THE MIDDEN

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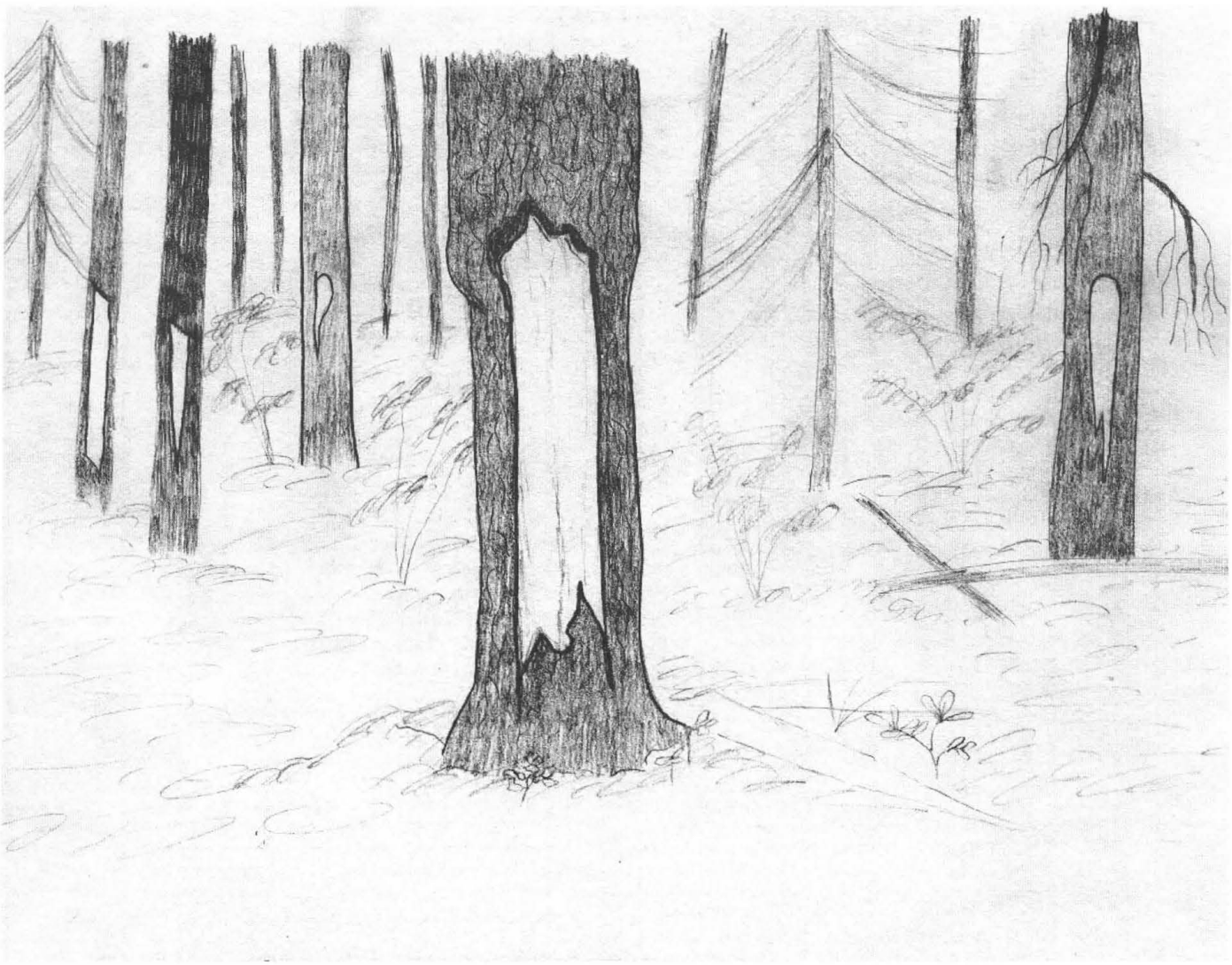

Culturally Modified Trees of the Nechako Valley
Wapato (Part II)
TRACES Field Report—Index Volume 33

THE MIDDEN

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Volume 34 No. 1, 2002

In this issue

Culturally Modified Trees of the Nechako Plateau *by Amanda L. Marshall*	2
Debitage	11
A Critical Look at the History, Enthnography, and Linguistics of Wapato *by Terry Spurgeon*	12
Field Notes	21
Debitage	21
Annual Index Volume 33	22
Exhibits	24
Conferences 2002	inside back cover
Conferences 2003	outside back cover
BC Archaeology Forum 2002	outside back cover

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Cover Page

Drawing of Culturally Modified Trees (CMTs).
See article by Amanda Marshall starting on the next page.

CULTURALLY MODIFIED TREES OF THE NECHAKO PLATEAU

CAMBIUM UTILIZATION AMONGST TRADITIONAL CARRIER (DAKHEL) PEOPLES

By Amanda L. Marshall

Introduction

This study investigates, using archaeological and ethnographic data, the significance of cambium within the seasonal round of Carrier First Nations of the Nechako Plateau, and how culturally modified trees (CMTs) fit into Carrier archaeology. The article argues that cambium was not used solely as an emergency food, but rather as one of a variety of foods that the Carrier consumed throughout the year, which contributed to the seasonal round by providing a springtime food full of carbohydrates, sugars, and body cleansing attributes. The archaeological data comes from two forestry cutting permit (CP) areas in northern British Columbia: CP MK-15 (site FjSg 12) and CP 541(site GgSp 55). Ethnographic data obtained from interviews conducted with 12 elders from various Carrier communities was also analyzed.

The study area falls into the region of the Nechako Plateau of interior BC, which is traditionally the territory of the Carrier Athapaskan First Nations (Figure 1). The Nechako Plateau is bordered by Babine and Stuart lakes to the north, Prince George in the east, Smithers to the west, and the Blackwater River to the south.

Culturally modified trees are one of the most common archaeological subsistence features found in the province of British Columbia today (Carlson 1998a). They are also widespread along the northwest coast and interior plateau regions of the United States (Bergland 1995), and have been extensively documented in Sweden (Niklasson et al. 1994; Zackrisson et al. 2000).

The inner bark tissues of the lodgepole pine (*Pinus contorta*), or *chundoo dze* in Carrier (Central Carrier Linguistic Committee 1973:11), was an almost universal springtime food of the interior First Nations (Turner 1997:53). Cambium collection involved removing the outer bark of the tree, and then scraping the cambium layer from the trunk and collecting it. According to ethnographic accounts, May and June were apparently the best months for cambium collection, as the sap runs during this time (Albright 1984; Bond and Russell 1992; Central Carrier Linguistic Committee 1973; Glynn-Ward 1932; Hall 1992; The People of 'Ksan 1980). This process of cambium stripping created a scar on the tree; the tree would continue to grow and the scar would slowly heal. It is these scars that we find today as archaeological features or CMTs (see cover).

The nutrient-rich cambium of the lodgepole pine provided a variety of vitamins and minerals, as well as dietary fibre (Turner 1997). So far there has been little documentation of the nutrient content of lodgepole pine cambium, but Turner and Kuhnlein (1991:13) expect that it would be high in sap content. Using maple sugar as an example, they would expect high carbohydrate/sugar energy values for inner-bark foods. In fact, the dietary supplement pycnogenol, a mixture of flavonoids with antioxidant activity, is derived from the bark of *Pinus maritima* (R.J. Marles, personal communication 2000).

Research Methodology and Design

Two sources of data were analyzed to answer the above research questions: both ethnographic (oral histories) and archaeological data.

Ethnographic Data

Several elders from the Carrier communities of Tachie, Middle River, Portage, and Nak'azdli agreed to be interviewed for the oral history project. They are: an elder from Fort St. James who requested anonymity, Russell Alec, Sebastian Anatole, Francesca Antoine, Josephine Austin, (the late) Camille Joseph, Walter Joseph, (the late) Annie Mattas, Celestine Thomas, Francis and Catherine Williams, and James Williams. The elders ranged in age from approximately 60 to 105 years, were of a traditional upbringing, and had all had first-hand experience collecting cambium.

Elders were interviewed on five general topics relating to CMTs: (1) cambium collection and its use as an emergency food; (2) the correlation between the different scar types, scar shapes, and scar top shapes; (3) the relationship of girdled trees and choppings to streams and trails; (4) the side of tree chosen for bark removal; and finally (5) how CMT densities correlate with the natural topography of the land.

Archaeological Data

Archaeological data was collected from two CMT sites referred to as CP 541 or GgSp 55, and MK-15 or FjSg 12 (see Figure 1 for the site locations). These two sites were chosen because of their accuracy in methodology and detail of data collection, which are described below:

CP 541

CP 541, or GgSp 55, is a large site, with an estimated 8,000 CMTs located within the block boundaries (Figures 2 and 3). This site is of the Harvest Area typology and is located east of Babine Lake, adjacent to the Carrier village of Old Fort. Because fieldwork was concentrated within the cutting permit boundaries, the full distribution of the site remains unknown. Carlson (1998b:3) believed that

the site distribution probably continues to the west toward the shore of Babine Lake, and north and south of the block. Due to the large number of CMTs located within the block, not every tree could be recorded, so an adequate sample of data was obtained. Systematic transect strip sampling (transects spaced 100 metres apart), and plot sampling every 100 m along the transect strips (20 m in diameter), were used to estimate the overall density and total number of CMTs present in the blocks (Carlson 1998b). A total of 237 dating samples were obtained, providing an approximate 3-to-4-percent sample of dates for all the CMTs present at the site. Using this transect/plot sampling methodology, an estimated total of 36,375 CMTs may be present at GgSp 55. Scar dates from the site range from AD 1785–1890.

CMT descriptive data was collected in each plot and includes: Block; Plot; CMT#; Dead/Alive; CMT Type; No. of Scars; Scar #; Scar Morphology; Side of Tree; Slope Angle; Slope Direction; DBH (diameter at breast height of CMT); Height Top of Scar; Height Bottom of Scar; Length; Width; Depth (lobe thickness); Scar Shape; Top Shape; Cut Marks; Basal or Bark 'v'; Lateral Cut Edge; Cut Branches; Choppings; and Scar Date. See Figure 4 for the recording guidelines developed by Traces Archaeological Research and Consulting Ltd.

CP MK-15

The second site examined is cutting permit MK-15, or FjSg 12, located in the Vanderhoof Forest District, just south of the Cheslatta River. The site, first documented by Father Morice in the early 1900s, is much smaller than GgSp 55 and is of the Trail typology: i.e., small clusters and/or linear clusters of CMTs distributed along a known Carrier trail (Carlson et al 1999:1). Data was collected from this site using the same transect strip and plot sampling methodology as that used in CP 541 (Figure 5). This sampling methodology, successful in CP 541, did not work well in recording a large sample of CMT descriptive data (as a majority of the CMTs were not located within the plots), and only worked well in recording distributions along the trail. An estimated total of CMTs at the site was 648 to 839. Scar dates from this site range from AD 1847 to 1931.

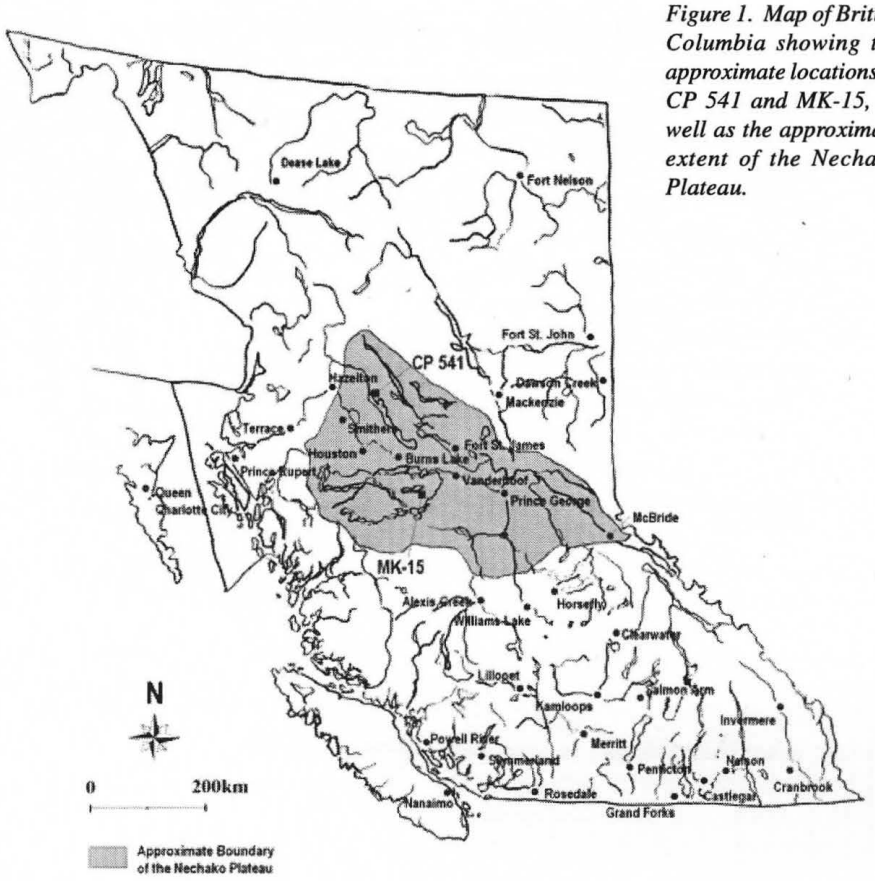


Figure 1. Map of British Columbia showing the approximate locations of CP 541 and MK-15, as well as the approximate extent of the Nechako Plateau.

Analysis and Discussion

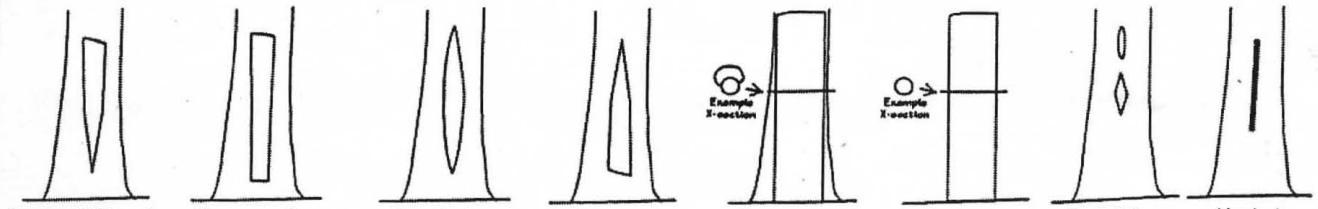
CMT Frequency Dates and the Use of Cambium

In 1998,Carlson (1998a) suggested that CMT frequency dates may correlate with fluctuations in the Carrier seasonal round (Figure 6). Similarly, dates obtained from sites GgSp 55 and FjSg 12 were initially entered into frequency histograms, which showed there were several peaks in frequency dates during certain years (Figures 7 and 8). This, along with the idea that cambium was often eaten as a starvation food, created the hypothesis that peaks in frequency dates may correlate with historic documentation of hard times due to fluctuations in other food resources such as salmon. Dates were then plotted on the original block maps. Several different subpopulations were apparent based on the age of scars in CP 541, somewhat defined by Blocks 1/4, 2, and 3. A box plot (Figure 9 and Table 1) was created, to demonstrate the apparent differences in the distribution of dates across the blocks. From the box plot we can see that a majority of the scars located in Block 1/4 cluster around AD 1847. Differences between the dates in Blocks 2 and 3 are not as easily defined. Dates from Block 2 cluster around AD 1803, and Block 3 around AD 1805, yet both have dates considerably older than the average scar date from

	1ST QUART	MAX	MIN	3RD QUART	MEAN	S
541-1/4	1828	1890	1785	1851	1847	20.67413
541-2	1802	1835	1793	1809	1803	10.71288
541-3	1803	1846	1790	1814.75	1805.5	12.15149
mk-15	1866.5	1917	1847	1886.5	1872	15.98945

Table 1. Summary of scar age range by subpopulation, Sites GgSp-55 and FjSg-12.

