ARCHAEOLOGY of COASTAL BRITISH COLUMBIA

Essays in Honour of Professor Philip M. Hobler

Edited by
Roy L. Carlson

Archaeology Press
Simon Fraser University
Burnaby, B.C.

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Frontispiece: Philip Hobler with the Nuxalk Elders and the Sisiutl Transformation Mask presented to him by his Friends and Colleagues at his Retirement in September, 2002. The Sisiutl Mask was designed and carved by Alvin Mack. From left to right: Andy Siwallace, Lillian Siwallace, Annie Schooner, Chief Anfinn Siwallace, Pearl Snow, Kitty Moody, Grace Hans, Hazel Hans, Mercy Snow. Photo: I. Dahm.

Notes on Radiocarbon Dates

Radiocarbon dates are not exactly equivalent with calendar dates. Radiocarbon dates can be corrected to more closely match calendar dates using the tree-ring calibration curve developed by Stuiver et al. (1998). In this volume some authors have used calibrated dates and some have used uncalibrated dates. Further confusion is created by citations of older dates determined before calibration curves were developed.

With uncalibrated C-14 dates younger than about 3000 BP the correction based on tree-ring calibration is insignificant for most purposes and frequently falls within the one sigma standard deviation shown by the ± figure given as part of the date. As such, no attempt at correcting dates younger than 3000 radiocarbon years BP has been attempted in this volume.

With uncalibrated C-14 dates older than 3000 BP a calibrated date rounded off to the nearest century has been added in brackets [cal] following the uncalibrated date. All dates are given in BP (before the present) meaning before AD 1950.

Radiocarbon Age	Calibrated Age	Radiocarbon Age	Calibrated Age
1000 BP	930 cal BP	9000 BP	10,190 cal BP
2000 BP	1940 cal BP	10,000 BP	11,400 cal BP
3000 BP	3180 cal BP	11,000 BP	13,000 cal BP
4000 BP	4490 cal BP	12,000 BP	14,060 cal BP
5000 bP	5730 cal BP	13,000 BP	15,630 cal BP
6000 BP	6820 cal BP	14,000 BP	16,790 cal BP
7000 BP	7810 cal BP	15,000 BP	17,940 cal BP
8000 BP	8870 cal BP	16,000 BP	19,090 cal BP

Calibrated ages based on Stuiver, M., J. Reimer, J.W. Beck, G.S. Burr, K.A. Hughen, B. Kromer, F.G. McCormack, J. Plicht, and M. Spurk. 1998 INTCAL 98 radiocarbon age calibration, 24,000 to 0 cal BP. *Radiocarbon* 40:1041-83.

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Preface and Acknowledgements

This volume originated from a symposium on Northwest Coast archaeology held at SFU on October 27, 2001 in honour of retiring professor, Philip M. Hobler in conjunction with the annual BC Archaeology Forum. The organizing committee of SFU graduate students had asked me to organize this symposium, so I invited SFU archaeology graduates who had worked or were working on the Coast to give presentations. Twenty papers were given at the symposium followed by a discussion by Dr. R.G. Matson of UBC. Eighteen of these papers were submitted for publication, and after peer review and some re-writing, are included in this monograph. Although this volume is a specific tribute to Phil Hobler it is also a general tribute to the coastal archaeology program of the SFU Department of Archaeology, and to the students who graduated from this program and became successful in their archaeological careers. While it was not possible to obtain papers from all our successful students, those who contributed are as follows:

Douglas Brown
BA, UBC 1993
MA, UBC 1996
PhD Candidate, SFU, Burnaby

Aubrey Cannon
BA, SFU 1979
PhD, Cambridge University 1987
Assoc. Professor, McMaster U., Hamilton

Catherine C. Carlson
BA Honours, SFU 1976
MSc, U. of Maine 1986
PhD, U. of Massachusetts 1992
Associate Professor of Anthropology,
U. College of the Cariboo, Kamloops

Paul Ewonus
BA Honours SFU 1999
Archaeologist, Antiquus Arch. Consultants

Daryl Fedje
BA, SFU 1978
MA, U. of Calgary 1993
Archaeologist, Parks Canada, Victoria

David Hall
BA, SFU 1994
MA, SFU 1998
Consulting archaeologist, Coquitlam

Johnstone, David
BA, SFU 1985
MA, SFU 1991
PhD, Southern Methodist U. 2001
Adjunct Professor,
Humboldt State U., Arcata, Calif.

Simon Kaltenreider
BA, SFU 1997
Staff Archaeologist
Western Matrix Research, Quesnel

Grant Keddie
BA, SFU 1972
Curator of Archaeology,
Royal BC Museum, Victoria

David Maxwell
BA, SFU 1986
MA, SFU 1989
PhD, U. of Arizona 1996
Director, Pacific Northwest Office,
Statistical Research Inc., Burnaby

Alex Maas
BA, SFU 1990
MA, SFU 1994
PhD candidate, U. of Southhampton,
Archaeologist, Hist. Research Assoc. Seattle

Duncan McClaren
BA, SFU 1995
MA, student,
U. of Victoria, Victoria

Alan McMillan
BA, U. of Saskatchewan 1966
MA, UBC 1969
PhD, SFU 1996
Instructor, Douglas College,
Adjunct Professor SFU, Burnaby

Paul Prince
BSc, Trent U. 1987
MA, SFU 1992
PhD, McMaster U. 1997, Hamilton

Farid Rahemtulla
BA, U. of Alberta 1986
MA, U. of Toronto 1990
MA, SFU 1995
Lecturer, UNBC, Prince George

Reimer, Rudy
BA, SFU 1997
MA, SFU 2000
Archaeologist, Squamish Nation

Michael Rousseau
BA, SFU 1980
MA SFU 1989
CEO Antiquus Archaeological Consultants
Ltd., Maple Ridge

David Schaepe
BA, New York U. 1989
MA, SFU 1998
Archaeologist, Sto:lo Nation, Chilliwack

Lisa Seip
BA, SFU 1996
MA, SFU 2000
Archaeologist, Antiquus Arch. Consultants

Terry Spurgeon
BA Honours, SFU 1994
MA, SFU 2001
Independant researcher, Coquitlam

FORWARD

BC Archaeology Then and Now

ROY L. CARLSON

In 1968 when Philip Hobler began his first archaeological field work on the coast of British Columbia with a survey of the seaward reaches of Nuxalk (then called Bella Coola) traditional territory on the central coast, the context in which most archaeological work in B.C. was undertaken was very different from what it is today. The only independent archaeological researcher working here at that time was Catherine Capes who undertook excavations at Fort Rupert and Milliard Creek on Vancouver Is. All other archaeology was being done by institutionally based researchers – Carl Borden at UBC, Donald Mitchell at U. Vic., Don Abbott, John Sendey, and Wilson Duff at the BC Provincial Museum, Roy Carlson at SFU who was directing the first archaeological field school in BC, and George MacDonald of the National Museum of Man (now the Museum of Civilization) who was directing the north coast archaeological project at Prince Rupert Harbour. The federal Historic Sites Branch, that later became part of Parks Canada, was mandated to excavate historic sites only, although Bill Folan did procede downward into prehistoric levels at Friendly Cove where he was working at that time.

Archaeology in BC had already entered an expansion stage before 1968 with the enactment of the *Archaeological and Historical Sites Protection Act* by the provincial legislature in 1960 and the establishment of the Archaeological Sites Advisory Board (ASAB) and its permitting system, but in 1968 archaeology was still very much institutionally based. The Archaeological Society of British Columbia had just been organized by members of an evening class in BC archaeology that I taught at UBC, and the first issue of their newsletter, later named *The Midden*, appeared in November 1968 under the supervision of Gladys Groves with Nick Russell as editor. *The Midden* rapidly became the most important medium of communication for archaeology in the entire province and is still published. Today most archaeological work is being done by archaeological consulting companies rather than museums and universities, a situation that in 1968 would have been beyond belief. How and why has this change come about ?

Archaeological research is dependant both on money and qualified personnel. ASAB had some limited funds available for research, but a more important source was the National Museum of Man's funds for contract and salvage archaeology. From the provincial perspective the chief disadvantage to doing research under this program was that all excavated materials were supposed to be sent to Ottawa. The next significant source was the Canada Council from which the Social Science and Humanities Research Council (SSHRC) was later derived. SSHRC still exists and is an important source of money for university researchers, although most of its archaeological research funds go to support research abroad. Phil Hobler obtained the first Canada Council grant for archaeological field research in BC in 1969 for his 2nd year of survey of Bella Coola territory. The first year had been funded by the President's Research Grant Committee at SFU.

SFU's coastal research program was greatly enhanced when the M.V. Sisiutl, a 37' aluminum hulled research vessel was built and launched on May 13, 1972. The Sisiutl was designed by Phil Hobler in consultation with Matsumoto Shipyards who built the vessel, and was paid for by SFU. We chose the name Sisiutl partly because this mythological water serpent was a symbol of great power with an impenetrable hide, and partly because we were impressed by the Sisiutl monument at Bella Coola near where we were doing research.

The Sisiutl was used from 1972 to the mid-1990s in many coastal archaeological projects and was particularly important in operating the archaeological field school in remote coastal localities. In 1972 the Sisiutl transported students and supplies to our remote field camps at Kwatna and Kimsquit. Kwatna was a particularly good locality for a field school because of the variety of types of archaeological sites found there: deep shell middens, house depressions, pictographs, burial caves, a waterlogged intertidal site, and intertidal lithic scatters. The greater the number of site types you can expose students to, the more likely they are to comprehend that different kinds of sites require different research techniques. The Nuxalk, who have reserves at Kwatna, were interested in the sites and band members Andy Schooner and Cyril Talleo participated in the excavations. In 1973 we used the Sisiutl for site surveys on Quatsino Sound and Seymour Inlet with funding from ASAB arranged by Bjorn Simonsen, in 1974 for my work at McNaughton Island, and in 1974 and 1975 for Phil's survey of Moresby Island. We used the Sisiutl in 1976 for site survey of the lower Nass and Portland Canal under the auspices of the Nishga Tribal Council with funding from ASAB. In 1977 and 1978 the Sisiutl was back on the central coast supporting more site survey work and excavations at Namu and Kwatna. In 1980 the Sisiutl supported field school excavations directed by Phil at FaSu 19 at Kwatna, and in 1982 at Fort McLoughlin at Old Bella Bella with assistance from Jennifer Carpenter and the Heiltsuk Cultural Education Centre. In 1983 the Sisiutl was used to support excavations at Troup Pass and Mackenzie's Rock and for transporting Heiltsuk students from Bella Bella for restoration work in historic graveyards in the area. From 1984 through 1986 the Sisiutl was used with the Pender Project in the Gulf Islands assisted by Abel Joe from Duncan with financial support from Programs of Excellence at SFU and from the Heritage Conservation Branch arranged for by Art Charlton, and from 1988 through 1990 first for Phil's surveys in the Hakai recreational area and then as support for the field school at Tsini Tsini operating out of Bella Coola.

The Sisiutl saw its last season of operation in 1994 when we used it to support my field school at Namu and Phil's at Tsini Tsini. The Sisiutl was sold in 2002. The Archaeology Department at SFU under the leadership of David Burley had by then moved away from Northwest Coast archaeology as a major area of research interest and replaced it with research on ancient DNA and colonial South American archaeology. Fortunately, both UBC and U. Vic. have continuing Northwest Coast archaeology research programs. Parks Canada has also now become a major player in prehistoric archaeology and Daryl Fedje is undertaking pure research in Haida Gwaii with very significant results.

BC archaeology today, both on the coast and in the interior, is being undertaken primarily by professional archaeological consultants employed by private companies to assess or mitigate the impact of specific construction projects on archaeological remains. This change has come about as a result of several factors. First the *Archaeological and Historic Sites Protection Act* was replaced by the *Heritage Conservation Act* in 1977 and later rewritten and strengthened with several amendments in the early 1990s that provided significant penalties for willful destruction of archaeological sites and guidelines for archaeological impact assessments. The old Archaeological Sites Advisory Board was replaced first by the Heritage Branch, then by the Archaeology Branch, and recently by Archaeological Planning and Assessment to manage permitting and record keeping. The second factor was the perception by the Native peoples of BC that archaeological remains are the physical evidence of their use of and hence their right to this land and its resources that with few exceptions they had never surrendered by treaty. As such these First Nations have tended to welcome archaeological research in their traditional territories, and have become more involved in the field research itself, particularly now that treaties are being negotiated.

A recent issue of *The Midden* (Vol. 34, No. 2, 2002) contains a list of 225 permits for archaeological work issued by Archaeological Planning and Assessment between January and July, 2002. This list provides a sample of what is happening archaeologically in BC today. Only eight of the 225 permits went to archaeologists at colleges and universities with the remainder going to 113 archaeologists employed as private consultants. These figures are in marked contrast to the total of nine archaeologists working in prehistoric archaeology in BC in 1968 of which all but one were from universities or museums. Archaeology has become both big business and because of land claims and treaty issues, highly political. At present it is uncertain to what extent the current high level of consulting archaeology will continue since *The Heritage Conservation Act* is currently under review by the recently elected provincial government.

The 18 papers in this volume do not attempt to cover all coastal archaeology in British Columbia. They are a sample of results obtained from a combination of academic and consulting research, and demonstrate that such combinations work in our quest for understanding and explaining the past. The primary

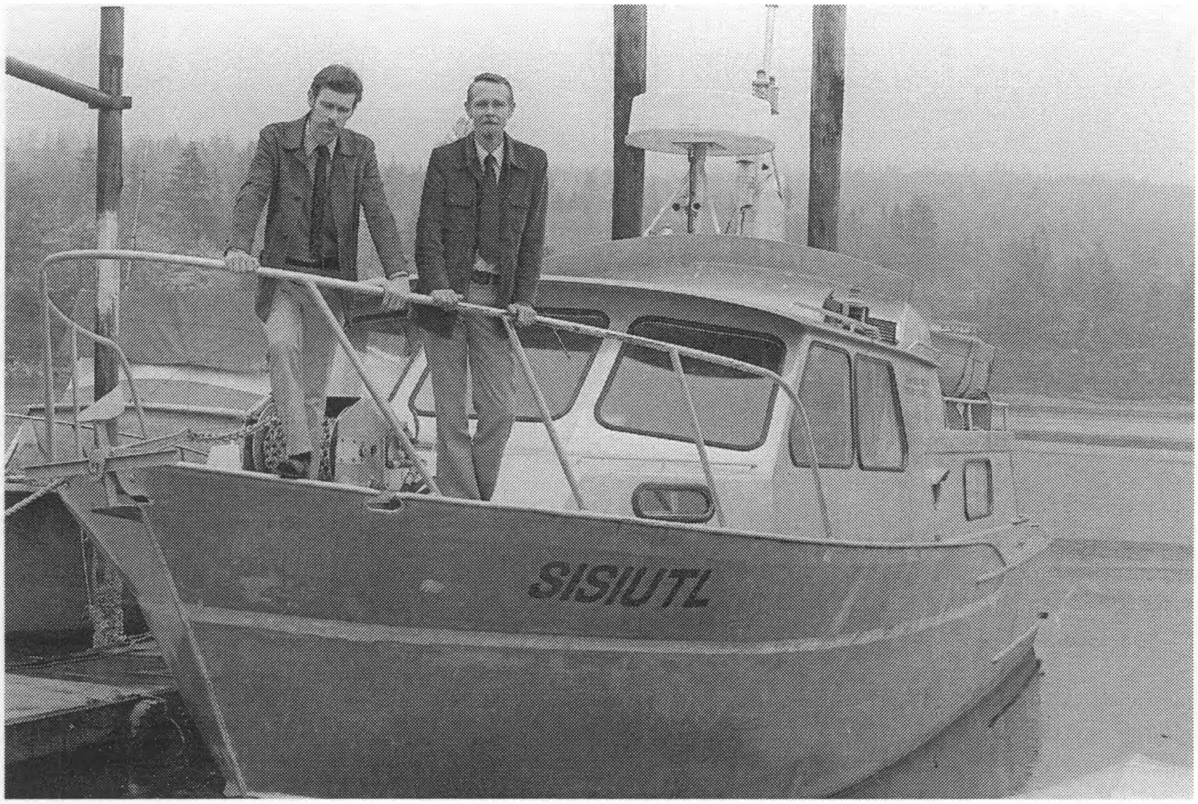

Figure F-1. **Philip Hobler (left) and Roy Carlson (right) at the Launching of the SFU Department of Archaeology's Research Vessel, the Sisiutl, May 13, 1972. Copyright photo by Ray Allen courtesy of the Vancouver Sun.**

result of archaeological research undertaken since 1968 is the demonstration of the continuity of occupation by native peoples from 10,000 [cal 11,400] years ago onward. Cannon (Ch. 1) reviews this evidence for the central coast, and Hall (Ch. 2) uses the Bella Coola Valley as an example of the vast sea and land level changes that took place at the end of the Pleistocene that impede discovery of the earliest remains. The Early Period (pre-5000 [cal 5700] BP) has recently been covered in detail (Carlson and Dalla Bona 1996), and Fedje's report (Ch. 3) on Parks Canada and University of Victoria research in Haida Gwaii brings us up to date for that period. McMillan (Ch. 4) provides information on the end of the Early Period on the west coast of Vancouver island. Reimer (Ch. 5) challenges the view that the coastal peoples were so coastally oriented that they never went into the uplands by presenting the results of survey work in the coast mountains. Rahemtulla (Ch. 6) looks at this same problem of coast-marine tunnel vision, but tackles it differently by emphasizing the importance of land mammal bone as raw material for tools. Catherine Carlson (Ch. 7) provides the long awaited results of the faunal sampling of the Bear Cove site excavated in 1978, clarifies the temporal position of the component containing the abundant sea mammal bones, and argues against the adaptational models favoured by some recent synthesizers of Northwest Coast prehistory that big game hunting slowly led to a late maritime adaptation on the Northwest Coast.

With Chapter 8 we move to archaeological remains from Middle and Late Period sites. In Chapter 8 the authors demonstrate that the site of Port Hammond, famous in the much older archaeological literature, is a classic Marpole phase occupation. In Chapters 9 (Johnstone) and 10 (Schaepe) information on pre-contact houses is presented. Schaepe's chapter provides the first detailed analysis and critical examination of the data from the Maurer House excavated by Ron LeClair in 1973, and contributes to both a more thorough interpretation of the house structure and to methodology. Johnstone reviews the rather meagre evidence for houses at three Gulf Island sites. Brown (Ch. 11) provides data on the Somenos Creek burials on southern Vancouver Island, and examines the problem of contemporaneity vs. intrusion in regard to burials in southern Strait of Georgia shell middens. Keddie (Ch. 12) provides new interpretations of some of the enigmatic stone bowls from the Lower Fraser and adjacent regions, and discusses the problem of fakes, while Maxwell (Ch. 13) questions the value of attempts to determine shellfish seasonality using presently known techniques.

With the last five chapters we move away from a total focus on archaeology to one involving considerable oral history and ethnography. McLaren (Ch 14) sequences past events mentioned in six central Coast Salish oral narratives, and then compares these events with events mentioned in the geological and archaeological literature. Seip (Ch 15) examines historic Nuxalk masks in museum collections as if they were archaeological specimens, and reconstructs their cultural context using both-style and ethnography as guides. The final three chapters refer to historic period archaeology and ethnography. Prince (Ch. 16) looks at Native responses to European contact at the remote villages at Kimsquit using both ethnohistoric and archaeological data, and Spurgeon (Ch. 17) critically examines the use and potential for survival in archeological sites of the food plant, wapato (*Sagittaria latifolia*). In the final chapter (18) Maas interprets the ceramics found associated with the Native houses and Fort McLaughlin at Old Bella Bella. All in all these papers resolve some archaeological problems and point the way for continuing research on others.

CHAPTER 1

Long-term Continuity in Central Northwest Coast Settlement Patterns

AUBREY CANNON

Introduction

Northwest Coast archaeological interpretation often rests on demonstrable discontinuities in site location and use. Site-specific patterns are interpreted as evidence of migration (Mitchell 1988:584, 1990:357), environmental change (Cannon 1991, 1995), or more general processes of cultural evolution (Matson 1992). Temporal variations in regional settlement patterns elicit interpretations of migration (McMillan 1998), warfare (Maschner 1997), and political integration (Acheson 1995). These are the patterns and processes commonly expected in histories encompassing millennia, and they are the common subjects of world archaeology. The other end of the spectrum, local and regional continuity in site use, provides a less ready basis for historical interpretation. Its reality is also less readily apparent or demonstrable.

Empirical data from multi-site testing in the Namu vicinity located in traditional Heiltsuk territory on the central British Columbia coast, suggest an unusual degree of continuity in site location and use (Cannon 2000a, 2002). Sites, once established, were never permanently abandoned, and may have remained more or less in continuous use throughout the period from their initial establishment through to the time of European contact and in some cases well beyond. Present analysis of auger samples of shellfish and fish remains indicates local site and regional subsistence economies also remained consistent with only minor exceptions throughout the time that each site was in use, at least over the last 7000 years for which a faunal record is available. There is also evidence from at least one site for millennia-long continuity in the use of space within the site.

Hobler (1990:298) noted that continuity is the prevailing pattern in the archaeological history of the central coast. He also implied this represented a picture of regional cultural stability. New data from multi-site testing support Hobler's main observation, but they also raise questions about whether continuities are due to the constraints of environment or cultural tradition, or the stability of economic adaptations or social and political histories. New research programs may ultimately resolve these issues, but contrasts between central coast patterns and those observed in other regions of the Northwest Coast support the likelihood of cultural continuity in this region.

Long-term continuity has been suggested for individual sites in various parts of the Northwest Coast on the basis of a variety of different criteria (e.g. Carlson 1970a, Carlson and Hobler 1993, Dewhirst 1980, Ham et al. 1986, Murray 1982). Regional continuity, as indicated in the Namu vicinity, has been less evident, due in part to the relative lack of regional research programs. Although archaeological interpretations of continuity and change are derived from empirical observation, differing theoretical perspectives also clearly underlie propensities to stress continuity or change in the archaeological record. The strongest empirical criterion of cultural continuity may be whether site localities are abandoned over time, though continuity of settlement may in some cases be due as much to the physical advantages of site localities. Demonstrations of continuous occupation or consistent patterns of settlement or resource use are often far more equivocal, and very few sites provide clear evidence of consistency in the use of space within settlements. Where present, these patterns may also be as much a function of physical constraint as cultural continuity. Resolution of the issue of continuity must therefore rest in part on evaluations of the nature, quantity, and quality of the archaeological evidence, but ultimately may rest as much on the simplicity and elegance of interpretations as well as the extent to which they have been shaped by theoretical perspectives.

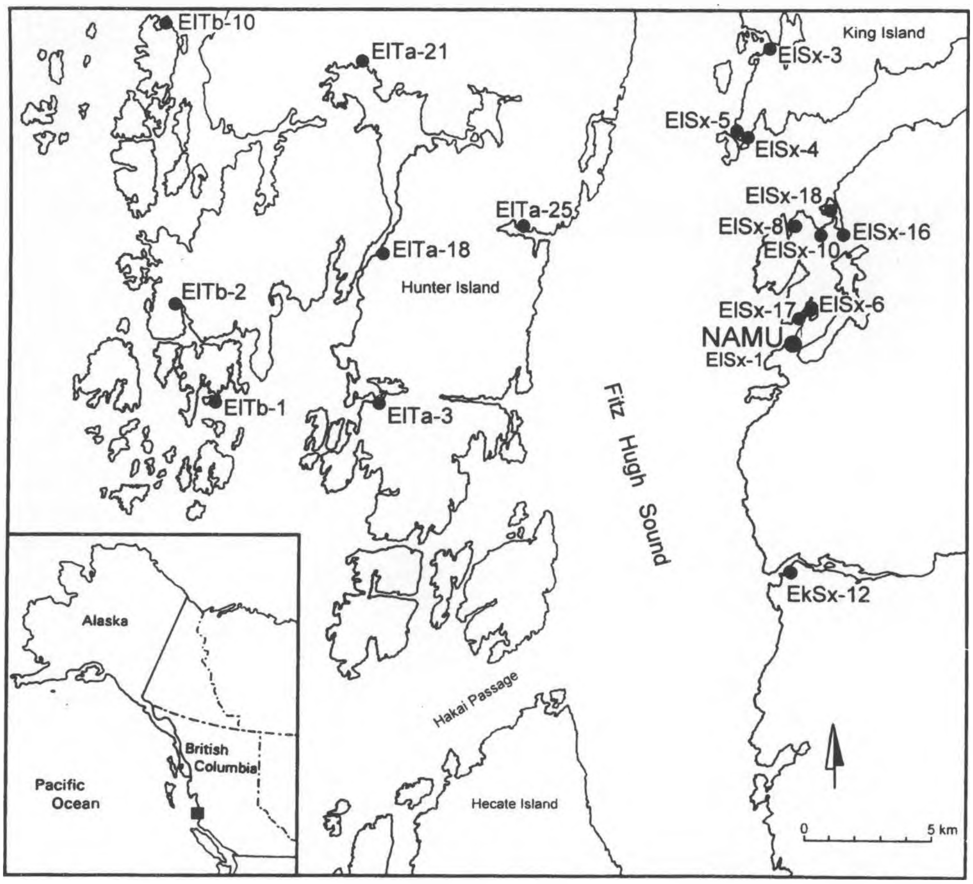

Figure 1:1. **Investigated Archaeological Sites in the Vicinity of Namu.**

Site Locations

Archaeological research on the central coast has a long history (Hobler 1982, 1990), but most research within traditional Heiltsuk territory has been survey based. Relatively few sites have been the subjects of extensive excavation or even limited testing. As a step toward increasing the number of site investigations in the Namu vicinity (Figure 1:1), I undertook a program of limited site coring and auger sampling in 1996 and1997 (Cannon 2000a, 2000b). The research was designed to establish the history of site settlement and to determine the focus and intensity of fishing and shellfish gathering economies. Dates from the bases of cores obtained from sixteen shell midden sites, representing villages, probable base camps, and specific purpose campsites, indicated a varied range of dates for initial site settlement over the past 11,000 years. These results and data from previous site investigations suggest the timing of initial settlement was partly governed by long-term environmental change (Cannon 2000b) and unique historical contingencies, especially in the period around 500 BC, which witnessed a dramatic expansion in the number of residential sites (Cannon 2002).

Variable timing in the establishment of this variety of settlements is not surprising, but radiocarbon dates or other indicators of terminal occupation at these and other sites in the region also show that almost all sites tested to date remained in use into the European contact period. In other words, a site location that came into use at any time over the past 11,000 years continued to be used into the contact era. Table 1:1 shows the latest dates of occupation at sites tested in the Namu vicinity. Radiocarbon dates for terminal occupations for most sites were derived from shell samples obtained from surface exposures, or more commonly, from eroding foreshore exposures of intact sections of shell midden deposits [see Cannon (2000b) and Morlan (2002) for more detail on radiocarbon dating]. Undated terminal occupations have been inferred from surface features, the presence of European artifacts, or oral traditions.

As Table 1:1 shows, only five of eighteen sites tested in the region lack definitive evidence of continued use into the contact era. Two of these sites (ElSx-6 and ElSx-17) are represented by very limited midden deposits

Table 1:1. Initial and Terminal Occupation Dates for Sites in the Namu Vicinity based on Calibrated C-14 Dates.

Site	Initial Occupation	C-14 Date or Other Indicators of Terminal Occupation
ElSx-17	AD 890-1165	no evidence of later occupation
ElTb-2	AD 20-245	AD 1255-1445
ElSx-4	890-670 BC	AD 1435-1685
ElSx-5	4780-4510 BC	AD 1470-1700
ElSx-6	AD 1550-1720	no evidence of later occupation
EkSx-12	255 BC - AD 30	AD 1520-1865
ElSx-1	9600-8650 BC	Contact era: oral tradition (Carlson 1991:95)
ElSx-3	770-50 BC	Contact era: oral tradition, surface features (Pomeroy 1980:33-36, Luebbers 1978:17)
ElSx-8	AD 140-430	AD 1660-1950
ElSx-10	4315-3960 BC	AD 1655-1950
ElSx-16	AD 660-940	AD 1670-1950
ElSx-18	1575-1310 BC	AD 1710-1950
ElTa-3	AD 1160-1300	AD 1660-1950
ElTa-18	9605-9250 BC	AD 1590-1950
ElTa-21	AD 140-425	AD 1530-1950
ElTa-25	2420-2025 BC	AD 1655-1950
ElTb-1	805-410 BC	Contact era: fallen cedar plank structures and European goods on surface
ElTb-10	830-400 BC	Contact era: European trade goods, oral tradition (Carlson1976:103)

on tiny islets in Namu Harbour. Their specific use is unknown, but they were never major residential or resource extraction locations. Two other sites (ElSx-4 and ElSx-5) show terminal occupations no earlier than the late seventeenth or early eighteenth century, but dated samples were obtained from surface exposures on high terraces near the back of each site. As yet undated shell samples collected from eroded foreshore sections of the midden deposits may well show later occupations typical of most other sites in the region. Only one camp-site (ElTb-2) therefore shows clear evidence of abandonment well before the period of European contact, and it was in use for a period of more than a thousand years up until at least the mid fifteenth century.

The question is whether this pattern of continued site use is unusual or unexpected for this or any other region of the Northwest Coast. Certainly, evidence of a limited period of residential occupation or other site use followed ultimately by site abandonment is available from all parts of the coast. On the south coast, the Point Grey site (Figure 1:2) (Coupland 1991:79) is an example of a single-component Marpole phase occupation of perhaps no more than 500 years. The extensively excavated upriver campsite on the Hoko River, on Washington's Olympic Peninsula, was also only occupied for a limited period of about 800 years, ending around 2200 BP (Croes and Hackenberger 1988:19). On the west coast of Vancouver Island, the Shoemaker Bay site is estimated to have been abandoned no later than the mid fifteenth century (McMillan and St. Claire 1982:61). On the north coast, the final occupation of the Paul Mason site, located on the Skeena River, is dated to about 1000 BC (Coupland 1985:50).

Of course, an equal number of site excavations show evidence of long-term continuity of site occupation without any evidence of abandonment up to and often well into the European contact era. The Helen Point site on Mayne Island, for example, was in use from as early as 3000 BC and in the documented historic period (Carlson 1970). The main site at Duke Point (DgRx-5) also shows continuity in occupation from ca. 3000 BC and into the period of European trade (Murray 1982:129). Yuquot, on the west coast of Vancouver Island, is another site that shows continuity in the use of a particular locality from as early as 2300 BC and into the contact era (Dewhirst 1980:336).

It is difficult to discern any more general pattern from these few examples except to say that site location abandonment is neither the rule nor the exception on the Northwest Coast.

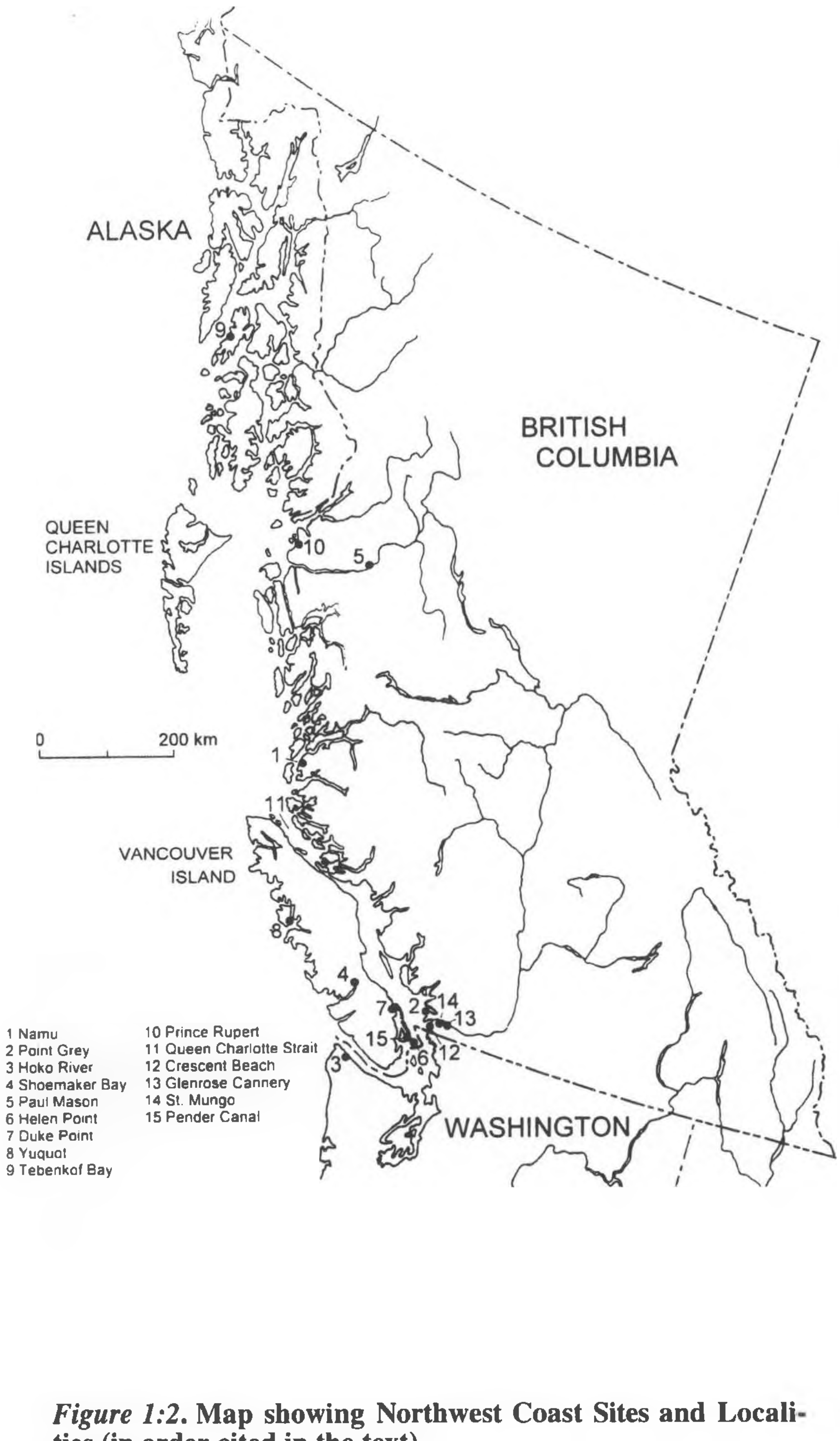

Figure 1:2. **Map showing Northwest Coast Sites and Localities (in order cited in the text).**

The only approximation to a general synthesis of terminal site dates is Ames and Maschner's (1999:54-55) attempt to use radiocarbon dates as a surrogate measure of population trends. They note generally fewer site dates from the period justprior to European contact and suggest a period of decline from earlier peak population levels. If so, then whatever the propensity to abandon sites may have been over the course of preceding millennia, this late decline in population certainly would have entailed late pre-contact abandonment of at least some site locations. Ames and Maschner's results, however, might equally reflect a reluctance among archaeologists to radiocarbon date terminal site deposits, especially in cases where surface finds and features, excavated artifact assemblages, historical records, or oral traditions provide as good or better indication of the date of terminal occupation.

The type of systematic regional multi-site testing programs needed to assess general patterns of settlement history is relatively rare, but wholesale abandonment of village and resource extraction locations is evident on the coast. Maschner's (1997) study of settlement patterns in Tebenkof Bay in southeastern Alaska, for example, documented a major shift ca. AD 300-500, which involved abandonment of smaller settlements in locations maximizing subsistence opportunities in favour of larger amalgamated villages in locations better suited to defense. Maschner attributed this development to increased political pressure and greater incidence of conflict in the region (1997:293). Increased incidence of warfarehas also been cited to explain the large-scale abandonment of village locations in Prince Rupert Harbour in the first few centuries AD (MacDonald and Cybulski 2001:19). Archer's (2001) systematic dating of surface features at eleven village sites in Prince Rupert Harbour, which he used to document the emergence of household ranking around AD 100, showed a range of dates for village abandonment over the period from 500 BC to AD 400.

These examples suggest that abandonment of site locations should almost be expected as a result of environmental changes and political developments. If continuity in the use of site locations in the Namu vicinity stands apart from patterns documented elsewhere on the Northwest Coast, then it suggests the possible absence of the large-scale political conflict and turmoil evident in Prince Rupert Harbour and southeastern Alaska. It also suggests that major environmental changes that would constrain or preclude continued site settlement were also not a factor. Environmental changes, including a minor decline in relative sea level and local changes that may have affected the productivity of the Namu salmon fishery are evident on the central coast, but they were not sufficient to preclude later use of site locations. Namu's continued occupation despite decline in its salmon fishery (Cannon et al. 1999) suggests that other physical advantages of the locality or, alternatively, cultural traditions (Cannon 2002) were sufficient to offset any hardships entailed.

The simplest and most direct explanation for this degree of continuity in the use of site locations would be a lack of equally viable or advantageous alternatives. Hobler (1983:154), however, has suggested that in contrast to the steep-sided fjord landscape of the eastern inner coast the western portion of the central coast contains ubiquitous localities suitable for settlement. The physical advantages of site localities might also be a function of their initial settlement as much as the natural features of the landscape. Shell midden sites, once established, provide their own advantages for subsequent occupations. Shell deposits create level, elevated, and well-drained surfaces suitable for building and other activities. Expanses of level, well-drained surface are relatively rare in the region. Namu stands out as a notable exception; its apparently unique local topography may have been a factor contributing to its long-term residential occupation, especially in the period prior to major shell midden deposition.

Of course, evidence for the use of the same locations in the European contact era that had been in use centuries or millennia earlier does not preclude periodic or even extended abandonment over the intervening years. All that is indicated with certainty is the absence of any major regional reorganization of settlement. Continuity in the sense of continued use of the same locations does not imply continuity in the sense of continuous use. Continuous use of a site is much more difficult to demonstrate given the varied histories of shell midden development. Some areas of shell midden sites might be abandoned for considerable periods while deposits continue to accumulate in other areas (Carlson 1983:30). Extensive excavation and intensive radiocarbon dating are generally considered the minimal requirements to make the case for continuous occupation.

Within the Namu vicinity, the best candidate for continuous site occupation is Namu itself. The site has been extensively excavated over six seasons and has yielded a total of 49 radiocarbon dates spanning the last 10,000 radiocarbon years (Carlson 1991, 1996, Morlan 2002). Yet even this unprecedented dating of a single site cannot preclude the possibility of periodic abandonment. Given the probabilistic nature of radiocarbon dates, no number of dates could demonstrate with certainty that a site was not periodically abandoned for up to a century at a time. To take an extreme hypothetical example, if Namu had a nearby sister site that produced matching radiocarbon dates, it would be impossible to prove with any amount of dating that each site was continuously occupied by two separate village populations. The alternative, that both sites were periodically occupied and abandoned at hundred year intervals by the same village population would always be, strictly on the basis of the evidence, equally likely. Despite common knowledge that this possibility exists, archaeological convention is to accept numerous dates spread evenly over the range of a site's occupation as evidence of more or less continuous occupation or use over that time (e.g. Carlson and Hobler 1993:48). Namu is therefore rightly described as the longest occupied site in British Columbia, showing continuous deposition of cultural remains for the last 10,000 radiocarbon [11,000 cal BP] years (Carlson 1991:95, 1998:27).

Table 1:2. Calibrated Radiocarbon Date Series from Sites in the Vicinity of Namu.

EISx-10	EISx-16	ElTa-18	ElTb-10*
AD 1655-1950	AD 1670-1950	AD 1590-1950	AD 980-1280
AD 1560-1950	AD 1425-1655	AD 1220-1460	400 BC- AD 70
2465-2150 BC	AD 1250-1425	2620-2310 BC	480 BC- AD 120
4315-3960 BC	AD 660-940	9605-9250 BC	800-230 BC
			830-400 BC

*Based on data from Pomeroy (1980)

The continuous occupation of Namu is not easily explained, given the later deterioration of the local salmon fishing economy and the periodic hardship this entailed, particularly in the period after 500 BC [see Cannon et al. (1999) for a summary discussion of the evidence for this and for reference citations]. Still, the site holds certain natural advantages with its harbour, major river outlet, and wide extent of level, elevated ground surface. The attractiveness of the locality is also indicated by extensive Euro-Canadian development at Namu beginning in the late nineteenth century and extending into the later twentieth century (Luebbers 1978:11).

Similar continuity, in the sense of continuous use or occupation is only suggested by the limited extent of dating undertaken at other sites in the Namu vicinity. Table 1:2 shows the number and range of radiocarbon dates obtained for other sites in the area. The depth of deposits at older sites and this range of intervening dates between basal and terminal deposits suggest at least the possibility that, like Namu, some if not most sites remained more or less in continuous use following the time of their initial settlement.

Site localities that exhibit ongoing use include major villages, such as Namu, and small campsites, such as ElTa-18, which is located on a small, high terrace overlooking a channel leading into the interior of Hunter Island. Both of these particular sites show use over the entire span of the last 11,000 years, suggesting that a settlement pattern consisting of major villages or base camps and smaller specific-purpose camps has also been in existence over this same time span. Persistence in the use of these locations suggests either they possessed cross-culturally recognized physical advantages, or a continuous cultural tradition seasonally brought successive generations back to the same locations used by their immediate and more distant ancestors.

The lack of site abandonment in the Namu vicinity minimally suggests there were no major disruptions in settlement patterns caused by extensive political conflict or environmental change. If more or less continuous occupation or use of sites is verified through more intensive dating of site deposits it would suggest there were no significant disruptions on a shorter term scale either. The results of core testing and previous site excavations indicate the only major change in settlement pattern to have been a significant increase in the number and density of village sites around 500 BC, followed by an increase in the number of small, specific-purpose campsites (Cannon 2002). I have attributed this expansion in village sites to the resettlement of family groups breaking with the settlement at Namu during periods of food shortage predicated on failure of the local salmon fishery. The late increase in sites of course, would also be consistent with a wider regional influx of population, which would fit with Mitchell's (1988:584, 1990:357) proposed migration of Wakashan-speaking populations around 500 BC. Both scenarios remain speculative, but if large-scale migration and population replacement did occur, as Mitchell suggests, then it occurred without any obvious disruption of longstanding patterns of site use in the area. Sites that had been in use millennia earlier remained in use after this date, and with no apparent change in how they were used.

An argument could be made that cultural replacement would not necessarily result in any changes in the use of existing sites if their settlement was initially and subsequently based on the physical advantages of their localities. Euro-Canadian development at Namu and construction of a cabin in the central area of ElTa-25 (Figure 1:3), a shell midden site directly west of Namu on the east coast of Hunter Island, support the argument that these were desirable locations regardless of cultural tradition. Two examples of post-contact site use are not enough, however, to make the case

Figure 1:3. **Site ElTa 25, Kiltik Cove, Hunter Island.**

that continuity of cultural tradition was not a factor influencing the stability of Namu vicinity settlement patterns..

There are two possible explanations for the degree of continuity in settlement pattern observed in the Namu vicinity. Either the physical advantages of site localities were sufficient to exert a strong influence on early and subse quent settlement by people of whatever cultural tradition, or alternative localities offered equal or greater advantages and the use of specific localities was governed more by cultural tradition. I have argued (Cannon 2002) that the continuous use of Namu and later other village sites in the area was a function of a seasonal ritual and food gathering cycle (Harkin 1997:7) that made winter villages places of ritual permanence in the landscape, following Bender (1985). This type of explanation seems especially appropriate to account for the continued occupation of Namu despite periodic failure of the local salmon fishery and the hardships this entailed (Cannon et al. 1999). Assessment of alternative explanations based on the relative physical advantages of different localities will require detailed multivariate geographic analysis. Hobler's (1983) initial study showed proximity to salmon streams was not critical in determining site location. Further studies will need to incorporate a wider range of factors including proximity to a variety of food resources, local topography, proximity to reliable fresh water, shelter from seasonal weather patterns, and visibility of access routes.

The persistence of site use, despite establishment of new settlements at alternative locations in the immediate vicinity, suggests the likely influence of cultural tradition. Village sites established at Kisameet Bay, twelve kilometres north of Namu, and at the Koeye River, nine kilometres to the south, for example, appear to have had more productive salmon fisheries than Namu in the period after 500 BC. Yet Namu was not abandoned in favour of settlement at these locations (Cannon 2000a, 2001). A similar pattern is evident at two major shell midden sites on Fougner Bay, a small bay on the mainland just north of Namu. Both sites are relatively large and contain evidence of a variety of subsistence activities suggestive of major base camps (Cannon 2000a). The earlier of the two, ElSx-10, was in use from as early as 4300 BC as well as in the contact era (Table 1:2). The other site, ElSx-18, located on a small island in the bay and directly facing ElSx-10, was established by 1600 BC and also was in use in the contact era. If the advantages of site locality were the main factors in later establishment of the site at ElSx-18, then it might be expected that the earlier site would have been abandoned in its favour. The alternative is that cultural or even family traditions played a role in the continued use of ElSx-10 and later the concurrent use of ElSx-18.

Of course, local population growth could have led to expansion in the use of less advantageous localities. Ranking site attributes in comparison to the chronology of their settlement would be one way to evaluate this possibility. With respect to salmon productivity, however, subsequent village sites in the vicinity are superior in comparison to Namu at the same time (Cannon 2000a). Their establishment did not lead to the abandonment of Namu that might have been expected if resource advantages were the determining factor in site settlement. Alternatively, if new villages were established because of an influx of outside populations, as in Mitchell's migration scenario, then it would also be unusual for new people in the area to maintain village settlement at Namu at the same time as they settled more productive village localities nearby.

Further site testing and dating to verify settlement histories will be needed to assess the likelihood of migration, and geographic assessment of site and non-site localities will be needed to determine the role the physical landscape played in determining site settlement. For now, historical contingency influenced by the constraints and advantages of the physical landscape appears the simplest explanation for the establishment of settlements at particular localities, while continuity of cultural tradition offers the simplest and most powerful explanation for continuity of settlement at those same localities.

Site Use

Analysis of faunal remains from Namu and other sites in the vicinity suggests long-term continuity in the way that different site localities were used. Patterns of seasonal site use and resource extraction remained stable over periods of several millennia in some cases. The density and seasonal variety of resources at Namu are the same from as early as 5000 BC, the date of the earliest preserved vertebrate fauna (Cannon 1991, 2000a). The faunal remains indicate multi-seasonal winter village occupation throughout this time, at least up until the most recent period in the site's occupation when it may have served more as a seasonal campsite than a winter village (Conover 1978:98). The only major difference in the faunal assemblage over time is the decline in the relative percentage of salmon from a peak of ninety-seven percent of recovered fish remains in the period 4000-2000 BC to sixty-seven percent in the period AD 1-1000. Auger samples show herring to have been far more abundant and more stable over time (Cannon 2000a).

The continuity in settlement and subsistence at Namu is well established on the basis of a wide variety of evidence. Assessment of similar continuity at other sites on the basis of faunal remains recovered from auger samples is far more tenuous. Currently available data, however, strongly suggest that all sites tested in the region exhibit similar patterns of utilization from the time of their initial establishment through to the time of their abandonment in the late pre-contact/early contact period.

Analysis and comparison of fish remains recovered from auger samples has been used as part of the basis for classifying sites in the Namu vicinity as winter villages, a spring village, probable base camps, and a variety of specific purpose campsites (Cannon 2000a, 2002). The density and variety of fish remains indicate the seasonal range, variety, focus, and intensity of activity at each of the site localities. Herring and salmon predominate among the fish, but the remains of twenty-four other taxa have also been identified. The density and variety of fish remains are much greater at sites that various indicators suggest are probable villages, but are more moderate at probable base camps and much lower at specific-purpose campsites. The characteristics of the faunal remains are generally consistent between sampling locations within sites and between samples from different levels at particular locations.

Unfortunately, it is presently impossible to assign auger samples from sites other than Namu to meaningful temporal units. No major stratigraphic breaks have been identified in the deposits, and artifact assemblages, that normally provide the basis for periodization at most Northwest Coast sites, are also not available. Artifacts occur only rarely in the auger samples and are generally undiagnostic, with the exception of one obsidian microblade recovered from the oldest dated deposits at ElSx-10. Insufficient funding for extensive radiocarbon dating has also prevented periodization on the basis of absolute dates. The lack of periodization precludes systematic comparison of the variety and density of fish over time. Ongoing analysis of shell samples may clarify relative temporal trends in shellfish use, and further dating may allow for quantitative analysis of the focus and intensity of fishing economies over time, but clear temporal patterns in the use of fish are not evident at any of the sites tested. There is certainly no indication that sites once used as major village or base camp settlements were subsequently reduced to seasonal, specific-purpose campsites. Any temporal variation in the intensity or focus of fisheries would have been more modest in scale, though even modest variability has provided the basis for interpretations of changes in resource use at Namu and at other locations on the Northwest Coast.

Auger samples from Namu were sufficient to show temporal variability in salmon density comparable to the direction and scale of variability earlier identified in the analysis of faunal remains from full-scale excavations (Cannon 2000a). Decline in the intensity of the salmon fishery and increase in use of a wider variety and often lesser quality of alternative fish resources has been attributed to changes in local environmental conditions that resulted in periodic failure of the Namu salmon fishery (Cannon 1995, Cannon et al. 1999). Although significant in its implications for the local population, this change in the local fishery was relatively modest overall, and insufficient to provide a basis for interpretations of cultural discontinuity. Temporal variation in the focus of fishing economies in other areas of the Northwest Coast, however, has been used to argue for cultural displacement or evolutionary change.

In the Queen Charlotte Strait, south of Namu, variation in fish assemblages that show an increase in salmon fishing have been used in conjunction with differences in artifact assemblages to suggest replacement of an Obsidian Culture type (3000-500 BC) by a Queen Charlotte Strait Culture type (AD 300-Contact). The latter is speculated to represent a migration of Wakashan-speaking peoples (Mitchell 1988). The poor quality of fish resources used in this region in earlier periods suggests instead either environmental change that increased the availability of salmon or improvement in technology that enhanced the productivity of salmon fishing (Cannon 1995, 2001). An 800-year gap between proposed culture types may account for the differences in associated artifact assemblages. The differences in fish assemblages between the two periods are relatively minor, with the exception of a greater proportion of ratfish in earlier periods, which likely represents the use of marginal alternative resources at times when salmon was in short supply. Although great interpretative weight is placed on varied use of resources over time, this evidence in itself provides little support for cultural discontinuity.

Evolutionary change in subsistence economies is sometimes inferred from minor variation in the relative abundance of fish remains or from substantial variability that is more easily explained with reference to other causes. Croes and Hackenberger (1988), for example, outlined an evolutionary model for intensification of salmon fishing based on contrasts in fish remains from two sites on the Hoko River on Washington's Olympic Peninsula. Seasonal contrast in use of the two sites, however, equally and more simply accounts for the variability in fishing economies. In extending the same model to the results of excavations at Crescent Beach and at the Glenrose Cannery site, Matson (1992, Matson and Coupland 1995) placed great weight on minor differences in the relative abundance of salmon and flatfish and salmon cranial elements. Cranial element representation, however, provides very weak support for later intensification of salmon fishing and storage (Cannon 2001), and the quantities of fish remains recovered from Crescent Beach and Glenrose do not indicate a clear evolutionary trend. Evolutionary change in the fishing economy is expressly denied on the basis of faunal remains from the St. Mungo site (Ham et al. 1986).

The reliability and strength of criteria used to argue for discontinuity or change in Northwest Coast subsistence economies should be re-evaluated. Where variation in seasonal use of sites or activity areas within sites cannot be controlled, evolutionary change in fishing economies should be held to a much higher standard than simpler and more direct interpretations that posit use of resources according to their availability, local abundance, and relative quality. Where temporal patterns are evident, the potential for local environmental changes to explain those patterns should be evaluated ahead of more elaborate interpretations of cultural discontinuity.

None of the evidence from the Namu vicinity comes close to meeting this high standard for demonstrating temporal variation in subsistence economies. On this basis, essential continuity in subsistence economies should be the preferred interpretation. Consistency in the use of resources at Namu and other sites in the vicinity supports but does not demonstrate cultural continuity. Use of particular localities is certainly constrained by resource opportunities and site characteristics, but it is also undoubtedly shaped by cultural perception and family and local group traditions of seasonal occupation and resource use. It may be possible to evaluate the resource potentials of particular localities and assess those against utilization patterns to see whether cultural patterns remained within some optimal limits. Given, however, that cultural perceptions and traditions are shaped as much by patterns of activity as any other factor, it may never be possible to separate cultural continuity from structures of environmental opportunity and constraint.

Spatial Organization

Auger and core samples generally provide little information of sufficient detail to assess whether there is any continuity over time in the organization of space within sites. As with most small-scale test excavations, they do not cover enough area to reveal features that might provide evidence of structures, nor do they yield large enough artifact assemblages to identify areas consistently used for specific types of activities. In the best of circumstances, core and auger samples provide only a rough indication of temporal trends in the spatial focus of activity. In only one case do sample contents suggest the possibility that distinct habitation and refuse disposal areas were maintained over the course of several millennia. At ElSx-10 on Fougner Bay multiple dating of deposits ranging from the back to the foreshore areas of the site clearly showed the focus of activity shifted over time, with older deposits near the back and younger deposits near the shore. In contrast, a linear series of auger samples down the central axis of the site of ElTa-25 on Kiltik Cove, on the eastern side of Hunter Island, showed clear contrasts in the matrix and faunal content of deposits that suggest long-term continuity in the location of habitation and refuse areas.

Field observation of auger samples from ElTa-25 showed that samples from locations A and C, at either end of the long axis of the site (Figure 4), contained larger amounts of relatively pure, loosely packed shell. Samples from location B, near the central part of the site, were characterized more by dark, sticky matrix typical of high organic content. Faunal analysis of the auger samples showed there were relatively few fish bones in any of the deposits, suggesting the site was used more for shellfish gathering than for fishing, but samples from the central area contained twice the density of fish bone. Samples from locations A and C contained an average of 4.9 identifiable fish bones per litre of matrix, while those from location B contained 11.5 fish bones per litre of matrix. These observations suggest a consistent pattern of habitation in the central part of the site and disposal of shellfish remains around the periphery of the habitation area.

It is almost certainly not a coincidence that samples from location B, which suggest habitation, are from close to a cabin that presently sits on top of the site. Continuity in the use of habitation space extends into the present in this case, and transcends cultural tradition. The implication of continuity is therefore equivocal. Even extensive excavation and clear evidence of successive structures on the same location would be insufficient to show unequivocal evidence of cultural continuity. The central part of the site may simply hold topographical advantages that are as likely to have constrained building in the past as in the present. Multiple lines of evidence showing even more specific consistency in the use of space for particular patterns of activity would be needed to bolster the case for cultural continuity, and even this level of evidence might not be sufficiently convincing.

Given the complexity and depth of shell midden deposits, few archaeological excavations on the Northwest Coast have been able to expose sufficient site area to show clear evidence of buried structures. Fewer still have had the resources to expose sufficiently wide areas at any considerable depth to show spatial continuity in constructions and related activities. One notable exception is the extensive excavation of the St. Mungo site, at the mouth of the Fraser River which was undertaken in 1982-83 (Ham et al. 1986). Large block excavations at this site revealed successive house floors (thin shell and sand layers), postmolds, and hearths (Ham et al. 1986:182). The postmolds included the remains of large house frame posts. Ham et al. (1986:202-203) cite spatial variability in artifacts together with evidence of successive structures to argue for family continuity at St..Mungo from as early as 4500 BP, with one area of the site occupied successively by wealthy families that specialized in the manufacture of matting and basketry.

The St. Mungo ex-cavations provide compelling evidence for cultural continuity in the organ-ization and use of space. Yet even this range, quantity, and quality of evidence can be said to provide only the basis for a "controversial claim for houses at this time and the assumption that the present day Halkomelem culture , and settlement pattern can be projected back to this time period" (Matson 1992:382). If the type and quality of evidence yielded by careful excavation over wide areas, as carried out at St Mungo, is insufficient to demonstrate cultural continuity, then it is likely that empirical evi-dence will never be sufficient to overcome interpretations shaped as much or more by evolutionary perspectives. These are bound by de-finition to look for and to find cultural transformation over time.

Indications of continuity in the evidence from St. Mungo are overwhelming in contrast to the near absence of evidence for significant change. The evidence in the Namu vicinity on the central coast is less detailed and therefore less compelling, but the case for continuity in this region derives as much from the lack of any compelling evidence of significant change or discontinuity in the use of sites, resources, or space within sites. If issues of cultural continuity and change are ever to be resolved in this or any other area of the coast, then some agreement on the relevant criteria, and on standards for the collection and assessment of evidence must be reached first.

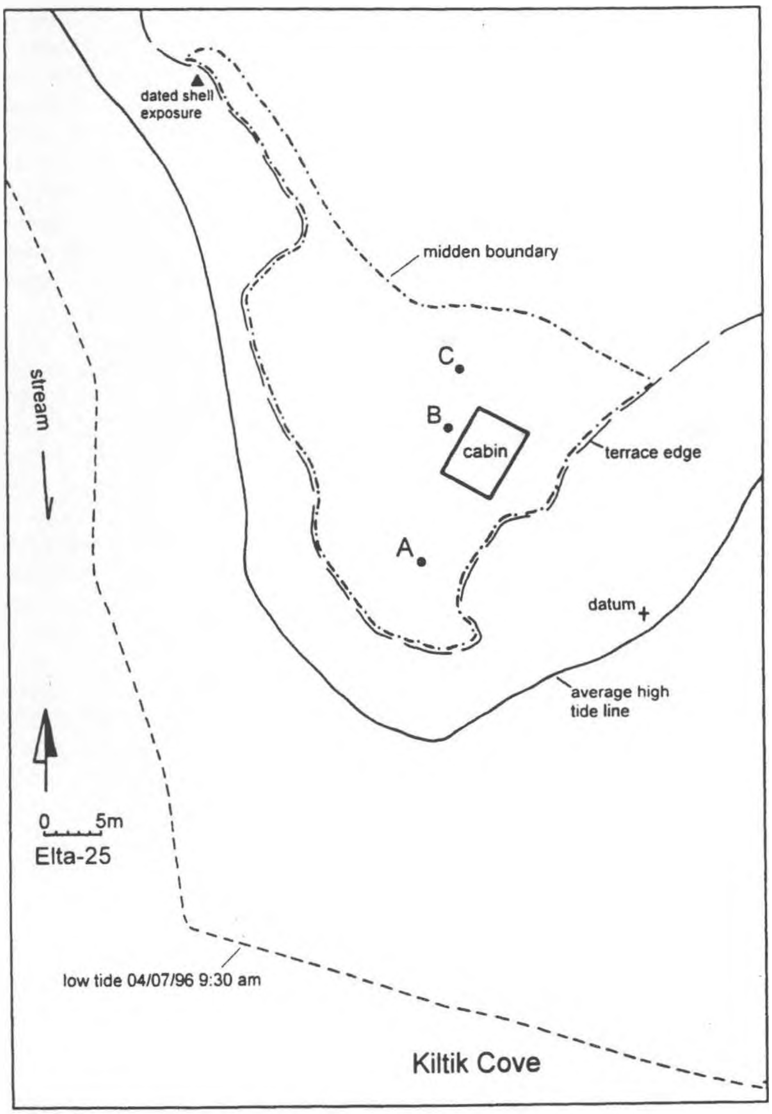

Figure 1:4. **Auger Sample Locations at Site ElTa 25.**

Discussion

Central coast archaeological investigations show a variety of evidence that together suggests long-term cultural continuity without major disruption from political conflict, migration and cultural replacement, or widespread environmental calamity. The clearest and most firmly established evidence is the indication that very few sites investigated to date were permanently abandoned. The implication is that despite a wide variety of alternative localities suitable for habitation in the area (Hobler 1983:154) subsequent populations were drawn to use localities that had been initially established as settlements centuries or millennia earlier. Systematic evaluation of the widest possible range of physical characteristics of site localities may yet reveal that these features ultimately guided and constrained choices of settlement location. Euro-Canadian use of localities, such as Namu and ElTa-25, that had long been the sites of indigenous settlement, support this possibility, but overall continuity in the use of site localities suggests that cultural perceptions of the landscape based on historical tradition were equally important. Consistency in local and regional subsistence economies, though more equivocal, also supports an argument for long-term continuity of cultural tradition. The weakest specific evidence for continuity is the consistent use of space at ElTa-25, but as one more line of evidence it adds to the overall impression of cultural persistence that had been noted based on earlier investigations in the area (Hobler 1990:298).

Continued use of site localities, continuous occupation, and consistency in subsistence econ-omies and artifact assemblages, and, in rare cases, consistent use of space within sites are widely cited on the Northwest Coast as evidence for cultural continuity. Dewhirst (1980:336), for example, notes remarkable consistencies in faunal remains and artifact assemblages from the Yuquot site to argue for cultural continuity at that location over a period of 4300 years. Murray (1982: 45) also cites remarkable similarity in artifacts and fauna from components of the main Duke Point site to argue for 4000 years of continuous in situ development and change at that locality. Ham (Ham et al. 1986:202-203) argues for continuity at St. Mungo based on consistency in faunal and artifact assemblages and the use of space. Carlson and Hobler (1993: 48-50) cite a wide range of evidence including a continuous series of radiocarbon dates and persistence of subsistence, social rank differentiation, and belief systems to make the case for cultural continuity at the Pender Canal sites.

Northwest Coast archaeologists have cited the economy (Carlson and Hobler 1993:48) and the simplicity and elegance (Murray 1982:46) of longstanding cultural tradition as an explanation for long-term consistency in empirical evidence. They have implicitly or explicitly taken the position that continuity should be the preferred interpretation in the absence of compelling evidence of change. Others have commented on the propensity to exaggerate minor variability in the process of archaeological phase construction (Dewhirst 1980:336, Hobler 1990:298, Hester 1978:101). Archaeologists inclined from empirical evidence or theoretical propensity to stress longstanding cultural traditions also note the difficulties involved in differentiating migration and cultural replacement from diffusion based on intermarriage and trade (e.g. Carlson 1970:22). Although proposals for migration and replacement are increasingly based on broader range of regionally derived archaeological evidence (e.g. McMillan 1998, Mitchell 1988), this explanation can still be held to a higher standard than simpler alternatives that attribute change to cultural interaction. The potential for local environment change or variable use of sites within seasonal settlement-subsistence systems (Cannon 2001, Carlson and Hobler 1993:50) should be evaluated before temporal variability in subsistence economies is attributed to cultural replacement (Mitchell 1988) or evolutionary development (Croes and Hackenberger 1988, Matson 1992).

In the end the propensity to stress continuity or change in Northwest Coast archaeology represents a conflation of historical reality and empirical evidence as well as researchers' theoretical perspective and their capacity to examine evidence from more than just limited areas within the wider spatial context of sites and regions. Limited excavations of particular sites tend to exaggerate temporal variability, whatever the theoretical predilection of investigators. Wide area excavation and regional multi-site sampling are more likely to reveal variability as part of a broader continuum.

Theoretical perspectives that are more ethnographic or historical in orientation will probably always stress continuity in the absence of compelling reasons to accept alternatives. Evolutionary perspectives will stress the importance of temporal variation, however minor or insubstantial. This debate will continue and will drive new research designed to resolve specific questions in support of either alternative. Although no amount of empirical research is likely to prove sufficient to resolve underlying differences among theoretical perspectives, future research on the central coast of British Columbia will continue to be at the forefront of theoretical and historical debate. Based on limited regional research in the Namu vicinity, cultural continuity seems, for now, the simplest and most compelling interpretation of the available empirical evidence. New research based on a greater number of more extensive excavations may provide empirical support for significant, long-term culture change. In the meantime the more immediate problem will be to elucidate structures (Cannon 2002) and patterns of human agency (Cowgill 2000:57) that would maintain cultural traditions over such remarkable lengths of time.

CHAPTER 2

Paleoenvironments, the Tsini Tsini Site, and Nuxalk Oral Histories

DAVID R. HALL

Introduction

It has been argued that late Quaternary paleoenvironmental factors and geomorphological events and processes strongly influenced when and where habitable land was available for occupation in British Columbia during the late Pleistocene and early Holocene (Fladmark 2001; Mathews 1979). Accordingly, it is essential to gain an understanding of the nature of the geologic, geomorphological, and climatic changes that occurred during the late Quaternary, particularly in coastal regions, if one is to attain a clear understanding of the early prehistory of any particular region within British Columbia (Borden 1979). The following paper evolved out of an attempt to place the assemblage recovered during Simon Fraser University's 1995 and 1996 excavations at the Tsini Tsini Site (FcSm 011) (Hall 1997, 1998; Hobler 1995, 1996; Hobler and Hall 1997) within its larger context and to gain a greater understanding of the late Quaternary paleoenvironmental, geologic, and geomorphological processes in the Bella Coola region, which may have affected both the context of the assemblage recovered from the site and the lifeways of its inhabitants. I also explore the possible identification of past geomorphological events in Nuxalk oral histories.

The Tsini Tsini Site

The Tsini Tsini site is located in the Talchako River valley on the central coast of British Columbia, approximately 500 km north of Vancouver (Figure 2:1). The site is situated approximately 30 m above the left bank of the Talchako River about 45 km east of Bella Coola and 2 km west of the community of Stuie.

The assemblage recovered from the site is dominated by mid-to-late stage biface reduction debris primarily fashioned from an unusual form of relatively fine-grained, moderately-to-heavily patinated andesite. A total of 149,660 artifacts were recovered during the 1995 and 1996 excavations. All but five of these artifacts were fashioned from lithic raw materials. Three possible features were also identified: a cache pit, a roasting pit, and a living floor. The vast majority of the items recovered (a total of 148,729 artifacts or over 99% of the total assemblage recovered) consist of andesite debitage. Of the remaining 931 artifacts, 393 consist of various amounts of obsidian, argillite, chert, jasper, basalt, quartz crystal, quartzite, and vein quartz debitage. The remaining 538 artifacts are formed tools, again almost all primarily of andesite, in the form of utilized and retouched flakes, denticulates, piercers, cores and core fragments, biface preforms, biface fragments, unifacial and bifacial choppers, a small number of projectile points (including a quartz crystal point), a single piece esquillee, and various forms of scrapers, spurs, and notches. A small but significant microlithic assemblage was also recovered including an obsidian microblade core platform rejuvenation flake, 16 obsidian microblades and microblade fragments, and a single possible basalt microblade fragment. Overall, the assemblage consists of a large typologically early-looking component with similarities to the early components at coastal sites such as Namu (ElSx 001) (Carlson 1997, 2000; Hobler 1995, 1996), and a poorly represented component (dating to approximately 500 BP) probably associated with a relatively recent Athapaskan presence within the upper Bella Coola valley.

Geomorphology

In the Bella Coola region, two important geomorphological processes aside from the fluvial actions of the Bella Coola River and its tributaries have significantly influenced both the timing and the potential location of prehistoric

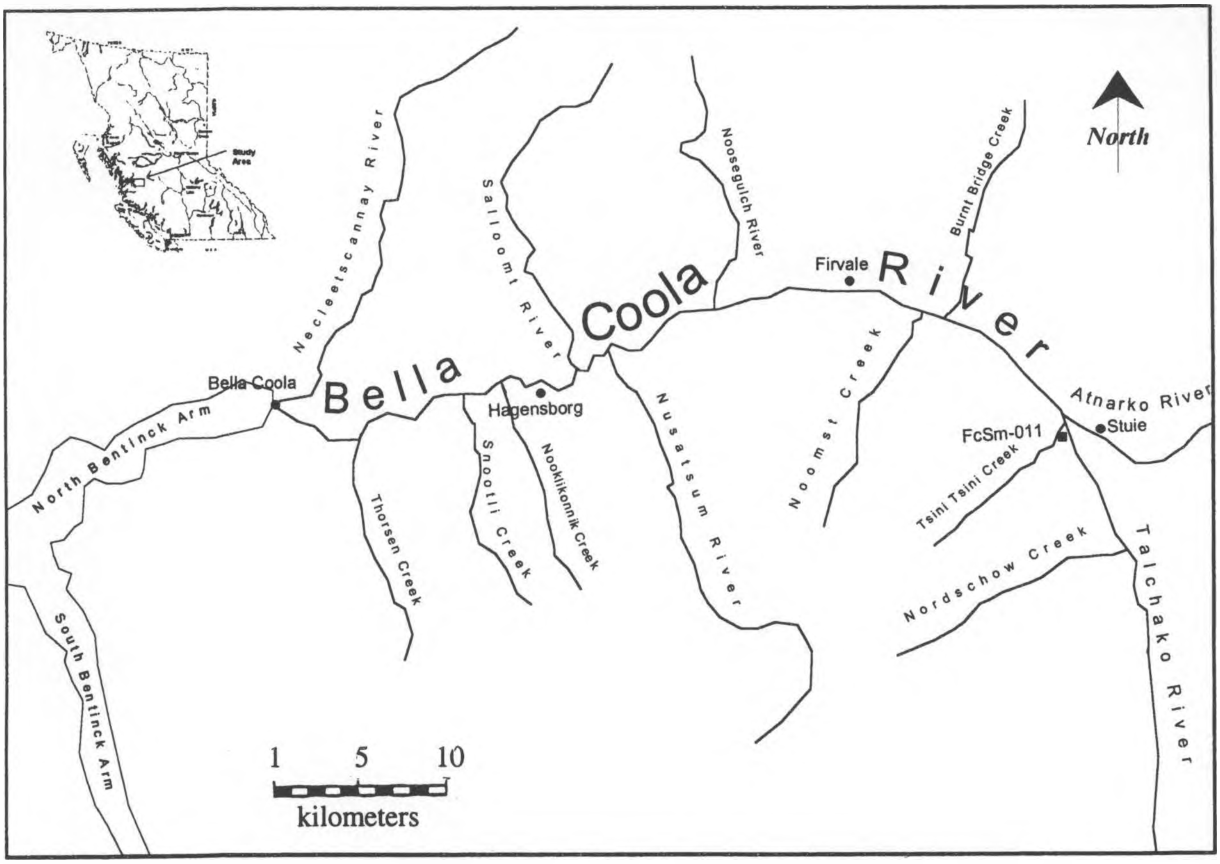

Figure 2:1. **Location of Tsini Tsini (FcSm 011) and other Places mentioned in the Text.**

habitation within the valley and surrounding region. These processes consist of Pleistocene and Holocene glacial fluctuations and changes in relative sea levels (Andrews and Retherford 1978:341; Retherford 1972:2). Throughout the Pleistocene and Holocene the relative land-sea interface along the Northwest Coast has been constantly fluctuating (Clague 1975; Fladmark 1974; Heusser 1960; Hebda and Frederick 1990:321; Holland 1976). These changes, which appear to have been caused by interaction between diastrophism (the tectonic movement of the earth's crust), eustacy (the raising and lowering of available water in the ocean), and glacio-isostacy (isostatic uplift and depression caused by the weight of late Quaternary glaciers), undoubtedly influenced both the timing and the location of habitable land within the region (Andrews and Retherford 1978; Clague 1975:17, 1983:321; Clague et al. 1982:598; Fladmark 1974; Heusser 1960:189; Holland 1976:116; Josenhans et al. 1995:75). Therefore, a discussion of both the late Pleistocene/Holocene glacial history of the region and the record of sea level fluctuations within the Bella Coola locality will be presented as an investigation of the history of these two geomorphological processes that can provide clues as to the maximum dates for the human occupation of any particular location within the Bella Coola basin, and insights into the forces that created the majority of the physiographic features and landforms in the region.

The Bella Coola basin was the locus of a significant amount of glacial activity during the late Pleistocene and early Holocene (Desloges and Church 1987:99; Kostaschuk 1984; Munday 1937). During the Fraser glaciation, most alpine areas of the Coast mountains such as those surrounding the Bella Coola valley, served as major centres of ice accumulation and dispersal with the main valleys, such as the Bella Coola, having served as channels through which coalescing Coast mountain glacial complexes flowed westward to the sea (Heusser 1960; Holland 1976; Munday 1934-1935; Ryder and Thomson 1986). At the height of the Fraser glaciation, approximately 15,000 [17,940 cal] BP (Blaise et al. 1990:282; Desloges 1987:24), confluencing glaciers eventually met and filled almost all of the major pre-glacial valleys in the Coast mountain region including the Bella Coola valley (Clague

1984:1; Desloges 1987:24; Ryder and Thomson 1986:273). This complex of glaciers encompassed almost all of the major pre-glacial divides within the Coast mountain physiographic region and enveloped almost all of the land on the mainland coast (with the exception of some of the higher peaks), eventually terminating on the continental shelf to the west on the outer coast (Clague 1984; Desloges 1987; Ryder and Thomson 1986). At its maximum extent, the ice sheet was most extensive over the mainland fjords, less extensive on the innermost section of the continental shelf, and relatively thin and/or completely absent from the continental shelf on the outer coast (Clague 1983:322).

During glaciation glaciers flowed westward from the Monarch Icefields through the Bella Coola valley (Desloges 1987:24). This western movement, which is indicated by the presence of striations along the valley walls and on mountains in the immediate vicinity, suggests that glacial ice flowed down the main and tributary valleys in a similar manner to modern drainage patterns (Baer 1973:8; Munday 1937:45, 1939a: 526). At the height of glaciation, a number of peaks in the Coast Mountains including some within the Bella Coola valley, protruded as nunataks above the ice sheets (Desloges 1990:107; Holland 1976:42; Ministry of Environment and Parks 1986:14; Retherford 1972:17). The maximum elevation of the ice sheet present within the Bella Coola valley is estimated as reaching approximately 2000-2100 m (Baer 1967:9, 1973:8). This estimate is based on the presence of distinct morphological changes at this elevational range at various locations including the sides of Mount Nusatsum and Salloomt Peak (Baer 1967:9, 1973:8). Mountain peaks within the Bella Coola valley at elevations below this elevational threshold were completely overridden, and were rounded off (Ministry of Environment and Parks 1986; Munday 1939a).

In general, it appears that the glacial chronology and the accompanying creation of glacial landforms within the Bella Coola valley would have been analogous to the glacial chronology and the accompanying creation of landforms that occurred in the Smithers-Terrace-Prince Rupert map area during the same period as reported by Clague (1984, 1985). This region therefore provides an analogous model by which the glaciation of the Bella Coola valley can be interpreted as, based on the geologic principle of the law of similar conditions (see Stokes 1960:34), it can be expected that the geomorphological processes that occurred within the Smithers-Terrace-Prince Rupert map area and the resulting landforms created would have been similar to those processes that occurred and resulting landforms created within the Bella Coola region based on the topographic similarity of the two regions.

In the Smithers-Terrace-Prince Rupert area, the outer coast was the first area to be deglaciated. This occurred approximately 13,000 [cal 15,600] BP (Clague 1984:1, 1985:256). Evidence from the Prince Rupert, Kitimat, and Bella

Figure 2:2. **View across the Bella Coola Valley from the Tsini Tsini Site, looking North.**

Bella regions suggest that deglaciation by calving and frontal retreat (Clague 1984:1, 1985:256), occurred relatively rapidly with glaciers retreating to the heads of coastal fjords by approximately 12,500 [cal 14,800] BP (Andrews and Retherford 1978; Clague 1983). Evidence from other areas of the coast suggests that local ice persisted in isolated areas of the inner central coast until approximately 11,000-10,000 [cal 13,000-11,400] BP (Church 1983:172; Clague et al. 1982:600; Josenhans et al. 1995:77) with glaciers having withdrawn from the majority of the major coastal valleys prior to approximate 9600 [cal 10,800] BP (Desloges and Ryder 1990:281).

