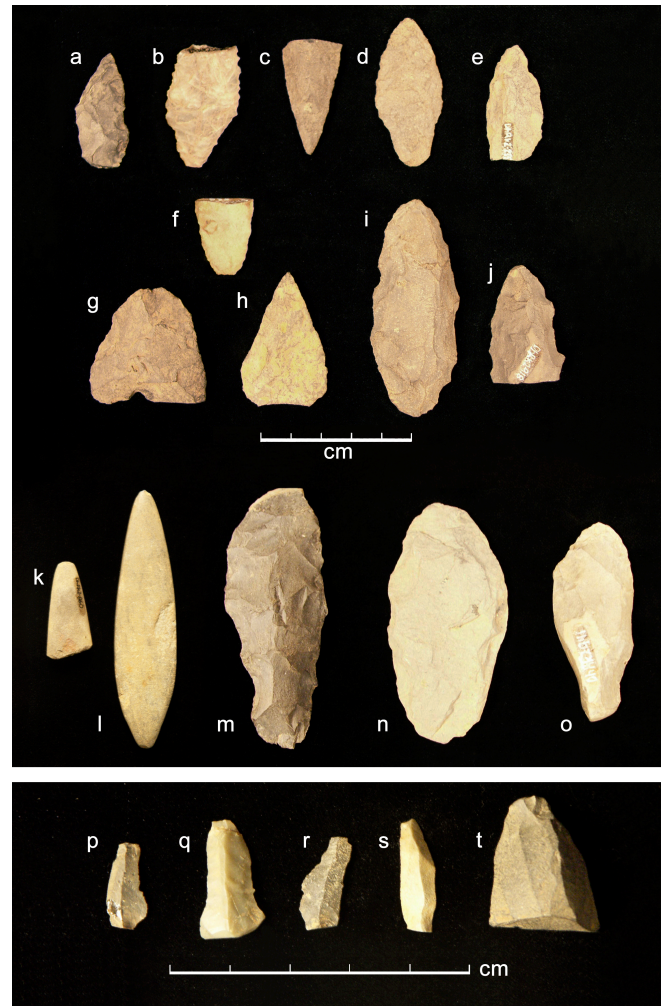


Figure 6. Bifaces, flakes and cores. Contracting stem points: (a): (McEx2); (b): Hozomeen (?) chert (Surface); (d): (Trench); (f): argillite (McEx1). Leaf-shaped points: (i) and (n) (McEx2); (m): (Midden). Ground leaf-shaped points: (k) and (l) (McEx2). Other bifaces: (c): (Surface); (e): (Trench); (g): (McEx1); (h and j): (McEx2); and (o): (STP). Blade-like flakes: (p-s). Microblade core: (t): (McEx1).

There are a wide variety of working edge forms represented in the Mccallum site chopper assemblage. Of the 56 choppers examined (McEx1=20; McEx2=26; Midden=10), only 5% can be placed in the beaked category and 45% comprise the broadly bitted category. The remaining 50% could not be classified into either of these two types. These results contrast with those of Hamilton and Roulette (2002), who found that beaked forms comprised ~40% of their assemblage. The Mccallum site chopper assemblage suggests that tasks involving grooving and gouging of wood were far less common than those involving chopping. Furthermore, the diversity of “other” chopper edge forms in the Mccallum assemblage may reflect a wide range of woodworking and other tasks. Haley (1987, 1996) argues that choppers cannot be “typed” and that the range of variation is due to cobble reduction sequences. While we also see a continuum of chopper edge forms, we believe that they were intentionally made with specific tasks in mind.

In general, the Mccallum artifact assemblage indicates that the site occupants were using predominately locally obtained lithic raw materials for their tools. The streambed at the north end of the site provided an easily accessible and abundant source of cobbles from which cobble chopper and flake tools were produced. Although the stream provided a mix of raw materials, people selected good quality materials (e.g., fine-grained silicates) for their tools.

Non-local materials in the Mccallum assemblage include argillite and chert bifaces (Figure 6:b, f); the latter may be made from Hozomeen chert, whose source is on Ross Lake in the Skagit watershed to the south (Mierendorf 1999, 2004). Artifacts made from Hozomeen chert are relatively common in mid-Holocene assemblages at the Maurer site (Schaepe 1998), and probably reflect broad regional exchange systems more typical of the early-mid Holocene than later periods (cf. Lepofsky et al. 2005) and/or higher group mobility. The source of the argillite is unknown.