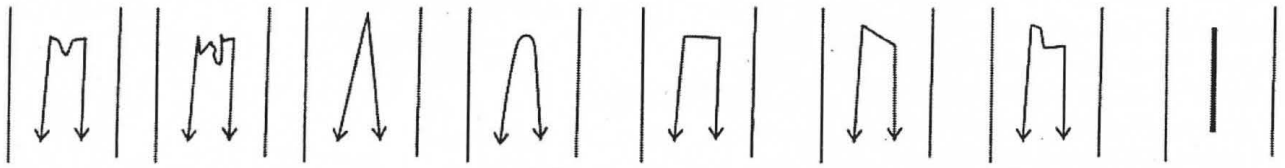
CMT Scar Shapes



Any scar which does not conform more-or-less to any of these shapes should be called "irregular (I) and should be described in comments and/or sketched.

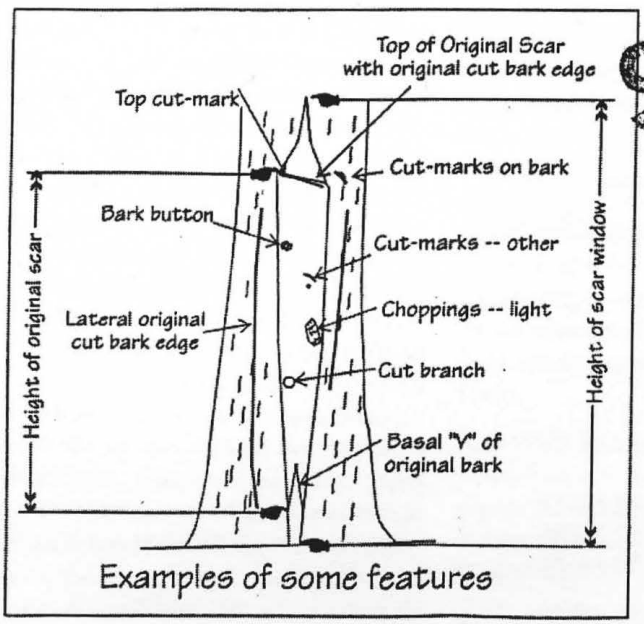
Shape describes overall shape of the scar window. The shape/form of scar top can vary highly. Describe top separately (see illustrations below).

CMT Scar Top Shape/Form



Top Shape describes either Top of Original Scar or Top of Scar Window, depending on overall morphology of scar.

Only use *Irregular* description if no other shape describes scar top.



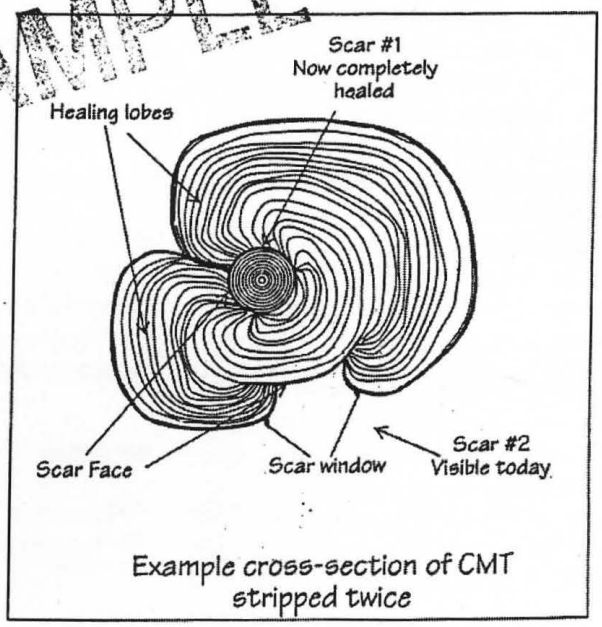


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Figure 4. TRACES Recording Form Guidelines for CMTs.

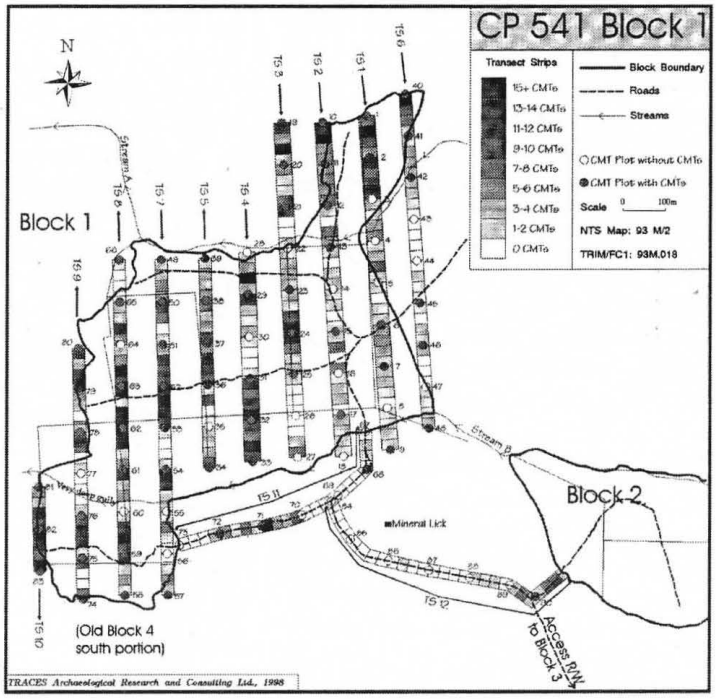


Figure 2. Map of CP 541, Block 1 (4) showing transect strips, CMT plots, and CMT densities (Carlson 1998b).

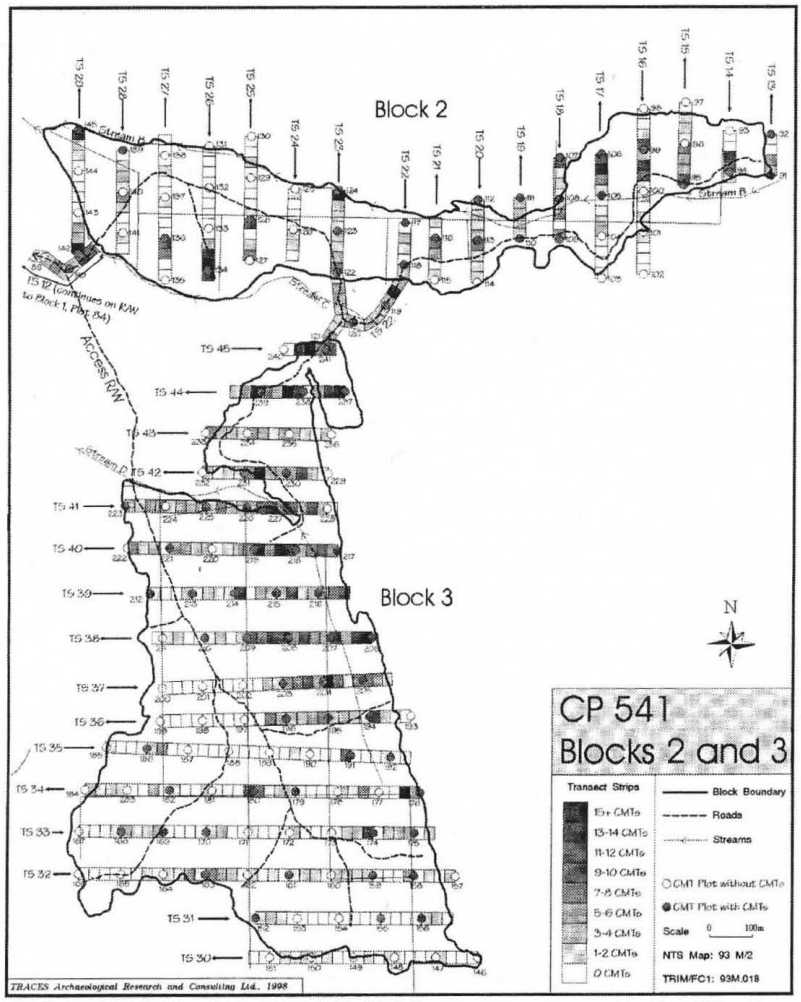


Figure 3. Map of CP 541, Blocks 2 and 3 showing transect strips, CMT plots, and CMT densities.

Block 1. Dates from MK-15, or FjSg 12, represent an even later time period, with an average date of AD 1872. A "one-way" analysis of variance (ANOVA) was performed, which confirms that the dates from the different subpopulations vary significantly.

Three possible scenarios are suggested by the author, which could explain what these fluctuations in dates represent (Smashnuk 1999). Situation One is as follows: there were certain time periods when other food sources were short in supply or certain social or subsistence factors were facilitating the use of emergency foods. In Situation Two, there were certain time periods in which a particular area was chosen for cambium collection as opposed to other areas. And finally, in Situation Three, fluctuations of dates were caused by an alteration in diet, for only a short period of time, and for no apparent reason. This final scenario makes little sense, because the Carrier traditional diet is thousands of years old; it is unreasonable to assume that a group of people would alter their diet for no apparent reason.

The author felt initially that Situation One was probably the most likely scenario for explaining fluctuation in scar dates. However, after reviewing the oral histories and the archaeological data throughout the course of this research, it has become more apparent that Situation Two is the most likely scenario for describing cambium use in the seasonal round.

Prince (2001) studied increment core dates from several sites in the Nechako River drainage. He found that CMTs located well above Cheslatta Falls, an area that historically lacked salmon spawning grounds, show a marked difference in the clustering of dates from other areas of the drainage. The increment core dates from this area demonstrate tight, discrete clusters that seem to reflect short-term, intensive collection from discrete patches of forest. He believes that gaps in cluster dates may mean other patches of forest were utilized, similar to what is described in Situation Two.

A closer look at how the dates are distributed across the landscape in GgSp 55 reveals an entirely different perspective in the clustering of frequency scar dates. Rather than more trees being stripped in certain years, what we see are certain ar-

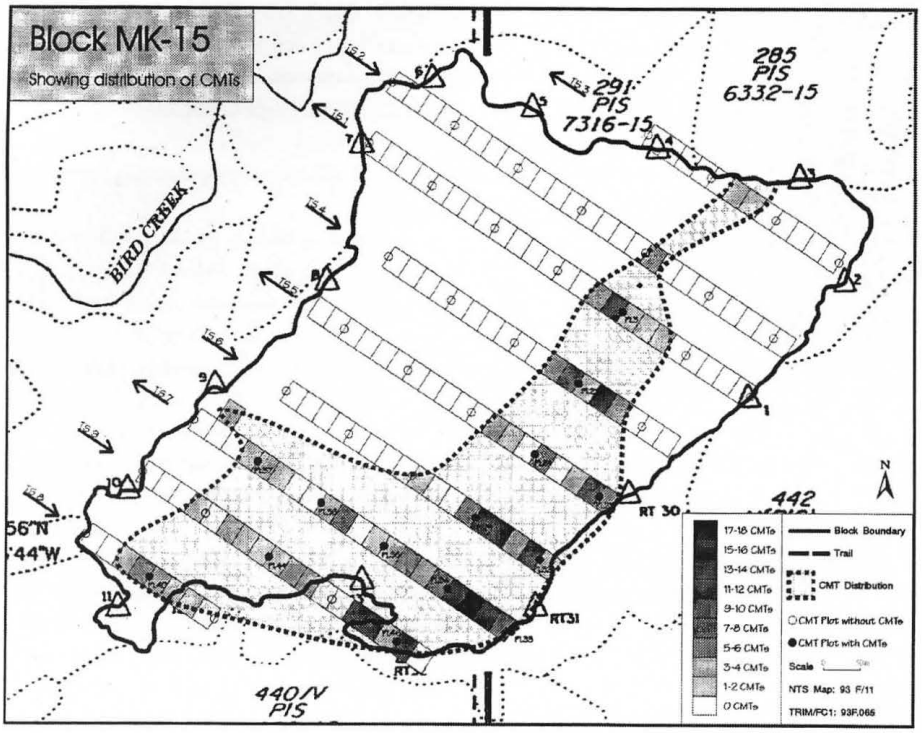


Figure 5. Block MK-15, showing transect strips, CMT plots and CMT densities (Carlson et al. 1999).

eas of the forest having scar dates that cluster around the same time period. One possible explanation for a particular area chosen for cambium collection may be the age of the forest relative to fire history. It has been described in the literature that a certain age and size of tree was preferred for cambium collection (Gottesfeld 1992:150; Zackrisson et al. 2000:107). Therefore, it could be that the relative age of a forest and its growth and fire history may have had a significant effect on which areas were considered "ripest" for cambium collection.

Although there may have been times when Native people had scarce supplies of salmon, there was little threat from starvation despite what fur traders have written. Morice (1895:73) notes that a shortfall in any major resource was made up with fish species that "seldom failed," such as minnows, sculpins, and suckers from neighbouring lakes and streams. Rabbits and other fur-bearing animals could also have been resorted to. Resources were variable from area to area and from year to year, but periods of extreme food scarcity for any specific village were rare (Bishop 1983:149). Alternate food resources and inter-village trade provided the means of preventing death by starvation. The elders interviewed all suggest that a failure in the salmon run would not be cause enough for starvation amongst the Carrier people.

In contrast to the "starvation food" concept of cambium use (Situation One), the elders describe the cambium's importance in a variety of ways: from a nutritional perspective and as a traditional way of refining one's blood; as a dessert (candy) or a delicacy; as a source of energy used while travelling; and a handy laxative.

Girdling Trees and Using the Forest in a Value-Added Way

Figure 10 is an example of where the unrecorded trails were located in CP 541. Girdled trees (bark strip scars that span the entire circumference of a tree) were plotted onto these maps to determine their locations relative to the trails and streams in the blocks. A hypothesis was that girdled trees would be found near areas where they could be easily relocated at a later date. It turns out that the girdled trees are found either next to the trails or very close to the streams.

A review of the oral histories tells us that girdling to the Carrier was a common practice during the historic period, as this provided people with a source of firewood later on once the girdled trees had expired.

Scar Shapes and Top Shapes

A comparison was performed between the two sites, GgSp 55 (Harvest Area Type site) and FjSg 12 (Trail Type site), to determine the differences in frequencies of CMT scar shapes and scar top shapes. This was done using a "two-sample" Chi Square test to compare the observed frequencies at each site with expected frequencies. Results of this analysis reveal that, with the two distributions of scars having been drawn from a common population, there are distinct similarities between the observed frequencies of scar shapes and scar top shapes at both of the sites. Interestingly the "lenticular" scar shape appears to be the most common scar shape at both sites, second would be the "inverted triangular" scar shape, the third most common scar shape is the "healed" scar, and fourth ranked is the "rectangular" scar. For scar top shapes, the "tapered" top is the most common, second is the "rounded" top, third is the "irregular" top, and fourth is the "healed" top. For counts on "angled" scar tops, the majority of them were "angled to the right." A person using their right hand, which is often the dominant hand for an individual, will make the cut angled down toward the right hand side.