It seems that the entire B.C. coast was isostatically depressed by the weight of Pleistocene icesheets with the sea subsequently transgressing these depressed regions. Following the isostatic depression and marine transgression, these areas isostatically rebounded (Andrews and Retherford 1978; Armstrong 1981; Clague 1975, 1983, 1984, 1985; Fyles 1963; Heusser 1960; Josenhans et al. 1995; Kerr 1936). This apparently coast-wide scenario (isostatic depression followed by marine transgression and then isostatic uplift and rebound), that was first recognized in a series of articles by George Dawson (1877, 1890), has been recognized within the Bella Coola region by a number of authors (see Andrews and Retherford 1978; Baer 1973; Church 1983:172; Clague 1983; Desloges 1987; Retherford 1972). The temporal sequence and the magnitude of relative sea level shifts within the Bella Coola valley are very similar to those reported for other areas of the B.C. coast (see Clague et al. 1982; Clague 1975, 1984, 1985; Fyles 1963; Armstrong 1981). This phenomenon is not exclusive to the B.C. coast, as this pattern has also been noted as having occurred on the glaciated portion of the eastern seaboard of the United States (Crossen 1991:127), in the Arctic (Bednarski 1986, 1989; Dredge 1991; Retelle et al. 1989), and along the coast of Norway (Postma and Cruickshank 1988).

The isostatic warping of the B.C. coast appears to have been in response to the weight of the Cordilleran icesheet while its unloading and subsequent uplift were the result of its subsequent melting and retreat (Holland 1976:116). Along the glaciated coast, the weight of Pleistocene icesheets isostatically depressed the earth's crust (Dawson 1890:161; Hebda and Frederick 1990:321), and this displacement was significant enough to counteract the lower eustatic ocean levels that are suggested to have been occurring during the same period (Andrews and Retherford 1978:390; Clague 1984:51, 1985:263; Clague et al. 1982:614; Luternauer et al. 1989:67). Consequently, glacial seas subsequently transgressed areas of lower elevation along the coast including most present day coastal lowlands.

Many lines of evidence indicate that marine transgressions occurred along the B.C. coast during the last glaciation (see Andrews and Retherford 1978; Armstrong 1981; Clague 1975, 1983, 1984, 1985; Dawson 1877, 1890; Fyles 1963; Heusser 1960; Josenhans et al. 1995). During the marine transgression, previously terrestrial areas became the sites of glaciomarine sedimentation that resulted in the creation of a number of glaciomarine landforms. In these areas, large amounts of sediments, which were transported by meltwater streams issuing from receding glaciers, were deposited on various valley bottom floodplains and coastal lowlands (Clague 1984:1; 1985:256). At the same time, outwash from valley glaciers, which occupied the various hanging valleys along the coast and within the Bella Coola valley, built deltas into the transgressed sea waters (Retherford 1972:7). The glaciers that were present within the valley deposited various forms of glaciofluvial sediments in the valley including various till and morainal formations, kames, and ice contact terraces (Desloges 1987:26-27; Desloges and Church 1987:99; Leany and Morris 1981:15).

Following the isostatic depression and the marine inundation of the B.C. coast, as the coast became freer of glacial ice, the crust isostatically rebounded as the glaciers ablated (Clague et al. 1982; Clague 1984:6; Dawson 1877, 1890; Hebda and Frederick 1990:321; Holland 1976:116). This isostatic rebound is generally thought to have occurred at the same time as the off-loading of the weight of the glacial icesheets (Holland 1976:116). This off-loading is thought to have been caused by the degradation of the ice sheets due to calving and melting (Holland 1976:116). As the land isostatically rose relative to the sea, previously subaerial glaciomarine landforms and deposits including previously subaqueous deltas were aerially exposed. Isostatic rebound also caused a re-emergence of previously submerged lowlands, which had been the subject of substantial glaciomarine sedimentation (Clague 1984:51). The isostatic rebound along the coast appears to have been a time transgressive event (Ryder, Fulton, and Clague 1991). This, it has been suggested, may have been due to micro-regional and macro-regional variations in the magnitude and extent of glacial masses along with regional variations in the thickness of the crust (Apland 1982:15).

In terms of the Bella Coola valley, the presence, location, and elevation of raised deltas and fill terraces as well as dates derived from shells and peat samples from within the Bella Coola valley have been used to delineate the timing and the magnitude of the marine transgression within the valley (Andrews and Retherford 1978; Desloges 1987:291; Retherford 1972:iii, 17). These data have also been used to delineate a sea level curve for the Bella Coola (Retherford 1972) and central coast regions (Andrews and Retherford 1978).

Dates from glaciomarine sediments within the Bella Coola valley indicate that the marine transgression within the valley occurred prior to 10,500 (cal 12,200) BP [Retherford 1972: iii]. A radiocarbon sample of marine shells recovered from marine clays at a site near Mills Creek across from Hagensborg which was dated to 10,570±85 [cal 12,200] BP suggests that the marine transgression of the valley was still occurring by this date (Hobler 1995:18) with the glacial sea extending to a depth of approximately 10-15 m near the mouth of the Salloomt River (Hobler and Bedard 1992:65). The land/sea interface would then have been near the mouth of the Nusatsum River, approximately 25 km west of the Tsini Tsini site (Hobler and Bedard 1992:65). A 600 year marine shell correction puts this date at 10,000 [cal 11,400] BP. During the marine inundation of the valley, relative sea levels ranging between 150 to 200+ m above present sea level appear to have occurred within the Bella Coola valley (Andrews and Retherford 1978; Desloges 1987; Retherford 1972:iii). From its maximum marine limit, the Bella Coola valley was isostatically uplifted between ca. 10,500-9500 [cal 12,200-10,800] BP thereby resulting in an accompanying drop in relative sea level (Clague et al. 1982). This drop in relative sea level was continuous with relative sea levels being about 20 m above modern relative sea levels by at least 9500 [cal 10,800] BP with relative sea levels continuing to fall after this date (Retherford 1972: iv). Near present sea levels were finally reached by 6500-6000 [cal 7450-6900] BP (Retherford 1972: iv). However, the residual affects of continued isostatic adjustment caused relative sea levels to continue to fall after this date with the land/sea interface being at least 2 m below present day relative sea level between 3500-3000 (cal 3800-3200)BP (Retherford 1972: iv). After approximately 3000 [cal 3200] BP however, relative sea level is thought to have risen slowly on a gradual curve until near present day relative sea levels were achieved (Retherford 1972:90). The sequence noted above for the Bella Coola region differs from that on the outer coast where recent research indicates that there was a steady decrease in relative sea levels throughout the Holocene (Cannon 2000). Radiocarbon dates from Namu (ElSx-001) and other sites on the outer coast indicate that the outer coast was aerially exposed by at least 9700 [cal 11,000] BP (Cannon 2000; Carlson 1996a). It appears that the isostatic adjustment of the earth's crust that began during the last major Pleistocene glaciation continues to effect the relative position of the land-sea interface as it has been suggested that the outer central coast is submerging at a rate of approximately 2 mm/year while the inner coast is simultaneously emerging at approximately the same rate (F.E. Stephenson, personal communication 1982 in Hobler 1990:301).

It should be noted that several authors have suggested that the isostatic rebound that occurred along the British Columbia coast took place as a series of waves or pulses (Andrews and Retherford 1978; Retherford 1972). Retherford (1972:iii) suggests that the presence of relict raised glaciomarine deltas in the Bella Coola valley, which appear to be scaled to past shorelines at different elevations, indicates that a number of distinct periods of stable sea level and/or periods of high sedimentation rates occurred during the marine transgression of the valley. Retherford (1972) further suggests that the raised marine features within the Bella Coola valley that cluster around elevations of 10, 70, 160 and 230 m respectively appear to represent former relative sea levels within the valley with the latter two groups of scaled raised marine features dating to approximately 11,000-10,000 [cal 13,000-11,400] BP and 13,000-12,000 [cal 15,600-14,000] BP respectively. Thus, according to Retherford (1972), there appears to be an association between the formation of raised glaciomarine deltas, stillstands of the ocean, and pulses of glacial activity. This interpretation has also been posited for other areas that have been subject to both isostatic depression/uplift and marine transgressions (e.g., Ashley et al. 1991:121; Heusser 1960:20).

Evidence from the outer central coast of B.C. has also been used to infer that the late Holocene marine transgression occurred in a series of small pulses (Andrews and Retherford 1978:346). These researchers point to the presence of a number of alternating layers of peat near the site of Namu (ElSx-001) on the outer central coast as evidence of this process. Clague et al. (1982:598) later challenged this inference in that they argued that the alternating bands of peat seen at Namu might not be related to glacial activity. Rather, they argued that these bands could have been the result of catastrophic floods and/or significant storm events. Despite the fact that this inference has yet to be proven conclusively, a scenario in which the marine transgression occurred in a series of pulses would help to explain the varied locations and elevations of marine deposits that have been identified by various authors within the Bella Coola valley (see Andrews and Retherford 1978; Baer 1973; Desloges 1987; Retherford 1972).

It should be noted that it has also been suggested that there is an apparent pattern along the central coast whereby raised marine features occur at high elevations at the heads of fjords and on the outer coast and at low elevations in the middle of fjords (Andrews and Retherford 1978:346). Andrews and Retherford (1978:346) attempted to explain this apparently anomalous pattern by suggesting that this pattern could have been caused by variations in the rate of ice retreat. However, continued geomorphological research along the Northwest Coast suggests that this apparently anomalous pattern may instead be the result of the effects of glacial forebulge.

Peltier (1974 in Clague 1983:333), Walcott (1970, 1972), Clark, Farrell, and Peltier (1978), and Ryder, Fulton, and Clague (1991) have described the forebulge effect. This phenomenon is created by the displacement of molten mantle material to those areas peripheral to the area immediately underneath the centre and weight of glacial mass and its subsequent lateral movement during the ablation phase of glaciation (Peltier 1974 in Clague 1983:333; Walcott 1970). During glaciation, molten material is displaced in front of the advancing glaciers. This causes a depletion of molten material beneath the ice mass and areas of uplift in front of and adjacent to the advancing glacial mass. As the ice sheet ablates, the molten material which caused the uplift reverses its flow and begins to flow back towards the centre of glacial mass, thereby resulting in a upward vertical displacement in this area (Clark et al. 1978; Peltier 1974 in Clague 1983:333). At the same time, in areas peripheral to the areas directly affected by advancing glaciers, the molten material flowing back towards the uplifted region causes a simultaneous depletion in the available amount of molten material in those areas away from the area of uplift (Clark et al. 1978). This results in submergence and depression of the earth's crust in these more distal areas (Walcott 1972). The forebulge caused by these various flow pattern changes in molten material is not thought to collapse in one place. Rather, it is thought that the forebulge migrates back towards the centre of glacial mass as the glacial mass ablates (Peltier 1974 in Clague 1983:333).

Recent studies have suggested that the migration and collapse of a glacial forebulge may have caused the rapid transgressions identified within the coastal fjords of B.C. (Luternauer, Conway, Barrie, Blaise, and Mathews 1989:357). Luternauer et al. (1989:357) in their analysis of cores from the northern end of Vancouver Island suggested that the rapid marine transgressions that they identified as having occurred on the continental shelf of British Columbia occurred at approximately the same time as the marine regressions, which occurred at the mainland heads of fjords. Consequently, they suggested that the marine transgression on the outer continental shelf and the marine regressions in mainland fjords might be genetically linked. They therefore suggested that the isostatic uplift apparent in the fjords of mainland coast and the crustal displacement of the Western Canadian continental shelf during the late Pleistocene/early Holocene might have been the result of the migration and collapse of a glacial forebulge (Luternauer et al. 1989:359). It appears that the effects of a glacial forebulge would appear to represent the most plausible explanation of the apparently anomalous pattern of marine features noted by Andrews and Retherford (1978). This recognition provides a model by which further research regarding marine features along the central coast might be interpreted.

Thus, synthesizing and summarizing the proceeding, it appears that from its maximum extent in the Bella Coola valley approximately 15,000 [cal 18,000] BP, the icesheet within the Bella Coola valley receded. At approximately 12,500 [cal 14,800] BP, certain areas within the valley were probably aerially exposed with local ice persisting until approximately 11,000-10,000 [cal13,000-11,400] BP. The entire valley appears to have been aerially exposed by at least 9500 [cal 10,800] BP. Marine inundation of the valley appears to have occurred between 12,500 and 10,500 [cal 14,800-12,200] BP with the valley being isostatically uplifted and the sea regressing between 10,500-9500 [cal 12,200-10,800] BP (Desloges 1987:24).

In terms of the timing of the potential habitation of the Bella Coola valley, it is possible that the Bella Coola valley could have been physically habitable by 11,000 [cal 13,000] BP (although temperatures and catabatic winds at the time would have made habitation prohibitive). The marine transgression, which occurred in the valley prior to 10,500 [cal 12,200]] BP, does not preclude the possibility that prehistoric populations may have been present in the region and may have inhabited the valley at this time at higher elevations. Rather, only the lower valley floor would have been inhabitable at this time. In terms of the Tsini Tsini site specifically, as the land-sea interface is suggested as being near the mouth of the Nusatsum River by 10,570±85 [cal 12,200] BP, and the fact that the lower terrace at the Tsini Tsini site is approximately 175 m above present day sea level with the upper terrace being approximately 190 m above present day sea levels, suggests that the entire surface of the Tsini Tsini site would have been aerially exposed and available for human occupation by at least 10,500 [cal 12,200] BP.

The Tsini Tsini Raised Delta

The Tsini Tsini site is situated upon a landform that appears to be associated with the marine transgression that occurred in the Bella Coola valley. This inference is derived from a number of lines of evidence including the identification of marine organisms in sediment samples taken from the Tsini Tsini site in addition to a number of morphological and sedimentological characteristics of the landform itself. Specifically, the Tsini Tsini site is situated on what appears to be a relict, elevated, fjord-wall glaciomarine delta that was built out into a still stand of the sea more than 150 m above contemporary sea levels (Joseph Desloges, pers. com., 1995). The Tsini Tsini landform therefore is part of a series of glaciomarine features that are scaled to approximately 160 m above present day sea levels and associated with a 11,000-10,000 [cal 13,000-11,400] BP date (Retherford 1972).

The identification of the glaciomarine origin of the landform on which the site is situated has a number of paleoenvironmental and archaeological implications. One of the most important of these implications is that the association of the landform with one of the possible stillstands of the temporally delimited marine transgression in the Bella Coola valley provides a maximum date of occupation for the site. In addition, the identification of the landform as being associated with the marine transgression within the valley has a number of important implications regarding the archaeological and geomorphological context of the site, since mistaken contextual information could be inferred if the origin of the landform on which the site is situated is not correctly identified as being marine in origin, particularly if the landform in question is related to marine transgressions and regressions (cf. Kraft 1985; Kraft et al. 1985).

Raised glaciomarine deltas are common features along the coastline of B.C. (Retherford 1972:52). They are especially prevalent within fjords along coastal areas that were subjected to glaciation during the late Pleistocene and early Holocene (Retherford 1972:52). For example, these features have been identified in the Bella Coola valley (Andrews and Retherford 1978; Baer 1967, 1973; Joe Desloges, pers. com. 1996; Leany and Morris 1981; Retherford 1972), in the Prince Rupert region (Clague 1984, 1985), in the Vancouver area (Armstrong 1981), on Vancouver Island (Fyles 1963), and other areas of the B.C. coast (Clague and Luternauer 1982; Heusser 1960). Moreover, they have also been identified in the Arctic (Bednarski 1986, 1988; Dredge 1991; Retelle et al. 1989), along the glaciated part of the eastern U.S. seaboard (Ashley et al. 1991; Crossen 1991), along the coast of Norway (Corner and Fjalstad 1993; Postma and Cruickshank 1988), and along the coast of Northern Ireland (McCabe and Eyles 1988).

Modern glaciomarine deltas, the direct genetic precursors of raised deltas, have been observed being formed by modern glaciers in Alaska (Boulton and Deynoux 1981; Powell and Molina 1989). The formation of raised glaciomarine deltas is described in Ashley et al. (1991), Bednarski (1986, 1988), Boulton and Deynoux (1981), Clague (1984, 1985), Clague and Luternauer (1982), Crossen (1991), Postma and Cruickshank (1988), McCabe and Eyles (1988), Powell and Molina (1989), Retherford (1972), and Rust (1977). A processual reconstruction of the creation of the landform on which the Tsini Tsini site is situated synthesizing the work of these authors follows. This model is put forth in the hope that an understanding of the depositional and temporal context of the cultural material recovered from the site may be gained since it appears that the glaciomarine deposits constitute the stratigraphic, geologic, and geomorphologic context (cf. Gladfelter 1977) from which the cultural material was recovered at the site.

Raised glaciomarine deltas such as the Tsini Tsini landform are created by glacial outwash streams flowing beneath tributary valley glaciers within fjord-sidewalls as these sidewall glaciers debouched into glacial seas (Bednarski 1986:1343; Clague 1984:32, 1985:260). Glaciomarine deltas are primarily formed during the ablation phase of glaciation in situations where a tributary valley glacier that is in contact with a glacial sea becomes relatively stable for at least a short period of time (Clague and Luternauer 1982:26; Powell and Molina 1989). In tributary valleys within fjords, the interface between the margin of a glacier and the glacial sea often includes prominent submarine outwash systems especially when the glacier is ice rafted (Powell and Molina 1989:369; Rust 1977). These subaqueous outwash systems create subaqueous fans that build deltaic-like foreslopes into the glacial sea (Powell and Molina 1989:381). As this delta progrades, glaciofluvial sands and gravels are deposited over the foreslope in a manner similar to that observed in the formation of modern non-glacial deltas (Clague 1985:260; Powell 1980, 1981 in Clague and Luternauer 1982:26).

The hypothesized sequence of the creation of the Tsini Tsini landform begins at the height of the last glaciation. As previously noted, during the Fraser glacial maximum, which is though to have occurred at approximately 15,000 BP [cal 18.000] (Blaise et al. 1990:282; Desloges 1987:24), coalescing alpine and tributary valley glaciers filled the Bella Coola valley (Clague 1984:1; Desloges 1987:24; Ryder and Thomson 1986:273) resulting in isostatic depression of the valley because of weight of the glacial mass. At the onset of the ablation phase and as the glaciers begin to recede from their maximum extent, the continued effects of isostatic depression allowed for the marine inundation of the valley thereby causing a simultaneous rafting of some of the remaining glaciers within the region. As noted, this marine transgression is thought to have occurred sometime prior to 10,500 [cal 12,200] BP (Retherford 1972: iii). During the marine inundation of the valley, subaqueous outwash systems began to deposit deltaic foreslopes of glaciofluvial sands and gravels beneath the Tsini Tsini valley glacier into the glacial sea. At some point prior to 10,500 [cal 12,200] BP, it appears that there was a drop in the relative position of the land-sea interface as a result of isostatic uplift due to the offloading of the weight of the glacier masses (Clague et al. 1982 in Desloges 1990:99). Continued isostatic uplift accompanied by a simultaneous westward retreat in the land-sea interface eventually aerially exposed the top of the originally subaqueous landform. As relative sea levels continued to drop, more and more of the landform was aerially exposed. Eventually, with the continued drop in relative sea level, the original deltaic foreslope was subject to the effects of wave action and storm events thereby resulting in the formation of a wave-cut terrace at the distal end of the landform. The relative sea level continued to drop until the sea completely retreated to near modern day levels with the resulting present-day shape of the landform being exposed and therefore available for occupation by approximately 10,500 [cal 12,200] BP (Hobler and Bedard 1992). As the base level of the Bella Coola basin fell during isostatic rebound, Tsini Tsini Creek appears to have incised the unconsolidated deltaic sediments within the landform, thereby dissecting the original form of the deltaic feature at the outlet of Tsini Tsini Creek. Subsequent gullying of the unconsolidated deltaic deposits also appears to have occurred along the eastern flank of the landform in that it appears that an ephemeral stream has incised the eastern flank of the relict delta thereby creating a gully at the eastern extremity of the landform.

It has been suggested that the spatial distribution and relative elevation of relict raised deltas is primarily a function of the relative position of sea level at the time of their formation while the size of these features is primarily a function of sedimentation rates, available sediment budget, and the available energy budget of the various fluvial transport systems in place during their formation (Nemec 1990; Retherford 1972). Glaciomarine deltas can form very rapidly (Clague 1985:260; Corner and Fjalstad 1993; Powell and Molina 1989:381). Observations of modern glaciers suggest that the sedimentation rate in subaerial outwash systems can be quite substantial (Powell and Molina 1989:372). An example of the speed in which glaciomarine deltas can aggrade and prograde into the sea was recently observed in the Glacier Bay region of Alaska (Powell 1983 in Powell and Molina 1989:381). In 1979, the Riggs glacier terminated in the ocean at a depth of approximately 55 m (Powell 1983 in Powell and Molina 1989:381). Two years later, it was noted that a glaciomarine delta with a fully intertidal plain had extended approximately 200 m seaward from the glacier. Four years later, this deltaic plain had extended a further 100 m into the ocean (Powell 1983 in Powell and Molina 1989:381). Thus, in a short four year period, an estimated total of approximately 10,000,000 m^3 of sediments had been deposited in front of the glacier and an approximately 300 m inter-tidal plain had been created (Powell 1983 in Powell and Molina 1989:381).

It has been argued that during the last glacial retreat that the volume of meltwater streams and their energy budgets would have been considerably greater than those observable today and that the amount of sediments available for transport and redeposition would have also been far greater as a result of the newly formed extensive till and morainal deposits that would have been continuously exposed to significant meltwater discharges (Retherford 1972:54). Consequently, it has been suggested that sedimentation rates within outwash of Pleistocene glaciers would have been extremely high for short periods of time during glacial retreats (Retherford 1972:79). This would thereby suggest that the

Tsini Tsini landform seen today may have been formed in a relatively short period of time and moreover that the creation of the landform would have necessitated only a very short period of relatively stable sea levels for it to be created.

In terms of their morphology, glaciomarine deltas often display what is described as a well developed Gilbert-type deltaic stratigraphy consisting of moderately sloping topset beds with steeply dipping delta-front deposits (foreset beds) overlaying relatively flat bottomset beds (Clague 1984:32, 1985:260; Corner and Fjalstad 1993; Fyles 1963:85; Retherford 1972:49). The foreset bedding apparent within glaciomarine deltas is thought to be indicative of the deposition of prograding deposits into standing water (Bednarski 1986:1343; Clague 1984:32). The sediments directly underlying raised deltas (bottomset beds) are often noted as having an either flat or gently inclined orientation while beneath the foreslope, foreset sediments are noted as often dipping parallel to the foreslope surface (Clague 1984:32). In general, topset beds within glaciomarine deltas are noted as having variable thicknesses, but as being relatively thin (Fyles 1963:85). Topset beds are thought to be generally courser than those beds that form the underlying sand and gravel foreset beds (Fyles 1963:85). Typically, prograding topset beds are described as being quite sandy (Joseph Desloges, pers. com., 1995) while bottomset beds are often described as being comprised of mainly silts (Clague 1985:260).

Sedimentologically, it has been suggested that sediments within glaciomarine deltas reflect the unstable nature of the glaciofluvial environment in which they are formed with them often displaying abrupt and distinct morphological and sedimentological changes between strata including the presence of lenses of poorly sorted gravels (Clague 1984:30; McCabe and Eyles 1988:1). Courser deposits within these features tend to be deposited closer to their sediment source (e.g., at the mouths of tributary valleys) with finer sediments generally being deposited in more distal areas (Clague 1985:260; Powell and Molina 1989:380). The finer sediments apparent within these features are thought to be the result of clays and silts settling from suspension and/or the result of turbidity flows caused by various types of slope failures and mass wastage episodes (Clague 1985:256).

A number of researchers have noted several morphological characteristics that many raised glaciomarine deltas, including the Tsini Tsini landform, share. For example, many raised deltas display scarps on their distal end and occasionally on their proximal sides (Clague 1984:32, 1985:260; Crossen 1991:129). These scarps have been interpreted as representing wave-cut cliffs formed during coastal erosion as they were modified by ocean currents and tidal processes (Ashley et al. 1991:123; Carobene and Ferrini 1993:234; Clague 1985:257; Crossen 1991:129; Dumas et al. 1993). It has also been suggested that within raised glaciomarine deltas, layers of course glaciomarine sediments are often stratigraphically superimposed over finer deltaic sediments as lag deposits. These types of lag deposits have been identified by a number of authors as being associated with marine regression (Corner and Fjalstad 1993:155; Corner et al. 1990:164; Postma and Cruickshank 1988:151; Fedje et al. 1996:136; Retherford 1972:25). For example, Retherford (1972:34) suggests that the presence of these course layers superimposed over fine layers and the coarsening upwards of sediments within raised deltas within the Bella Coola valley indicate that when the glacial sea receded from the Bella Coola valley, the regression must have occurred both relatively rapidly and continuously; otherwise the uncompacted gravels and fine clays retained in some of these features would have been washed away by the significant currents and glaciofluvial outwash systems which would have been prevalent within the valley at this time. This inference is consistent with the relatively short timeframe within which the regression appears to have taken place (between 11,000-10,000 [cal 13,000-11,400] BP). In Alaska, this same pattern (i.e., course sediments overlaying finer sediments) has also been interpreted as representing the seaward migration of the land-sea interface (Andrews 1978:390).

Definitively determining whether a landform represents a raised delta is somewhat problematic. In many cases it is unclear whether a terraced feature is deltaic, fluvial, or a combination of both (Clague 1984:32). One way to definitively differentiate whether or not a feature represents a fluvial terrace rather than a raised delta is to look for evidence that indicates that deltas were built up into the sea (Clague 1984:32). This evidence includes the presence of foreset bedding, the presence of a moderately steep depositional surface or delta foreslope (Clague 1984:32), and the presence of worm tubes (Retherford 1972:34). One of the only uniquely diagnostic ways of determining if a landform is definitively associated with a marine environment is the identification within the landform of the presence of marine shells and marine muds (Boulton and Deynoux 1981:418). In this way one can discount other possible sources for the features such as landslide dams, coalescing river deltas, or whether or not the landform represents a paraglacial alluvial fan (see Ryder 1971; Retherford 1972:55; Clague 1984:32, 1985:260). Thus, through the identification of a number of morphological characteristics of raised deltas, it is possible, although difficult, to positively identify these landforms.

One of the most diagnostic lines of evidence concerning the glaciomarine origin of the Tsini Tsini landform was provided by an analysis of a sediment sample from the site itself. Samples of a sterile sandy stratum from an excavation unit on the upper terrace of the site were subjected to a diatom analysis by Daryl Fedje of Parks Canada and produced some illuminating results. Diatom analysis is a type of analysis that has been found to be particularly informative in terms of the reconstruction of paleoenvironments (Anderson and Vos 1992) especially in those areas subject to marine transgressions and regressions (i.e., Pienitz et al. 1991). These types of analyses have been instrumental in the delineation of past-sea levels (i.e., Stabell 1980), the identification of the extent of uplift of formerly glaciated regions, and in the identification of paleoenvironmental change especially in coastal areas as a number of marine diatoms have specific tolerances in terms of temperature, salinity, and water depth (Pienitz et al. 1991; Vos and de Wolf 1993a, 1993b). The analysis conducted by Fedje of the sample taken from the sandy layer beneath the main culture-bearing strata at the site revealed the presence of a number of saltwater diatoms and a single sponge spicule (Hobler 1995:7). Of the marine diatoms identified within the sample examined by Fedje, only one could be identified to species level (Daryl Fedje, personal communication 1997). This consisted of the marine plantonic diatom *Paralia sulcata* (Daryl Fedje, pers. com. 1997) or *Melrosia sulcata*, as it is known in early literature regarding diatoms (Stabell 1996:156).

Paralia sulcata is a common form of microscopic unicellular coastal algae (Hendey 1964:2) that is considered a true bottom form (Hendey 1964:73). This particular type of diatom is often found in fossil marine sediments (Loseva 1988:83) and is often found in the basal sand layer of oceans (Pienitz et al. 1991), thereby suggesting that the sandy strata beneath the main culture bearing deposit within the Tsini Tsini feature was once the bottom of a glacial sea. The diatom *Paralia sulcata* is considered to be tide-indifferent (Vos and de Wolf 1993a) with a salinity tolerance of greater than 20% (Vos and De Wolf 1993a:289). It is considered to represent a type of diatom easily transported (i.e., by tidal actions). Therefore the presence of this particular species of diatom can only provide information about the wider surrounding environment and not the specific location in which it was found (Vos and De Wolf 1993a:291). As such, *Paralia* diatoms have been described as being less useful for paleoenvironmental reconstructions than other types of diatoms (Anderson and Vos 1992:24) as one can only suggest that the environment at the time of the deposition of the diatom was strongly influenced by the sea (Anderson and Vos 1992:24; Vos and De Wolf 1993b:304). Unfortunately no datable material was recovered in the samples examined by Fedje (personal communication 1997). The identification of the marine material in the sandy stratum beneath the main culture-bearing deposit at the site and the sandy nature of the uppermost strata at the site (which is thought to be a characteristic of deltaic topset beds) suggests therefore that the uppermost layers of the site at one time represented the top layer of a subaqueous delta and therefore the bottom of a glacial sea.

In the case of the Tsini Tsini landform, the identification of the presence of marine diatoms and sponges within matrix samples recovered from the site, the presence within the Tsini Tsini landform of a number of previously noted morphological and sedimentological characteristics of raised deltas, and the identification of the landform as a raised delta by Joseph Desloges, combine to suggest that the landform on which the Tsini Tsini site is situated represents a relict raised glaciomarine delta formed during the marine transgression within the valley. However, the fact that no definite foreset beds have yet been identified within the landform makes this inference somewhat problematic. A 2 m profile of the landform excavated during the 1995 field season by the author and Farid Rahemtulla failed to reveal the presence of foreset beds. However, it is possible that a larger profile of the landform needs to be excavated in order to expose any forset bedding, since topset beds within glaciomarine deltas have been identified as being up to 3 m thick (Corner and Fjalstad 1993:155; Corner et al. 1990:161). Moreover, the suggestion that glaciomarine deltas are known to be particularly subject to a great deal of subaqueous slumping and sliding and other forms of mass movement (Carlson and Powell 1992:572; Phillips and Smith 1992:93), processes which may have obscured the original depositional profile of the landform, further suggests a possible reason for the lack of identifiable foreset bedding within the excavated sample profile.

It should be noted that there is an alternative explanation as to the genesis of the Tsini Tsini landform. It is possible that the Tsini Tsini landform was formed behind the coalescing delta that is thought to have existed for a short period in the valley somewhere between 11,000-10,000 [cal 13,000-11,400] BP (Baer 1973:11; Retherford 1972:91). This is similar to a situation described in Clague (1984) for the Smithers-Terrace-Prince Rupert map area. A dammed lake, thought to have occurred as a result of the coalescing of the deltas of the Nusatsum and Salloomt rivers, is thought to have had only a brief existence in the valley as the uncompacted sediments within the delta would only have briefly been able to withstand the significant erosional forces within the valley at this time (Retherford 1972:112). Evidence that is suggestive of the presence of this coalesced dammed lake includes the presence of terraces along both the Nusatsum and Salloomt River valleys and the presence of varved sediments approximately 327 m upslope of the old bridge at Hagensborg (Baer 1973:11). It should be noted that laminated clays situated 300 m above Noomst creek (Munday 1937:47) may also be the result of this damming phenomena.

If the Tsini Tsini landform was formed during the period that the coalesced delta dammed lake is thought to have existed in the Bella Coola valley, it is possible that the Tsini Tsini landform would share many of the morphological features of raised glaciomarine deltas including the presence of marine diatoms and sponges, since the coalesced delta could have trapped ocean water behind it (Retherford 1972:112). Ocean water trapped behind its walls would have provided the opportunity and the mechanism by which the marine organisms identified within matrix samples recovered from the site could have been incorporated within the Tsini Tsini landform.

Alternatively, it is possible that the marine diatoms and sponges were incorporated into the matrix of the landform as a result of a particularly large Tsunami. Significant tsunamis occurred often during the Holocene along the west coast of British Columbia (Hutchinson and McMillan 1997, Ng et al. 1990). However, as current estimates suggest that the magnitude of Tsunami waves at fjord heads in other areas would probably not have attained levels substantially above 15 m (Ng et al. 1990:1250), it is unlikely that the marine organisms were introduced to the site in this manner. Nevertheless, a particularly powerful Tsunami could have lead to the deposition of the marine organisms within the Tsini Tsini landform.

Despite the existence of these alternative explanations, the identification of the Tsini Tsini landform as a relict raised glaciomarine delta appears to be the most plausible explanation of its origin. The identification of the Tsini Tsini landform as a raised delta is not unique within the Bella Coola valley, as a number of raised deltas have previously been identified there. These include those at the mouths of Thorsen, Noomst, and Nooklikonnik creeks and those at the mouths of the Salloomt, Nusatsum, and Necleetsconnay rivers (Baer 1967:9, 1973:10; Retherford 1972:44).

Since the Tsini Tsini landform exhibits a number of morphological and sedimentological characteristics of raised deltas, marine organisms are present within the Tsini Tsini feature, and the elevation of the feature above present day relative sea level is consistent with the identification of other local glaciomarine features, the most reasonable conclusion is that the landform on which the Tsini Tsini site is situated represents a relict raised glaciomarine delta associated with an earlier higher stand of a glacial sea. Previous researchers within the valley either failed to note the feature (Retherford 1972) or identified the feature as representing either an alluvial or a deltaic feature without being more specific (Baer 1973, Map 1329A). Thus, it appears that Hobler (1995) was the first researcher in the valley to correctly suggest that the landform present at the outlet of Tsini Tsini Creek is indeed a relict raised delta. Thus, as is evident, the previous discussion of the genesis of the Tsini Tsini landform has provided insight and sources of hypotheses as to the depositional context in which the cultural material at the site was found and has provided a suggested maximum date for the occupation for the site. Further geoarchaeological research at the site needs to be conducted in order for the hypotheses put forth in the proceeding to be rejected or validated.

A Paleoenvironmental Reconstruction for the Bella Coola Region

The climate of a region strongly influences the biotic composition and the availability of resources within any region and therefore imposes constraints upon the types of adaptations, subsistence strategies, and types of settlement patterns possible, and in turn influences the resulting form of technology. Therefore, determining the past paleoenvironment of a region is important as it can provide valuable clues as to the available resources in a region for earlier populations and can help identify the constraints under which human adaptive responses and technological strategies were selected for. Moreover, it can also provide a baseline by which comparisons with modern climate and available resources can be made.

The paleoclimate and the paleoenvironment of a region can be inferred from the identification of glacial fluctuations and the presence/absence and/or relative proportion of environmentally sensitive indicator species within pollen cores. Utilizing these data, Hebda (1995:75-77) recently published a synthesis of the paleoclimatic record of British Columbia. He proposes the following revised classificatory scheme of Holocene climatic phases for the coast of British Columbia. This scheme will be utilized in order to present a proposed paleoclimatic reconstruction for the Bella Coola valley during the Holocene. Within his classification scheme, Hebda proposes that a xerothermic or hypsithermal event (Deevey and Flint 1957; Heusser 1960:185) (a dryer and warmer period than today) occurred between approximately 9500 and 7000 [cal 10,800-7800] BP immediately following the withdrawal of early Holocene glaciers (Hebda 1995:77; see also Clague and Mathewes 1989; Mathewes 1985; Pellatt and Mathewes 1997). During this period, Hebda suggests that mean temperatures between 2-4° C warmer than modern temperature ranges occurred with maximum temperatures between 9000-7500 [cal 10,200-8400] BP, and with a phase of increased moisture between 8500 and 6000 [cal 9150-6800] BP. Following this period, between approximately 7000 and 4500 BP [cal 7800-5100], a warm and moist mesothermic period with modern annual precipitation occurred, but with temperatures exceeding modern levels. Following this mesothermic period, he suggests that during the period from approximately 4500 [cal 5100] BP to the present, moderate temperatures and moist conditions prevailed, but with a possible increase in moisture between 4500-3000 [cal 5100-3200] BP.

While this scheme can be utilized to provide an overall impression of the paleoclimatic history of the Bella Coola valley, macroclimatic/paleoclimatic classificatory schemes such as that proposed by Hebda, while useful for delineating overall trends, tend not to be as valuable as interpretations derived from cores within any specific area under investigation, because an increase in distance from data sites results in an increase in the uncertainty as to the applicability and validity of the reconstruction of the region in question (cf. Mann and Hamilton 1995:449). However, as of yet, no datable pollen cores that could aid in the paleoclimatic reconstruction of the Holocene paleoclimatic record within the Bella Coola valley have been obtained. Nevertheless, a number of palynological cores have been obtained from regions surrounding the Bella Coola valley. These cores will be utilized within this study in order to make microclimatic/paleoclimatic inferences.

The closest palynological cores to the Tsini Tsini site so far obtained include the cores from near the Tezli and Ulgatcho sites on the Plateau (Donahue and Habgood 1974), a core from Dwarf Birch Lake at Heckmann Pass approximately 25 km northeast of the Tsini Tsini site (unpublished data by Hebda and Allen 1993 cited in Hebda 1995), a core from Bear Cove Bog on Northern Vancouver Island (Hebda 1983), and a core from a bog near Prince Rupert (Banner, Pojar, and Rouse 1983). A further study of cores from the outer coast near Bella Bella conducted by H. Nichols is noted in Andrews and Retherford (1978). However, the results of this study have yet to be published.

The results of the analyses of the cores noted above appear to concur with Hebda's (1995) macroclimatic scheme, particularly in terms of the dating of the Hypsithermal event in the region. However, some differences do exist. For example, analysis of the core from Dwarf Birch Lake, which represents the closest dated pollen core to the Tsini Tsini site, suggests that just prior to 6000 [cal 6800] BP, the climate in the region was moister and possibly cooler than it was in the early Holocene (Hebda and Allen unpublished in Hebda 1995:69). This period of moist and cool temperatures is noted as having lasted until approximately 3800 [cal 4200] BP when drier conditions returned (Hebda 1995:69).

In addition to palynological analyses, it has been argued that Holocene Neoglacial advances can also provide information that can be utilized in paleoenvironmental reconstructions, in that it has been argued that glacial advances can be suggestive of regional climatic controls and/or the occurrence in specific areas of periods of below average temperatures and/or well above average rainfall (Desloges and Ryder 1990:289; Hebda 1995:77). In the Bella Coola valley, two major episodes of Neoglacial advances (defined as the rebirth and/or growth of glaciers following maximum shrinkage during the Hypsithermal interval ([Porter and Denton 1967:205]) have been identified including a series of advances which occurred between approximately 3500 and 2500 [cal 3800-2500] BP (Desloges and Ryder 1990:289; Retherford 1972:3) and a series of little Ice Age advances which occurred between approximately 800 and 1880 AD (Desloges 1990:99; Desloges and Church 1987:99; Desloges and Ryder 1990:281). Both of these periods of Neoglacial advances appear to be contemporaneous with glacial advances that occurred in the southern coast mountains (Ryder and Thomson 1986), in the Canadian Rockies (Luckman et al. 1993; Osborn and Karlstrom 1989), and in other regions (Kerr 1936; Porter and Denton 1967; Ricker 1983) although the exact maxima for Neoglacial conditions seems to be a time transgressive event (Mann and Hamilton 1995:464). Nevertheless, the apparent synchronicity of these advances in a number of different areas indicates that a macro-regional climatic change occurred during these periods (Desloges and Ryder 1990:289). Thus, it appears that periods of below average temperatures and/or well above average rainfall occurred within the Bella Coola valley between 3500-2500 [cal 3800-2500] BP and from approximately 1200 BP to 120 BP.

Thus, synthesizing the work of the authors noted above, a hypothesized paleoenvironmental reconstruction of the paleoclimate of the Bella Coola valley is presented below in the absence of the absence of any paleoenvironmental research within the Bella Coola Valley itself. It appears that the climate within the Bella Coola valley from approximately 9000-7000 [cal 10,200-7800] BP during the Hypsithermal event was considerably warmer and drier than at present. From approximately 7000-4000 [cal 7800-4500] BP, it appears that the climate in the Bella Coola valley was cooler and moister than during the preceding period. From about 4000 [cal 4500] BP on it appears that near modern climatic regimes were established with this period being punctuated by cooler and/or wetter periods during periods of Neoglacial advances between 3500-2500 [cal 3800-2700] BP and during the little Ice Age (1200-120 [cal 1150-95] BP).

The hypothesized changes in overall climate would have undoubtedly affected both the biotic composition and the hydrological regime of the Bella Coola region in addition to the frequency of storm events, flooding, and forest fires in a manner similar to that suggested for other areas (see Franklin et al. 1991). This climatic change would in turn have affected the availability of resource species within the valley thereby placing constraints on any human population there at that time (Hebda and Frederick 1990:327). Moreover, it has been demonstrated that tree lines and the extent of alpine areas changed during the Holocene in relation to macro and micro-regional climatic influences (see Clague et al. 1992; Pellatt and Mathewes 1997). This too would have imposed constraints on human populations within the valley in that the distribution of tree species and utilized resource species within alpine areas both in the valley and in the surrounding region would have been affected. It has also been demonstrated that species migrations took place in response to macro-regional climatic change during the Holocene (see Erlandson and Moss 1996; Hebda and Mathewes 1984), This change would have affected the relative makeup of the biome in the valley during the Holocene, and would have imposed constraints on human populations living in the region. However, as the response of biotic communities to climatic change varies and the response of specific species to climatic change appears to be species dependant (cf. Mathewes and King 1989:1822), the exact nature of these changes is difficult to infer.

Many ethnographically important riverine resources would have undoubtedly also been affected by climatic change during the Holocene. For example, it has been suggested that the various anadromous salmon species are susceptible to even minute changes in their environmental regime and accordingly that their reproductive success therefore fluctuates in response to climatic change (Fladmark 1974; Francis and Sibley 1991; McBean et al. 1991; Nehlsen and Lichatowich 1997; Neitzel et al. 1991; Shalk 1977). This would have undoubtedly been the case during the Holocene, as they almost assuredly would have been affected by the significant climatic changes that occurred during that period. In the Columbia River basin, for example it has been argued that conditions for salmon were poorest during the Hypsithermal with optimum conditions being reached during the Neoglacial (Chatters et al. 1995) thereby resulting in more populous and successful runs during this period. The success of salmon runs during the Neoglacial period also appears to be evident on the central coast as suggested by the maximum values for salmonoid resources at Namu coinciding with this period (see Carlson 1991, 1995). Within the Bella Coola Valley itself, modern observations of fish populations within the Bella Coola River system confirm that even year to year small scale climatic changes can have a considerable impact on the availability and viability of riverine resources (see Boland 1974), thereby further suggesting the possible affects that paleoclimatic changes would have had on salmonoid resources within the valley.

While the proposed changes in biotic composition and resource species can be inferred, determining the specific ecological changes and the corresponding changes in species availability that occurred within the Bella Coola area during the many changes in climate that are known to have occurred in the region during the Holocene is problematic and represents an avenue for further research.

Nuxalk Oral Traditions and Paleoenvironments

An attempt will now be made to integrate the results of the proceeding investigation with the oral history of the Nuxalk peoples. There are numerous references within Nuxalk oral histories to events that seem to have a number of specific geomorphological and paleoenvironmental corollaries. The numerous occurrences of these corollaries suggests that a deep continuity in time exists within Nuxalk oral traditions. Among the geologic and geomorphological events that occur frequently within Nuxalk oral histories is the marine transgression in the valley. For example, Filip Jacobsen (1895) recorded an oral tradition in which it is stated that the sea extended far up the Bella Coola valley in mythological time (in Boas 1898:52-53) while in another story, North Bentinck arm is described at the beginning of creation as extending past Stuie (Andy Schooner Sr. n.d. in Storie 1973:75). McIlwraith (1948 I:89) and Davis and Saunders (1980:71) also record a story in which it is stated that in the beginning of time, the ocean resided to the east of Bella Coola with land being located to the west of the valley. In this story, Raven is thought to have altered the land and sea to its present position and that most ocean dwellers followed the sea to its new home in the west, although a number of mussels stayed with their human friends and are still present in the upper valley (McIlwraith 1948 I:89). These mussels, which are present in the upper valley and which are called by the Nuxalk the same name as ocean mussels, were pointed to as proof to McIlwraith that saltwater was at one time present within the upper Bella Coola valley (McIlwraith 1948 I:89; Andy Schooner Sr. n.d. in Storie 1973:75).

It could be argued that the various oral histories noted above refer to a time at the end of the Fraser glaciation in which the marine transgression of the Bella Coola valley and the collapse of a glacial forebulge were occurring simultaneousl. The effects of a collapsing glacial forebulge could explain the apparently anomalous suggestion apparent in Nuxalk oral histories that the present day seafloor in the past was at a higher elevation than the present day relative position of dry land. Further, the effects of a collapsing forebulge could also explain the pattern of the present day land being underwater as the transgressed sea waters within the Bella Coola valley could have been present within the valley at approximately the same time as the forebulge was collapsing. Thus, although intuitively the reversal of the land-sea relationship referred to in Nuxalk oral histories initially does not appear plausible, there is a possible specific geomorphological explanation for this scenario.

Another of the apparent geologic and geomorphological corollaries evident in Nuxalk oral histories is the reference to the existence of a prairie-like plain to the west of the mainland, west of Bella Bella and Namu. In the legend of the first salmon noted by Boas (1898:39) and Kirk (1986:82-83), Raven and Mouse traveled-west to the land of the salmon. In this story, the land of the salmon is described as a flat land comprising a vast prairie with no trees (Boas 1898:39). Recent research conducted by Barrier et al. (1993), Luternauer and Clague et al. (1989), Luternauer and Conway et al. (1989), Josenhans et al. (1995), and Josenhans et al. (1997) has indicated that at approximately 10,500 [cal 12,200] BP, a great deal of the Western Canadian Continental shelf was aerially exposed by the lower relative sea levels that occurred at this time due to the effects of a glacial forebulge. The portion of the sea floor on the Western Continental shelf to the west of Namu appears to be quite flat and, if vertically raised and aerially exposed, could have resembled the area described in Nuxalk oral histories.

Within Nuxalk oral histories there are also many references to a catastrophic flood occurring in the valley. For example, the flood story recorded by McIlwraith (1948 II: 503) and also noted and referred to in French (1994:23), Mack (1993:13), Munday (1937, 1939b), Palmer (1863:10), Storie (1973), and Lady Tweedsmuir (1938), states that,

> Once long ago, it began to rain steadily. The mountain creeks became swollen; then the rivers and the valleys became flooded. The people were forced to make canoes...The valleys were filled; at first a number of mountains were left exposed but finally the bare peak of Nusqualst, the highest mountain in the Bella Coola valley alone rose above the raging torrent. The Bella Coola (Nuxalk) were driven to this spot where a large camp was formed.

Flood stories within First Nation oral histories are ubiquitous along the Northwest Coast (see Harris 1997; Hill-Tout 1902) with the flood story noted above being nearly identical to that told to William Duncan at Metlakatla by the Tsimshian and recorded in Mayne (1862) and that told to Olson (1955) by the Kwakiutl. There are a number of potential explanations as to the source of these accounts. Firstly, it is possible that the flooding apparent in this story could

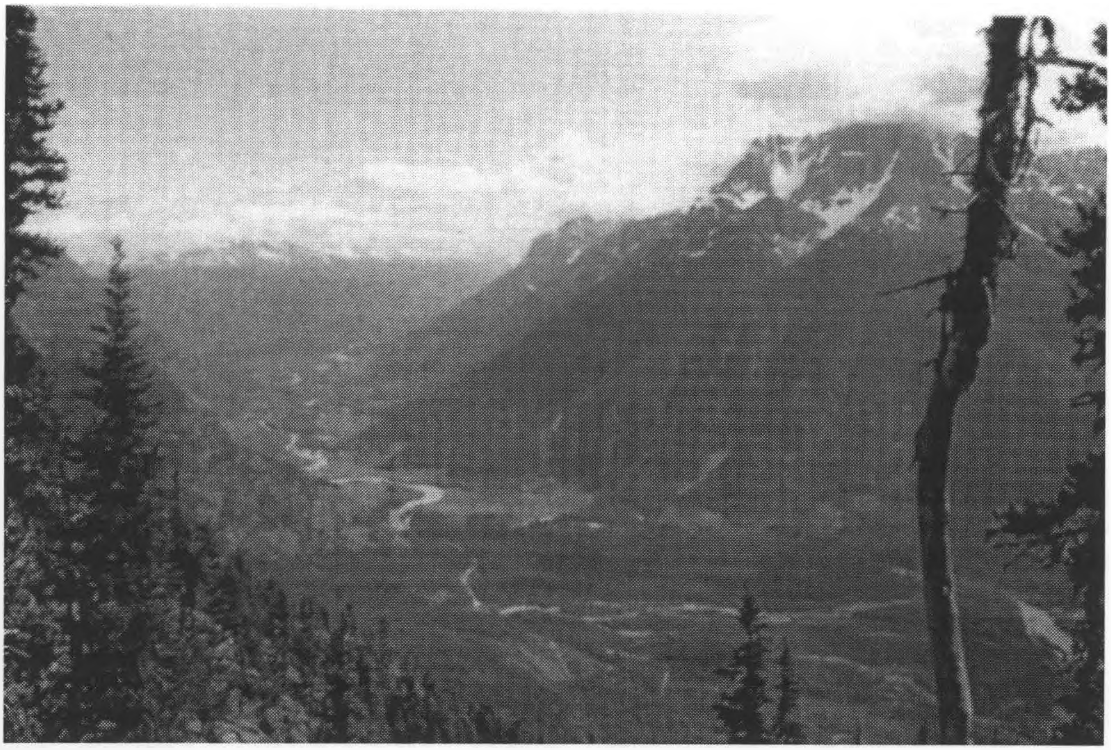

Figure 2:3. **Looking East at the upper Bella Coola Valley immediately down-river from the Tsini Tsini Site. At the time of occupation at Tsini Tsini this valley was an arm of the sea (Photo: R. Carlson).**

have been the direct result of the various increases in rainfall that are known to have occurred during the Holocene. This flooding could have occurred during the transition from the Hypsithermal to the cooler and wetter period around 7000 BP (Hebda 1995:55, 77) or alternatively, it could have occurred during the Neoglacial advance between 3500 and 2500 BP (Desloges and Ryder 1990:289; Retherford 1972:3). It does not appear that this flooding could be related to the little Ice Age advance in the valley, as this advance would have occurred in relatively recent memory. Secondly, it could be possible that the flood referred to specifically in Nuxalk oral traditions may be referring to the presence of the coalescing delta dammed lake that is thought to have had a short presence in the valley between 11,000-10,000 [cal 13,000-11,400] BP between the Nusatsum and Salloomt rivers (Retherford 1972:112). This coalesced delta would have dammed the Bella Coola valley and most likely caused flooding once the dam broke. Determining which of these possible alternatives (or any other alternative) is responsible for the creation of this flood story is problematic as there does not appear to be enough specific information within Nuxalk oral histories to rule out any one possibility.

It should be also noted that a number of oral histories suggest that there was a great heat which followed the flood (McIlwraith 1948 I:309, 424, 500). It is possible that this great heat is referring to the hypothesized xerothermic event (warm and dry period) which is thought to have occurred following deglaciation and following the marine transgression between 9500 and 7000 BP (Hebda 1995:55, 77). Alternatively, it could be that the great heat is actually referring to a relative warming of the environment that is thought to have occurred following Neoglacial advances. The noting that a great heat followed the flooding in the valley does not favour any of the Nuxalk oral histories, as the great heat could have occurred after any of the previously suggested alternative explanations. Again, ruling out any one of these possibilities is problematic.

Finally, it should also be noted that there are a number of references within Nuxalk oral histories referring to glacier activity with one story referring to a period of bitter cold and perpetual ice (McIlwraith 1948 II:503) and another apparently referring to the actions of a glacier (McIlwraith 1948 I:307). Once again, there is not enough information to determine if the glacial advance being referred to in these stories is referring to early Holocene or more recent Neoglacial advances.

Taken as a whole, the numerous references to specific late Quaternary paleoenvironmental and geomorphological events within Nuxalk oral histories appear to preclude the possibility that these corollaries are purely coincidental thereby suggesting that a great time depth exists within Nuxalk oral histories. Moreover, the fact that obsidian from the Anahim Lake area to the east was recovered in a context dating to approximately 9700-9000 [cal 11,000-10,200] BP at Namu (Carlson 1994) to the west, a time when some of these geomorphological phenomena were still taking place, the identification of a number of surface finds within the Valley which suggest an early Holocene human presence in the valley, and the early nature of the artifacts recovered from the main component at the Tsini Tsini site and their similarity to the early components at Namu, combine to suggest that early populations were more than likely residing in the valley and/or traveling through the Bella Coola valley at a time when they could have witnessed many of the geomorphological events that occurred in the Late Pleistocene/Early Holocene period.

Conclusions

The preceding investigation into the geologic, geomorphological and paleoecological context of the Tsini Tsini site is an attempt to identify both when the Tsini Tsini site could have first been occupied and what forces during the Late Pleistocene/early Holocene may have affected the context of the assemblage recovered there as well as the culture of the people responsible for the creation of that assemblage. Further, through a hypothesized reconstruction of the formation of the Tsini Tsini landform, an attempt has been made to present hypotheses as to the nature of the depositional context of the cultural material found at the Tsini Tsini site. Moreover, the proceeding represents at least an initial attempt at trying to integrate Nuxalk oral histories within the known paleoenvironmental and geomorphological history of the Bella Coola valley. Further archaeological and geoarchaeological research needs to be conducted on raised glaciomarine features within the upper reaches of fjords along the B.C. coast, as additional early coastal sites may be present in these areas.

CHAPTER 3

Ancient Landscapes and Archaeology in Haida Gwaii and Hecate Strait

DARYL FEDJE

Introduction

Reconstruction of ancient landscapes in the Haida Gwaii and Hecate Strait area has aided in the discovery and interpretation of several early post-glacial archaeological and paleontological sites. This chapter will provide a brief overview of the history of environmental change and results of archaeological investigations at two key sites, Richardson Island and Kilgii Gwaay, found on these early landscapes.

Paleoenvironments

The paleoenvironmental record for Haida Gwaii and Hecate Strait (Figure 3:1) exhibits a remarkably dynamic history. The following summary covers the sea level, vegetation and climate, and paleontological history of this region.

Sea Level

Haida Gwaii and Hecate Strait have been subject to rapid and substantial changes in relative sea level from Glacial through to mid-Holocene time (Figure 3:2). These changes have significant consequences to discovery and interpretation of the early archaeological record in the area. Intensive investigation into regional sea level history over the last decade has resulted in a detailed record for Haida Gwaii and additional data for the east Hecate area. This information has been used to model ancient shoreline positions, identify archaeological and paleoecological targets for "on-ground" investigation, and aid interpretation of early Holocene archaeological sites (Fedje and Christensen 1999; Josenhans et al. 1997; Fedje and Josenhans 2000; Fedje et al. 2001).

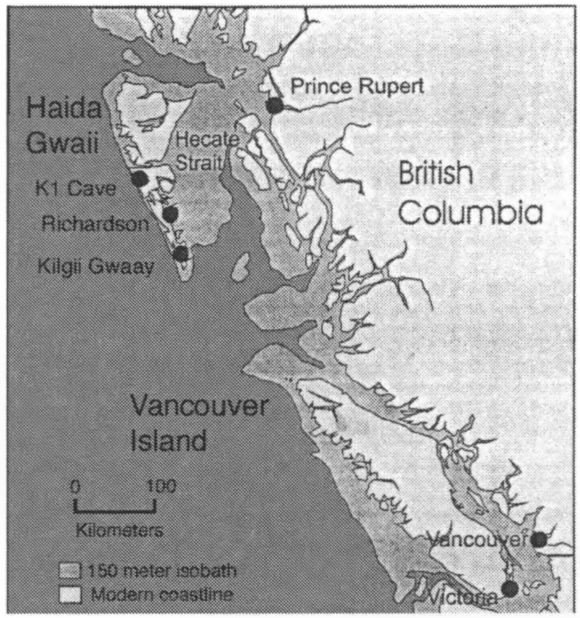

***Figure 3:1*. The British Columbia Coast with the 150 m Isobath.**

Climate and Vegetation History

Palynological research demonstrates that the climate and vegetation history of Haida Gwaii were subject to significant change at the same time that shoreline positions were shifting rapidly (Lacourse and Mathewes n.d.; Pellatt and Mathewes 1994, 1997; Mathewes 1989, Fedje 1993). This work shows that from at least 15,000 [cal 18,000] BP until ca. 12,200 [cal 14,400] BP Haida Gwaii climate was cool and vegetation was coastal tundra. After 12,200 [cal 14,400] BP and until ca. 11,000 [cal 13,000] BP the climate was warm and relatively dry, and the landscape was dominated by pine parkland. During Younger Dryas times (ca. 11,000 [cal 13,000] to 10,200 [cal 11,500] BP) there was significant climatic cooling and lowland vegetation communities shifted to open, mixed forests variously composed of alder, pine, mountain hemlock and spruce. Closed temperate forests dominated by spruce and hemlock developed after ca. 10,200 [cal 11,500] only to be replaced by open mixed forests during the early Holocene climatic optimum (ca. 10,000 [cal 11,400] to 6500 [cal 7500] BP). After this time climatic deterioration commenced and the modern hypemaritime forests of Haida Gwaii, characterized by spruce, hemlock and western red cedar, were established by ca. 3500 [cal 3800] BP.

Paleontology
The late Wisconsin and early Holocene paleontological record for the northern Northwest Coast has developed from being virtually nonexistent a decade ago to one that is substantial and rapidly expanding. In southeast Alaska,

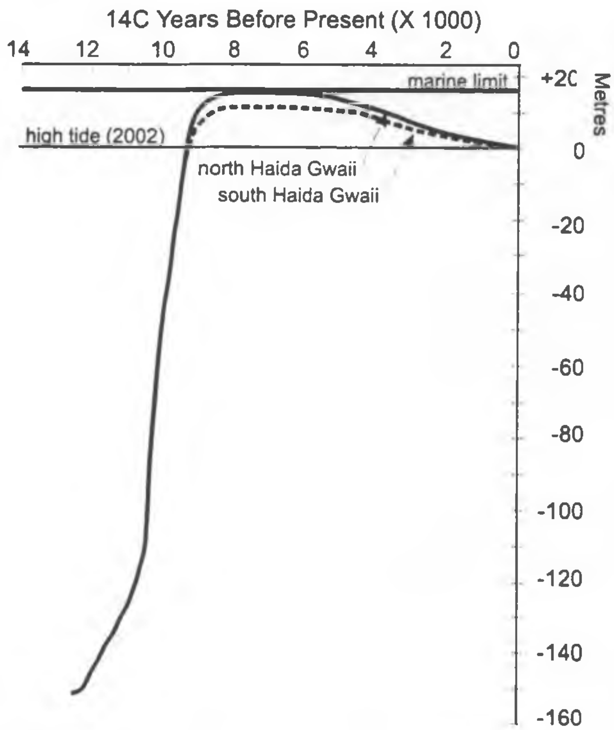

Figure 3:2. **Relative Sea Levels, Haida Gwaii.**

Heaton and colleagues (Heaton and Grady 2003) have demonstrated evidence for the presence of an arctic fauna, including ringed seal and arctic fox, during the glacial maximum, and an early post-glacial fauna, including arctic fox, caribou and grizzly bear, by 12,000 [cal 14,000] BP. In Haida Gwaii there is similar change in the paleontological record. Ten years ago the oldest known faunal assemblage was from an archaeological site dating to ca. 6000 [cal 6800] BP (Ham 1990). Recent work, especially that at Kilgii Gwaay (see below) and K1 Cave (Figure 3:3) has extended the record to ca. 14,500 [cal 18,200] BP. Most of this record derives from the 9400 [cal 10,600] BP faunal assemblage from Kilgii Gwaay (Fedje et al. 2001), although the recent work at K1 Cave on the west coast of Moresby Island has identified an assemblage of bears (MNI = 7) with several dating from ca. 10,500 to 11,500 [cal 12,200 – 13,500] BP and one dating to 14,500 [cal 17,500] BP (Table 3: 1 from Ramsey et al. n.d.). Analyses of the 2002 collections are incomplete, but do indicate the presence of additional species including brown bear and caribou. These data suggest that there may have been substantial refugia on the Northwest Coast during the glacial maximum and support the opening of a biologically productive coastal corridor before 12,000 [cal 14,000] BP.

Environmental Synthesis and Modeling
The environmental history of Haida Gwaii and Hecate Strait poses significant challenges to discovering the locations of the early post-glacial archaeological record. Prior to 12,000 [cal 14,000] BP the western margin of the Continental Shelf was emergent and dominated by broad low relief, open tundra with large lakes, meandering rivers and low-slope ocean shorelines (Figure 3:4). In Haida Gwaii and western Hecate Strait these low elevation plains are now deeply drowned whereas in the area of eastern Hecate Strait and the outermost Mainland coast the ancient shorelines are stranded in the forest.

Survey of the ancient coastline of Haida Gwaii is fraught with challenges, however, *in situ* geological and botanical evidence of the ancient landscape has been obtained along with surficial evidence of human occupation (Fedje and Josenhans 2000; Fedje et al. 2001). Models derived from the integration of paleoenvironmental data and terrain models (topographic digital elevation models) have proven key to locating and interpreting early Holocene archaeological sites as well as the aforementioned early post-glacial paleoenvironmental sites. In conjunction with the palynological evidence the presence of black bear by ca. 12,000 [cal 14,000] BP in Haida Gwaii and southeast Alaska provides strong evidence that a biological corridor was available by that time. Significantly, bears are omnivores with many of the same environmental needs as humans. Their distribution is supportive of the early post-glacial viability of the landscape to people.

Archaeology

The potential contribution of Haida Gwaii to a more complete understanding of the early human occupation of the Northwest Coast was recognized more than three decades ago (Fladmark 1969; Hobler 1978). Investigations in the

Figure 3:3. **Duncan McLaren in K1 Cave, Series 11 Passage (2002).**

late 1960s and early 1970s provided a broad array of evidence suggesting that the prehistoric record extended to at least 9000 [cal 10,200] BP. Over the last decade significant new information in support of this potential has been obtained by a number of investigations only a few of which will be summarized here.

Prior to the 1990s the prehistory of Haida Gwaii was suggested to have considerable antiquity but firm evidence extended no earlier than ca. 7500 [cal 8400] BP. In the 1970s Phil Hobler (1978) located several intertidal lithic sites hypothesized to date before 8500 [cal 9500] BP as well as sites associated with a raised beach. From recent archaeological work (see below) and the local sea level history the intertidal sites are now known to date to ca. 9500 [cal 10,800] BP and the raised beach sites from ca. 9000 [cal 10,200] to 5000 [cal 5700] BP (Fedje and Josenhans 2000). Fladmark (1989) identified a number of raised beach sites with components dating from ca. 7500 to 5000 [cal 8400-5700] BP as well as low elevation components associated with rapidly rising sea levels. The sea level record suggests the latter should date between 9400 and 9300 [cal 10,600-10,500] BP (Fedje and Josenhans 2000, Fedje et al. 2001).

Table 3:1. K1 Cave Radiocarbon Dates.

Lab# (CAMS)	Provenience	Material	Elev. m	^{14}C age	Calendar years ago: -1 sigma, mean, + 1 sigma	Context
75558	K Series 6b	Dog bone	32	2,350±40	2355, 2349, 2341	surface
75559	K Series 7a	Bear bone	32	11,150±50	13172, 13144, 13014	surface
75746	K Series 7h	Bear femur	32	14,540±70	17679, 17411, 17158	surface
79488	K Series 8a	Bear tibia	48	9,376±50	10684, 10628, 10505	surface
79687	K Series 11	charcoal	20	10,380±80	12622, 12328, 11960	strat. section
79489	K Series11b	Bear ulna	20	11,250±70	13372, 13166, 13052	strat. section
79490	K Series 11f	Bear ulna	20	10,450±60	12790, 12498, 12166	strat. section

Results of excavations at two early Holocene archaeological sites, Richardson Island and Kilgii Gwaay, are briefly presented in the following paragraphs. Both sites give evidence of the earliest known Holocene maritime adaptation on Haida Gwaii and, in conjunction with paleoenvironmental data, portend the discovery of significantly earlier records.

Richardson Island

The Richardson Island site is situated on a raised marine terrace on the west coast of Richardson Island in southeastern Haida Gwaii. The site was occupied at a time when sea levels were rising rapidly to the early Holocene marine transgression maximum of 15 to 16 m above modern levels.

History of Research

The Richardson Island site was first identified in 1993 with the discovery of a large intertidal lithic scatter on the west side of the island (Mackie and Wilson 1994) that was later determined to be a secondary deposit of material from a raised beach site situated some 100 meters inland at an elevation of ca. 15 to 18m above high tide (Fedje and Christensen 1999). In 1995 and 1997 two one metre square units were excavated by Parks Canada and Haida archaeologists. In total, over four metres of well-stratified cultural deposits were excavated during these preliminary investigations. In 2001 the site was revisited by a team led by Quentin Mackie and a larger area of excavation initiated. This was the first year of a three-year University of Victoria research program funded by SSHRC.

Stratigraphy and Dating

The early Holocene Richardson Island archaeological record was recovered from regosolic stratified marine berm gravels. Abundant charcoal and lithic artifacts characterize ancient land surfaces. A minimum of 23 separate occupation layers was identified. The lowest paleosol rests on the surface of a diamicton (debris-flow) within which is incorporated charcoal dating to ca. 9600 [cal 11,100] BP. The paleosol underlies an occupation layer dated to 9300 [cal 10,600] BP and, as with all overlying paleosols contains abundant lithic artifacts. Overlying paleosols are separated by layers of fine gravel ranging from 2 to 50 cm in thickness (Figure 3:5) Imbrication within the gravel layers and the strike (landward incline) of the layers themselves suggest these materials were

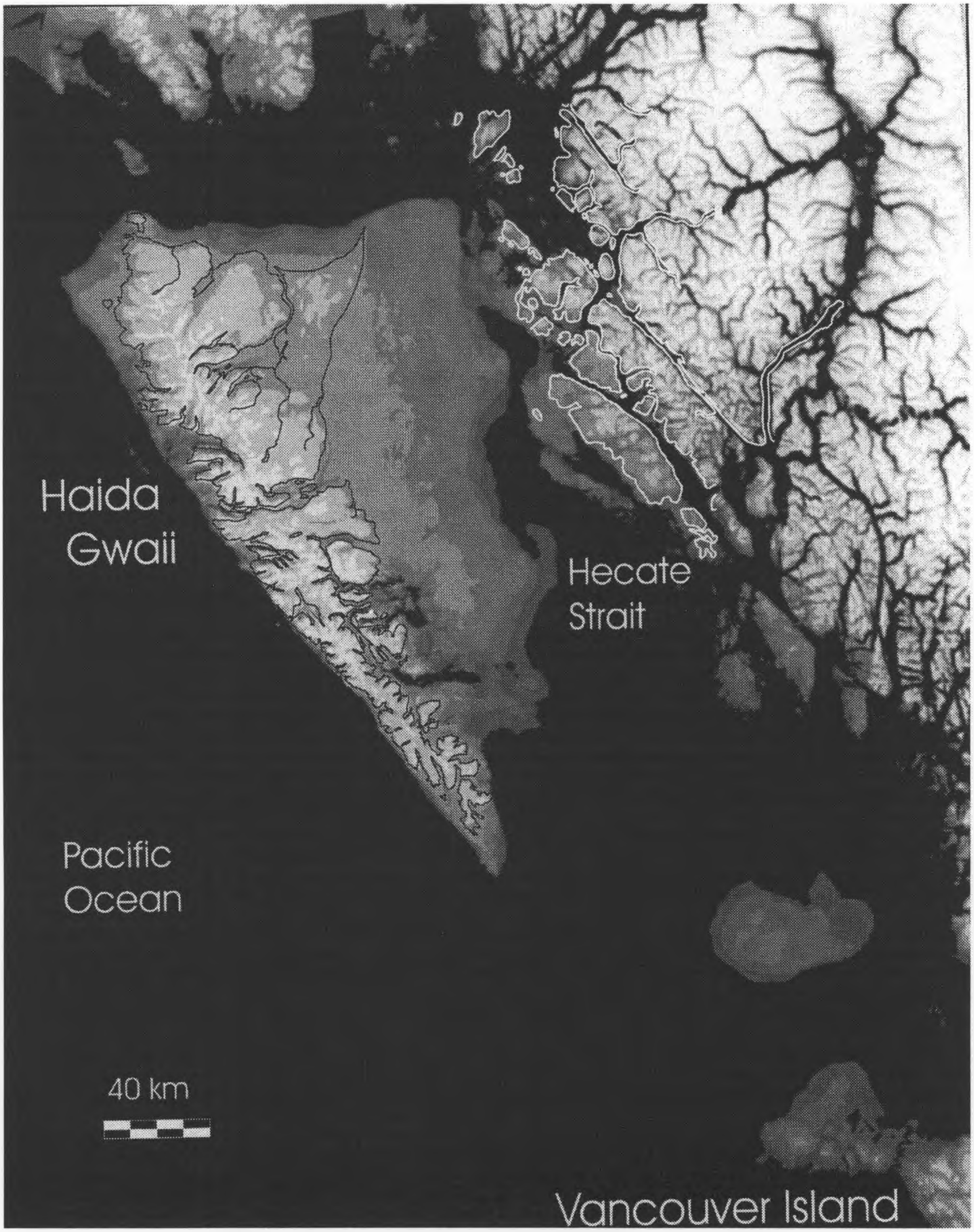

Figure 3:4. **The Northern Coast of British Columbia ca. 12,000 [cal 14,000] BP. The modern shore of Haida Gwaii is outlined in black, and western Hecate Strait is outlined in white (Image prepared by G. MacMillan and D. Fedje).**

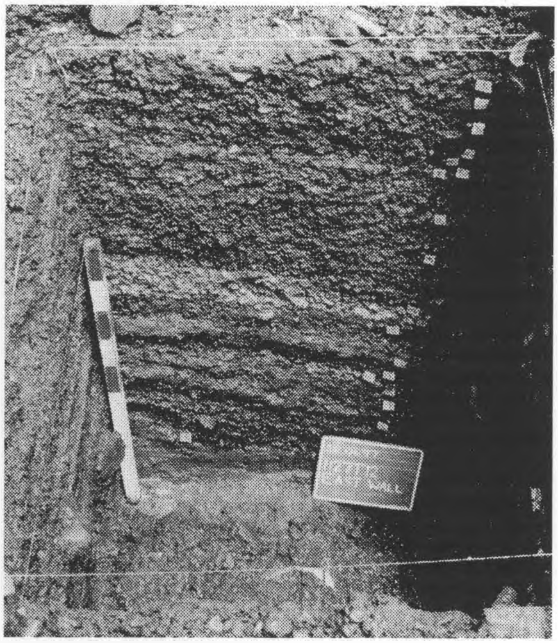

***Figure 3:5.* Excavation Unit 12, Richardson Island.**

deposited as berm overwash during major storm events or tsunamis. Continuous rising of sea level until ca. 8900 [cal 10,000] BP (Fedje and Josenhans 2000) permitted berm aggradation to continue for approximately 500 years and provides an exceptionally high-resolution record. The berm sequence is approximately four metres thick and capped by ca. 50 cm of alluvial gravel and recent (post-8000 [cal 9000] BP) debris-flow deposits.

Table 3:2. Richardson Island Radiocarbon Dates.

Lab# (CAMS)	Proveninence	Material	Datum m aht	Depth cm	14C Age	±	Calendar years ago -1sigma, mean, +1 sigma	Comment
Stratigraphic exposure 1								
16199	1127T6	charcoal	18	50	8490	70	9534, 9509, 9441	raised beach
16200	1127T6	charcoal	18	100	8690	70	9817, 9627, 9549	raised beach
16202	1127T6	charcoal	18	300	9010	60	10221, 10201, 10159	raised beach
Stratigraphic exposure 2								
26270	1127T11	charcoal	18	348	9220	60	10492, 10316, 10243	raised beach
Excavation Unit 10								
26262	1127T10J	charcoal	18	61	8470	60	9530, 9490, 9435	raised beach
26263	1127T10N	charcoal	18	108	8640	50	9676, 9551, 9542	raised beach
26264	1127T10N	charcoal	18	251	8850	60	10151, 10091, 9781	raised beach
26265	1127T10S	charcoal	18	325	8700	60	9885, 9662, 9552	raised beach
26266	1127T10S	charcoal	18	329	8980	60	10215, 10185, 9977	raised beach
26267	1127T10S	charcoal	18	347	8960	60	10210, 10176, 9922	raised beach
26268	1127T10S	charcoal	18	354	9080	60	10241, 10222, 10193	raised beach
26269	1127T10S	charcoal	18	374	9160	60	10400, 10352, 10236	raised beach
Excavation Unit 12								
39875	1127T12T	charcoal	18	404	9290	50	10558, 10438, 10294	raised beach
39876	1127T12T	charcoal	18	421	9290	50	10558, 10438, 10294	raised beach
39877	1127T12R	charcoal	18	434	9590	50	11112, 10823, 10751	diamicton

*m(aht) -meters above high tide. All dates are corrected for isotopic fractionation (13C/12C).

Fourteen radiocarbon dates were obtained from the cultural deposits as well as one date on the underlying diamicton (Table 3:2). The dates are stratigraphically consistent at one sigma with the exception of CAMS26265, which is out of sequence by two sigma.

Material Culture

Vertebrate remains recovered from this site are limited to a few grams of calcined bone, most of which are fish. The bones of rockfish, bird and, tentatively, caribou have been identified.

The lithic assemblage includes ca. 8300 artifacts collected in 1995 and 1997 and ca. 5000 artifacts recovered in 2001 (analysis of the 2001 assemblage is not complete at this time). All of the artifacts recovered appear to be of locally derived material. Preliminary analysis suggests two components are present at the site (Fedje and Christensen 1999; Fedje et al. n.d.). The earliest component is assigned to the Kinggi Complex and dates from 9300 to 9000 [cal 10,600 to 10,250] BP). This component is characterized by a non-microblade assemblage with abundant evidence of biface technology, simple flake tools and large unifacially worked tools (Figure 3:6). The later Early Moresby Tradition component dates from ca. 9000 to 8500 [cal 10,250 to 9600] BP and exhibits abundant evidence of North Coast Microblade Tradition technology in association with declining representation of biface technology. This component contains the same range of simple flake and large unifacial tools as seen in the Kinggi component.