Paleoethnobotanical Analysis

A wide range of plants were processed and disposed of in the semi-subterranean structure McEx2 (Table 2). Among the plant food remains, *Rubus* sp. seeds are the most common; in fact the recovery in some samples is quite high when compared to other paleoethnobotanical samples from Northwest Coast sites. While the seeds from this genus could represent several species, salmonberry (*Rubus spectabilis*) or blackcap (*Rubus leucodermis*) are the most likely, based on modern plant phytogeography. Both of these species are highly regarded foods of the Coast Salish, and were eaten fresh or dried for later consumption (Turner 1995). We surmise that the high number of *Rubus* seeds in some of the samples indicates that the fruits were being processed at the Mccallum site to be eaten immediately (in a soup?) or for later consumption (as fruit leather?). The abundance of seeds from unidentified taxa, particularly in samples with high densities of identified edible remains, suggests that other plant resources were also being

processed at the site. The harvesting of plants at the site likely occurred during the summer.

Table 2. Archaeobotanical remains recovered from McEx2 and the Midden.

Taxa	McEx2 (N=30 flot. samples) ¹	Midden (N=4 flot. samples) ¹
<i>Seeds (N)</i>		
A. alnifolia (cf.)	5	
Brassica	1	
Chenopodium	4	
Lamiaceae	1	
Poaceae	5	
Ranunculus	1	
Rubus	145	3
Unidentified	40	
Total Seeds	204 (ave/liter =1.25)	3 (ave/liter =0.16)
<i>Needles (N)</i>		
P. menziesii	7	
Tsuga	6	
Unidentified	10	
Total Needles	23	
<i>Charcoal²</i>		
Douglas -fir	X	X
Total Charcoal	44.48 (ave/liter= 0.20)	3.95 (ave/liter= 0.46)

1. Flotation samples were variable volumes.

2. X= present. Charcoal was identified from all four midden flotation samples but only from four samples from McEx2.

In addition to the plants processed for food, we found an array of woods used for fuel (Table 2). Douglas-fir was generally the most ubiquitous and abundant of the fuels used. Ethnographically, and in more recent archaeological sites in the Fraser Valley (e.g., Lepofsky and Lyons 2003), Douglas-fir is consistently the preferred fuel wood. In addition to Douglas-fir, the Mccallum site occupants used a variety of other locally available woods, especially hardwoods. Western redcedar is noticeably absent from the wood assemblage. Whether the site occupants were using redcedar wood for technological (non-fuel) purposes cannot be determined with our data since the data are biased towards remains preserved through charring.

Zooarchaeological Analysis

As is typical of zooarchaeological remains recovered from Fraser Valley sites, the faunal remains from the midden and McEx 2 excavations at Mccallum were in poor shape and the majority could not be identified beyond general classes of animals. Despite the very small sample sizes, the abundance of calcined and uncharred bone fragments indicate that a wide range of faunal species were processed and disposed of at the site. The assemblage is dominated by

unidentified bird/mammal and salmon, but medium-sized mammals, and sturgeon are also present in significant numbers (Figure 7; Table 3). Our field observations of uncharred, disintegrated bone while *in situ* suggests that many of these were from a medium-sized animal, likely an ungulate. In one instance, an uncharred bone fragment appeared to have a spiral fracture possibly indicating marrow extraction. Collectively, the faunal remains indicate a wide range of aquatic and terrestrial food resources and diverse procurement strategies.

Table 3. Identified faunal remains recovered from McEx2 and the Midden. See Lepofsky and Lenert (2004) for discussion of size categories.

Taxa	McEx2	Midden
Fish (N)		
Salmon	25	4
Sturgeon	8	-
Stickleback	1	-
Peamouth Chub	1	-
Small Fish	3	-
Medium Fish	4	1
Unidentified Fish	1	-
Total Fish	43	5
Bird/Mammal (N)		
Beaver	1	-
Dog/Coyote	1	-
Small Bird	-	2
Small-med Bird	-	1
Medium Bird	2	4
Med Bird/Sm Mammal	1	1
Bird/Mammal	57	12
Small Carnivore	2	-
Small Mammal	3	1
Medium Mammal	12	1
Unident. Mammal	1	-
Total Bird/Mammal	80	22
Total Identifiable (N)	123	27