An analysis of the different scar shapes and scar top shapes at a site may allow for identification of individuals, families, and groups through "style" analyses (Muir and Moon 2000). The scar shape produced by a person stripping a tree represents individuality, in respect to different families or clans who may have been taught to strip trees in certain ways. The elders interviewed suggest that people from different areas do things different ways, probably following the teachings of their elders.

CMT Types

Already described are the girdled (G) CMTs, which fall into the CMT type stripping (ST). Three other CMT types commonly found in the interior of BC are blazes (BL), choppings (CP), or other (O). It was hypothesized that blazes and choppings would occur more frequently at Trail Type sites than at Harvest Area Type sites, and two pie charts were created to demonstrate the differences between the two site types (Figures 11 and 12). Included in this analysis were blazes

and choppings, as well as strippings that contained choppings on the scar face (classified as ST/CPs). These charts show a clear difference between the two sites in this regard. At GgSp 55, 96 percent of the CMTs were of the stripping typology, and only 4 percent were blazes. At FjSg 12 on the other hand, 82 percent of the CMTs were of the stripping typology, 8 percent were blazes, and 10 percent were strippings with choppings.

The obvious explanation for FjSg 12 having more blazes is that it is a Trail Type site, as opposed to a Harvest Area Type site. Also, the large number of ST/CPs at FjSg 12 indicates that people were collecting kindling while travelling. Elders confirm this and suggest that this dry, pitchy wood obtained in this way would allow the travellers to light a fire even if it was raining.

Side of Tree

The side of the tree refers to a compass bearing in degrees, or azimuth, for the direction the scar is facing. There are conflicting opinions from elders that make reference to a tree's side with the greatest amount of sun exposure as being the best side for cambium collection. Only four out of twelve of the elders from this study said that the sunny side of the tree was the better side to strip for cambium. The remaining eight elders said that it did not matter which side of the tree was chosen.

A hypothesis is that, if it matters which side a person collects cambium from, this will be represented in the archaeological data. To test this hypothesis, a "one-sample" Chi Square test was performed to determine if the "side of tree" distribution was uniform, and there was no selection for any particular side of the tree. As a result of this test we can *reject* the null hypothesis that only chance has caused any difference between expected frequencies and observed frequencies. In all four blocks, there seems to be a slight favouring of the northwest, north, and northeast sides of the tree compared to the more southerly sides. In all cases, the north side of the tree appears to be the most commonly selected side. In the spring the sun is shining towards the south side of the tree at noon, and the north side of the tree is always slightly shaded. Therefore, it seems that in sites GgSp 55 and FjSg 12 there was a preference for stripping cambium from the shady side of the tree.

Similar results have been found by Zackrisson et al. (2000:102) in that the north, northwest, and northeast sides of the tree were the most commonly chosen sides for bark removal among the native Sami of northern Sweden. Of trees with multiple cambium strippings, the north side appears to be chosen first and the south side was subsequently chosen. They mention that in Sami culture, north and south directions have a strong influence on various cultural and religious phenomena. Zackrisson et al. suggest a relationship between the south side of the tree trunk, which was exposed to the sun, and the shaded north side may have theoretically influenced which side was peeled for bark removal. They also describe how living pine trees are treated with respect, and that before a tree was cut, "the spirit of the tree had to be informed so that it could safely leave the tree" (2000:106).

Stryd (1997) explains that the shady side of the tree usually has fewer branches, suggesting that this side of the tree would

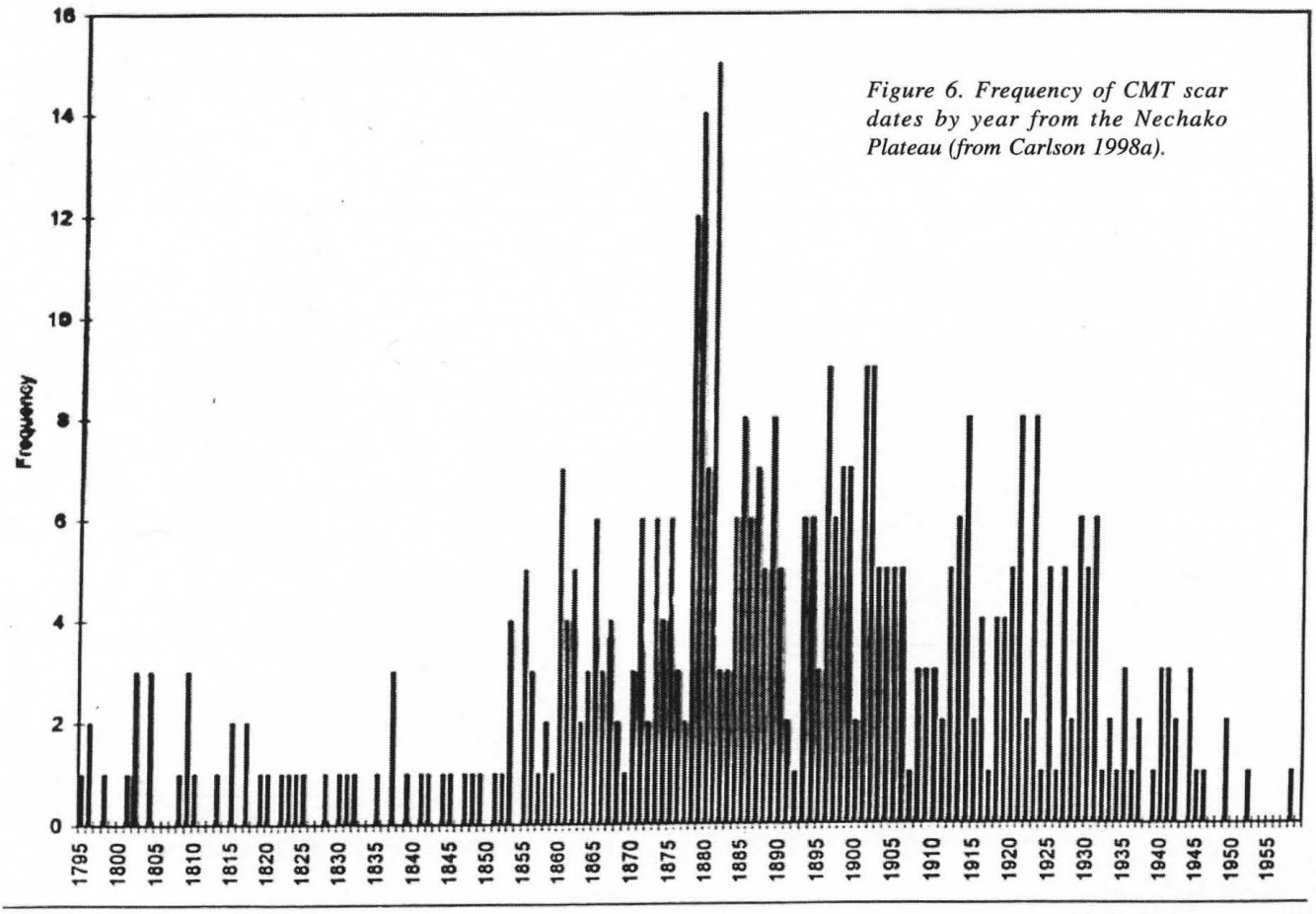


Figure 6. Frequency of CMT scar dates by year from the Nechako Plateau (from Carlson 1998a).

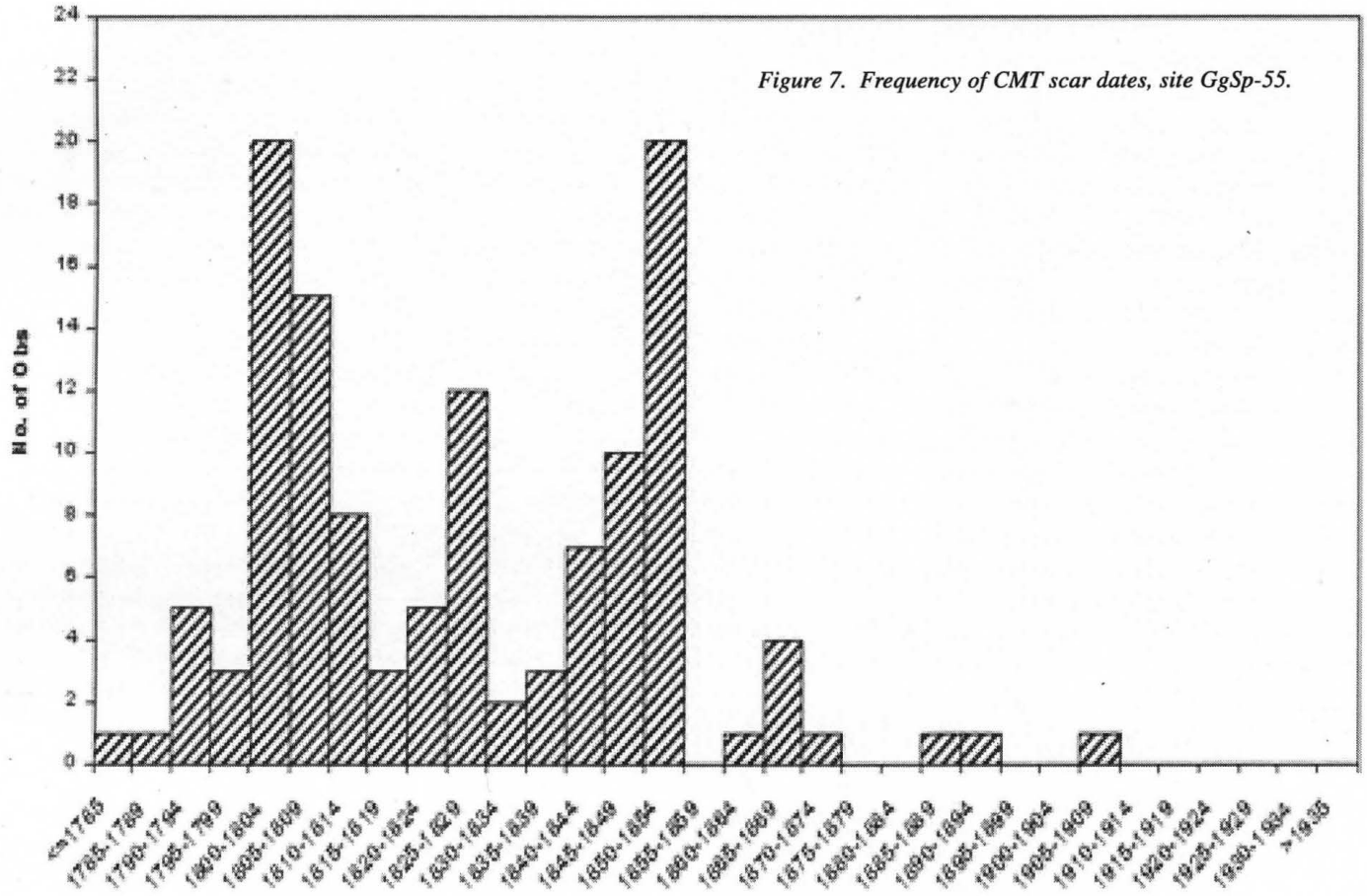


Figure 7. Frequency of CMT scar dates, site GgSp-55.

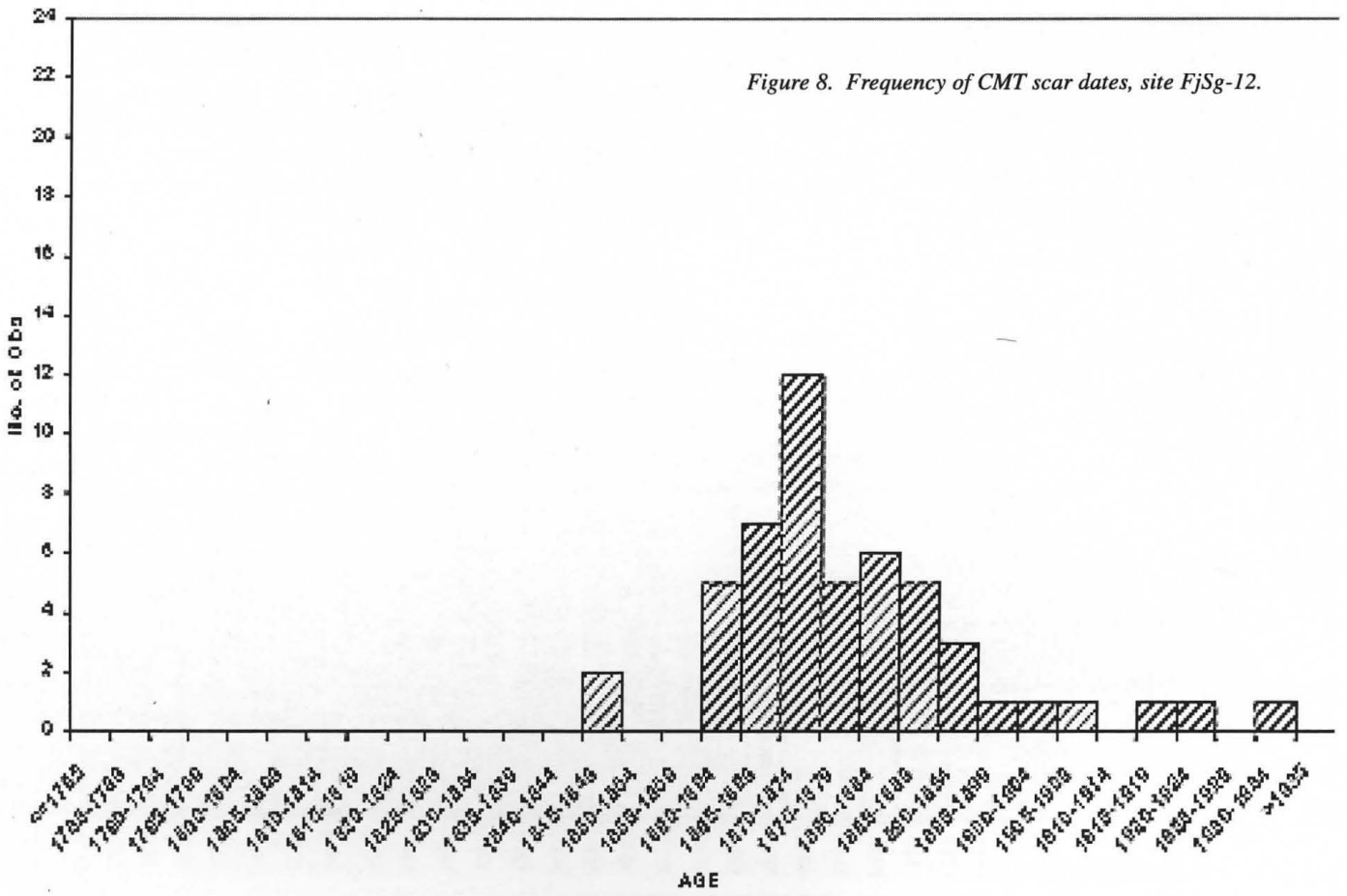


Figure 8. Frequency of CMT scar dates, site FjSg-12.

be more easily stripped of its bark. Also, when a tree is located on a significant slope, Stryd suggests that the most likely selected side of tree is going to be on the upslope. In Block 1 of CP 541, there is a deep gully located at the southwest portion of the block, which is easily recognizable by the stream flowing through the bottom. Plots located along this gully with a steep slope were used in this analysis. Out of 61 scars, only 33 (54 percent) were found facing upslope. On the other hand, if one is comparing just the CMTs in these plots that have only one scar feature, then 8 times out of 11 (73 percent), the scars were found to be on the upslope.