Kilgii Gwaay

The Kilgii Gwaay site is situated in the modern intertidal zone of a small embayment on the south side of Ellen Island (Figure 3:7) in southernmost Haida Gwaii (Fedje et al. 2001). During late-glacial and very earliest Holocene time the landform encompassing Kilgii Gwaay was in an inland forested setting. By ca. 9500 BP [cal 10,750 BP] sea level had risen such that Kilgii Gwaay was adjacent to the ocean shore. About 100 years later still-rising seas flooded the site. Evidence of human occupation is present on the east and west sides of an ancient pond, now capped by shell hash, which would have become a shallow lagoon during the time of site use.

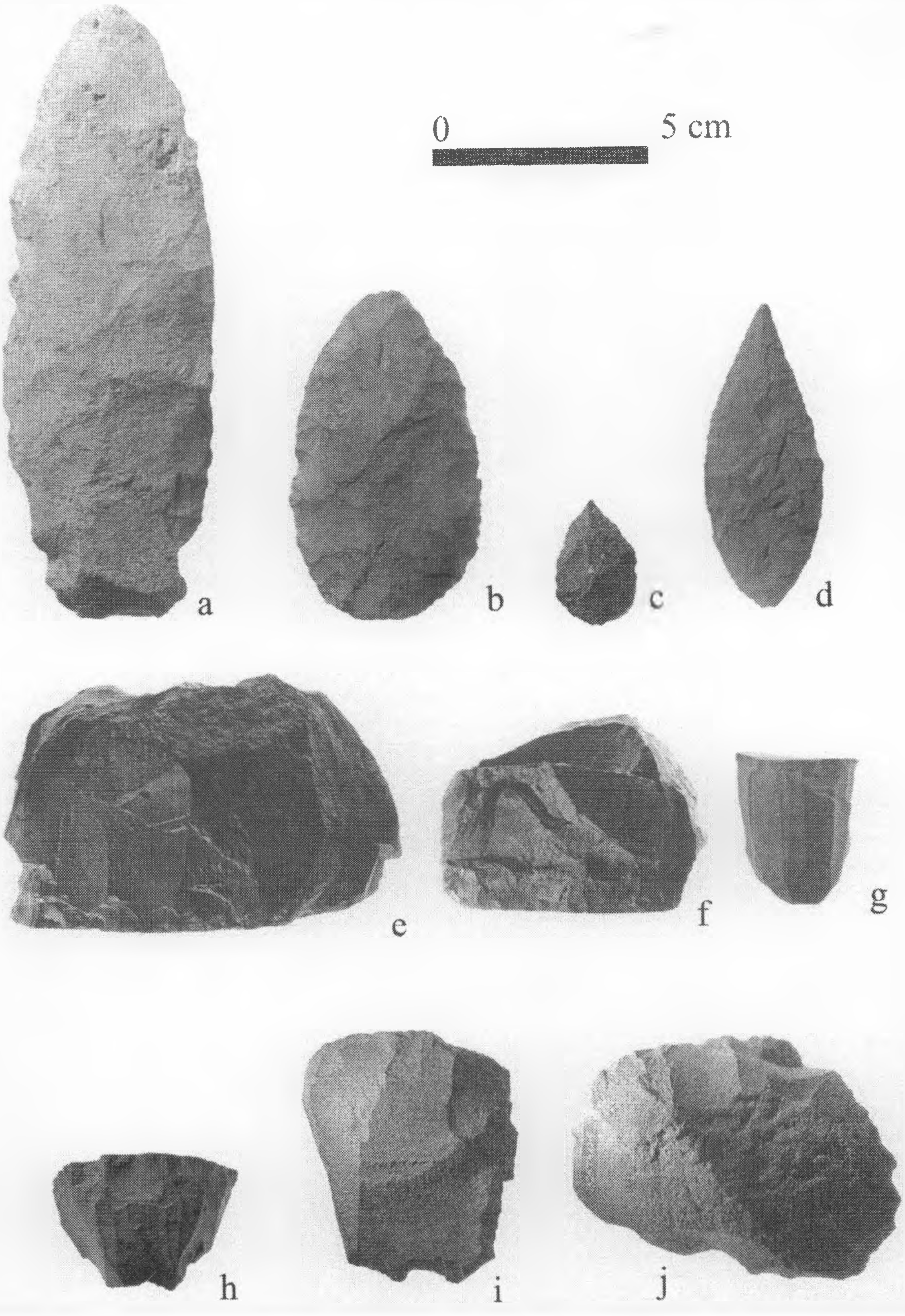

Figure 3:6. **Bifaces (a-d). Scraperplanes (e,f) and Microblade Cores (g,h) from Richardson Island, and Unifaces (i,j) from Kilgii Gwaay. Photo: J. McSporran.**

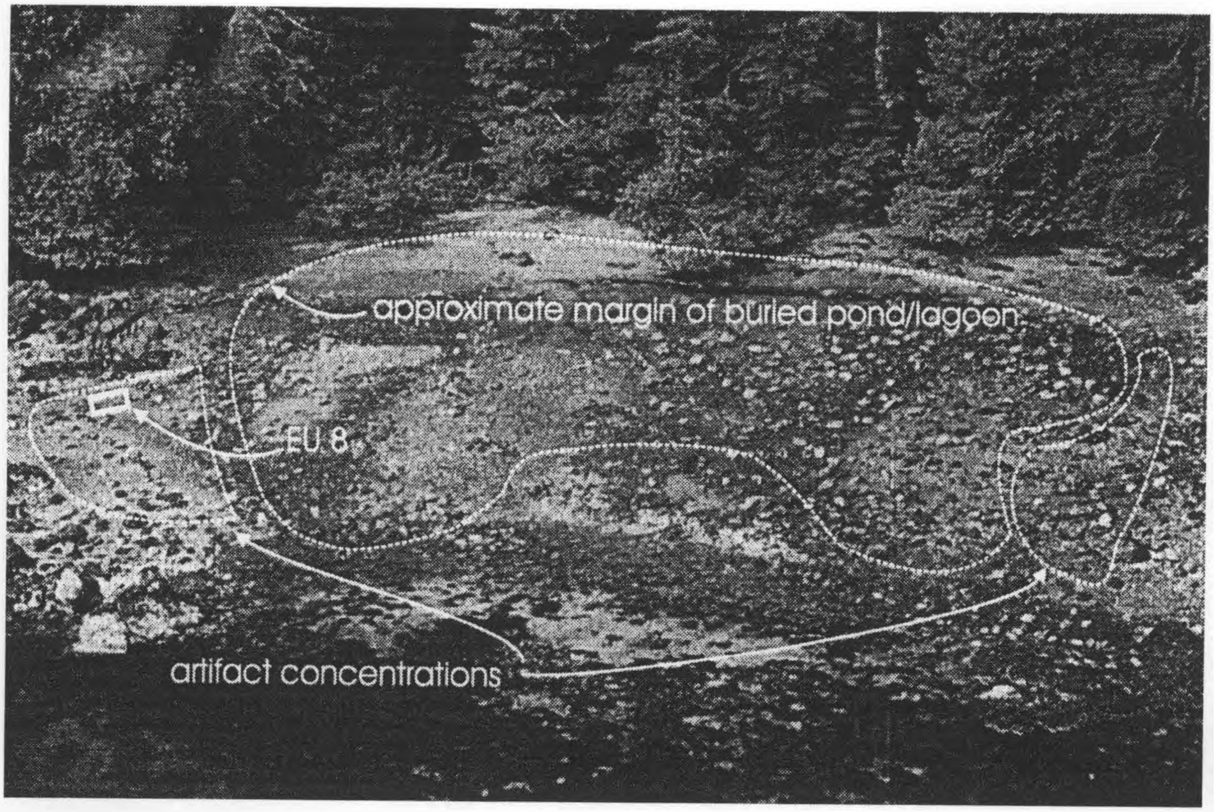

Figure 3:7. **The Kilgii Gwaay Site.**

Table 3:3. Kilgii Gwaay Radiocarbon Dates.

Lab# (CAMS)	Provenience	Material	Datum m bht	Depth cm	14C age BP	Calendar years ago -1 sigma, mean, + 1 sigma	Comment
Test Unit 3							
70704	1325T3	bone	2	45	9460 ± 50	11036, 10690, 10583	Bone, shell layer
Excavation Unit 8B							
76666	1325T8B	charcoal	2	24	9430 ± 50	10733, 10641, 10578	Bone, shell layer
77248	1325T8B	charcoal	2	24	9410 ± 50	10725, 10610, 10560	Bone, shell layer
76667	1325T8B	shell	2	24	9440 ± 50	10737, 10642, 10579	Bone, shell layer
79681	1325T8B	shell	2	31	9420 ± 50	10729, 10640, 10562	Bone, shell layer
79682	1325T8B	charcoal	2	31	9260 ± 40	10500, 10444, 10289	Bone, shell layer
76668	1325T8B	charcoal	2	40	9230 ± 50	10491, 10314, 10248	Bone, shell layer
76669	1325T8B	Shell	2	40	9540 ± 40	11068, 10995, 10697	Bone, shell layer
79683	1325T8B	Shell	2	40	9440 ± 40	10734, 10642, 10581	Bone, shell layer
79684	1325T8B	charcoal	2	40	9340 ± 40	10636, 10557, 10431	Bone, shell layer
76670	1325T8B	charcoal	2	52	9850 ± 40	11233, 11226, 11198	Paleosol below bone, shell layer
Excavation Unit 8A							
77720	1325T8A	Shell	2	50	650 ± 40	658, 578, 559	Marine gravel
Excavation Unit 8C							
77719	1325T8C	Shell	2	50	440 ± 40	517, 507, 479	Marine gravel
Pollen Core 2							
79685	1325TC2	Shell	2	120	8670 ± 40	9692, 9575, 9549	Base of shell hash
79686	1325TC2	Seed	2	307	12420 ± 60	15371, 14345, 14220	Lower pond sediment

History of Research

In 1991 the Haida archaeologist, Captain Gold, found Kilgii Gwaay and collected some 1500 lithic artifacts from the surface. The site was visited several times in the following years but it was not until 2000 when a fuel storage facility was proposed for the area that more detailed investigations were initiated. In 2000 the site was mapped and two 50 cm-square test units excavated to determine whether buried cultural deposits were present. A small collection of stone tools, faunal remains and waterlogged wood was recovered. A splinter of bone was dated to 9460 [cal 10,700] BP and a surprisingly diverse fauna identified. In 2001 and 2002 further work was undertaken, including surface collection, block excavation and sediment coring.

Stratigraphy and Dating

At Kilgii Gwaay the archaeological record is present in both surface and subsurface contexts. Excavations and subsequent analyses indicate that the subsurface archaeological record includes both *in situ* and disturbed (context compromised by burrowing shellfish or erosion) cultural material. Where intact, basal deposits at Kilgii Gwaay include glacial clays and diamicton that are overlying early post-glacial organic-rich sediment. The organic sediment includes paleosols

Figure 3:8. **Kilgii Gwaay Excavations in 2002 showing Excavation Unit 8 at center and Stratigraphic Detail in inset at left.**

in formerly terrestrial context, and peat and gyytja (highly organic lacustrine sedi-ment) in the area of the ancient pond. The paleosol was observed to be overlain by cultural deposits containing lithic artifacts, faunal remains and waterlogged plant material in most areas of the site tested; however, these appear to be *in situ* in only a few small areas. Preservation of organic material is variable among the areas excavated. The cultural deposits were best preserved in Excavation Unit 8, a 1 by 2 m excavation block at the western edge of the site. In Unit 8 *in situ* shell-rich cultural deposits are directly underlain by shell-free cultural deposits (Figure 3:8). Excavations at the edge of the ancient pond encountered abundant cultural material including waterlogged wood.

Material Culture

Archaeological material recovered from preliminary work at Kilgii Gwaay includes lithic artifacts Figure 3:6 i,j), vertebrate and invertebrate fauna, and waterlogged wood.

Faunal remains recovered in 2001 include abundant intertidal shellfish, dominated by California mussel, as well as a broad variety of vertebrates (Table 3:4). The vertebrate fauna include a number of specimens (n = 94) with evidence of cultural modification including chopping scars, cut marks, splintering and burning. The assemblage is dominated by maritime species.

The botanical assemblage includes a small number of pieces of waterlogged wood with evidence of cultural modification. These include specimens with evidence of chopping and whittling.

Table 3:4. Kilgii Gwaii Fauna.

Mammals	NISP	**Birds**	NISP
Black bear *Ursus americana*	54	Red-necked grebe *Podiceps grisegena*	1
River otter *Lontra canadensis*	3	Medium grebe Podicipedidae	2
Sea otter *Enhydra lutris*	10	Snow goose *Anser caerulescens*	1
Sea lion Otaaridae	2	Small scoter *Melanitta sp.*	1
Harbour seal *Phoca vitulina*	36	Medium duck Anatidae	3
Fish		Common murre *Uria aalge*	2
Skate *Raja sp.*	5	Pigeon guillemot *Cepphus columba*	1
Dogfish *Squalus acanthias*	27	Rhinoceras auklet *Cerorhinca monocerata*	8
Pacific herring *Clupea pallasii*	1	Cassin's auklet *Ptychoramphus aleuticus*	30
Salmon *Oncorhynchus sp.*	1	Medium alcid Alcidae	4
Rockfish *Sebastes sp.*	473	Small alcid Alcidae	5
Greenling *Hexagrammos sp.*	8	Common raven *Corvus corax*	1
Striped seaperch *Embiotoca lateralis*	1	Cackling Canada goose *Branta canadensis minima*	1
Halibut *Hippoglossus stenolepis*	3	Double-crested cormorant *Phalacrocorax auritus*	2
Cabezon *Scorpaenichthys elongatus*	15	Albatross cf. short-tailed *Diomedea cf. albatrus*	16
Sculpin sp. Cottidae	3		
Irish lord sp. *Hemilepidotus sp.*	1		
Lingcod *Ophiodon elongatus*	31		

Lithic artifacts from 2001 excavated contexts at Kilgii Gwaay (n = 1853) are dominated by secondary core reduction detritus but include a number of flakes and unifacially modified tools as well as a few pieces of biface reduction debitage. No bifacial tools were recovered and there was no evidence of microblade technology. All material appears to be of local provenance with more than 95% closely similar to the high quality basalts available at Benjamin Point, a few kilometres to the northeast. Comprehensive analysis of the lithic assemblage is being conducted under the auspices of an anthropology M.A. at the University of Victoria.

Summary and Future Directions

Although only a few very early Holocene archaeological sites have been excavated in Haida Gwaii the material record from these sites and the identification of a large number of other sites of similar age indicates that human presence was well established by 9500 [cal 10,800] BP. Sea level research has shown that any earlier coastal occupation sites will be drowned with significant logistical challenges to discovery and investigation. It is unlikely that the 9500 [cal 10,800] BP sites represent the initial occupation of the area and the discovery of a stone tool on a deeply drowned ancient landscape in Werner Bay (Fedje and Josenhans 2000) hints at human presence by ca. 10,000 [cal 11,400] BP.

Richardson Island and Kilgii Gwaay support the idea of a very long history of maritime adaptation in Haida Gwaii. These sites were occupied during a time of rapid environmental change and the inhabitants clearly possessed a broad array of technological skills enabling them to adapt to this change and succeed in the physically challenging environment of this isolated island archipelago. Both the archaeological record from these sites and the evidence for a substantial, archipelago-wide, distribution of sites of similar age suggests these people were not newcomers and by extension, the likelihood that sites predating the ca. 9500 [cal 10,800] BP limit of the current record will eventually be discovered.

The paleoenvironmental record helps us understand why the archaeological record is currently limited to Holocene time,

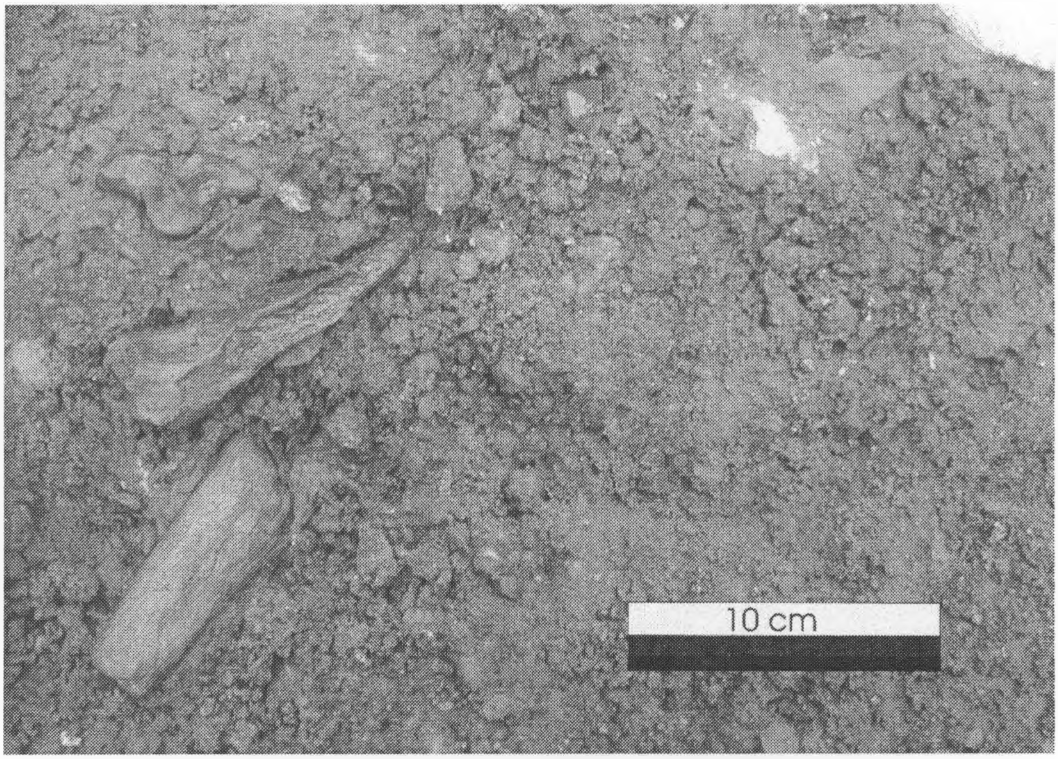

Figure 3:9. **Detail of Activity Area in Excavation Unit 8 at Kilgii Gwaay.**

and provides direction for investigations to determine whether the human history of the Northwest Coast extends to early post-glacial time. One approach we have initiated in order to mitigate these challenges is the development of a more intensive program of karst investigation. There are extensive limestone deposits with associated karst in Haida Gwaii and a number of potentially significant cave systems have been identified within the last few years. Caves and associated features are a common focus for animals and people, either for hunting or shelter, and it is likely that these would have had even greater importance in early post-glacial time when terrestrial fauna such as bear and caribou may have been more abundant, and intertidal and anadromous resources potentially less so. Another approach is our ongoing research into east Hecate Strait paleoecology (Fedje and Mackie 2001), in order to detail local sea level histories and permit modeling of paleoshorelines. It is hoped that these data will help focus archaeological survey of ancient coastal landscapes distant from the modern shore.

In sum, although it can be demonstrated that the coastal margin along the Northwest Coast was biologically productive and suitable for human occupation and movement prior to 12,000 [cal 14,000] BP, the archaeological record currently extends no earlier than about 10,300 [cal 11,600] BP (Dixon 1999). In Haida Gwaii the record of human history has been pushed back at least two millennia in the past decade (to 9500 [cal 10,800] BP and possibly 10,000 [cal 11,400] BP) and it is anticipated that this history can be extended further by continuing to employ paleoenvironmental reconstruction as a key tool in archaeological investigation.

Acknowledgements

The work at Richardson Island and Kilgii Gwaay has been funded by Gwaii Haanas Archipelago Management Board, Parks Canada Archaeological Services and by a University of Victoria grant from the Canada Social Sciences and Humanities Research Council. Gwaii Haanas provided project approval and logistical support. The archaeological team included Haida archaeologists Allan Davidson, Tom Green, Jordan Yeltatze and Sean Young; and Parks Canada and University of Victoria archaeologists Marty Magne, Ian Sumpter, Quentin Mackie, Joanne McSporran, Cynthia Lake and Trevor Orchard. Ian Sumpter (invertebrates) and Becky Wigen (vertebrates) carried out the faunal analyses. John Southon and the team from CAMS at Livermore conducted radiocarbon dating. The previously unpublished K-1 dates are courtesy of Carol Ramsey, Paul Griffiths, Becky Wigen, and Quentin Mackie.

CHAPTER 4

The Early Component at Ts'ishaa, an Outer Coast Site on Western Vancouver Island

Alan D. McMillan

Introduction

This paper presents recent results of the Tseshaht Archaeological Project, in Barkley Sound, western Vancouver Island. In particular, I report the findings from the early component, located on a raised landform at the back of the large outer-coast ancestral Nuu-chah-nulth village of Ts'ishaa. This research, co-directed by Denis St. Claire and myself, has been a cooperative venture with the Tseshaht First Nation and Parks Canada. As the analysis of recovered materials is at an early stage, the results reported here are preliminary.

"Early" in this paper is used in a relative sense. Elsewhere on the Northwest Coast the term generally implies an age greater than 5000 years (Carlson 1996). No such "early" dates have been reported previously for western Vancouver Island, a fact that reflects sea level history in this region and the restriction of previous archaeological attention to sites associated with modern tides. The recent work at Ts'ishaa, however, extends our knowledge slightly beyond this chronological barrier.

The site of Yuquot (DjSp 1), near the outer coast of Nootka Sound, has long held claim to the oldest radiocarbon dates in ethnographic Nuu-chah-nulth territory. The earliest, a date of 4230±90, is based on charcoal from sand and pebbles at the base of the cultural deposits and presumably refers to the initial occupation of this large village site (Dewhirst 1980:37). Calibration of this date (at two sigma) extends the initial occupation back to between 4530 and 4990 BP (Hutchinson 1992:14). Dewhirst (1980) argues for continuity throughout the cultural sequence at Yuquot, leading directly to the historic Nuu-chah-nulth of Nootka Sound. The Yuquot data featured prominently in Mitchell's (1990) definition of the West Coast culture type and shaped his view that this was a stable adaptation with little change over the last 5000 years.

More recent research in Barkley Sound, however, has provided dates that rival Yuquot and has yielded assemblages that challenge the prevailing view of long-term continuity (McMillan 1998). At the western edge of the sound, at Ucluelet, the Little Beach site (DfSj 100) provided two basal dates of 4000 radiocarbon years (calibrated 4240 to 4820 BP). A small sample of stone artifacts suggested markedly different cultural affiliations than the lower deposits at Yuquot (Arcas Consulting Archeologists 1991). Nearby, the large village site of Ch'uumat'a (DfSi 4) provided equally early dates from the deep back portion of the site, and yielded a larger sample of chipped stone and other artifacts that resembled those from Little Beach (McMillan and St. Claire 1996; McMillan 1999). At all three sites, the basal dates came from beach sands with water-rolled shell and artifacts now well above the high tide line, indicating that sea levels were significantly higher at the time of initial occupation.

Ts'ishaa Excavations

More compelling evidence has recently come from the large village of Ts'ishaa (DfSi 16) on Benson Island, one of the outer islands of the Broken Group in central Barkley Sound (Figure 4:1). This large village site was the original homeland of the Tseshaht, a Nuu-chah-nulth group now resident in Port Alberni, whose traditional territories encompassed all of central Barkley Sound (McMillan and St. Claire 2001). Not only do they derive their name from this site (Tseshaht literally means "people of Ts'ishaa"), but in their oral traditions it was at this location that First Man and First Woman came into being (Sapir and Swadesh 1955:52-

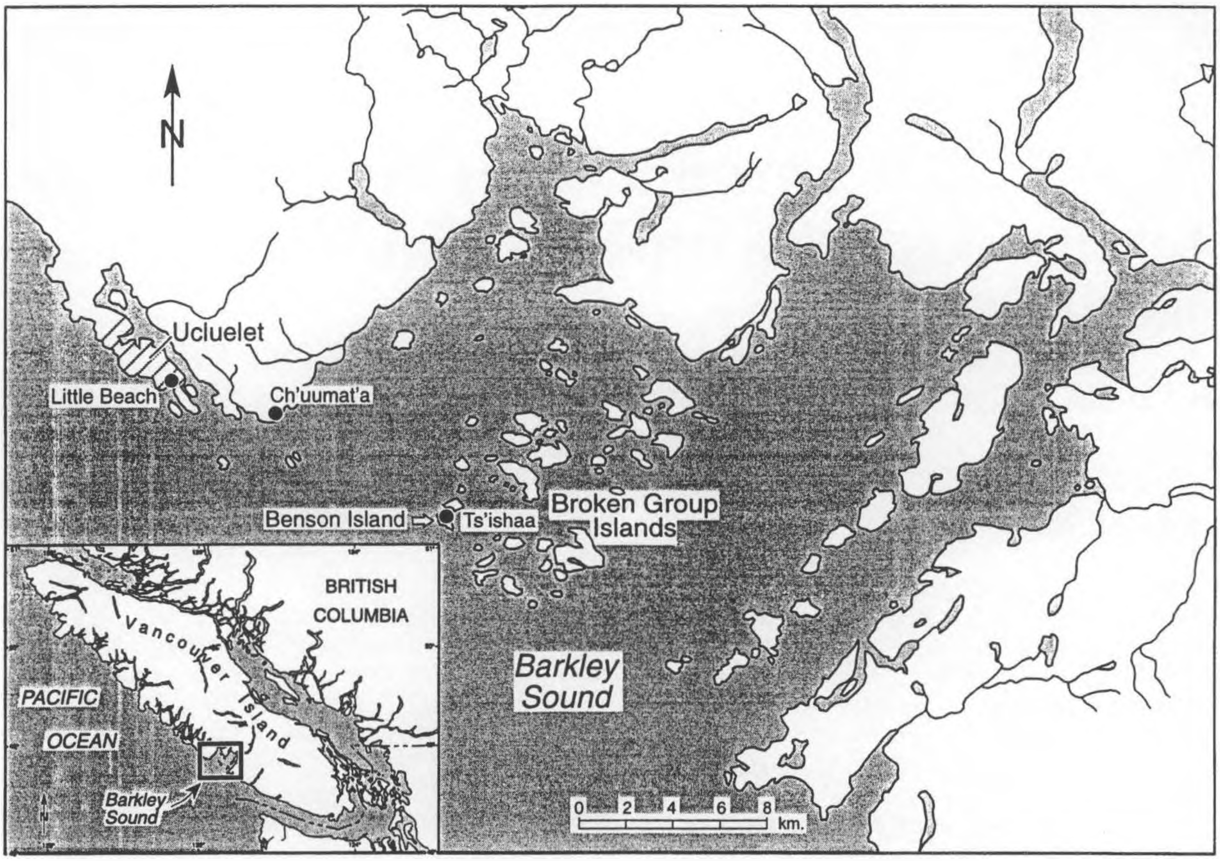

Figure 4:1. **Map of Barkley Sound, western Vancouver Island, showing location of Ts'ishaa on Benson Island.**

53). Early in the 20th century knowledgeable Tseshaht individuals provided the anthropologist Edward Sapir with extensive accounts of the history and social groups associated with this site. Over three seasons, from 1999 to 2001, we excavated in three widely separated portions of the site, in extensive shell midden deposits up to 3.7 m in depth (McMillan and St. Claire 2000, 2001). The artifact assemblage, dominated by small bone implements such as points and bipoints, falls within the West Coast culture type. A series of radiocarbon dates from across the site places its history within the last two millennia.

One small area of the site, however, provided evidence of earlier occupation and yielded a distinctly different artifact assemblage. Probing detected midden deposit on a relatively flat elevated area behind the main village, separated from it by a gully for most of its length. This back ridge portion of the site stands about four metres above the main village area. When the cultural deposits are removed from consideration, however, the base of the back portion of the site stands six to seven metres above the original beach at the base of the main village area. We interpreted this area as representing an earlier occupation at a time of higher sea levels and began test excavation there in 2000 and larger scale excavation in 2001 (Figure 4:2).

Friele (1991), Hutchinson (1992), and others (Friele and Hutchinson 1993; Boxwell et al. 2000) have examined Holocene relative sea level history on central western Vancouver Island. They have proposed a sea level curve that is based primarily on Clayoquot Sound data, although it incorporates some information from Barkley Sound and is believed to reflect sea level history for the entire region (Figure 4:3). Hebda's work at several locations in the Broken Group islands of Barkley Sound, for example, indicates that early Holocene sea levels stood at least 10 metres below present levels (Hutchinson 1992:37). From these early Holocene lows, the relative sea level rose rapidly to intersect the modern beach just prior to about 7000 cal BP. In Barkley Sound this sea level rise is marked by freshwater peats in island bogs that are overlain

Figure 4:2. **Excavation along the Back Ridge Portion of the Ts'ishaa Site.**

Table 4:1. Radiocarbon dates from the Ts'ishaa early component.

Lab No.	Lab Date	*Calibrated range (2 sigma)*	*Intercept Date*	Comments
Beta-158739	430+/-46	BP 540 to 320	BP 500	Upper silt layer – date rejected
Beta-158740	3000+/-70	BP 3360 to 2960	BP 3210	Shell layer
Beta-158744	3050+/-70	BP 3390 to 3050	BP 3260	Upper shell layer
Beta-158742	3330+/-70	BP 3710 to 3390	BP 3570	Shell layer
Beta-147071	3580+/-80	BP 4090 to 3670	BP 3870	Base of shell layer
Beta-158745	4080+/-70	BP 4830 to 4410	BP 4540	Brown silt-clay
Beta-158747	4160+/-70	BP 4850 to 4440	BP 4720 (average)	Near base of shell layer
Beta-158743	4430+/-80	BP 5310 to 4840	BP 5010 (average)	Red-brown clay at base
Beta-158741	4470+/-70	BP 5310 to 4860	BP 5050	Surface of red-brown clay, with cultural materials
Beta-147073	5050+/-60	BP 5920 to 5640	BP 5810 (average)	From red-brown clay at base

by marine deposits dating to around that time (Hutchinson 1992:37). The relative sea level continued to rise and reached three to four metres above present, where it remained from about 6000 to 4800 cal BP, a period termed the Ahous Bay Stillstand by Friele (1991). Subsequent gradual emergence of the land relative to the sea through the late Holocene is attributed to tectonic uplift (Friele 1991; Friele and Hutchinson 1993; Boxwell et al. 2000).

This research indicates that the area that later became the village of Ts'ishaa would have been an active beach during the period of mid-

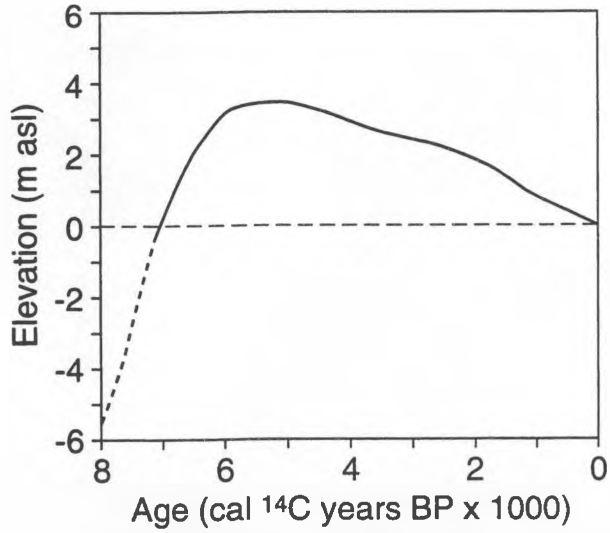

Figure 4:3. **Reconstructed Holocene Sea Level History for central western Vancouver Island (based on Friele 1991, Friele and Hutchinson 1993, Boxwell et al. 2000).**

Holocene higher sea levels, with highest tides coming right to the rise below what is now the back ridge. Radiocarbon dates from this portion of the site provide supporting evidence. Our oldest date, from the clay at the base of the deposit, is 5920 to 5640 cal BP. Two other dates, from similar contexts, are roughly 5300 to 4800 cal BP. These correspond very closely to the proposed period of higher sea levels, the Ahous Bay Stillstand.

Radiocarbon dates from throughout the deposits (Table 4:1) demonstrate that this back area of the site had been in use for over 2000 years. The upper stratum, consisting of black silt and rocks, contained a number of highly distinctive artifacts, including a large biface of obsidian from Glass Buttes in Oregon, several large stemmed and faceted ground slate points (Figure. 4:4), and large bone points with barbs produced by shallow notches. All were found clustered in a small area and may be mortuary offerings as several burials were encountered nearby. In addition, crudely chipped stone objects were abundant throughout this layer. These consist of schist knives, choppers based on cobbles or large cortex spalls, large retouched flake scrapers, and numerous smaller flakes and split pebbles, many showing evidence of a bipolar flaking technology (Figure 4:5). Chert and vein quartz microliths are particularly common. Although this layer is undated, its age is estimated at 2500 to 3200 BP, based on dates from the underlying stratum and the close similarity of several distinct artifact types with the

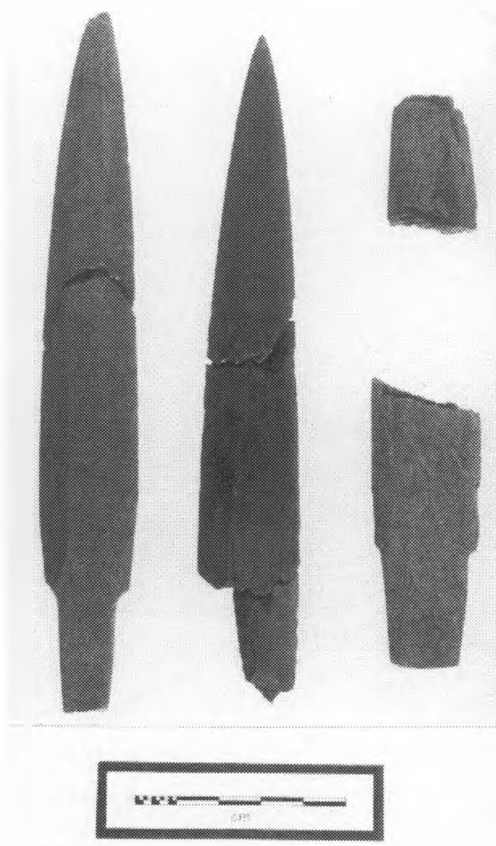

Figure 4:4. **Ground Slate Points from the Upper Layer of the Ts'ishaa Back Ridge.**

Locarno Beach stage in the Strait of Georgia. These include the large stemmed and faceted ground slate points and the large bone points with shallow enclosed barbs, both of which have close counterparts in Locarno Beach assemblages (Matson and Coupland 1995:158-9).

A shell layer underlies this upper stratum along the eastern portion of the back ridge. It is most extensive at its eastern end, which would have been a point extending out over the former high tide line. Here it reaches over two metres in depth, with bracketing dates of 3260 cal BP at the top and 4720 cal BP near the base. Along the back of the site the shell layer is much less extensive, with two dates of 3210 cal BP and 3570 cal BP. Another date of 3870 cal BP was obtained from a silt and shell stratum just above the basal clay.

Figure 4:5. **Chipped Stone from the Ts'ishaa Back Ridge (upper row: bipolar cores and flakes; lower row: chert and vein quartz microliths).**

The shell disappears completely or is restricted to a few isolated pockets along the northern and western portions of the back ridge. In these areas a brown silty-clay directly underlies the black silt of the uppermost stratum. Stone flakes, split pebbles, and choppers were relatively common. Abrasive stones were also numerous, including several decorated examples. A particularly finely-made sandstone abrader, with an incised triangular design around its raised outer surface, was found directly below a charcoal sample dated to 4540 cal BP, the only date available from this layer.

At the base of the deposit is reddish-brown clay, which sits directly on bedrock at the back of the site although it is of considerable depth closer to the slope down to the later village. It is likely marine, or possibly glacio-marine, in origin. Crushed shell and charcoal extend into its upper surface, likely as a result of trampling during the earliest occupation of this landform. One sample from this type of context yielded a result of 5050 cal BP, which may date the initial occupation. The earliest date obtained from the site, 5920 to 5640 cal BP, came from charcoal within the clay matrix, but cannot be conclusively shown to refer to a cultural event. No artifacts, shell, or other cultural materials were in direct association, although the charcoal was collected a very short distance below the base of the lowest shell layer.

Faunal remains have not yet been analyzed. Bone is poorly preserved in the non-shell layers. Nevertheless, sea mammal bones, most large enough to be identified as whale, were relatively commonly encountered. A fully maritime way of life seems to date to the earliest occupation, as would be expected for this outer island location.

Comparisons and Conclusions

The lithic materials from the Ts'ishaa back ridge resemble those from Ch'uumat'a, Little Beach, and the Hoko River site on the Olympic Peninsula. Traits such as quartz microliths and bipolar split pebbles, chipped schist knives, and large faceted ground slate points seem particularly akin to Hoko River (see Croes 1995). All resemble Locarno Beach assemblages in the Strait of Georgia, with which they are contemporaneous. The earliest Ts'ishaa materials, along with those from the lowest levels at Ch'uumat'a, also overlap with the Charles culture in the Strait of Georgia. All are markedly dissimilar to contemporaneous materials from the earliest levels at Yuquot, where stone tools (with the exception of abraders) are relatively rare and chipped stone almost absent (Dewhirst 1980).

The predominance of stone in the Ts'ishaa back ridge assemblage (68.8% of the total), particularly chipped stone (43.4%, including unmodified flakes), also makes this area markedly dissimilar to the later village at Ts'ishaa, where stone makes up only 10.6% of the total and chipped stone objects are rare (0.7%). One possible explanation for this apparent discontinuity involves ethnic replacement, with a relatively late arrival of Nuu-chah-nulth culture in the Barkley Sound area (McMillan 1998). On the other hand, Croes (1989; 1995:227-8) interprets changes in the stone and bone artifact assemblages as reflecting sequential economic stages, while viewing styles of basketry preserved at Hoko River as indicating ethnic continuity to the historic inhabitants of the area.

Ts'ishaa, now with the oldest radiocarbon dates for a site in ethnographic Nuu-chah-nulth territory, extends the known history of this region back in time to just over 5000 cal BP. It also serves as one more reminder that the complex sea level history of this region needs to be better understood and taken into account in regional archaeological studies. Although evidence of early Holocene occupation may have been lost to rising sea levels, additional mid-Holocene sites should be sought at higher elevations than the large village locations of later times. Although we now have considerable information on late Holocene Nuu-chah-nulth culture from a number of sites, the earlier history of this region remains largely unknown.

Acknowledgements

In this tribute volume, I would like to acknowledge Phil Hobler's early interest in the relationship between archaeological sites and sea levels, as well as his work with early lithic assemblages at several locations on the coast. The research reported here was cooperatively funded and supported in various ways by Parks Canada and the Tseshaht First Nation. Denis St. Claire co-directed the project with the author. Ian Sumpter participated in the project as a Parks Canada representative and Jim Stafford served as field supervisor on this portion of the site.

CHAPTER 5

Alpine Archaeology and Oral Traditions of the Squamish*

RUDY REIMER

Introduction

Intense vertical relief dominates the Coast Range Mountains of southwestern British Columbia (Figure 5:1), part of the traditional territory of the Squamish people. Many mountains rise from sea level or valley bottoms to elevations of over 2000 meters in less than 1-kilometer horizontal distance. The Coast Range has been shaped by both vulcanism and heavy glaciation as well as by influence from the adjacent marine environment. In this paper I examine the connections between Squamish culture and this mountainous terrain with a specific focus on the sub-alpine and alpine areas of the southern Coast Range within Squamish traditional territory (Figure 5:2), and without the notion of this landscape as a barrier to human use.

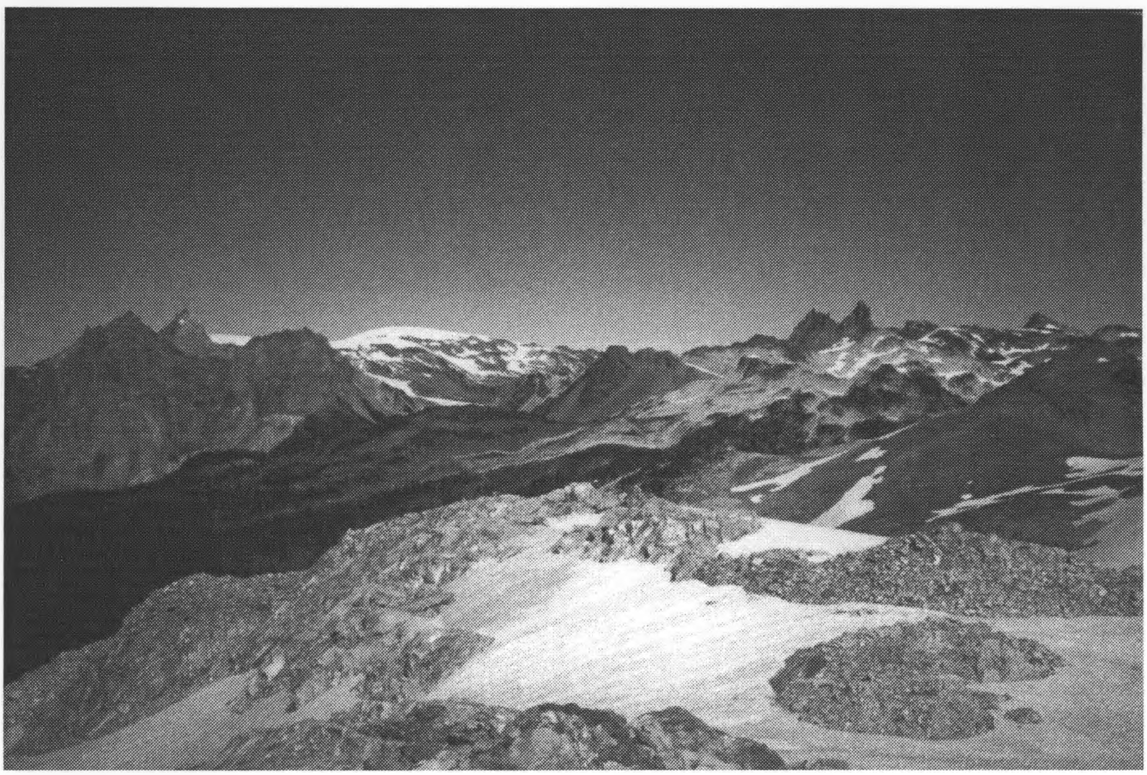

Figure 5: 1. **The Southern Coast Mountains of the Squamish Area.**

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*All cultural information and material presented in this paper is the sole property of the Squamish Nation.

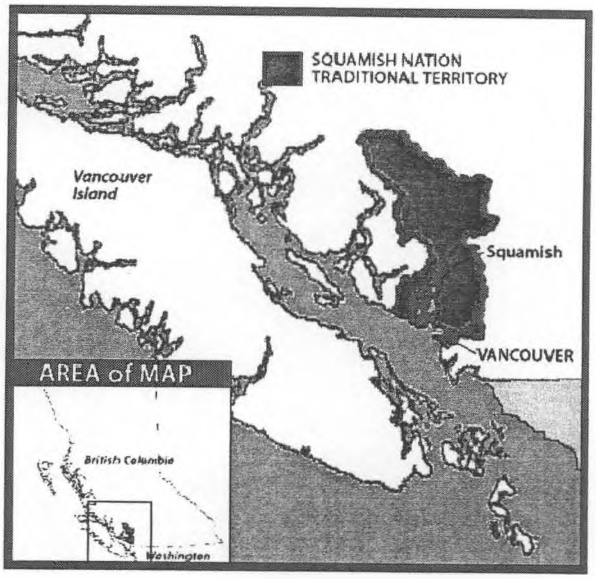


Figure 5:2. **Squamish Nation Traditional Territory.**

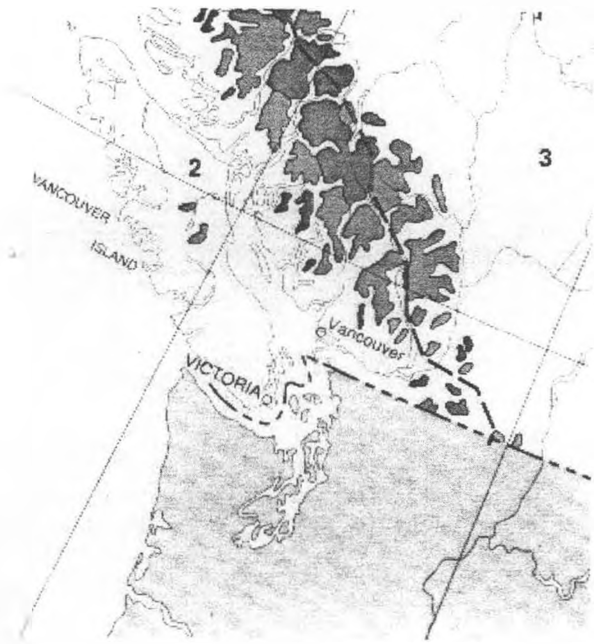


Figure 5:3. **Glacial Areas along the south Coast of British Columbia.**

This review of the role of mountains in traditional Squamish life illustrates that there are many intriguing themes that offer insights for researchers in the fields of archaeology, anthropology and geology. Many of the Squamish people's traditional beliefs, stories, legends and activities took place in this mountainous terrain. The information in this paper combines traditional knowledge with archaeological knowledge so that these mountainous areas that are sometimes viewed as harsh and inaccessible can now be viewed as areas that have a unique, complex, natural and cultural relationship.

The Modern Landscape

The main water drainage in the study area is the Squamish River, of which the Cheakamus, Mamquam, Elaho and Ashlu are its major tributaries. Physiographically the area is highly mountainous, with summits reaching 2000-3000 meters. In Figure 5:3, the distribution of glaciers along the south coast of British Columbia is variable. Dark areas mark low mountains with less than 10% glacial ice cover, light areas are mountains of moderate elevation and 10-40% glacial ice cover, medium areas are mountains of high elevation with 40-60% glacial ice cover (Ryder 1998:1-39). With a maritime weather influence of heavy winter snow packs, many of these areas are still in an ice age.

Notable peaks include Mount Garibaldi, the Black Tusk, Mount Fee, Mount Cayley, the Tricuni Peaks and Tantalus Range. On these mountains the topography can range from steep and rugged, to gentle sloping meadow tablelands, creating habitats suitable for a diversity of plants and animals. In rocky areas little in the way of plant or animal life exists, yet on the alpine meadows several species of plants and animals reside. Plants that grow at high elevations often ripen later than their lowland equivalents. Animals and people are aware of this seasonal "up-slope ripening" and hence follow the fresh food up-slope in the late summer to early fall seasons. (Arno and Hammerly 1984; Pojar and McKinninon 1994).

In total, the modern environment of the Squamish region includes three biogeoclimatic zones (Meidinger and Pojar 1991:52). First the Coastal Western Hemlock zone lies at low elevations near the ocean and along river valleys, second the Mountain Hemlock zone lies above the Coastal Western Hemlock, up to elevations of approximately 1200 meters (Meidinger and Pojar 1991:113-124; Pojar and McKinnon 1994:15-20). Its growing season is short due to the heavy snow packs common along the Coast Mountains (Arno and Hammerly 1984; Ryder 1998: 1-38). At higher elevations the Mountain Hemlock zone becomes patchy and eventually becomes subalpine parkland. Trees such as subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*) are found at higher elevations and are separated by an interfingering heath and meadow alpine plant communities (Arno and Hammerly 1984:95-97; Woodward et al. 1995:217-225). Third and above the Mountain Hemlock Zone is the Alpine Tundra Zone (Meidinger and Pojar 1991:263-274; Bennet 1976). Essentially treeless, it has a very short growing season and all plant growth is stunted in size (Lettmerding 1976). Alpine plant communities can be divided into three main types, Subalpine Parkland, Heath, and Mountain Meadow (Arno and Hammerly 1984:102-107; Pojar and McKinnon 1994:15-20).

Notable mammal species that seasonally inhabit alpine areas are black bears (*Ursus americanus*), grizzly bears (*Ursus artos horriblus*), mountain goats (*Oremanus americanus*), elk (*Cervus canadiaesis leucodontus*), deer (*Odocoilus hemionus hemionus*), snowshoe hare (*Lepus americanus pallidus*), and yellow-bellied marmots (*Marmmota flaviventis avara*) (Chadwick 1983; Lee and Fundenberg 1982 a and b; Reichel 1986:111-119). These mammals prefer no individual plant community (Chadwick 1983; Lee and Fundenberg 1982a and b), although many smaller animal species prefer the subalpine parkland and mountain meadows to heath communities. Heath plant communities are more typical of stable sub-alpine habitats and hence are considered to be a more developed mature, but less diverse plant community (Reichel 1986:111-119).

Bird species that seasonally inhabit the alpine region include Canada goose (*Branta canadiaensis*), grouse (*Dendragrapus abscurus*) and ptarmigan (*Lagopus lecurus*) (Meidinger and Pojar 1991:272).

The Ancient Landscape

The landscape of the Squamish region has been transformed numerous times. The current environmental setting described above is a fairly recent phenomenon. A complex series of geological units lies at the base of this landscape. The Coast Mountains of the south coast are made up of large lava flows (ca. 145-65+ million years old). This plutonic complex served as a foundation on which more recent lava flows were built (Brooks and Friele 1992:2425-2428; Jounrneay et al. 1996). These recent lava flows range in age ca. 2.3 million to 10,000 [cal 11,400] years BP. Most notable of these recent eruptive lava flow events (12,000-10,000 [cal 14,000-11,400] BP) are those of the stratovolcano, Mt. Garibaldi, whose many eruptions built up a cinder cone on top of a solid dacite core (Mathews 1975). Many of these eruptions spilt lava on top of Wisconsinan glacial ice and created numerous flows and patchy outcrop deposits of basalt, andesite, dacite, rhyodacite and an obsidian like material geochemically defined as "glassy rhyodacite" (Carter 2000: 9-27; Reimer 2000).

At 12,000 [cal 14,000] BP sea levels were approximately 200m above present day levels. The marine limit was located just south of the Elaho and Squamish river confluence, some 50 km north of the present day Squamish river delta (Freile and Clague n.d.). As deglaciation of the Squamish valley took place ca. 10,700-10,200 [cal 12,400-11,700] BP the southwestern slopes of Mt. Garibaldi fell into the lower Squamish River Valley, creating the Creekeye fan deposits (Freile and Hickon n.d). Examinations of backhoe trench profiles of this fan deposit indicate that sea levels were 30-40m above present day levels. By 9800 [cal 11,300] BP sea levels fell to 30m above present levels (Freile and Clague n.d.; Freile and Hickon n.d.) and the rise in temperature of the early Holocene warm interval pushed tree lines 60-120m up slope (Clague and Mathews 1989:277-280; Clague et al. 1992:153-167; Evans 1997:81-92; Hebda 1995:55-79). This shift in tree line altered mountain plant and animal communities, by either expanding or shrinking specific habitats (Figure 5:4).

The curves in Figure 5:4 indicate the relationship of the proportion of land area and altitude in two south coast mountain drainage basins. In these coast mountain basins alpine areas presently occupy 38 and 17% of the area. A 200m rise in timberline would reduce this to 21 and 3% respectively, and would have probably affected plant, animal, and human use of these areas (Reimer 2000; Ryder 1998:17).

By 8000 [cal 8900] BP sea levels dropped 12m below present day levels, yet by 6000 [cal 6800] BP sea levels had risen to 4m below present day levels. Also by 6000 [cal 5800] BP the Squamish river delta had aggregated to or near the confluence of the Ashlu River, or approximately 28 kilometers north of its present day position (Freile and Clague n.d.; Freile and Hickon n.d.). The tree line remained at 60-120m above present day positions until ca. 6000 [cal 5800] BP when temperatures dropped slightly but precipitation increased, resulting in the Garibaldi phase of neoglaciation (Mathews1975; Porter and Danton 1967:177; Ryder and Thompson 1986; Ryder 1989:74-76). Again this altered plant and animal distributions (Reimer 2000). By 5000 [cal 5700] BP a)

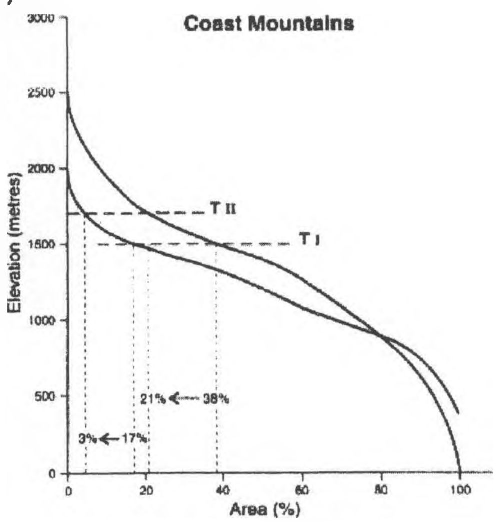


Figure 5:4. **A Hypsographic curve for the south Coast Mountains (after Ryder 1998:17).**

the climate had changed to near present-day conditions and the tree line to near present day elevations.

From 6000 to 2250 [cal 6800-2300] BP sea levels had risen to near present-day levels, and remained relatively stable until modern times. Falling from the slopes of Mt. Cayley ca. 4800 [cal 5500] BP a large landslide impounded the Squamish River for a short time period (Evans and Brooks 1991:1365-1374; Brooks and Hicken 1991: 1375-1385). This large landslide event may have had an impact on the Squamish river salmon runs. By 3000 [cal 3100] BP the Squamish river delta had moved as far south as the confluence of the Cheakamus River and Cheekeye fan deposits (Freile and Clague n.d.; Freile and Hickon n.d.). In the mountains ca. 3300-1900 [cal 3500-1850] BP the Tiedemann advance of neo-glaciation occurred, lowering tree lines and once again altering plant and animal distributions (Reimer 2000; Ryder and Thompson 1986; Ryder 1989:74-76). From 2250 [cal 2250] BP the Squamish river delta had moved south passed the Mamquam river and towards its modern position (Freile and Clague n.d.; Freile and Hickon n.d.). At 1100 [cal 1000] and 500 [cal 500] BP additional landslide events in the Mt. Cayley area impounded the Squamish River (Evans and Brooks 1991:1365-1374; Brooks and Hicken 1991: 1375-1385), possibly affecting salmon runs. Over the millennia the dramatic changes in the landscape would have had a profound effect on the plants, animals and people of the Squamish region. With all these modifications to the landscape, are there any correlative events recorded in the ethnographic accounts, and any archaeological signatures in these mountainous areas?

The Squamish People

The Squamish are a distinct part of the Coast Salish cultural group and speak their own unique language "Sko-mish" (Suttles 1990:453-475). The Musqueam to the south, the Sechelt and Lil'wat to the north, and the Tsleil-Waututh and Katzie to the south and east are Squamish neighbors (Suttles 1987).

Squamish traditional territory lies in the lower mainland region of southwestern British Columbia. The Squamish define the boundaries of their traditional territory (Figure 5:2) as follows: from Point Grey to Roberts Creek on the west, then north along the height of land to the Elaho river headwaters, including all of the islands in Howe Sound and the entire Squamish valley and Howe Sound drainage. The boundary then extends southeast to the confluence of the Soo and Green rivers north from Whistler, then south along the height of land to the Port Moody area, including the entire Mamquam river and Indian Arm drainage; then west along the height of land on the south side of Burrard Inlet to Point Grey.

Ethnographically the Squamish can be characterized as a semi-sedentary fishing, hunting and gathering group with a complex social and political structure. During winter months extended families lived in large, long, shed roof plank houses. These houses formed villages usually found along rivers and the ocean sides where inter-tidal and ocean resources could easily be obtained (Barnett 1955; Bouchard and Kennedy 1976 a and b; Bouchard and Turner 1976; Matthews 1955; Suttles 1990:453-475).

In summer the large family groups living in these villages spread out across the landscape for hunting, fishing, and gathering in all surrounding biogeoclimatic zones. The location of their temporary settlements was determined by the availability of important food resources or the resources desired for a specific need. In these temporary camps the Squamish built and lived in small mat lodge structures (Barnett 1955; Bouchard and Kennedy 1976 a and b Bouchard and Turner 1976; Matthews 1955 and Suttles 1990:453-475).

More detailed accounts of Squamish traditional life are found in (Barnett 1955; Bouchard and Kennedy 1976; and Bouchard and Turner 1976; Hill-Tout 1978: 27-56; Matthews 1955; Suttles 1990:453-475).

Squamish Accounts of High Altitude Resource Use

Fauna

The most commonly hunted animals by Coast Salish peoples at high altitudes were mountain goats (Bouchard and Kennedy 1976; Drucker 1953:7-50; 1955:51-52; Duff 1952:71-73; Kennedy and Bouchard 1983:25-40; 1990: 453-475). Several areas in the Squamish river drainage are ethnographically known for high altitude floral and faunal resource pursuits, especially mountain goats (see Bouchard and Kennedy 1976; Bouchard and Turner 1976; Hill-Tout 1978: 27-56; Kennedy and Bouchard 1983:25-40; Matthews 1955; Suttles 1990:453-475). Examples of areas that were noted for their abundance of mountain goats are the following:

> A number of mountains thirty kilometers north of the Squamish river mouth, where in the upper river valley there was a village traditionally known as "Pu'yam." The inhabitants of this village were well known for their skills in hunting mountain goats. The area surrounding this village is very mountainous, with some local mountains having specific names.
>
> The mountains above the northwest of the confluence of the Squamish and Cheakamus rivers "Kiyayekep Nexwyuxwm".
>
> The mountains above the Elaho river valley "Sxel'tskwut".
>
> Goat Ridge, a long mountain ridge southeast of the modern town of Squamish "Ntsewxsus".
>
> The mountains above Deeks Creek and the mountain now known as The Lions, which drains into Howe Sound. Traditionally these areas are known as "Ch'ich'iyu'y Elxwikn."
>
> The large mountains above the modern pulp mill Woodfiber were traditionally known as "Swi'ya't."
>
> The Tantalus Range is called "Tswilix" by the Squamish, is named after a legendary Mt. Goat hunter (Bouchard and Turner 1976; Bouchard and Kennedy 1976; Hill-Tout 1978: 27-56; Mathews 1955; Suttles 1990:453-475).

"Xwuxwelken", or gray haired head, is the Squamish name for a mountain goat. A young mountain goat is called "i7imkiya", while an old one is referred to as "sinakw". Mountain goats were hunted mostly after the rutting season in late November, when they are at their fattest and their fur is at it's best. When hunted in the spring mountain goat meat was said to have tasted like cedar, due to goats eating the tips of cedar boughs in times of deep snow (Bouchard and Turner 1976; Bouchard and Kennedy 1976; Duff 1952:71-73; Hill-Tout 1978: 27-56; Mathews 1955; Suttles 1990:453-475).

The actual hunting of mountain goats was considered dangerous, and was thus reserved for those with "the power" of the mountain goat. Even with the aid of specially trained hunting dogs and after receiving the power for hunting mountain goats, a young man must still apprentice under an older hunter. Eventually training would pay off in the reception of the power through a spirit quest. Spirits came to young men in dreams and while fasting in the wilderness (Bouchard and Kennedy 1976; Drucker 1955:51-52; Duff 1952:71-73; Hill-Tout 1978: 27-56; Kennedy and Bouchard 1983:25-40; Mathews 1955).

In following goats in the mountains the young men must "keep their smell from the goats" (Bouchard and Kennedy 1976: 45-46). If this could not be done, the goats could detect the hunters and success in the hunt would not be achieved. Masking their human smell, hunters would have to bath often, rub cedar boughs over their bodies and cover themselves with a mountain goat wool blanket. Obtaining enough mountain goat wool off the trees in highland areas, where mountain goats would rub themselves to shed their winter coats, would be one way to make a blanket. Another way a blanket could be obtained was when it would be passed down from an older hunter to a younger one. In addition to special powers, hunters who traveled into high country areas also carried a long pole or "alpenstock" to be used for aid in mountaineering in the steep slopes of the Coast Range (Bouchard and Kennedy 1976; Drucker 1955:51-52; Duff 1952:71-73; Hill-Tout 1978: 27-56; Kennedy and Bouchard 1983:25-40; Mathews 1955).

Going on a prolonged mountain goat hunting trip was called "tl'elhnayem". People with status owned areas, usually near their village, where mountain goats were hunted, (Bouchard and Kennedy 1976). Mountain Goat hunters would occasionally hunt alone, but three or more hunters usually comprised a hunting group. Mountain goats are very difficult animals to track, approach and hunt. A hunter would slowly stalk across mountain slopes and ridges in close connection with the surround terrain. Knowledge of predominant wind directions and natural hiding places such as large rocks and knolls would aid the hunter in stalking prey. Once the hunter got close enough to the mountain goat he would utilize a spear thrower, a bow and arrow or long spear to impale the mountain goat or in other cases drive the mountain goat(s) over a cliff (Bouchard and Kennedy 1976; Drucker 1955:51-52; Duff 1952:71-73; Hill-Tout 1978: 27-56; Kennedy and Bouchard 1983:25-40; Mathews 1955).

Once killed, a mountain goat could be used several ways. The meat could be cooked and eaten by boiling or roasting over a fire. A freshly killed mountain goat could also be cooked by igniting a fire with wood kindling within the rib cage of the goat. This would provide both heat and a cooked meal for the hunter. The meat could also be preserved by smoke drying in the mountains, and the fat could be rendered into cakes to be used later. Mountain goat fat was used to cover the skin in cold weather, or boiled down to make butter like cakes. The horns of a mountain goat were soaked in water to be made pliable, then split and shaped into spoons called "xa7lew" (Bouchard and Kennedy 1976; Bouchard and Turner 1976; Drucker 1955:51-52; Duff 1952:71-73; Hill-Tout 1978: 27-56; Kennedy and Bouchard 1976; Kennedy and Bouchard 1983:25-40; Mathews 1955).

The skins of the mountain goat were highly valued and figure in some of the legends of the Squamish people. A young man in pursuit of the woman he desired to marry could use the pelts of a mountain goat as a tribute payment to the woman's family. Mountain goat wool blankets were made by combining the wool with dog fur and the fluffy seeds of the fireweed plant (Bouchard and Kennedy 1976; Bouchard and Turner 1976; Hill-Tout 1978: 27-56; Kennedy and Bouchard 1983:25-40; Gustafson 1980:37-64; Mathews 1955:23-26).

In ceremonial contexts, mountain goat wool blankets were highly valued, and were distributed at potlatches as a sign of wealth. If not enough mountain goat wool blankets were acquired; the family holding the potlatch would tear up the existing blankets in order to give something to everyone. These blanket scrambles were common at larger feasts and potlatches (Barnett 1955; Bouchard and Kennedy 1976; Bouchard and Turner 1976; Gustafson 1980:37-64; Hill- tout 1978: 27-56; Matthews 1955:23-26; Suttles 1990:453-475).

Other animals hunted in the high mountains included deer and elk. These animals were hunted in much the same way as mountain goats. The meat and skins of these ungulates were used, but not viewed as high status items since the hunting grounds where these animals were obtained were not owned. High elevation areas where these animals were hunted include: The mountains above the confluence of the Squamish and Ashlu Rivers; the slopes around what is know called Mount Garibaldi; the large islands with mountains know now as Anvil, Gambier; and Bowen Island (Barnett 1955; Bouchard and Kennedy 1976; Drucker 1955:51-52; Duff 1952:71-73; Kennedy and Bouchard 1983:25-40; Matthews 1955; Suttles 1990:453-475).

Flora

The most important plant resource for coastal groups was cedar. Available at almost all elevations, cedar was used in making everything from houses, canoes and rope, to clothing. Many other trees were used for construction materials and fuel. Some plants were used as medicine and such knowledge was owned and usually kept secret. Many of the medicines were part of a tea-like drink, while others were applied directly to the skin (Bouchard and Turner 1976).

Major plant foods that contributed variety to the diet were the numerous species of berries found throughout the coastal environment, particularly those harvested in large quantities at high elevation picking grounds. Chief August Jack Khahtsahlano gives a description of this process (Matthews 1955:10):

> Them berries. Indian woman know how to dry berries, dry lots berries; just like raisins. Dry them first, then press into pancakes, make them up in blocks just like pancakes, about three pounds to block. Stack cakes in high pile in house; when want to cook, break piece off

The process of berry drying involved the excavation of a long (2-12m) narrow (approx. 1 m), and shallow (approx. 20cm) trench. On one side of this trench back dirt was piled and on the other a log would be placed. Over top of the back dirt and log a rectangular frame was constructed. Over top this frame a number of woven mats were placed and then vast quantities of berries were placed on these mats. In the trench a small, smoldering and smoky fire was lit. This fire dried the berries and kept insect pests away form the processed food (Mack 1989:49-58; Mack and McClure 1998:1-7; Frank 2000: 21-

40). Once dried and cut into cakes as described above, the process could be repeated, until enough berry cakes were made, and transported back to the village (Bouchard and Turner 1976).

Plant preparation in Squamish society was exclusively a woman's job. Many Squamish women aspired to be "good berry" pickers. The first harvest of berries in late spring and early summer was distributed to all in the village since berry picking grounds were not owned and were accessible to all. As summer turns to falls the up slope ripening of berries occurs. By mid to late fall many sub-alpine meadows could be characterized as large berry fields, ready for mass harvesting. Other plant foods were roasted in pits, or needed no preparation and were eaten raw (for more detailed accounts of plant uses see Turner 1975 and 1998).

Archaeology at High Elevations in the Squamish Region

Between 1996 and 2001 a number of judgmental archaeological surveys were conducted in mountainous areas of Squamish Nation traditional territory (Howe 1997; Reimer 2000). Survey design was aimed at finding signatures of Squamish ethno-historical accounts of use of mountainous terrain and its resources, and was tempered with knowledge of the dramatic changes found in the paleoenvironmental record. Table 5:1 lists the number of sites and site types that were located during the last 5 years of high elevation survey. Lithic scatters are the most common site type found at high elevations. Many of these sites are associated with procurement of lithic raw materials; most notable is "Garibaldi Glassy Rhyodacite." Camps, rock-features, and culturally modified trees are less common while lithic workshops, berry-drying trenches, and isolated finds are even less so. It is apparent that these sites verify the Squamish accounts of high elevation faunal and floral resource use, and land occupancy. Furthermore the distribution of these sites ranges from nearby ethnographically recorded villages to more remote mountain ranges, including; 1) The Squamish Cheakamus divide; the mountainous areas surround the resort town of Whistler, 2) the remote areas of Garibaldi Provincial Park, 3) the steep slopes of Mt. Garibaldi and, 4) the steep mountains of Howe Sound. A more ore detailed discussion of the role of these sites can be found in Reimer (2000).

In Table 5:2 it is apparent that archaeological sites in the mountains of the Squamish region range in elevation from 1460 to 1850 m above

Table 5:1. Site Types in the Squamish/Garibaldi Region.

Site Type	Number	Percent
Lithic Scatter	8	46%
Camp	2	12%
Quarry/Workshop	1	6%
Rock shelter	0	0%
Berry Drying Trench	1	6%
Cairn/ Petroform	2	12%
Isolated Find	1	6%
Historic	0	0%
Culturally Modified Tree	2	12%
Game Drive	0	0%
Totals	17	100%

Table 5:2. Site Attributes.

Attribute Range	Mean
Elevation 1460m-1850m	1641.36m
Site Size 50m-40, 000	7572m2
Sample Size	17

Table 5:3. Environmental Setting of Sites.

Vegetation Zone	Number	Percent
Alpine	3	18%
Subalpine	14	82%
Totals	17	100%

sea level, and in size from 1x1 m to 200x200m. Most sites tend to cluster at elevations of 1640m asl and are approximately 85x 85m in size, with artifact assemblages occurring in low densities.

As indicated in Table 5:3, sites at high elevations are most likely to be found in the sub-alpine/montane forest ecotone, with very few sites actually located in the true alpine zone. Most sites in the region are found in sheltered cirque basins and near tarns (sub-alpine lakes), along ridges, benches and moraines, where it is easiest to access a wide variety of resources (faunal, floral, shelter, fuel and water).

Considering the dramatic past of the mountainous environment in this region, it is possible to model the changes in the environment that surround these sites (Table 5:4). By examining the local environmental conditions and the locations of nearby glaciers it is possible to predict what type of landscape change has occurred at these sites over the span of the Holocene. The modeling of site location is a useful exercise to aid in bracketing the potential age of each of these sites.

Table 5:4. Modeling A Site's Effective Environment.

Site	Landform	Current Zone	Little Ice Age	Tiedemann Advance	Garibaldi Advance	Hypsithermal
DkRr1	ridge	subalpine	subapine/alpine	subalpine/ alpine	subalpine/ alpine	montane forest
DkRr2	ridge	subalpine	subapine/alpine	subalpine/ alpine	subalpine/ alpine	montane forest
DkRr3	ridge	subalpine	subapine/alpine	subalpine/ alpine	subalpine/ alpine	montane forest
DkRr4	ridge	alpine	alpine	alpine	alpine	alpine
DkRr5	ridge	subalpine	alpine	alpine	alpine	montane forest/subalpine
DkRr6	ridge	subalpine	alpine	alpine	alpine	montane forest/subalpine
DkRr7	ridge	subalpine	alpine	alpine	alpine	montaneforest/subalpine
DkRr8	moraine/lake	subalpine	alpine	alpine	alpine	montane forest/subalpine
DkRr9	bench	subalpine	subalpine	subalpine	subalpine	Montane forest
DlRs3	ridge	subalpine	subal-pine/alpine	subalpine	subalpine	montane forest/subalpine
DlRs 4	bench	subalpine	alpine	alpine	alpine	montane forest/subalpine
EaRr4	moraine/lake	alpine	alpine	alpine	alpine	subalpine
EaRt1	cirque/tarn	subalpine	alpine	alpine	alpine	subalpine
EaRt2	cirque/tarn	subalpine	alpine	alpine	alpine	montane forest/subalpine
EaRt3	Cirque/tarn	alpine	alpine	alpine	alpine	subalpine
EaRt4	cirque/tarn	subalpine	alpine	alpine	alpine	montane forest/subalpine
EaRt5	moraine/bench	subalpine	alpine	alpine	alpine	montane forest/subalpine

Temporally Diagnostic Artifacts from High Elevation Site in Squamish Traditional Territory

Only six temporally diagnostic biface/ projectile points have been identified in the sites located in sub-alpine and alpine contexts (Figures 5:5 & 5:6). The types of projectile points shown in Figure 5:5 from right to left date from known time periods on the southern Northwest Coast (Carlson 1983, 1983b; 1990; 1996b; Fladmark 1982; Mitchell 1990). The large biface/ projectile point base at far right is from EaRt 2 (Figure 5:5), and while the type is common in all time periods, this specimen was found along with cobble/ flake tools and cores, more typical of early time periods. The complete, stemmed, square base projectile point is from DkRr 5 and resembles others recently found in the Stave Lake locality (Mclaren and Owens 2000), and resembles points from the Intermontane Stemmed Point Tradition (10,000-7000 [cal 11,400-7800] BP) (Carlson 1996b, Rice 1972). The base of this point has been thinned via pressure flaking and has faint basal grinding. The point bases (Figure 5:6) are typical of those found in the Charles Culture Type (5500-3500 [cal 6300-3800] BP), and Marpole phase (2500-1500 [cal 2500-1400] BP) and are from EaRt 4

Figure 5:5. **Projectile Points/Bifacesfrom High Elevation Sites in the Squamish Region. Actual size.**

(Mitchell 1990; Burley 1989). Third from the right (Figure 5:5) is a projectile point base similar to those found in the Lochnore phase (5500-3500 [cal 6300-3800] BP) and is from EaRr 5 (Stryd and Rousseau 1996). The small projectile point base at far left (Figure 5:5) resembles those common to the Late phase (1500-200 [1400-200] BP) of the south Northwest Coast cultural sequence and is also from EaRr 5 (Mitchell 1990).

Other temporally diagnostic artifacts found in sites in sub-alpine and alpine settings are microblades and cores (Figure 5:7). These implements are found at DkRr 1 and 4, EaRt 5, EaRr 5. At DkRr 4, EaRt 5 microblades and cores are the only artifacts found at these sites, while at DkRr 1 and EaRr 5 microblades and cores are found along with projectile points and flake tools. On the southern Northwest Coast microblade technology is found from 7500-1500 [cal 8400-1400] BP (Fladmark 1982). Since only microblade technology is found at DkRr 4 and EaRt 5 it is possible that these sites date to earlier time periods. At DkRr 1 and EaRr 5 microblade technology is less common and it is likely these sites date to later time periods.

Spatial and Temporal Distribution of Garibaldi Obsidian

The occurrence of a readily identifiable, common, well known lithic material, "Garibaldi glassy rhyodacite" or "Garibaldi obsidian"is an additiona laid in the determination of the age of sites found at high elevations in Squamish territory. Garibaldi obsidian has visually identifiable (Table 5:5) characteristics, and has also been analyzed by X-Ray fluorescence and by geo-chemical and thin section analysis (Carter 2000; Reimer 2000). Initial distribution diagrams by Reimer (2000) focused on the general spatial and temporal distribution of this material. With additional data and analysis of Garibaldi

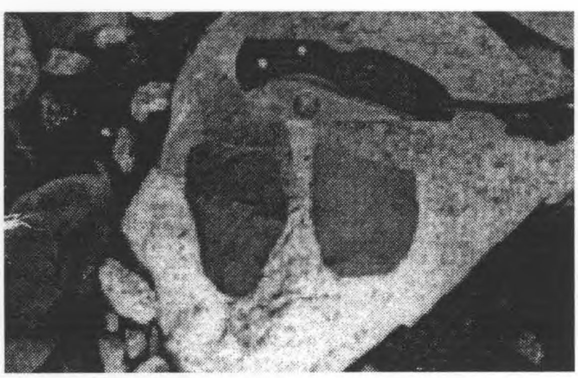


Figure 5:6. **Projectile Point Bases from EaRt 4.**

obsidian from sites in a wide range of environments and locations more complete spatial and temporal analysis is found in Figures 5:8-5:12.

Results of X-Ray fluorescence of Garibaldi Obsidian "fingerprinting" indicate that the most common chemical signature peaks in the spectrum are Iron (Fe) Strontium (Sr), and Zirconium (Zr) (Nelson 1975; Nelson et al. 1975). Trace element analysis by Carter (2000:9-25) found that the most common trace elements are 68-75% SiO2, 12-14% Al2O3, and 5-14% Na2O.

Table 5:5. Geological Visual Description of Garibaldi Obsidian.

Property	Garibaldi Obsidian
Crystal Structure	none
Texture	very fine to fine grain
Cleavage	little
Fracture	conchoidal
Hardness	5-6
Color	10 YR 2/1
Luster	glassy
Banding	Flow Type
Inclusions and other characteristics	Iron Oxide, Biotite Lack of spherulites

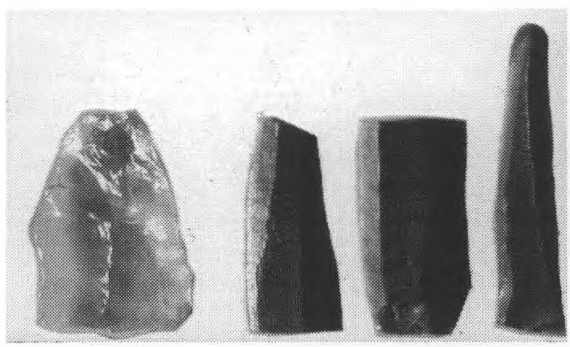


Figure 5:7. **Microblades from High Elevation Sites in the Squamish Region. Actual size.**

The well-defined visual, broad-spectrum trace element database for Garibaldi obsidian permitted a literature search of southern Northwest Coast archaeology to locate occurrences of Garibaldi Obsidian. While incomplete at this time, due to yet to be published or reported data, it was found that numerous sites throughout the southern North-west Coast have Garibaldi obsidian within their deposits. The following discussion of the nature of the distribution of this material is organized by the following archaeological time periods; Early Period, Charles Culture Type, Locarno Beach Phase, Marpole and Late Phases (Carlson 1996b; Fladmark 1982; Matson and Coupland 1995; Mitchell 1990).