Features

Two areas in the site have thick, artifact rich cultural deposits that include a cultural depression (McEx2) and a small midden (Figure 3). McEx2 is a square, basin-shaped, depression roughly 3 x 3 m in size (Figure 8). The dominant feature within this depression is a large, square burn area composed of stratified deposits of charcoal, lithic artifacts, fire-reddened silts, fire-altered rock (FAR), calcined bone, and the occasional highly degraded uncharred bone. This is likely a cooking feature, composed of *in situ* wood burning and subsequent dumping of charred and uncharred materials. Associated with the cultural depression are two postholes of unknown specific function, but one is large enough to provide substantial structural support. Their internal stratigraphy suggests both postholes

were burned in place and that the cooking feature continued to be used after they burned. A radiocarbon date on charcoal (Beta 194650) from the base of the cooking feature returned a date of 4920 ± 30 BP (Table 1).

Cultural depression McEx2 is the remains of a semi-subterranean structure used repeatedly as a shelter while processing foods. Based on the distribution of artifacts and features, activities associated with the structure extend to the southeast outside the structure, which remains unexcavated. Botanical and faunal remains indicate summer occupation of the site, but spring occupation may have also occurred. The absence of any obvious postholes along the perimeter of the structure leads us to surmise that shallow-set posts were set along the perimeter of the feature, but any scant evidence for their existence was destroyed during recent plowing. The lack of any evidence for large structural posts and small size of the structure are consistent with a temporary, seasonal structure, possibly with open sides.

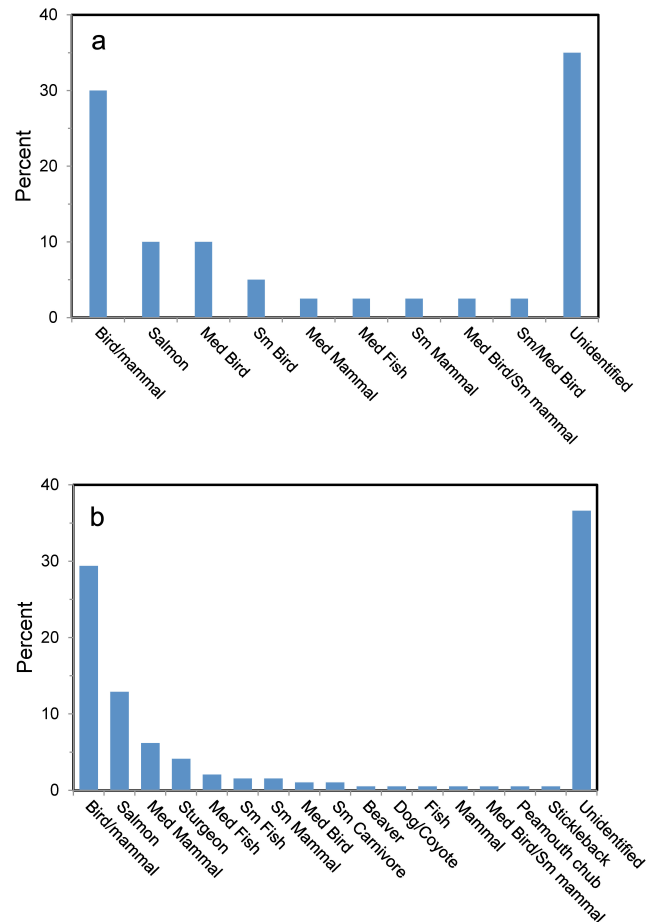


Figure 7. Relative proportions of fauna recovered from (a): McEx2 and (b): Midden.

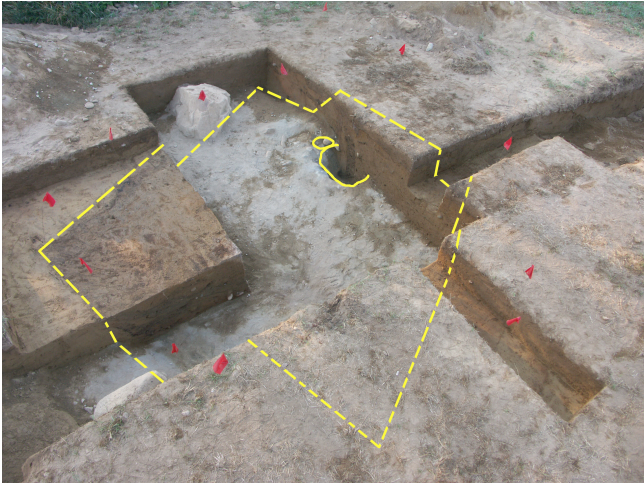


Figure 8. Area McEx2 after excavation showing outline of structure and large and small post holes indicated by yellow lines.