Locations of CMTs

The next topic of discussion is whether certain natural features on the landscape will affect where CMT densities are concentrated; for example, near streams, trails, or other resource acquisition sites. To determine this, recorded numbers of CMTs in each transect were plotted onto the block maps to visually represent areas with greater densities. In Block 1/4 the reasons for CMT densities clustering more heavily in certain areas of the block are not obviously apparent. However in Blocks 2 and 3, densities of CMTs closely follow Stream D (running northwest), Stream C (also running northwest) and Stream B (running west). These areas were probably natural travel routes to and from the lake, since it would have been easy to follow a stream to and from a village without getting lost. The deep gullies and streams in Block 1/4 do not seem to have had much of an effect on where CMT distributions are located. This portion of the block is also much closer to the lake, and people may not have been as concerned about getting lost there.

On the topic of resource acquisition sites, areas frequented for moss collection were mentioned by both Josephine Austin and Rusty Alec, as also having been chosen for cambium collection. Russell Alec states that his mother and aunties used to do two things at once close to the swampy ground:

> ....They used to do it there, they used to get the moss, and hang it up on a tree to dry and then they would be scraping the cambium from the jack pine. Then at the end of the day they'd go around and pick up the moss after it was dried, and put it in sacks and store it....[they] would go out to a big swamp there. I think that maybe because there was more water there, too.... when there's a bunch of water the jack pine cambium had a lot of juice that came with it (Marshall 2002:201).

It is speculated here that other plant resources may have simultaneously been collected near areas where cambium was harvested, such as fiddlehead ferns, devil's club, or other traditional plants used in the springtime.

Summary and Conclusion

Various aspects of the Carrier seasonal round can be defined and understood by combining the information presented in the elders' oral accounts and the archaeological data. It seems that cambium was not used solely as an emergency food, and that frequencies of scar dates are explained by how the dates are distributed across the landscape rather than fluctuations in animal and/or plant resources essential to the Carrier seasonal round. Girdled trees are often found near streams or trail routes and are used for firewood when they dry. Scar shape and top shape

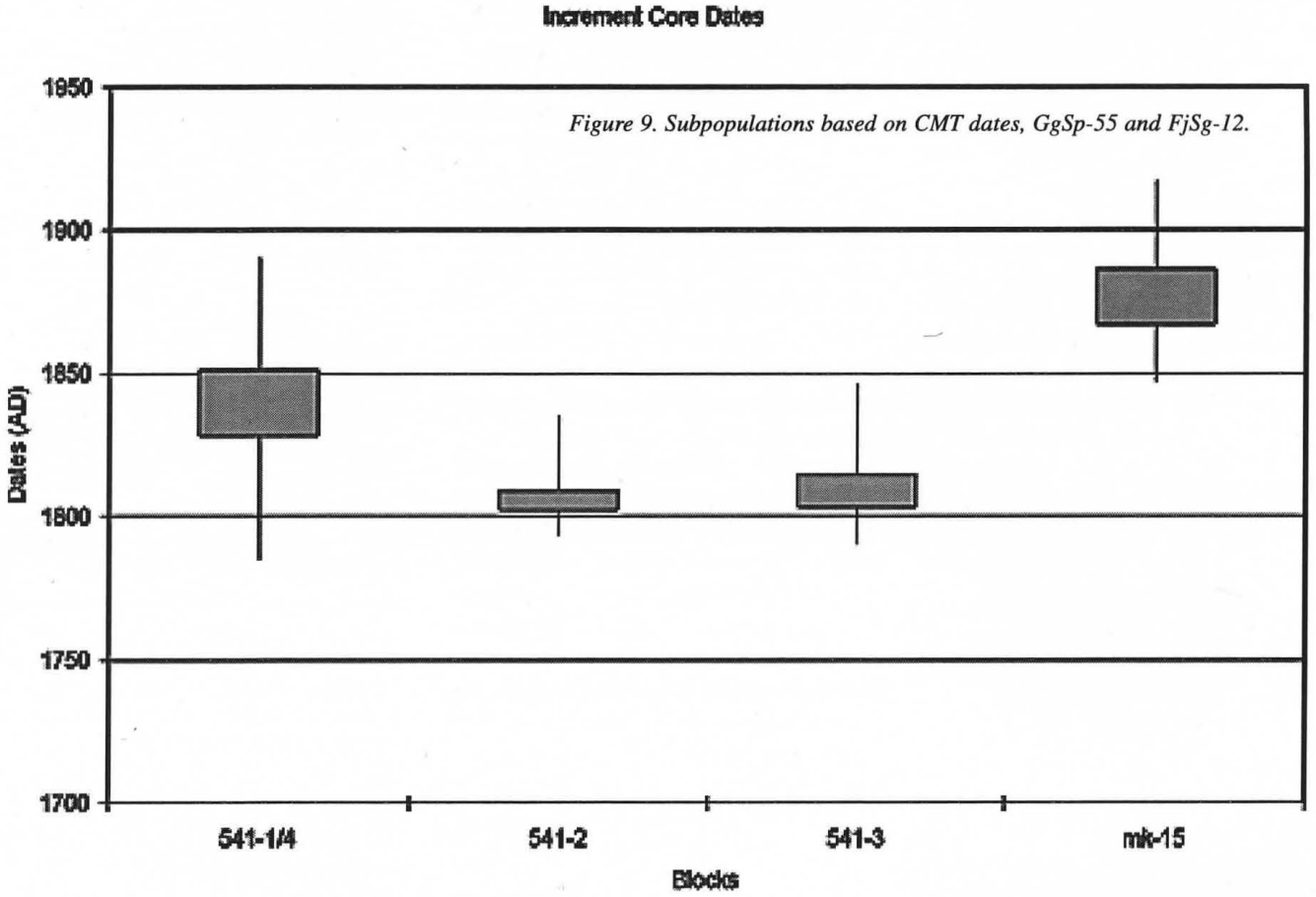
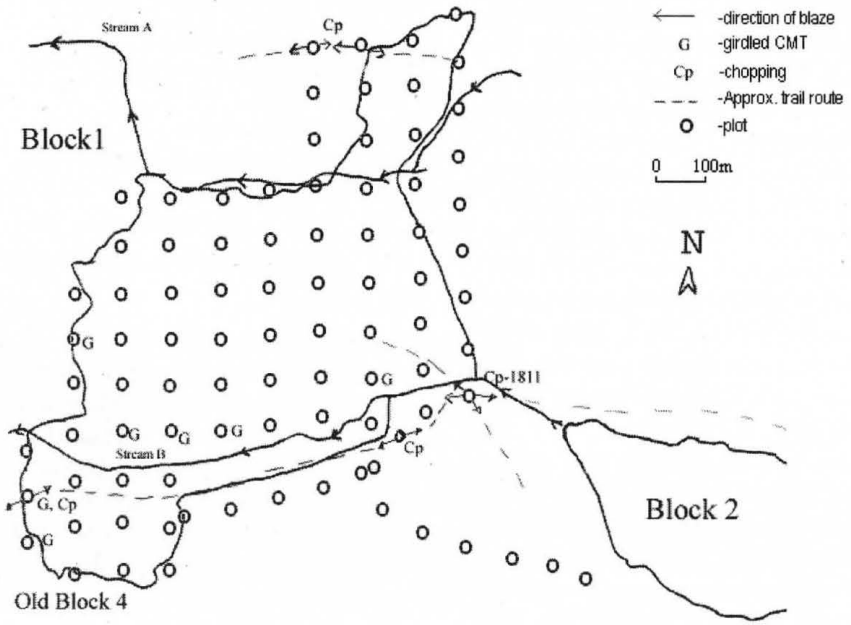


Figure 9. Subpopulations based on CMT dates, GgSp-55 and FjSg-12.

Figure 10. Blazes and choppings indicating approximate trail routes through GgSp-55, Block ¼.



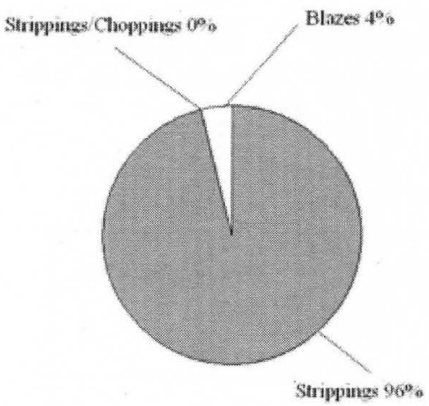


Figure 11. Percentages of CMT types, Site GgSp-55, CP 541.

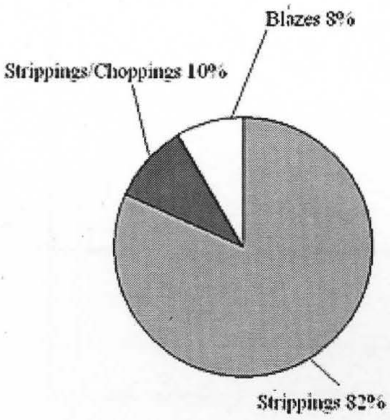


Figure 12. Percentages of CMT types, Site FjSg-12, MK-15.

frequencies appear to be very similar between the two sites, the lenticular shape being the most common; the Harvest Area Type site has a smaller proportion of blazes and strippings with choppings than the Trail Type site. The side of tree selected by a person collecting cambium may depend on the person's preference, and in these two sites appear to be mostly from the shady or north side of the tree. Slope does not seem to have a significant effect on the side of tree selected for stripping. And finally, CMT locations tend to be related to other resource acquisition sites, and along trails and streams.

The archaeological data presented in this article combined with the oral histories told by the elders have helped reveal many aspects of the Carrier practice of cambium collection and the resulting CMTs. Most importantly, it is now clear that cambium collection was only one of many resources collected over the course of the year. Cambium was not solely used as an emergency food; rather it supplemented the Carrier diet by providing carbohydrates, vitamins, and other nutrients necessary for survival.

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Amanda Marshall has recently completed her MA at Simon Fraser University on interior culturally modified trees, and has recently joined the BCAPCA as a professional member. She has been working in archaeology in BC since 1994, and is currently employed by Ecofor Consulting Ltd. in Fort St. James, BC.

DEBITAGE

Earlier this year, the **Canada Foundation for Innovation (CFI)** announced an award of $17.2 million to the Museum of Anthropology. The funds will be directed toward a re-designed research wing and the creation of a new Reciprocal Research Network. Entitled "A Partnership of Peoples: A New Infrastructure for Collaborative Research," the Museum's project is being developed in partnership with the UBC Laboratory of Archaeology and three First Nations: Musqueam, Stó:lo, and the U'mista Cultural Centre. It will provide UBC with the most advanced and comprehensive ethnological and archaeological facility in Canada.

The infrastructure will forge links between academic scholars, originating communities, and research museums through the creation of two new facilities in real and virtual space. This will involve a renovated physical infrastructure that includes work, laboratory, and storage areas to support interdisciplinary and collaborative research with originating communities in four interrelated areas: (1) material and visual culture, (2) language and oral history, (3) museology and repatriation, and (4) museums, new technology, and intellectual property.

The virtual infrastructure will consist of a Research Network that supports collaborative research over the web. The network will digitally link the collections and expertise in First Nations communities and major Canadian and international museums.

Washington State celebrates its 10th annual Archaeology Month in October 2002. Archaeology Month consists of a series of statewide events held in local communities to create public awareness about the importance of protecting Washington's archaeological heritage. Last year nearly 80 events and exhibits were organized by museums, tribal nations, universities, school districts, and federal, state, and local government agencies. For more information contact the Washington State Office of Archaeology and Historic Preservation at 360.586.3065; Web site: <www.oahp.wa.gov>.

To celebrate Washington State's Archaeology Month, the **Burke Museum of Natural History and Culture** hosts its annual Archaeology Day on 19 October 2002. Visitors to the Museum will have opportunities to handle field equipment and record and interpret artifacts. Staff and students from the Burke's Archaeology Division will display their collections, answer questions, and talk about the projects they're working on. Archaeology Day visitors can also participate in guided field trips to the 4,200-year-old West Point Archaeological Site in Seattle's Discovery Park. For further information on the Burke Museum's Archaeology Day contact the Museum at 206.543.5590 or check out their Web site: <www.washington.edu/burkemuseum.>

At the start of August 2002, the **Heritage Resource Management Branch of Alberta Community Development** began to levy fees for processing archaeological permit applications connected with development activities. Revenue from the fees will be applied to the administration of the permitting program, which for some time has faced administrative challenges.

The fee for a Mitigative Research Permit is $350 + GST, and the fee for a Mitigative Research Permit Amendment is $150 + GST. Permits and permit amendments will not be issued until the permit fees are received. When a permit or permit amendment application is rejected, $100 of the permit fee and $50 of the amendment fee will be retained as an administrative charge. The balance of the permit or amendment fee will be refunded to the applicant. Fees will not be levied for Archaeological Research Permits or Archaeological Research Permit Amendments to ensure there are no impediments to archaeological research in Alberta.

The winner in the undergraduate category for the **2001-2002 Daniel Weetaluktuk Memorial Scholarship** is Jaime Holthuysen from the University of British Columbia. Her paper is entitled "Clues to the Past: The Manufacturing of Dentalium Shell Beads." Winners receive a $250 prize and have the opportunity to publish their paper in the Canadian Journal of Archaeology.

A Critical Look at the History, Ethnography, and Linguistics of Wapato

By Terry Spurgeon

> We hear that a mass of Indians are now collected there, and that their women are busied in gathering Wappatoes [wapatos] a root of which they are particularly fond, and which is found under the water in Pools and Marshes. The Indians here call it Skous, tho' I have given it the name by which it is known on the Columbia.
>
> George Barnston, *The Fort Langley Journals 1827-30,* (Maclachlan 1998:40)

Introduction

In the previous issue of *The Midden* basic information on the ecology of wapato and the context of my research was presented. Here a critical review is conducted of the ethnographic and historic data pertaining to wapato in order to provide a more understandable framework in which to study traditional Katzie use of wapato, and ultimately to set the stage for dealing with wapato in possible archaeological contexts. The need for this type of analysis should be self-evident, given the modern emergence of critical archaeology whose main tenets were derived from ethnography and history by archaeologists. Additionally, the frequent and uncritical use of ethnographic analysis and the direct historical approach to augment or initiate archaeological interpretations demands that greater attention be paid to critical review and the context of original sources to avoid perpetuating misleading interpretations.