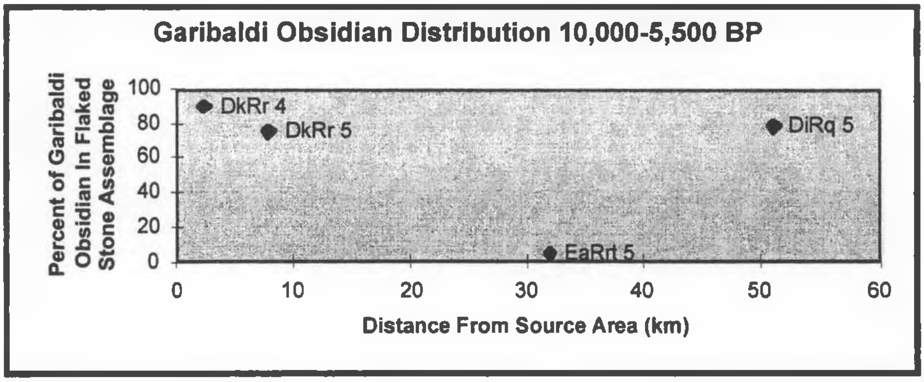


Figure 5:8. **Distribution of Garibaldi Obsidian 10,000-5500 [cal 11,400-6300] BP. N=229.**

The Early Period 10,000-5500 [cal 11,400-6300] BP

Found at four sites, ranging from alpine to interior mountainous lakeside settings (Figure 5:8), Garibaldi obsidian was utilized in the Early Period at sites DiRq 5, DkRr 4, DkRr 5, EaRt 5 (Reimer 2000, 2001; Wright 1996). Examination of site assemblages indicates that flake tools and microblades were being manufactured.

The source area for Garibaldi Obsidian is located in sub-alpine and alpine areas behind Mt. Garibaldi, in the upper reaches of Ring Creek (Reimer 2000: 178). It is likely the material formed during the eruptions of Mt. Garibaldi. During these eruptions ice sheets covered the surrounding landscape. When the lava from these eruptions came into contact with the glacial ice, the obsidian was formed. Therefore there is no single bedrock outcrop of the material since the area around the mountain has been shaped and re-shaped by a combination of volcanic, glacial, colluvial and alluvial processes. Pieces of raw material can be found around the higher elevation slopes of Mt. Garibaldi and range from cobble to granule size (Reimer 2000: 178-179). It is likely that after deglaciation Garibaldi obsidian would have been easy to locate on the freshly exposed ground surfaces near the source area.

Charles Culture Type 5500-3500 [cal 6300-3800] BP

During the Charles Culture Type time periods the spatial distribution and numerical occurrence of Garibaldi Obsidian increases from the Early Period (Figure 5:9). The material is being utilized from alpine to lowland river delta and inlet to island contexts. The distribution of Garibaldi obsidian during this time period is suggestive of several possible distributive steps: (1) The material was accessed directly by people living in the Squamish area, and is then brought to lowland village contexts at DkRr 6, EaRr 5, and DkRs 6 (ARCAS 1999; Reimer 2000, 2001), and was (2) then traded to inhabitants of Burrard Inlet, the Fraser River delta and upriver villages at DiRn 1, DiRn 2, DhRo 17, DhRn 14, DhRn 17, DhRq 22, DgRr 2, DgRs 1,and DhRs 1 (ARCAS 1996; 1999; Carlson 1994; Ham et al. 1984; Millennia 1998a, b, and

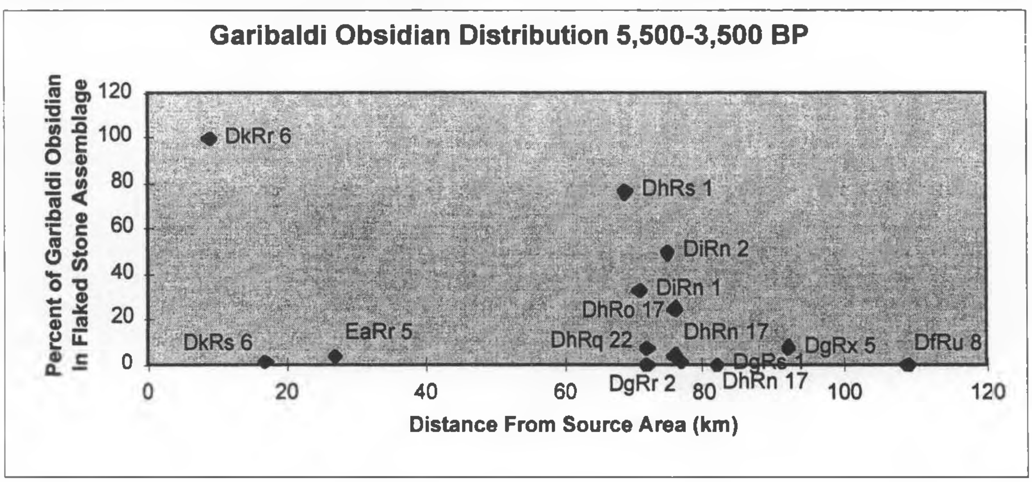


Figure 5:9. **Distribution of Garibaldi Obsidian 5500-3500 [cal 6300-3800] BP. N=61.**

c; Murray 1982; Reimer 2000; Spurgeon 1992; 1994). 3) Further trade took place either directly or down the line from person to person, to the Gulf Islands at DgRx5 and DfRu 8 (Carlson 1970a, 1994; Murray 1982).

Access to the source area must have been limited to those people with knowledge of where to obtain the material. The material was probably an important resource that had value not only to those who obtained it, but also to those who did not have direct access to the source. The occurrence of the material in archaeological sites shows that flake tools, projectile points and microblades were being manufactured. The material could have been used to trade for other resources not found in the Squamish area, or used in gift giving in ceremonial contexts to strengthen marriage/ kinship ties throughout the region (Reimer 2001). Therefore this may be an indication of specialist trad-ers during the Charles Culture Type time period, with specific individuals accessing specific high elevation areas to obtain specific resources suchas Garibaldi obsidian and/or rare animals such as mountain goats (Reimer 2000, 2001).

During the Locarno Beach phase a sharp decline in the utilization of Garibaldi obsidian occurs. It is found at two sites DiRu 15 (ARCAS 1999) and DhRq 21 (Patenaude 1985), and totals only 3 small pieces of debitage. Clearly a change had taken place throughout the region to affect a previously well-established lithic trade. At this time, high in the Coast Mountains the numerous glaciers that cover the alpine regions were expanding enough to cut off the source of Garibaldi obsidian. A focus towards an increased lowland resource economy and sedentism developed, and a ground stone industry became established. It is at this time period that the first strong indications of well established villages and associated resource procurement sites along the southern Northwest Coast are found (Ames and Maschner 1999: 147-176; Carlson and Hobler 1993: 25-52; Matson and Coupland 1995:145-182).

Locarno, Marpole and Late Period 3500-200 [cal 3800-200] BP

During the Marpole Phase utilization of Garibaldi obsidian was at its maximum. The material is distributed widely from alpine sites; DkRr1-3; river valleys and delta sites, DhRs 1, EaRu 5, and DhRl 16; to ocean side sites, DiRu 19, 56 and 60, DhRt 5, DhRr 8,; and lake side sites, DhRo 26; and to the Gulf and Vancouver-Islands, DgRx 36, DgRw 4, 199 and 204, DhRx 16, and DgRv 3 (ARCAS 1999; Burley 1980, 1989; Carlson 1994; Grier 2000; Murray 1982; Millennia 1998; Reimer 2000). Also at this time the highest volume of material is found across the region in the forms of projectile points, bifacial tools, microblades, and flake tools. A similar trade pattern to that found during the Charles Culture Type is found during the Marpole Phase, since 1) the neoglacial advance in the Coast Mountains had ended, allowing for wider access to high elevation areas and its resources and 2) the establishment of specialists during this time period required the use of these areas and the need for Garibaldi Obsidian. During this time period Garibaldi obsidian is also found in burial contexts at DgRw 4, 199, and 204, indicating that it may have ideological qualities as well as an economic value (Burley 1989: 51-80; Curtin 1998; Reimer 2001).

The Marpole phase is widely recognized as a time period of cultural elaboration (Ames and

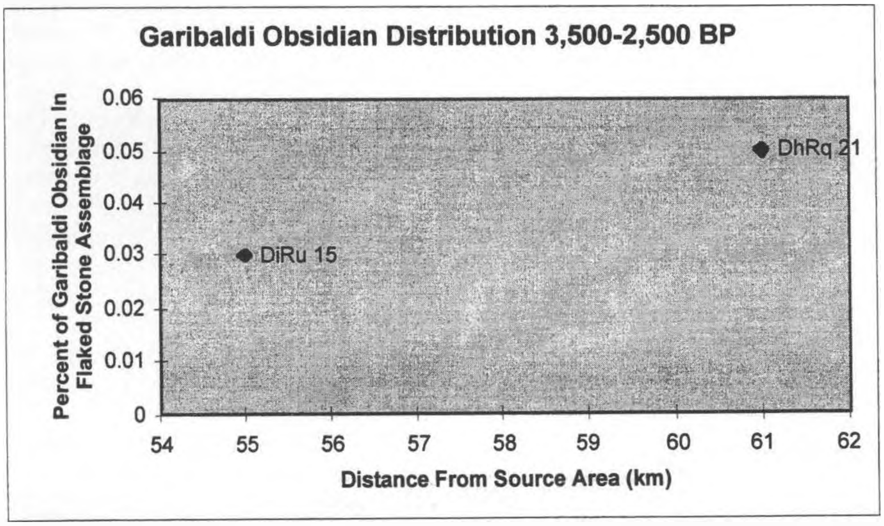


Figure 5:10. **Distribution of Garibaldi Obsidian 3500-2500 [cal 3800-2700] BP. N=3.**

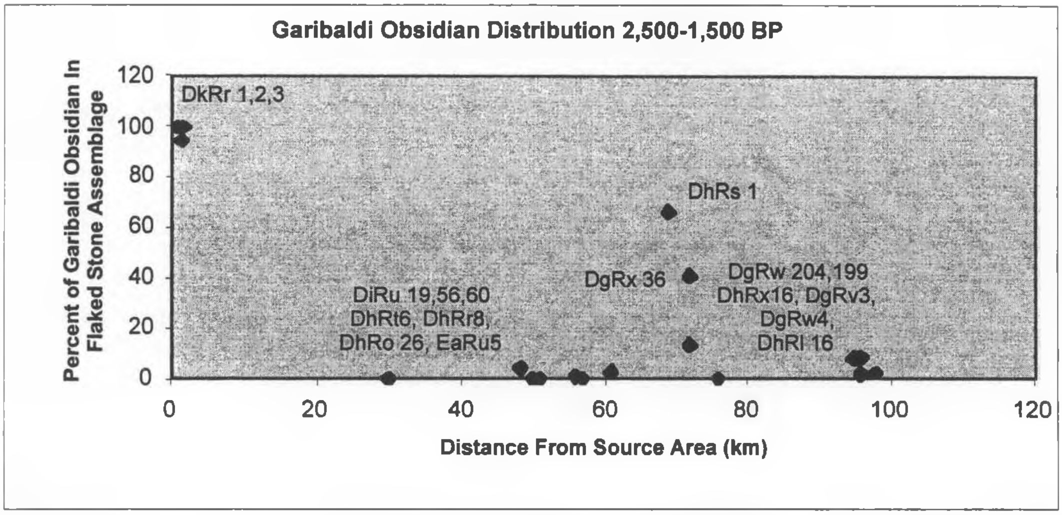


Figure 5:11. **Distribution of Garibaldi Obsidian 2500-1500 [cal 2700-1500] BP. N=5530.**

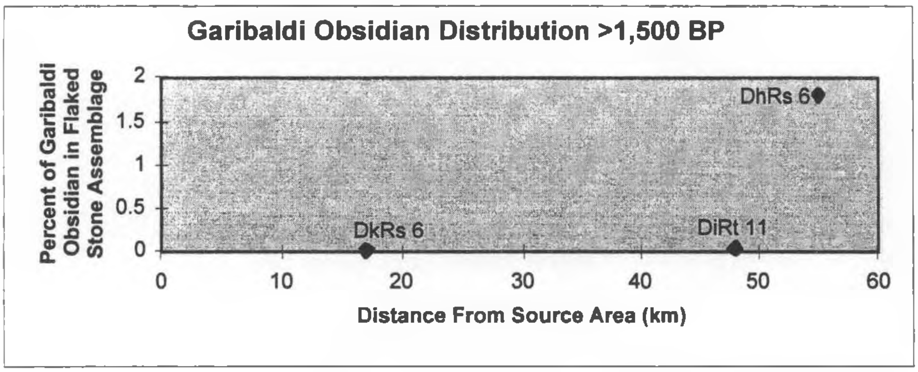


Figure 5:12. **Distribution of Garibaldi Obsidian >1500 [cal 1500] BP. N=20.**

Mashner 1999: 249-256; Burley 1980; Carlson 1960:563; Grier 2000; Matson and Coupland 1995: 199-246; Mitchell 1990:344-346). Considering the source area of Garibaldi Obsidian and the spiritual qualities often associated with mountainous areas, it is likely that this material held some special quality different from that of regular raw stone materials. Visually the material is different than any other local lithic raw material. There are numerous stories and legends associated with large mountains such as Nch'Kay or Mt. Garibaldi and T'ak T'ak Mu'yin Tl'a In7iny'axe7en or the Black Tusk and Mt. Cayley, which offer corroborative evidence that high elevation areas are widely know as places inhabited by powerful beings such as the Thunderbird, where there is a powerful connection to the land and its resources. Considering the economic (trade in difficult to obtain resources), social (marriage and maintenance of kinship ties) and ideological (ethnographic accounts) values of Garibaldi Obsidian (Reimer 2001) it is not surprising that this material is so abundant during Marpole phase times.

During the post-Marpole or late period of the southern Northwest Coast, Garibaldi obsidian takes a sharp decline in spatial distribution and numerical occurrence (Figure 5:12). It is only found in very low quantities at sites located on the mainland of British Columbia, DkRs 6, DhRs 6 and DiRt 11. Broad changes in technology, including a shift from chipped to ground stone, the disappearance of microblades, the replacement of the atlatl by the bow and arrow, more sedentary populations with greater focus on lowland areas, and a later proto-contact population decline (Ames and Maschner 1999:87-112; Carlson 1983b, 1990, 1994:319-323; Fladmark 1982a:95-156; Mitchell 1990:340-358; Suttles 1990) may all be related factors .

It has been noted elsewhere on the southern Northwest Coast that during the Late Period the distribution of sites becomes wider, reflecting the use of specialized resource procurement sites

(Ames and Maschner 1999:144-146; Matson and Coupland 1995: 270; Mitchell 1990: 346-353), and there are few excavated sites and site components that date to the Late Period.

Discussion of the Overall Distribution of Garibaldi Obsidian

The overall distribution of Garibaldi obsidian indicates a broad scale of patterned movement from the high elevation source area southwards. The material rarely moves northwards, and when it does, it occurs in the Squamish and Elaho river valleys, areas to which the local inhabitants had access. The limited movement of the material north and into the interior is likely due to a number of factors, 1) a different type of marriage/kinship network between coastal and interior Salish peoples, where exchange of lithic material was not important, and 2) the availability of other raw materials in the interior, e.g. many types of chert.

Future Directions

While serving as a starting point the spatial and temporal distributions of Garibaldi obsidian offer a dynamic picture of high elevation land and resource use, it should also be noted that the occurrence of a single resource or material type from high elevation areas should not be the ultimate factor determining use of those areas. This is especially important when considering recent finds at high elevations of basketry dated to 2900 [cal 3000] BP in Olympic National Park, Washington State (Olympic National Park 2000) and the remains of Kwanday Dan Sinchi in northern British Columbia (Beattie et al. 2000:129-146; Champagne and Aishihik First Nations 1999). With more detailed analysis of faunal and floral remains archaeologists can begin to move beyond basic dietary analysis and being to investigate broad questions of pre-contact land and resource use, similar to approaches taken by Lyman (1995:369-424) and Rahemtulla (this volume) for faunal remains, and that of Lyons (2000) and Spurgeon (this volume) for floral remains. In order to develop such models it is essential that archaeologists formulate middle range theoretical frameworks as a bridge between low-level data and higher archaeological theory (cf. Binford 2000). With any approach that attempts to determine broad scale use of faunal and floral resources in the archaeological record a foundation of middle range frameworks is needed.

Table 5:6. Fauna Species Utilized at High Elevations by The Squamish People.

Animal Species	Uses	Archaeological Visibility and Manifestation
Mountain Goat (*Oreamnos americanus*)	food, wool and or fur, horns, bone raw material	Medium; bones in high altitude sites, bones and horns in low land shell middens, fibers in wet site contexts
Deer (*Odocoileus sp.*)	food, bone raw material	High; bones in sites in various settings
Elk (*Cervus elaphus*)	food, antler, bone raw material	Medium; bones in sites in various settings
Marmot (*Marmota monax, Marmota caligata*)	food	Medium; bones in high altitude sites
Grouse/Ptarmigan (*Dendragapus obscurus, Lagopus lagopus*)	food	Medium; bones in sites in various settings
Skunk (*Mephitis mamphitis*)	medicine	Low; ?
Black Bear (*Ursus americanus*)	food, bone raw materials	High; bones in sites in various contexts
Grizzly Bear (*Ursus actos horribilis*)	food, bone raw materials	Medium; bones in sites in various contexts
Rodents, Moles (*rodenta sp.*), Porcupine (*Erethizon dorsatum nigrescens*), Snowshoe Hare (*Lepus americanus macfarlani*), Beaver (*Castor canadensis*), Muskrat (*Mustelidae sp.*) , Racoon (*Procyon lotor*)	food	Medium; bones in sites in various contexts
Bald Eagle (*Haliaeetus leucocephalus*)	feathers	Low; feathers in shell middens or wet site contexts
Golden Eagle (*Aquila chrysaetos*)	feathers	Low; feathers in shell middens or wet site contexts
Snow Goose (*Chen caerulescens*)	food	Medium; bones in sites in various contexts
Canadian Goose (*Branta canadensis*)	food, bone raw materials	Medium; bones in sites in various contexts

Table 5:7. Plant Species Utilized at High Elevations by the Squamish People.

Plant	Mat erial	Foo d	Medi cine	Other	Archaeological Visibility
yellow cedar (*Chamaecyparis nootkaensis*)	*			*	High; CMTs, charred
silver fir (*Abeis amabilis*)	*		*	*	High; CMTs, charred
grand fir (*Abies grandis*)	*		*		High; CMTs, charred
trembling aspen (*Populus tremuloides*)			*		Medium; CMTs, charred
white pine (*Pinus monticola*)	*		*		High; CMTs, charred
sitka spruce (*Picea sitchensis*)	*		*		High; CMTs, charred
mountain alder (*Alnus sinuata*)			*		Medium; CMTs, charred
mountain hemlock (*Tsuga mertensiana*)	*		*		High; CMTs, charred
old mans beard (*Alectoria sarmentosa*)			*		Low; ?
swamp goose berry (*Ribis lacuture*)		*			Medium; charred
Alaska blueberry (*Vaccinium alaskense*)		*			High; Cultural Depressions, charred seed
bog cranberry (*Vacciniumoxycoccus*)		*			Medium; charred
bunchberry (*Cornus canadensis*)		*			Medium; charred
devils club (*Oplopanax horridum*)			*		Medium; charred
Canadablueberry(*Vaccinum mytillordes*)		*			High; Cultural Depressions, charred seed
bog blueberry (*Vacinnium uliginosum*)		*			Medium; charred
stink currant (*Ribes bracteosum*)		*			Medium; charred
red huckleberry (*Vaccinumparvifolium*)		*			High; Cultural Depressions, charred seed
black twinberry (*Lonicera chilensis*)			*		Medium; charred
thimbleberry (*Rubusparvilflorus*)		*			Medium; charred
wild gooseberry (*Ribes divaricatum*)		*			Medium; charred seed
red elderberry (*Sambucus racemosa*)		*			High; Cultural Depressions, charred seed
salmon berry (*Rubus spectabilis*)		*			Medium; charred seed
blue elderberry (*Rubus cerulea*)		*			High; Cultural Depressions, charred seed
mountain bilberry (*Vaccinum membranaceum*)		*			Med.Cultural Depressions, charred seed
oval leafed blueberry (*Vaccinum ovalifolium*)		*			High; Cultural Depressions, charred seed
blueberries (*Vaccinum sp.*)		*			High; Cultural Depressions, charred seed
Indian hellebore (*Veratum viride*)			*		Low; ?
Indian thistle (*Cirsium brevistylum*)				*	Medium; charred
deer fern (*Blechnum spicant*)			*		Medium; charred
bracken fern (*Pteridium aqulinum*)		*		*	Medium; charred
lady fern (*Athyrium filix femina*)	*				Medium; charred
cow parsnip (*Heraclem lanatum*)		*			Low; ?
grasses (*Carx sp.*)	*				Medium; charred
Indian hemp (*Apocynum cannabinum*)	*				Medium; charred or water logged
yarrow (*Achillea millefolium*)			*		Low; ?
fireweed (*Epilobium angustifolium*)	*				High; fibers in blankets
puffball (*Lycoperdon sp.*)				*	Low; ?
horsetail (*Equsetum arvense*)		*			Low; ?
stinging nettle (*Uritca dioica*)		*		*	Low; ?
kinnikinnick (*Arctostaphylos uvaursi*)		*	*	*	Medium; charred
Indian plant fungus (*Echinodontium tinctorium*)				*	High; rock art
bluejoint reedgrass (*Calamagrostis canadensis*)	*				Medium; charred

Middle Range Fauna Assemblage Predictions for High Elevation Sites

Along with lithic artifacts, common to almost all archaeological sites in British Columbia, faunal remains from large ungulates and smaller animal species available in the mountainous terrain of the south Coast Range are likely to be present. Depending on the location and degree of paleoenvironmental fluctuation, archaeological sites at all elevations may have indications of sub-alpine and alpine fauna. Table 5:6 lists the uses of animals hunted by Squamish people at high elevations, along with a prediction of their possible visibility in archaeological contexts. Mountain goats and other animals viewed as high status items may have some antiquity, since they are represented in art found in archaeological contexts dated ca. 3500 [cal 3800] BP (Carlson 1983b: 199-206, 1996:215-226, 1999:39-48; Carlson and Hobler 1993: 25-52). Further research (Reimer n.d.) has begun to examine the nature of high elevation faunal remains in archaeological contexts of the southern Northwest Coast, but to aid the potential interests of other researchers approaches similar to that in Table 5:6 may be taken.

Middle Range Flora Assemblage Predictions for High Elevation Sites

Along with lithic artifacts and faunal remains, floral remains from the large number of plant species available throughout the mountainous terrain of the south Coast Range may be present in archaeological sites. Depending on the location and degree of paleoenvironmental fluctuation, archaeological sites at all elevations may have evidence of sub-alpine and alpine flora.. Many of the important food plants ripen in late Summer and Fall. People gathering these resources knew they were best at this time (Barnett 1955; Bouchard and Turner 1976; Drucker 1955: 53-55; Duff 1952:73-74; Hill-Tout 1978a: 27-56; Kennedy and Bouchard 1983:25-40; Matthews 1955; Suttles 1955:26-27; 1990; Turner 1975,1998). The timing of harvesting for many of these plant foods followed the mass harvesting, processing and storage of marine and terrestrial foods. The harvest of these plant foods coincided with other high altitude resource procurement pursuits (see above). Although further research (Reimer n.d.) has begun to examine the nature of high elevation floral remains in archaeological contexts, other researchers may wish to take approaches similar to that in Table 5:7.

Conclusions

While still not fully developed mountain archaeology of the Northwest Coast is beginning to have influence on "low-land" or "valley" archaeology, and vice versa. No longer can archaeologists view of mountains as peripheral to the native cultures that inhabited them. From the ocean to the tops of mountains is part of the whole cultural landscape on which the Native inhabitants of the Northwest Coast are connected. Old concepts of mountains being barriers, places that were traveled through to get somewhere else, or as areas to seek refuge can no longer be accepted. The distribution of sites in many different mountainous regions (cf. Burtchard 1998; Frank 2000; Mack and McClure 1998; Mierendorf 1999, Reimer 2000) illustrates that many sites are not only located high above nearby villages, but also in many areas that were once viewed as remote and inhabitable. If one were to begin high elevation survey in the Coast Range it is suggested that they begin in large cirque/tarn basins, above or near village sites. In these locations one is likely to find residential base camps in the montane forest/alpine ecotone. From these locations it can be predicted where more distant short-term resource procurement camps are located. By conducting such research archaeologist along the Northwest Coast can begin to view the culture areas as not being some 2500km long and 200 m wide, but 2500km long and 300-400km wide.

The pre-contact inhabitants of the region had both a deep understanding of the landscape and a high level of physical fitness in order to access these areas, no matter where their location. A common claim of many modern mountaineers is having a "first summit" of a particular mountain, yet it is likely that individuals from First Nations communities of the area had reached that summit hundreds or even thousands of years earlier. This fact is evident from the numerous sites reported here and elsewhere.

With a strong connection to mountainous areas the pre-contact populations of the southern Northwest Coast viewed mountains as places to obtain resources but also as places to seek spiritual guidance and mark the boundaries of their respective territories. The numerous place names, stories, legends, and myths that took place in these locations are evidence of this type of activity. With this evidence of long term and dynamic connection to the mountains many more archaeologists need to consider the role those mountains played in the incredible archaeology of the Northwest Coast.

CHAPTER 6

The Use of Large Terrestrial Mammal Bone on the Northwest Coast

FARID RAHEMTULLA

Introduction

Discussions of Northwest Coast faunal-economy tend to focus largely on diet and seasonality, with far less attention paid to non-dietary constituents. In Northwest Coast middens marine taxa tend to numerically overwhelm terrestrial mammals, resulting in the argument that land-mammals provided a secondary and minor nutritional source in subsistence systems that were primarily marine focused. However, large terrestrial mammals were more than nutritional resources; they also provided valuable raw materials used for a number of types of material culture. Archaeologically this fact is reflected in the ubiquity of artifacts made of terrestrial mammal bone. For example bone and antler were commonly used as raw materials for elements of composite marine harvesting equipment. Bone and antler harpoons, barbs and hooks have been recovered in abundance at various Northwest Coast sites.

The economic contribution of terrestrial mammals is almost always inferred from the non-modified archaeo-faunal remains and rarely from the artifact assemblages. The rare weighting of this non-dietary contribution results in an under-evaluation of the overall importance of land-mammals in marine economies. When zooarchaeological evidence is combined with worked bone and antler remains, the importance of terrestrial mammals is revealed not only in their relative nutritional contributions, but also in their raw material contributions. As such, terrestrial mammals may have been more important to the economy as a whole in pre-Contact times than is realized.

By the time the ethnographers were making their observations, Northwest Coast peoples had replaced much of their traditional raw materials with new materials such as iron. This shift to metal would have had the effect of limiting the importance of land mammals as a source of raw materials for tools. As iron and other raw materials became more commonly available, the need to capture terrestrial mammals may have declined so that during the ethnographic period activities such as hunting and trapping of deer and elk had lost some of their value.

The Pre-Contact Period

The Peoples of the Northwest Coast are renowned for their complex stratified societies, large sedentary villages dependent on stored surpluses, rich ritual and artistic traditions, and large trade networks, all based on a maritime way of life (Suttles 1990). In most cases the economic basis for this phenomenon was the surplus capture, processing and storage of the various species of Pacific salmon, supplemented by various marine organisms. Although this maritime focus likely developed during the late Pleistocene/early Holocene (Carlson 1998:31), mid-Holocene stabilization of hydrological and ecological regimes may have been an important contributing factor to an increase in numbers of anadromous fish in major coastal waterways in subsequent millennia (Fladmark 1975). Archaeologically there appears to have been a marked intensification of use of marine and riverine resources on the Northwest coast after 5000 BP [5730 cal BP] (Ames and Maschner 1999; Cannon 1991:48; Matson and Coupland 1995), indicated in the rising relative frequencies of fish bones (particularly salmon). Marine and riverine taxa heavily dominate coastal faunal assemblages after this time, a trend corroborated by stable isotope studies on archaeological human (Chisholm 1986) and dog (Cannon *et. al.* 1999) skeletal material that indicate high levels of marine protein consumption.

Although some Northwest Coast communities used sophisticated and group intensive methods such as reef netting for procuring marine resources (Suttles 1974), these methods were restricted to specific localities. Fish weirs and all manners of traps were, however, common throughout the coast and interior. These methods undoubtedly provided much of the marine harvest, although in archaeological middens on the coast, the appearance of bone tools in high numbers is also indicative of their importance in procuring marine resources.

Prior to European contact, bone from land mammals served as the raw material for a wide variety of tools and implements, a number of which were used for harvesting marine resources. Northwest Coast peoples manufactured a variety of harpoons, fishhooks, leisters, spears and specialized implements such as the herring rake. Most of these were composite tools in which wood was the primary raw material though bone and antler barbs were used in a number of implements, and bone and antler pieces were important elements in fixed and toggling harpoons and in other technologies (Stewart 1977). Archaeologically these bone and antler elements appear in impressive quantity in many sites (Table 6:1), even though the wooden elements rarely survive. Deer (*Odocoileus hemionus*) and wapiti (*Cervus elaphus*) were primary sources of raw material for production of bone and antler artifacts. Ethnographic and ethnohistoric works document the use and importance of bone technology in fishing and woodworking industries, as well as in other aspects of daily life on the Northwest Coast (Boas 1891; Barnett 1955; Stewart 1981; Suttles 1974).

Archaeological middens on the other hand exhibit an overwhelming number of fish and other marine taxa in comparison to unworked land mammal elements particularly from deer and wapiti. The sheer mass of marine faunal remains at a site can be quite impressive in both volume and quantity. Terrestrial mammal bone may be under-represented in faunal samples due to various taphonomic processes such as marrow extraction, tool manufacture, scavenging by dogs and other animals, and differential bone density survivorship, although the articular ends of such bones are usually not used as part of the finished tool, and are identifiable as faunal remains. Many Northwest Coast zooarchaeological reports document very high numbers of bone fragments that are unclassified beyond "land mammal" or "artiodactyl" due to fragmentation. In some cases as few as 20% of the total mammal sample can be identified to lower taxonomic categories (e.g. Arcas 1996). This lack of identification serves to heighten the statistical dominance of the easily identifiable salmon vertebrae (Hodgetts and Rahemtulla 2001:57), although fish bones in general are softer and survive less well than land mammal bones, and this factor could help even out the equation. Those same sites with quantities of fish bone also contain large numbers of bone and antler artifacts most commonly made on deer and wapiti elements.

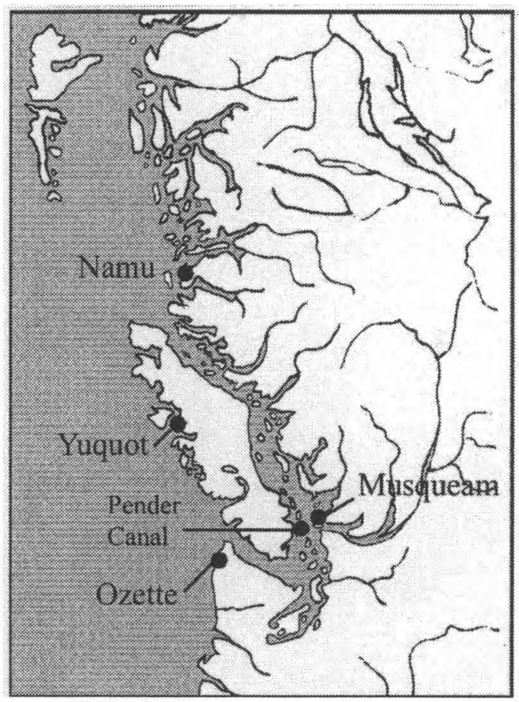


***Figure 6:1.* Sites mentioned in the Text.**

This dichotomy is highlighted at many Northwest Coast sites (Fig. 6:1, Table 6:1). At the Ozette site, terrestrial mammals are poorly represented in the archaeofauna and yet this class is relatively far more significant as a raw material for bone artifacts. Ozette is unique in being one of a handful of Northwest Coast localities in which the inhabitants practiced intensive whaling (and other sea mammal harvesting). In view of this the majority of bone artifacts are made on whale bone; however, removal of whalebone artifacts from the sample reveals that only 11% of the remaining artifacts are made on sea-mammal other than whale, while an overwhelming 89% are made on land-mammal, most likely deer. An additional 1,174 bone artifacts were not classified to taxon, and Huelsbeck (1994:50) opines that many of these are made on land mammal bone. The Ozette data suggest that terrestrial mammal elements were highly selected for tool manufacture, and that they are under-represented in the faunal collection (Huelsbeck 1994:49).

Table 6:1. Northwest Coast sites with deer/wapiti faunal samples versus artifacts made on terrestrial mammal bone and antler (after Hodgetts and Rahemtulla 2001:Table 1).

Site	Deer/Wapiti (% of total site fauna by NISP)	Modified bone and antler Total	(% land mammal)	Sources
Namu	1.3	168	97.0	Cannon 1991 Carlson 1995
Yuquot	N/A	133	80.2[1]	Rick 1980
Pender Canal Sites	1.9	1675	99.1	Hanson 1995 Carlson 1986
Ozette	1.2	952	44.2, 88.8[2]	Huelsbeck 1994
Musqueam(DhRt 4)	0.7	34	89.5	Pratt 1992 Stiefel 1985

[1] This is one of very few analyses that attempted to identify species and elements from artifacts. A sample of 133 was submitted, 58 were unidentifiable but are thought to be deer, these are included in this figure. Unfortunately no information is available on mammalian fauna.

[2] First figure includes whalebone artefacts; second figure represents land-mammal artifacts after removal of whalebone artifacts.

Namu is a multi-period site on the central coast of British Columbia (Fig 6:1). Cultural deposits here span some 10,000 [11,400 cal BP] years and include shell midden beginning at roughly 6500 BP [7450 cal] (Carlson 1996). Deer is the most common mammal at Namu throughout the sequence although as in many Northwest Coast sites, fish remains grossly overwhelm mammalian elements (Cannon 1991). Also as in other sites, the vast majority of bone artifacts are made of terrestrial mammal bone (Table 6:1).

Some 168 artifacts from the same deposits at Namu are classified as modified bone and antler (Table 6:1). Many of these are complete or fragments of barbs, harpoons and other types used in composite marine harvesting implements. The vast majority of bone tools (97%) are made of terrestrial mammal elements, with a smaller number of sea-mammal or bird bone. Once again, the fact that deer accounts for only 1.3 % of total faunal remains at Namu indicates the importance of terrestrial mammals cannot be simply gauged from archaeofauna alone. This pattern is evident at several other Northwest Coast sites (Table 6:1), providing support to Conover's (1978) contention that deer procurement at Namu was driven by a need for non-dietary elements such as hides and bone, and not by nutritional needs.

Although many archaeologists comment on the importance of terrestrial mammal bone for tool production (e.g. Cannon 1991:23; Ham 1982; Hanson 1995:43), these comments are rarely followed up with an assessment of the actual economic importance of land mammals. While bone artifacts from these sites have been analyzed in terms of typology and function, less emphasis is put on identification of elements and species from which the artifacts were derived. Given the nature of some bone artifact types on the Northwest Coast and rates of fragmentation, such identifications may be a difficult task. Nonetheless, such analyses would be potentially useful in measuring the importance of land-mammals as raw material sources (Hodgetts and Rahemtulla 2001).

There is also some suggestion that terrestrial mammal bone and antler was selectively transported to and curated at these sites for the purpose of tool manufacture. Cannon (1991:23-27) conducted a brief taphonomic exercise comparing the Namu deer data to Brain's (1980:117) study on differential goat skeleton survival in Hottentot camps. Overall the relatively strong correlation between the Namu deer data and Brain's published values (r_s=0.64, P <.005), led Cannon to suggest that whole carcasses were brought back to the site, however, there may be a modest selection for elements (limbs) used in tool-making. More recently the Namu data were subject to comparison with Lyman's (1984) deer bone density values, and the results are very similar to the goat data analysis (Cannon 1999: pers. com.).

At Crescent Beach Ham (1982) found wapiti elements accounted for 75% of mammalian remains recovered in 12 of 31 excavated layers. Ham classifies body parts into three general categories, head, body, and limb. Wapiti limb elements are anomalously high in most layers with the exception of Layer 4, which exhibits a high preponderance of "body" elements and a virtual absence of "head" elements. With caution Ham argues that selective transport of limb elements and antler for tool production was likely (1982:364). A fairly wide sample of bone and antler tools was recovered in addition to nearly 300 tiny chips of antler, leading Ham (1982:269) to suggest that tool manufacture took place at the site.

This apparent selection for limb elements is interesting in light of the many Northwest Coast ethno-historical references to the importance of lower limb elements, particularly metapodials in artifact manufacture (Boas 1909: 505, 1921: 157; Barnett 1955:101; Suttles 1974: 91, 115). One such stock pile was discovered at the Pender Canal site, DeRt 1 (R. Carlson pers. comm. 2002). Some authors discuss stockpiling of such elements for future tool production (e.g. Suttles 1974:91) and in some cases metapodials were stored under water in order to keep them from being detected by dogs. It is possible that the archaeological over-representations of limb bones are remnants of once larger stockpiles depleted via modification for marrow and/or modification into various artifact forms. This practice may be difficult to gauge solely through examination of the non-modified faunal assemblage. The presence of artifacts made on terrestrial mammal bone provides another line of evidence.

Stringent foci on diet and seasonality downplay the contribution of terrestrial mammals; this oversight potentially creates an added bias in gauging the importance of various economic constituents. Part of the problem may reside in conceptual approaches where modified bone is categorized as a separate class of material culture from unworked bone. This process begins in the field where "bone artifacts" are collected, bagged and classified separately from "faunal material." In many cases different individuals conduct analyses of the two material categories, and this leads to an arbitrary division whereby bone tools are conceptually distanced from their raw material sources. Paradoxically, while bone and antler tools are viewed as important mechanical elements in the maintenance of prehistoric marine subsistence, the value of hunting and trapping terrestrial mammals for the raw materials is understated. Inclusion of bone and antler tools in faunal analyses, with the goal of identifying species and elements, would partially mitigate this problem. With a few exceptions (Driver 1984, 1985; Lugg 1986; Rick 1980) faunal analysts do not normally examine bone tools for zoological classification. This inclusive approach would yield a more refined estimate on economic contributions, and can be done in addition to functional and typological analyses (Hodgetts and Rahemtulla 2001).

The Ethnographic Period

On the whole most ethnographies probably downplay the economic role of large terrestrial mammals, focusing instead on maritime resources (e.g. McIlwraith 1949). While many ethnographers discuss traditional bone and antler tool manufacture, it is apparent that by the time of their observations in the 19th and 20th centuries many of the traditional technologies had been substantially altered or replaced by iron and other new raw materials. Despite this situation there are good ethnographic descriptions on the manufacture of traditional implements, probably from knowledge retained within the aboriginal communities. Deer and wapiti provided much of the bone and antler raw material for these composite implements as described by Boas 1909:505; Barnett 1955:101; Gunther 1936:117; Suttles 1974:106, 115 and Swan 1870. Lower limb elements seem to have been particularly favoured, perhaps due to the presence of large flat areas that are advantageous to producing certain tool types. Boas (1909:494, 505) describes several traditional methods for working bone in the process of manufacturing composite tools. Interestingly, the specimens he illustrates (Boas 1909:489) are archaeological examples; contemporary specimens were not available or did not exist. In fact, Boas indicates that many of the contemporary composite implements are made of iron while retaining traditional forms (1909:494). This observation suggests that traditional raw materials were not commonly used in the manufacture of these implements at this time. Stewart (1977) also illustrates a number of traditional fishing and hunting implements transformed by the use of iron.

Western raw materials and goods transformed aboriginal use of the landscape and had repercussions for social systems. While having this rich ethnographic base to draw from is certainly a luxury, careful reading is necessary to understand the nature of the transformations that took place with European contact. In this manner, a more rigorous and holistic understanding of pre-Contact lifeways can be achieved.

Conclusions

From a faunal-economic perspective, terrestrial mammals may have been more important in pre-Contact Northwest Coast communities than is presently argued. Hunting and trapping of terrestrial mammals in these coastal communities may have been driven primarily by the need for raw materials, and secondarily by nutritional desire. It seems fairly certain that on the Northwest Coast, large terrestrial mammal bone and antler played a role in sustaining marine/riverine economies. These raw materials were also modified into a variety of other forms used in daily life; this is borne out by the number of bone and antler artifacts recovered from middens. Archaeofaunal contents on their own may not reflect the economic import of terrestrial mammals. An integrative approach that combines unworked faunal material with zoological identification of bone and antler artifacts is more productive for evaluating roles of various taxa in lifeways of coastal peoples (Hodgetts and Rahemtulla 2001). Although the focus of this paper has been on bone and antler raw materials used in marine harvesting technologies because they are preserved in the archaeological record, other mammalian raw materials could have been equally important such as hides, sinews, internal organs, fat, hooves and more. Terrestrial mammals would have been formidable packages of raw materials *and* meat and marrow.

With a focus on economy, bone tools can be viewed as results of a production trajectory where raw materials are procured, processed, used and discarded much like other portable technologies such as stone tools (see for example papers in Odell 1996). The obvious difference with land mammals is the additional nutritional and non-nutritional (hide, internal organs, etc.) resources they provide. Far from serving nutritional purposes only, large land-mammals may have been highly valued as packages of raw material. As such, production of bone and antler technologies probably entailed some degree of logistical sophistication involving scheduling, transport, and stockpiling of raw materials. In this light, the importance of terrestrial mammals is heightened above that indicated in ethnographies and many zooarchaeological studies, especially where bone tools were important in the maintenance of marine subsistence.

Acknowledgements

I thank Roy Carlson for inviting me to take part in the symposium and to contribute to this volume. I also thank Phil Hobler for his mentoring and his friendship through the years.

CHAPTER 7

The Bear Cove Fauna and the Subsistence History of Northwest Coast Maritime Culture

CATHERINE C. CARLSON

Introduction

The excavation of the Bear Cove site (EeSu 8), a shell midden on the northeast end of Vancouver Island, produced a large and well-preserved sample of faunal remains. The excavation in 1978 was sponsored by the British Columbia Heritage Conservation Branch and was initiated to mitigate the impacts of a proposed ferry terminal development. The Fort Rupert Village Committee drafted a Band Council Resolution on March 9, 1978, that authorized the excavation of the site. Bear Cove is one of the few known sites on the British Columbia coast with an Early Period lithic and faunal component. At over 8000 years in age, it is the earliest C-14 dated site on Vancouver Island excavated to date. The primary purpose of this paper is to present the analysis and age of the Bear Cove faunal assemblage, and to discuss it within the context of the origins and development of maritime subsistence patterns on the Northwest Coast.

Bear Cove is located within the traditional territory of the Kwakwala (or southern Kwakiutl) peoples (Codere 1990) (Figure 7:1). The site is in a small cove in Hardy Bay across from the town of Port Hardy (Figure 7:2). It is just two kilometers east around Dillon point from the village of Fort Rupert in Beaver Harbour where Franz Boas conducted much of his ethnographic field work at the turn of the twentieth century (Boas 1909,1921,1934).

Although Boas spent little time documenting aspects of economic organization of interest to archaeology, such as seasonal settlement patterns or detailed resource utilization, he did map geographical place names illustrating resource use and ownership patterns of sites. No place name was recorded for the exact location of the Bear Cove site, although he (Boas 1934) did record a place on the southern shore of Bear Cove as "a place where chitons are cooked". Although two species of chitons were identified in the Bear Cove archaeological fauna, they represent less than one percent of the shellfish identified. Boas also recorded a place name slightly south of Bear Cove translated as "a place of origins" (Galois 1994), a name that is intriguing in that it supports the antiquity of the Bear Cove locality revealed by the radiocarbon dates and early lithic assemblage. Hebda's (1983) pollen and plant macro-fossil study of the Bear Cove Bog,

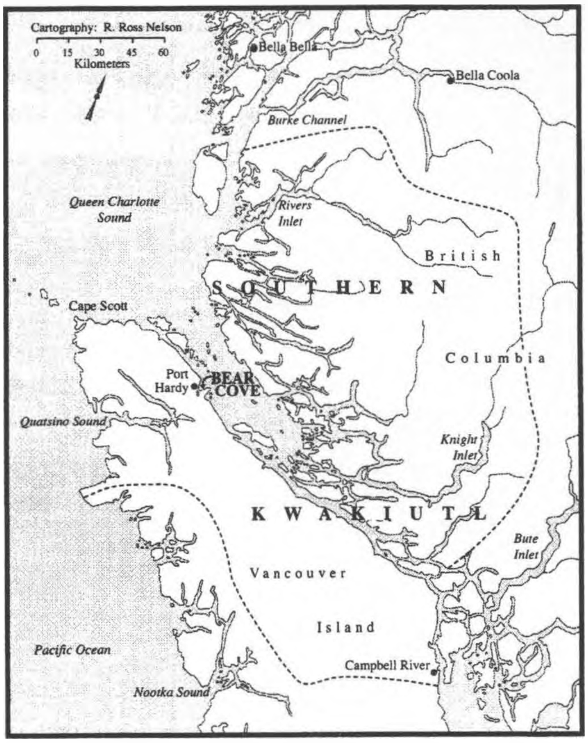


Figure 7:1. **Map of the Central Coast of British Columbia showing Kwakiutl Territory and the Location of the Bear Cove site on the northern end of Vancouver Island.**

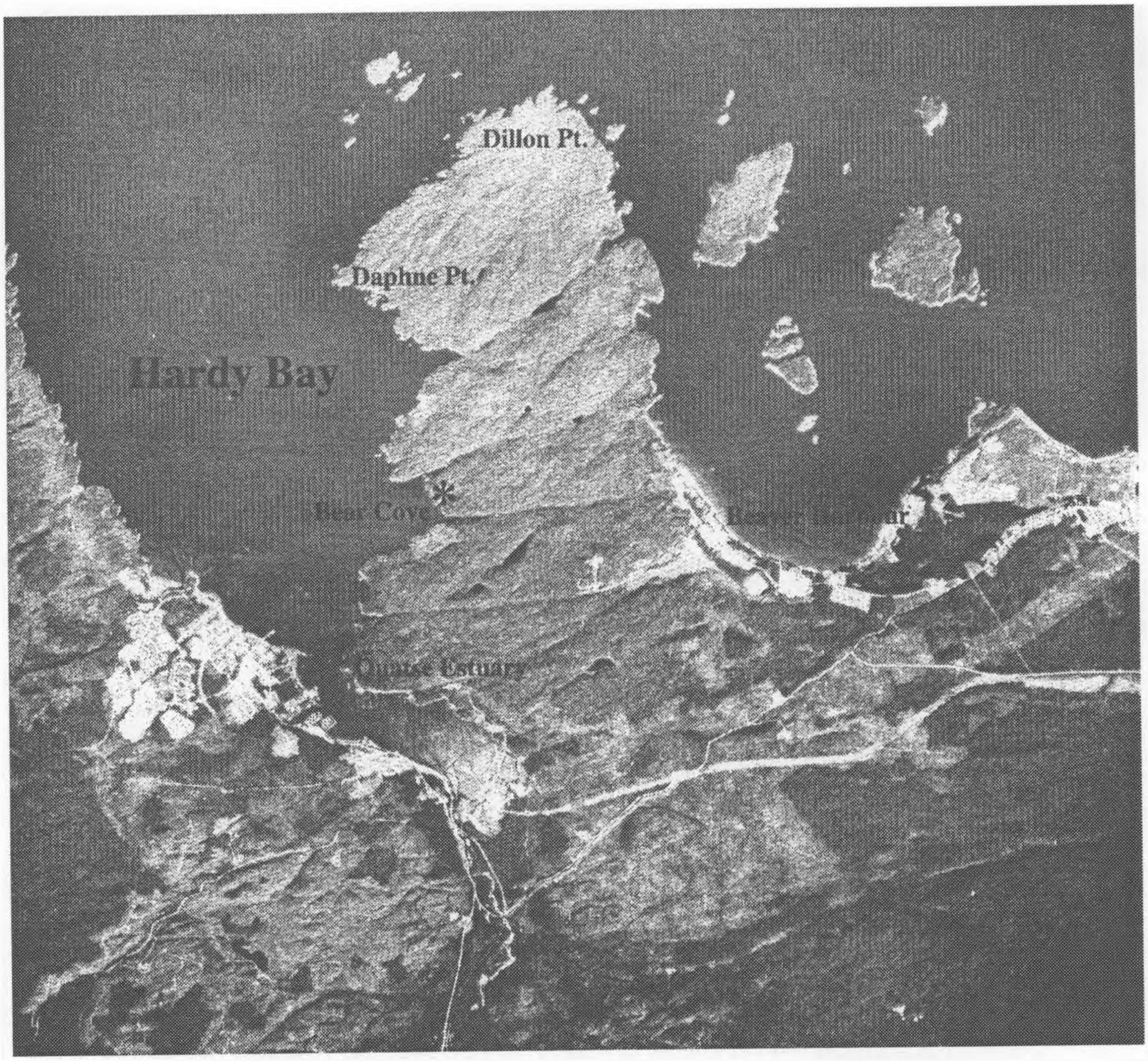


Figure 7:2. **Aerial Photograph Showing Hardy Bay, Bear Cove, Daphne-Dillon Points Peninsula, the Quatse Estuary, and Beaver Harbour, depicting the protected environmental Setting of Bear Cove (BC77114 No 184, Sept. 10, 1977).**

located 30 m above sea level behind the archaeological site, indicates that the peninsula was deglaciated and vegetated by 13,630 [cal 16,300] BP. According to Hebda (1983) this area of Vancouver Is. is the earliest known part to have been deglaciated,, and would have provided habitable land for early human populations migrating along the coast. For early peoples traveling south along the coastline, Hardy Bay would have provided the first protected harbour after crossing the open, treacherous Queen Charlotte Sound. One of the oldest members of the Fort Rupert Band, Bob Wilson (pers. com. 1978), did not recall any use of the Bear Cove site during his lifetime (about 90 years), and no historic period remains were found there (Figure 7:3). All together the evidence supports the locality as "a place of origins".

The excavations at Bear Cove revealed an intact shell midden underlain by non-shell culture-bearing strata, with an early uncalibrated radiocarbon date of 8020±110 [cal 8900] BP (WSU- 2141) (Figure 7:4). The early component contained stone tool assemblages typical of the B.C. coast "Pebble Tool Tradition" as defined by R. Carlson (1990) (Figures 7:5, 7:6). The later shell midden contained stone and bone tool assemblages (Figure 7:7, 7:8) assignable to Fladmark's (1982) "Developmental Period," or "the Obsidian Culture Type" of the Queen Charlotte Strait (Mitchell 1990).

Due to the layers of midden-shell which neutralize otherwise acid forest soils, thousands of mammal, fish, and bird bones were well preserved in the site deposits, including faunal samples from two underlying non-shell strata.

Figure 7:3. **Bear Cove site from the Water, to the right of the Boat. The two small islands are visible in the Cove, and the dense coastal rain forest (C.C. photo).**

The faunal remains, consist of almost 30,000 identifiable bones, and were identified by the author at the British Columbia Provincial Museum between 1978 and 1980. Preliminary results of the faunal analysis from the early Pebble Tool Tradition component have previously been presented (C. Carlson 1979, 1979a).

The faunal material from the Bear Cove site is important for addressing issues of long-term resource utilization in the central, or classic core area, of the Pacific Northwest Coast Culture Area. Archaeological fauna from stratified sites, representing long-term coastal village occupations, provide a valuable source of material evidence pertaining to the long-term use of coastal resources, usually in greater detail than that of ethnographic accounts. This paper will compare the identified fauna from the earliest site Component I to the latest post-4300 [cal 4900] BP Component III in order to document trends in faunal use. In particular, questions about the antiquity of use of marine resources in the context of understanding early coastal subsistence patterns are the focus of discussion. Whether the initial occupants of the coast were marine-adapted peoples from the outset, or were instead inland game hunters who later learned proficiency at harvesting marine resources to become truly "maritime adapted" in the late periods of prehistory, remains a subject of inquiry.

Site Description and Excavation Methodology

Auger testing at the site prior to the 1978 excavations characterized it as a medium-sized, 1.5 m in depth, shell midden that ran parallel to the shore for about 70 meters, and extended inland

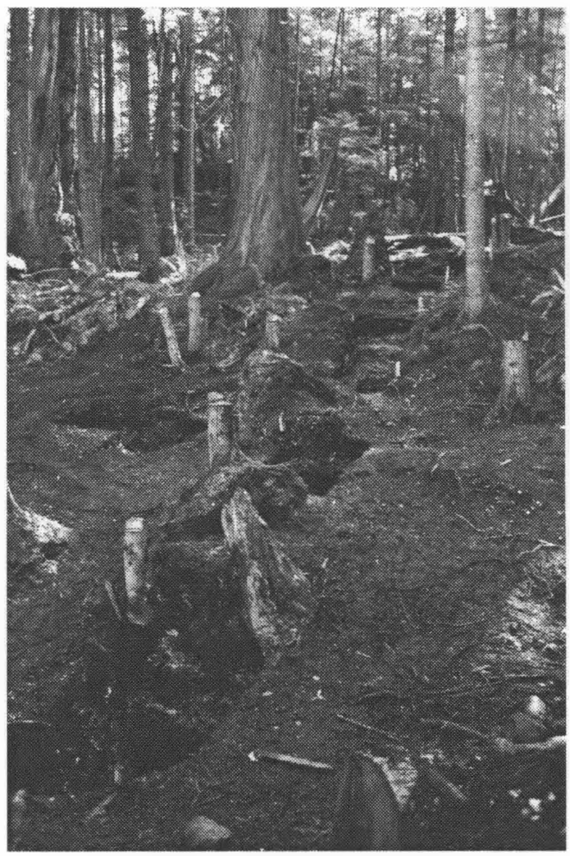


Figure 7:4. **The 1978 Excavations at Bear Cove. Alternate excavation unit transects were employed in the dense forest of the site. Area 1 is in the foreground and Area 2 in the background. (C.C. photo 1978).**

Figure 7:5. **Selected Bear Cove Pebble Tools, Component I (half-size).**

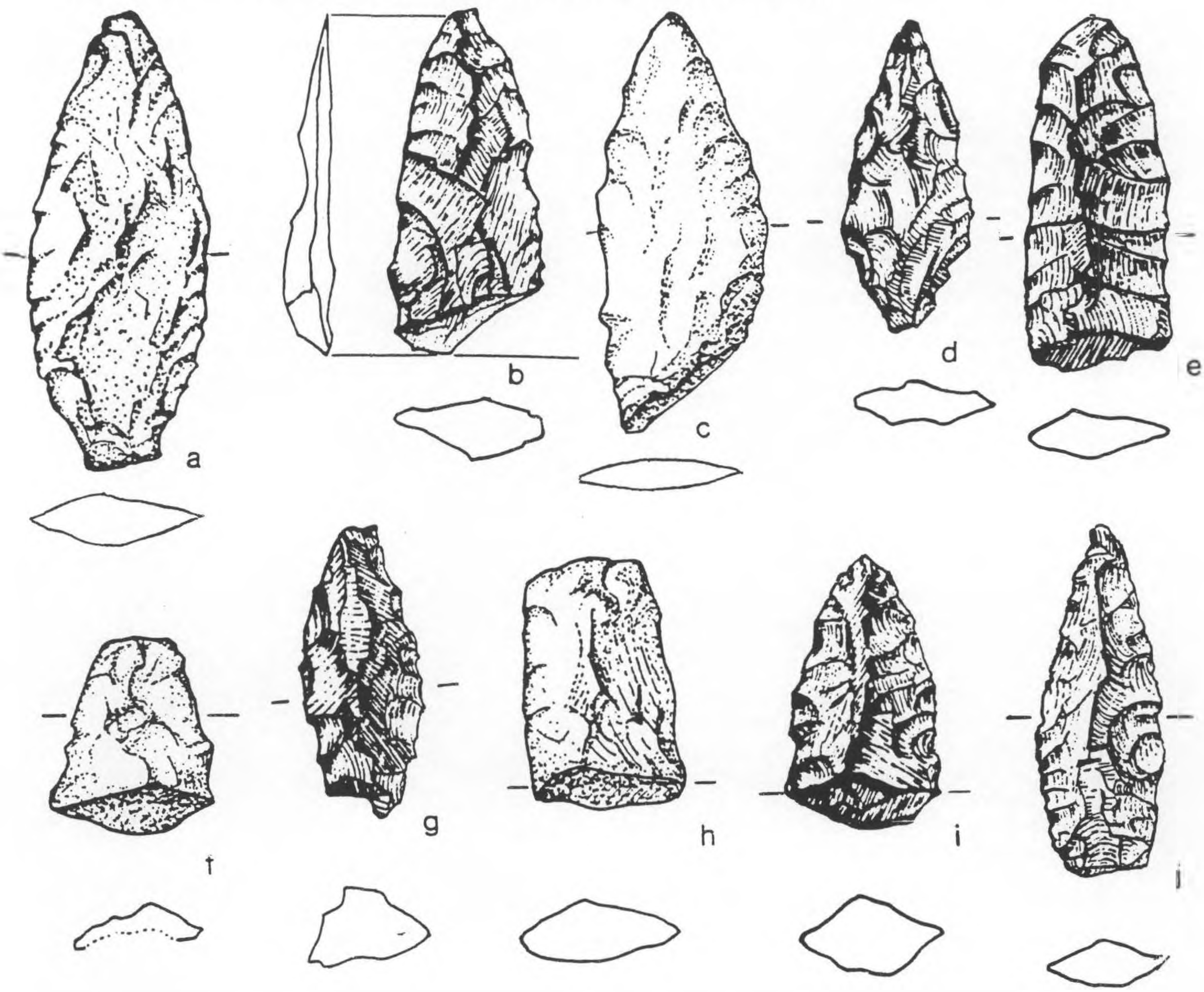


Figure 7:6. **Bear Cove Projectile Points and Biface Fragments, Component I (actual size).**

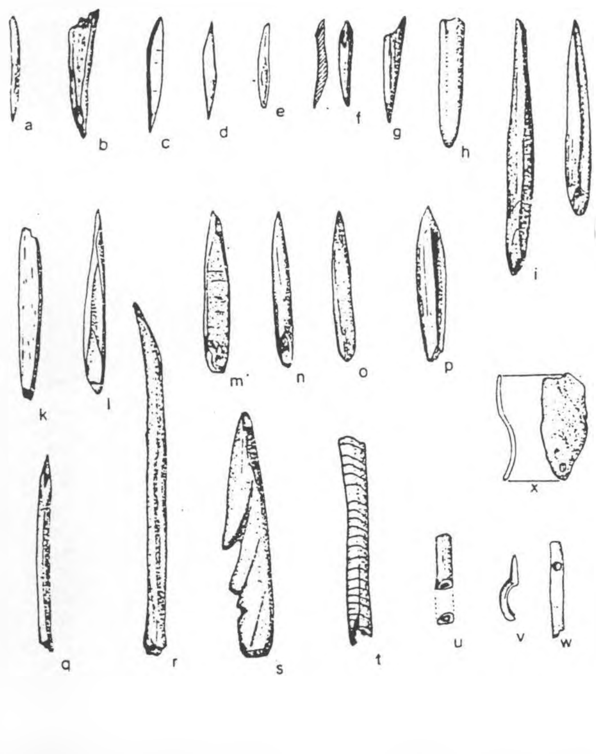


Figure 7:7. **Bear Cove Bone Points, Harpoon points, Needles, and Miscellaneous Bone Artifacts, Component III (half-size).**

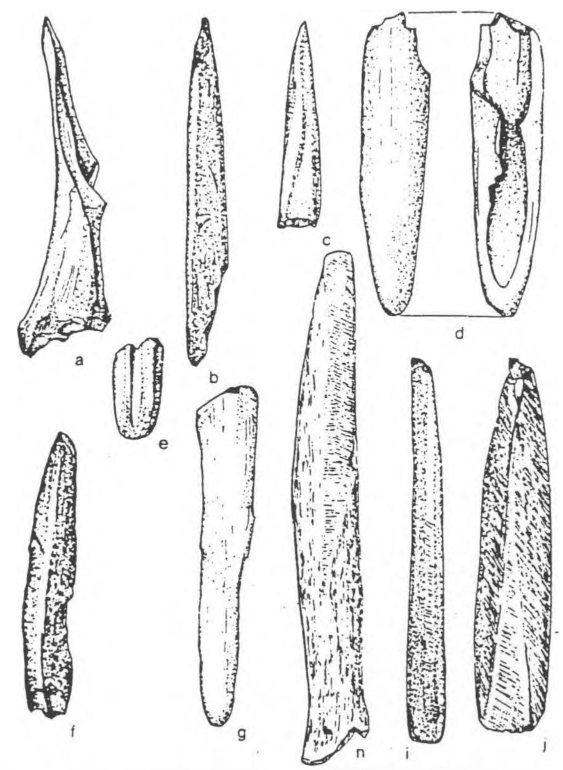


Figure 7:8. **Bear Cove Bone Awls, Chisels, and Points, Component III (half-size).**

from the beach about 35 meters (Chisholm and Duff 1977). The dense forest of western hemlock, red cedar, and Sitka spruce covering the site (Figure 7:4) made excavation and photography difficult.

An intermittent creek flowed through the middle of the site. The creek today is not a salmon spawning stream; however, the salmon-bearing Quatse River is nearby at the southern end of Hardy Bay. The lack of a salmon-spawning stream suggests that the site was probably not a summer salmon-fishing village. Two small tidal bedrock islands are located off the beach, and harbor a great diversity of intertidal resources. These islands and the indented shoreline of the cove provide a sheltered setting that protects the site and beach from wind and water erosion.

George Dawson (1887: 66) remarked:

> Low shores well adapted for the landing and beaching of canoes have usually been selected for the more important villages, especially where such a shore is contiguous to some rocky point or promontory or small high rocky island.

Topographically the site (Figure 7:9) exhibits both a low elevation midden terrace close to the beach (7-8 m above mean sea level), and an upper midden terrace at the back of the site (20 m from the beach, with a surface elevation between 9-11 m above sea level). The low terrace site area south of the creek was designated Area 1, the upper terrace south of the creek Area 2, and the area north of the creek as Area 3.

The judgmental excavation plan for locating sampling units was chosen to maximize both temporal and spatial coverage across the site for addressing questions of site chronology and structure, since the site was destined for complete destruction. Recovery of faunal samples that would represent the complete range of species utilized by the pre-Contact peoples, for understanding questions of subsistence and seasonality, was also reflected in the areal coverage and sampling methodology that used a combination of 1/8-inch mesh (3.2mm) on-site water screens and column samples. Interval-transect excavation units were employed. Four transects (A–D) were excavated in 2 m x 1 m intervals; one parallel to the beach at the front of the midden in Areas 1 and 3 (transect A); two crossingp this transect at right intervals in the south (Area 1) and north (Area 3) areas of the site (transects B and D); and a fourth running parallel to the beach on the upper terrace of the south area (Area 3) of the site (transect C) (Figure 7:9). The transects were arbitrarily placed in areas of least interference from large trees. The horizontal

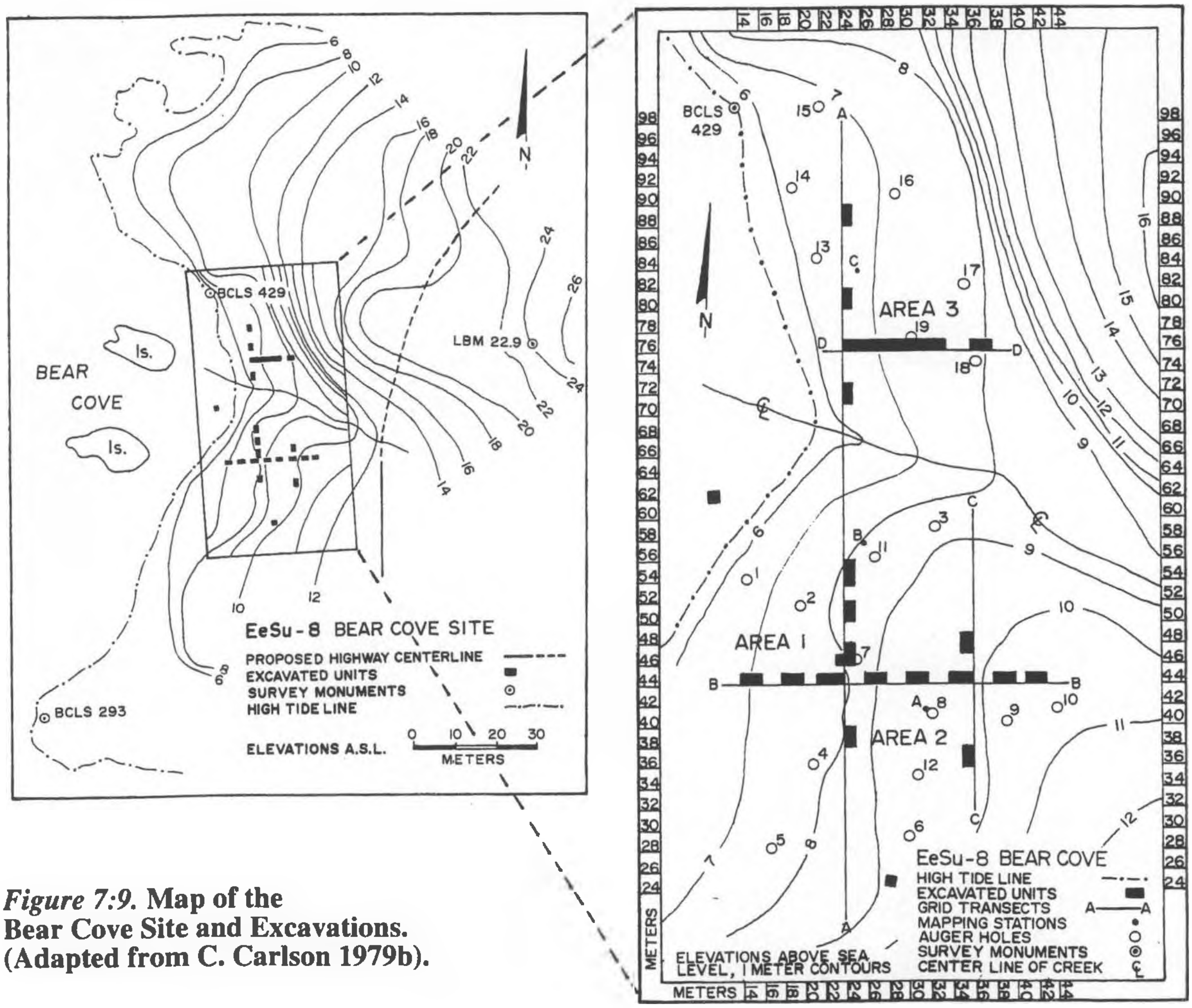


Figure 7:9. **Map of the Bear Cove Site and Excavations. (Adapted from C. Carlson 1979b).**

datum was a survey marker (BCLS 429) that has since been removed, and vertical datum was mean sea level, with all four corners of each excavation unit mapped according to elevation above mean sea level. A total of 25 2 m x 1m units were excavated; depths ranged from 0.6 to two m (63 cubic m of deposits). Units were excavated in 10 cm levels, and all deposits were water-screened through 1/8-inch (3.2 mm) mesh. Two column samples (10 cm x 10 cm) were taken from the east wall of each unit for sediment, micro-faunal, and floral analysis.

Stratigraphy and Dates

There were two major divisions in the site stratigraphy: (1) the upper shell midden deposits in Areas 1, 2 and 3 (called Component III), and (2) the lower non-shell deposits (called Component I in Area 2, and Component II in Areas 1 and 3). In general, and typical of coastal shell middens, the micro-stratification was complex, varied from one area of the site to another, and layers were often not continuous even across excavation units. The shell midden deposits (Component III) in Area 1 and 3 on the lower terrace closest to the beach, were underlain by a stratum of black organic sediment (Component II) that, in turn, lay directly over sterile olive (5Y 4/4) beach sands similar to the modern beach. In Area 2, the upper terrace, the shell midden (Component III), was underlain by different non-shell deposits (Component I), which were deeper and more stratigraphically complex than the Component II non-shell deposits on the lower terrace in Areas 1 and 3 (Figure 7:10).

Component I (Area 2) Stratigraphy

This component was located in Area 2, the upper back terrace of the site, below the shell midden (Figures 7:11, 7:12). The deposit consisted of horizontal bands of silt, sand, clayey-silt, pebbles and gravel, of about one meter in depth. Sediment colour varied from black to olive, to red, and reddish-brown; several of the bands were very greasy in texture, probably reflecting high organic content. The sediments in the back units of Transect B were very compacted.

In the most seaward unit (N44-45/E30-32) at the front face of the upper terrace, the overlying shell midden was the deepest for Area 2 (150 cm). Component I in this unit consisted only of a shallow 20 cm thick layer of olive beach sand. A piece of sea lion bone was found in this layer, 5 cm below the shell deposit at 155 cm below surface that was submitted for AMS dating (Beta-157416, Table 1) (discussion of dates below).

The excavation unit in the middle of Transect B (N44-45/E34-36) (Figure 7:12), and the north excavation unit of Transect D (N47-49/E35-36) were excavated in the deepest and most stratigraphically complex portion of Component I deposits. The Transect B unit stratigraphy is composed of eight bands of sediment within a 90 cm span; the Transect D unit stratigraphy is composed of ten bands of sediment within a 100 cm span. The top band in each unit is black silt with pebbles approximately 20 cm deep. Below that are thin bands of olive sand, greasy red and black silt, sand and gravel, red-brown clay, black silt and pebbles, fine greasy black, and brown and olive sand. The only dateable charcoal sample (WSU-2140) from these two units came from N44-45/E34-36 at 10 cm below the shell in the black silt. However, flecks of shell were identified in the sample and so it probably dates the bottom of the overlying Component III shell midden, and not the terminal deposition of Component I (Table 7:1, Figure 7:12).

In the two back (landward) units, Component I consisted of more compacted greasy black silt and reddish-brown,"oxidated," sandy clay silts with gravel. The upper layers of the Component were often more black (organic) in appearance, and with a pH of 7.4-7.2, had better bone preservation than the lower olive and reddish deposits (pH of 6.8-5.6). The underlying sterile deposits consisted of olive sand and gravel in the more shoreward units, and of olive sand, reddish-brown silt, and weathered bedrock in two units at the back of the site. The weathered bedrock, sand, and gravel that lay below the Component I cultural deposits suggest a raised beach and higher sea level (by 7-9 meters above modern mean sea level) at the initial occupation of the site.

Component 1(Area 2) Radiocarbon Dates

A charcoal sample recovered from near the bottom of the Area 2, Component I deposits, about 20 cm above the sterile sands and gravel, and 70 cm below the bottom of the shell midden produced the oldest date at the site of 8020±110 [cal 9000] BP (WSU-2141) (Table 7:1). A more recently obtained date (Beta-157416) on a sea lion mandible from 5 cm below the shell midden dated 4470±60 BP, which calibrated to two sigma is 5310 to 4870 BP (Table 7:1). This bone sample came from an olive sand and pebble matrix 30 cm above the bottom of the excavation unit at 155 cm below surface, from the most shoreward excavation unit in Area 2 (N 44-45/E 30-32). The Beta date suggests that Component I terminated around 5000 years ago, and that the sea lion belonged to the terminal occupation of the early Component I. Another recently obtained date, NUTA-3786, on a sample of fur seal bone, from 45 cm below the shell midden in orange-brown silt, produced a date of 4576±30 [cal 5300] (Table 7:1).

Component II (Areas 1 and 3) Stratigraphy

Component II consisted of a stratum of "greasy" organic black silt, ranging in thickness from 5 cm to 65 cm. It occurred below the shell midden deposits in both Areas 1 and 3 on the lower terraces. This component lay directly over sterile olive (5Y 4/4) beach sands and gravel similar to the modern beach (Figures 7:10, 7:13 and 7:14). The presence of a black shell-free component or stratum underlying shell midden deposits is not unique to Bear Cove. For the Namu site, Roy Carlson (1993:19-20, 1998:25) suggested that the black shell-free deposit under the shell midden there might be the result of shoreward erosion of earlier middens. If this is the case, the black non-shell layers are remnants of the "back" of the midden, possibly under house floors. If this applies also to Bear Cove, then Component II relates depositionally and culturally to the Component III shell midden. In support of this interpretation is that in one of the excavation units from the back of the lower terrace in Area 1, along Transect A (N46-48/E24-25), two probable house-post holes were identified in Component II. They were visible at the contact with the overlying shell midden, and extend into Component II; one was 10 cm in diameter and25 cm deep, the other was 20 cm in diameter and 45 cm deep, and extended through Component II into the sterile beach gravel.

Area 1

In Area 1 (south of the creek), in the excavation unit furthest back from the shore (Transect B, N44-45/E26-28), at the very back of the lower terrace, Component II was only 5 cm thick, and occurred 140-145 cm below surface. From there

Table 7:1. Bear Cove Radiocarbon Dates.

Lab sample/ Date of Sample	Material/ Excavation Unit	14C Age B.P. uncalibrated	Sample Context
WSU-2137/1978	Charcoal sample 2 N44-45/E14-16	1035 ± 80	*Component III* (upper section), *Area 1*, in shell deposit, 40 cm below surface
WSU-2138/1978	Charcoal sample 6 N44-45/E34-36	4360 ± 90 [cal 5000]	*Component III* (middle-lower section), *Area 2*, in shell deposit, 76 cm b.s.
WSU-2142/1978	Charcoal sample 16 N80-82/E24-25	2075 ± 80	*Component III* (bottom section), *Area 3*, at bottom of shell, 130 cm b.s.
WSU-2140/1978	Charcoal sample 9 N44-45/E34-36	4180 ± 90 2 sigma range: 5310 -4870	*Component III* (bottom section), *Area 2*, 10 cm below shell, in black silt, flecks shell, with associated hearth, 114 cm b.s
WSU-2139/1978	Charcoal sample 8 N44-45/E14-16	2430 ± 90	*Component II* (middle section), *Area 1*, 20 cm below shell, in silt & gravel, 140 cm b.s.
BETA-157416/2001	Sea Lion bone sample 1 N44-45/E30-32	4470 ± 60 [cal 5000]	*Component I* (top section), *Area 2*, 5 cm below shell, in olive sand & pebbles, 30 cm above bottom of the shoreward unit, 155 cm b.s.
NUTA-3786/2002	Fur Seal bone sample 3 N44-45/E38-40	4576 ± 39 [cal 5300]	*Component I* (middle section), *Area 2*, 45 cm below shell, 45 cm above bottom of unit, in orange-brown silt & gravel, 145 cm b.s.
WSU-2141/1978	Charcoal sample 11 N44-45/E38-40	8020 ± 110 [cal 9000]	*Component I* (bottom section), *Area 2*, 70 cm below shell at bottom of black silt, 180 cm b.s.