The abundance of charred and uncharred plant and animal remains, and the size of the cooking feature, suggests intensive food processing. Evidence for such intensive processing is consistent with the putting away of foods for later consumption. Intensive food processing for delayed consumption is also indicated at the site of *Xaytem* in deposits dating to approximately 5000 years ago (Ormerod 2002).

The midden area, about 17 m north of the small structure (Figure 3), was composed of multiple lenses rich in artifacts, calcined bone, charcoal, FAR, chopper rejuvenation and rejuvenation flakes, and fire-reddened sediment. These remains suggest the site occupants repeatedly cleaned nearby activity areas and hearths and disposed the trash in this designated location. A radiocarbon date on charcoal from the midden produced a date of 5250 ± 40 BP (Beta 194649, Table 1). Thus, at least one lens of the midden was deposited approximately 200 - 600 years before the structure was used.

Life at the Mccallum Site

The rich and varied archaeological record of the Mccallum site allows us to piece together how people lived on this terrace ~5500 to 6000 years ago (Table 1). The botanical remains indicate at least summer use, and the absence of a substantial structure supports the interpretation that the occupations were limited to the milder months. Repeated occupations are suggested by the multiple-use events in the cooking feature and the midden, and by the widespread, low-density scatter of lithics across much of the terrace.

In many respects, the deposits at the Mccallum site fit well with the perceived view of daily life for people of the Lower Fraser River region during the mid-Holocene (e.g., Matson and Coupland 1995; Matson 1996). There is no evidence for a permanent dwelling or the use of the site by a large social group. People subsisted on a broad range of food resources, with somewhat of a focus on birds and/or mammals and berries. Salmon, while utilized, was not an

especially important resource. Taken together, these data indicate the Mccallum site occupants were relatively small groups of mobile hunter-gatherers who traveled the region exploiting a broad spectrum of foods when they became seasonally available.

To this generalized scenario, we can add more details about lives lived at the Mccallum site some six millennia ago. That the site was used repeatedly indicates it was either part of a seasonal round, or was a regularly used field camp associated with a more permanent settlement. In either instance, site occupants maintained a cognitive map of the landscape that regularly took them to the same locations to conduct the same sets of tasks. That is, their use of the landscape was deliberate, planned, and part of the yearly rhythm of one or more social groups'. We assume that easy access to the Fraser River, both for food and travel, was a major draw to this location. This is further indicated by the fact that people ceased coming to the site when the river substantially shifted its course away from the Mccallum terrace.

The Mccallum site occupants repeatedly used structure McEx2 to process large amount of food. This processing was either for immediate consumption by a large number of people (e.g., a feast), or to put food away for later use. Since there is no other evidence for large numbers of people at the site, we suggest the latter scenario is more strongly supported. Stored food would have offset fluctuations in resource availability throughout the seasons. However, the small size of the social groups, and a diet consisting in part of foods that were available year-round, would have mitigated the need to store copious quantities of food. The nearby contemporaneously occupied site of *Xaytem* also has evidence of mass processing and storage of food (Ormerod 2002) and the occupants of the nearby Glenrose Cannery site had a similarly broad diet (Figure 1) (Matson 1996).

The Mccallum Site in Context

Comparison of the Mccallum lithic assemblage to other early sites in the Fraser Valley (Figures 1 and 9) indicates that there is a dramatic difference in the relative frequencies of cobble chopper and other artifact classes among sites. In sites older than about 5500 BP, the percent abundance of choppers ranges from as much as ~28% at Glenrose and South Yale to as little as ~6% at the Milliken site. Edge-modified flakes, on the other hand, make up the majority of tools at Milliken and are considerably less common at the other sites. Differences in relative abundance of tool types likely reflect differential access to raw materials and the nature and intensity of tasks conducted at each locale. Sites with an abundance of cobble tools and only a few other artifact types ("cobble chopper sites"; Roulette 1989; Hamilton and Roulette 2002) may be associated primarily with wood harvesting and processing (e.g., South Yale and Union Bar sites), whereas a broader range of tasks, including woodworking can be inferred for sites with more diverse assemblages (e.g., Glenrose). Conversely, early sites with relatively few cobble tools and generally low

artifact diversity overall (e.g., Milliken) were likely task-focused sites where woodworking was not a major activity.