Searching for Bias

Recognition of bias is an important consideration in the process of critically reviewing the information available. Hammersley and Gomm (1997:1.1) conclude that accusations of bias are a recurrent event in the social sciences. They make the point that in response to such accusations of bias there is often a countercharge that it is not the original research that is at fault, but it is the evaluation of the research that is biased. Bias exists in three main forms in their view: the first is "the adoption of a particular perspective from which some things become salient and others merge into the background"; secondly in reference to systematic error, or "deviation from a true score as a valid measurement of some phenomenon or to accurate estimation of some population parameter"; and lastly in a more specific form denoting a particular form of systematic error: "that deriving from an unconscious or conscious tendency on the part of the researcher to produce data, and/or to interpret them, in a way that inclines towards erroneous conclusions which are in line with his or her commitments."

Communication in the form of verbal accounts, written records, and observed behaviour provide the basis upon which the historic and ethnographic information researchers use was recorded. Communication implies something in the way of information being transmitted from the source, and the reception of this information by the recorder. For the former the expectations of the enquirer may not always be fully understood, and for the latter understanding the information being transmitted may not always be clear. Subsequently, users of the recorded information also bring their biases and potential for misunderstanding into the process, often at great distances in time and space. Obviously the process is fraught with potential problems that must be addressed to ensure the veracity of the final record and subsequent interpretations. Assuming the process includes an informant and a recorder, for now leaving out the ultimate user, some of the problems are: (1) recorder qualifications—writing ability, language understanding; (2) recorder and informant comprehension—what is really meant? (3) informant knowledge and biases—gender, width of view (family, community), and validity; (4) informant distance in time from the activity being recorded; (5) distance in time from when the recording takes place from the activity being recorded; (6) translation problems—is a potato a potato? (7) do informants intentionally mislead or are they misinformed? (8) do recorders inject their biases and is the research itself biased?

Glavin (2000:7) puts the need to consider these numerous ramifications quite succinctly when he states "Sorting out the history of the North Pacific involves the business of considering questions not only about the observed but also about the observer and the observer's own culture and ideology." Analysis of the quotation at the start of this article serves to illustrate the potential problems attendant upon uncritically accepting information at face value from quotations taken from a variety of historic and ethnographic sources. Taken as a whole such sources offer something of value when studying wapato, but nearly all can be misleading. There are potential problems with subject, intent, context, recorder and informant bias, and many other issues. An excellent example is how the Barnston quote appears in different sources. The transcription by MacIntosh (1963:26) of the original archival copy reads:

> We hear that a mass of Indians are now collected there, but that most of them intend soon to clear out entirely for their lands, not to return again until next sum-

mer. It appears that they procure, where they are at present, a great number of Wappatoes a root found under water in pools and marshes, and held by them in great estimation as an article of food. The name they give it here is Scous or rather Skous. On the Columbia it is known by the one first mentioned.

The MacIntosh (1963) version does not attribute the entry to Barnston, implying that it is a journal entry by James MacMillan. Duff (1952:73) has essentially the same information, although he names the location as the "Forks" (of Pitt and Fraser rivers), whereas the MacIntosh transcription of Barnston refers to the location as "the forks below." It is the recent work of MacLachlan (1998:40) that attributes the entry to George Barnston and introduces the notion that women did the digging, although there is no mention of women doing the digging in the other versions. Several references to this passage refer to 5,000 Indians assembled at the confluence to dig skous on return from salmon fishing upriver (Suttles 1987:142 footnote 12; McKelvie 1947:33, 1991:39) although no such figure exists in the original journal. It appears this number originates from an 1829 estimate in a separate report by a Hudson's Bay Chief Factor (Duff 1952:26; Murphy 1929:19). Overall, there is evidence here of bias, error, and interpretation, all added at later dates well removed from the original to enhance the quotation, notwithstanding that events may well have transpired each year as indicated. There is a hint here that one should take care in regard to the absolute veracity of such sources.

An important role of archaeology in addition to understanding the past is in providing historical perspective for understanding ethnographic data (Trigger 1989:336). Trigger indicates that anthropologists are coming to believe that "ethnologists and social anthropologists, whether studying social structure or change, are investigating the results of acculturation because their data are derived from small-scale societies that are either being destroyed or integrated ever more completely into the modern world system." He further notes that it is clear that no society can be properly understood or classified structurally unless its relationships with other societies is taken into account (Trigger 1989:336). This is an idea in consonance with Hodder's (1991:143) overarching view of context.

On the Northwest Coast bias at a high level is quite evident in several forms. There is a bias in archaeological artifact preservation, where lithics dominate and faunal and floral remains are less successful in surviving the vagaries of taphonomic processes. The bias in artifact recovery results in the dominance of lithics analysis in reports, while faunal and especially floral analyses are less evident. Faunal analysis is more prevalent than botanical analysis, which has only been emerging in the last decade as a major focus in research design, recovery, and interpretation (Lepofsky 2002). The traditional categorizing of hunter-gatherer bands and sedentary agricultural societies into separate entities is somewhat problematic on the Northwest Coast as sedentary collectors have more in common demographically, socially, and politically with agriculturalists than they do with most hunter-gatherers (Trigger 1989:399). Archaeology can lead to re-interpretation of misleading or erroneous information in historic and ethnological information, this being evident in the emergence of paleoethnobotany as a major force on the Northwest Coast (Lepofsky 2002; Lepofsky et al. nd.; Loewen 1998; Lyons 2000). The following quote best sums up the present situation regarding typical Northwest Coast ethnography:

> When field notes were worked up into books, an academic datum plane was created: traditional Northwest Coast culture. If ethnographers asked their questions at the end of the nineteenth or early in the twentieth century, as many of them did, their informants remembered and described early- to mid-nineteenth-century societies. This was the slice of time that ethnography transformed into timeless traditional culture (Harris 1997:28).

Historic and Ethnographic Impacts Affecting the Study of Wapato

The potential entry of myriad biases into the historic and ethnographic record regarding wapato must be accounted for. All of the possible entry points for misleading information or bias as noted are potentially at play when studying wapato in Katzie territory.

To properly conduct archaeological interpretations of wapato it is appropriate to use accepted archaeological methods to arrive at interpretations. Also, it is necessary to more fully pursue our understanding of the roots of our modern knowledge of wapato. The archaeological methods of paleoethnobotany should be directed at the matter. In conjunction, it is useful to address the numerous historic changes since contact that have influenced our present knowledge of wapato use and affect the potential to confidently use the direct historical approach or ethnographic analogy as methods to infer prehistoric practices. Table 1 presents post-contact influences that have regionally affected our modern understanding of this plant resource. The table presents the major influences in more or less chronological order from the present to early contact times and includes brief comments on

each of the impacts listed. Accompanying these influences, especially since diking commenced, is a continuous disturbance to or loss of archaeological sites. Represented in the table is an almost continuous series of impacts with both one-time and cumulative effects such that any speculation about wapato must be tempered with at least one or more of these factors. For many traditional uses the local Native population was precluded from accessing significant portions of the landscape by land alienation, which, while distributing land first to speculators (Collins 1975) and later to settlers, excluded Native land ownership.

The continuous depredations of disease, estimated to have reduced pre-contact Native population levels by up to ninety percent, would have limited traditional uses. This factor, coupled with the relatively late or, depending on viewpoint, recent gathering of ethnographic data (cf. Jenness 1955; Suttles 1955) raises questions about the accuracy of male-dominated information about female activities and the nature of what was being reported and its closeness to pre-contact practices. Suttles (1987:16 footnote 2) notes that personal recollections of the oldest informants did not date back earlier than the 1870s and 1880s, a situation that raises questions then about the potential archaeological significance of some ethnographic reconstructions. It has been pointed out to me by Katzie band members that the knowledge of one family group about wapato as reported in Suttles (1955) might not necessarily reflect that of another family group.

An exception to closeness in time would be *The Fort Langley Journals: 1827-30* (Maclachlan 1998), which record activities during the AD 1827–1830 period, but have their own problems relating to the recorder's Old World colonial and cultural biases and their difficulties in understanding and writing Native languages (Suttles 1998). The accompanying new economic climate, where paid jobs, trade goods, and changed markets dominated, would have affected wapato use through the introduction of potato (*S. tuberosum)* growing by Natives for their own consumption and to serve local white markets. Suttles (1987:145) suggests that in addition to meeting their own food needs the Natives also grew potatoes because they had cash value at nearby trading posts. In contrast, *The Fort Langley Journals* (Maclachlan 1998:112) note potatoes (*S. tuberosum*) from the Fort being used as payment to Native labourers in May 1829. Brown (1868:380) notes that Native-grown potatoes (*Solanum tuberosum*) commanded higher prices, even from white men, than any other potatoes.

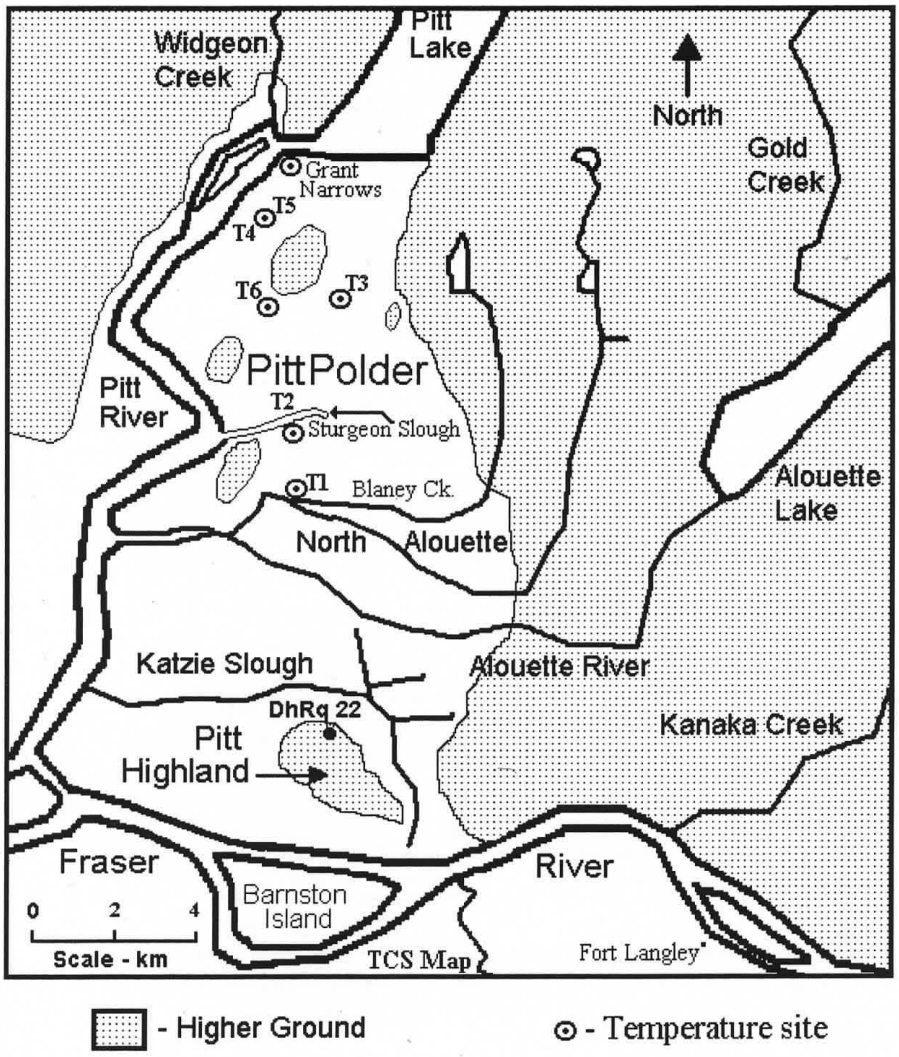
Table 1: Factors Affecting Wapato Use in Katzie Traditional Territory.

Major Influence: Associated Impact(s)
Urbanization and development: Since 1860—ever increasing access restrictions to traditional use areas.
Hydroelectric development: Since dam construction in 1925—reduced water flow in Alouette River, changes to Alouette Lake(s).
Forestry: Since late nineteenth century, ending by 1930. Mainly second growth left, large forest fires burned remainder ending logging. Access roads and hydrology disruptions.
Agriculture: Mainly since diking—reduced access, increased biotic disruptions, crops and pastures replace native plants.
Diking: Started in 1892—diversions, ditches, dredging, continuing maintenance, major biotic disruptions.
Botanical nomenclature: Old World/New World plant naming conventions.
Land alienation/Indian Reserves: Since 1860—reduced or prohibited access to traditional use areas, ghetto-like treatment of Native population; land surveying started.
Colony status granted: 1858—new government, spurs settlement, irrevocably sustains new economy.
Language change: Constant erosion of /change to Native languages.
Fur Trade/Fort Langley: 1827—a new economy introduced—furs, money, jobs, trade goods, demand for consumer items such as food products.
Simon Fraser: Spring 1808—Fraser River in freshet, notes expanses of water in Fraser Valley area, Natives with firearms at mouth.
Potato (*Solanum tuberosum*) introduced: May signal end of large-scale wapato harvest.
First contacts/Disease: Pre-AD 1800—Native population reduction begins, trade goods introduced.

Recently, landscape studies in archaeology have become popular in addressing people's interaction with their environment; indeed such studies are a fundamental part of studying prehistoric cultures. Contextualizing the landscape of the time and documenting the changes that have occurred, e.g. diking and land alienation, are important in the understanding of wapato. Wapato is initially difficult to find in the absence of context and detailed study of relevant modern botanical information.

Botanists, ethnographers, and historians variously refer to wapato as *Sagittaria sagittifolia* or *Sagittaria latifolia* depending on the date of the record. Early records compiled by European researchers will likely refer to wapato as *Sagittaria sagittifolia*, for the species nomenclature with which they were familiar in the Old World. Later recorders eventually adopted the plant classification *Sagittaria latifolia* to conform to the more modern convention for the New World species of the plant. Coupled with the variable Native language words and meanings when referring to wapato and potatoes, the issue is further complicated. A factor complicating our knowledge of wapato is the rapid influx of the common potato (*Solanum tuberosum)* following first contact with Europeans as documented by Suttles (1987). The rapid influx may in part have contributed to the decline in wapato consumption (Brown 1868:379; Rivera 1949:21). A comparison of the nutrient composition of *S. tuberosum* and *S. latifolia* as reported by Norton et al. (1984) and Horton (1987:94) shows them to be quite similar. The major difference between the two species is in their growing and harvesting conditions. Wapato is grown and harvested in water whereas *S. tuberosum* is grown and harvested on dry land.

Figure 1: Temperature sites.



Pitt Polder Climate

Wapato was generally harvested between October and March. Periods of colder temperatures may have had energy gain and loss implications related to harvesting activity and success. This is particularly so where tuber recovery required harvesters to enter the water as noted in ethnographic accounts. In order to better understand the present-day climate of the Pitt Polder area I recorded a weekly set of qualitative and quantitative measurements at six locations for the 69-week period between 11 December 1997 and 4 April 1999. Climate records for the Polder have not been kept in the past, making comparisons difficult, but the weather during the monitoring period did not appear to be appreciably different from that of the last decade.

The information recorded includes: date, time (local), water temperature, air temperature, general sky condition, precipitation, wind, water level fluctuations (to record seasonal, tidal, or dyking/pumping influences), and the current direction of flowing water locations (i.e., Blaney Creek). Due to water level fluctuations the thermometer was allowed to lie on the bottom during all readings. Recording site locations are shown in Figure 1.