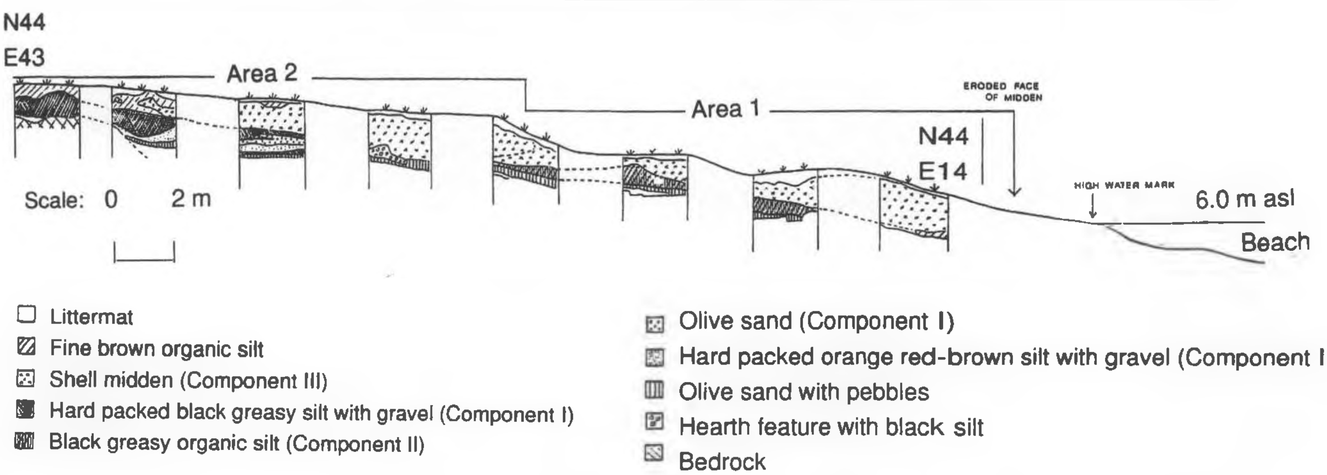


Figure 7:10. **East-West Transect indicating general stratigraphic Relationships between Excavated Units in Area 1 (low terrace) and Area 2 (upper terrace).**

shoreward the Component increased in thickness to 65 cm in unit N44-45/E22-24, at 8 meters from the front face of the midden, where the bottom of the stratum was at 100 – 120 cm below surface. Along Transect B, from the back of the lower terrace to the front of the midden, the component graded from a black greasy silt, to a black gravelly silt, to completely disappearing in the front (shoreward) excavation unit. The surface topography of Component II was undulating at the contact with the overlying shell midden (Figures 7:13, 7:14, 7:15).

Area 3

Component II in Area 3 (north of the creek) was present under the shell midden from the front to the back of the terrace. Along Transect D it was thinnest (10 cm) at the front excavation unit, with maximum thickness (50 cm) in the center units. The Component graded from black or-

Figure 7:11. **North Wall Stratigraphy Unit N44-45/E 34-36, Area 2 (C.C. photo. 1978).**

ganic silt in the back units to black organic silt and gravel towards the shore. The bottom of the Component was 120 cm below surface. It was underlain by olive (5Y 4/4) beach gravel in the two shoreward units of Transect D and three units of Transect A, and by olive to yellowish brown (10YR 5/4) gravelly sand in the back units of Transect D.

Component II (Areas 1 and 3) Radiocarbon Dates

A single radiocarbon date was obtained on this stratigraphic component, from Area 1 (Table 7:1). The date of 2430±90 (WSU-2139) provides an age on the mid-point of the stratigraphic unit, suggesting that the initial occupation on the lower beach terrace post-dates 3000 years ago.

Component III (Areas 1 – 3) Stratigraphy

Component III consisted of shell midden from all site areas on both the upper and lower terraces. The age of the shell midden on the upper terrace is older than that of the midden on the lower terraces (see below). Culturally the shell midden represents the Late or "Developmental" period of Northwest Coast prehistory, i.e., the semi-sedentary village settlement pattern.

Area 1

The shell midden stratigraphy consisted of banded layers of black silt, crushed shell, and ash, with lenses or pockets of whole and large fragments of shell. Clam and barnacle were the visually dominant shellfish types. The maximum depth (150 cm) was at the front of midden, and the minimum depth (95 cm) in the central area. The midden was also deep (130 cm) at the back of the lower terrace where midden from the upper terrace had spilled over its front sloping face (Figures 7:10, 7:13, 7:14, 7:15).

Area 2

The midden in Area 2 was 12 meters in width from the front to the back of the upper terrace (Figure 7:10). The midden extended inland as far as excavation unit N44-45/E 38-40, that is, 29 meters from the front face of the lower midden at the beach. The furthest back unit of Transect B contained no shell midden, but did contain non-shell deposits of Component I. The shell midden was thickest at the front (150 cm), tapering to 35 cm in thickness at the back of the terrace, and 110 cm deep in the middle excavation units along Transect B. The midden was multi-layered and pocketed with whole and crushed shell, ash and dark silt. Clam, mussel, and barnacle were visually predominant (Figures 7:11 and 7:12).

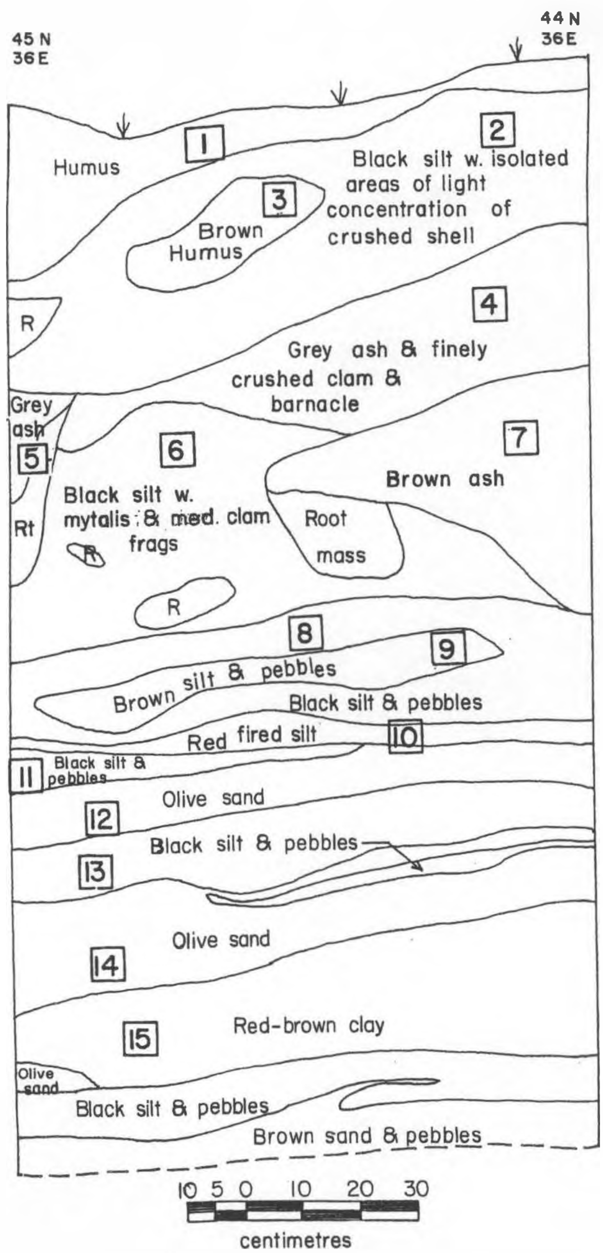


Figure 7:12. **East Wall Stratigraphy of Unit N44-45/E 34-36, Area 2 (Transect B) with numbered locations of Soil Samples. Samples 8-15 are Component I.**

Area 3

The midden was deepest in the front excavation units (100 cm), tapering to only 20 cm in unit N76-77/E32-24 of Transect D. The furthest back unit of Transect D contained no shell midden, and hence the midden width from front to back was 13 m. The shell midden consisted mostly of large and medium fragments of loose clamshell with some barnacle and mussel and pockets of finely crushed shell and ash.

Component III (Areas 1 – 3) Radiocarbon Dates

At the bottom of Component III in Area 2 was a 20 cm layer of dark greasy loam with pebbles, sand, and weathered stone. A charcoal sample from a hearth feature in this layer, at the contact with the overlying shell midden, at 114 cm below surface, was dated at 4180 ± 90 BP. (WSU-2140) (Table 7:1). This date, however, is potentially too young because another sample (WSU-2138) from the same excavation unit, but above it stratigraphically at 76 cm below surface, midway through theshell midden deposit, was dated at 4369±90 BP (Table 7:1).

The lower terrace shell midden in Area 3 is dated at the base of the shell at 2075±80 BP. (WSU-2142) (Table 7:1). Another date of 1035± 80 BP was obtained from near the top of the shell midden in Area 1 at 40 cm below surface. These two dates plus the date on Component II from Area 1, indicate that the shell midden on the lower terrace is at least 2000 years younger than the shell midden on the upper terrace.

Modern Hardy Bay Fauna

Modern species diversity provided the background context for the archaeological faunal identification. Recent biological surveys identi fied 18 species of land mammals and 21 sea mammals that inhabit the northern Vancouver Island region (Tera 1978). Of these, Boas (1909) recorded the use of five land mammals (deer, wolf, black bear, river otter, and beaver), and six sea mammals (northern fur seal, northern sea lion, harbour seal, sea otter, harbour porpoise, and Dall porpoise) by the Kwakiutl peoples. There are also upwards of 185 species of birds (both aquatic and terrestrial) that were available for human use in the Hardy Bay region (Tera 1978). A survey of the intertidal zone in Bear Cove by the 1978 field crew identified barnacles and 20 species of molluscs, including clams, cockles, mussels, limpets, abalone, and whelks.

The major freshwater system in Hardy Bay (Figure 7:2) is the Quatse River, containing spawning and rearing habitat for sockeye, coho, chum, and pink salmon, steelhead, and Dolly Varden char. In addition, the Tsulquate and Glenlion rivers entering the west side of the bay support runs of coho, chum, pink and steelhead. The fish resources available in Hardy Bay and Queen Charlotte Sound are vast, and include 37 species of rockfish, ratfish, several greenlings, herring, 40 species of sculpins, dogfish, halibut and other flatfish, four cods, lingcod, five species of salmon, four skates, several perch, sablefish, and plainfin midshipman.

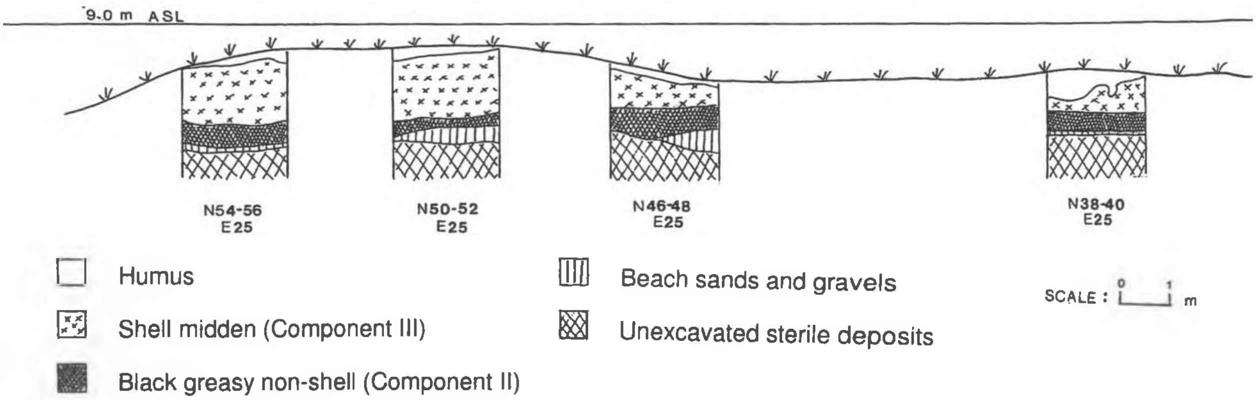


Figure 7:13. **North-South Transect Indicating General Stratigraphic Relationships Between Excavated Units in Area 1 (low terrace).**

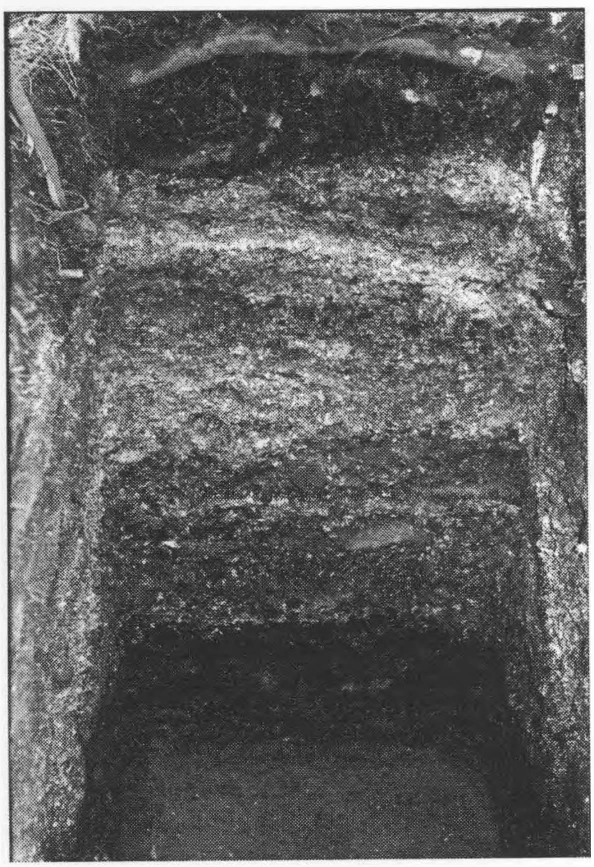


Figure 7:14. **Stratigraphy in Unit N44-45/E26-28, east wall (E28), 150 cm below surface, Area 1, back unit of lower terrace Showing Black Layer (Component II) under the shell midden. (C.C. photo 1978).**

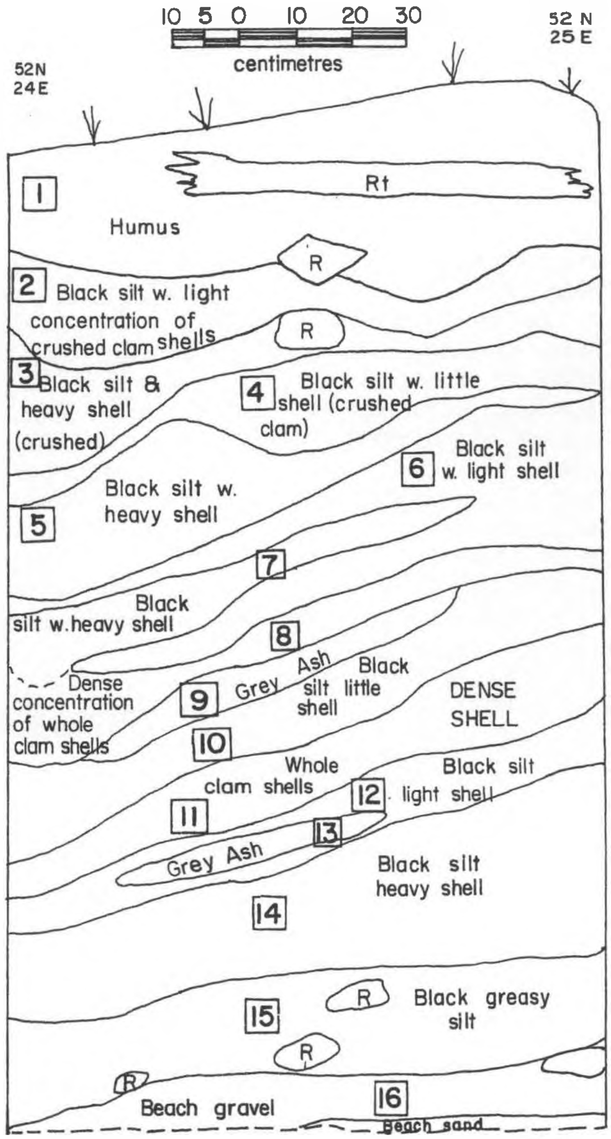


Figure 7:15. **East Wall Stratigraphy of Unit N 44-45/E 14-16, Area 1 (Transect A) with numbered locations of Soil Samples. Sample 15 is Component II.**

Bear Cove Archaeological Fauna

The faunal remains from the excavation units and column samples were identified to the lowest taxonomic level possible through comparison to skeletal collections at the British Columbia Provincial Museum (now the Royal BC Museum). The identified bone and shell were quantified by fragment counts (NISP), by minimum number of individuals (MNI), and by weight (gm). A total site sample of 29,888 bones weighing 7,432 gm was identified to species, representing a minimum of 1,543 individuals. Of this, by MNI, 77% were fish, 13 % were mammal, and 10% were bird (Table 7:2). The faunal sample sizes were comparatively evenly distributed between each of the three site areas with producing 38 % from Area 1, 32 % from Area 2, and 29% from Area 3 of the total sample by MNI (Table 7:2). Between Components, however, there is a marked sample size difference; the oldest Component I produced only 7 5.5 % of the sample by NISP/MNI; Component II produced 11 % (MNI & NISP); and the shell midden Component III produced the largest sample size at 81-83% by NISP/MNI (Table 7:2).

Twenty-six genera or species of fish in total were identified from the Bear Cove site (rockfish and ratfish were the most common, followed by greenling and herring) (Table 7:3); eleven land mammals were identified (deer, elk, canid, black bear, beaver, river otter, raccoon, mink, marten, vole, and squirrel), and six species of sea mammals (northern sea lion, northern fur seal, harbour seal, sea otter, harbour porpoise, and a small whale of uncertain species) (Table 7:4); and twenty-two genera or species of birds (mostly aquatic birds such as ducks, geese, loons, cormorants, heron and grebes) (Table 7:5). The analysis of 37,335 gm of column sample shell identified 23 species of molluscs (butter clam and littleneck clam are most abundant), as well as a large amount of barnacle (Table 7:6).

Faunal Trends/Component Comparisons

The faunal species relative percentages are compared between the earliest non-shell Component I (dated from 8020 to 4300 [8900-4900] BP in Area 2), and the latest shell midden Component III (dated from 4300 to 1035 [4900-900] BP in all areas) to suggest trends over time in subsistence practices. Component I by MNI, consists of 46 % fish, 25 % bird, and 29 % mammal. Of the mammal, by MNI, 76 % are species of sea mammal (harbour porpoise and unidentifiable *Delphinidae* sp., northern sea lion, northern fur seal and sea otter), and 30 % are land mammal (deer, canid, black bear and river otter). In contrast the shell midden, (Component III, by MNI, consists of 78 % fish, 13 % mammal, and 9 % bird; of the mammal, 40 % is sea mammal and 60 % is land mammal

Table 7:2. Summary of the Bear Cove Vertebrate Sample.

Vertebrate Sample by Class	NISP	NISP %	MNI	MNI %
FISH	26004	87	1185	77
MAMMAL	3268	11	208	13
BIRD	616	2	150	10
TOTAL	29888	100	1543	100
Vertebrate Sample by Component				
COMP. I	2136	7	85	5.5
COMP.II	3451	11	178	11.5
COMP.III	24301	81	1280	83
TOTAL	29888	100	1543	100
Vertebrate Sample by Site Area				
AREA 1	12612	42	591	38
AREA 2	10862	36	500	32
AREA 3	6414	22	452	29
TOTAL	29888	100	1543	100

The data indicate that Component I has a 36 % higher percentage of sea mammal, a 32 % lower percentage of fish, and a 16 % higher percentage of bird than Component III. The noticeably higher utilization of sea mammals than land mammals in Component I suggests a greater emphasis on the sea for subsistence in the earliest occupations of the site than in the later occupations. The contrast between the higher amounts of sea mammal in Component I is also reflected in the higher amount for site Area 2 in general, which contained the oldest deposits, including the oldest shell midden which deposits in the site (Figure 7:16). The lesser amount of fish in Component I compared with Component III may reflect the taphonomic bone. Rockfishes are the dominant species in allprocesses inherent in older non-shell deposits where fish may not survive as well as mammal the site components, and are fish that are easily procured by angling from boats close to shore. The higher amount of codfishes, however, in Component I may also indicate that a more open-ocean fishing pattern, complementary to an

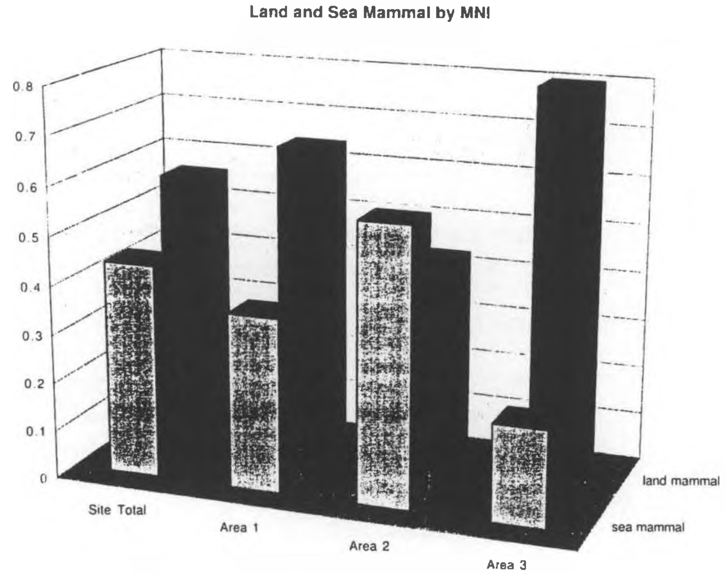


Figure 7:16. **Graph Showing Comparison of Frequency of Sea Mammal and Land Mammal by Site Areas. Area 2 has the oldest components, Area 3 the most recent.**

Open ocean sea mammal hunting pattern, may also have existed in the early occupation. The higher frequencies of birds in Component I, the majority of which are sea birds, also suggest a subsistence focus on the open ocean that was greater than that of the later occupation.

Also noteworthy in regards to fishing is that although salmon has been identified in all components of the site, it is not abundant (the site average is 3%). Several explanations for the low abundance of salmon are possible. First, in this area of the coast, rockfishes, ratfishes, flatfishes, and herring may be more abundant in the local environment than salmon, and/or easier to catch. Second, this site may have been occupied outside the salmon fishing season where preserved salmon without backbones could have been eaten. Third, salmon was consumed at other locations, such as at sites along the salmon spawning rivers. Despite the low abundance of salmon—a fish that is frequently considered to be the signature resource of the ethnographic Northwest Coast, fish bone nevertheless represents as much as 78 % of the identified sample by MNI. With 26 genera and/or species of fish identified for the site, it must be concluded that ocean fishing was an important subsistence occupation. The tendency to only focus on salmonas a critical marine resource is probably reflected in the biases that are imposed by the ethnographic accounts (Hobler 1983; Ford 1989).

Seasonality

One of the research methods employed was to investigate seasonality indicators in the fauna. Interpretations of seasonality were based on a study of the growth rings of clamshells, and the migratory schedules, life cycle patterns, and age classes of the vertebrates. Following the methodology of Ham and Irvine (1975) and Ham (1976), 126 clam shell valves of two species (little neck and butter clam) were sectioned and polished to measure the last growth ring to determine in which growth season it was harvested. Of the 126 valves, only 19 had intact edges that were considered readable. Of these, 74% showed that they were gathered during the period when the winter check-ring was being formed, or during the initial stages of post-winter growth; 16% showed late summer growth; and 10% late fall. Despite the small sample size, this distribution suggests that clams were most heavily harvested during the winter, with some harvesting in the late summer or fall, in the post-4300 [cal 4900]BP shell midden Component of the site (although subsequent to this study in 1978, several methodological problems have become recognized (see Maxwell, this volume).

Bird migratory patterns indicate that of the total species identified, 7 species are migratory into Hardy Bay only during winter, 11 species are available year-round, and one species, the Rhinoceros auklet, represented by a single specimen, is a spring-migrant only, with nesting colonies on Pine Island in Queen Charlotte Sound (Godfrey 1979:202-203). These data indicate that birding was part of at least a winter-to-spring activity, and could have been accomplished year-round with certain species.

Table 7:3. Bear Cove Fish.

	Component I				Component II				Component III			
SPECIES	NISP	NISP %	MNI	MNI %	NISP	NISP %	MNI	MNI %	NISP	NISP %	MNI	MNI %
Sebastes spp. rockfish	266	73	18	46.0	640	52	27	18	6429	61	284	28.4
Sebastes ruberrimus yelloweye rockfish									4	+	2	0.2
Hydrolagus colliei ratfish	11	3	5	13.0	136	11	44	30	772	7	229	23
Hexagrammos spp. greenling	1	+	1	2.5	85	7	13	9	1041	10	101	10
Clupea harengus pallasi herring	18	5	1	2.5	26	2	9	6	478	4.5	87	8.7
Cottidae spp. sculpin	2	+	2	5.0	26	2	7	5	307	3	42	4
Hemilepidotus hemilepidous red irish lord					1	+	1	0.6	55	0.5	11	1
Myoxocephalus polyacanthocephalus									6	+	2	0.2
Leptocottus armatus staghorn sculpin					1	+	1	0.6	1	+	1	0.1
Enophrys bison buffalo sculpin									1	+	1	0.1
Scorpaenichthys marmoratus cabazon									2	+	1	0.1
Squalus acanthias dogfish	7	2	2	5.0	59	4.8	7	5	163	1.5	41	4
Flatfish sp.	2	+	1	2.5	54	4.4	9	6	241	2.3	35	3.5
Hippoglossus stenolepis halibut									3	+	3	0.3
Platichthys stellatus starry flounder									1	+	1	0.1
Atheresthes stomias arrowtooth flounder									1	+	1	0.1
Lepidopsetta bilineata rock sole									4	+	2	0.2
Gadus macrocephalus Pacific cod	7	2	2	5.0	8	0.6	4	3	133	1.2	38	4
Theragra chalcogramma pollock					10	0.8	3	2	79	0.7	21	2
Merluccius productus hake					1	+	1	0.6	3	+	2	0.2
Microgadus proximus tomcod					1	+	1	0.6				
Gadidae sp. codfish	42	11.5	4	10	97	8	9	6	402	4	34	3
Ophiodon elongatus ling-cod	1	+	1	2.5	16	1.3	3	2	22	0.2	10	1
Oncorhynchus sp. salmon	6	2	2	5.0	58	4.7	5	3	343	3.2	35	3.5
Anoplopoma fimbria sablefish									2	+	2	0.2
Embiotocidae sp. surf perches												
Rhacochilus vacca pile perch									3	+	3	0.3
Embiotoca lateralis striped sea perch									5	+	4	0.4
Raja sp. skate					3	0.2	2	1.3	6	+	6	0.6
Porichthys notatus midshipman									1	+	1	0.1
Total *identifiable* fish	363		39		1222		146		10508		1000	
Unidentifiable fish	1317	78			1901	61			10693	50		
Total fish	1680				3123				21201			

Table 7:4. Bear Cove Mammal.

	Component I				Component II				Component III			
SPECIES	NISP	NISP %	MNI	MNI %	NISP	NISP %	MNI	MNI %	NISP	NISP %	MNI	MNI %
Odocoileus hemionus deer	35	31	4	16	26	70	7	44	227	41	53	32
Cervus elaphus wapiti					1	3	1	6	1	+	1	0.5
Cervidae spp. deer/elk									42	8		
Canis spp. canids					1	3	1	6	32	6	17	10
Ursus americanus black bear									5	1	4	2
Castor canadensis beaver	2	2	1	4	2	5	2	12	7	1	6	3.5
Mustelid spp. weasel/minks									10	2	6	3.5
Procyon lotor racoon									10	2	6	3.5
Lontra canadensis river otter	2	2	1	4					4	1	4	2
Microtus spp. voles					1	3	1	6				
Martes americana marten									1	+	1	0.5
Tamiascurus spp. red squirrels									1	+	1	0.5
Delphinidae spp. dolphin/porpoises	48	42	8	32	4	10	2	12	113	20	15	9
Phocoena vomeinra harbour porpoise	1	1	1	4					7	1	3	2
Callorhinus ursinus northern fur seal	11	10	2	8					18	3	11	6.5
Eumatopias jubata northern sea lion	9	8	6	24					12	2	10	6
Phoca vitulina harbour seal									26	5	13	8
Pinniped sp. seal/sea lion									6	1		
Enhydra lutris sea otter	5	4	2	8	2	5	2	12	16	3	12	7
Ziphidae spp. beaked whales									8	1	4	2
Total identifiable mammal	113		25		37		16		546		167	
Unidentifiable land mammal	48				51				660			
Unidentifiable sea mammal	44				3				166			
Unidentifiable mammal	163				175				1262			
Total unidentifiable mammal	255	69			232	86			2088	79		
Total mammal	368				266				2634			

Table 7:5. Bear Cove Bird.

	Component I				Component II				Component III			
SPECIES	NISP	NISP %	MNI	MNI %	NISP	NISP %	MNI	MNI %	NISP	NISP %	MNI	MNI %
Anas/ Aytha spp. duck *Melanitta* spp. scoter *Bucephala clangula* common goldeneye	11	38	6	28	5	21	4	25	89	51	53	47
Goose spp. *Branta canadensis* Canada goose					1	4	1	6	2	1	2	2
Larus spp. gull	4	14	3	14					17	10	11	10
Gavia spp. loon *Gavia immer* common loon *Gavia stellata* red throated loon	9	31	7	33					11	6	11	10
Grebe spp. grebe *Podiceps auritus* horned grebe *Podiceps grisegna* red-necked grebe *Podiceps caspicus* eared grebe *Aechmophorus occidenttalis* western grebe					1	4	1	6	12	7	9	8
Phalacrocorax spp. cormorant *P. penicillatus* Brandt's cormorant *P. pelagicus* pelagic cormorant *P. auritus* double-crested cormorant	1	3	1	5	1	4	1	6	7	4	7	6
Ardea herodias great blue heron	1	3	1	5								
Auklet spp. *Cerorhinca monocerata* rhinoceros auklet *Ptychoramphus aleuticus* Cassin's auklet					11	46	5	31	5	3	3	2.5
Brachyramphus marmoratum marbled murrelet									4	2	2	2
Murre sp. *Uria aalge* common murre	1	3	1	5	1	4	1	6	7	4	5	4
Megaceryle alcyon belted kingfisher									1	0.5	1	1
Haliaeetus leucocephalus bald eagle	1	3	1	5	1	4	1	6	14	8	6	5
Corvus spp. *Corvus corax* raven *Corvus caurinus* crow	1	3	1	5					4	2	3	2.5
Cyanacitta stelleri Steller's jay					1	4	1	6				
Passerine sp. perching bird					2	8	1	6				
Total identifiable bird	29		21		24		16		173		113	
Unidentifiable bird	59	67			38	61			293	63		
Total bird	88				62				466			

Rockfishes, ratfishes, and greenling—the most abundant fishes identified—are year-round residents that are easily caught by angling close to shore (Carl 1971). They are thus a reliable resource even in winter when weather conditions are more hazardous for fishing. Late winter and early spring is prime herring catching season in the kelp beds close to shore (Carl 1971:22).

Age class was recorded during identification for the mammalian fauna as an indicator of seasonality. The presence and/or absence of immature individuals are used as evidence for spring/summer hunting. In the shell Component III of Area 1, bones of three juvenile *Canis* sp., one juvenile and one foetal/newborn *Callorhinus ursinus* (Northern fur seal), one juvenile *Phoca vitulina* (Harbour seal), one juvenile *Enhydra lutris* (Sea otter), one juvenile *Eumetopias jubata* (Northern sea-lion), and one juvenile *Odocoileus hemionus* (Coast deer) were identified. While this represents a minimum number of only nine individuals, their presence suggests that spring/ summer hunting, particularly for the sea mammals, was part of the subsistence pattern in the late occupation of the site. Whether or not this seasonal hunting pattern is one that had its origins in the initial occupation of the site is not known.

The presence or absence of certain sea mammals can also be used for seasonality estimates (Stewart and Stewart 1976). In particular, the northern fur seal migrate from Bering Sea to California and back in fall and spring, with many spending the winter in Queen Charlotte Sound. The Northern sea lion is commonly found close inshore in bays and river estuaries during the winter (Cowan and Guiguet 1978:346-349).

In sum, it seems reasonable to suggest that the Bear Cove site represents minimally a winter-spring village for the late period occupation, based on the faunal seasonality information. This agrees with the geographical location of the site in a protected cove buffered by intertidal islands, situated on a non-salmon stream. The accumulation of shell midden deposits reflects semi-sedentism in the settlement pattern during the late period of occupation. Seasonality evidence for the Early Period (Component I) is sparser; however, the presence of adult northern fur seal and northern sea lion may also support a winter-spring occupation.

Discussion

There are differing interpretations about the nature and evolution of early subsistence patterns on the Northwest coast of British Columbia. Some (R. Carlson 1990, 1995; Moss 1998; Dixon 1999) have argued that the Pebble Tool and Northern Microblade cultures of the coast are ultimately derived from northern *coastal* traditions, while others have argued for an *inland*-big-game hunting derivation (Matson and Coupland 1995; Matson 1996; Coupland 1998; Ames and Maschner 1999). Faunal data contribute significantly to this debate, especially the faunal assemblages from five early sites along the British Columbia and Alaska coastlines: (1) Chuck Lake (Ackerman et. al 1985, 1989); (2) Namu (Conover 1978; Cannon 1991, 1996); (3) Glenrose (Imamoto 1975; Casteel 1976; Matson and Coupland 1995; Matson 1980, 1996); (4) Bear Cove (C. Carlson 1979); and (5) Kilgii Gwaay (Fedje et al. 2001). Other important early sites such as Tsini Tsini (Hobler 2000) unfortunately lack faunal remains, probably because they do not underlie later shell middens.

The faunal remains at Glenrose consist of land mammal (elk, deer, *Canis* sp., beaver), sea mammal (harbour seal), fish (salmon, sturgeon, flatfish, eulachon, stickleback), and shellfish (mussel), which have led Matson (1996) and Matson and Coupland (1995) to suggest that the origins of Northwest Coast culture lay in inland big game hunting traditions of the Plateau. They credit the Plateau Old Cordilleran Culture (see Butler 1961) as the probable ancestor to the early Pebble Tool complexes on the southern and central Northwest Coast. The sample sizes from the Old Cordilleran component at Glenrose, however, are very small for the mammal bones, with an MNI of 4 elk, 2 deer, and 2 seal (Imamoto 1976). The larger number of identified bones for marine fishes (Casteel 1976) and shellfish than mammal, thus suggests that the interpretation of an inland instead of a marine subsistence focus is tenuous. Also, Matson and Coupland (1995:74) have pointed out that "Unfortunately the units with the majority of the faunal remains were not radiocarbon dated. In the absence of direct dates, the only surety is that the faunal and seasonality information is older than 5000 [cal 5700] BP."

The earliest dated faunal remains from another early central coast site, the Namu site, are dated to approximately 6000 [cal 6800] BP in the Period 2 deposits. A preponderance of fish, sea-mammals, and marine waterfowl in the early period occupations suggest to Cannon (1996:117) "the establishment of a broad-based marine economy" by that time period. There is much less salmon in the Period 2 occupation than in later occupations, and harbour seal was the most abundant of the early mammals. Cannon (1996:119) notes, however, that while dolphins, porpoises, northern fur seal, and northern sea lion are present in the sea mammals identified, they are not a major part of the assemblage.

For the central coast, Coupland has argued, "maritime adaptations evolved on the central Northwest Coast between 5000 and 4500 [cal 5700-5100] BP." (1998:50), and that "Although marine resources were probably utilized on the central coast from the time of earliest human occupation at the end of the Pleistocene, a developed maritime adaptation did not become widespread in the region until about 4500 [cal 5100] BP, and characterizes the early coastal assemblages as "pre-maritime" Coupland (1998:36-39) He calls Bear Cove a "coastal Old Cordilleran" site, where "evidence of a developed maritime adaptation is equivocal," and that the site probably represents a seasonal occupation on the coast. In other words, "Coastal Old Cordilleran sites, including Glenrose...and Bear Cove reflect a movement — possibly a seasonal one at first — to a coastal environment." Coupland argues that early coastal peoples were descended from Clovis inland big-game hunting cultures because of "the presence of Clovis at the eastern margin of the central coast" (1998:39), by which he refers to the Wenatchee site in central Washington state (Mehringer and Foit 1990).

The case for a southern inland cultural origin of the early coastal traditions of the southern and central coast is very tenuous for several reasons. The first is that the Clovis Wenatchee site is locatedeast of the Cascade/Coast Mountain range in the central Plateau of Washington, not on the "margin of the central coast." The Cascade/Coast Mountains present a formidable geographical and cultural barrier to coastal-inland population movements and shared resource adaptations. To link the Wenatchee site to the early coast occupation seems improbable on topographical issues alone, notwithstanding the major differences in artifact technology between that and the Pebble Tool assemblages. Second, the probability that people may have traveled on a seasonal basis to the northern end of Vancouver Island (BearCove), or to the mouth of the Fraser River (Glenrose), from the inland Plateau across the highest mountain ranges on the continent, and then across the coastal waterways by boat, only to return at the end of "the season" seems highly improbable. Third, Coupland's (1998:36) argument that peoples were initially terrestrially adapted is logically inconsistent when he notes that, "the mountainous, heavily forested [coastal] terrain is not ideally suited to a terrestrial foraging way of life." Finally, the definition

Table. 7:6. Bear Cove Component III Shellfish.

SPECIES	Weight (gm)	Weight %
Saxidomus giganteus butter clam	11457.6	33
Protothaca staminea little neck clam	9293.1	27
Clinocardium nuttalli cockle	223.4	0.6
Tresus capax horseclam	152.2	0.4
Macoma spp. bent nose clam	50.0	+
Mytilus californianus sea mussel	617.2	1.7
Mytilus edulis bay mussel	56.3	+
Pecten caurinus Pacific scallop	1.6	+
Hiatella gillicana Gallic saxicave	0.2	+
Thais lamellosa wrinkled purple whelk	586.1	1.6
Thais emarginata short-spired purple whelk	1.5	+
Thais canaliculata channeled purple whelk	6.2	+
Thais sp. whelk	570.9	1.6
Searlesia dira spindle shell	15.1	+
Littorina sitkana Sitka littorine snail	30.8	+
Ceratostoma foliata leafy hornmouth	5.3	+
Calliostoma ligatum blue top-shell snail	8.0	+
Balanus cariosus acorn barnacle	11570.3	33
Amphineura sp. chiton	3.2	+
Katharina tunicata leather chiton	58.4	+
Cryptochiton stelleri gumboot chiton	18.5	+
Acmaeidae sp. limpet	26.6	+
Haliotis kamtschatkana northern abalone	2.3	+
Strongylocentrotus sp. sea urchin	0.4	+
Cancer sp. crab	0.1	+
Marine snail sp.	2.2	+
Land/fresh water snail sp.	1.0	+
Total identifiable shell	34755.9	93
Unidentifiable shell	2579.2	7
Total shell	37335.0	

of the coastal Pebble Tool Tradition as a "coastal variant" (Matson 1976) of the inland Old Cordilleran Tradition of the Plateau has no supportable ethnographic analogy.

Ames and Maschner (1999) also argue against a maritime-based subsistence pattern for early coastal occupations, referring to faunal data from Chuck Lake, Glenrose, and Bear Cove. They state that because of the preponderance of sea mammal bones, only the Bear Cove site is "a major sticking point for our model" (1999:26), but nevertheless dismiss the assemblage as evidence supporting a maritime economy due to "questions about porpoise behavior and the dating of the site" (1999:26). One is left to wonder what the questions are about porpoise behavior that negates a model for a maritime economy. The dating concerns the actual age of the Component I bones, which date to its terminal occupation (clearly a taphonomic preservation issue not unique to Bear Cove). They fail to point out however, that the same problems of dating are evident at the Glenrose site where the age of the fauna there is an unspecified "older than 5000 B.P." (Matson and Coupland 1995:74). In addition, Ames and Maschner (1991) give no explanation as to why they chose to ignore the early faunal data from the Namu site that Cannon clearly categorizes as a "broad-based marine economy" (1996:117).

In summary, to explain early coastal Pebble Tool sites such as Bear Cove, Glenrose, and, by inference, Namu, as both "seasonal" occupations and "coastal variants" of an inland big-game Plateau tradition called the Old Cordilleran (as defined by Butler 1961) ignores several fundamental issues. These issues include coastal site location, mountainous topographical barriers between the coast and the interior, different natural resource bases and the technology necessary to harvest them, and faunal analyses that indicates extensive use of sea fishes, sea mammals, and sea birds in the early occupation levels on the coast; all infer maritime-based adaptations. These data more logically support the idea of separate inland and coastal traditions from the beginning of Northwest Pacific occupation. To deny the Northwest Coast tradition its maritime heritage is similar to the problem of the "Great White Race" theory of the Mississippian Mound cultures where credit was not given to the local Indians for having built the mounds, but to an earlier more sophisticated race (—in this case the Clovis culture).

Hildebrant and Jones (1992), Colten and Arnold (1998), and Erlandson et al. (1998) address the significance of sea mammal hunting in the origins and evolution of maritime adaptations. This issue is of relevance to the Bear Cove fauna because of the relatively high percentages of sea mammal bones compared with land mammal bones from Component I. Hildebrant and Jones (1992) discuss the role of sea mammal hunting in the evolution of social complexity in coastal sites on the southern Northwest Coast (Oregon and California). They argue that after an initial elimination of easily caught seals and sea lions at rookeries in the early periods of occupation, people subsequently developed boats and the organized hunting of more difficult prey such as harbour seals and sea otters; this activity, in turn, led to technological and social organizational changes. Erlandson et al. (1998) and Colten and Arnold (1998) have critiqued this model, arguing instead that the faunal evidence indicates a shift to increased fishing activities in the later periods of prehistory on the southern coast, and that it was fishing, and not sea mammal hunting that eventually lead to maritime social complexity. Neither of these critiques, however, negates the important role of sea mammal hunting and the focus on the sea to the earliest marine occupations of the southern coast, but both suggest that its role in explaining the evolution of cultural complexity has been exaggerated by Hildebrant and Jones (1992). Erlandson et al. (1998), for example, discuss the faunal evidence from the early components at the Tahkenitch Lake site (8000 [cal 8900] BP) and Duncan's Point Cave site (8600 [cal 9600] BP), both of which are dominated by marine species in their early levels (i.e., by marine fish, sea birds, harbour seals, and unidentified sea mammals, as well as some land mammal [1998:11]). They suggest that sea mammals were one component of a diversified marine diet, although pinnipeds (seals and sea lions) "may have played a central economic role at some sites located near major rookeries" (1998:14). Likewise, Colten and Arnold (1998) re-interpret early period assemblages from Channel Island sites in California by converting bone counts to meat weights, reporting that the earliest faunal remains (7500-2600 [cal 8400-2600] BP) are dominated by shellfish and sea mammals. However, as noted by McCartney et al. (1998:5), "certain accomplishments of maritime peoples—for example, boat construction, seamanship, and the hunting of large and dangerous sea mammals far from shore—must rank among the impressive cultural achievements of cultural evolution."

Since the earliest initial colonization of North America, people have probably lived all along the coastlines of the Northwest Coast culture area from Alaska to Oregon. Highly mobile, traveling in watercraft, small groups of people fished and hunted the coast for sea fishes, sea mammals, and sea birds, in addition to some land hunting for fur-bearing animals, leaving a spotty record of their presence on the land as evidenced by the few sites with radiocarbon ages greater than 5000 [cal 5700] BP. They probably originated from northern maritime peoples of Northeast Asia and Beringia during the Late Pleistocene. Tabarev (2001:512) reports that the earliest sites in the Pacific maritime region of the Russian Far East fall in the 15-14,000 [cal 17,900-16,700] BP. age, and they are microblade and core assemblages. In addition, "incontrovertible evidence from the western Pacific (Japan, Australia) indicates that seaworthy boats capable of ocean crossings were in the cultural repertoire of at least some late Pleistocene hunter-gatherers" (McCartney et al. 1998:2). Recently, Dixon (1999:251) has suggested that the Clovis weapon system may have been derived from an earlier coastal harpoon technology associated with marine mammal hunting. He speculates that if people first entered the North American continent via the coast, later moving inland to hunt large terrestrial game, then "the Clovis weapon system may have its origins in coastal marine mammal hunting weapons technology, which was subsequently adapted to hunting large terrestrial mammals" (1999:251). Dixon's (1991) overview of all archaeological data pertaining to the question of human origins in North America supports a model of the earliest colonizers being marine-adapted peoples. The research at Bear Cove would thus support a general statement that the search for pre-Clovis must lie in Pacific Northwest coastal archaeology.

The "coastal migration route" hypothesis, first proposed by Fladmark (1979), has generally been considered more controversial or problematic than the hypothesized inland ice-free corridor route of entry. This is partly due to the effect of sea-level rise that has drowned the earliest part of the coastal archaeological record, but also to the perception that the coast of Alaska during the Late Pleistocene would have presented an impassable glaciated barrier to travel from Beringia. Yesner (1998:206-207) has recently reviewed the geological literature, which indicates that icebergs were no longer present in the Gulf of Alaska after 13,000 [cal 15,600] BP, and that on the Alaska Peninsula deglaciation was well underway by 11,500 [cal 13,500] BP. Other geological and paleoecological studies support the interpretation of major ice-free areas along the coast of British Columbia by 13,000 [cal 15,600] BP (Hebda 1983, Blaise et al. 1990; Josenhans et al. 1995, 1997). The finding of Black Bear bones on the Queen Charlotte Islands between 9800 and 9400 [cal 11,200-10,600] years ago (Fedje et al. 2001) may also support the idea of Late Pleistocene coastal refugia. Another possibility, argued on the basis of artifact similarity, but not subsistence pattern (although there is some evidence of salmonid use), is that the early coastal traditions had their roots in the inland Nenana complex of central Alaska, which later developed a coastal adaptation as an *in situ* North American feature during the early Holocene (R. Carlson 1998: 30-31). In either scenario, a maritime subsistence pattern is present with initial occupation of the coast, which is derived from northern (i.e. Beringian), populations — not from the southern inland Plateau or Plains. The recent questioning of the timing and accessibility of the inland ice-free corridor (Mandryk et al. 2001; Mandryk 2001) may finally put to rest the hesitancy to accept the coast as a route of early migration for people into the New World.

Along the Northwest Coast there is a truncated archaeological record of early settlements, unquestionably due to sea level rise. However, enough is intact from a few site components of the 10,000 - 5000 B.P. time period to understand what was fundamental to the subsistence pattern of the first occupation of the coast. That it was distinctively different from the inland Paleoindian cultures of Clovis, Protowestern, and/or Old Cordilleran that focused on hunting of terrestrial big game is apparent. It is different not only in the distinctiveness of the artifact assemblages, but also in the faunal remains (Carlson 1995). Roy Carlson states, for example, that "it is apparent that Matson and Coupland (1994) have never examined the collections on which the concept of the Protowestern is based" (1995:13), that the "Protowestern construct ignores significant differences in the lithics of sequent assemblages" (1995:13), and that "artifact assemblages typified by pebble tools and foliate bifaces... are earlier on the Coast and later in the Interior" (1995:14). In regards to faunal data, he (1995:14) also notes that "Quite a lot of data would need to be explained away if one were to accept a general land mammal hunting orientation as the primary subsistence base" on the Coast before 4500 [cal 5100] BP.

The faunal remains at Bear Cove, and other early assemblages such as Chuck Lake, Namu, Kilgii Gwaay, and Glenrose, indicate a subsistence pattern based on the harvesting of sea fishes, sea mammals, sea birds, some shellfish, and some land mammals. It is surprising that the use of both salmon and shellfish, long considered the signature species of the Northwest

Coast, appear to have a variable record of use in early sites. Namu, for example, sees a heavy dependence on salmon (89% of fish in early levels), with no shellfish (Cannon 1996, 1998); Glenrose has small amounts of salmon and some shellfish (Matson 1996); Bear Cove has very small amounts of salmon (3%) and no shellfish; Chuck Lake has small amounts of salmon (3.5%) and a definite shell midden (Ackerman et al. 1985 in Moss 1998:103); and Kilgii Gwaay has only a single salmon vertebra (Fedje et al. 2001). The lack of shellfish in the black zone underlying later shell midden deposits at both Bear Cove (Component II) and Namu may be a function of shoreward erosion of earlier middens (for which the black non-shell layers are remnants of the "back" of the midden under possible house floors), rather than lack of shellfish utilization (R. Carlson 1993:19-20, 1998:25). There are good fossil records of molluscs from nearshore glacial marine deposits of the late Pleistocene and early Holocene that indicate an abundance of important food resources such as butter clams, littleneck clams, and bay mussel (Wagner 1959; Hebda and Frederick 1990:327).

What is characteristically "maritime" about these early faunal assemblages are not salmon and shellfish, but the prevalence of sea fishes, sea mammals, and sea birds, all of which probably required some type of watercraft for harvesting. It could also be argued that shellfish do not represent "maritime adaptations" *per se* because they are essentially a *land-gathered* resource. Similarly, other than the few incidentals caught in trolling for sea fishes, salmon is essentially not marine-harvested either; it is a riverine or estuarine resource. Despite a maritime focus, the hunting of land mammals was also practiced if for no other reasons than providing furs for clothing and bones for tools.

The issue of cultural developments on the Northwest Coast should be re-focused to look not at the evolution and increasing complexity of maritime adaptations from the Early to the Late Periods, but at an evolution from Early maritime to Late terrestrial subsistence patterns. In this model, an initially seafaring, mobile, maritime fishing and hunting pattern (of sea fishes and sea mammals) of the initial colonizers, became one of people becoming more settled on the land after 5000 [cal 5700] BP, learning how to harvest riverine and estuarine resources (salmon, eulachon), using land-based technology of weirs, but also gathering inter-tidal (littoral) terrestrial shellfish, and hunting coastal forest game animals. Early maritime adaptations gave way to the inclusion of more terrestrial adaptations, including the technology of weirs and a more sedentary settlement pattern, becoming land-focused to the rivers, to the intertidal land, and to the forest resources, after the initial colonization phase of small mobile ocean-oriented fisher-hunters. This re-orientation towards the land after the Early Period eventually led to an over-production of river-caught salmon in more efficient fishing weirs, which provided the catalyst for the development of preservation and storage technologies (cache pits initially) (see R. Carlson 1998, Moss et al. 1990; Moss 1998; Moss and Erlandson 1998). A comparison of the percentages of sea mammal versus land mammal between the oldest components in Area 2 at Bear Cove with that of the later components in Areas 1 and 3 (Figure 7:18) shows the increasing emphasis on land mammals in later periods, supporting a model for a shift from marine to terrestrial resources over time.

Another important issue regarding resource utilization on the coast is that once cedar forests reached climax growth around 3000 [cal 3200] years ago (Hebda and Matthewes 1984), the raw materials for making planks became available. That, with a new woodworking technology of wedges and mauls, produced planks large enough to be made into huge storage features. Although not usually categorized this way, the Northwest Coast plank house was essentially a food storage and preservation facility that was also conveniently usable as a residential structure. If this were not so, there would be no reason to put so much labour into building these large houses with enormous high rafters. They could not have been built for residential comfort since they were probably drafty, smoky, and cold, but instead were built as warehouses that were ideal for storing vast quantities of salmon in a very wet environment. The smoke from the residential fires had the added benefit of keeping smoked fish preserved longer. The high rafters were hung with the season's produce, and the vast wall space provided storage areas for boxes of foodstuffs, including vats of eulachon oil and dried plants. This is not unlike the Pueblo cultures of the American Southwest where people eventually came to store their surplus agricultural production in large above-ground pueblo storage facilities that also functioned as residential buildings (an evolution from earlier non-agricultural pithouse dwellers).

Such large structures necessitated communal building skills, and such a large space may have led to or encouraged multiple family occupations that gave rise to amalgamations of families into extended kin networks, or lineages and clans, within houses. The improvements on storage of surplus food with the building of plank houses led to increases in population, ceremonialism (feasting), and competition between houses for resources. Competition over resources created disputes that ultimately led to the formalization of resource ownership rights. Ownership rights, in turn, created status differentiation between lineages or houses, and led to the creation of crest art. Status was affirmed by potlatching and redistribution between houses and, eventually, between villages. Import of exotic goods also served to affirm status, which necessitated travel outside of one's resource sphere, and led to a technology for producing large ocean-going trade canoes (huge dugouts of cedar made with adzes), and to the development of extensive trade networks up and down the coast. Any potential crashes in the salmon resource would put a damper on affluence if people weren't being fed. This may have been the case in the Fraser Delta during the Gulf of Georgia phase when there is an apparent decline in status differentiation following Marpole, possibly related to rock slides in the Fraser canyon that blocked salmon runs, that also effected interior pithouse villages (see Hayden and Ryder 1991). Europeans eventually arrived with new exotic goods that re-energized the system with increased potlatching as affirmation of status, later abated by missionaries and de-population due to disease.

In summary, the focus on salmon as a preservable, storable food surplus, with the resultant changes in social organization and settlement pattern, has its roots in the earlier *fishing* of marine fish and hunting of sea mammals. The initial subsistence focus on fish and aquatic resources is what led to the intensification of the salmon fishery. The idea of early coastal peoples initially being specialized terrestrial big-game hunters, and later becoming maritime adapted, appears unlikely. In ethnographic accounts of other aboriginal hunter-gatherers who engage in minimal fishing, such as the Sekani peoples of the northern Rocky Mountains, it is written that "even to this day they retain the scorn of true hunters for fishermen, and speak contemptuously of the Carrier as "Fisheaters" (Jenness 1932:379). The origins of maritime cultures on the Northwest Coast must logically be viewed in the context of late Pleistocene maritime cultures to the north as far as the shores of Beringia or perhaps beyond, which may have undergone an even earlier maritime adaptation.

Acknowledgements

Phillip Hobler first introduced me to the challenges of doing fieldwork on the central coast of British Columbia. He, along with my father, taught me the crucial research skills that are necessary for undertaking successful archaeology in British Columbia's remote coastal areas; including running boats, chainsawing trees, operating pumps for water screens, surveying transects in coastal rainforests, and many more skills necessary to successful archaeology in remote coastal areas. Bjorn Simonsen, the provincial archaeologist in 1977, was instrumental in initiating the Bear Cove salvage project, and I thank him for the support he gave me as field project co-director along with Brian Apland and Leonard Ham, who deserve praise for their expertise and commitment to the fieldwork (March 15 – June 30, 1978). Bjorn also ensured that funding was obtained from the Department of Highways for the extensive faunal, artifact, and soils analyses. David Black expertly drafted the site maps and datum points. The Fort Rupert Band Council was very supportive of the excavations, and several Band members worked at the site during the fieldwork. The British Columbia Provincial Museum (now the Royal British Columbia Museum) provided laboratory space and comparative faunal collections. I am particularly grateful to both Gay Frederick and Susan Crockford who taught me everything I needed to know about faunal identification. Dawn Stofer ably assisted me in the day to day faunal identification, and provided the necessary levity to get us through the task. Richard Hebda provided much paleoecological expertise and general support. Neal Crozier undertook the soils analysis crucial to understanding the site stratigraphy. Grant Keddie assisted in copying field slides and locating sea mammal bones from level bags for AMS dates. I am grateful to Brian Chisholm for running the AMS dates at the Nagoya University Tadem Accelerator in Japan. My husband George Nicholas, and my father Roy Carlson have always encouraged me to finish the faunal analysis of Bear Cove, and both have given much appreciated editorial advice. The University College of the Cariboo awarded me a research leave that allowed time away from teaching to complete the manuscript. Any errors in fact or interpretation rest solely with me.

CHAPTER 8

PORT HAMMOND REVISITED

MIKE ROUSSEAU, LISA SEIP, PAUL EWONUS, and SIMON KALTENRIEDER

Introduction

The Port Hammond site (DhRp 17) holds a unique position in local archaeology in that it and Marpole were two sites on the lower mainland of British Columbia recorded very early in the professional archaeological literature, and partly excavated. The first published descriptions of shell midden sites in the region, and of the Port Hammond site specifically, was published by Charles Hill-Tout in 1895 as part of the Transactions of the Royal Society of Canada. Hill-Tout made collections of artifacts from Port Hammond and other shell midden sites. In 1897 research by the Jesup North Pacific Expedition commenced under the direction of anthropologist Franz Boas. Harlan I. Smith, the only archaeologist on the expedition, conducted archaeological excavations and surface collections throughout British Columbia in the years 1897 - 1907 (R. Carlson 1990a; Thom n.d.), and excavated at Port Hammond in September and October 1897 and September 1898 (Smith 1903:135-136).

In the century between Smith's work in 1897-1898 and our work there that began in 2000, the site had been visited by professionals and was indeed given the site number, DhRp 17, in 1953 by Walter Kenyon and later described in 1978 by Wayne Hanson and Gordon Mohs, who reported that it extended 1600 m west along the river from the eastern end of Hammond Cedar Mill's property (Derby Reach) to the Katzie Reserve, and about 50 to 100 m back (north) from the present river bank edge (Figure 8:1). The site figured in various early attempts at cultural-historical reconstruction such as Drucker's (1943:116) attempt to seriate Smith's excavated sites on the basis of skull shapes, and Carlson's (1970b:117) suggestion on the basis of artifact comparisons that a Mayne phase component was present there. However, no further field work took place at the site until Antiquus Archaeological Consultants Ltd. began work there in late 2000 and early 2001.

The opportunity to revisit and implement a monitoring program at Port Hammond arose as a result of construction activities associated with removal and replacement of a timber dry kiln building and apron within International Forest Products' (Interfor) Hammond Cedar Mill property. This monitoring program was unique in that the entire proposed impact zone was capped by an extensive 0.5 m-thick concrete foundation laid in the 1960s, that consequently prevented initiation of a detailed archaeological impact assessment (AIA) study prior to commencement of kiln replacement project land-altering activities. While it was known that pre-contact period (prehistoric) artifacts had been found previously in the general area, it was not known if cultural deposits actually existed beneath the existing kiln building or apron concrete foundations.

This chapter does not attempt to provide a detailed account of the nature, distribution, and significance of the data observed and/or recovered from this section of site DhRp 17 because of the extent of previous disturbance of the cultural deposits within the impact zone, and the relatively unrefined recovery methods and techniques used to gather data in the field. Additional information about all aspects of this study is presented in Antiquus (2001).

Site Location and Setting

Site DhRp 17 is situated on the north bank of the Fraser River, approximately 10 km upriver from its confluence with the Pitt River, in the Pitt Meadows area of the Fraser lowland. It lies within the traditional territory of the Katzie First Nation, which includes the banks of the Fraser River, Pitt Meadows, and the Alouette River drainages. The Katzie people speak a mainland Halkomelem dialect of the Coast Salish linguistic family (Smith 1903), and they are generally considered to have participated in a typical South Coast ethnographic culture pattern, with a subsistence economy based heavily on riverine and terrestrial resources.

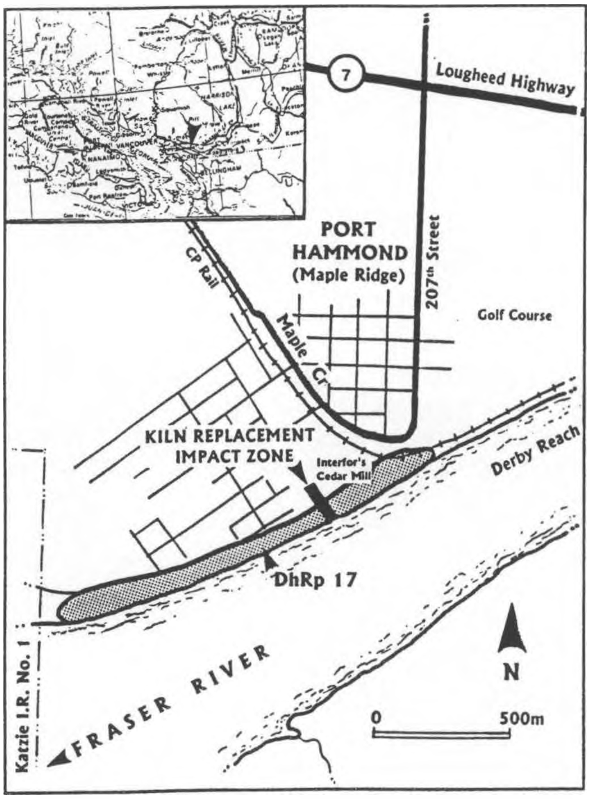


Figure 8:1. **Estimated extent of site DhRp 17 in Port Hammond, and Location of the Kiln Replacement Project.**

The study area, and the Fraser lowlands generally, are situated within the Coastal Western Hemlock (CWH) biogeoclimatic zone. Western hemlock is generally the most abundant arboreal species, but the forest cover also typically includes Western red cedar, and Douglas fir. Red alder is common on disturbed sites, while black cottonwood is present along major rivers like the Fraser. Understory vegetation ranges from sparse to dense, and includes edible species such as huckleberry, salmonberry, Oregon grape, and a variety of blueberries (Driver 1998; Pojar et al. 1994). Common mammalian fauna in the study region include black-tailed deer, moose, grizzly and black bear, and mountain goat. The Fraser River and associated rivers and streams in the study area support five species of Pacific salmon, and also contain white sturgeon, cutthroat trout, and steelhead. Sea mammals, including California and Stellar's sea lions and harbour, northern fur, and northern elephant seals are available in the marine waters of the Straight of Georgia located to the west of the study area. The Fraser lowland also contains the greatest diversity of birds in B.C., including a variety of waterfowl.

The site occupies a well-defined, extensive river terrace and terrace-edge levee berm consisting of sterile, loose, poorly sorted fluvial sand with low percentages of pea gravel and small pebbles overlying a deposit of compact, light yellow, yellow/grey, and grey glacial clay that was encountered at depths varying between 1.5 and 3.0 m below ground surface. Accumulation of natural and cultural sediments and debris over the last 3000 years or so have added another 1.0 to 2.0 m of deposits above the sterile sand, contributing significantly to the development of the terrace-edge berm formation.

That this specific area was considered attractive for settlement to pre-contact period inhabitants of the region for many hundreds of years is easy to understand. It has southern exposure, sandy matrix, slow moving river current for easy navigation of watercraft, good vantage up and down the river, several nearby sources of fresh water, proximity of several good salmon fisheries, and an abundance and diversity of terrestrial plant and animal resources in adjacent and nearby Port Hammond, Pitt Meadows, Barnston Island and Walnut Grove localities.

Review of early recorded information, and our casual inspections of the entire area occupied by DhRp 17 clearly indicate that somewhere between 50 and 75% of it has been disturbed by road construction, and various other land-altering activities associated with residential and industrial developments. Intact cultural deposits appear to be most prevalent as deeply buried (i.e., below 1.0 m below ground surface) in small pockets to fairly large patches (e.g., 100 m^2). Previous extensive heavy equipment disturbance of originally intact cultural deposits within the kiln replacement project impact zone is estimated to have been about 70%.

Smith (1903:136) provided a brief description of the site as it existed in 1897. He wrote:

> At Port Hammond the main shell-heap is located on the alluvial ridge parallel to the north bank of the Fraser River, and is always within fifty feet of the stream, which in places has cut into the shell-layers. It extends along this ridge continuously for about half a mile downstream, beginning at the base of the gravel terrace through which a cut has been made for the Canadian Pacific Railway, and on which was located a burial

mound. There are some oval shell-knolls on the most westerly part of the main shell-heap where it is low. There are also some such knolls on the natural ridge beyond. They occur at intervals of from perhaps a hundred to a hundred and fifty feet, and probably mark spaces where refuse was thrown between the ancient houses, or in close proximity to the doorways. It is possible, however, that they mark centers of habitation. Beyond the end of the ridge where the land is low there are a few low oval shell heaps, probably refuse from isolated houses. Back of the ridge along which the shell-heap extended, the land is low, and in some places was swampy before the making of dikes and ditches. It is said that in the rear of the shell-heap there was formerly a water-course, which extended from near its eastern end northwestward to Pitt Meadows, and farther on into Pitt River, this affording canoe communication from the rear of the village to the north, while the Fraser afforded connection with the east and west.

On the basis of illustrations of artifacts recovered from the Port Hammond site (Smith 1903, 1907), researchers have generally concluded that the site was occupied primarily during the Marpole phase (Burley 1980; McMillan and Nelson 1989; Mitchell 1990), although a Charles Culture or Mayne component may also be present at the site (R. Carlson 1970b; Leonard Ham, pers. com., 2001).

Douglas College obtained a carved bone club from a private collection from Maple Ridge that is believed to have come from the Port Hammond site. This artifact was radiocarbon dated to 1995±80 radiocarbon years BP (RIDDL-1142) (McMillan and Nelson 1989:216). This date places the artifact firmly within the Marpole phase (ca. 2500 - 1500/1100 BP). Prior to our monitoring project, this was the only radiometric age determination for the Port Hammond site.

The Kiln Replacement Project

The new kiln complex included three structural components: (1) a concrete apron that essentially occupied the same area as the former old kiln building; (2) an enclosed metal kiln building that occupies most of the previous old kiln apron; and (3) an open-sided metal cooling shed that occupies the northern end of the complex.

The old kiln to be replaced was constructed in the 1960s, and it consisted of a three-gabled building and associated "apron" (Figure 8:2). Removal of the concrete apron and excavation of the new kiln foundation with heavy equipment began in October, 2000. No cultural de

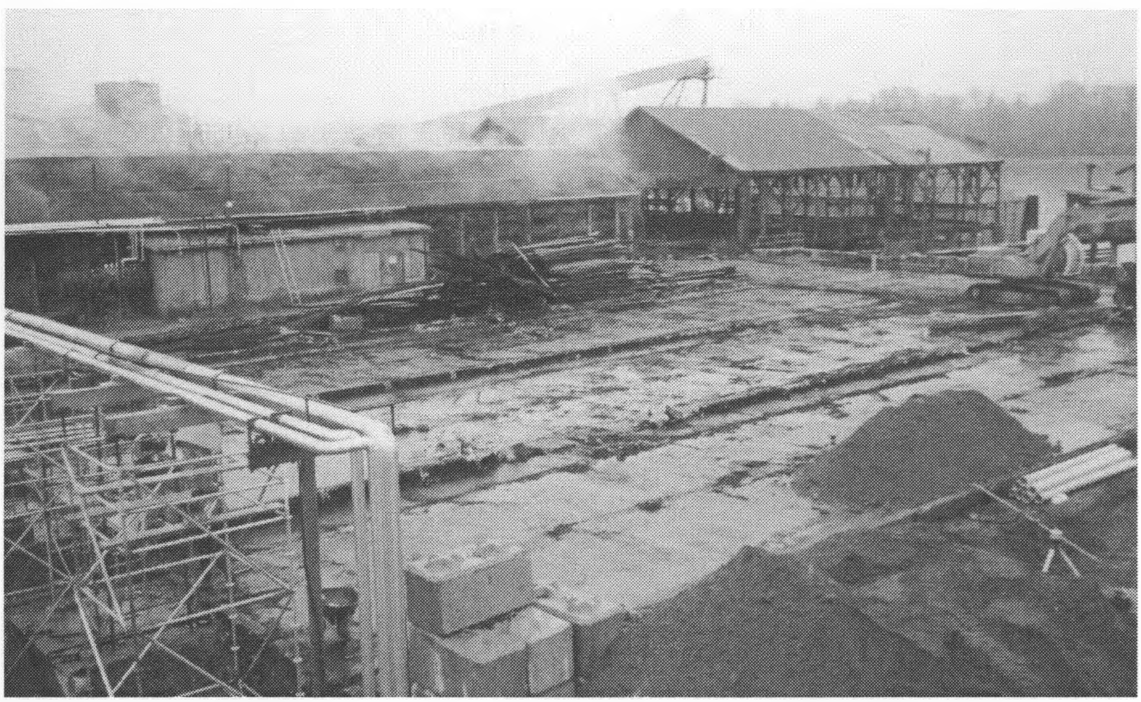


Figure 8:2. **Pre-monitoring view of old Kiln Building Concrete Foundation subsequent to removal of the Kiln Building, looking southeast. An identical building is in the upper left.**

posits were encountered beneath the old kiln apron. Demolition of the old three-gabled kiln building began in October, 2000, and involved total removal of the wooden structure. The 0.5 m-thick concrete slab supporting the old kiln was removed during December, 2000.

The new kiln apron was constructed in the same location as the old kiln. Removal of the sandy overburden beneath the concrete foundation slab exposed cultural deposits in the northern half of the new kiln apron (Figure 8:2) that had been previously disturbed during the construction of the old kiln in the 1960s.

Specific land-altering activities affecting the cultural deposits during the kiln replacement project included: (1) excavation of pipeline trenches along the southern, western, and northern peripheries of the new apron with a large backhoe; (2) removal of 0.5 to 1.0 m-thick sterile and cultural deposits from beneath the old kiln building foundation and old kiln apron with bulldozers and backhoes; (3) construction of a temporary road bed and pipeline right-of-way along the eastern edge of the new kiln apron with bulldozers and backhoe; and (4) heavy equipment traffic over the exposed cultural deposits during machine excavation.

The greatest and most severe impact to cultural deposits occurred in the northern half of the old kiln building foundation, which is now the new kiln apron (Figures 8:2 and 8:14). It is important to note that for the most part, only the uppermost 0.5 m to 1.0 m-thick culture-bearing deposits were removed from the new kiln apron impact zone. Additional cultural deposits lie below the maximum extent of machine excavation in the north half, and below the sterile sandy fill in the southern portion.

Monitoring Objectives

The objectives of the monitoring study conducted at the Port Hammond site were to:

(1) Determine the location and maximum depth of cultural deposits at the site through excavation of deep exploratory test trenches;
(2) Ensure that adverse impacts on significant archaeological deposits were limited and/or halted;
(3) Collect artifacts exposed on the ground surface during the land-altering construction activities;
(4) Ensure proper management of any significant archaeological remains encountered during the land-altering activities;
(5) Catalogue, describe, analyze, and interpret the data retrieved using standard recording and analytic techniques consistent with recent Gulf of Georgia Region archaeological analyses;
6) Prepare a descriptive final report that will present, discuss and interpret the results of the investigation and its significance.

All of these objectives were met in the course of the monitoring program described here.

Monitoring Methods

Monitoring occurred on various days between October 2000and February 2001, and entailed a systematic visual inspection of the entire disturbed ground surface and the displaced matrices. Excavation was halted several times to allow recovery of artifacts and evaluation of exposed stratigraphic deposits. Removed cultural deposits were piled beside the trenches using a backhoe, and were systematically subjected to hand and trowel sorting in order to visually identify and retrieve items.

Recovery methods used during the monitoring program were rudimentary. Throughout much of the impact zone removal of the previously existing yellow sandy fill exposed the top of the much darker cultural deposits. The machine operators were then asked to remove the underlying cultural deposits in 10 to 15 cm-thick levels. A systematic visual inspection of the disturbed matrices was done while the machine excavation was in progress. Subsequently, stockpiled cultural deposits were hand/trowel sorted by a large crew in order to keep an acceptable pace with the machine excavations. After the cultural deposits had been sorted, the backdirt was trucked to the Katzie Reserve and dumped in a landfill. These piles were water-screened using 1/4" (6 mm) mesh by two Katzie community members, who recovered the few items we had missed. While screening of all the matrices would have been preferred, it was simply not practical or possible. When significant items were observed *in situ*, their exact locations were recorded.

Of necessity the analyses focus on the detailed description and subsequent interpretation of the artifacts and features. The distributions and frequencies of various types of observed cultural and natural phenomenon were documented, and where possible, their function(s) and/or significance are inferred. Lithic artifacts are described using terminology considered standard for the Gulf of Georgia region (Mason 1994; Morrison 1997; Pratt 1993; Schaepe 2001; Sto:lo Nation and Antiquus Consulting Archaeologists Ltd. 1999). Faunal remains are identified to the most specific taxonomic category possible,.

Scattered human skeletal remains were recovered from several areas within the cultural deposits intersected by the impact zone. Basic data recorded include the elements represented, relative provenience, date of recovery, number of elements or element fragments, side and aspect, and comments regarding relative age, sex, degree of dental wear, etc.

Using the reference collections at Simon Fraser University the floral remains collected were identified to the most precise phylogenetic level possible. Floral remains from soil samples were floated, counted, measured and weighed according to standard palaeoethnobotanical methods. These analyses provide basic information regarding site activities, seasonality, and subsistence practices and are used to assist in the interpretation of features.

The cultural deposits encountered during monitoring were dated using both absolute and relative methods. Radiocarbon dating of a selection of organic samples from features in the site was used for absolute age determinations. Five radiocarbon samples (4 charcoal, 1 bone) from various sections of the impact zone cultural deposits were submitted to Beta Analytic Inc. for radiocarbon age determinations. These five dates range between about 1500 and 2000 years BP, and indicate that this part of site DhRp 17 was occupied during the latter part of the Marpole phase.

An additional test of the relative age of the cultural deposits in the impact zone at DhRp 17 involved selection and comparison of temporally diagnostic artifact types from the assemblage. These included specific forms of bifacial projectile points, hand mauls, bone and antler points and harpoons, and decorative items (Burley 1980; Mitchell 1990). A typical Marpole phase age was indicated.

Four obsidian flakes were sent to the Department of Chemistry at Simon Fraser University for source analysis by XRF conducted by Malcolm James. Two sources were identified. and procedures and results of the analysis are presented in Antiquus (2001).

Monitoring Results and Interpretation

This section presents interpretations and inferences about the general nature, chronology, duration, and frequency of past human activities that took place within the project zone at site DhRp 17. Several researchers have contributed to the information and interpretations presented here. The reader should note that we do not provide a definitive account of every activity represented in this part of the site. Rather, a general reconstruction of the more obvious behaviors are offered.

Lithic Tool Manufacture, Use, Maintenance

A total of 1396 lithic artifacts were recovered during monitoring. Of these, 441 are complete. Artifacts and waste recovered from the investigated portion of DhRp 17 allow a number of important activities associated with stone tool manufacture, use, and maintenance to be inferred (Table 8:1). This assemblage of items is similar to that found by Smith in 1898.