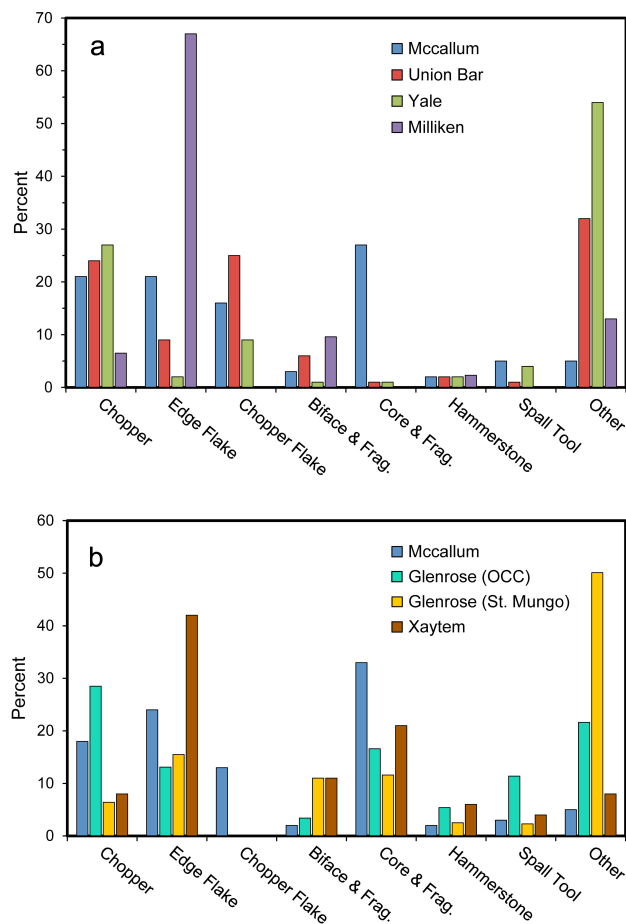


Figure 9. Comparison of major classes of artifacts recovered from the Mccallum site with other mid-Holocene sites in the Lower Fraser region. Screened and non-screened assemblages are compared separately, depending on site excavation methods. Graph (a): All Mccallum artifacts compared with Union Bar (Haley 1987), South Yale (Haley 1987), and Milliken (Mitchell and Pokotylo 1996). Milliken has no data for chopper rejuvenation flakes, cores, or spall tools. Thus, numbers in other categories are inflated. Graph (b): Screened Mccallum contexts (McEx1, McEx2 and Midden combined) compared with Glenrose St. Mungo and Old Cordilleran components (Matson 1996) and Xaytem (~5000-6000 cal BP; Ormerod and Matson 2000). Data on chopper rejuvenation flakes not available for Glenrose and Xaytem, thus numbers in other categories are inflated.

Northwest Coast people relied heavily on wood and wood products (Lepofsky et al. 2003; Turner 1998) and so it should be no surprise that cobble choppers form such a large proportion of some assemblages of early sites on the southern coast. Considering that some woodworking events would have produced few lithics (Hayden 1977; 1978), the

abundance of choppers in early southern coastal sites is even more striking and indicates just how important wood was as a raw material. The abundance of tools associated with wood extraction is consistent with estimates that over 50% of the artifacts originally deposited in Northwest Coast sites were composed of fibrous and woody materials (Hobler 1990: 299).

Although cobble choppers occur throughout the Holocene archaeological record of the Northwest Coast, the few securely dated sites on the south coast with abundant cobble choppers suggest that these sites may have been limited to the early to mid-Holocene. Later in time, during the St. Mungo phase (~5500 BP to 3800 BP), the relative abundance of choppers ranges from ~5% at Glenrose, St. Mungo, and Xaytem, to <1% of the assemblage at the Maurer site (Matson and Coupland 1995:102, table 5-2; Schaepe 1998:146). In the following Locarno Beach phase (~3800 to 2400 BP), chopper frequencies range again from ~11 to 1% of lithic assemblages (Matson and Coupland 1995, table 6-2). By 2400 BP, at the onset of the Marpole phase, choppers are extremely rare in the archaeological record (Carlson 1970; Pettigrew 1990:552).