The recording sites are all located in the Pitt Polder, north of the North Alouette River. Tables 2 and 3 include climatic data for the sites at Blaney Creek (TMP 1), Sturgeon, the Dike site (TMP 4), Gate, and Grant Narrows. Figure 2 includes climatic data for the Blaney Creek and the Dike site. Blaney Creek, located outside the polder diking system, is a flowing water site subject to daily tidal influences. There is wapato present at the Blaney site. The Dike site is a stillwater site located wholly within the Polder dike/pumping system and is thus subject to longer term water fluctuations. There is no wapato at this site today. The Grant Narrows site, completely outside the dike system and subject to daily tidal influences, is located at the boat wharf on the Pitt River where the river flows out of Pitt Lake opposite IR4. There is wapato growing at this site.

The sites were selected judgementally after a lengthy period of familiarization and observation based upon access, maximizing coverage of the Polder area, and providing a mix of sites inside/outside the dike system. The distance from the more southerly—Blaney Creek—to the northernmost—Grant Narrows—is 8.9 km. The other sites are more or less evenly spaced between the two. Despite the relative proximity of the recording sites there were noticeable minor climate variations amongst them as can be seen in Tables 2 and 3.

The further north the site, the cooler the air temperatures. The Grant Narrows air temperatures are frequently cooler. The Grant Narrows water temperatures do not follow the general pattern, a situation I attribute to Pitt Lake acting as a huge heat-sink, which reduces the magnitude of water temperature fluctuations.

Of major relevance are the water and air temperatures, especially for the cooler winter months from October to March. There were a total of 42 cooler period observations taken, the resulting water and air temperature ranges being shown in Table 2. Moderate to strong winds were experienced just over a third of the time, with strong outflow winds present on several occasions. The net result was water and air temperatures that I felt did not encourage wading in the water. Several instances of ice-covered water were also noted.

Table 3 and Figure 2 present averaged monthly water and air temperature values over one contiguous year (52 weekly observations from 1 April 1998 to 31 March 1999). The general pattern of warm summers and cooler winters is evident. Precipitation in the form of rain or snow for the winter period (October to March) was approximately six times more frequent than for the summer (April to September) period. This is consistent with the expected wetter winter period. The cooler temperatures of the wapato harvest period

Table 2: Selected Water/Air Temperature Ranges (Celsius); October through March

	Blaney Creek		Sturgeon		Dike		Gate		Grant Narrows	
Month	Water	Air	Water	Air	Water	Air	Water	Air	Water	Air
October - Low	10.0	9.5	11.0	9.0	10.5	9.0	10.0	9.0	12.0	9.5
High	12.0	13.0	15.0	13.0	12.0	13.0	12.0	13.0	14.0	13.0
November - Low	7.0	6.0	7.5	6.0	6.0	6.0	6.0	6.0	7.5	6.0
High	10.0	11.5	10.5	11.0	10.0	11.0	9.5	10.5	11.0	10.5
December - Low	-0.5	-5.5	0.5	-6.5	-0.5	-8.0	-1.0	-7.0	2.5	-7.0
High	6.0	5.5	7.0	5.5	5.5	5.0	5.5	5.5	7.0	5.5
January - Low	0.0	-1.0	1.0	-1.0	0.0	-2.0	1.0	-1.0	4.0	0.0
High	5.0	7.0	6.0	7.0	5.5	6.0	5.0	6.5	5.5	5.0
February - Low	4.0	3.5	4.0	3.0	4.0	3.0	4.0	3.0	4.5	3.0
High	6.5	9.0	6.0	10.0	7.0	9.5	5.5	9.0	5.0	6.0
March - Low	5.0	5.0	5.0	5.0	5.0	5.0	4.5	4.5	4.5	6.0
High	9.0	12.0	10.5	12.0	10.0	12.0	9.5	11.0	6.0	7.5

Table 3: Monthly Average Water/Air Temperatures (Celsius); Observation period from 1 April 1998 to 31 March 1999– 52 weeks

		Blaney Creek		Dike Site		Grant Narrows	
Month	n=	Water temp.	Air temp.	Water temp.	Air temp.	Water temp.	Air temp.
January	5	3.3	3.2	3.5	2.9	4.8	3.1
February	4	5.1	5.8	4.6	3.9	4.8	4.4
March	4	6.3	8	6.8	8.9	5.4	7.1
April	4	10.3	9.6	11.5	8.3	-	-
May	5	14.7	15.2	15.2	14.5	-	-
June	4	19.8	21.1	20.9	20.3	-	-
July	4	20.6	19.1	21.6	19.4	-	-
August	4	22	22.4	21.6	22.1	-	-
September	5	20	24.3	20.8	24.4	17.5	22
October	4	10.6	11.6	11.4	11.5	12.9	11.6
November	5	8.4	8.2	8.2	8	9.3	8
December	4	3.1	1.1	2.4	0	4.8	0.75

Figure 2: Average Monthly Water/Air Temperatures (Celsius). Observation period from 1 April 1998 to 31 March 1999—52 weeks

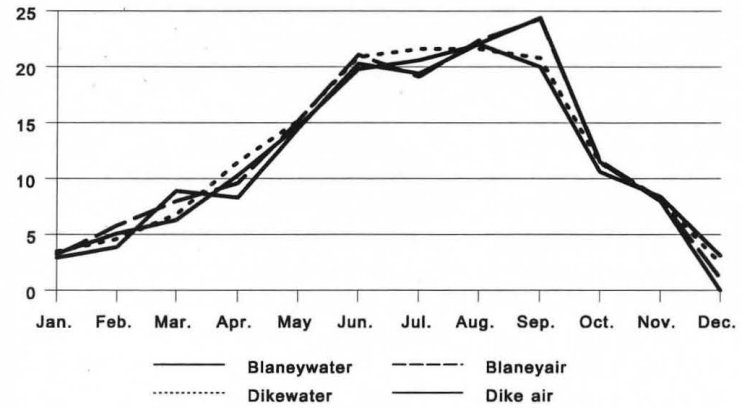
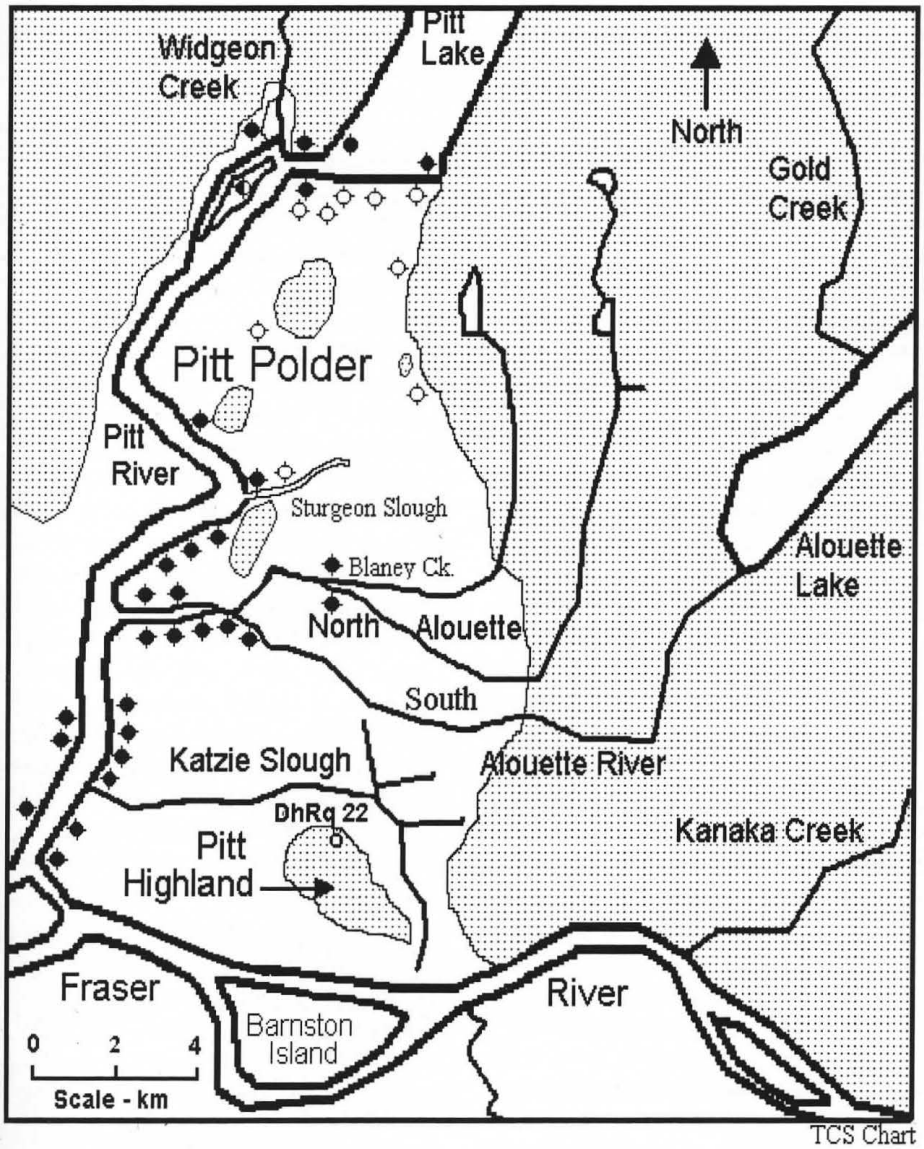


Figure 3: Wapato Locations



Wapato sites - **ethnographic report** ◇ - all inside dike system

observed 1998 ◆ - all outside dike system

both ◈ - outside dike system

▨ - Higher ground

from October to March lend credence to the use of digging sticks for wapato recovery in place of wading, which is widely reported as the tuber recovery method. It may be a modern bias but on those occasions when I harvested tubers using a shovel or trowel during the cold period hands rapidly stiffened and tolerable exposure times were very short.

Study Area Wapato Distribution

During 1998, I recorded wapato patches on the banks of the Fraser and Pitt rivers, the lower reaches of Blaney Creek, the North and South Alouette, and the Alouette River main channel below the forks. Wapato is also present on the Pitt River fronting IR4, in Widgeon Creek and slough, and on Siwash Island. Field reconnaissance was split approximately evenly between inside and outside dike locales. The search involved walking along dikes observing water on both sides and included canoeing in the Pitt River, Pitt Lake, Widgeon Creek and Slough, and the Pitt Marsh where foot access is impossible. An estimated total in excess of 50 kms was surveyed by foot and canoe. Ongoing reconnaissance continues to reveal new wapato patches.

In all instances to date the patches have been located in water bodies where there is daily flow, albeit subject to short-term water fluctuations (i.e., tides, flood stages), and with bottom sediments comprised of silty/clayey muds. As yet, no wapato has been observed growing in non-flowing waters or those subject to long-term fluctuations in water level or where the bottom sediments are largely peat with mixed silt/clay, conditions that are typical behind dikes. Marburger (1993:250) indicates wapato grows in coastal and inland freshwater marshes, around the margins of lakes and ponds, and along rivers and streams. Turner (1995:36) notes the habitat for wapato as wholly or partly submerged in the water at the edges of lakes, ponds, and streams, or in wet mud. Brayshaw (1985:45) describes wapato growing in marshes and sheltered shallow water. Marburger (1993:250-52) discusses a variety of conditions affecting the sexual and asexual reproduction and growth of wapato, among them achene production being higher in water bodies with stable levels versus fluctuating levels; low water and dry conditions resulting in reduced

flower and achene production; and plants growing in soft organic silts producing 14 to 15 times as many achenes as those growing in hard-packed clays.

The initial association of wapato with flowing, muddy-bottomed waters subject to short-term level fluctuations, in contrast to its apparent absence in non-flowing waters with peaty clay/silt bottoms and longer-term water level fluctuations, leads to the conclusion that modern diking, which has interrupted the water flow in the extensively channeled pre-diked lowland, has resulted in conditions where wapato no longer thrives. Also contributing to the negative impact of diking on wapato and archaeological site preservation is the regular maintenance of the dike system and the frequent dredging of channels, ditches, and slough systems in the dike-enclosed areas. Figure 3 shows ethnographically reported wapato sites from Suttles (1955: Table 1 and Map II) and those wapato patches observed by me during summer 1998. In all instances the observed modern wapato was located outside the dike system, whereas many of the named ethnographic sites were at locations now inside the dike system where there is no longer any wapato. Notwithstanding the frequent mentions of wapato in Suttles (1955), it should be noted that in his later compilation of plants for Chapter 3 in Woodcock (1996) Suttles notes that during his peregrination with Simon Pierre in August 1955 *Sagittaria latifolia* was not gathered for subsequent identification at UBC (Suttles 1996; also see footnote p. 27 in Suttles 1955). This is an indication that wapato is not always easy to find, having been impacted by a variety of disruptive forces.

Based on my observations, the notion subscribed to by some that wapato remains hidden below ground if not extensively cultivated is not correct. The false view is likely the result of several factors that, once understood, render wapato easy to find. These include the aforementioned diking impacts, water-level fluctuations, wildlife predation, and a narrow growing season. The distinctive arrowhead-shaped foliage is best sought in the months of July and August. It is also seen in June and September depending upon annual growing conditions. At other times of the year the roots and tubers remain below ground level making it important to have knowledge of the patch locations to effect the fall/winter tuber harvest, a season when foliage is no longer visible. Daily tidal fluctuations may also obscure the emergent foliage early in the growing season making searching during low tides a good practice. High tides seem to protect young plants from predation but during a protracted period of low tides—common in the summer—plants are exposed to predation. While in the field I observed numerous instances of Canada geese feeding on the foliage whereby a large patch visible one day would be undetectable the next. Anderson (1925:134) mentions seeing flocks of swans "heads under the water, and tails in the air" feeding on wapato in the Columbia River. On the Columbia River predation by introduced European carp is blamed on the near extermination of this once abundant plant (Piper 1906:101). I observed that patches in the vicinity of frequent human activity, i.e. boat launching ramps and hiking paths, were less impacted by animal predation and seemingly ignored by people.

While these are only preliminary conclusions based on several seasons of fieldwork it is not unreasonable to speculate a bit on the Katzie traditional use of this once important plant. The notion of the seasonal round that included some summer intervention to tend patches, ultimately leading to a tuber harvest, oversimplifies the realities of the activities associated with wapato. Considerable effort would have been required to initially locate patches, eradicate competing plants, ensure a continuous supply of fresh water, and to protect immature foliage from predation. Once found the patches would likely be used repeatedly. Familiarity with the location of patches was necessary to facilitate fall/winter tuber harvesting, a time when the distinctive foliage would no longer have been in evidence. Planning around high and low tides was another complication that required attention, as the lowest tides would not always have been conveniently present in daylight hours or during the season of interest. To not properly plan these activities would potentially have led to a poor energy return for the time invested, a particularly serious matter given that air temperatures in the area during the harvest period (October to March) generally fall between -8° C to +13° C, and water temperatures fall between -1.0° C to +15.0° C (see Figure 2), a rather cool mix for wading. I have harvested wapato into the month of April. While diking appears to have had a negative impact on wapato growing inside dike enclosed areas, wapato remains in abundance outside the dike system. One could speculate perhaps that the many conditions and impacts attendant upon successful cultivation and harvest of wapato rendered the popularity of the introduced common potato (*Solanum tuberosum)* inevitable.