Low frequency of direct evidence for chipped stone tool manufacture (e.g., core fragments, debitage, hammerstones, etc.) indicates little stone tool manufacture in this portion of the site. Very low frequency of waste flakes (n=23) recovered supports this inference. Presence of several bipolar cores indicates that this simple reduction technique was favoured for production of medium-sized and small flakes (2 to 4 cm max. dimension), useful as cutting, scraping, and shaving tools in food procurement and preparation, production of textiles, and manufacture of ceremonial and decorative items.

A fair number of complete and fragmented projectile points were found (Figures 8:3 to 8:5). Many of these were made from extra-local basalts and exotic crystalline and cryptocrystalline silicates. These points indicate hunting activities. The paucity of debitage in the sample suggests that projectile points were made elsewhere at the site, or perhaps were imported through trade.

The surprisingly large sample of complete and fragmented ground nephrite celts/adze blades (Figure 8:7) supports the hypothesis that this part of the site was used mainly for work with adzes in woodworking (i.e. houses, canoes, carving, debarking, etc.). Most of the celts were relatively small, and were clearly exhausted "slugs" that were discarded at the end of their use-life. Several examples were burned as indicated by white or cream coloured exteriors, thermal crazing and cracking, and potlid spalling. Nephrite for these celts was most likely obtained from the Lillooet and Bridge River localities in the Mid-Fraser River region (Darwent 1998) through exchange systems operating between the Mid- and Lower Fraser River regions. Whether the nephrite celts arrived as unfinished blanks, or as completed celts remains to be determined. Initially, they would have been considerably longer and per-

Table 8:1. Summary of Lithic Artifact Frequencies Grouped by Inferred Activity.

MANUFACTURING TOOLS/PREFORMS	
Artifact Type	**Frequency**
Abrader	32
Abrader /Saw	5
Abrader fragment	106
Anvil stone/Abrader	2
Anvil stone	19
Anvil stone fragment	1
Bipolar core	76
Core	11
Graver	2
Hammer stone	16
Hammer stone fragment	1
Microblade core	5
Microblade	3
Perforator	6
TOTAL	285
Percent of assemblage	20.4%
Total complete artifacts	177
Percent of complete artifact assemblage	40.1%
WOODWORKING TOOLS	
Celts and fragments	27
Celt fragments	31
Chisel	3
Formed biface – drill	1
Hand maul, nipple-topped	1
Hand maul fragments	10
Wedge	12
TOTAL	85
Percent of assemblage	6.1%
Total complete artifacts	44
Percent of complete artifact assemblage	10.0%
FIBER PROCESSING	
Bifacially retouched flake	3
Unifacial retouched flake	17
Flaked pebble tool	3
Formed biface - scraper/knife	3
Ground awl fragment	1
Notched scraper	1
Utilized flake	74
Utilized slate	5
TOTAL	107
Percent of assemblage	7.7%
Total complete artifacts	106
Percent of complete artifact assemblage	24.0%
HUNTING	
Formed biface - projectile point	44
Formed biface - projectile point fragment	22
TOTAL	66
Percent of assemblage	4.7%
Total complete artifacts	44
Percent of complete artifact assemblage	10.0%

CEREMONIAL/DECORATIVE	
Artifact Type	**Frequency**
Art fragment	3
Bead, disc	1
Bowl	1
Pestle fragment	1
Pendent, argillite	1
Pipe fragment	4
Carved steatite	1
Red Ochre	5
TOTAL	17
Percent of assemblage	1.2%
Total complete artifacts	8
Percent of complete artifact assemblage	1.8%
FISHING	
Fish net weight	7
Ground stone/net gauge	1
TOTAL	8
Percent of assemblage	0.5%
Total complete artifacts	8
Percent of complete artifact assemblage	1.8%
HARPOONING	
Ground slate point	9
Ground point fragment	6
TOTAL	15
Percent of assemblage	1.1%
Total complete artifacts	9
Percent of complete artifact assemblage	2.0%
FOOD PROCESSING	
Ground slate knife	3
Ground slate knife fragment	699
Knife	20
Knife fragment	25
Utilized cortex spall	5
TOTAL	752
Percent of assemblage	53.9%
Total complete artifacts	28
Percent of complete artifact assemblage	6.3%
UNKNOWN FUNCTION	
Ground stone / pebble	9
Quartz crystal	3
Whatzit	2
TOTAL	19
Percent of assemblage	1.4%
Total complete artifacts	17
Percent of complete artifact assemblage	3.9%
DETRITUS	
Flakes	23
Block shatter	6
Mica flake	2
Quartz flake	3
TOTAL	39
Percent of assemblage	2.8%

haps somewhat wider than the exhausted specimens we secured.

A nearly complete pecked nipple-top hand maul, and 10 hand maul fragments (Figure 8:8) can be directly related to woodworking and construction activities (e.g., splitting cedar planks with antler, bone and stone wedges; pounding stakes in the ground; carving and maintaining canoes; and manufacture and carving of a variety of other utilitarian and decorative wooden items). Undoubtedly these "all purpose" hammers functioned in other capacities (e.g., cracking nuts, opening mollusks, etc.), although these were likely of lesser importance. Lithic raw materials used to make the hand mauls were probably obtained locally from fluvial or littoral cobble deposits. Mauls could have been made at the site, although they may have been imported from elsewhere.

About 700 ground slate knife fragments were recovered; some are shown in Figure 8:9. The number of fragments indicates that cutting activities were commonly undertaken in this part of the site, and knives were frequently broken and discarded. They were probably primarily engaged in fish and animal flesh processing (i.e., cleaning, butchering, flensing, etc.). Several researchers who examined the sub-assemblage of slate knives we recovered remarked that many were noticeably thicker than those found in earlier Marpole phase occupations in the Lower Fraser Region.

Complete and fragmented sandstone slab abraders are well represented in the sample (Figure 8:10), indicating that manufacture and resharpening of slate knives, and possibly production and maintenance of bone and antler artifacts, were common activities. Concreted sandstone of varying abrasive grits is available in many locations throughout the Lower Fraser River region, and could have been obtained during visits to specific source locations while undertaking other subsistence tasks, or through informal local trade systems.

Fewer than 100 unmodified utilized flake tools and unifacially-retouched flakes were recovered. Most of these would have been involved in simple cutting, scraping, or shaving tasks related to subsistence and textile (e.g., baskets and mats) manufacture and maintenance. Flakes were probably made by a bipolar reduction technique, as suggested by the recovery of a fair number of bipolar cores, although a lesser number were struck from larger multidirectional cores.

A variety of other task-specific and/or rare stone tools (i.e., a nephrite chisel, a graver, perforators, microblades, whatzits, fish net weights, a net gauge, pipe fragments, an argillite pendant, etc.) (Figure 8:13), were also found in low frequencies. This presence suggests that this part of DhRp 17 was used for a period of time as a residential focus, a fact supported by observed house floor deposits.

Thousands of "boiling stones" or thermally altered large pebbles and small cobbles were observed in the northeastern aspect of the impact zone. Two randomly selected samples indicate that all displayed evidence of having been subjected to intense heat (i.e., discolouration, crazing, cracking, fracturing, pot lid spalling). Most of these stones were granodiorite, granite, quartzite and siltstone, all of which can be obtained locally from glacial and fluvial gravel and cobble exposures. A number of activities can be inferred from the boiling stones, including: boiling marine mollusks, fish, meat and plant foods; construction of cobble lined hearth beds to prolong residential or outdoor warmth and/or to smoke/heat-dry fish and meat; manufacturing canoe hulls; steaming wood, branches and withes for textile manufacture; and possibly for sweat-lodges. That thousands of these cobbles were found in the northeastern part of the impact zone suggests that they may have been used primarily in this part of the site, but more probably, they were transported from elsewhere and discarded along with other refuse to create Hearth Refuse Dump Feature # 1 (see below).

Lithic raw material types represented in the assemblage indicate origins from both local and extra local sources. The basalts with fine-grained to coarse-grained groundmasses were probably obtained locally from glacial drift and fluvial gravel deposits. Vitreous and fine-grained basalts may have originated from the well-known and abundant sources in the Cache Creek locality in the Thompson River region, having been introduced by formally organized and casual exchange (trade) systems operating in the Fraser River drainage between interior and coastal Salish groups.

The various "exotic" cryptocrystalline silicates in the chipped stone tool sub-assemblage probably originated from local and extra-local sources. There are numerous sources of flakeable silicate stone in the Mid-Fraser River region, and some may have been obtained directly from these sources through exchange, or from local riverine fluvial gravel and cobble deposits. Some form of interaction with various groups to the south in Washington and Oregon and to the north around Garibaldi (Reimer, this vol.) is indicated by the presence of obsidian flakes found in the monitoring

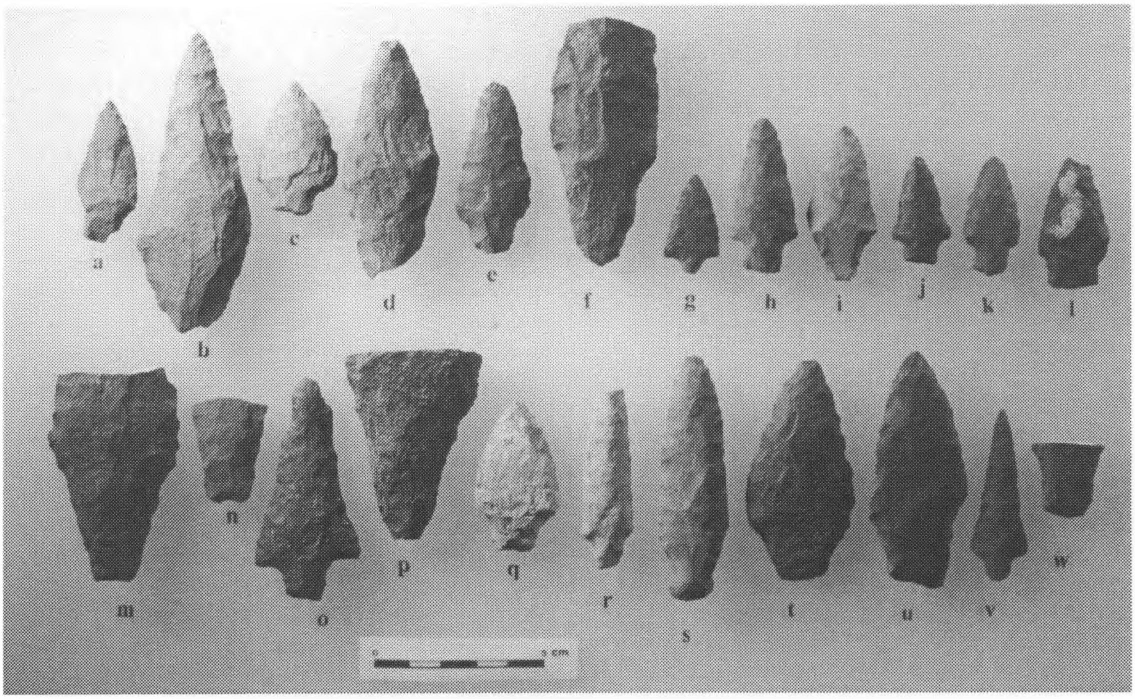


Figure 8:3. **Formed Bifaces and Projectile Points. Item (a): DhRp 17:4; (b): 71; (c): 90; (d): 299; (e): 338; (f): 344; (g): 346; (h): 502; (i): 608; (j): 617; (k): 911; (l): 938; (m): 939; (n): 969; (o): 983; (p): 1007: (q): 1047; (r): 1062; (s): 1097; (t): 1113; (u): 1153; (v): 1226; (w): 1292.**

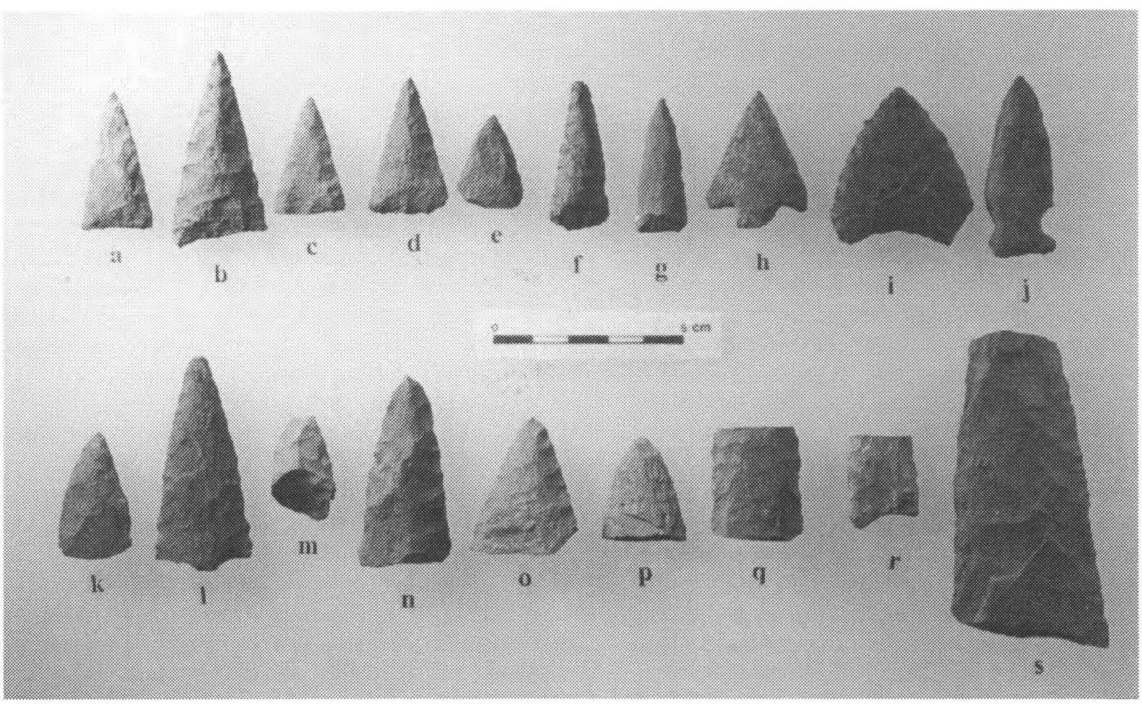


Figure 8:4. **Formed Bifaces and Projectile Points. Item (a): DhRp 17:1; (b): 3; (c): 534; (d): 948; (e): 1150; (f): 1206; (g): 212; (h): 95; (i): 986; (j): 1211; (k): 96; (l): 1299; (m): 567; (n): 715; (o): 220; (p): 1324; (q): 5; (r): 629; (s): 869.**

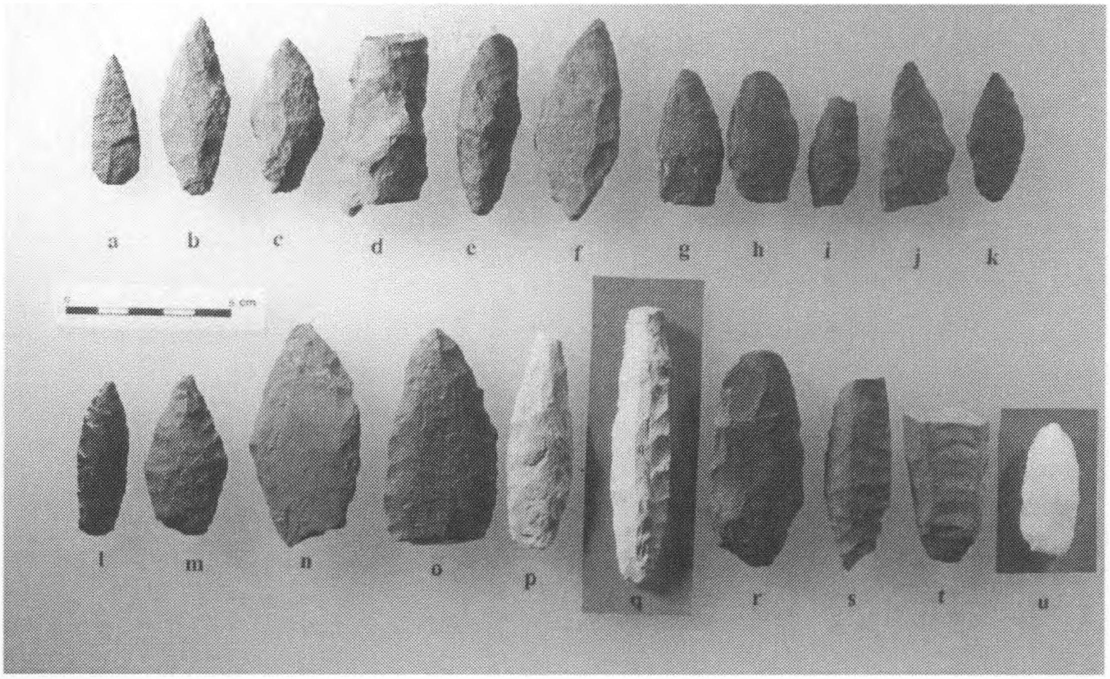


Figure 8:5. **Formed Bifaces and Projectile Points. Item (a): DhRp 17:2; (b): 91; (c): 93; (d): 94; (e): 229; (f): 305; (g): 335; (h): 375; (i): 393; (j): 543; (k): 593; (l): 643; (m): 649; (n): 791; (o): 831; (p): 932; (q): 1037; (r): 1038; (s): 1200; (t): 1266; (u): 1294.**

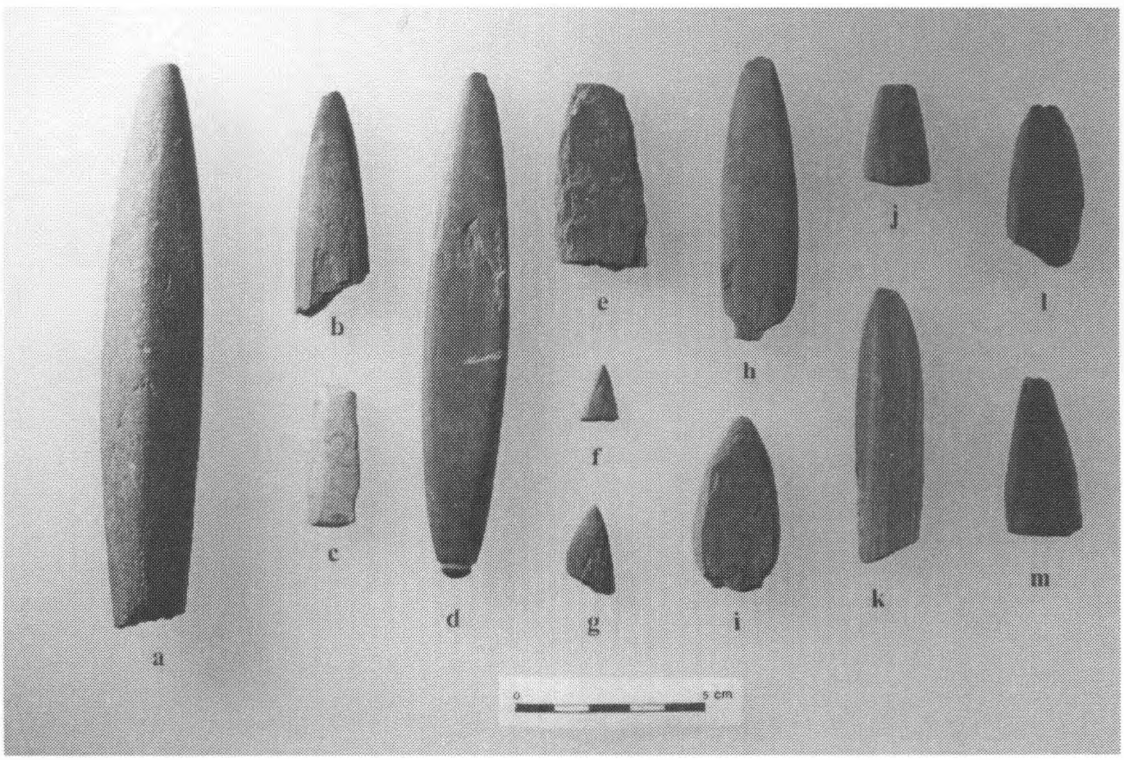


Figure 8:6. **Ground Points and Knives. Item (a): DhRp 17:242; (b): 419; (c): 535; (d): 599; (e): 647; (f): 663; (g): 713; (h): 792; (i): 982; (j): 1003; (k): 1154; (l): 1189; (m): 1277.**

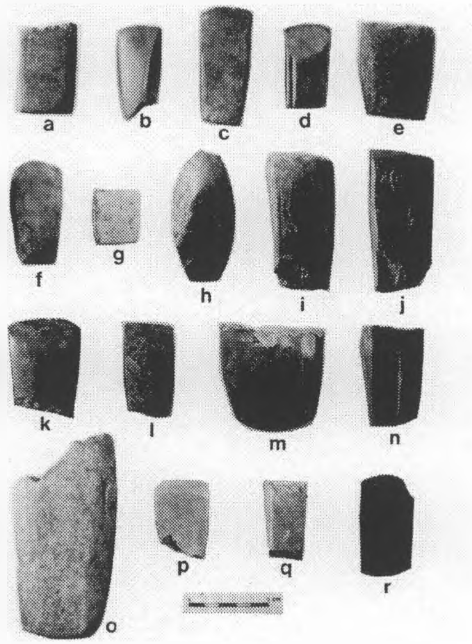


Figure 8:7. **Selected Celts and Celt Slugs. Item (a): DhRp 17:13; (b): 14; (c): 171; (d): 215; (e): 231; (f): 385; (g): 392; (h): 1105; (i): 1141; (j): 963; (k): 968; (l): 964; (m): 985; (n): 1090; (o): 397; (p): 773; (q): 808; (r): 950.**

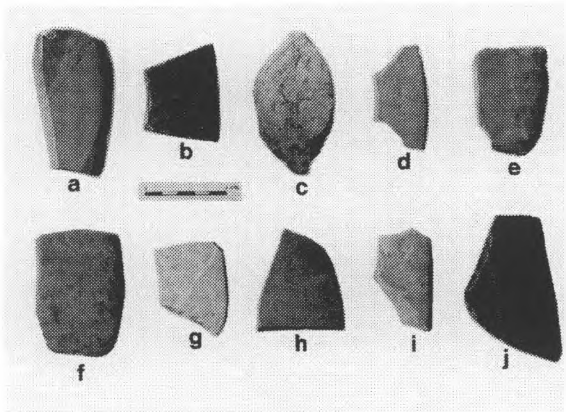


Figure 8:9. **Selected fragmented Ground Slate Knives. Item (a): DhRp 17:441; (b): 455; (c): 805; (d): 837; (e): 945; (f): 976; (g): 17; (h): 72; (i): 18; (j): 98.**

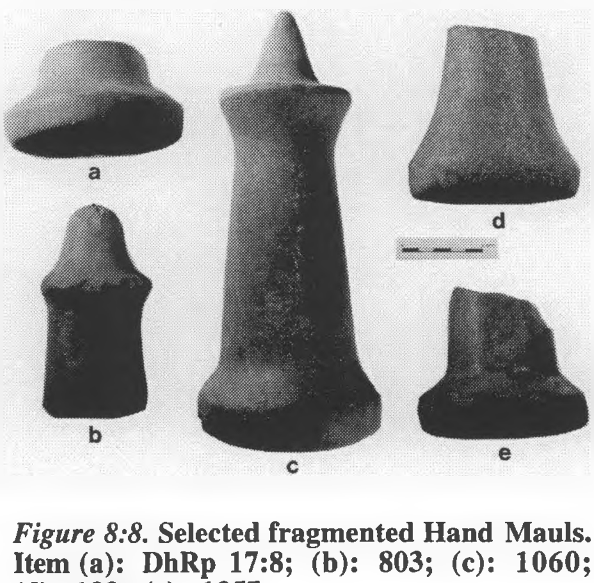


Figure 8:8. **Selected fragmented Hand Mauls. Item (a): DhRp 17:8; (b): 803; (c): 1060; (d): 133; (e): 1257.**

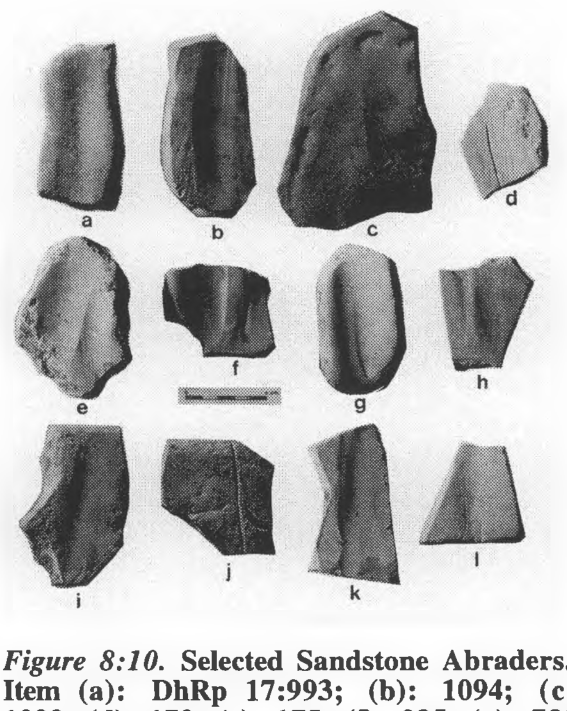


Figure 8:10. **Selected Sandstone Abraders. Item (a): DhRp 17:993; (b): 1094; (c): 1293; (d): 173; (e): 175; (f): 285; (g): 788; (h): 876; (i): 1183; (j): 1203; (k): 336; (l): 806.**

sample. Small quartz crystals, both modified and unmodified, may have been found locally. At least two specimens are made from "Hozameen Chert" found at the north end of Ross Lake along the northern border of Washington south of Hope (Mierendorf 1987a, 1987b; Rousseau 1988), and a biface made from a distinctive reddish-brown chert originating-from the Chilliwack River valley near Chilliwack was also recovered (Schaepe 1994; Sto:lo Nation and Antiquus Archaeological Consultants Ltd. 1999).

Faunal Artifact Manufacture, Use, and Maintenance

About 130 bone and antler artifacts were recovered during the monitoring program, representing a number of tool classes and functions. Selected items are shown in Figures 8:11 to 8:13. This sub-assemblage is similar to that found in other Marpole phase components in the Gulf of Georgia region (e.g., Burley 1980, 1989; Carlson 1960, 1970; Matson and Coupland 1995; Mitchell 1971, 1990).

The presence of a fair number of these items in this part of the site suggests that perhaps some were being manufactured there, but there is more evidence to suggest that they were mostly being used, maintained, and discarded when exhausted or broken. The bone and antler tools may have been produced elsewhere at the site, or could have been imported from other villages along the Fraser River. Numerous sandstone abraders were found, particularly those with deep concave surfaces and obvious wide smooth linear grooves (Figure 8:10). These were used to polish, resharpen, maintain, or repair bone and antler tools. Function-specific bone and antler artifacts such as barbed and unbarbed points and harpoons are strong evidence for fishing and hunting (Figures 8:11 and 8:12).

Slender unbarbed points, needles, and awls all suggest working textiles (e.g., basketry and clothing manufacture, etc.). Complete and fragmented antler wedges were well represented in the recovered assemblage, and these are commonly associated with woodworking tasks, particularly splitting cedar planks.

A small number of ceremonial and/or personal decorative items made from bone and antler were found, including two finely carved pendants, a large fragmented carved ring that may have been a gorget worn on a cord around the neck, and a four-holed "whatzit" (Figure 8:13). The latter differs from similar illustrated rectangular whatzits (Dahm 1994:48-49; Duff 1955:49) in that it has four or more holes, rather than only two. These items may have been made and worn/used at the site, having been accidentally lost or intentionally discarded after use. A medial frag-

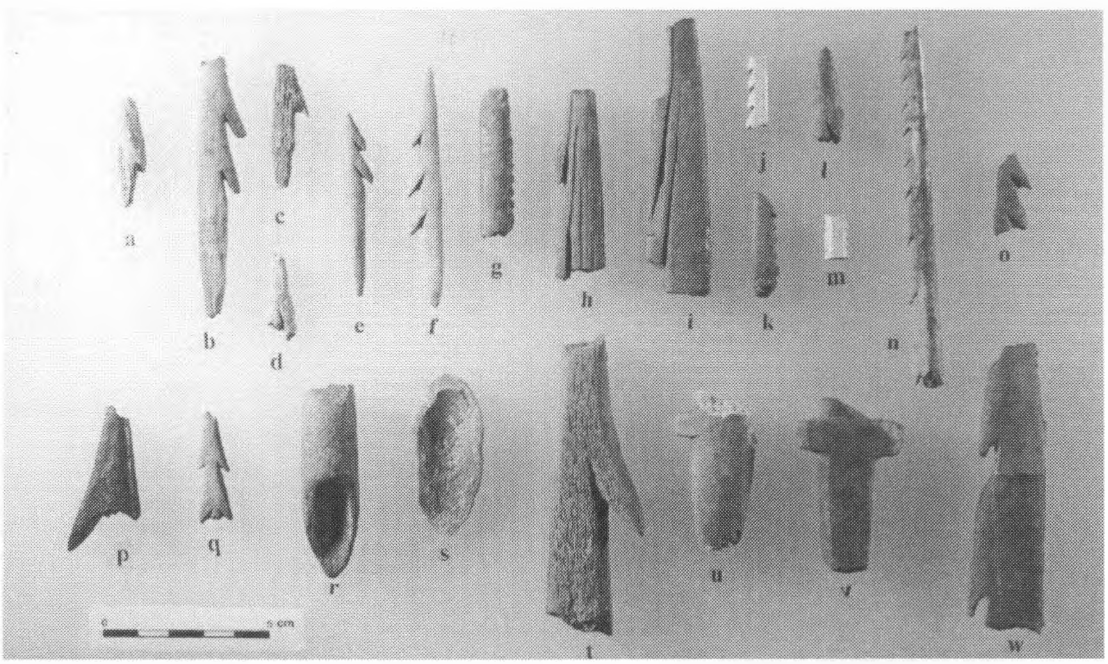


***Figure 8:11.* Selected Bone and Antler Artifacts. Item (a): DhRp 17:2364; (b): 2366; (c): 2369; (d): 2391; (e): 2400; (f): 2416; (g): 2418; (h): 2438; (i): 2471; (j): 2455; (k): 2458; (l): 1367; (m): 2473; (n): 2475; (o): 2500; (p): 1114; (q): 2390; (r): 2472; (s): 2384; (t): 2448; (u): 2467; (v): 2468; (w): 2443.**

ment of a unilateral bone harpoon exhibits a decorative motif consisting of parallel lines and ticks (Figure 8:11w) that was likely inscribed with a simple flake tool or graver.

Three complete antler wedges and fourteen antler wedge fragments were identified in the sub-assemblage. Some are shown in Figures 8:12. Harlan Smith (1903:161) found 26 wedges at Port Hammond during his investigations there in 1897 and 1898, further attesting to the importance of woodworking activities at the site. Two complete and three fragmentary bone and antler chisels or basketry plaiting tools were recovered (Figures 8:12k-o). One end of each of these artifacts is beveled from two sides to create a sharpened chisel. This type of tool could also have been used in basketry or net production activities. Two notched bone tools were found (Figure 8:12i,j) that may also have functioned in basketry or textile manufacture.

The sub-assemblage includes seven awls and awl fragments. Twelve single points of bone and antler were also recovered. These artifacts show a range in size from small arrow-sized points to larger spear-sized points. Three of these uni-points are calcined and another is burned. Three bone and antler bi-points were found; two may have armed composite toggling harpoon heads.

The faunal artifact sub-assemblage includes fifteen unilaterally barbed fixed bone and antler points and point fragments. These artifacts (Figure 8:11a-k, m-o) are arrow point to large spear or harpoon size, and have from one to nine formed barbs. Two specimens are calcined and two others are complete. One bilaterally barbed bone or antler fixed point fragment was also recovered (Figure 8:11q). It is a medial section of a point with four intact barb, similar in form to three specimens found by Smith (1903:152) at Port Hammond.

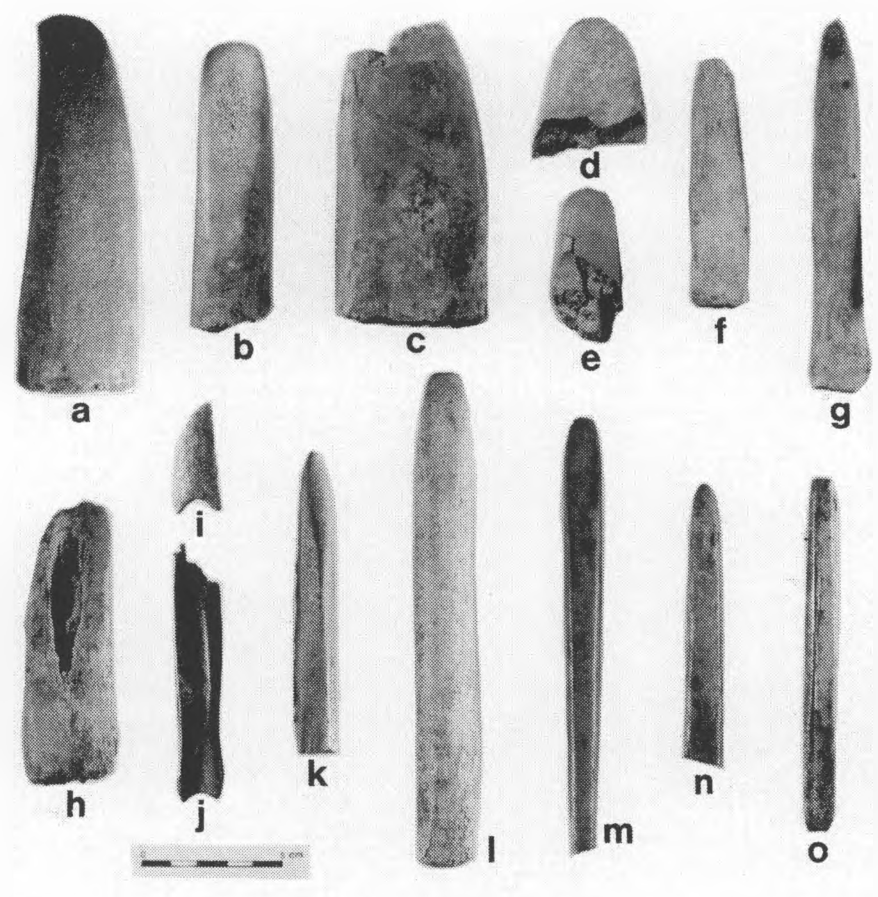


***Figure 8:12.* Selected Antler and Bone Artifacts. Item (a): DhRp 17:2368; (b): 2470; (c): 2399; (d): 2383; (e): 2402; (f): 2449; (g): 2450; (h): 2465; (i): 2425; (j): 2502; (k): 2406; (l): 2415; (m): 2372; (n): 2444; (o): 2375.**

Six fragments of fixed, unilaterally barbed harpoon points were found during excavation. These include two antler harpoon point bases, with tang and one or two line guards (Figure 8:11u-v). A medial antler harpoon section with one large barb preserved (Figure 8:11t), and a black coloured antler harpoon tip fragment (Figure 8:11p) are also represented. Perhaps most interesting are two medial fragments of a large antler fixed harpoon with two preserved unilateral barbs and a geometric line design carved on the surface of both fragments (Figure 8:11w and Art.# 2489 [not pictured]). A harpoon point also bearing incised geometric designs was found at Port Hammond by Smith (1903:182), although the design is slightly different than on the more recently recovered specimen. These artifacts are typical of the Marpole phase in the Gulf of Georgia region, and at DhRp 17 they may have been used primarily to hunt sturgeon (Roy Carlson, pers. com., 2001).

One antler single-valve toggling harpoon head is missinf its distal section (Figure 8:11r). The preserved portion includes the medial section and a single, large proximal barb with a short closed socket in the base for the attachment of the foreshaft. Due to its fragmentary nature, whether this specimen was self-arming or armed with a bone or stone point cannot be determined. However, it most closely resembles Borden's (1970:98) "type B" toggling harpoon head, with only one barb and no hole or groove for a retrieving line. This type of harpoon head was two-piece, with a slot for a cutting blade in the same plane as the barb. It is more typical of the Locarno Beach phase in the Gulf of Georgia region.

Finally, one large and heavily weathered composite toggling harpoon valve was found. This artifact (Figure 8:11s) is wider than the more common toggling valves and may have been designed to accommodate an arming point larger than the majority of most points.

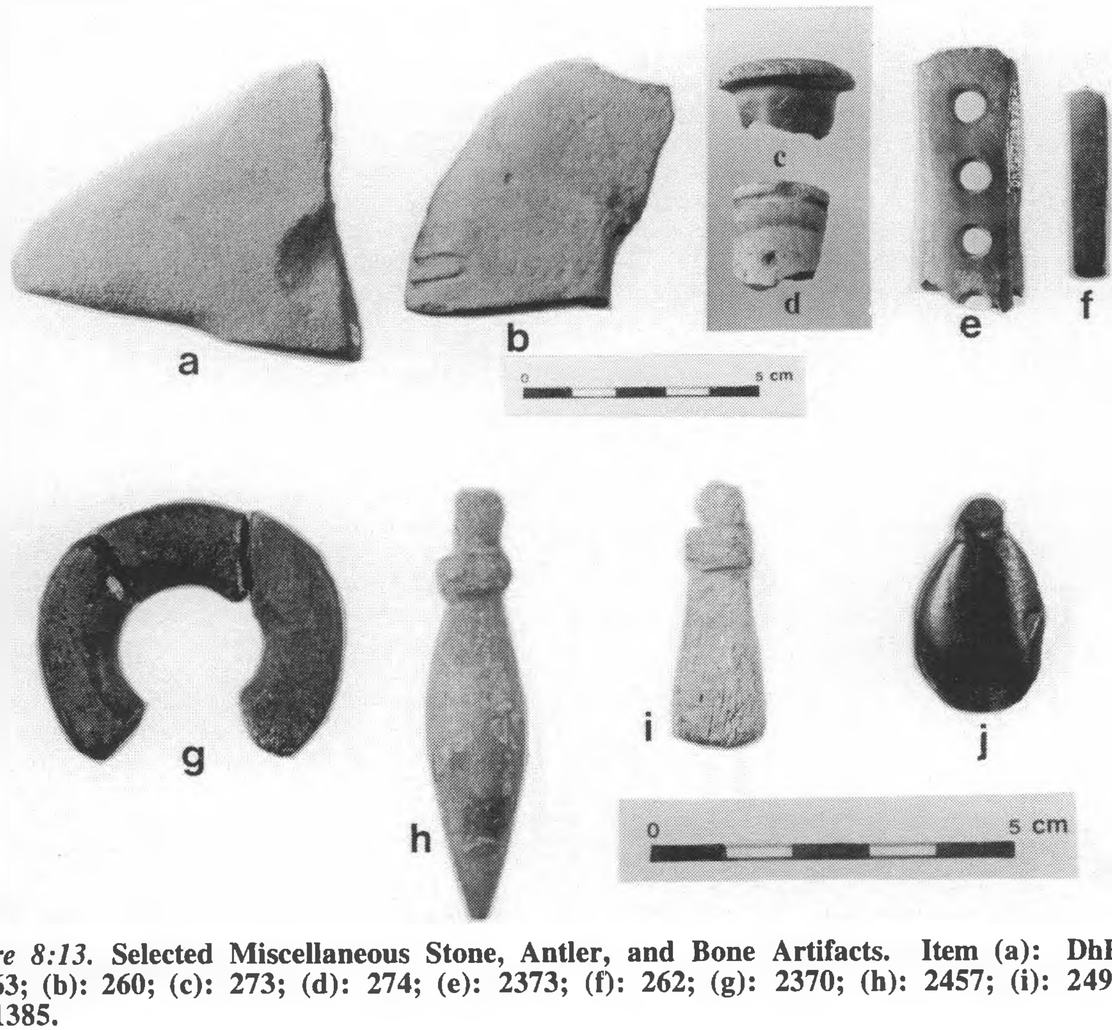


Figure 8:13. **Selected Miscellaneous Stone, Antler, and Bone Artifacts. Item (a): DhRp 17:363; (b): 260; (c): 273; (d): 274; (e): 2373; (f): 262; (g): 2370; (h): 2457; (i): 2495; (j): 1385.**

It is also worth mentioning that a finely carved whalebone club handle was recovered from the Port Hammond site by a collector and donated to Douglas College (McMillan and Nelson 1989). The base of the handle is carved to represent a whale's tail with two human figures in profile forming the flukes. The shaft is broken at the edge of what would have been the grip area of the club. McMillan and Nelson describe this specimen in detail and obtained an AMS radiocarbon date from the artifact of 1995±80 BP (RIDDL-1142). This date is coeval with the earlier dates from the kiln apron impact zone (Table 8:5).

Hunting, Fishing, and Gathering

The artifact assemblage provides ample evidence for hunting, fishing, and food gathering. The actual faunal remains of animal species exploited are additional evidence for these activities. The number of elements and list of species represented are fairly exhaustive, and indicate a very wide variety of species were specifically targeted or casually harvested during other subsistence-related forays away from the village site. Most of the animals represented in the recovered assemblage indicate a heavy reliance on terrestrial and riverine species that would have been locally available during occupation of the site. The exceptions are several species of marine mollusks and herring, commodities that were obtained further to the west on the Pacific Coast.

Numerous artifacts in the assemblage can be related directly to hunting and fishing activities. They include: chipped stone projectile points; numerous ground slate and flaked bifacial knives; flattened cobble net weights; a fish net gauge; unilaterally barbed fixed bone and antler points and harpoons; and elements of a toggling harpoon.

The faunal assemblage recovered during monitoring includes 5048 bone, antler and shell specimens with a total weight of 9,641 grams (Tables 8:2 and 8:3). Of these, 1,992 (7,556.6 g) were identifiable to at least the class level and the remaining 3056 (2084.4 g) were unidentifiable. The majority of recovered faunal remains (87%) are not burned, while a small percentage are burned or calcined (13%). When bone weights are considered, the predominance of unburned bone is further increased (98%). It was possible to identify six specific taxa (deer, bald eagle, duck, salmon, and eulachon) with either burned or calcined elements. The remainder of burned and calcined specimens was either unidentified or identifiable only to the class level.

Table 8:2. Summary of absolute and relative NISP and Weight Frequencies for each Class (or group of classes) of pre-contact period identified Faunal Remains.

Class(es)	NISP	f	Weight (g)	f
Mammalia	870	44.8	5014.9	91.5
Aves (birds)	211	10.9	191.4	3.5
Osteichthyes (bony fish)	726	37.4	135.0	2.5
Invertebrates	135	6.9	136.6	2.5
Total	**1942**	**100.0**	**5477.9**	**100.0**

Good evidence is present in the assemblage for human processing of sea mammal, artiodactyl, and bird remains. The following taxa displayed evidence of cutmarks or percussion impact scars on various bone elements: harbour seal (femur), elk (humerus, magnum), deer (scapula), and bald eagle (carpometacarpus, ulna). Dogs are unlikely to have been butchered (although the possibility exists) and some rodents may be intrusive in site deposits.

Carnivore chewing damage was identified on elements of three taxa: harbour seal (femur), *Canis* sp. (scapula), and Canada goose (humerus). Among identified (to at least order) taxa, rodent gnawing damage was evident on *Canis* sp. (femur) and elk (antler tine) elements. The specific effects of these taphonomic processes on the composition of the faunal assemblage are unknown, but appear to be relatively minor.

The most predominant class of faunal remains is Mammalia (45% of pre-contact identified fauna, by NISP). This figure would be increased further if the faunal artifacts (n=133), made almost exclusively of land mammal bone, were included in the total. However, the proportion of fish in the assemblage would significantly increase if both eulachon and herring were recovered in a representative manner. Based upon the abundance of eulachon and herring in the matrix samples, these two taxa are vastly under-represented among identified fauna at DhRp 17.

The sample of pre-contact faunal remains recovered from the impact zone indicated that dog is most common among identified mammals followed by elk and deer. Domestication of dogs was a common practice for all Salish groups, and the archaeological record from the interior and coastal regions of B.C. suggests that from 2000 to 1500 years BP, stocky, medium-sized dogs resembling wolves, coyotes, and huskies (Crellin 1994

Table 8:3. NISP and MNI Values for all pre-contact identified Fauna (mammal, bird, fish, and invertebrate) recovered from DhRp 17.

Order	Taxon	Common name	NISP	% Mammal	%All taxa	MNI
Artiodactyla	*Odocoileus* sp.	Deer	28	3.22	1.44	2
	Cervus elaphus	Elk	36	4.14	1.85	3
	Cervidae	Elk, deer, moose	1	0.11	0.05	1
	Artiodactyl	Even-toed ungulate	28	3.22	1.44	1
	Med. Artiodactyls	Deer-sized artiodactyl	1	0.11	0.05	1
	Med-lrg. Artiodactyls	Deer-sized and larger	3	0.34	0.15	1
	Lrg. Artiodactyls	Larger than deer-sized	6	0.69	0.31	1
Carnivora	*Ursus americanus*	Black bear	3	0.34	0.15	1
	Ursus sp.	Bear	3	0.34	0.15	1
	Procyon lotor	Raccoon	1	0.11	0.05	1
	Lynx sp.	Lynx, bobcat	1	0.11	0.05	1
	Canis sp.	Dog, wolf, coyote	145	16.67	7.47	11
	Canidae	Fox, coyote, dog, wolf	2	0.23	0.10	1
	Carnivora	Carnivore	1	0.11	0.05	1
Rodentia	*Ondatra zibethicus*	Muskrat	1	0.11	0.05	1
	Castor canadensis	Beaver	4	0.46	0.21	1
	Rodentia	Rodent	1	0.11	0.05	1
Pinipedia	*Phoca vitulina*	Harbour seal	3	0.34	0.15	1
Miscellaneous	Ungulate	Hoofed mammal	3	0.34	0.15	1
	Lrg. Ungulate	Larger than deer-sized	1	0.11	0.05	1
	Mammal	Mammal	121	13.91	6.23	1
	Sml. Mammal	Smaller than dog	16	1.84	0.82	1
	Sml-med. Mammal	Deer-sized and smaller	49	5.63	2.52	1
	Med. Mammal	Dog to deer-sized	67	7.70	3.45	1
	Med-lrg. Mammal	Dog-sized and larger	289	33.22	14.88	1
	Lrg. Mammal	Larger than deer-sized	56	6.44	2.88	2
Total Mammal			**870**	**100.00**	**44.75**	**40**

Order	Taxon	Common name	NISP	% Bird	%All taxa	MNI
Anseriformes	*Branta canadensis*	Canada goose	2	0.95	0.10	1
	Anser caerulescens	Snow goose	11	5.21	0.57	4
	Anser sp.	Goose	4	1.90	0.21	2
	Anas sp.	Dabbling ducks	83	39.34	4.27	19
	Anatidae	Swans, geese, ducks	16	7.58	0.82	4
Charadriiformes	*Laurus* sp.	Gull	1	0.47	0.05	1
	Uria sp.	Murre	1	0.47	0.05	1
Ciconiiformes	*Ardea herodias*	Great blue heron	1	0.47	0.05	1
Falconiformes	*Haliaeetus leucocephalus*	Bald eagle	10	4.74	0.51	2
Galliformes	Tetraonida	Grouse	2	0.95	0.10	1
Miscellaneous	Aves or small. Mammal		59	27.96	3.04	1
	Aves	Bird	15	7.11	0.77	2
	Sml. Aves	Duck-sized and smaller	1	0.47	0.05	1
	Med-lrg. Aves	Duck-sized and larger	3	1.43	0.15	1
	Lrg. Aves	Larger than duck-sized	2	0.95	0.10	1
Total Bird			**211**	**100.00**	**10.84**	**42**

Table 8:3. NISP and MNI Values for all pre-contact identified Fauna (mammal, bird, fish, and invertebrate) recovered from DhRp 17 (cont'd).

Order	Taxon	Common name	NISP	% Fish	%All taxa	MNI
Acipenseriformes	*Acipenser* sp.	Sturgeon	54	7.44	2.78	1
Clupeiformes	*Clupea harengus pallasi*	Pacific herring	7	0.96	0.36	1
Cypriniformes	*Ptychocheilus oregonensis*	Northern pikeminnow	2	0.28	0.10	1
Pleuronectiformes	*Lepidopsetta bilineata*	Rock sole	3	0.41	0.15	1
Salmoniformes	*Oncorhyncus* sp.	Pacific salmon	571	78.65	29.40	1
	Salmo gairdneri	Rainbow trout	2	0.28	0.10	1
	Thaleichthys pacificus	Eulachon	48	6.61	2.47	1
Miscellaneous	Osteichthyes	Bony fishes	39	5.37	2.01	1
Total Fish			**726**	**100.00**	**37.37**	**8**
Class	**Taxon**	**Common name**	**NISP**	**% Invert.**	**%All taxa**	**MNI**
Gastropoda	Buccinidae/Muricidae/Nassariidae	Whelks	2	1.48	0.10	2
	Gastropoda	Univalves	4	2.96	0.21	1
Pelecypoda	*Clinocardium nuttallii*	Basket cockle	1	0.74	0.05	1
	Tresus sp.	Horse clam/gaper	3	2.22	0.15	2
	Mytilidae	Mussels	55	40.74	2.83	1
	Mactridae/Tellinidae/Veneridae	Clams	12	8.89	0.62	1
Maxillopoda	*Semibalanus cariosus*	Thatched barnacle	6	4.44	0.31	1
Miscellaneous	Mollusca	Mollusks	52	38.52	2.68	1
Total Invertebrate			**135**	**100.00**	**6.95**	**10**
Total Pre-Contact Identified Fauna			**1942**		**100.00**	**100**

Crellin and Heffner 2000; Crockford and Pye 1997) were most common. It is likely that similar dogs resided at DhRp 17.

Other than providing family companionship and protection, dogs were utilized in hunting, to pack commodities on subsistence forays, and to assist in disposal of unwanted domestic and butchering wastes. Additionally, ethnographic Coast Salish peoples kept a breed of small, white "wool" dog, the hair of which was woven into blankets (Schulting 1994). It is not known whether such dogs were present on the lower Fraser River during the Marpole phase.

Dogs would have also contributed significantly to disturbance of cultural deposits during pre-contact period times (particularly in the midden/dump deposits), and may have also contributed to the preservation of some faunal remains by burying and forgetting them in anaerobic matrix contexts. Some animal remains (e.g., salmon, mammals, birds, etc.) may be under-represented in the recovered faunal sample as a result of consumption by dogs. Indeed, there is direct evidence for canine gnawing on some specimens. We know of no direct evidence to suggest that dogs were consumed for food, and ethnographic accounts suggest they were not.

Specimens identified only as artiodactyls probably also represent predominantly elk (wapiti) and deer. Remaining terrestrial carnivores identified include black bear, raccoon, and lynx or bobcat. Identified rodents include beaver and muskrat. A single taxon of sea mammal, harbour seal, is also represented in the sub-assemblage. In addition, during his excavations at Port Hammond during 1897 and 1898, Smith (1903:140-141,161) found an unspecified number of bones from the following mammalian taxa: whale, dolphin, seal, bear, elk, moose, deer, mountain goat, beaver, otter, raccoon, skunk, dog, and bat. This indicates that sea mammals may have made a more significant contribution to the diet than the three recovered harbour seal elements would suggest. Of course, this is assuming the whale and dolphin remains represent subsistence activities rather than raw materials for artifact manufacture.

Bird remains recovered from the site compose 11% of pre-contact period identified fauna (by NISP), clearly of lesser subsistence importance than either mammals or fish. Ducks dominates bird remains. Geese are a distant second, and include snow goose as well as Canada goose. Other bird remains found in low frequency include bald eagle, grouse, great blue heron, gull and a murre. Smith (1903:141) also found an unspecified number of cormorant and crow remains.

Pacific salmon (*Oncorhyncus* sp.) are clearly most predominant among the fish sub-assemblage (79% of total fish). Sturgeon is a distant second, followed closely by eulachon. Pacific herring, rock sole, northern pikeminnow, and rainbow trout complete the identified fish. The relative contribution of fish to the faunal assemblage is under-represented, due to very limited recovery of herring and eulachon elements. Despite the effects of this bias in the recovery of small fish bone, it appears unlikely that fish were more important to the diet than large mammals (deer, elk, bear, harbour seal), as these taxa represent proportionately much larger amounts of meat per skeletal element. A conservative assessment of relative subsistence importance would suggest (primarily terrestrial) mammals and fish made roughly equal contributions to the diet. Bird remains are clearly less abundant and made a smaller dietary contribution. It appears that the contribution of shellfish to subsistence was also secondary to mammals and fish, although with the data currently available this conclusion is more difficult to support.

The vast majority of shellfish remains encountered during excavations were highly fragmentary and mostly impossible to quantify. Based on the limited quantitative data and a qualitative assessment of the amount of highly crushed shell present in the impacted area of the site, shellfish appear to be a secondary food resource. Smith (1903:141) provides a description of shellfish remains recovered from the Port Hammond site in 1897 and 1898 that is very detailed for its time. Bivalves found in significant numbers at the site include butter clam, pacific littleneck, bay mussel, basket cockle, horse clam and bent-nose macoma. Native pacific oyster and giant pacific scallop were recovered in small numbers. Whelk were recovered in fair numbers, and barnacles and sea urchin were also found.

None of these shellfish species can be obtained in the immediate area of the Port Hammond site. It is necessary to travel at least 32 km to the mouth of the Fraser River, or elsewhere along the coast, to obtain these saltwater mollusks. Alternatively, the distance overland to the head of Burrard Inlet, the closest marine shellfish habitat, is about 15 km.

Pacific herring remains probably indicate fishing at the time of spawning in late winter or early spring, more specifically February to April with the heaviest concentrations in March (Hart 1973:97). Eulachon are available in the lower Fraser River during their spawning period from the middle of March to the middle of May (Hart 1973:149), indicating spring occupation of the site. Rock sole spawns between February and April and occurs in shallower water during the summer (Hart 1973:622). However, this species of flatfish is available in the Gulf of Georgia year round and occurs only in small numbers at DhRp 17, so cannot be considered a good indicator of seasonality. Salmon were present in the lower Fraser River in large numbers during spawning runs from late summer to late fall, and were likely harvested near DhRp 17 during this time of year. However, salmon are known to have been stored in large numbers for winter consumption (Cannon 1998; Carlson 1995; Eldridge and Acheson 1992; Matson 1992; Matson and Coupland 1995) making it less useful as an indicator of seasonality.

That the site was likely occupied in early fall for salmon harvesting and preservation, and again in early spring for herring and eulachon fishing suggests a continuous occupation through the winter at this large shell-midden site. There are few reasons for catching and preserving winter salmon supplies at one location, moving to another site for a short winter stay, only to return to the original location in early spring for the herring season (Cannon 1991:59). Presence of snow goose remains further supports winter occupation. Overall, the recovered faunal assemblage indicates continuous occupation of the site from early fall to mid-spring (September to April). No faunal data supports occupation during the summer months (June, July, and August), although the floral analysis results appear to suggest use of the site in spring and summer. If floral data are included and assumed to be reliable indicators of seasonality, then site occupation can be considered as year-round.

When the faunal assemblage is considered as a whole, marine subsistence resources (most fish, shellfish, and harbour seal) appear somewhat more important to overall diet than do terrestrial resources (land mammals and most birds). While this is not the marine-dominated diet suggested by Marpole phase faunal assemblage and stable carbon isotopic evidence from Crescent Beach (DgRr 1) and Beach Grove (DgRs 1) on Boundary Bay (Arcas Consulting Archaeologists 1996; Chisholm 1986: Appendix B; Matson 1992:395-408, 416), it is broadly similar to results reported for the Marpole component at Glenrose Cannery (DgRr 6) on the Fraser Delta. Matson

(1976, 1981) has concluded that the Marpole phase faunal assemblage from Glenrose is indicative of a fall-winter season of occupation, and so in this regard should be roughly comparable with Port Hammond. Indeed, when considering marine versus terrestrial resource use, the Glenrose faunal assemblage shows distinct similarities with the DhRp 17 results. The importance of elk, deer, bear, duck, and goose is also seen at Glenrose, as is the even greater contribution of bay mussel, salmon, herring, sturgeon and harbour seal to subsistence. The relative contributions to the diet are generally very similar between the two sites, although several minor differences are present. The most significant of these differences are the greater proportion of bay mussel and the absence of eulachon at Glenrose. The lesser importance of shellfish (primarily mussel) at Port Hammond appears logical, given the locations of the sites relative to the seacoast. The absence of eulachon from Glenrose may be the result of a sampling bias.

Burial of Deceased

Human skeletal remains were found scattered in several areas throughout the impacted cultural deposits. Most of the remains had been disturbed and altered primarily by post-contact period land-altering activities during the late 1950s and early 1960s. Some disturbance of human remains could have occurred accidentally during the pre-contact period while constructing house floor foundations, and fire and storage pits.

The disturbed remains do not allow any firm affirmation of the initial mode(s) of interment, such as whether they were originally extended, flexed, pronate, supinate, or disarticulated. None of the human remains were dated by ^{14}C assay, so it is difficult to confidently assign them specifically to the Marpole phase occupation, although it is very likely that they date between 2000 and 1500 years BP.

Scattered complete and fragmented human skeletal elements were recovered from various locations in the disturbed and intact cultural deposits within the new kiln apron impact zone. Preservation of the remains ranged from very poor to excellent, with cranial, mandibular, dental and longbone shaft fragments being the best preserved. Demographically, the sample consists of elements belonging to adults, adolescents and juveniles. Most of the major skeletal elements of the body are represented.

The recovered skeletal data could only be examined and described briefly in the lab. Recorded details are provided in Antiquus (2001). At the request of the Katzie First Nation, no photographs were taken. Mr. William Pierre, a spiritual leader for the Katzie community, conducted reburial ceremonies on several occasions during our fieldwork. The bones were reburied in a manner that ensured no further disturbance.

The presence of scattered human remains in the kiln impact zone at DhRp 17, and previous accounts of recovery of skulls and other remains at various times in the last 100 years, attest that human remains are probably quite common throughout most of this site. This is not uncommon for most major village sites in the Lower Fraser River and Gulf of Georgia regions (Ham 1982; Matson and Coupland 1995).

Floral Resource Harvesting

Analysis of matrix samples taken from a column sample, possible house-floor, and hearth feature at the Port Hammond site yielded a large number of botanical remains that were attributable to nine taxa, including six families. A total of 67 seeds were recovered from seven flotation samples (Table 8:4). These 67 seeds include nine identified species and four unidentified species. Results of this analysis indicate that both elderberry and *Rubus* (salmonberry, raspberry, blackberry, and thimbleberry) were important food plants during the Marpole phase at the site. Sedges (Cyperaceae) identified in the samples may have been used as materials for the manufacture of basketry, netting, mats, and/or textiles. Site seasonality cannot be inferred with great certainty. However, the presence of seeds from fruits that were normally eaten fresh appears to suggest occupation during the spring and summer. Seeds typically stored for winter use were not found.

Construction and Maintenance of Residential Structures and Canoes

The high incidence of woodworking tools attests to large-scale projects involving erection and maintenance of plank-houses, canoe construction, and other carving tasks (Figures 8:7 to 8:12; Table 8:1). Cedar and other major species of wood are ubiquitous in the Port Hammond locality, and would have been readily available in immediate proximity to DhRp 17. They would have been harvested with stone and antler tools and/or fire, and residential structural elements (e.g., support posts, planks) and canoe blanks transported to the site. Large trees could have also been harvested by canoe from the Fraser River as they passed downstream during spring runoff.

Pre-Contact Period Features

During this monitoring project two large pre-contact period features were encountered in the northeastern aspect of the new kiln apron impact zone (Figure 8:14). These included the remains of a large hearth/fire refuse dump area, and a small portion of the intact cultural deposits that had microstratigraphic superposed lenses of ash, charcoal, and shell that were interpreted to be associated with specific house floor levels and/or house-related activity events.

Hearth Refuse Dump Feature 1

A large hearth/fire refuse dump feature or area was observed to extend throughout the northeast aspect of the new kiln apron impact zone (Figure 8:14). It averaged about 20 to 25 cm thick, and sloped down northward to a depth of about 1.5 m below the old kiln foundation floor. The majority of the matrix was mainly characterized by a moderately compact, mucky dark black mixture of sand, silt, clay, charcoal, and decayed cultural materials with literally thousands of fire-altered pebbles and cobbles. Artifacts recovered from this area were primarily of stone, and noteworthy items include ground celts, ground slate knifes, projectile points, bipolar cores, abraders, perforator and hammer stones. A sample of large thermally altered pebbles and small cobbles in this feature were taken. It is obvious that they were being selected according to specific characteristics, and that they were imported to this part of the site from nearby beaches or river embankment exposures. Radiocarbon samples from this feature yielded dates of 1600±60 BP (Beta 153919) and 1560±60 BP (Beta 153917) (Table 8:5).

The large size of this feature and nature and condition of cultural materials found within and adjacent to it suggests that the northeast corner of the new kiln apron impact zone was once used for extensive woodworking activities, such as canoe making. Heatestones similar to those found at DhRp 17 are

Table 8:4. Raw data from the plant inventory. Note: cf. species compared to Montgomery 1977 and Schoch et al. 1988, as comparative samples were not available.

Area/ Sample Type	Sample Size (Liters) and Depth below Surface	Seeds	Charcoal Weight (g) 4.0/2.0mm	Charcoal Weight (g) 1.0/.425mm & Catchpan	Total Charcoal Weight (g)
Zone 6 Section 8/ Column sample	5-10 cm (1 L)	Unidentified A 1	0.83	9.99	10.82
	10-15 cm (1 L)	*Carex* 1, *Rubus* 3 *Sambucus* 6	0.98	10.99	11.97
	15-20 cm (1 L)	*Rubus* 7, *Sambucus* 17 Unidentified B1 Unidentified C 1	0.58	21.25	21.83
	20-25 cm (1 L)	*Sambucus* 6	0.76	7.07	7.83
	25-30 cm (1 L)	"Grass" 1, *Fragaria* 1 *Rubus* 5, *Sambucus* 4 *Scirpus* 2	0.96	3.19	4.15
Zone 6 Section 8/House floor	5-30 cm	*Chenopodium* 1 cf. *Eleocharis* 1 cf. *Polygonum* 1 *Sambucus* 6, Unidentified D1	3.54	11.68	15.22
Zone 7 Section 6/charcoal sample	40 cm (0.5 L)	*Sambucus* 1	**38.37**	**17.22**	55.59
TOTAL		**67**	**46.02**	**81.39**	**127.41**

***Figure 8:14*. View of main impact zone showing location of Hearth Refuse Dump Feature # 1 (lower left). The crew is working over the area containing intact microstratigraphic sections of house floor deposits, looking south.**

known to have been used in steaming the interior of canoes as part of the manufacturing process. Outdoor cooking or warming fires may have also been constructed in this location, and very likely this is where most of the heating of the stones occurred. Undoubtedly, many stones were also used in houses to boil and steam food, and to line the bottoms of hearths to retain and radiate heat when inside fires were low. When their use-lives had been expended, they were discarded in this specific part of the site forming a sort of trash fill containing the contents of cleaned-out hearths, fire-altered rock, broken and lost tools, faunal remains, etc. The presence of virtually thousands of pebbles and cobbles suggests a long period of use and discard. This hearth/fire refuse dump feature is in close association with the house floors described below.

Intact House Floor Deposits

In several locations in the mid-central aspect of the new kiln apron impact zone we encountered pockets and patches of moderately disturbed to intact cultural deposits that displayed thin microstratigraphic layers and lenses of moderately compact overlapping layers of crushed shell, thin layers of charcoal, burnt clay and ash. These deposits are interpreted as portions of superposed house floors. This part of the impact zone also had a conspicuously high density of faunal remains and artifacts including basketry needles, harpoons, bone points, celts, ground slate knives, projectile points, abraders, and wedges. These floor deposits were subjected to some detailed data recovery (Antiquus 2001:62-63), but most were removed by backhoe with little attention to *in situ* recovery of items.

Relative and Absolute Dating

The cultural deposits encountered during monitoring were dated using both "absolute" and "relative" methods.

Relative Dating

Temporally diagnostic or "time marker" artifacts recovered from the cultural deposits in the new kiln impact zone display characteristics and traits considered to be most prevalent or typical during the Marpole phase, which is currently estimated to have commenced around 2500 BP, and terminated ca. 1500 and 1100 BP (Matson and Coupland 1995). Notable items include nipple-topped hand mauls (Figure 8:11), various specific styles of stemmed and corner-notched projectile points and bifaces (Figures 8:3-8:5), and unilaterally barbed bone and antler harpoons and points (Figure 8:11). Radiocarbon dating results on bone and charcoal samples collected from the impact zone range in age from ca. 2000 to 1500 years BP.

While no direct convincing evidence for Locarno Beach phase (ca. 3500 to 2500 BP) occupations was identified within the impact zone, a component of this earlier cultural period may indeed lie beneath the deposits we investigated and below the current foundation of the new kiln apron.

Absolute Dating

Five radiocarbon samples submitted to Beta Analytic Inc. in Florida, produced age determinations ranging from about 2000 to 1500 years BP (Table 8:5). Standard radiometric analyses were performed on the samples. These five dates ranged between about 1500 and 2000 radiocarbon years BP, indicating that this part of DhRp 17 was occupied during the latter part of the Marpole phase which spanned from ca. 2500 to 1500/1100 years BP.

X-Ray Fluorescence Results

Four obsidian lithic waste flake samples recovered during our monitoring study were submitted to the Department of Chemistry, SFU to determine their probable sources. The results indicate that three samples originated from the Garibaldi Park source, and the fourth was from "Flow C" of the Glass Butte source in Oregon. The small number of obsidian flakes recovered from the kiln replacement impact zone at DhRp 17 indicates that this raw material was not particularly important to stone tool manufacture and use. Locally available raw materials were deemed suitable for performing the vast majority of tasks, and obsidian may have been considered more of a novelty and rarity, much like quartz crystals.

Concluding Remarks

These most recent archaeological investigations at Port Hammond provide an important comparative data set on Marpole phase culture. Recovered lithic and faunal artifacts indicate a wide variety of activities took place in this part of the site, most notably woodworking and food resource processing. Faunal and floral remains support feature and artifact data in indicating that DhRp 17 was a winter village during the Marpole period. Prehistoric inhabitants exploited a substantial number of food and raw material resources at this site, most of which were available locally, although long distance trade and coastal resource use are clearly evident. Seasonal occupation of this permanent village site likely spanned from at least September to April, although the paleoethnobotanical results suggest the possibility of summer habitation in some form. All recovered artifact, feature, and subsistence information along with five radiocarbon dates place the deposits firmly within the Marpole phase, although the possibility of earlier site

Table 8:5. Summary of Radiocarbon Sample Assay Age Determination Results.

Temporary Sample #	Permanent Lab No.	Sample Material	Provenience	Radiocarbon Age
DhRp 17-R1	Beta-153916	Elk bone Collagen	Trench 2; 20-30 m N; 1.0-1.5 m BS*	1900±70 BP
DhRp 17-R2	Beta-153917	Charcoal	N corner of Unit 1; Zone 7,Section 11, 10 cm BS*	1560±60 BP
DhRp 17-R3	Beta-153918	Charcoal	SE corner of Zone 6, Section 5; from large hearth at 20-25 cm BS*	1530±60 BP
DhRp 17-R4	Beta-153919	Charcoal	Zone 6, Section 8; Edge of Zone 6-7, 50 cm BS*; below dense ash lenses.	1600±60 BP
DhRp 17-R5	Beta-153920	Charcoal	Zone 8; Drainage Hole 1;Bottom of cultural deposits at about 1.0 m BS*	1910±80 BP

*BS = Below Surface (i.e., from the top of the dark culture-bearing deposits within the impact zone).

use exists in other site areas or in deeply buried deposits. Our data strongly support the ini erence that this site was a large permanent village with a riverine and terrestrial economy.

In our opinion, this monitoring study is an outstanding example of how a number of agencies can work collectively to resolve a drect adverse conflict existing between a major development and an important archaeological resource. That there was no impact assessment study conducted before the monitoring posed a problem, but the fieldwork was carried out in a manner that allowed all practical impediments or scheduling difficulties to be resolved with only minor inconvenience to any agency involved. Despite previous disturbance and coarse recovery methods, the data recovered permitted the foregoing general reconstruction of human behaviour in this part of the site.

Much of the remaining portions of DhRp 17 still have a high heritage value. Recovery and analysis of the data from the kiln replacement project impact zone has provided a good comparative Marpole phase artifact assemblage, a fair amount of information about faunal resources exploited, and a good sample of dog remains that could be subjected to further detailed study. Future systematic investigations of other undisturbed cultural deposits would undoubtedly provide a great deal more information about human behaviour and activities that transpired at this important site.

CHAPTER 9

Early Architecture from the Southern Georgia Strait Region

DAVID P. JOHNSTONE

Introduction

One of the defining characteristics of the Northwest Coast culture area are permanent villages constructed of split cedar planks. To date, few sites containing preserved architectural remains have been investigated in the Southern Georgia Straits region. The architectural details that are present pose a number of archaeological problems: how is it possible to identify perishable architecture?, how long has the historically documented architectural pattern been present?, and what was the greater social function of that architecture?

Much of what we assume we know about the prehistoric architecture of the southern Georgia Strait region has been derived by direct analogy with historical Coast Salish houses. These houses were of two types: a temporary summer dwelling constructed of mats supported by poles, and a permanent or semi-permanent winter dwelling of hewn planks supported by posts and beams (Suttles 1990). While temporary architectural remains have been excavated (*e.g.* Patenaude 1985), the larger, more durable wooden architecture will be the focus of this paper. Both shed and gabled roofs were present, though the latter is supposed to be the more recent of the two.

Archaeological excavations of prehistoric houses on the Northwest Coast have been relatively rare (Ames *et al.* 1992, Grier 2001, Leclair 1973, Schaepe, this volume). The archaeological visibility of these sometimes-large structures is limited by the general absence of non-perishable construction materials. The remains of these structures in the archaeological record is limited to postmoulds of wall and roof supports, and to internal features such as hearths, steaming pits, benches, and storage boxes. The recognition of these features as belonging to prehistoric architecture is limited by the in field recognition of the features, the scale of architecture as a function of the size of the excavation, and the depth at which some of the features are buried by later deposits. As such, the identification of architecture on the Northwest Coast is as much a matter of luck as research design. In some instances it has been possible to infer the presence of houses on the basis of accumulated shell around the periphery of these structures *e.g.* Whalen Farm (Smith 1921), Helen Point (Carlson1970a),False Narrows (Burley 1988), Beach Grove (Matson et al. 1980), and Garrison Bay (Stein 2000).

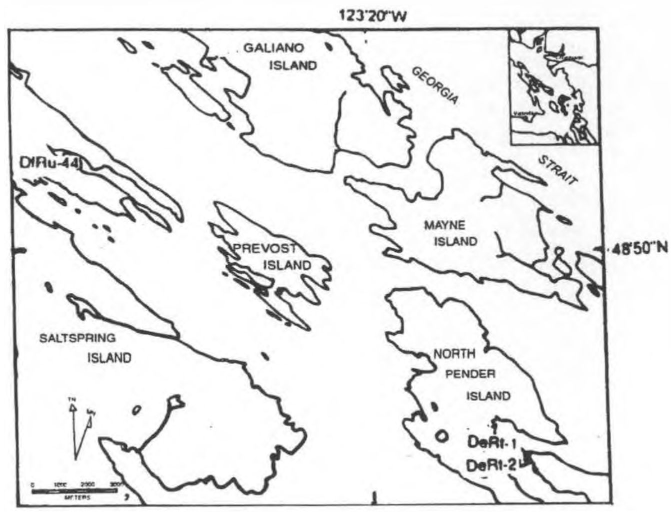


Figure 9:1. **Location of the Pender Canal (DeRt 1 and 2) and Long harbour (DfRu 44) Sites in the Gulf Islands.**

The question of how far the historical analogy of larger rectangular plank houses can be extended into the past remains an open one. The Pompeii-like preservation of the slide-covered site of Ozette (Samuels 1991) suggests that historically documented size and construction techniques for coastal houses extended at least 400 years into the past. This would suggest that the ethnographic pattern would be applicable for the San Juan Phase. Some (*e.g.* Borden 1970, Burley 1988:45, Mitchell 1971:52) have extended the model of large plank houses to the Marpole phase on the basis of the presence of large (>30cm diameter) postmoulds encountered during excavations. While the presence of single or even multiple postmoulds are by themselves scant evidence for large architecture, the excavation at Dionisio Point (Grier 2001), of a substantial portion of a rectangular depression exposed a number of postmoulds and interior hearths suggesting that large plank houses were present by the Marpole phase. Test excavations in house depressions at False Narrows (Burley 1988), Beach Grove (Matson *et al.* 1980) and Garrison Bay (Stein 2000) suggest that these large rectangular features also date to the Marpole phase. Earlier phases have yielded fewer large postmoulds suggestive of plank houses. Matson (Matson and Coupland 1995, Matson 1996) suggests that a small depression at Crescent Beach represents a "pithouse". However, the scale of excavation and the absence of postmoulds make the interpretation of this feature difficult. Two Charles phase plank houses have been excavated at the Mauer (Le Clair 1973), and Hatzic (Mason 1994) sites along the Lower Fraser River that included interior benches. To date, no contemporaneous permanent architecture has been identified in coastal contexts. Carlson and Hobler (1993:36) suggest that sites containing houses immediately paralleling the beach older than 2250 years ago have been inundated or eroded due to changes in relative sea level.

The three sites detailed in this paper are coastal shell middens located in the Gulf Islands of Southwest B.C. (Figure 9:1). All are located at the heads of inlets that affords them maximum protection from gales. These sites were excavated between 1984 and 1988 by S.F.U. projects headed by Roy Carlson (Carlson 1986) or myself (Johnstone 1991). Each multi-season project was primarily a salvage effort to mitigate against threat to the site from erosion or development. While all of the sites had multiple cultural components, the architectural features were identified from Locarno Beach phase (2300-3300 BP) deposits in each case.

The Pender Canal Sites

The oldest architecture from this study was excavated from DeRt-2, located at the head of Bedwell Harbour. A series of 5 postmoulds 20 cm in diameter intruded from a compact organic-rich midden 30 cm into the sterile glacial till underlying the site extend in a line over a distance of 6 meters (Figure 9:2). The diameter of these holes is smaller than the historic descriptions of support posts. This, and their close 1-meter spacing, suggests that these constitute a non load-bearing, freestanding curtain wall with planks attached to their eastern face. One indication of relative permanency of this wall is a 40 cm thick deposit of shell-rich midden east of the alignment of postmoulds (Figure 9:2). This deposit is thickest where it abruptly terminates vertically at the line of post moulds, suggesting that it was either banked up against a rigid, non-moving artificial obstacle, or truncated during the construction of the architectural feature. The presence of this midden also defines and interior and an exterior to this wall, and suggests that the wall was the eastern part of a larger structure. As no further alignments of post moulds that may have corresponded to a western wall were encountered within the limits of the excavations, we might assume that this structure was greater than 7 meters in width.