Woodworking, cobble choppers, adzes, and cedar

In the late pre-contact and post-contact periods, woodworking on the Northwest Coast was focused on red- and yellow cedar. In fact, cedars were so important to Northwest Coast peoples that it has been suggested that without them, their societies would have developed differently (Hebda and Mathewes 1984). The importance of cedar is reflected in economic and spiritual realms and in the languages of Northwest Coast peoples (Garibaldi and Turner 2004; Turner 1998, 2014). In the later pre-contact and historic periods, woodworking, primarily of cedar, was the job of specialists and was controlled by few individuals within a community (Ames 1995).

These connections among cedar, woodworking technology, and social status, however, are a later phenomenon that mostly did not involve cobble choppers. In part this has to do with the timing of cedar establishment on the coast, the workability of cedar fibers, and the expedient nature of cobble tools. These factors in turn suggest that woodworking occurred in a very different social context in the early and mid-Holocene compared to later times.

The precise timing for establishment of cedar forests in the Fraser Valley is not known. However, macrofossil remains from high elevation lake deposits indicate that redcedar was growing in the lower Fraser Valley by ~6800 BP (Wainman and Mathewes 1987). Assuming these macrofossils mark the first appearance of cedars, we can assume that cedar trees were well established in local forests only after 6500 BP. Thus, at least until this time, cobble choppers at sites like Glenrose Cannery were used to work woods other than cedars.

The decline and subsequent disappearance of cobble choppers from the record, beginning about 1000 years after

the establishment of cedar, is paired with the appearance and increased frequency of other wood working tools. Crudely made celts have been found in deposits dating to as early as the St. Mungo/Mayne phase at the Pender Canal site (Roy Carlson, pers. comm. to D. Lepofsky, 2005), and small celts are associated with the subsequent Locarno Beach phase. By the Marpole phase (2400 to 1200 BP), when choppers are largely absent from the archaeological record, large, well-made celts and hand mauls are characteristic (Burley 1980).

It has been proposed that this decline in choppers on the Northwest Coast reflects the functional replacement of chopper technology with more labour intensive groundstone woodworking tools such as adzes and hand mauls (Carlson 1970; Roulette 1989). Roulette (1989:87-88) argues that small celts found in Locarno Beach phase components could not have been used for the full range of tasks associated with woodworking, and were used in conjunction with cobble choppers. By the Marpole phase, large celts seemingly fully replaced the role of the chopper tool. Notably, the increasing importance of ground stone celts over time corresponds with an increase in other ground stone, antler, and bone artifacts throughout the Northwest Coast.

We suggest that the functional advantage of adzes over choppers is best realized when working cedar. While adzes clearly have mechanical advantage over choppers for chopping trees, choppers also function effectively for this task, especially for a tree with a burned trunk. Choppers also functioned efficiently for scraping and pounding bark and wood fibers. Adzes are far superior, however, for removing wood chips to make planks, canoes, etc., from soft and easily worked cedar. Adzes could not have been used effectively to work the denser, harder woods such as Douglas-fir and maple. Choppers used after cedar was established may have been used primarily on woods other than cedar.

Another important difference between adzes and choppers is their expediency and whether they were curated. Choppers were made quickly and easily from readily available and locally abundant river cobbles and thus were often discarded after use. Celts, on the other hand, were much more costly with respect to the time and skill required to make them, and in some cases, there were social and logistical barriers to acquiring the nephrite to make the tools (Darwent 1996; Morin 2012) (Chapter 27). While both tools could have been used multiple times, celts were highly curated and were resharpened and reworked repeatedly. Being lighter than choppers, and of various sizes, celts could also be more easily transported than choppers (unless they were hafted). As a result of these differences in access to the raw material, expediency, and curation, choppers are a dominant artifact class up to ~2400 BP, whereas celts are a minor component of later assemblages (e.g., Matson and Coupland 1995, table 7-3, p. 217), especially around 1000 BP (Morin 2015).

The differences between choppers and adzes are similar to those between simple hammerstones and hand mauls – another central tool type of the later period woodworking kit. Like celts, hand mauls require considerable time and energy and craftsmanship to make, and were made and owned by only a few, elite individuals (Matthews 1955:39). However, river cobbles with flattened ends would function the same as hand mauls and requires a lot less effort to produce. Notably, hand mauls are also rare in later archaeological assemblages.