Some final words on harvesting methods are in order. In the compacted silt/clay substrates in which the modern tubers grow it is almost impossible to dislodge tubers with toes pushed into the mud. This difficulty is further complicated by the natural detritus contained in the substrate. It simply may be that the substrates in pre-diking times were less compacted and were not so fouled with modern detritus, easing the effort required to dig with toes. Furthermore, several attempts have been made to pull tubers from the substrate using the above-ground foliage for gripping. In all instances the foliage has been torn away with no movement of the buried tubers evident. Again the nature of the modern substrate may preclude success with this method. It is possible that some form of digging stick suitably shaped at the end for dislodging tubers and breaking up the substrate and root mat was used for harvest. Darby (1996:68-9) notes several accounts of digging for wapato tubers but digging sticks are not mentioned. Unfortunately, while such root-digging tools are widely reported ethnographically associated with other root species (Brown 1868:379; Duff 1952:73; Haeberlin and Gunther 1930:20; Suttles 1987:137 in reference to *S. tuberosum*; Turner 1979:33), there is little likelihood of such tools surviving in archaeological contexts unless waterlogged conditions exist.

There are many cross-cultural examples for the use of digging sticks. One example is associated with the cultivation of taro (*Colocasia esculenta)* in Oceania (Sillitoe 1983; Oliver 1989). Taro, which grows up to a metre high, produces a large starchy corm (up to 30 cm long and 15 cm in diameter), propagates vegetatively, comes in many varieties, and grows in

Table 4: Native Language Names for Selected Species of Foodplants—sometimes referred to as "potato"—

Common Name	Botanical Name	Native Language Word	Source
Spring Beauty	*Claytonia lanceolata*	Skwenkwínem Nlaka'pamux (Okanagan-Colville)	Turner et al. 1980:113
Mariposa Lily	*Calochortus macrocarpus*	/məq?=ú[ˑ?]pe? Nlaka'pamux (Thompson)	Turner et al. 1990:119
Broad-Leaved Starflower	*Trientalis latifolia*	/ciqʷˑ=ó[ˑqʷ]pe? Nlaka'pamux (Thompson)	Turner et al. 1990:245
Yellow Avalanche Lily	*Erythronium grandiflorum*	s/kˈémˈec Nlaka'pamux (Thompson)	Turner et al. 1990:121
Camas	*Camassia quamash*	/ʔítxʷeʔ Nlaka'pamux (Thompson) kʷaˑdis Ditidaht k'aˊməs Stó:lo	Turner et al. 1990:120 Turner et al. 1983:83 Duff 1952:73

dryland and wetland/aquatic conditions (Sillitoe 1983:37-42; Oliver 1989:190). Oliver (1989:194) indicates that digging stick cultivation techniques associated with taro include the loosening and turning of soil, digging of planting holes, and uprooting of tubers, some users employing different size sticks for different jobs. The commonest type of digging stick was pointed with the working end fire-hardened, although some types from the New Guinea Highlands and New Caledonia had spatulate or shovel-like ends (Oliver 1989:194). Golson and Steensberg (1985:347-384) discuss a wide variety of such digging stick implements used in all phases of taro cultivation in the New Guinea Highlands for several millennia.

Language, Trade, and Taxonomy

The look at the linguistic evidence for *wapato* words in Northwest Coast Native languages in the previous *Midden* article provides an informative perspective, which suggests a need to carefully evaluate ethnographic information before accepting it at face value. The linguistic information reinforces the argument presented here that care must be taken to avoid confusion when using ethnographic and historic accounts of Native people using wapato and potatoes.

Complicating the language picture, and not strictly a linguistics problem, is the fact that in addition to the potential for confusion between *Sagittaria latifolia* and *Solanum tuberosum*, there are several other edible "root" species in the Pacific Northwest that are often referred to as Indian and swamp potato. Ethnographies and botanical guides frequently contain references to Spring Beauty (*Claytonia lanceolata*) as "Indian potato" (Turner *et al.* 1980:113), Mariposa Lily (*Calochortus macrocarpus*) as "Wild potato" (Turner 1997:64), the Yellow Avalanche Lily (*Erythronium grandiflorum*) as "Indian potato" (Turner *et al.* 1990:121), all three being Interior species, and Broad-Leaved Starflower (*Trientalis latifolia*) as "Indian potato" (Pojar and MacKinnon 1994:322). Camas (*Camassia quamash*), while not present in Katzie territory, could arrive there via trade and could easily be confused with wapato. The potential for confusion amongst edible "root" foods is obvious where proper botanical nomenclature is not used in conjunction with common names. Linguists and ethnographers could have frequently confused these species with wapato. Table 4 lists these species with the Native language word for each. Fortunately, the Native language words for these species are distinct from those related to wapato. Hopefully, ethnographers and others accurately documented Native language words precluding such confusion.

A comparison of the Columbia and Fraser rivers is illuminating as pertains to wapato distribution, language, and the potential wapato provides as an item for trade. The comparison is also relevant given the linguistic origins for the Chinook Trade Jargon term *wapato,* and the word's subsequent spread throughout the Northwest Coast area. The major river drainages of the Northwest Coast have long been regarded as significant corridors for prehistoric human interaction between Interior and Coastal peoples. They support significant migrations of anadromous salmon (Schalk 1981) and serve as major transportation corridors. The Wappatoo Valley (Portland Basin) of the Columbia River and the Fraser Valley section of the Fraser River systems both supported extensive areas of wapato. In the case of the Columbia River there appears to have been trade involving wapato both up and downriver (Boyd 1996:149; Ray

1938:120; Ruby and Brown 1976:99). Darby's (1996) wapato research is centred on this region. A similar upriver/ downriver movement of wapato is reported for the Fraser River, especially focused on the wapato patches in Katzie territory.

Summary

The need to critically review historic and ethnological data is evident. For wapato the modern records provide much of value but the inherent biases must be identified and accounted for. The historical context of the times, when changes were occurring in the use of wapato during the nineteenth century, is vital to its understanding. Critical review and contextual analysis reveal much about wapato and alert the modern researcher to the many sources of bias present in past records and to the potential for bias to enter into the research undertaken here.

A look at the modern Pitt Polder climate in conjunction with contextual analysis of the historic changes that have affected the Polder since European contact provides an illuminating view of wapato and the impacts affecting its continuing exploitation by Native people. The climate conditions during the wapato harvest period in conjunction with indirect ethnographic evidence and cross-cultural data support the argument that digging sticks were likely used to dig the tubers. A major influence has been diking, which appears to have affected wapato distribution such that it is no longer present in many ethnographically reported locations. Wapato is present today only in waters outside the dike system.

Wapato is not the only species to have been impacted by modern influences. Locally, the Katzie were placed onto reserves and this act in conjunction with land alienation effectively removed them from the Pitt Polder lowland area. Traditional uses of the landscape were truncated or ended altogether. The depredations of disease further reduced the number of Native people able to eke out traditional subsistence. The introduction of new economic influences in combination with the other major changes effectively brought about an end to the majority of traditional land uses in the area.

Analysis of Native language words for wapato provides a tantalizing look at the use of wapato and possible trade implications. Native wapato trade was eventually ended through the introduction of the potato (*Solanum tuberosum*), a factor that has many implications involving wapato use. The introduced potato had economic, trade, and horticultural implications. Taxonomic nomenclature can at the same time confuse and clarify the wapato picture. Ultimately, the widespread use of the terms "wapato" and "potato" to refer to a variety of edible root species requires researchers to be alert to potential confusion in historic and ethnographic data sources.

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FIELD NOTES

TRACES ARCHAEOLOGICAL RESEARCH & CONSULTING LTD.

TRACES Archaeological Research & Consulting Ltd. had a busy year in 2001 investigating and recording 170 cultural heritage sites in the Vanderhoof Forest District (VFD) under permit 2001-171. A total of 46 development areas were surveyed, and cultural heritage resources were identified in all but three of these developments.

Developments investigated include large areas along trail routes, lakeshores, and drainage systems surveyed for Mountain Pine Beetle (MPB) salvage operations, as well as small MPB broods, logging blocks, and a forestry recreation site. TRACES conducted 39 AIAs (archaeological impact assessment), seven PFRs (preliminary field reconnaissance), as well as an AIA, test excavations, and subsequent monitoring at site GaSe 10. The latter project was in response to a proposal to relocate four outhouses within a forestry recreation site. A large portion of the archaeological site GaSe 10 is located within the recreation site area.

TRACES employed representatives from the Cheslatta Carrier Nation, Lhooskuz Dene Government, Nazko Band Government, Saik'uz First Nation, Ulkatcho Indian Band, and Nadleh Whut'en Band during these assessments. Many of our representatives had considerable archaeological survey experience with either TRACES, or other archaeological consulting companies.

Of the 170 sites investigated by TRACES in 2001, 14 were previously recorded archaeological sites which were revisited for verification of locations, as well as additional recording and mapping. One hundred and nine of the sites identified and revisited by TRACES in 2001 were protected sites and include cultural material (subsurface and surface), cultural depressions (cache pits, a roasting pit, and house pits), pre-1846 CMT sites, heritage trails, message trees, and an arborgraph of a human face. Sixty-one non-protected sites were recorded, the majority of which were post-1846 CMT sites, as well as trails, a trap house, a historic cabin, and two above-ground caches.

The archaeological sites identified and recorded by TRACES in 2001 ranged in size from isolated lithic scatters and CMTs, to small village sites with up to 56 cultural depressions, large-scale cambium harvest CMT sites, and large expanses of heritage trails. Many of the survey areas investigated by TRACES in 2001 were situated along major trail corridors within the VFD including the Messue, Mill's Creek, and Cutoff Creek trail routes. The trails proved to be rich in cultural heritage sites from the pre-contact period into the historic period, confirming that Aboriginal trails should be heavily considered when predicting areas of high and moderate archaeological site potential (Carlson 1996).

–NICOLE JACKMAN-CRAIG

DEBITAGE

Coming this autumn to the **Society for American Archaeology's Web site** <www.saa.org> is a peer-reviewed serial in a digital format. It will be available on-line free of charge. The publication will provide context for scholarly contributions to archaeology that cannot be produced in traditional hardcopy media. If you are interested in creating a submission for this new digital publication, contact editor John Hoopers at the Department of Anthropology, University of Kansas, 785.864.2638 or e-mail <hoopers@ku.edu>.

Individuals interested in looking for archaeological fieldwork opportunities can now submit their c.v. to the **Canadian Archaeological Association's (CAA) Fieldwork Resume Database**. Your resume stays in the database, and CAA members can search the database for field workers in the CAA Webmember's Section. The Fieldwork Resume Database is located at <www.canadianarchaeology.com/home.lasso>.

ANNUAL INDEX TO *THE MIDDEN* VOL. 33, 2001

Compiled by Heather Myles, editor

*indicates illustrated article

AUTHOR

ARNOLD, TOM: Book Review: Sampling in Archaeology, by Clive Orton. 33/1:14

CARLSON, ROY L.: *Philip Hobler and SFU. 33/3:2-5

CARLSON, ROY L.: *A Selection of Phil Hobler's Publications 1967-2000. 33/3:6-7

CHATAN, ROBBIN: Book Review: Historical Archaeologies of Capitalism, edited by Mark P. Leone and Parker B. Potter Jr. 33/3:15-16

DAHLSTROM, BRUCE, AND REMI FARVACQUE: *Orthophotos and the AOA Process. 33/2:7-8

GOULD, BRENDA, CHARLENE ALLISON, AND DANETTE WHITNEY: *The Pinto Flats Site. 33/4:10-12

HAGEN, JUDY: *Katherine Capes: Remembering A Women of Distinction. 33/3:14

HAGGARTY, JAMES C., and LAURIE WILLIAMSON: *Archaeological Investigations at the Yellow Rock (Chrome Island) Petroglyph Site. 33/1:2-8

HOWE, GEORDIE: A Tale of Two Sites: Book Review: Exploring Coast Salish Prehistory: The Archaeology of San Juan Island, by Julie K. Stein. 33/2:9-11

KARPIAK, MONICA: *The Tsleil-Waututh First Nation Community Archaeology Project. 33/1:10-11

KARPIAK, MONICA: Book Review: Nuu-chah-nulth Voices, Histories, Objects and Journeys, edited by Alan L. Hoover. 33/4:17

MUCKLE, BOB: *The Seymour Valley Archaeology Project. 33/2:2-6

MYLES, HEATHER: Annual Index to The Midden Vol. 32, 2000. 33/1:19-20

POULSEN, MICHELLE: *Hoko River: A Review of Lithic, Linguistic, Ethnographic, and Basketry Evidence for Ethnicity. 33/3:8-13

SHARP, KARYN: Book Review: Cultural Evolution: Contemporary Viewpoints, edited by Gary M. Feinman and Linda Manzanilla. 33/2:9

SPURGEON, T.: *Wapato in Katzie Traditional Territory. 33/4:2-9

TITLE

2002 Archaeological Field Schools. 33/4:12-13

Annual Index to The Midden Vol. 32, 2000. 33/1:19-20

Antiquus Archaeological Consultants Ltd. 33/4:13-14

Arcas Consulting Archeologists Ltd. 33/1:13

*Archaeological Investigations at the Yellow Rock (Chrome Island) Petroglyph Site. 33/1:2-8

Archaeology Branch Changes, from the Ministry of Sustainable Resource Management. 33/2:21

Arrowstone Archaeological Research and Consulting. 33/4:14

*A Selection of Phil Hobler's Publications 1967-2000. 33/3:6-7

Book Review: Cultural Evolution: Contemporary Viewpoints, edited by Gary M. Feinman and Linda Manzanilla. 33/2:9

Book Review: Exploring Coast Salish Prehistory: The Archaeology of San Juan Island, by Julie K. Stein. 33/2:9-11

Book Review: Historical Archaeologies of Capitalism, edited by Mark P. Leone and Parker B. Potter Jr. 33/3:15-16

Book Review: Nuu-chah-nulth Voices, Histories, Objects and Journeys, edited by Alan L. Hoover. 33/4:17

Book Review: Sampling in Archaeology, by Clive Orton. 33/1:14

Conferences 2001. 33/1:22; Conferences 2002. 33/1:21; Conferences 2002. 33/4:21-22; Conferences. 33/2:22; Conferences. 33/3:21-22

Debitage. 33/1:11; Debitage. 33/1:14; Debitage. 33/2:11; Debitage. 33/2:20; Debitage. 33/3:16; Debitage. 33/4:9

Douglas College and Coast Heritage Consulting. 33/4:15

Exhibits. 33/1:21; Exhibits. 33/4:21

Golder Associates Ltd. 33/1:12

*Hoko River: A Review of Lithic, Linguistic, Ethnographic, and Basketry Evidence for Ethnicity. 33/3:8-13

I.R. Wilson Consultants Ltd. 33/1:12-13

*Katherine Capes: Remembering A Women of Distinction. 33/3:14

Langara College. 33/1:9

Langara College. 33/4:16

Lectures. 33/3:21

Nanaimo Lectures. 33/2:19

Okanagan University College. 33/4:16

*Orthophotos and the AOA Process. 33/2:7-8

Permits Issued by the Archaeology Branch January to May 2001. 33/1:15-18; May to August 2001. 33/2:12-18; August to October 2001. 33/3:17-20; August to December 2001. 33/4:18-20