***Figure 9:2.* The Row of Post Holes and adjacent Midden at DeRt 2.**

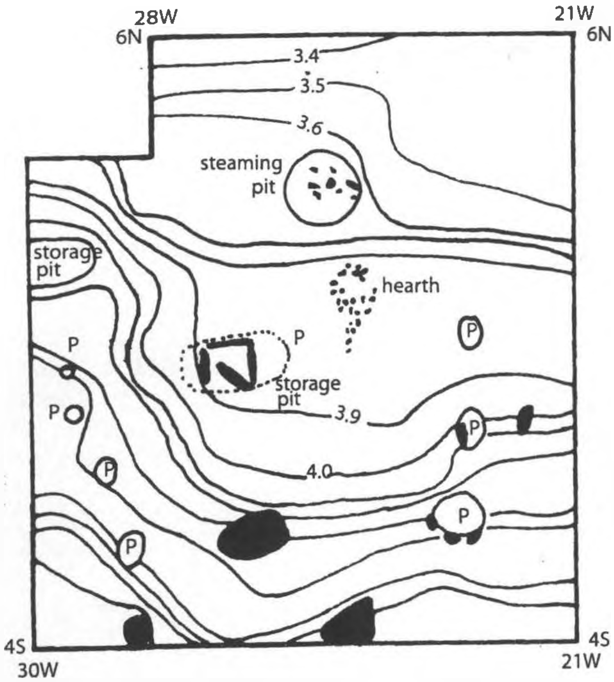


***Figure 9:3*. The House Floor and Associated Features at DeRt 1.**

A second set of architectural features was excavated at DeRt-1, located in a cove off of Browning Harbour approximately 100 meters north of DeRt-2. Seven post moulds extending from a compact, dark midden into the sterile glacial subsoil define a level rectangular space 5 x 6 meters in size (Figure 9:3). The post moulds range from 15 to 30 cm in diameter, with the larger ones having stones set vertically into their walls, likely as shims.Unlike DeRt-2, a number of features are located inside or adjacent to thestructure. The most unusual of these was a stone box constructed of sandstone slabs set on edge into the earthen floor and covered by a fifth slab. This feature is located near the corner of the structure, out of traffic's way. A circular hearth was more centrally located, where it might provide an efficient source of light and heat as well as a locus for cooking. External features included a steaming pit and a slab and clay lined pit to the west above a bedrock outcrop. Mitchell (1971:144) has reported a similar clay and stone lined pit from Montague Harbour dating to the Locarno Beach phase.

Long Harbour (DfRu-44)

The architectural remains at Long Harbour (DfRu-44) are the most complete and show the most detail (Figure 9:4). Two size classes of post moulds are present: the smaller has a diameter of 10-15 cm, while the larger are from 30-40 cm in diameter. Both classes of post moulds are from 20 to 30 cm deep and intruded from a dark midden into either a subsoil of glacial till, or gravel beach sediments. Some post moulds have tabular stones embedded in their sides, presumably to act as wedges to secure the post within its hole. The smaller posts are spaced 60 cm apart in a line running for 8.5 meters. These are probably the remains of a non-load bearing curtain wall that supported horizontal planks. The larger post-moulds are located within the smaller post moulds and are probably the remains of load bearing roof supports. A thin shell rich midden was located to the west of the line of wall posts, while a more substantial shell rich midden paralleling the first was located to the east, on the ocean side of the structure. These middens and floor contours suggest a width of 7.5 m for this structure. Associated features include a steaming pit located towards the back of the structure and a more centrally located hearth.

Comparisons and Interpretation

The three structures presented are roughly contemporaneous features dating to the Locarno Beach phase. Each was located on a relatively level portion of the site, backed up against rises in the underlying till, and roughly paralleling the beach. There is no evidence to suggest that the localities for these structures were artificially leveled or excavated. Much of the documented contours can be attributed to preexisting topographic relief to which the buildings were accommodated. Changes to the local relief consist of accumulations of shell around the perimeter of the building; particularly on the side facing the beach. Stein (2000:68) proposed that such shell deposits might have been deliberately banked against some structures in order to insulate them.

The scale and fixed position of the walls suggest a high degree of permanency to which wooden planks were secured. The Long Harbour example probably had larger interior posts designed to support the roof. While we cannot be certain of the lentos of these structures, we can more confidently suggest a width of 7-8 meters.
As a group, the three structures from the Pender canal sites and from Long Harbour are interpreted as permanent structures in light of the size of post moulds, the scale of the overall features, and the relative permanence as reflected by accumulated middens around the perimeters. Such structures are more substantial than the mat house, and on that basis, a seasonal structure can be rejected. Determining their exact function is somewhat more problematic, especially given the percentage of the structures that were excavated. Building function must then be inferred from

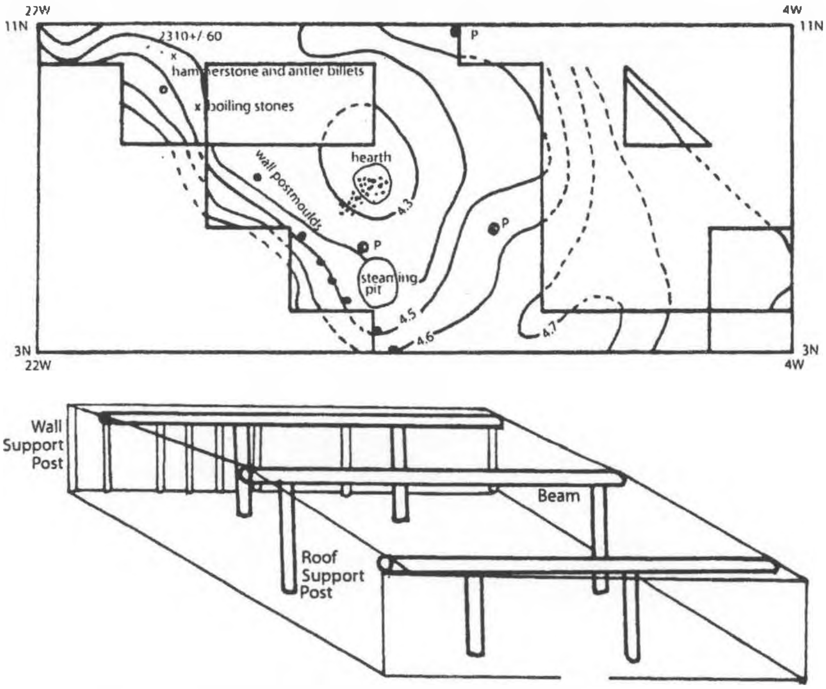


Figure 9:4. **Upper: Plan of Post Holes and Features at Long Harbour (DfRu 44). Lower: Reconstruction of House Frame.**

of the structure that were suggestive of its possible use. A number of burials were found externally. While it is possible that the building may relate to the nearby mortuary activity, there is no direct evidence to support this hypothesis. The structure at DeRt 1 was more completely exposed and had more associated features. Storage pits, hearths, and steaming pits are all domestic features, and suggest that the structure there can be interpreted as a semi-permanent house. While the structure at Long Harbour lacks obvious storage features, there is good evidence for food preparation in the form of smoking, steaming, and boiling. Minimally, this structure can be interpreted as a kitchen, but given that roof beams serve also in a storage capacity when items are suspended, it is equally likely that this building served as a house.

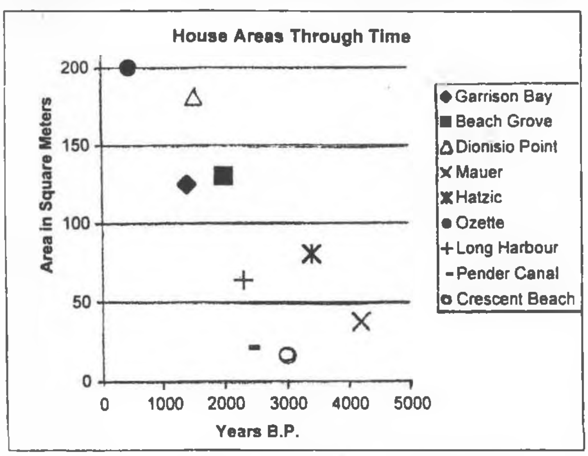


Figure 9:5. **A Comparison of Plank House square Footage for different Time Period.**

Conclusions

The Pender Canal and Long Harbour sites indicate that permanent split plank houses were present at coastal settings of the Southern Strait of Georgia by the Locarno Beach period. Technologically, they closely resemble their ethnographic counterparts in terms of materials and construction techniques. In terms of scale, these houses do not resemble the large multifamily longhouses of the historic period. Instead, it is likely that these structures were single or extended family residences. Coupland (1996) has suggested that multifamily housing arose due to the development of social competition for wealth and prestige and that the larger houses were required to house the greater labour pool. Alternately, Ames (1996) suggests that the increased space was necessary to store the surplus product of this competition. A comparison of plank house space from different periods (Figure 9:5) suggests that the differences in size were of degree rather than of kind, and that house size increased gradually over time rather than rapidly evolving into a more complex form. Given the lack of evidence for excavated floors, thick deposits of shell accumulated around a structure may be the result of long occupation periods, or multiple occupations rather than the large labour investments of corporate groups. In any case, these data do not inform us about the nature of village structure; either of intrasite variability in house size and use, or of village spatial organization.

CHAPTER 10

Validating the Maurer House

DAVID M. SCHAEPE

Introduction and Study Objectives

In 1973, Ronald LeClair carried out the precedent setting excvation of what he reported as an ancient house feature at the Maurer site (DhRk 8) near Agassiz, southwest British Columbia. This feature was located on a small terrace at the base of Hopyard Hill, a bedrock outcrop in the upper Fraser River valley floodplain near the confluence of Cheam Slough and the Fraser River, approximately 110 km upstream from the river's mouth[1] (Figures 10:1-3). LeClair (1973) produced a permit report containing his preliminary findings that was later expanded slightly and published after he had obtained several radiocarbon dates (LeClair 1976). He suggests in this preliminary report that this feature was the remains of an Eayem Phase house dating to circa 5500-3500 BP [cal 6300-3800], which made it the oldest known house on the Northwest Coast. As in most preliminary reports, little detailed evidence was presented in support of these conclusions.[1]

The many references to the Maurer house in Northwest Coast archaeological literature are an indication of its potential importance. The validity of the Maurer house feature has been questioned (Matson and Coupland 1995:117), and formal analysis and presentation of findings from the Maurer site have repeatedly been called for (Mason 1994:120-121; Pratt 1992:240-241).

In 1996 I was given the opportunity to analyze the field notes, photographs, and excavated materials from the site for a master's thesis (Schaepe 1998). The goal of my analysis was to test the reliability of the data from the 1973 excavations, to build on LeClair's groundwork by assessing the validity of his preliminary conclusions and to add whatever insights could be gleaned from a complete analysis of his data. The use of analytical techniques not available to LeClair in 1973 hinted at a new and better understanding of the Maurer data. The results of this study are the subject of this paper.

In Section I, I assess whether or not the excavated feature is a structure; compare original and reconstructed site plans and profiles; assess the original lithic typology; and assess artifact frequencies from a number of excavation units associated with extant profiles. In Section II, I assess the function of the feature; artifacts, lithic tools, and debris are isolated, described and functionally analyzed. In Section III I evaluate radiocarbon samples and dates associated with the Maurer feature, and evaluate their reliability The results of these analyses lead to an identification of the Maurer feature[2]

Archaeological Excavations at the Maurer Site – Defining and Assessing a Usable Data Set

In this section, I present a history of the archaeological investigation of the Maurer site in order to define a usable data set for the purposes of this study.

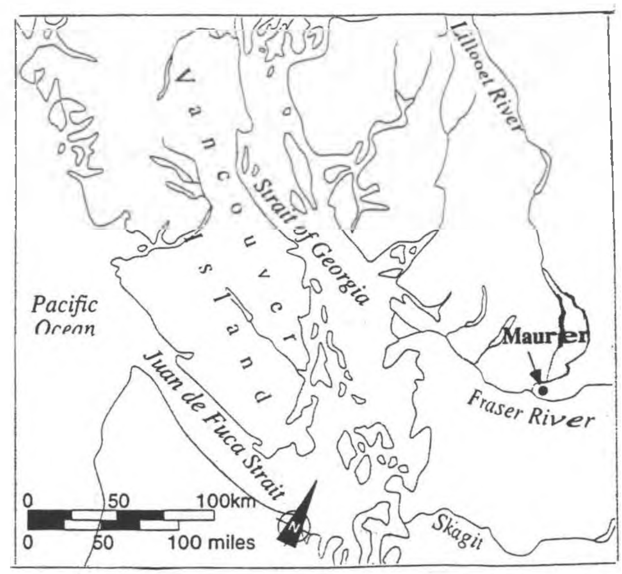


Figure 10:1. **Location of the Maurer site.**

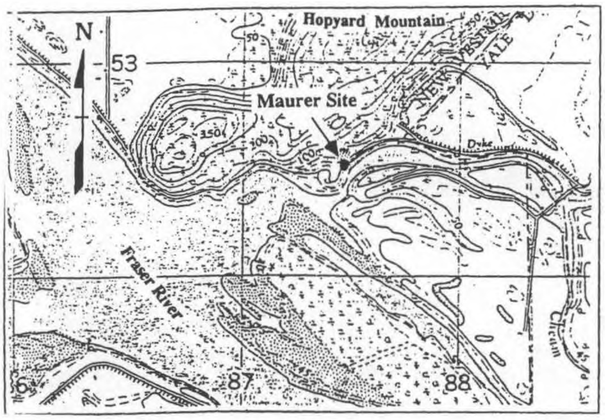


Figure 10:2. **The Location of the Maurer Site (DhRk 8) in the central Fraser River Valley.**

The 1971 and 1972 Excavations

The first archaeological investigation of the Maurer site was conducted in August, 1971, though it was confirmed that it did not impact the depression (R. Percy, pers. com. 1996).

In 1972, Thea DeVos sampled the site more intensively. Ten 2 m x 1 m test units were placed within a roughly WNW-ESE oriented grid over the depression (see Figure 10:4). These units were excavated to varying depths, a number of them penetrating what is later identified by LeClair as the house floor. Information from this excavation is not available as the location of the excavation material and notes is unknown. This excavation represents the greatest known impact to the Maurer site[3], and has adversely affected this attempt at analyzing the Maurer feature. The absence of usable data from the 1971 and 1972 excavations limits my analysis to that recovered by Ronald LeClair in 1973.

The 1973 Excavation

Le Clair undertook excavation of the Maurer site between May and September 1973. Util izing DeVos's apparently arbitrary NE-SW oriented site grid, LeClair established a roughly 14 m (NE-SW) by 18 m (NW-SE) excavation grid encompassing the depression feature. Within this area, he excavated a total of fifty-nine 2 m x 1 m units, two 2 m x 2 m units, and two 1 m x 1,m units -- totaling an excavated area of 128 square meters. These units generally ranged between 1.0 m and 1.5 m in depth. Unit provenience was indicated in meters south and west from an arbitrary site datum. The excavation accounted for 100% of the Maurer feature remains. Figure 10:5 depicts the combined 1972 and 1973 excavation plans. Excavators used trowels and shovels following amixed technique of excavating in arbitrary levels and stratigraphic layers. Examination of the excavation unit level notes indicated that the humus was removed as a singlenatural layer with no vertical subdivision. The layer identified as the house floor was also excavated as a discreet stratigraphic layer, separate from overlying sediments, and sub-divided into arbitrary 10 cm levels where the thickness of these deposits allowed. Excavating the observed floor as a discrete layer proved to be a crucial factor as it permitted the reconstruction in my study of

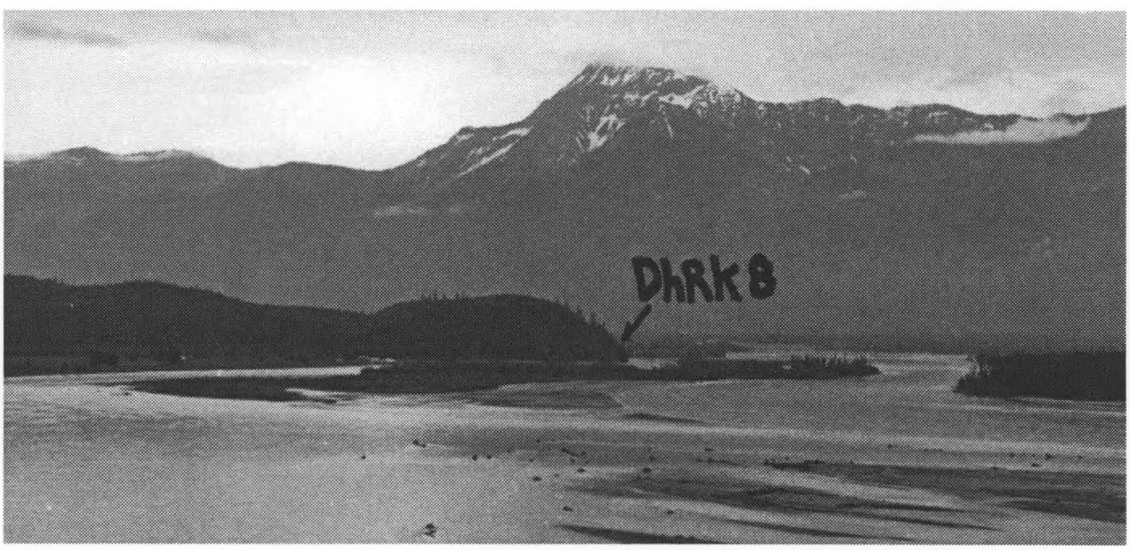


Figure 10:3. **Looking eastward over the Fraser River toward the Maurer site (Photo: LeClair).**

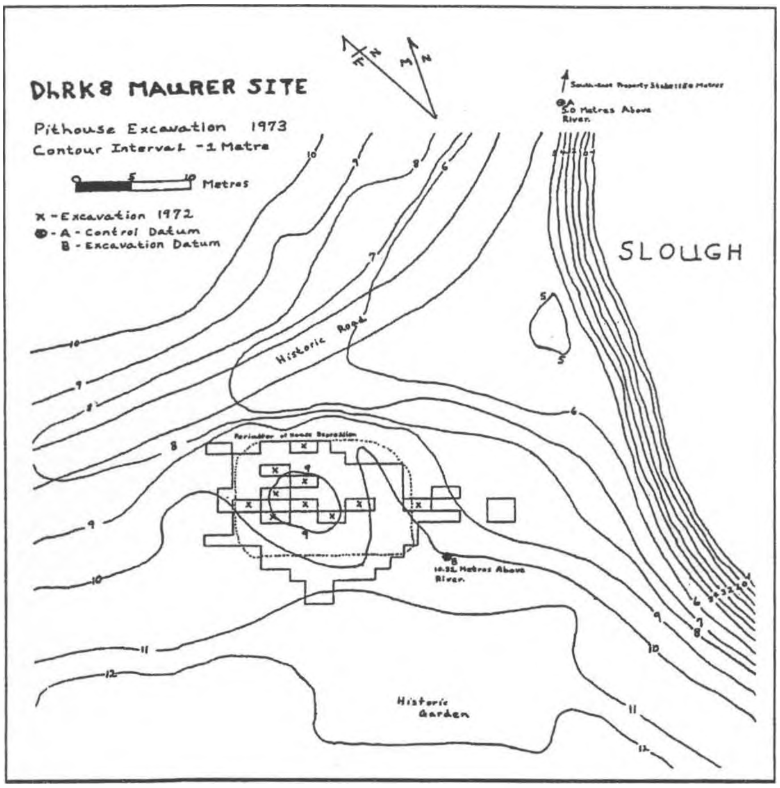


Figure 10:4. **The 1973 site area contour map / excavation plan (per LeClair 1976:36).**

the associated artifact assemblage without mixing strata. Depth measurements were taken from both the ground surface and an arbitrary datum line strung above the depression. While this method was followed in most cases, notes for a number of units lacked reference to one or the other of those provenience points. Fortunately, notes were located which document the depths of the ground surface below datum for each excavation unit. This reference allowed missing depth measurements, either DBS or DBD, to be extrapolated with a high degree of certainty.

Level data recorded on level and feature forms provide basic information, including: the Borden Site Number; date; recorder; horizontal provenience (e.g., 31.2-32.2 m S, 18-20 m W); vertical provenience (e.g., 30-40 cm BS); and a brief description of soil color and cultural material. Usually, depth measurements and a plan drawing of the bottom of each excavated level are present, along with a directional indicator. Indications of the level or layer being excavated were generally lacking.

Stratigraphic profiling of the site was minimal. Only two provenienced profiles were located among the excavation documents, recording intersecting 13 m (roughly NE-SW oriented) and 16 m (roughly SE-NW oriented) cross-sections of the completely excavated feature (see Figure 10:5). Different versions of these profiles, in preliminary and finished states, were found in the project collection. The NE-SW profile -- what I call 'Profile B' -- is labeled with written and Munsell coded soil descriptions. Only written descriptions label the SE-NW profile -- what I call 'Profile A'. Also depicted in both profiles is the datum line from which depth measurements are referenced. These two profiles provide the basis for conducting stratigraphic analyses of the Maurer feature, a critical element of this investigation.

As mentioned above, plan drawings are depicted in the level notes for most excavation units. Scales are lacking in some of these drawings. In such cases, distance measurements are noted for significant provenience points. In addition, three scaled plan maps of the excavated structure are included in the site documentation. Comparison of these structural plans reveals some discrepancies that are discussed below.

LeClair's photographs, negatives and photo record forms provide additional documentation of the excavation. Photographs were taken of the site prior to, during and at the completion of the 1973 excavation. Of particular interest are oblique color and black and white photographs of the exposed Maurer feature at the completion of the project, and close-up photographs of a number of exposed associated sub-features. Two photographs show

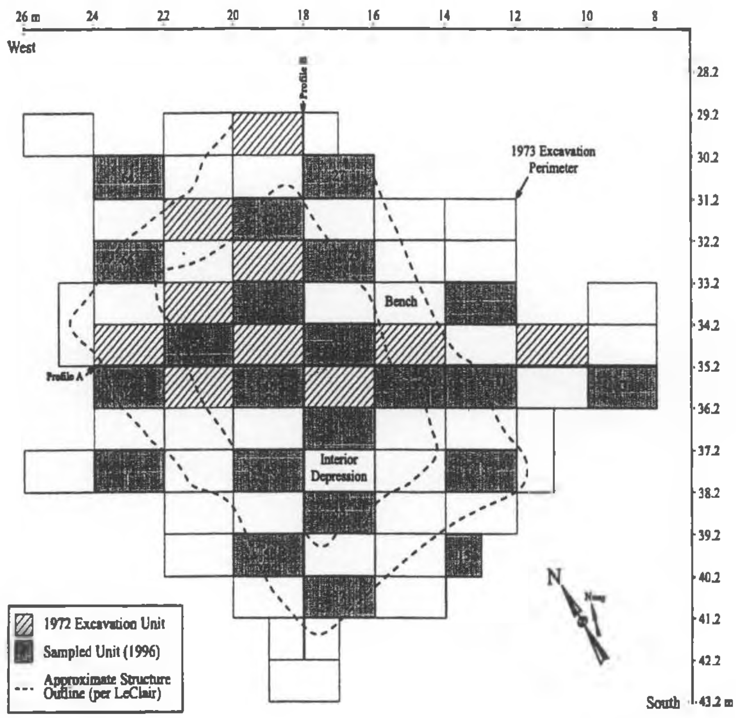


Figure 10:5. **Composite site plan showing 1972 and 1973 excavation units and units sampled for this study ('1996').**

the dark stain of what appears to be a floor or occupation surface of another structural feature exposed in a road cut-bank approximately 15 m from the excavated feature.

Much to his credit LeClair maintained field notebooks that include descriptive details of the excavation. Log entries provide routine information on the progress of the excavation, but become increasingly sparse throughout the course of the work. Importantly, however, the log includes detailed notes on the three-dimensional provenience, context and materials of all radiocarbon samples collected from the site. Site soil acidity values by depth below surface and a rough outline of project objectives were also recorded.

The entire DhRk 8 collection from 1973 consists of roughly 17,000 lithic artifacts, perhaps 2000 of which are tools[4]. Identified tool types consist mainly of unifaces, bifaces, drills, spall tools, cobble and pebble tools, hammerstones, and cores. No classification of the debitage was attempted. Artifacts were generally catalogued by the date of catalogue entry, artifact number, artifact type, artifact location, depth (cm BS and/or cm BD) and excavator(s).

Lithic artifacts from DhRk 8 received catalogue numbers 1-4,053. Only identified tools were assigned and labeled with individual artifact numbers. Debitage was assigned one number per unit/level. All artifacts were provenienced by unit and depth. A very small number of artifacts, primarily tools, received three-dimensional provenience. Lithic material type was generally not noted. No mention was made of layer association, except for the occasional important notation of 'floor association'.

The state of the collection organization at the beginning of the present study was such that all debitage remained in its original level bags, while tools had been removed to a series of cabinets. The tool assemblage was unsorted and required complete re-organization. Fortunately, the tools (with only a handful of exceptions) were labeled with artifact numbers. Thus, I was able to cross-reference numbered artifacts with the artifact catalogue as a means of re-establishing their provenience. Lastly, I located preliminary artifact frequency figures by cm BS among the collection documents.

Validity and Reliability of the Maurer Data

In this as in any collections study, the assessment of data reliability is critical to defining the scope of possible research. Unreliable data limit the scope of such research beyond, even, the restrictions imposed by the research strategy and methods employed in original data collection. Diminution of usable data detracts from the ability to examine the validity of conclusions based upon these data, and generally reduces resolution. Following Nance (1987:246) reliability refers to dependability and consistency. With reference to measurements:

> a measurement or observation is reliable if repeated attempts to make the measurement yield the same results. An observation is unreliable if it does not yield consistent data.... The reliability of a measurement is inversely related to the amount of random error present in that measurement.

Increasing random error decreases both replicability and reliability in a data set. Connected to but not dependent upon reliability is the concept of validity (Nance (1987:246):

> Validity refers to the degree to which observations yield satisfactory responses or data. Satisfactory data tell you what you want to know....an observation is valid if it measures what you think it measures. Thus an invalid observation is a biased observation, the degree of validity is inversely related to the amount of systematic error present in measurements.

Validity, then, is a measure of systematic error; that is, bias.

Two factors represent basic determinants of reliability and validity for the Maurer data. The first relates to the general inexperience of the crew[5]. The potential for random error in the collection of data was therefore high, and the resulting data reliability is questionable. A second factor possibly affecting data validity is LeClair's classification of the depression at the site was a house. This description represents a possible bias in the approach to the excavation and analysis of this feature. Thus, a critical approach to measuring the degrees of validity and reliability of the data will be applied in the following analysis.

Section I: Assessing the Validity and Reliability of the Maurer "House" - Is there a Structure at DhRk 8?

In this section, I examine the question of whether the remains of a structure (that is, a feature comprised of associated architectural elements) was excavated at DhRk 8. I develop archaeological expectations associated with this question. Taphonomic factors possibly affecting these expectations are proposed, methods applied in this study are described, and reliability of the 1973 data is assessed.

Expectations

Evaluating the 'structure question' includes developing expectations of what types of material remains may constitute structural remnants. This endeavor was hindered by three factors: (1) the type of expected structure is not known; (2) the associated time period is not definitely known; and (3) data from which to model expected structural remains in the central/upper Fraser River valley are somewhat limited. Circular and sub-rectangular semi-subterranean structures (Hanson 1973; von Krogh 1976; Mason 1994), platform structures (Matson 1994; Blake 1995; Morrison 1997) and elements of surface structures (Eldridge 1982) of various time periods have been excavated in the central and upper Fraser River valley. Descriptions of these features provide an interpretative basis for the Maurer remains, but do not assist in clarifying the type of structural remains to expect there.

LeClair's description of the Maurer structure contains three basic structural elements -- the *sub-structure*, *sub-structural features*, and the *super-structure*. – and represents the most specific set of data from which to devise testable expectations for this feature. Definitions of these structural elements and associated archaeological remains from Maurer are presented below:

Sub-structure *- that portion of the structure which is either set into or incorporates the associated ground surface, including*:

- a rectangular pit, measuring roughly 7.5 m by 5.5 m, excavated 30-40 cm into the associated ground surface and capped by a grayish brown floor deposit of unspecified thickness
- a roughly 1 m-wide bench which incorporates the associated ground surface surrounding the central depression

Sub-structural features *- features directly associated with the sub-structure, including:*

- a 3.0 m by 0.5 m hearth (of unspecified depth) associated with the floor in the south end of the central depression

Super-structure *- that portion of the structure which stood above the associated ground surface, including:*

- six upright post-holes around the outer edge of the central depression (at each corner and centered along the long axis walls)
- nineteen post-holes (apparently angled), surrounding the outer edge of the bench

• a roughly 3 cm-thick charcoal lens, representing the decayed remnants of a super-structure, capping the floor deposit

From this description, expectations of how these structural elements should appear in the archaeological record may be developed.

One of the principle tests by which this structure may be evaluated lies in its ability to be defined stratigraphically. Each of the three structural elements described by LeClair (1976) may be defined in profile and plan drawings. Thus, a number of expectations can be developed with regards to observing sub-structure, sub-structural features and super-structure remains in the plans and profiles:

Sub-structure

• the sub-structural floor and bench features should constitute a distinct stratum with clear vertical and horizontal limits which are distinguishable from and bounded by the natural stratigraphy (see Table 10:1)

• in profile, the floor -- and possibly the bench -- should be definable as an organic stratum distinct from its surrounding matrix

• the remnant super-structure should provide an association between the floor and the bench

• both floor and bench, as interior structural elements, should be consistently overlain by carbonized super-structural remains, unless these were deliberately removed prior to collapse.

• the floor/bench stratum should have a stepped configuration due to the elevation difference between the floor and surrounding bench, assuming that the same kind of organic deposition occurred in both areas and depending upon the degree of post-abandonment slumping.

Sub-structural features

• sub-structural features should be identifiable as pits in the floor surface, intruding into the sub-floor stratum.

Super-structure

• in plan view, two sets of post-hole patterns should be identifiable:

one set of large post-holes is expected to define the outer edge of the central depression

a flanking series of smaller post-holes should define the outer edge of the bench

• these two sets of post-holes should define the horizontal limits of the structure

• in profile, the tops of the post-holes surrounding the central depression should have similar depths below datum, indicating that they were set into a common ground surface

In sum, verifying this structure, as detailed by LeClair, requires identifying each of these three defined structural elements at DhRk 8. As a single structural unit, direct association between these elements must be demonstrated. Identifying these elements and their associations is the aim of this section.

The vertical distribution of artifacts may also provide important insights useful in analyzing this structure. However, far less artifact data were reported than for the structural remains themselves. While LeClair notes artifacts were associated with the structure, their frequencies and proveniences are not described. As a result, no valid expectations may be developed concerning the relationship of the structure to the artifact assemblage. Nevertheless I examine the horizontal and vertical distributions of artifacts in an attempt to reveal meaningful patterns within the feature area.

Taphonomy

Analysis of this structure requires evaluation of possible taphonomic and post-depositional factors which might have affected the configuration of its remains and the archaeological expectations discussed above. However, aside from the 1972 test excavations, taphonomic factors affecting the site are not known. Furthermore, lack of comparative data hampers the definition of taphonomic factors which might have affected this structure. However, site formation processes identified from the investigation of semi-subterranean structures in other regions may be applied to the Maurer feature.

Both Fladmark (1982) and Spafford (1991) present a number of taphonomic processes which tend to interfere with the interpretation of semi-subterranean structures. Though derived from Fraser Plateau and Canyon pithouse excavations, a number of these processes are doubtless applicable to the expected situation at Maurer. As adopted from Fladmark (1982:123), taphonomic processes possibly affecting the purported Maurer structure include[6]:

• excavation of housepits into older cultural horizons

• mixing of housepit and older cultural component materials by trampling on the house floor

• house abandonment and -
  - slumping of roof materials into pit
  - slow size-sorted filtering of materials through roof back onto the floor
  - slow collapse of the roof accompanied by

natural aeolian or fluvial deposition
- burning of the structure and collapse of the charred roof into the pit

• slumping of pit walls, and the accumulation of intrusive cultural materials onto the house floor
• re-occupation and partial or complete re-excavation of the housepit, and the repetition of the entire cycle
• final abandonment and in-filling of the depression which might result from later, transitory non-pit-house occupations, and/or deliberate filling with cultural refuse, coupled with natural sedimentary and disturbance processes

All the factors listed above affect the way structural and artifact distribution patterns appear in the archaeological record. Some, all, or none of these factors may affect the expected pattern of structural remains presented above, potentially obscuring their archaeological visibility. Determining the occupational history of the site in relation to the construction, use, abandonment and decay of the structure is essential in assessing the effect(s) of taphonomic agents.

Identification of taphonomic agents affecting the integrity of the proposed Maurer structure may be approached in a number of ways. Stratigraphic analysis may be used to identify superimposed structures or occupation surfaces, the re-use and re-occupation of the structure, the extent of post-abandonment infilling, and evidence of bioturbation. In conjunction with stratigraphic analysis, analysis of artifact vertical distributions may be helpful in determining the number of cultural occupations at the site. The effects of natural vertical size-sorting on artifact distributions can also be assessed through size-dependent distribution analyses of this sort. I apply such analyses in the following portion of this section. Identification of active taphonomic processes is important as it serves to establish interpretive limits based upon accurate assessments of feature integrity and artifact assemblage integrity.

Table 10:1. Maurer Site Vicinity Soil Horizon Profile.

Depth Below Surface (cm)	Soil Horizon	Description
0-5	Ah	very dark grayish brown to dark brown silt loam
5-18	Bf1	dark reddish brown silt loam
18-43	Bf2	reddish brown to dark brown or yellow brown silt loam
43-56	BC	dark brown or light yellowish brown loam
56-127	Cgj1	dark grayish brown to dark brown loam
127-204	Cgj2	dark brown to brown loam or very fine sandy loam, overlying bedrock

The Reliability and Validity of the Profiles and Plans

Stratigraphic profiles and plan drawings are essential analytic tools critical to conducting this investigation. As discussed in the previous section, the reliability of the original plan and profile descriptions is, however, questionable. Testing the reconstructibility of profiles and plans from the 1973 excavation provides insight into the accuracy of these data. 'Reconstructibility', as I use it, refers to the ability of original data such as plans and profiles to be re-created from (primarily) the excavation unit notes. Non-reconstructible data must be viewed as being prone to error and lacking reliability. The objective of the reconstruction test, then, is to identify a primary set of reliable data with which to proceed in analyzing the Maurer feature.

Artifact frequencies in this and following section(s) are the result of my complete reclassification of the DhRk 8 assemblage. Explicit definitions and descriptions of artifact classes in this study are in Appendix I of Schaepe (1998).

Methods

The data I use in this analysis are, again, limited to those collected by LeClair in 1973. Initially, LeClair's excavation plan was reconstructed using unit proveniences (meters south and west of the site datum) recorded in excavation unit level notes. In this way, LeClair's reported site plan, which outlines the excavated area, was filled in with unit-specific locations (see Figure 10:5). I compared this reconstruction to photographs and preliminary plans to verify its accuracy, and then numbered all the DhRk 8 excavation units, including those from DeVos's 1972 project. I identified the location of the two provenienced stratigraphic profiles within the excavation plan (labeled Profile A and B -- see Figure 10:5), to provide an intersecting cross-sectioned view of the depression feature.

For this study, I sampled fifteen 2 m x 1 m units adjoining Profiles A and B. Assemblages of art-ifacts from these units were completely re-analyzed. I developed individual, reconstructed profiles for each of these sampled units. Such reconstruction was permitted from data contained in the excavation unit level notes. Individual profile reconstructions were linked together to create replicas matching LeClair's Profiles A and B. As a means of comparing consistency (that is, reliability), I overlaid the original and reconstructed versions of the profiles. What I determined to be reliable profiles were then compared to the recorded natural stratigraphy of the site vicinity and used for analysis of the structural remains, site taphonomy and occupational history. In addition, I developed vertical frequency distribution profiles of artifacts for the sampled units that could be overlain on the stratigraphic profiles as part of this analysis.

In addition to the above, four 2 m x 1 m excavation units and one 1 m x 1 m unit, not along Profiles A and B, were selected due to their locations beyond the structure boundary indicated by LeClair. I reconstructed profiles along the center line of each of these units (long axis for the 2 m x 1 m units, N-S for the 1 m x 1 m unit). Artifact assemblages and their vertical artifact frequencies were also reanalyzed from each unit. This strategy allowed for the analysis of stratigraphy and the vertical frequency of artifacts between locations both within and beyond the feature area.

Two additional 2 m x 1 m units, also not associated with Profiles A and B, were sampled from portions of the structure LeClair indicated as comprising the bench. Again, I reconstructed these unit profiles along their center line (long axis) and re-analyzed their artifact assemblages and vertical artifact frequencies. This sampling strategy allowed for assessment of the bench feature, as a distinct structural element.

For the purposes of this study, I classified lithic artifacts broadly as either tools or debitage. I sub-classified debitage by variables derived from Ahler's Mass Analysis method (Ahler 1989) and Sullivan and Rozen's Flake Completeness method as modified by Prentiss (Sullivan and Rozen 1985, Prentiss and Romanski 1989). Debitage was separated by size using 1", 1/2" and 1/4" square wire-mesh screens, equivalent to Ahler's G1, G2 and G3 size gradations, respectively. Because 1/8" screening was not employed by the 1973 excavation, no representative G4 sample exists and the insignificant amount of debitage smaller than 1/4" screen mesh is neither recorded nor used in this thesis[7]. The absence of a G4 size grade sample negates the possibility of properly implementing Mass Analysis which requires a complete set of debitage size grades for assessment of size-relative debitage pro-portions, as defined by Ahler (Ahler 1989). The absence of a G4 debitage class may be compensated for by experimentally replicating a comparative sample of G1-G3 size classes, thus developing relative proportions of these three size classes. Unfortunately, comparative relative proportions of G1, G2 and G3 debitage (as a specific set) are currently unavailable and replication of this debitage set is beyond the scope of this study. Despite lacking the 1/8" sample, the Maurer data are available otherwise for pursuit of Mass Analysis by interested archaeologists. I compared the cumulative relative proportions of G1, G2 and G3 debitage vertically across the sampled units adjoining Profiles A and B. Thus, for this study, size sorting allowed the analysis of possible natural sorting factors at the site.

As with the profiles, I used excavation unit level descriptions and plans to reconstruct plan drawings of specific areas at specific depths. Again, the reconstructed plans represent comparative data against which I could evaluate the reliability of LeClair's original plan drawings. I used replicable plan elements, as reliable data for evaluating the horizontal extent of the structure and proposed structural elements not identified in the profiles.

In addition to profiles, plans, and artifact frequencies, photographs are an additional source of comparative data. Photographic evidence for a number of structural elements is available. With the exception of subject selection, focusing, etc., photographs are free from the effects of human random error. Due to their comparable objectivity, photos are considered reliable, though contextually dependent, sources of data.

Natural Profile of the Site Vicinity

The natural profile of the Maurer site locality provided a context within which I assessed C) with six subdivisions (Ah, Bfl, Bf2, BC, Cgjl, Cgj2, underlying DhRk 8 Profiles A and B. Table 10:1 provides the Maurer site locality soil horizon profile adapted from an Agassiz area soil survey description (Luttmerding and Sprout 1967:65). According to this soil survey, upland, Ryder series orthic acid brown wooded soil predominates in the vicinity of Hopyard Mountain, including the location of DhRk 8. Parent material for this soil series is "silty aeolian deposits over glacial till or bedrock. Generally the depth of the aeolian overlay is three or more feet". This series is comprised of three major soil horizons (A, B and bedrock).

Horizon transitions are generally gradual or diffuse, with abrupt boundaries existing only between the Ah and Bfl horizons, and the Cgj2 horizon and bedrock. Ryder series soils are slightly acid with noted pH values ranging from 6.0 at Ah to 6.7 at Cgj2. Local variations of this profile are expected to exist.

Profile Interpretation - Cultural Stratigraphy

Original profiles from the 1973 excavation are presented in Figures 10:6a and 10:8a. Profile A (Figure 10:6a) is oriented roughly E-W. Profile B (Figure 10:8a) is oriented roughly N-S. The two profiles intersect at 35.2 m South (mS) and 18 m West (mW). These profiles generally match the natural stratigraphy[8] of the area as described above, with the exception that the C horizon appears to be somewhat grayer than expected. While there is a good deal of accordance between the cultural and natural stratigraphic profiles, one difference is obvious. A stepped, narrow layer of orange and black mottled sediment is shown at the base of both Profiles A and B, at what would naturally be the depth of the C horizon grayish brown sediment. While this black layer is continuous across Profile B, it is seemingly of limited horizontal extent in Profile A. Three associated pit features, one in Profile A and two in Profile B, appear to intrude into the C horizon substrate below the black layer. This black layer and associated pits stand out as anomalies in the natural soil horizon profile. Not only is the natural soil profile interrupted at this level, but the transition between sediments is unexpectedly abrupt. The stratigraphic anomalies, as well as artifacts located throughout the sediments in these profiles, provide definite evidence of cultural activity. Additionally, the stratigraphic anomalies match elements of LeClair's structural description - an excavated, level-floored structure with a surrounding raised bench, a hearth, and post-hole features. Initially, evidence from these profiles appears to substantiate portions of LeClair's conclusion that this feature represents a structure.

Reliability - Profile A

Assessment of the reliability of LeClair's Profiles A and B is required before any sound stratigraphic interpretations may be made. LeClair's Profiles A and B were compared to the versions reconstructed for this study. The original and reconstructed versions of Profile A are presented in Figure 10:6. Several similarities and differences between these two profiles are immediately noticeable. Differences, comprised of irreproducible elements of the original profile (that is, absent from the reconstructed profile), are summarized as follows:

Colour Codes	Sediment Description		
BG	Brownish Gray		Humus
C or ■	Charcoal		Stump
CB or ■	Mottled Charcoal & Black Staining		Post
CO or ■	Mottled Charcoal Flakes & Orange		Fire-Cracked Rock
DB	Dark Brown (Silt)		Pebble
DO	Dark Orange (Silt)		Slump
DOT	Dark Orange Tan (Silt)		Unexcavated
DYB	Dark Yellowish Brown (Silt)		
G	Gray (Sandy Silt)		
LB	Light Brown (Sandy Silt)		
LGB	Light Gray Brown (Sandy Silt)		
LYB	Light Yellowish Brown (Sandy Silt)		
O	Orange (Silt)		
OLB	Olive Brown (Silt)		
OT	Orange Tan (Silt)		
YB	Yellowish Brown (Sandy Silt)		
YBG	Yellowish Brown Gray (Silt)		
YG	Yellowish Gray (Silt)		
VDGB	Very Dark Grayish Brown (Sandy Silt)		

Table 10:2. Profiles A and B legend.

- the majority of the B horizon composition (that is, the majority of the orange yellow brown ranging sediments between the humus and the black layer)

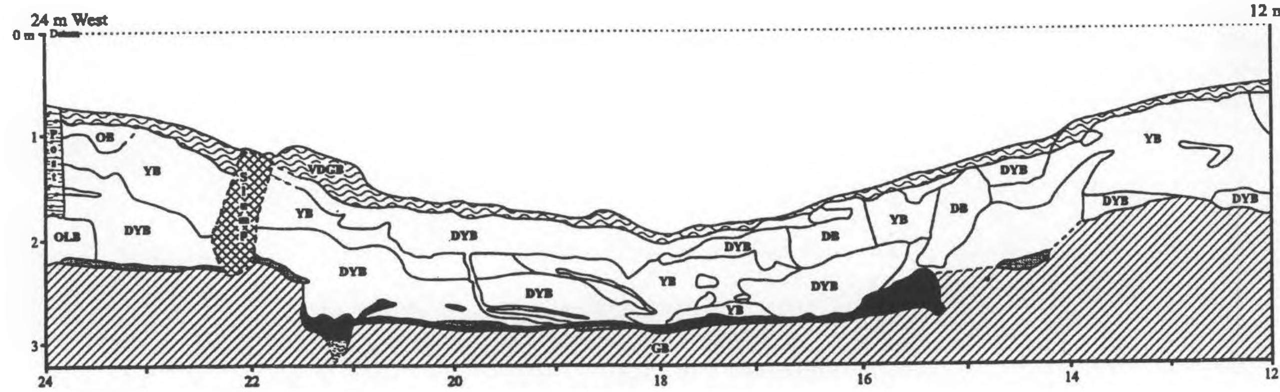


Figure 10:6a. **Original Profile A.**

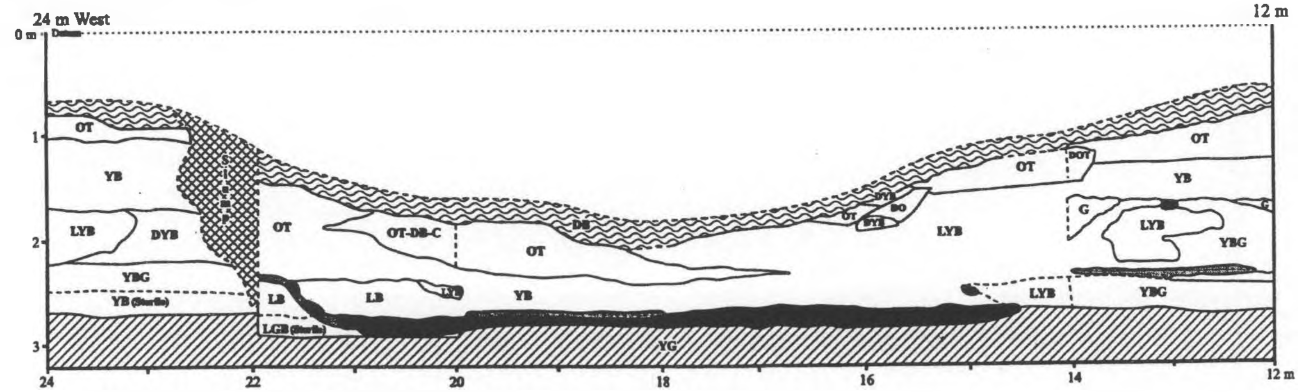


Figure 10:6b. **Reconstructed Profile A.**

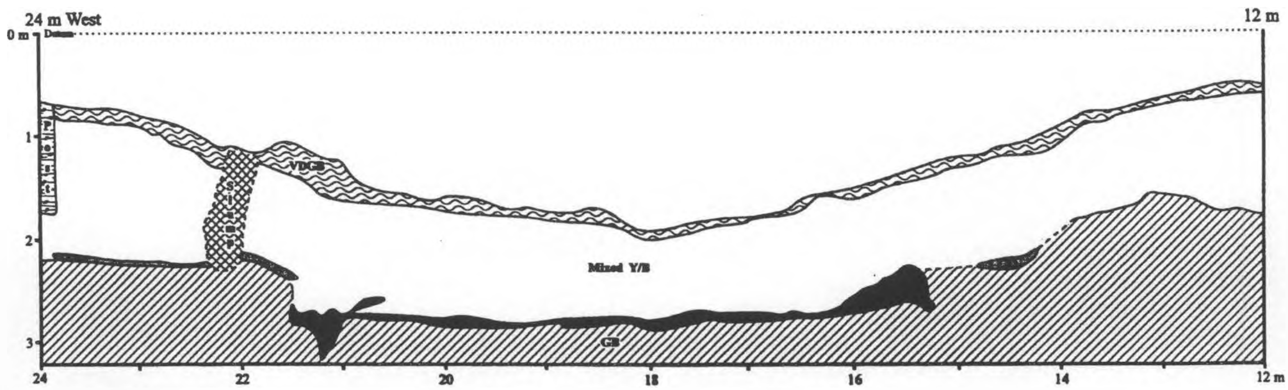


Figure 10:7a. **Original Profile A with Consolidated B Horizon.**

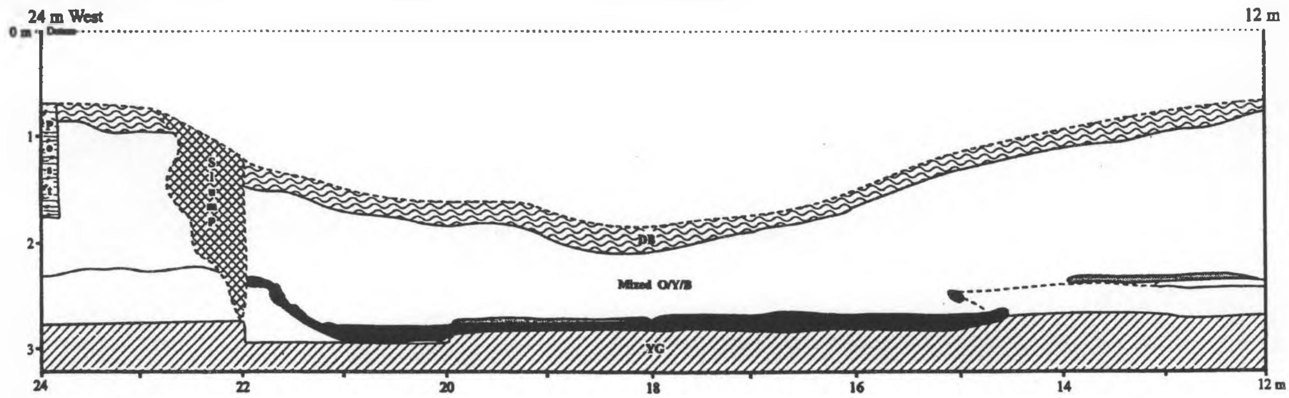


Figure 10:7b. **Reconstructed Profile A with Consolidated B Horizon.**

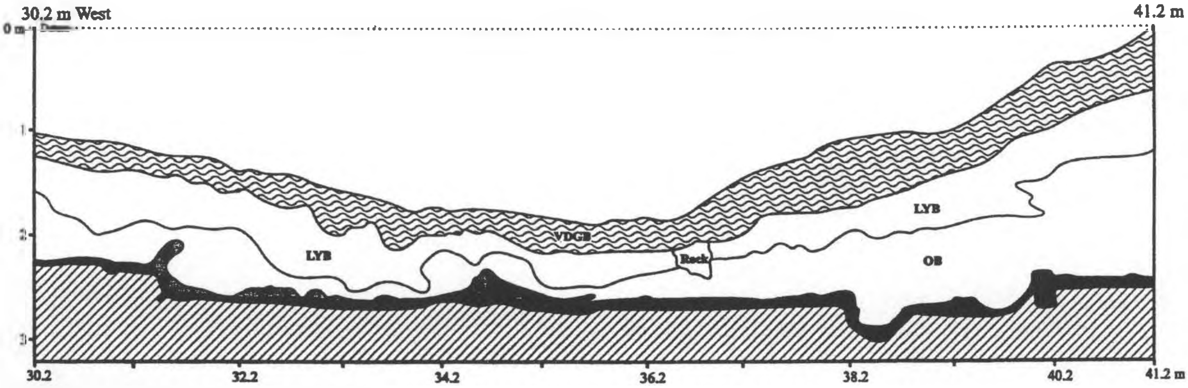


Figure 10:8a. **Original Profile B.**

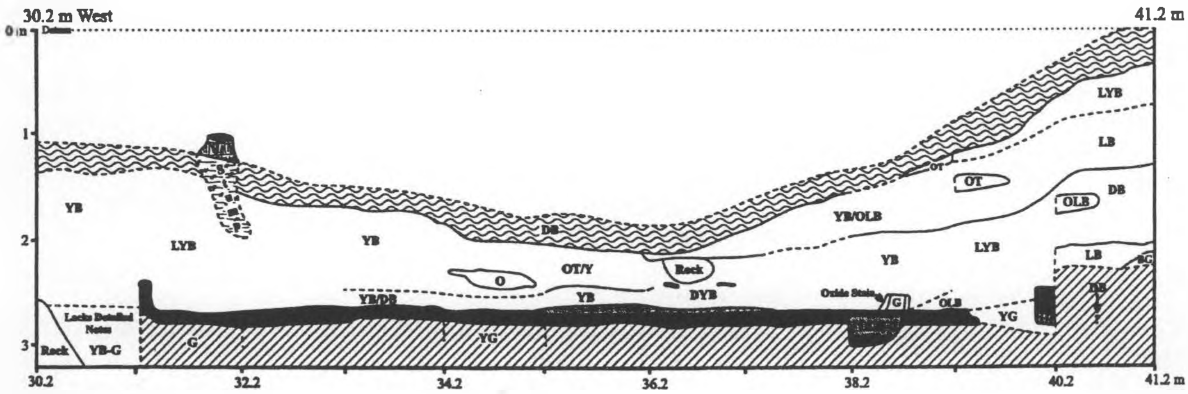


Figure 10:8b. **Reconstructed Profile B.**

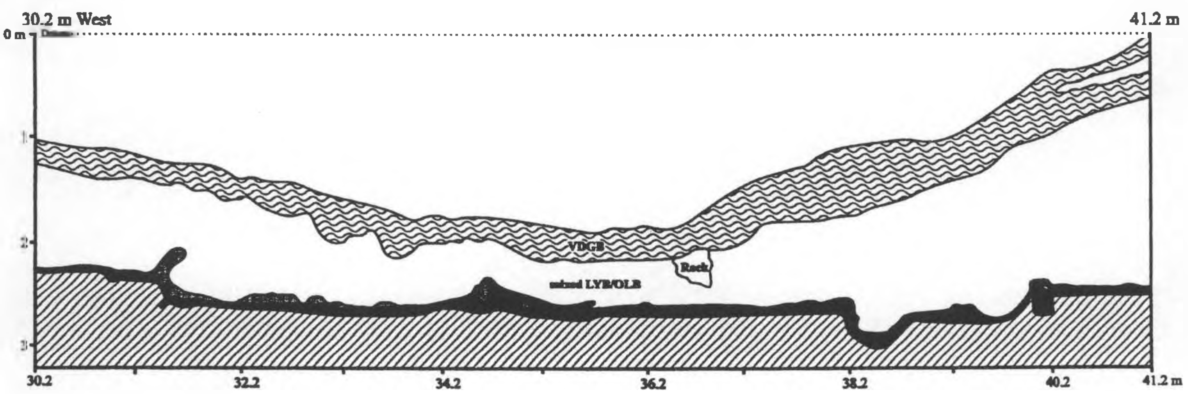


Figure 10:9a. **Original Profile B with Consolidated B Horizon.**

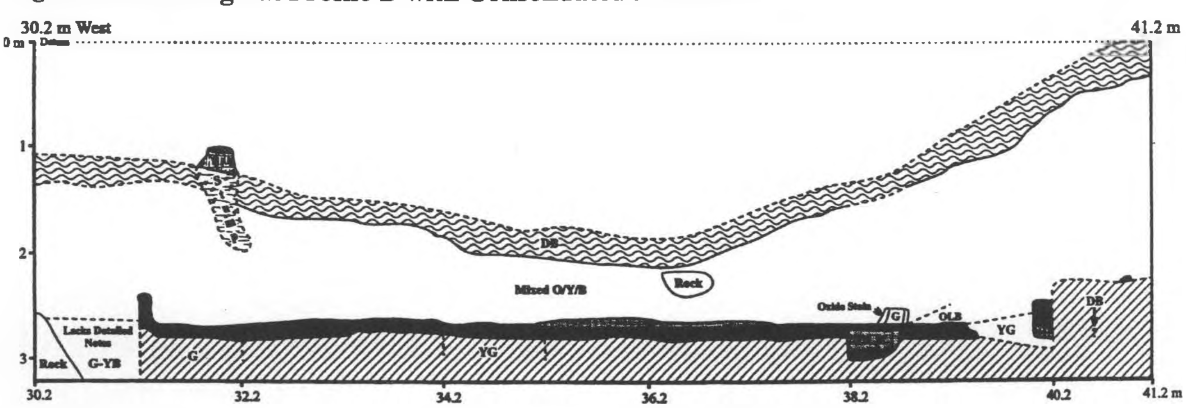


Figure 10:9b. **Reconstructed Profile B with Consolidated B Horizon.**

• a charcoal and ash lens indicating the raised bench at roughly 225 centimeters below datum (cm BD) between 24 m - 21.5 m W

• a pit feature at roughly 275-310 cmBD, 21 mW and a post feature at 24 m

Similarities, comprised of reproducible elements of the original profile (that is, present in both profiles), are summarized as follows:

• the A horizon (that is, the humus layer noted as DB and VDGB) and the general vertical extent of the B horizon

• a slumped part of the profile at 22 mW

• a black layer at the base of the profile, roughly from 22 m W to 14 m W, 275 cm BD

Additionally, the reconstructed profile provides information for areas not shown in LeClair's original profile -- particularly at the horizontal extremes of the black layer, below 225 cm BD. In order to maximize agreement between the two versions of Profile A, the B horizon in each profile was consolidated to form a single zone of undifferentiated sediments, as depicted in Figure 10:7. The degree of agreement between the two profiles is increased at the expense of stratigraphic resolution. However, considering the ap- parent lack of 'real' stratigraphy in the B horizon, and apparent degree of unreliability, its homogenization is not considered to significantly affect the amount of usable data.

With the exception of the bench and floor pit, the profiles in Figure 10:7 represent data with maximum reliability. The post feature is added in Figure 10:7b as it is documented in photographs of the site. Importantly, the black layer is, with only slight variation, one of the reproduci ble elements of Profile A. This layer represents consistent, reliable data and may be further investigated as such. Because it was adapted from referenced sources of information, using known and reproducible methods, the reconstruction is considered the more reliable of the two profiles. Further reference to Profile A will be in regard to the reconstructed profile in Figure 10:7b.

Reliability - Profile B

Repeating the above procedure, original and reconstructed versions of Profile B are presented in Figure 10:8. For unknown reasons, LeClair's version of Profile B is considerably less detailed than his version of Profile A. A number of similarities and differences are again immediately noticeable between the original and recon structed versions of Profile B. Differences, comprised of irreproducible elements of the original profile (that is, absent from the reconstructed profile), are summarized as follows:

• the composition of Horizon B, within an area lying roughly between the humus and the Black layer, from rock at 36.5 mS to 30.2 mS

A stump at 32.2 mS

• thick black bench lenses at either end of the central black layer (40.2 mS-41.2 mS and 30.2 mS-31.2 mS, at 230-240 cm BD)

• a thin black concave lens (39.5 mS-40.2 mS, at 250 cm BD) immediately adjacent to a small pit feature

Similarities, comprised of reproducible elements of the original profile (that is, present in both profiles), are summarized as follows:

• the A horizon (humus)

• a rock in Unit 33

• the composition of the B horizon south of the rock (36.5 mS - 41.2 mS)

• a pit feature at roughly 40.2 mS, 260-275 cm BD

• a second pit feature, at roughly 38.4 mS, 275-305 cm BD

• a black layer at the base of the profile, roughly 31.2 to 39.2 mS, at 275 cm BD

As in the Profile A, the reconstructed Profile B contains some information not included in the original, such as in Unit 27 below 230 cm BD.

As above, portions of the original and reconstructed versions of Profile B were consolidated to maximize the level of agreement between the two. Figure 10:9 is the tailored versions of Profile B, excluding all but reproducible profile elements. Detail is lost as a result of identifying and deleting unreliable, error-prone data and keeping reproducible and reliable data. Further reference to Profile B will be solely to the reconstructed profile depicted in Figure 10:9b.

Two interesting results arise from the comparison of Profiles A and B. First, the black layer is identifiable in both cases, indicating reliability. Second, the organic layer expected of the bench feature cannot be identified in either case, calling this architectural feature into question. This analysis provides useful primary information from which to expand this investigation.

Profile Interpretation - Reliable Cultural Stratigraphy

Profiles A and B suggest the presence of four *strata*[9]. Bedrock, incontrovertibly establishing the base of the site, was exposed at the northern end of Profile B. Overlaying bedrock is the basal stratum (C horizon) comprised of grayish to yellowish brown sandy sediments. Capping a portion of the basal stratum is a 10-15 cm thick layer of compact, black to orange and black mottled sediment with distinct horizontal limits (ranging between 7-8 m in length) and a consistent depth (ranging between 260-280 cm BD). At least one pit feature is directly associated and a second pit feature indirectly associated with the black stratum. A narrow, vertically oriented, 5-10 cm wide, black band defines the lateral extremes of the black layer, separating it from the surrounding grayish sediment. The black band is particularly apparent in Profile A and the north end of Profile B, where it extends 30-40 cm upward from the black stratum to the approximate beginning of the grayish stratum. Level notes describe the dark band as composed of 'burned organic matter.' While this linear feature may be composed of organic matter, some doubt exists as to its carbonized nature. Long-term pedogenic processes as well as rapid combustion can result in the carbonization of organic material. This issue will be discussed later in this section. Directly overlying both the gray and black layers is a roughly 50-150 cm thick accumulation of loose to moderately compacted orange, yellow and brown silts (the contemporary B horizon), with sparse charcoal and ash lenses. This layer is concave in profile, as though overlying an existing depression. Directly overlying the B horizon is the humus (A horizon), a moderate to loosely compacted dark brown, silty loam varying from 5-30 cm thick. This basic stratigraphy is consistent between Profiles A and B.

For organizational purposes, the above described sequence of sediments was divided into six discrete strata. Stratum 1, the A horizon (humus), was excavated as a discrete horizon. Stratum 2, the B horizon, is divided into three pedologically based sub-divisions -- 2.1, 2.2 and 2.3. Stratum 2.1 represents the Bfl horizon - a dark reddish brown sediment. Stratum 2.2 represents mixed reddish brown, dark brown and yellow brown sediments. Stratum 2.3 is a grayish yellow to grayish brown sediment bearing cultural material, and represents transitional B and C horizons. Within Stratum 2, artifacts were given specific 2.1 or 2.3 provenience whenever possible. Artifacts lacking a definite provenience within Stratum 2 were otherwise classified as general Stratum 2.2. Stratum 3, in reality a portion of the B horizon, was defined as an arbitrary level comprising the approximately 10 cm thick deposit of yellowish brown to brown sediment capping the black layer. Stratum 4 represents the top 10 cm (or portion thereof) of the organic, blackish and orange and black mottled sediment. The orange and black mottled sediment appears mainly on the surface margins of Stratum 4. Stratum 5 represents the subsequent 10 cm (or portion thereof) of the blackish sediment. Importantly, the black sediment comprising Strata 4 and 5, the only layer in this profile, was isolated and excavated separately from the surrounding horizon sediments. This layer was sub-divided into arbitrary 10 cm levels where its thickness allowed. This excavation method allowed cultural material within the black sediment to be consistently and accurately associated with either Stratum 4 or 5. Stratum 6 is the basal C horizon -- a sterile, grayish sediment. A number of initial interpretations can be based on this stratigraphic analysis.

First, Strata 4 and 5, the black layer, has the characteristics of an occupation surface or floor:

- it is level in cross-section
- it is distinctly confined both vertically (10-15 cm thick) and horizontally (6-8 m in profile) by sediment of a different nature (color, texture, composition, compaction)
- its horizontal limits are outlined by a dark, linear band of either carbonized or decayed organic material
- at least one feature, a fire-cracked and thermally altered rock-filled pit indicative of a hearth, is associated with its surface

Second, these strata are inset, as though excavated, into Stratum 6 -- the grayish sandy sub-strate. The linear black band which outlines Stratum 4 establishes the association between the surface of Stratum 4 and the approximate surface of the surrounding gray sediments, 30-40 cm higher. Inward slumping of the stepped outline appears to have occurred at the east edge of Stratum 4 as is seen in Profile A, Unit 20.

Third, the black layer (Strata 4 and 5) is capped and further defined by a patchy lens of oxidized, orange-red sediment and charcoal. The composition of this lens resembles the ef fects of burning of this surface, but is also typical of ferro-humic podzols which predominate in the site vicinity. The dark band surrounding this layer appears to represent wood which either burned or decayed and blackened through natural pedogenic processes. There is insufficient usable data to determine conclusively the formation process(es), either pedogenic or combustive, of the oxidation and blackening of the lens capping-

Stratum 4 and the dark-stained band.

Fourth, the black layer is overlain by sediments which lack other identifiable unconformities. Analyzing vertical artifact distributions within this stratigraphic sequence adds insight to these four initial interpretations.

Artifact Distribution - Cumulative

Below, I present the results of the analyses of cumulative frequencies of artifacts from excavation units associated with Profiles A and B. Artifact frequencies in the cumulative analysis are presented by separate tool and debitage classes. Tool and debitage frequencies are presented both by layer and depth below datum. Depth below datum, though an arbitrary measurement, is initially used as a means of analyzing the correlation of artifact frequencies to potential floor or occupation layers, focusing primarily on Strata 4 and 5.

Distributions of debitage and tool frequencies by layer are presented in Figures 10:10 and 10:11, respectively. This analysis shows a pronounced bimodal distribution pattern which is identical in both graphs. Extremely distinct peaks in artifact frequencies are associated with Stratum 2.2 and Stratum 4. Debitage frequencies (per stratum) peak in Stratum 2.2 (n=1225) and Stratum 4 (n=740), respectively. In contrast, Stratum 3 -- with the next highest frequency -- contains only 224 pieces of debitage. The marked difference between peak (Strata 2.2 and 4) and non-peak (Strata 1, 2.1, 2.3, 3, 5 and 6) frequencies is readily apparent. Likewise, tool frequencies (per stratum) also peak in Stratum 2.2 (n=217) and Stratum 4 (n=191). A marked difference again separates tool peak (Strata 2.2 and 4) and non peak (Strata 1, 2.1, 2.3, 3, 5 and 6) frequencies, with the next highest tool frequency -- in Stratum 2.1 -- being only 52.

Superficial analysis of the bimodal pattern in these graphs suggests two major cultural occupations of the site, associated with Stratum 2.2 and Stratum 4 -- the consolidated B horizon and the primary portion of the black layer, respectively. This pattern raises questions about vertical distributions of both artifacts and strata. Over what vertical range are the peaks associated with Strata 2.2 and 4 spread? Are the artifacts within these layers vertically clustered? Are these peaks the result of genuine vertical artifact clustering or simply differential numbers of excavation levels per layer?

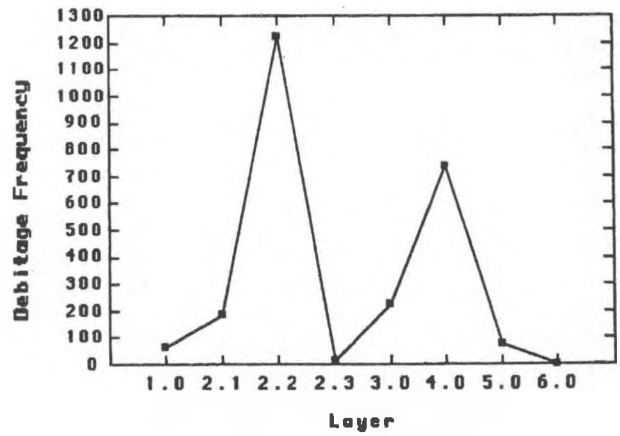


Figure 10:10. **Frequency of Debitage from Profile Units by Layer.**

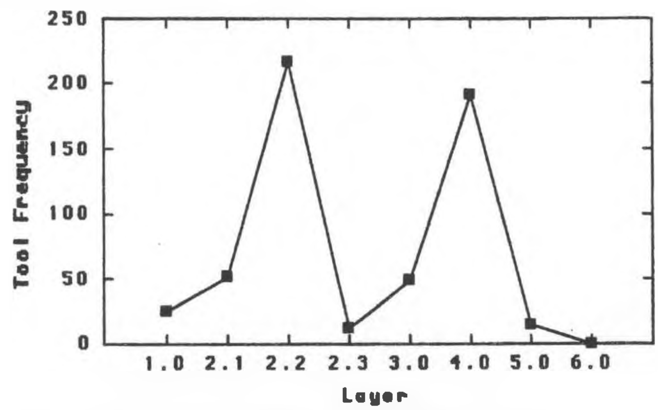


Figure 10:11. **Frequency of Tools from Profile Units by Layer.**

Graphs of cumulative artifact frequencies and relative proportions of associated layers by depth below datum (in centimeters) are presented in Figures 10:12 a, b (debitage frequency/layer proportions) and Figures 10:13 a, b (tool frequency/layer proportions). Artifact frequencies are plotted at 10 cm intervals for central proveniences starting at 5 cm BD. Patterns similar to those identified above are apparent in these two sets of graphs.

Considering the graphs of tool and debitage frequencies by cm BD (Figures 10:12a and 10:13a), the previously identified bimodal pattern is smoothed out to form a single prominent peak, with a weaker secondary peak

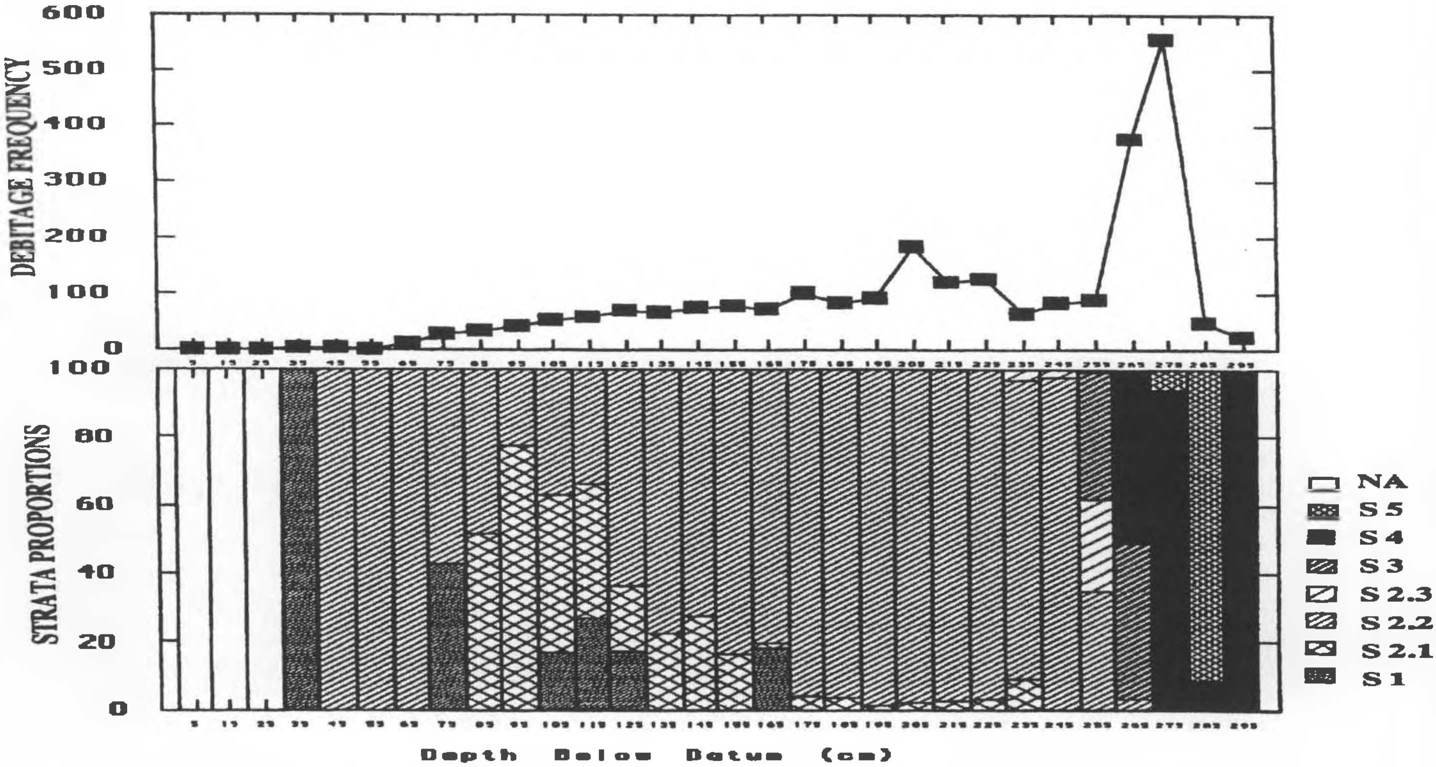


Figure 10:12 a, (upper), **Frequency of Debitage from Profile Units by Depth below Datum (cm).** ***b, (lower),*** **Strata Proportions by Depth below Datum (cm) as extrapolated from Profile Unit Debitage Frequencies.**

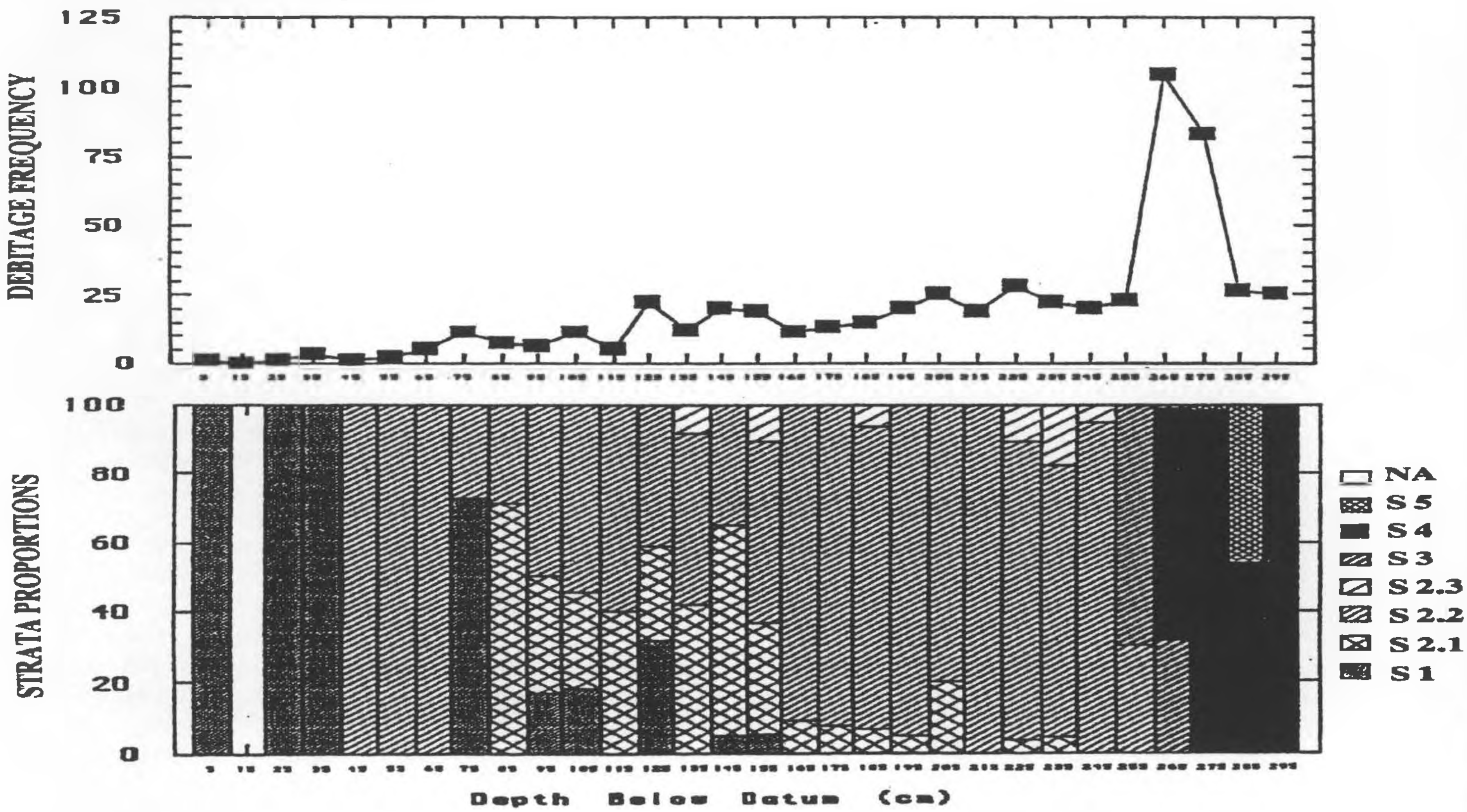


Figure 10:13 a, (upper), **Frequency of Tools from Profile Units by Depth below Datum (cm).** ***b, (lower),*** **Strata Proportions by Depth below Datum (cm) as extrapolated from Profile Unit Debitage Frequencies.**

noticeable in debitage distribution in Figure 10:12a. Between 265-275 cm BD, tool frequency peaks at 104 compared to the next highest value of 28, and debitage frequency peaks at 553. The next highest debitage frequency is 183 at 205 cm BD - forming a weak second peak. Aside from the individual pronounced peaks in each of these graphs, artifact frequencies are generally low with regular distributions.