Since adzes had several presumed advantages over choppers, it is striking that they were not used more often and earlier in the culture historical sequence. Certainly, the knowledge about how to produce ground stone artifacts among Northwest Coast peoples has a long tradition, as was the knowledge related to making adzes. Furthermore, since cedar forests were likely established for at least 1500 years before cobble choppers started to decline and celts increased in numbers, the presence of cedar alone does not explain the demise of extensive chopper use.

The shift away from cobble choppers – which could be made and used by anyone, to nephrite celts – which required specialized status and knowledge to produce and use, signals a significant shift in the social context of woodworking. By at least 2400 years ago, and likely earlier, Northwest Coast societies supported specialists who controlled access to valued cedar wood and the tools for utilizing it. The making and use of large canoes, carved masks, and multi-family plank houses with immense support beams and posts, became inextricably linked to complex social systems characterized by differential access to resources and their symbols. This disparity in access to the making and use of wood products, especially of cedar, was a far cry from the socio-economic setting of woodworking in the first half of the Holocene. At sites like Mccallum, woodworking probably focused on a range of tree species, and appears to have been a common activity accessible to all.

Concluding Remarks and Recommendations for Future Research

The Mccallum site is one of the few well-dated sites from a mid-Holocene context in the Fraser Valley. At that time, similar sites would have been relatively common throughout the Lower Fraser River region. Today, many of the elevated landforms containing these sites have been destroyed by development, and the remaining few are threatened. Compared to the early and later periods, little is known about the archaeology of the middle pre-contact period and even less is known about cobble chopper sites. It is imperative that sites like the Mccallum site are protected for the future and that any excavations of these sites are conducted to the highest standards. To this end, we make the following recommendations:

- Survey likely landforms for mid-Holocene sites, such as elevated river terraces, so the sites can be protected.

- If a site has to be excavated, ensure that the full range of material remains are recovered and analyzed, including faunal and paleoethnobotanical remains.
- Conduct wood identifications of all contexts associated with cobble choppers.
- Conduct experiments to understand how well choppers in general, and choppers with different bits specifically, perform on a range of wood-working tasks and on a variety of wood species.
- Increase the sample of securely dated archaeological contexts with cobble choppers to determine their age and spatial distribution.

Acknowledgments

We are grateful to the many individuals in the several communities who graciously offered support to the excavation team. In particular, we thank Sid and Judy Douglas and Denise Douglas of Cheam First Nation, June Harris of Seabird First Nation, and Deanna and Denise Peters of Schkam First Nation. At Sto:lo Nation, we thank Larry Comodore of Soowalie First Nation, Dennis Leon of Chehalis, Riley Lewis of Skway First Nation, Sonny McHalsie of Shxwowhamel, and Dave Schaepe. As always, Dave played an essential role as collaborator, organizer, and liaison. Ian Frank helped us set up the camp and provided insights

about the artifact collection. Many thanks also to Yvette John of Chawathl First Nation and Amanda King for the outstanding outreach programme that brought over 700 people through the site. We also thank Steven Point for his spiritual guidance.

The success of our field season was also due in large part to the support of several people in the Aggasiz community including Bev Kennedy, Colleen Gingerich, George and Debra Boyes, Steve Minchuk, and Gerald Grappin. A special thanks to Greg and Margaret Vanderhoek, and to the whole Vanderhoek family, for their help and support.

We are very grateful to the SFU field school students and their TA, Peter Locher for their skills and hard work. Teresa Trost analyzed the faunal remains and Naoko Endo analyzed the plant remains. Many thanks to Sue Formosa for collecting much of the total station data and to Sue and Shannon Wood for producing the figures.

The McCallum journey got us deeply immersed in discussions about cobble choppers with whoever would listen to us. We especially appreciate discussions with Phil Hobler, Roy Carlson, Duncan MacLaren, Tom Churchill, and Bill Roulette. Bill's 1989 Master's thesis on chopper sites in the Northwest served as a foundation for many of the analyses and interpretations presented here. We would like to dedicate this article to Phil Hobler, whose enthusiasm and intelligence inspired many a Northwest Coast archaeologist.

This research was funded by the SFU Archaeology Field School and a SSHRC Research Grant awarded to D. Lepofsky (#410-2003-1525).