*Philip Hobler and SFU. 33/3:2-5

Recent Publications. 33/2:18

Secwepemc Education Institute-Simon Fraser University. 33/1:9

SFU 2001 Field Season at the Salloomt Site. 33/4:16

Simon Fraser University. 33/1:9
Simon Fraser University, Douglas College, and Coast Heritage Consultants. 33/1:8
Simon Fraser University – Secwepemc Education Institute. 33/4:14-15
*The Pinto Flats Site. 33/4:10-12
*The Seymour Valley Archaeology Project. 33/2:2-6
*The Tsleil-Waututh First Nation Community Archaeology Project. 33/1:10-11
University of British Columbia. 33/1:9
University of Victoria and Parks Canada. 33/4:15
*Wapato in Katzie Traditional Territory. 33/4:2-9

SUBJECT

ACADEMIC FIELD NOTES
Douglas College and Coast Heritage Consulting. 33/4:15
Langara College. 33/1:9
Langara College. 33/4:16
Okanagan University College. 33/4:16
Secwepemc Education Institute-Simon Fraser University. 33/1:9
SFU 2001 Field Season at the Salloomt Site. 33/4:16
Simon Fraser University. 33/1:9
Simon Fraser University, Douglas College, and Coast Heritage Consultants. 33/1:8
Simon Fraser University – Secwepemc Education Institute. 33/4:14-15
University of British Columbia. 33/1:9
University of Victoria and Parks Canada. 33/4:15

ARCHAEOLOGISTS, LOCAL
*Katherine Capes: Remembering A Women of Distinction. 33/3:14
*Philp Hobler and SFU. 33/3:2-5

ARCHAEOLOGY BRANCH
Archaeology Branch Changes, from the Ministry of Sustainable Resource Management. 33/2:21
Debitage. 33/2:20

ARCHAEOLOGY PERMITS
Permits Issued by the Archaeology Branch, January to May 2001. 33/1:15-18; May to August 2001. 33/2:12-18; August to October 2001. 33/3;17-20; August to December 2001. 33/4:18-20

ART
*Archaeological Investigations at the Yellow Rock (Chrome Island) Petroglyph Site. 33/1:2-8
Book Review: Nuu-chah-nulth Voices, Histories, Objects and Journeys, edited by Alan L. Hoover. 33/4:17
Debitage. 33/1:11
Exhibits. 33/4:21

BASKETRY
Exhibits. 33/1:21
*Hoko River: A Review of Lithic, Linguistic, Ethnographic, and Basketry Evidence for Ethnicity. 33/3:8-13

BOOK REVIEWS
Cultural Evolution: Contemporary Viewpoints, edited by Gary M. Feinman and Linda Manzanilla. 33/2:9
Exploring Coast Salish Prehistory: The Archaeology of San Juan Island, by Julie K. Stein. 33/2:9-11
Historical Archaeologies of Capitalism, edited by Mark P. Leone and Parker B. Potter Jr. 33/3:15-16
Nuu-chah-nulth Voices, Histories, Objects and Journeys, edited by Alan L. Hoover. 33/4:17
Sampling in Archaeology, by Clive Orton. 33/1:14

BRITISH COLUMBIA HERITAGE TRUST
Debitage. 33/3:16

CANADIAN ARCHAEOLOGICAL ASSOCIATION
Debitage. 33/3:16; 33/4:9
Capilano College
*The Seymour Valley Archaeology Project. 33/2:2-6

CULTURAL RESOURCE MANAGEMENT
Archaeology Branch Changes, from the Ministry of Sustainable Resource Management. 33/2:21
Book Review: Sampling in Archaeology, by Clive Orton. 33/1:14
Debitage. 33/2:20; 33/4:9
*Orthophotos and the AOA Process. 33/2:7-8

ETHNOBOTANY
*Wapato in Katzie Traditional Territory. 33/4:2-9

FIELD NOTES
Antiquus Archaeological Consultants Ltd. 33/4:13-14
Arcas Consulting Archeologists Ltd. 33/1:13
Arrowstone Archaeological Research and Consulting. 33/4:14
Golder Associates Ltd. 33/1:12
I.R. Wilson Consultants Ltd. 33/1:12-13

FIELD SCHOOLS
2002 Archaeological Field Schools. 33/4:12-13
Langara College. 33/1:9
Langara College. 33/4:16
SFU 2001 Field Season at the Salloomt Site. 33/4:16
Simon Fraser University – Secwepemc Education Institute. 33/4:14-15
*The Seymour Valley Archaeology Project. 33/2:2-6
*The Tsleil-Waututh First Nation Community Archaeology Project. 33/1:10-11

FIRST NATIONS
*The Pinto Flats Site. 33/4:10-12
*The Tsleil-Waututh First Nation Community Archaeology Project. 33/1:10-11

HISTORIC ARCHAEOLOGY
*The Seymour Valley Archaeology Project. 33/2:2-6

LINGUISTICS
*Hoko River: A Review of Lithic, Linguistic, Ethnographic, and Basketry Evidence for Ethnicity. 33/3:8-13
*Wapato in Katzie Traditional Territory. 33/4:2-9

MUSEUMS
Debitage. 33/1:11; 33/1:14; 33/2:20; 33/3:16
Exhibits. 33/1:21; 33/4:21

NOTICES
Conferences 2001. 33/1:22; Conferences 2002. 33/1:21; 33/4:21-22; Conferences. 33/2:22; 33/3:21-22
Nanaimo Lectures. 33/2:19

OBITUARIES
*Katherine Capes: Remembering A Women of Distinction. 33/3:14

PETROGLYPHS
*Archaeological Investigations at the Yellow Rock (Chrome Island) Petroglyph Site. 33/1:2-8

PUBLICATIONS
*A Selection of Phil Hobler's Publications 1967-2000. 33/3:6-7
Recent Publications. 33/2:18

SIMON FRASER UNIVERSITY
2002 Archaeological Field Schools. 33/4:12-13
Debitage. 33/2:11; 33/3:16; 33/4:9
*Philp Hobler and SFU. 33/3:2-5
Secwepemc Education Institute-Simon Fraser University. 33/1:9
SFU 2001 Field Season at the Salloomt Site. 33/4:16
Simon Fraser University. 33/1:9
Simon Fraser University, Douglas College, and Coast Heritage Consultants. 33/1:8
Simon Fraser University – Secwepemc Education Institute. 33/4:14-15
*The Tsleil-Waututh First Nation Community Archaeology Project. 33/1:10-11

SITES
Antiquus Archaeological Consultants Ltd. 33/4:13-14
Arcas Consulting Archeologists Ltd. 33/1:13
*Archaeological Investigations at the Yellow Rock (Chrome Island) Petroglyph Site. 33/1:2-8
A Tale of Two Sites: Book Review: Exploring Coast Salish Prehistory: The Archaeology of San Juan Island, by Julie K. Stein. 33/2:9-11
Douglas College and Coast Heritage Consulting. 33/4:15
Golder Associates Ltd. 33/1:12
*Hoko River: A Review of Lithic, Linguistic, Ethnographic, and Basketry Evidence for Ethnicity. 33/3:8-13
SFU 2001 Field Season at the Salloomt Site. 33/4:16
Simon Fraser University, Douglas College, and Coast Heritage Consultants. 33/1:8
*The Pinto Flats Site. 33/4:10-12
*The Seymour Valley Archaeology Project. 33/2:2-6
*The Tsleil-Waututh First Nation Community Archaeology Project. 33/1:10-11

THE MIDDEN
Annual Index to *The Midden* Vol. 32, 2000. 33/1:19-20
Debitage. 33/1:14

UNDERWATER ARCHAEOLOGICAL SOCIETY OF BC
Lectures. 33/3:21

UNIVERSITY OF BRITISH COLUMBIA
2002 Archaeological Field Schools. 33/4:12-13
Debitage. 33/2:11
University of British Columbia. 33/1:9

UNIVERSITY OF VICTORIA
2002 Archaeological Field Schools. 33/4:12-13
Debitage. 33/2:20; 33/4:9
University of Victoria and Parks Canada. 33/4:15

THE MIDDEN

We need a news editor to compile information on archaeological conferences, lectures, exhibits, courses, and related archaeological news items.

If you are interested in assisting with the production of the ASBC's quarterly publication please contact Heather Myles, *Midden* Editor, for more information.

Phone 604-274-4294 or e-mail heathermyles@shaw.ca.

EXHIBITS

VANCOUVER MUSEUM

"Yuquot: The Centre of Our World"

Through 29 October 2002

Yuquot, on the west coast of Vancouver Island, is the home of the Mowachaht-Muchalaht First Nations people. "The Centre of Our World" exhibits the rich history of the Mowachaht-Muchalaht First Nations people through their own eyes. Historic artifacts including masks, ceremonial rattles, and clothing are only a few items featured in this exhibition. For more information contact the Vancouver Museum at 604.736.4431 or check out their Web site: <www.vanmuseum.bc.ca>.

CONFERENCES 2002

October 23-26 **BC Museum Association's (BCMA)Conference 2002, "Negotiating the Changing Landscape"**
Vancouver, BC
The BCMA's 46th Annual Conference will explore the current economic, political, and social changes that are sweeping the provincial landscape and re-shaping how communities, cultural institutions, and workplaces must adapt to continue to preserve and promote heritage values. Proposed sessions include: Sustainability: Landmarks for Success; The Pillar of Your Community: Your Community Profile; Tourism—Our Way; Youth and Volunteerism: Experience that Counts; Core Competencies: Next Steps; and Heritage as Core Curriculum: Steering Towards the Future.
Contact: Lesley Moore, Conference 2002 Coordinator, British Columbia Museums Association, Suite 204, 26 Bastion Square, Victoria, BC, V8W 1H9; voice mail: 250.356.5856; e-mail: <lmoore@MuseumsAssn.bc.ca>; Web site: <www.museumsassn.bc.ca/conference/2002/>.

November 13-17 **35th Annual Chacmool Conference, "Apocalypse Then & Now"**
Calgary, Alberta
The 35th Annual Chacmool Conference is a conference about archaeology and world's ends. The focus is on how our discipline deals with disasters (both natural and human-caused), and other world-ending crises. Potential topics include: Megafauna Extinctions; Disasters of Biblical Proportions; Interpersonal Violence in the Past; Archaeology & the Art of War; Emerging & Re-emerging Infectious Diseases: Implications for Human Variation; Broken Vessels: The Archaeology of Shipwrecks; Apocalyptic Themes in the Classical World: The Archaeology of Invasion; Natural Calamities; Challenging Thirst: Drought as a Factor in Human and Landscape History; Archaeology of Pompeii; Exploring Death and Disease through GIS; Physiology of Starvation & Famine; Eruptions and Interruptions: Human Impacts of Volcanoes; The Maya Collapse; Post-Apocalyptic Archaeology: Recovering from Collapse; Indigenous Perspectives on the End of the World; Physical Anthropology & Archaeology: Responses to Modern Disasters; and Open Sessions for Individually Submitted Papers.

In keeping with the conference theme, the plenary speakers will speak on topics inspired by the Four Horseman of the Apocalypse. Confirmed speakers include Fekri Hassan, Ann Herring, Phillip Walker, and Joseph Tainter. The after-dinner speaker at the Saturday banquet is renowned author and broadcaster Ronald Wright. Undergraduate and Master's students are invited to submit their papers for consideration for the Bea Loveseth Award. This is a $200 prize made in memory of Bea Loveseth, a former President of Chacmool. Papers must be submitted to the Selection Committee no later than November 1st.
Contact: Session topics and abstracts, Larry Steinbrenner, Program Chair, e-mail: <llsteinb@ucalgary.ca>; General inquires, Meaghan Peuramaki-Brown, Conference Coordinator, e-mail: <chacmool@ucalgary.ca>; Department of Archaeology, University of Calgary, 2500 University Drive NW, Calgary, AB, T2N 1N4; tel. 403.220.7120; fax 403.282.9567; Web site: <www.ucalgary.ca/UofC/faculties/SS/ARKY/Chacmool/chacmool.html>.

November 20-24 **101st Annual Meeting of the American Anthropological Association (AAA)**
New Orleans, Louisiana, USA
The theme for the 2002 Annual Meeting of the American Anthropological Association, entitled "(Un)Imaginable Futures: Anthropology Faces the Next 100 Years," looks ahead to anthropology's engagement within the next 100 years. The meeting's organizers anticipate sessions on a broad array of topics. Information about key note speakers and presentation highlights will be posted on the Society's Web site this autumn.
Contact: AAA Meetings office, 4350 North Fairfax Drive, Suite 640, Arlington, VA, USA., 22203-1620; tel. 703.528.1902 ext. 3025; fax 703. 528.3596; e-mail: <jmeier@aaanet.org>; Web site: <www.aaanet.org>

Conferences 2003 on outside cover >>

CONFERENCES 2003

April 1-5

Wet Site Connections—Linking Indigenous Histories, Archaeology, and the Public
Olympia, Washington, USA

The Wetland Archaeology Research Project (WARP) is an international conference about waterlogged archaeological sites. The conference will emphasize how wet sites bring the interests of indigenous peoples, scientists (including conservators, archaeologists, floral /fauna analysts, etc.,), and the general public together with mutual objectives—to preserve, study, and present the waterlogged perishable artifacts not normally found in less preserved archaeological contexts.

Conference activities will include workshops, presentations of the latest and ongoing wet sites research around the world, field trips to the Squaxin Island Tribe/SPSCC wet site at *Qwu?gwes*, visits to the new Squaxin Island Tribe Museum Library and Research Center, optional field trips to the Makah Cultural and Research Center museums featuring the Ozette Village wet site materials, and visits to other regional wet sites.

Contact: Dr. Dale R. Croes, WARP Conference Coordinator, Anthropology, South Puget Sound Community College, 2011 Mottoman Road SW, Olympia, Washington, 98512-3872, USA.; tel. 360.754.7711 extension 5336; fax 360.664.0780; e-mail: <dcroes@spscc.ctc.edu>.

April 9-13

Society for American Archaeology (SAA), 68th Annual Meeting
Milwaukee, Wisconsin, USA
Call for Submissions. There is an on-line version of the Call for Submissions on the SAA Web site, as well as PDF format for paper submissions.
Contact: SAA Headquarters, 900 Second Street NE #12, Washington DC, 20002-3557, USA; tel. 202.789.8200; fax 202.789.0284; e-mail: <meetings@saa.org>; Web site: <www.saa.org>.

BC ARCHAEOLOGY FORUM 2002

OCTOBER 25-27, NANAIMO, BC

The 11th Annual BC Archaeology forum will be hosted by Snuneymuxw First Nation and the Department of Anthropology, Malaspina University-College in Nanaimo. Registration takes place on Friday evening, October 25th. The meetings will be held on Saturday with the morning devoted to "show and tell" projects, and three panel discussions in the afternoon. There is a salmon dinner on Saturday evening, and a guided tour of the Gabriola Island petroglyphs is planned for Sunday morning.

Contact: Gay Frederick <frederig@mala.bc.ca>; Imogene Lim <limi@mala.bc.ca>; and Bjorn Simonsen <bjorns@islandnet.com>. Web site: <http://web.mala.bc.ca/bc_arch2002/>

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