Figures 10:12b and 10:13b present the 'relative proportions' of strata by depth below datum (in centimeters). These figures are derived from the cumulative percentages of artifacts within each stratum, per 10 cm level below datum. When paired with Figures 10:12a and 10:13a, he association between the vertical range of both artifacts and strata can be observed. As before, strata are provided central depth proveniences beginning at 5 cm BD. Figures 10:12b and 10:13b show very similar vertical distribution patterns per layer .Of interest are the distributions of Stratum 2.2 and Stratum 4, previously representing artifact frequency peaks. Significantly, Stratum 2.2 is vertically dispersed over a range of approximately 2.1 m between 145-255 cm BD, while the comparable verticalange of Stratum 4 is generally limited to the 20 cm between 260 and 280 cm BD. The additional range of Stratum 4 between 280-300 cm BD is associated with the rock-filled pit feature which intrudes into the sub-strate below 270 cmBD. Below 280 cmBD, artifact frequencies are insignificant. The pattern of primary interest is the peak in vertical artifact frequency associated with Stratum 4, and quickly diminishing distribution thereafter.

In relation to questions posed above, the data presented in Figures 10:12 and 10:13 indicate vertical clustering of artifacts between depths of 260 cm BD and 280 cm BD. Stratum 4 is predominantly concentrated within this vertical range. This range is consistent with the depth rf the Stratum 4 in Profiles A and B. Stratum 2.2, alternately, is dispersed over a vertical range of more than 200 cm. A weak debitage frequency peak remains identifiable within Stratum 2.2. Thus, the only pronounced artifact cluster exists in association with Stratum 4.

While a strong association of cultural material with Stratum 4 is indicated, the possibility of a second, overlying, cultural occupation cannot yet be dismissed. Graphs of cumulative vertical artifact frequencies by depth below an arbitrary datum only reflect artifact concentrations on level surfaces. Curvilinear artifact clusters associated with a concave ground surface or stratum, as at the Maurer site, would not be readily apparent in such graphs. Even so, weak indications of a second debitage distribution peak are noticeable. The effect of the curved surface is noticeable in the 'floating' 5 cm BD level in Figure 12b. This illusion is simply the result of the vertical rise between upper levels of units in markedly sloped sections of the profile. To compensate for this analytic drawback and investigate the possibility of a second cultural occupation, vertical artifact distributions are presented for each of the sampled units on Profiles A and B.

Artifact Distribution - Unit Specific

Figures 10:14 a, b (debitage) and Figures 10:15 a, b (tools) present artifact frequency profiles for the sampled units along Profiles A and B. Artifact frequency profiles were plotted to scale and overlain on stratigraphic Profiles A and B. It should be noted that sub-lettered figures correlate with profile designation, that is, Figures 10:14'a' and 10:15'a' correlate with Profile 'A,' while Figures 10:14'b' and 10:15'b' correlate with Profile 'B'. To permit horizontal continuity between graphs, artifact frequencies are plotted by depth below datum (in centimeters).

Four observations characterize the relationship between artifact and stratigraphic profiles,. and are best exemplified by the debitage profiles (Figures 10:14 a, b), summarized as follows:

• two distinct modes, manifest as either bimodes or individual upper or lower modes, are apparent in the artifact distribution profiles
• lower modes represent pronounced frequency peaks consistently associated with and limited to Strata 4 and 5
• comparatively less pronounced upper modes exist consistently within a limited vertical range between about 50-70 cm BS, creating a concave, crescent shaped band across both profiles
• upper mode frequencies increase west to east and are generally consistent north-south
• the transition to the lower, Strata 4 and 5-associated mode is typically abrupt - defining the separation between Strata 3 and 4

These four observations comprise basic patterns expected of a continuous, crescent shaped band of artifacts indirectly overlying a level, horizontally limited band of artifacts. Reproducing the bimodal pattern first described in Figure 10:10, these discrete bands suggest that two major cultural occupations are present within the area of the purported structural feature. The lower cultural band is positively associated with Strata 4 and 5 and contains high frequencies of both tools and debitage -- strongly suggesting a true floor or occupation surface assemblage. The upper cultural band is associated with a concave surface and contains far fewerrtifacts than its lower counterpart -- suggesting debris from a younger, less intensive occupation. The artifact cluster on that higher concave surface should also be identifiable through analysis of artifacts by depth below surface. Figure 10:16 represents cumulative debitage frequencies by depth below surface (cmBS). A distinct debitage cluster is identifiable between 55-75 cmBS, matching the profile pattern. These data support the presence of a second cultural component in the area of the Maurer feature. The vertical distance separating these two assemblages, and the abrupt artifact frequency transition, is suggestive of unmixed cultural components. However, while the majority of this evidence indicates discrete cultural components, two anomalous observations must be addressed.

Contrary to the bi-modal pattern with the abrupt transition, described above, the debitage profiles of Units 58 and 20 (Figure 10:14a) respectively depict a gradual downward transition to the 'lower' mode distribution, and an overall tri-modal distribution pattern. Interestingly, these anomalies occur at the lateral limits of the black layer. The gradually increasing artifact debitage frequency approaching Stratum 4, displayed in Unit 58, represents slumpage of debris from the adjoining ground surface -- approximately 40 cm higher. A similar explanation may be applied to the tri-modal pattern in Unit 20. The peak of the third mode is coincident with the level of the proposed bench, and tapers off downward toward Stratum 4. This pattern is, again, indicative of the accumulation of slumped debris at the edge of the recessed occupation surface. The following facts substantiate this explanation:

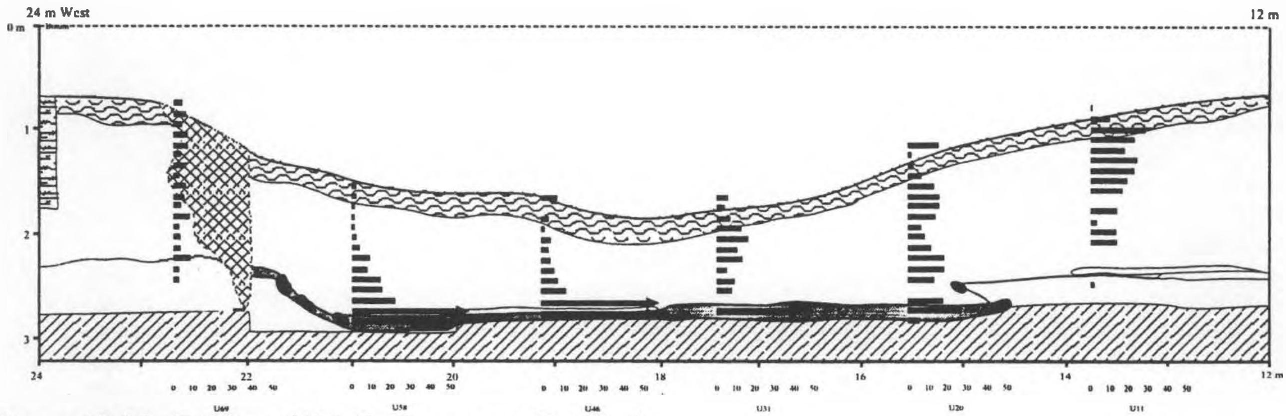


Figure 10:14a. **Debitage Distribution across Profile A.**

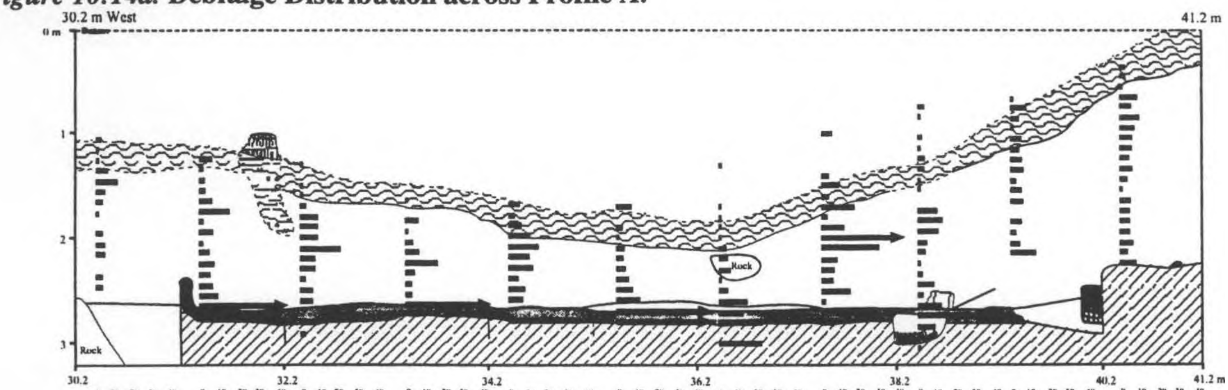


Figure 10:14b. **Debitage Distribution across Profile B.**

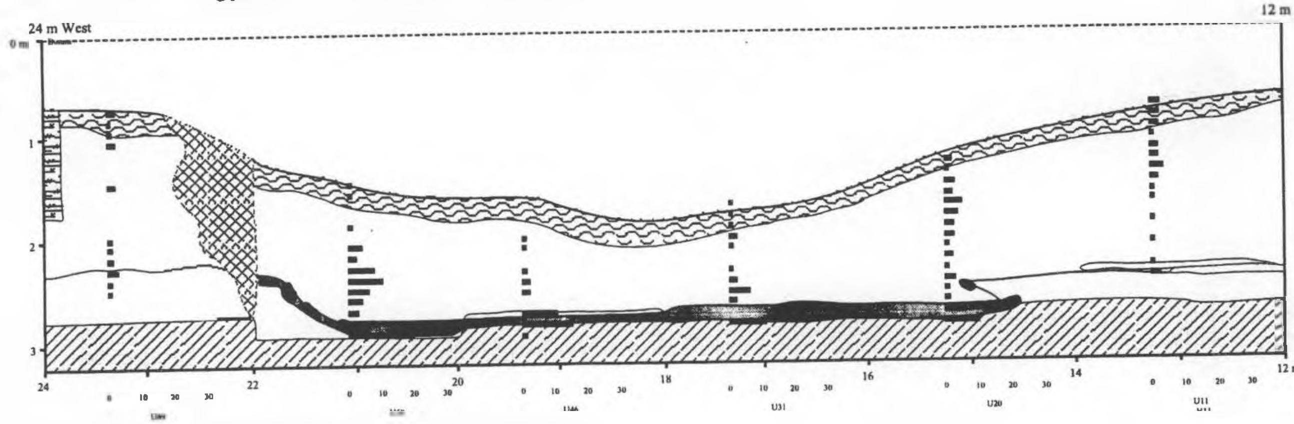


Figure 10:15a. **Tool Distribution across Profile A.**

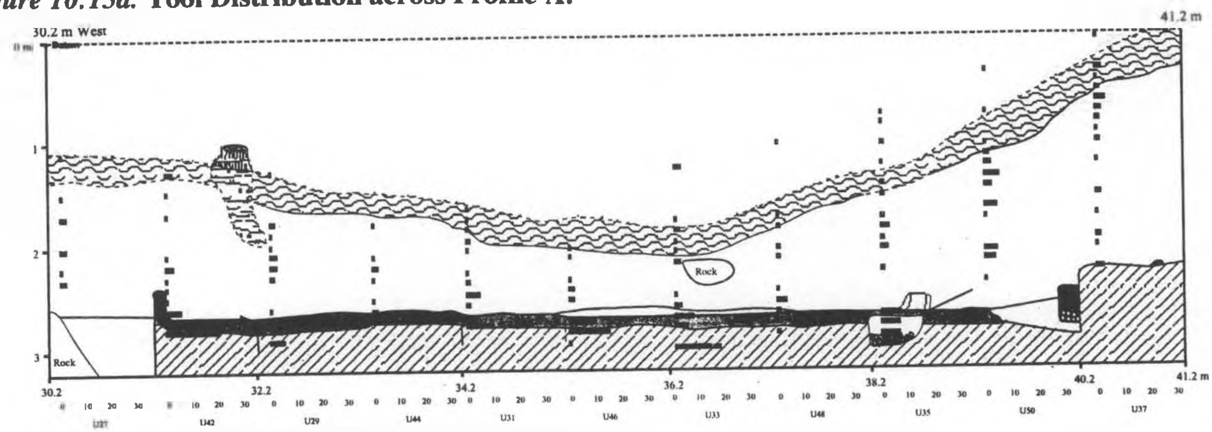


Figure 10:15b. **Tool Distribution across Profile B.**

- the apparent inward slumping of the dark stained band (possible wall remains) associated with the edge of the black layer (occupation surface or floor)
- the vague extension of the lens capping the mixed yellow-brown-gray sediments(Stratum 2.3) -- into which the floor appears to have been dug -- towards the inwardly sloping dark stained band (see Figures 10:14 and 10:15)

While sidewall slumping is generally expected to occur during post-abandonment erosion of structures with recessed floors, artifact frequencies and stratigraphic data coincident with Profile A indicate limited effects of this sort in the present case. While slightly higher debitage frequencies typify Stratum 3 deposits in Units 58 and 20, upper and lower assemblage mixing due to slumping is considered to be insignificant. Strata 3 (10 cm above occupation surface/floor) and 4 (occupation surface/floor) remain separable by the following:

- an abrupt stratigraphic transition
- significant differences in debitage frequencies, as evident in Unit 58
- significant differences in tool frequencies, as evident in both Units 58 and 20

Thus, contamination of the occupation surface/floor (Strata 4 and 5) with cultural material from the slumped ground surface does not appear to be a real detriment to the integrity of the Strata 4 and 5 assemblage. Additionally, no stratigraphic evidence of significant sidewall slumping is apparent in Profile B.

Sub-Occupation Surface/Floor Component

Given identifiable occupation surface/floor and overlying cultural components, the possibility of an earlier sub-floor cultural component must also be investigated. Whether or not the recessed occupation surface/floor intrudes into material from an earlier cultural occupation is an important consideration with potential taphonomic implications. Constraints on this aspect of the investigation are imposed by the variable depths of the excavated units and the fact that a definite sterile, natural basal deposit was not located by deep test excavations throughout the entirety of the feature area. Considering units along Profiles A and B, only Unit 27 (Profile B) depicts the sediment and cultural material below the exposed floor. Excavation of all the other analyzed units along the profiles stopped at the base of Stratum 5 or before reaching Stratum 4 .

Unit 27, located at the northern edge of the occupation surface/floor, provides a profile to a depth of 320 cm BD -- approximately 40 cm below the base of Stratum 5 (approximately 280 cmBD). According to the level notes for Unit 27, sediment is "yellow-brown [with] some dark brown blotches " between 240-250 cmBD and contains only three flakes (debitage). Levels below 250 cm BD are apparently sterile. At 260 cm BD, bedrock was exposed in a portion of the unit. Between 260 cm BD and the bottom of the unit at 320 cm BD, sediments graded from yellowish brown to gray and were mottled with iron-oxide staining. Though not excavated below Strata 4 and 5, the level notes for Units 42, 29, and 31 (Profile B) indicate that excavation of Strata 4 and 5 deposits ceased at the transition to a yellowish gray and/or gray substrate lacking the charcoal and mottled orange and black coloration of the occupation surface/floor. Three additional units, 69, 20 and 50 (Profiles A and B), adjoining the occupation surface/floor layer were excavated to depths minimally equivalent to the base of Stratum 5. Culturally sterile, yellowish gray or brownish gray sandy sediment predominated in these units at depths equivalent to or slightly below the base of Stratum 5.

Units 13 and 34, not covered by the profiles (see Figure 10:5), were excavated to minimal depths of 300 cm BD, or at least 20 cm below Stratum 5. Unit 34, located within the horizontal limits of the floor, contained only culturally sterile, loosely compacted gray sand between 280 cm BD and the unit bottom at 300 cm BD, except for a Stratum 4 associated pit feature. Unit 13, located adjacent to the floor but within the bench area (see Figure 10:5), contained only yellowish gray sediment between 235 cm BD and the unit bottom at 313 cmBD. Only three flakes (debitage) were found between 235-290 cm BD, No archaeological material was identified below 290 cm BD. A gray lens capping the yellowish gray sediment at 235 cm BD is the last substantial artifact-bearing facies in this unit.

The sediments into which Strata 4 and 5 intrude appear to be devoid of cultural material. The floor deposit is described as being contained within a gray sandy sediment, a portion of which directly overlays bedrock. The description of this sediment matches the natural C horizon discussed earlier. Basal cultural deposits are generally coincident with the B-C horizon transition between roughly 235-240 cmBD. The floor layer appears to be intrusive into the archaeologically sterile C horizon. While a sub-occupation surface/floor cultural component cannot positively be ruled out, there is no evidence in the existing data set to suggest that:

- a cultural component was present within the sediment into which Strata 4 and 5 intrude
- an earlier, underlying cultural deposit exists below Stratum 5

Thus, mixture of artifacts from previous cultural occupation(s) and the Strata 4 and 5 deposit does not appear to be a taphonomic factor affecting the Maurer feature.

Interpretive Summary - Profiles A and B

Analysis of stratigraphy and artifact frequencies along Profiles A and B provides only a portion of the data required in testing the 'structural' assertion presented in this section. From the above analysis, evidence was presented that supports a number of preliminary conclusions:

- two major cultural components are present in the area of the Maurer feature
- the lower cultural component is directly associated with an anomalous (that is, unnatural) stratigraphic layer ('Strata 4 and 5')
- the anomalous layer represents an occupation surface or structural floor
- the occupation surface/floor is recessed 30-40 cm below what is either a surrounding bench feature or the associated ground surface
- the black, linear band at the lateral margins of the occupation/floor surface represent the remains (decayed or carbonized) of a wooden retaining wall which extends vertically to the surrounding bench/associated ground surface
- the fire-cracked and thermally altered rock-filled pit directly associated with Stratum 4 represents a hearth feature
- the occupation surface/floor has been oxidized -- resultant from either burning or natural pedogenic processes -- as indicated by sediment oxidation and charcoal mottling across its surface, and blackened organic remains at its lateral margins
- only one occupation surface/floor zone is identifiable in the stratigraphic profile

These conclusions indicate only the presence of a subterranean floor or occupation surface. Little evidence of structural elements associated with this occupation surface/floor can be identified in Profiles A and B, except a hearth and remnants of a retaining wall. While there does appear to be an exterior surface with which the occupation surface/floor is associated, it remains unclear whether this is the prehistoric ground surface or the structural bench feature reported by LeClair (1976:35). Additional data are required to clarify these ambiguities. To address such issues, the following section presents additional data from the plan diagrams of the excavated feature. For simplicity, Strata 4 and 5, the occupation surface/floor zone, will be referred to as an 'occupation surface' in the following sections.

Plan Diagram Analysis

Plan view depictions of the Maurer feature are available from three main sources:

- field photographs of the exposed occupation surface and surrounding bench
- plan drawings from the 1973 excavation
- plan view reconstructions produced for the present study

Detailed photographs of several features and a number of original plan drawings accompany the 1973 excavation documents. The feature plans are somewhat variable and appear to represent different stages of analysis, from preliminary to finalized versions. Post-hole patterning is particularly variable between these plans, diminishing from 58 to 24 post-holes between preliminary and finalized plan versions. None of these counts match the "25 post-moulds" in LeClair's published description (1976:35). In the following section, LeClair's finalized plan will be presented and compared with a reconstructed plan drawing based on information from excavation unit notes and photographic evidence. A reliable plan is developed from this comparison. Lastly, structural elements observable in this array of evidence are investigated.

LeClair's finalized plan diagram of the exposed feature (see Figure 10:17) closely matches his description of the structure (1976). Evidence is provided for a recessed, central occupation surface associated with an elongated hearth, a surrounding bench, a number of post-holes and an entrance in the east wall. While this plan accounts for all the basic elements of LeClair's rectangular structure, the observed post-hole pattern is inconsistent with his description. Post-hole patterning is difficult to discern -- two types of post-holes (angled and vertical) are present, post-hole diameters are variable and evidence of aligned patterning is generally lacking. The association between post-holes and other structural elements is less obvious than was originally reported. The variation in the depicted post-hole pattern (Figure 10:17) increases substantially when post-holes from all three of LeClair's plan drawings are cumulatively considered.

Floor and bench representations are generally consistent between all three versions of the plan. With a total of 58 post-holes, the pattern observed in Figure 10:17 becomes more complex and somewhat less apparent. Twenty-three small posts (possibly stakes) only indicated on what appears to be the most preliminary of the three plans, precisely surround the bench, about a meter from the edge of the recessed occupation surface. Thirty-five larger, vertical and angled post-holes are distributed as depicted in Figure 10:17. "Rock" clusters are distributed across the bench, which is variably described as having "slight" to "no" charcoal associated with it (LeClair, plan drawing notes, 1974). Importantly, depths below datum are provided for the tops of most of the post-holes, a number of points on the bench surface, a number of points on the recessed occupation surface and the vertical extent of the hearth. Bench (230-240 cm BD) and occupation surface depths (260-280 cm BD) are consistent with Profile A and B measurements.

Post-hole (top) depths were evaluated to establish their vertical association with either the occupation surface or the bench. Post-holes with depths less than 220 cm BD were considered to lack association with either the occupation surface or bench. All the angled post-holes, ranging in depth between 120-180 cm BD, are associated with the upper rather than the lower cultural component previously identified. The arrangement of the angled posts is reminiscent of A-frame, pole-constructed, fish drying racks ethnographically documented in the upper Fraser River valley and Fraser Canyon. Their presence suggests that such a structure(s) may have been constructed in association with the upper cultural occupation. Thus, the angled post-holes cannot be considered elements of the feature under investigation and are, thus, not included in the revised feature plan.

Plan Reliability

A reconstruction of the feature plan (see Figure 10:18) was prepared to provide a basis for assessing the reliability of the LeClair's original structural plans. This reconstruction was based on available forms of information, including excavation unit notes, photographs and artifact catalogue entries. Similar to the profile reliability tests, degrees of similarity and dissimilarity are discernible between original and reconstructed diagrams. Differences (that is, irreproducible elements of LeClair's plans) are summarized as follows:

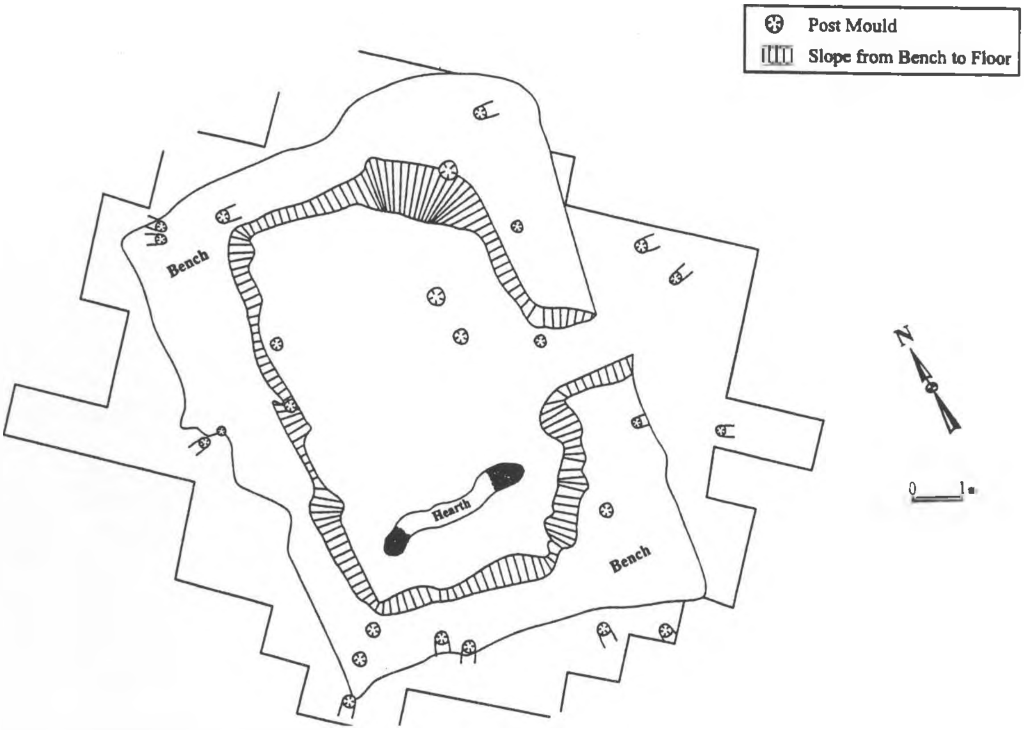


Figure 10:17. **Original Finalized Feature Plan**

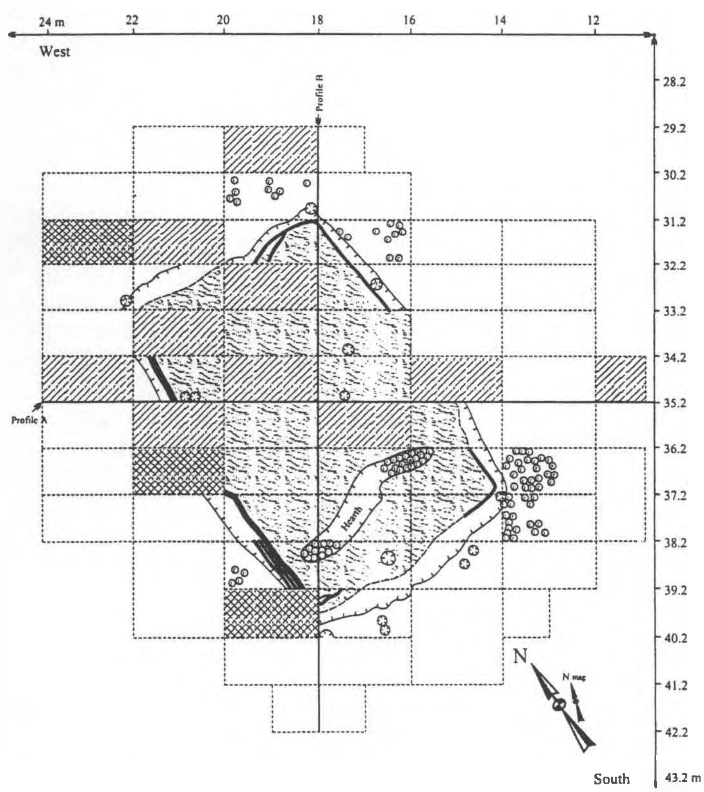
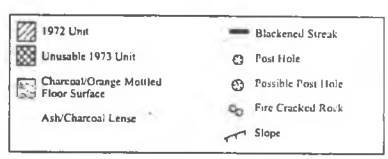


Figure 10:18. **Reconstructed Feature Plan.**



• none of the 23 small post-holes outlining the bench in the original plan(s) were reproducible
• the hearth feature differs slightly in position between the two diagrams
• definite evidence for a structural entrance is lacking
• the reconstructed occupation surface shape is more regular and complete than in LeClair's plans

Similarities (that is, reconstructible elements of LeClair's plans) include:

• a generally rectangular shape of the occupation surface
• depth of the recessed occupation surface
• dark, organic streaks defining the margins of the occupation surface
• notation of the vertical position of the dark perimeter streaks between the occupation surface and the bench surface approximately 30 cm higher
• fire-cracked and thermally altered rock (FCR) distributed over the bench surface
• thin ash and/or charcoal lenses distributed over portions of the bench surface, particularly the south end
• the position of some post-holes around the rim of the occupation surface depression

In the following section, I present reproducible plan elements in a reliable feature plan diagram.

Reliable Plan Interpretation

The reconstructed plan depicted in Figure 10:18, based on reproducible elements, is considered to represent a reliable feature plan diagram and will be referenced as such in the following text. Positions of the hearth and the post-holes in the northwest corner and center of the floor, as depicted, are observable in photographs taken of the exposed feature (see Figure 10:19; Section II). The reliable plan differs from LeClair's plans in two significant ways:

• post-holes in the reliable plan surround only the recessed floor (that is, they do not encompass a 'bench')
• in the reliable plan, the 'bench' lacks peripheral definition and is primarily associated with fire-cracked and thermally altered rock debris (as became apparent through inventorying the bench level material)

These differences are significant for two reasons:

• the occupation surface appears to have been enclosed by a wall constructed around the immediate margin of the depression rim, as indicated by the identified post-hole locations
• the' bench' may alternatively be interpreted as the original ground surface outside the wall, upon which refuse (e.g., hearth contents such as fire-cracked and thermally altered rock, ash and charcoal, debitage, etc.) accumulated

This midden should have a sharply defined 'inside' margin where it accumulated against and abutted the proposed wall. The 'outside' margin of the midden deposit, where it was not retained by the wall, should be less well defined and have a more diffuse edge than the 'inside' margin. This basic pattern is identifiable in the reliable plan.

A second argument against the existence of a discrete sub-structural bench feature is based on the distribution of proposed super-structural remnants. If the bench were contained within a walled structure, as implied by LeClair, evidence of the remains of the encompassing super-structure, whether subject to rapid combustion or slow pedogenic decomposition/carbonization, should be apparent on portions of the occupation surface and bench surface. However, such evidence is not apparent on the bench surface. Oxidized, carbon and ash mottled sediments on the bench surface are minimal and appear only as sporadic lenses, apart from the wall edge. The occupation surface, alternately, is moderately to heavily carbon mottled and consistently oxidized. No identifiable features, such as post-holes, indicate the inclusion of this 'bench' surface within the super-structure. Therefore, the presumed bench does not appear to have been contained within the super-structure. More explicitly, the 'bench' is not considered to be a part of the sub-structure but represents, rather, the original ground surface into which the occupation surface was excavated and on the lip of which the super-structure was constructed. Midden development accounts for the cultural material located on this ground surface, outside of and surrounding the recessed feature.

r It is now possible to present reliable evidence verifying portions of the sub-structure, sub-structural features and super-structure. Primarily, the sub-structure consists of a floor layer. This layer was previously identified as an 'occupation surface.' Now provided definite association with the feature's super-structural elements, I present this 'surface' as a sub-structural floor feature. The floor, as described in plan view, is:

• subterranean –excavated 30-40 cm below the original ground surface

***Figure 10:19.* The exposed Feature - oblique View from the SW Corner. (Photo: LeClair).**

- rectangular – 7.5 m long by 5.0 m wide
- oriented N-S

The floor surface, which is relatively level (slopes slightly to the NW), is generally oxidized with an apparent carbon mottled matrix. Floor surface depths range from 259-275 cm BD. The margin of the floor is partially defined by 5-8 cm wide linear streaks (described as "burnt timber(s)" - Unit 58, 270-280 cm BD Level Notes). These linear streaks are similar to the description of the edges of wooden planks and plank outlines documented at the Ozette (Mauger 1978:183-185) and Scowlitz sites (Sandra Morrison, pers. com. 1997).

Such streaks extend vertically from the floor to the ancient ground surface some 30-40 cm above the floor surface. From this description, it appears that horizontal planks were laid on-edge to form a subterranean retaining wall at the perimeter of the recessed floor. Though incomplete, the implied plank remnants conform with the edge of the floor matrix and form a regular, rectangular outline. Additionally, evidence is shown by the small post-holes in Unit 58, and possibly in Unit 29, for stakes abutting the retaining wall. These stakes would have provided necessary vertical support to this retaining wall, keeping it from collapsing inward onto the floor.

According to analyses of local pollen spectra, western red cedar (*Thuja plicata*), became established in the upper Fraser River valley region nearly 6000 years ago [6820 cal BP] (Hebda 1966:64; Mathewes 1973:2100). By the period represented by the earliest date reported for the Maurer site, western red cedar would have been available as a usable resource. It is, therefore, possible that the outlines are the decomposed or carbonized remnants of cedar planks.

Carbonization of wood due to exposure to fire is one explanation for the preservation of the plank remnants as linear streaks of blackened organic matter. Apparent plank remnants are minimal in the south end of the house, nearest the hearth where exposed wood may have been a fire-hazard. If the hearth were the source of an accidental fire, wooden material nearest the hearth may have been more completely burned than that farther away. Earthen insulation of the plank retaining wall may have acted as a fire retardant, preventing complete consumption of the wood and stabilizing the charred remnants. Uninsulated wooden walls, stakes and posts may either have burned completely or been partially burned and scavenged as fire-wood, charcoal or still usable construction material, potentially accounting for their absence. Charcoal flecks and orange oxidized sediments within the floor matrix, particularly at the surface, provide supportive evidence of a burning event within the presumed structure.

Alternately, the preservation of the apparent plank remnants may be due to *in situ* pedogenic processes. As previously noted, slow decay of wood in acid rich sediment can resemble the effects of rapid combustion and result in the blackening of such remnants. Sediment oxidation through long-term soil-forming processes can also simulate the appearance of burned sediments. Whether through combustion or pedogenic decay, portions of the wooden sub-structure were preserved as remnant, black linear streaks and an orange oxidized and charcoal flecked floor surface. Insufficient data are present to definitively determine which process affected these organic remains.

Sub-structural features include a hearth and a number of post-holes and stakes. The hearth, excavated into the southern end of the floor (see Profile B), is approximately 3.5 m long by 0.3 to 0.4 m wide and 0.3 m deep. Charcoal and thermally altered rock are located at both ends of the hearth and charcoal impregnated fill lines the feature between these clusters. Additionally, four probable post-holes, (see Appendix II for post hole diameters) are located in the northern half of the floor.

Super-structural features include seven post-holes located around the rim of the floor depression. These include four large posts, one located at each of the floor pit corners, and three smaller diameter posts or stakes, situated in a line between the SE and SW corners. The larger post holes range between 20-26 cm in diameter, averaging 24 cm in diameter. All seven of the post / stake hole features are associated with the ancient ground surface between 230-240 cmBD. There is no indication of the type of wall or roof material supported by these posts. Super-structural wall and roof materials appear to have completely deteriorated.

Structural Taphonomy Reconsidered

Patterns in the stratigraphy and vertical distributions of artifacts presented above provide a basis from which to identify taphonomic agents which have affected the Maurer feature. A number of the factors, per the taphonomy list presented earlier, can be addressed. Summary assessments of these factors are presented below.

A subterranean floor, excavated 30-40 cm into the surrounding ground surface is the dominant representation of a structure at this site. Available data suggest this floor was excavated into a sterile substrate. If underlying cultural deposits are present, they are located below the basal level of the floor and floor features. Mixing of artifacts from an earlier cultural component with the floor assemblage does not appear to have occurred. Collapse of the structure appears to have occurred rapidly, as indicated by a lack of siltation between the floor matrix and any overlying decomposed or carbonized structural remnants. Resultant deposition of artifacts from a possible roof assemblage onto the floor surface does not appear to be a factor due to the rather abrupt transition in artifact frequencies between Stratum 4 (the upper floor zone) and the immediately overlying 10 cm, Stratum 3. Limited slumpage of the floor depression sidewalls is apparent. However, structural collapse appears to have preceded post-abandonment slumping. The transition between the charcoal and oxidized sediment capped floor and the overlaying slumpage around the edge of the floor is abrupt and easily identifiable in the stratigraphic profiles. Noticeable effects from slumping are limited to a slight obscuring of the floor perimeter.

Slow, natural size-sorted filtering of artifacts onto the floor has not yet been addressed in this study. In an attempt to identify natural sorting, I analyzed the relative proportions of different sized artifacts by depth below surface (DBS). Figure 10:20 presents the relative proportions of size-graded debitage by DBS based on cumulative debitage frequencies from the sampled profile units. Debitage size grades correspond with Ahler's mass analysis technique (1986) and are the result of sorting by 1", 1/2" and 1/4" screens. If size-sorting is a factor affecting the vertical distribution of artifacts within the Maurer feature, an inverse correlation in the proportions of small and large debitage, increasing by depth, should be evident. This pattern should be most clearly represented in the G2 and G3 debitage proportions, given their similar frequencies (G1 = 178, G2 = 1,255, G3 = 1,066). Analysis of the data plotted on Figure 10:20 shows no such correlation between any of the debitage size grades. Proportional fluctuations occur throughout the vertical extent of the profiled area. Natural size-sorting appears not to have affected the integrity of this portion of the site.

In relation to episodes of abandonment and reoccupation, profile analysis indicates the presence of a vertically undifferentiated floor layer between 10 and 15 cm thick. While the depth of the accumulated floor deposit indicates use of the floor over an extended period of time, specific occupation episodes are not definable. Occupation of this floor surface appears to have continued without identifiable floor reconstruction. Floor features are all associated with the floor surface, indicating continual structural maintenance and repair during the course of the structure's occupation. In relation to the super-structure, post-holes are relatively few in number, indicating relatively static structural supports which either lasted the lifetime of the structure or were repaired and/or replaced using the same post-hole locations. While the floor appears to have been either continuously or periodically occupied, there is no available evidence to indicate significant reconstruction of either the sub-structure or super-structure.

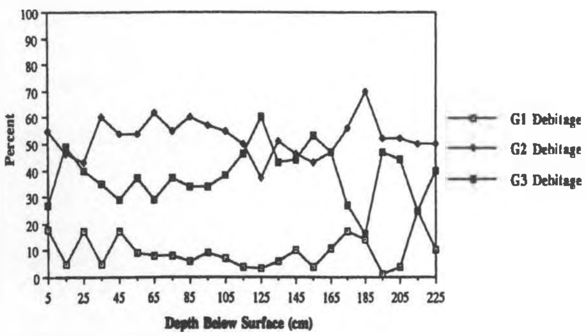


***Figure 10:20.* Proportion of Size-graded Debitage by Depth below Surface (cm).**

Final abandonment of this structure appears to have been coincident with the apparent collapse of its super-structure, possibly due to partial or complete burning. Overlying sediments are comprised of silt deposits with low frequencies of artifacts. The profile of these deposits indicate that they accumulated on a concave surface, formed by the slumping depression. Approximately 30 to 60 cm above the floor, an accumulation of cultural material from a second cultural occupation accounts for roughly 50 to 60 cm of continuous deposition of cultural matrial. Angled post-holes originating within the vertical range of this deposit suggest light-framed structure(s) -- possibly A-frame racks -- associated with this younger cultural component. Approximately 15 cm of insubstantial cultural deposits accumulated above the second component, representing the deposits exposed on the contemporary ground surface.

Evidence of post-contact use of the site is provided by green glass shards and machine-cut, wire nails, restricted to Stratum 1. Additional recent surface remains are identifiable in photographs of the Maurer site taken at the beginning of the 1973 excavation. As mentioned previously, a wooden bin and a post (depicted in the original Profile A) were located at the edge of the depression. Evidence of significant recent disturbance of the site is limited to the 10 excavation units dug in 1972. Seven of these excavation units directly impacted structural elements under investigation.

Tree roots and other bioturbation agents are additional factors to be considered in this study. Visible tree root disturbances are depicted in a number of reconstructed unit profiles, though not in Profiles A or B. Moreover, these either did not reach the floor zone, or were no longer visible at the time of excavation. LeClair's Profile A provides possible evidence of rodent burrow disturbance within Unit 46. This apparent burrow extends from the upper portion of the site deposit to the floor at approximately 35.2 m South and 19 m West. Thus, artifacts may have been displaced by rodent burrowing and will be further examined in the following section.

In summary, relatively few taphonomic agents appear to have acted to disturb the integrity of the identified structural remains. Mixing of artifacts between floor and surrounding deposits is not observable to any significant degree. With the exception of super-structural elements, the remains uncovered during the 1973 excavation appear to have a high degree of overall integrity.

Evaluating Question One

The preceding portion of this section provides the framework for evaluating Question One -- that the remains uncovered during the 1973 excavation of the Maurer site are those of a structural feature. I used available data to evaluate a set of expectations developed in support of this question. Multiple lines of evidence (floor plans, stratigraphic profiles, artifact distributions, field records) substantiated the presence of directly associated sub-structural (including sub-structural features) and super-structural elements. Taphonomic factors discussed in this section cannot be considered responsible for the formation of the observed patterns. On a general level these attributes meet the explicit expectations required to verify this structural feature. Thus, the question that the feature excavated at DhRk 8 represents the remains of a structure is accepted.

However, while Question One can be accepted at a general level, there is some divergence between the demonstrable pattern of structural remains and those described by LeClair in his preliminary report (1976:35-36). My analyses presented in this section result in a lack of verification of several expectations and in significant changes in the following:

- the internal bench feature originally thought to be part of the structure's architecture was, rather, an external midden and results in a significantly reduction of the floor area and alteration of the perception of the structure's architecture
- all of the small diameter, angled post-holes previously thought to define the bench perimeter were associated with a younger, overlying cultural component rather than the structure, itself, and this also changes the perception of the structure's architecture
- the feature was a plank-walled structure, a previously unspecified detail

A revised structural description, incorporating these differences, is presented below.

Revised Structural Description

The Maurer structure can now be confidently described as a north-south oriented, 7.5 m x 5.0 m, shallow semi-subterranean (0.3 - 0.4 m deep), rectangular structure with a floor surface area of 37.5 square meters. In the absence of angled post-holes, extrapolation of its roof height is not possible. Post-holes associated with this structure are all vertical in cross-section, so perimeter walls were vertical rather than angled. An interesting post-hole pattern is suggested by the position of large post-holes at the corners of the structure with smaller post-holes (i.e., stakes) placed in-between. This pattern is best observed along the south edge of the floor pit and resembles that of the 'rafter support post/wall pole' systems associated with plank-walled structures at the Ozette site (Mauger 1978:142-143, 151-152). Large corner posts function as weight-bearing supports, while planks are lashed to smaller, intermediate retaining posts or stakes. The post-hole pattern at Maurer suggests a similar architecture.

Apparent plank retaining walls, lining the floor pit side-walls, extend vertically between 30 to 40 cm from the floor surface to the ancient ground surface into which the floor was recessed. Small interior posts (stakes) abutting the retaining wall appear to have acted as reinforcements, preventing the retaining wall from collapsing inward. A 3.00 m long x 0.35 m wide x 0.30 m deep hearth, with fire-cracked and thermally altered rock concentrations at its extremities is located in the southern third of the structure. Four possible post-holes are located in the northern half of the floor. No substantial evidence exists for the location of an entrance. Refuse appears to have been deposited around most of the outside perimeter of the structure, forming a midden. Accumulation of a 10-15 cm thick floor deposit, confined within the floor depression, indicates extended use of the structure.

It should be explicitly stated that the Maurer feature was a quasi-permanent structure. While elements of the structure were likely transportable, such as the above ground wall and/or roof elements (possibly planks), portions of the structure represent permanently set, non-transportable features such as the recessed floor, hearth and large corner-posts. While the architecture of the Maurer structure has been analyzed, the function of this quasi-permanent structure remains to be assessed. Analyses of the types and patterns of artifacts associated with the floor are carried out in the following Section II.

Section II: Evaluating Function – Was the Maurer Structure a House?

As a basis for testing this question, I developed a set of archaeological expectations generally associated with houses (i.e., domestic residences). I assess taphonomic factors possibly affecting the floor assemblage, and investigate the frequencies and functions of artifacts associated with the floor and floor features.

Expectations

The limited data from the Maurer structure - only lithic artifacts and a few structural features - must be accommodated in any comparisons. Development of a comparable set of testable expectations was hindered by the lack of precedent for functional tests of this sort on the Northwest Coast. Structures identified in archaeological sites have generally been assumed to be houses without critical evaluation. Alternate functions are rarely considered even though this actuality is documented in both the ethnographic and prehistoric records (Moss and Erlandson 1992). While a number of apparent prehistoric houses have been excavated in the upper Fraser Valley (e.g., Hanson 1973; von Krogh 1976), more useful descriptions of prehistoric house assemblages are provided by pithouse analyses at the Keatley Creek site in the Fraser Canyon (e.g., Spafford 1991; Hayden and Spafford 1993). Ethnographically documented residences.facilitated identification of houses at this site by strong analogic association. Despite the lack of comparable data for Maurer, hypothetical expectations of house associated assemblages may be developed provided guiding assumptions are explicitly stated.

The expectations I present in support of a house function for the Maurer structure are based upon the notion that the household is the center of production and the basic socioeconomic unit of society (Mitchell and Donald 1988:313). Thus, such a household group carries out a wide range of activities, material correlates of which should be associated with the structure they inhabit(ed). Again, the Keatley Creek site offers a number of parallels to the Maurer site. There, floor-associated artifact distributions were analyzed with respect to defining activity areas, the way house space was functionally appropriated. Spafford's (1991) analysis of artifact distributions on housepit floors revealed cooking and storage features, and artifactual evidence of flintknapping, hide processing and food preparation activity areas. The functional analyses and types of structures at Keatley Creek provide a scenario similar to that of the Maurer site, although modeling of house function at Maurer based on analogies to Keatley Creek is necessarily limited to the most general comparisons.

As the residence of a household group, a house functions as an inhabitable shelter. Within this shelter, space is usually provided for consumption, production and living. Consumption activities include:

- food preparation
- cooking
- eating

Production activities include:

- tool production
- tool maintenance
- the production and maintenance of various non-food items

Living activities include:

- sleeping
- socializing
- entering and exiting the structure

These three activity sets, heretofore cumulatively referred to as household activities, are wide ranging and, together, are presumed to correlate with house function. Material remnants of such household activities are possibly preserved in the forms of structural features, botanical and faunal remains, chemical signatures and artifacts. At Maurer, such material evidence is limited to lithic artifacts and structural features.

A basic premise is that if the Maurer structure functioned as a house, floor features and artifacts from the floor deposit should be associated with consumption, production and living related activities. Floor features should include:

- a hearth for cooking, heat and light
- storage pits (possibly)

The artifact assemblage from the floor should include:

- tool types indicative of a variety of functions, such as cutting, scraping, incising, piercing, grinding, hammering

Additionally, debris from household activity, that is the floor deposit, is expected to reflect either continuous or intermittent extended occupation of the structure should be indicated by:

- hearth(s) with a high degree of use
- a rich, possibly thick organic floor deposit
- possibly numerous and varied artifacts

These qualities, reflecting intensive use of the structure for consumption and production activities, are proposed as indicators of house assemblages. Variations in predicted patterns might indicate alternative functions for the structure. Evidence of less intense occupation and/or the prevalence of artifacts associated with either consumption or production activities might indicate specialized use as a fort, refuge, resource processing, or ceremonial structure. These expectations are believed to be valid for house assemblages in which the household unit represents the basic means and mode of production. Though simplistic, this set of expectations can be tested against the material remains from the Maurer structure.

Taphonomy

Beyond the problems related to developing testable expectations, other factors interfere with the ability to test Question Two. Using data derived from excavation methods that were not explicitly designed to test this hypothesis represents one such confounding factor. The 'coarse' excavation methods employed at Maurer in 1973 (e.g., arbitrary 10 cm levels; not providing floor-associated artifacts with three-dimensional provenience;

vague descriptions of features) also compromise my ability to adequately test Question Two. The concentration of the excavation on the area within the structural feature also limits this study to the analysis of the floor-specific assemblage. It should be noted that the entire range of household activities may not be performed inside the house, and floor assemblages are potentially subject to a number of taphonomic factors. While the former limitation represents an unavoidable deficit to this study, its effects identifiably reduce the level of resolution of the ensuing analyses. The latter limitation -- floor taphonomy -- must be considered in greater detail before its associated effects may be likewise identified.

In Section I, taphonomic processes were considered in relation to the general integrity of the structural feature. The conclusion that the floor, as a structural feature, appeared to be relatively intact, is not necessarily transferable to all portable, floor-associated artifacts. A number of taphonomic agents possibly affecting the position of artifacts recovered from the floor must be investigated prior to interpreting floor assemblage distributions as anthropogenic. Inter-component mixing, one taphonomic agent previously examined, does not appear to have affected the development of the floor assemblage. However, additional taphonomic agents which must be considered include:

- periodic cleaning of all or part of the floor
- post-abandonment recycling and scavenging of tools and raw material
- post-abandonment bio- and cryoturbation (that is, rodent burrowing, animal scavenging, frost heaving) of the floor surface
- post-abandonment discard of non-occupation associated artifacts in the structure

These taphonomic factors may have affected the original floor assemblage composition and disturbed primary spatial patterning.

As a subtractive mechanism, periodic floor cleaning is likely to have had the most profound effect on the assemblage. In living areas, cleaning was most likely a continuous practice responsible for removal of most of the accumulated debris. In areas where consumption and production activities took place, cleaning may have been less frequently and/or thoroughly practiced. Floor cleaning is likely to maintain artifact-clear living areas, while debris is more likely to accumulate around consumption and/or production activity areas. Debitage and broken tools are most likely to be reduced in number by cleaning practices. Functioning tools and usable raw materials would not be expected to have been removed in this manner. Cleaning is therefore considered to be only partially effective in disrupting floor assemblage patterns. Conversely, cleaning may maintain clear floor areas indicative of living spaces.

Post-abandonment scavenging or recycling of artifacts remaining on a floor surface is more likely to result in the removal of usable raw materials and tools. I hypothesize that broken tools, expedient tools lacking labor-added value, debitage and commonly available raw materials represent unlikely targets of scavenging. Exotic raw materials, complete formed tools -- particularly those whose manufacture is labor intensive, such as bifaces and ground stone tools -- prepared cores and ornamental goods are considered to represent items more likely to retain value and, therefore, be scavenged. As such, the extent of scavenging may be related to the nature of the floor assemblage itself. Floor assemblages containing valuable items are logically more prone to scavenging or recycling than those lacking such items. Scavenging is not likely to remove all such artifacts, particularly those accumulated within deposits below the floor surface and not readily visible. Theoretically, the possible extent of scavenging can be inferred from the artifact proportions in the remnant floor and sub-floor assemblages.

Bioturbation is considered to have been minimally disruptive to the Maurer structure floor assemblage. Artifact positions can shift considerably as a result of bio- and cryoturbation. Identifiable bioturbation is restricted to minimal evidence of rodent burrowing in LeClair's Profile B.

Additive taphonomic processes may also be considered. Though slim, the possibility that artifacts were secondarily added to the floor assemblage does exist. Mixing from over- or underlying cultural deposits has been ruled out as a significant additive factor. Use of the floor for purposes besides its principle function, such as dumping refuse, may have occurred during intermittent periods of disuse separating transitory occupations of the structure, if such periods existed. While there is no clear evidence of intermittent occupation of the Maurer structure (such as, waterlain silt or humified lenses, and floor reconstruction), such a scenario is possible. However, it is likely that any material deposited in the structure during periods of disuse would have been removed upon reoccupation. The probability of such material remaining on the floor of the structure, mixed with the actual household deposits, is largely dependent upon the nature of the structure's abandonment and speed of its collapse. Given that the abandonment of the Maurer structure and the ensuing collapse and decomposition of its super-structure appears to have occurred rapidly -- possibly as a result of burning -- post-abandonment deposits would likely lay above the floor, separated by the super-structural remnants which apparently cap the floor. The abrupt transition both stratigraphically and in artifact (particularly debitage) frequencies between Strata 3 and 4 is considered to illustrate this situation. Therefore, as artifacts directly associated with Stratum 4, the floor surface, appear to be isolated from overlying, post-abandonment accumulated deposits, additive taphonomic processes are not considered to be significant factors affecting the floor deposit.

The effects of taphonomic agents presented in this section are generally more difficult to identify than those discussed previously. Taphonomically, human cleaning and scavenging/recycling of the house floor remain potentially significant factors whose possible effects are investigated in the following section.

Methods

The artifact frequencies presented in this section represent the entire Maurer floor assemblage. I derived data for this stage of the analysis from portions of 20 excavation units comprising the majority of the floor area. Data from a number of excavation units (from both the 1972 and 1973 excavations), which affected part of the floor area, were not available. The available data represent approximately 75% of the total floor area, with the missing portions primarily confined to the central and northern portions of the structure (see Figure 10:18).

Data for floor associated (Strata 4 and 5) artifacts were easily isolated from excavation units adjoining the profile which I fully analyzed. Retrieving similar data from partially analyzed floor units (that is, units for which only the floor layer, Strata 4 and 5, material was analyzed) was more difficult. Referring to excavation plans, stratigraphic profiles and level notes, I located level bags containing cultural material associated with the floor. I classified such material according to the tool and debitage typologies which I established for the fully analyzed excavation units. The entire, undifferentiated (though labeled with discrete artifact numbers) tool assemblage from both DhRk 8 and DhRk 8A was found to have been removed from provenienced level bags and mixed together. I initially separated artifacts labeled with a 'DhRk 8A' designation from the DhRk 8 collection. I classified the remaining tool assemblage according to the typology presented in Appendix I of my M.A. thesis (Schaepe 1998). Discrete proveniences for remaining artifacts from DhRk 8 were then re-established by cross-referencing labeled artifact numbers with the proveniences recorded in LeClair's artifact catalogue, and with artifact descriptions and locations provided in level notes. A significant number of tools with direct floor association could be referenced to specific level note descriptions. Excluding a few tools and tool fragments discovered in the level bags (which were not physically reincorporated with the tool assemblage), I reestablished the entire assemblage of tools from the floor of the Maurer structure.

Artifact Frequencies - Floor Assemblage

Table 10:3 presents the frequencies and proportions of artifacts in the Maurer structure floor assemblage. Floor 1 (Stratum 4) was distributed across the entire sampled floor area, therefore, Floor 1 totals are derivative of the

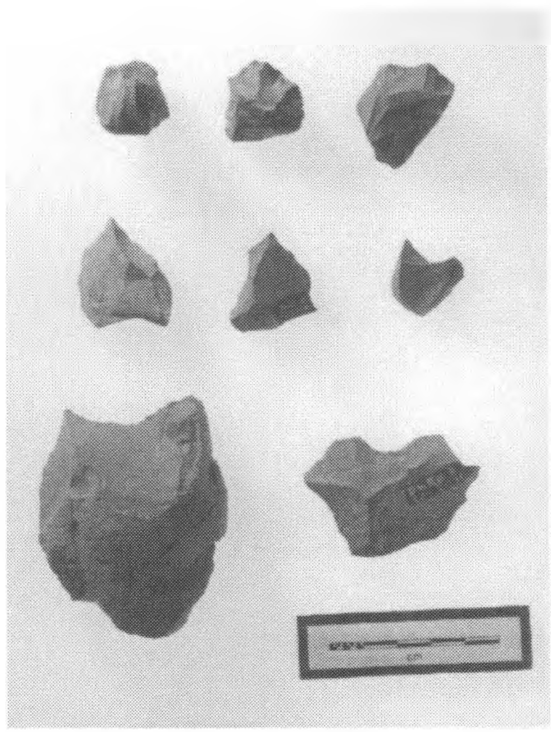


***Figure 10:21.* Microblade Core and Pressure-flake Cores (top); Burin and Gravers (middle), and Notches (bottom).**

complete floor sample. Because of the uneven thickness of the floor deposit, the Floor 2 (Stratum 5) deposit existed in less than 50 percent of the sampled floor area and, thus, represents an incomplete floor area sample. Floor 1 and 2 totals are, therefore, not directly comparable. Because of the indirect association between feature contents, artifacts located within floor features such as the hearth and the surrounding floor assemblage. Floor Feature totals were isolated from those of Floor 1.

The proportions of artifacts found in the floor deposit are comparatively consistent across each of the defined floor categories (e.g., Floor 1 Floor 2 and Total Floor) as exemplified by the Total Floor figures. For simplicity of discussion, reference to 'tools' will include cores. Debitage will be referenced separately.

Table 10:3 shows that a total of 230 tools and 1,189 pieces of debitage are associated with the floor deposit. An additional 45 tools and 224 pieces of debitage were located within floor features, primarily the hearth. Three of the tool classes in the Total Floor assemblage have high relative proportions:

- acute-edged utilized flake fragments (26%)
- acute-edged utilized flakes (22%)
- core fragments (12%)

Proportions of the remaining 32 tool categories fall, individually, below 3%. While 59% of the identified tools are represented in only three categories, the variety of tools comprising the remaining 41% of the assemblage is significant. Microblade and pressure-flake cores, pebble core tools, spalls, leaf-shaped and lanceolate bifaces, blade-like flakes, notches, gravers, a burin, a drill fragment, ground and battered stone tools, tabular palette fragments and a few miscellaneous types are present in low frequencies (see Figures 10:21-22).

Categories of individual tool types combined into groups of related items, as presented in Table 10:4, results in a slightly more distinctive pattern of relative tool proportions. While 'Cores and Core Fragments,' 'Biface Points' and 'Burins, Drills, Gravers, Notches' categories are self-evident, the composition of the remaining combined tool categories require explicit definition. 'Expedient Acute-edged Tools' include utilized and unifacial flake tools and fragments, 'Spalls' include unmodified, unifacial and bifacial spalls, and 'Expedient Obtuse-edged Tools' include utilized and unifacial flake tools and fragments. From the figures presented in Table 10:4, it is possible to conclude that an expedient tool technology -- tools requiring little or no modification for use -- dominates this assemblage.

Figure 10:22. **Bifaces and Biface Fragments.**

Functional Variation - Floor Assemblage

Based on macroscopic morphological attributes, the floor assemblage tools represent a number of broad functional types. Scraping, cutting, sawing, perforating, drilling, incising, abrading, and battering represent some functions with well established and generally accepted macroscopic morphological correlates in stone tools (e.g., Hayden 1979, Keeley 1980, Semenov 1970). In order to investigate evidence of macroscopic use-wear, I examined the floor assemblage tools under 16x magnification. Though few in number, tools with multiple attributes, such as acute and obtuse edges, were identified. I classified these tools according to their predominant (that is, most well used) morphological feature. Such analysis accounts for the functional classifications of tools presented in this study. Table 10:5 summarizes the conventional tool/function correlates employed here.

Based on the these correlates, tools in the Total Floor assemblage functionally represent: light to heavy cutting, drilling, light to heavy scraping, chopping, perforating, grinding, incising, and percussing

Table 10:4 demonstrates that expedient cutting tools are, by far, the most numerous type in the Maurer floor assemblage. In both individual and combined tool categories, tools with other functions range proportionally below 5%. It is obvious that while this assemblage is comprised of a diverse array of tool types, its proportions are heavily weighed toward tools with cutting functions. This extreme contrast in proportions of tools is explainable in a number of ways. As reported by Hayden, Franco and Spafford (1996), raw materials, and task, social, technological and ideological constraints act as limiting factors in tool assemblage variability. Variable frequencies of tools in a diverse assemblage, as in the present case, may result from the influence of one or more of these constraints. While one functional type predominates in the Total Floor assemblage, task specialization is not considered to be an appropriate interpretation of this pattern, particularly given the unspecialized nature of expedient cutting tools. A wide range of possible activities -- including those defining consumption and production activities -- is inherent in the expedient acute-edged tools dominating the floor assemblage of the Maurer structure.

In the absence of residue and high-magnification use-wear analyses, determining the types of material worked by these tools is not directly possible. Hide- and wood-working may, however, be inferred. Notches and cobble core tools traditionally have been described as woodworking tools (Eldridge 1982:43; Haley 1987:39). Spalls have been linked with hide-working (Hayden 1990:96). Given the presence of a variety of cutting implements (unmodified flakes, unifaces, bifaces), it is probable that bone/antler, meat and vegetal materials were also processed. This inferential evidence indi cates that the Total Floor assemblage tools may have been used to work a variety of materials.

Floor Features

As described in the previous section, several post-hole and hearth features are associated with Floor 1 (Stratum 4) of the Maurer structure. The hearth, because it is the only floor feature which is not a post-hole, is of primary importance to this investigation. As verified, the hearth was located in the south end of the floor. Oxidized sediments, carbonized material and fire-cracked and thermally altered rock (FCR) comprised the majority of the hearth contents (see Figure 10:23). Variable amounts of lithic debitage and small numbers of stone tools, apparently not fire-altered, were found within the matrix of this material.

As recorded in the level notes for Units 21, 33, 34 and 35, abundant FCR was present throughout the length of the hearth. This description contrasts with LeClair's original floor plan drawings and excavation photographs which show FCR absent from the center of the hearth. This gap is largely coincident with Unit 34, the level notes for which do indicate the presence of FCR. During analysis, however, no FCR was recovered from the Unit 34 'hearth'-level bags. It is possible that if FCR were originally present in Unit 34, it might have been excavated and discarded without being recorded. Collection of FCR during the 1973 excavation appears to have been unsystematic and dependent upon individual excavators' initiatives. Review of the level notes indicates that the exca- vation of Unit 34 was undertaken early in thefield season, prior to the excavation of the other units in which the hearth was present. Thus, the practice of leaving feature deposits *in situ* may not yet have been established.

A notably large amount of lithic debitage (n = 183) was recovered from the hearth matrix in Unit 34. This debitage frequency is significantly higher than was recovered in the other portions of the hearth and on the surrounding floor, and could indicate the infilling of the central portion of the hearth with refuse. When this might have occurred, and whether the hearth was subsequently re-used, is indeterminate. While the hearth pit and some evidence of its use are documented in the Unit 34 level notes, a general lack of information frustrates the reconstruction of hearth-use history. Except for Unit 34, it is possible to define the composition of the east and west ends of the hearth. These extremities are defined by FCR concentrations associated with a small number of tools and debitage. The FCR accumulations overlay charcoal rich sediments, which defined the base of the feature (see Figure 10:23). The sides of the hearth and its base are further defined by oxidized sediments which, in profile, formed a U-shaped pit intrusive into the sterile gray layer below the floor (see Profile B – Figure 8b). Tools and debitage within the

Table 10:3. Floor Assemblage Artifact Frequencies and Proportions.

ARTIFACT TYPES	Floor 1 (n)	Floor 1 (%)	Floor 2 (n)	Floor 2 (%)	Total Floor (n)	Total Floor (%)	Feat.s (n)	Tot. Assmb. (n)	Tot. Assmb. (%)
CORES									
Cores	12	6	3	8	15	7	1	16	6
Core Fragments	20	10	7	18	27	12	6	33	12
Bipolar Cores	3	2	0	N/A	3	1	0	3	1
Microblade Cores	1	<1	0	N/A	1	<1	0	1	<1
Pressure-Flake Cores	1	<1	1	3	2	1	0	2	<1
TOOLS									
Pebble Core-Tools									
Uniface Pebble Core-Tool - Acute	2	1	0	N/A	2	1	0	2	<1
Uniface Pebble Core-Tool - Obtuse	1	<1	0	N/A	1	<1	0	1	<1
Biface Pebble Core-Tool - Obtuse	0	N/A	0	N/A	0	N/A	1	1	<1
Utilized Flakes/Spalls									
Utilized Flake - Acute	41	21	9	23	50	22	7	57	21
Utilized Flake Fragment - Acute	50	26	9	23	59	26	9	68	25
Utilized Flake - Obtuse	1	<1	1	3	2	1	0	2	<1
Utilized Flake Fragment - Obtuse	3	2	0	N/A	3	1	0	3	1
Spall (unmodified)	6	3	1	3	7	3	2	9	3
Utilized Spall - Acute	1	<1	0	N/A	1	<1	0	1	<1
Expedient Unifaces									
Expedient Uniface - Acute	11	6	1	3	12	5	3	15	5
Expedient Uniface Fragment - Acute	6	3	1	3	7	3	2	9	3
Expedient Uniface - Obtuse	2	1	0	N/A	2	1	2	4	1
Expedient Uniface Fragment - Obtuse	3	2	0	N/A	3	1	0	3	1
Notch - Acute	4	2	1	3	5	2	0	5	2
Notch Fragment - Acute	0	N/A	0	N/A	0	N/A	1	1	<1
Uniface Spall - Acute	0	N/A	0	N/A	0	N/A	1	1	<1
Uniface Spall - Obtuse	0	N/A	0	N/A	0	N/A	1	1	<1
Scrapers									
Scraper	1	<1	0	N/A	1	<1	0	1	<1
Scraper Fragment	1	<1	0	N/A	1	<1	1	2	<1
Expedient Bifaces									
Biface Spall - Obtuse	1	<1	0	N/A	1	<1	0	1	<1
Expedient Biface Fragment - Acute	3	2	0	N/A	3	1	1	4	1
Expedient Biface Fragment - Obtuse	1	<1	0	N/A	1	<1	0	1	<1
Bifaces									
Leaf-Shaped Biface	0	N/A	2	5	2	1	0	2	<1
Leaf-Shaped Biface Fragment	1	<1	0	N/A	1	<1	0	1	<1
Lanceolate Biface	1	<1	0	N/A	1	<1	0	1	<1
Triangular Biface	0	N/A	0	N/A	0	N/A	1	1	<1
Leaf-Shaped Preform	1	<1	0	N/A	1	<1	0	1	<1
Miscellaneous Point Fragment	3	2	1	3	4	2	0	4	1
Miscellaneous Biface Fragment	1	<1	0	N/A	1	<1	0	1	<1
Blade Tools									
Blade-Like Flake	1	<1	1	3	2	1	1	3	1
Misc. Chipped Stone Tools									
Graver	1	<1	1	3	2	1	0	2	<1
Drill Fragment	1	<1	0	N/A	1	<1	0	1	<1
Burin	1	<1	0	N/A	1	<1	0	1	<1
Misc. Ground/Battered Stone Tools									
Miscellaneous Ground Stone	1	<1	0	N/A	1	<1	0	1	<1
Misc. Pecked/Battered Pebble	0	N/A	0	N/A	0	N/A	1	1	<1
Hammerstone	1	<1	0	N/A	1	<1	1	2	<1
Anvilstone	0	N/A	0	N/A	0	N/A	1	1	<1
Edge/End Battered Pebble	1	<1	0	N/A	1	<1	1	2	<1
Tabular Palette - Pecked	0	N/A	0	N/A	0	N/A	1	1	<1
Misc. Tabular Palette Fragment	2	1	0	N/A	2	1	0	2	<1
Total - Tools & Cores	191	100	39	100	230	100	45	275	100
Total - Tools	156	82	28	72	184	80	36	220	80
COMBINED TOOL CATAGORIES									
Cores & Core Fragments	35	18	11	28	46	20	9	55	20
Pebble Core-Tools	3	2	0	N/A	3	1	1	4	1
Expedient Tool Fragments - Acute	58	30	10	26	68	30	12	80	26
Complete Expedient Tools - Acute	54	28	10	26	64	28	10	74	27
Expedient Tools - Acute	112	59	20	51	132	57	22	154	56
Spalls	8	4	1	3	9	4	4	13	5
Expedient Tool Fragments - Obtuse	7	4	0	N/A	7	3	0	7	3
Complete Expedient Tools - Obtuse	4	2	1	3	5	2	1	6	2
Expedient Tools - Obtuse	11	6	1	3	12	5	1	13	5
Bifaces	7	4	3	8	10	4	1	11	4
Biface Points	6	3	3	8	9	4	1	10	4
Notches, Drills, Gravers, Burins	8	4	1	3	9	4	1	10	4
DEBITAGE									
Debitage - Size Grade 1	26	3	13	4	39	3	14	53	4
Debitage - Size Grade 2	393	46	121	36	514	43	77	591	42
Debitage - Size Grade 3	438	51	198	60	636	54	133	769	54
Total - Debitage	857	100	332	100	1189	100	224	1413	100

Table 10:4. Combined Tool Category Data Total Floor.

Combined Tool Category	Total Floor (n)	Total Floor (%)
Cores and Core Fragments	46	20
Expedient Acute-edged Tools	132	57
Spalls	9	4
Expedient Obtuse-edged Tools	12	5
Biface Points	9	4
Burins, Drills, Gravers, Notches	9	4
Misc. Tools	13	6
Total	230	100

hearth contents may have resulted from primary deposition,or secondary deposition from slumping floor deposits or infilling events, specific to the hearth pit itself. Given the available data, it is not possible to determine the factor(s) responsible for the deposition of these artifacts within the hearth. While the hearth contents may be somewhat mixed, these materials likely originate from the surrounding floor deposits. Because the origin of these artifacts is uncertain, their separation from the floor deposits is maintained both in Tables 10:3 and 10:4, and the spatial analysis of the floor assemblage. Though questions concerning the integrity of the hearth contents exist, the underlying charcoal-rich sediments constitute primary deposits forming the bottom of the hearth.

In evaluating hearth integrity, I determined that cultural materials accumulated within this feature are possibly of mixed origin. Insufficient data made it impossible to assess the integrity of the hearth section covered by Unit 34. Addition- ally, it was not possible to establish whether the hearth trench functioned as a single elongated feature or two separate features when the Maurer structure was abandoned. The presence of at least one hearth feature is not in doubt. However, documentation of the hearth lacked the detail necessary to assess its intensity of use. Cross-sections and descriptions of the extent of oxidation and the amount of charcoal and carbon accumulations were not provided. Although significant amounts of FCR occur in both ends, collection of FCR from the entire hearth trench appears to have been unsystematic. Notwithstanding the above, the hearth feature, including its carbon-impregnated base, appears to be relatively intact.

Table 10:5. Artifact/Tool Function and Worked Material Correlates.

Artifact Type	Conventional Function	Worked Material
Core	Raw material for stone tool and flake manufacture	Lithic
Microblade Core	Raw material for microblade manufacture	Lithic
Microblade/Blade-Like Flake	Precision cutting	Meat, Plant
Pebble Core-Tool	Heavy chopping	Wood, Meat, Miscellaneous
Expedient Tool - Acute Edge	Light to moderate cutting	Plant, Meat, Hide, Miscellaneous
Expedient Tool - Obtuse Edge	Light to moderate scraping	Wood, Bone, Hide, Miscellaneous
Spall	Moderate to heavy scraping	Hide, Miscellaneous
Biface Point/Knife	Light to heavy cutting; Weaponry	Meat, Miscellaneous
Notch	Scraping and shaving	Wood, Bone, Antler
Graver	Incising	Wood, Bone, Antler, Soft Stone
Drill	Perforating	Wood, Bone, Antler; Soft Stone
Burin	Incising	Wood, Bone, Antler, Soft Stone
Tabular Palette	Platform for chopping, mashing and grinding	Plant, Meat, Mineral
Edge-/End-Battered Pebble	Mashing and pounding/percussing	Plant, Mineral, Miscellaneous
Debitage	Debris from stone tool manufacture and maintenance; potential expedient tool stock	Lithic

In functional terms, remains from the hearth indicate its use as, minimally, a place for building fires and heating stones. Functional implications may be extended to include:

- heating the space within the structure
- lighting
- cooking
- heat-treating lithic material
- the possible smoked or dried preservation of organic material

Summary - Artifacts and Features

Lithic raw materials, tools and debitage were recovered from the floor deposit of the Maurer structure. The identified patterns of tools in this assemblage, while best exemplified by the Total Floor figures, are recognizable in the Floor 1 deposit as well. The Floor 2 sample does not represent the entire floor area and therefore was not discussed. Though expedient, utilized flake tools predominate, a wide range of tool types, cores and debitage comprises this assemblage. Minimally, eleven functional classes of artifacts occur, representing a wide range of inherent potential activities. At least one hearth feature is associated with Floor 1. Carbonized material and heated rocks in it suggest general heating, lighting and cooking functions, but the intensity of use of this feature could not be established.

Testing Question Two

Analyzing the composition and taphonomy of the Maurer structure floor assemblage allows the testing of Question Two -- that the structure functioned as a house. The observed results of this analysis compare favorably with the expectations developed for testing Question Two. A variety of tool types and at least one hearth feature represent a diverse range of possible functions amongst the floor assemblage. These activities are representative of the wide range of activities expected of a household group, comprising the basic socioeconomic unit of organization and means of production. The observed floor assemblage composition satisfied the expectations for a domestic structure, as developed in this study. Evidence supports the inference that this structure functioned as the location for a variety of activities. While available data does not permit assessment of the intensity of hearth use, the identifiable FCR and charcoal concentration indicates that the hearth was utilized up until the final abandonment of the structure. The thickness and rich organic nature of the floor deposits infer an extended and generally intensive use of the structure. Given the positive outcome of the above comparison, Question Two is accepted. It is concluded that the Maurer structure was a house.

Section III: Evaluating the Age of the Maurer House – How old is the Maurer House ?

In this section, I focus on assessing Question Three that the Maurer house represents a 5500-3500 years old [6300-3800 cal BP], Eayem Phase structure (LeClair 1976:42). I analyze the reliability of the data on which LeClair's age estimates are based. As a means of assessing its relative age, I compare the Maurer house assemblage to the most relevant comparative assemblage -- Occupation Three from the Hatzic Rock site. In additiona, I compare this assemblage to cultural material typifying a range of time periods in the upper Fraser Valley culture historical sequence.

Expectations

As stated above, two forms of data -- radiocarbon dates and assemblage composition -- are expected to support Question Three. Some, if not all, of the reported DhRk 8 radiocarbon dates (uncalibrated) ranging between 3860 and 4780 BP[10] (LeClair 1976:42) should relate directly to the Maurer structure. If valid, processed radiocarbon samples should have three-dimensional proveniences directly associated with elements of the house remains, and represent undisturbed primary deposits of material of appropriate type and adequate quantity for radiocarbon dating. Sample locations and materials should be replicable, that is, adequately referenced in the 1973 excavation notes. Field collection and radiocarbon dating methods should have followed acceptable standards, minimally of 1973 and ideally of the present. A consistent range of dates should be represented by radiocarbon samples from the house remains.

Additionally, the Maurer house assemblage composition is expected to resemble other upper Fraser Valley, Eayem phase / Charles Culture sites. Such assemblages should be consistent in terms of the general presence or absence of artifact types and/or specific artifact proportions. I compare the Maurer house assemblage with that from the only other site in the upper Fraser Valley with an apparent similar function and age -- the circa 4800 BP [5590 cal BP] Occupation III at Hatzic Rock (DgRn 23).

Radiocarbon Dates

It was possible to determine date associations by referencing field notes documenting the locations of sample material for each of the seven reported dates. I found that only five of the seven dates are associated with DhRk 8, while the remaining two relate to material from DhRk 8A, an adjacent site. Data for the DhRk 8-associated radiocarbon dates, including both uncalibrated and calibrated[11] dates, are presented in Table 10:6. Additionally, radiocarbon sample locations, identified in LeClair's field notes, are depicted on the house floor plan in Figure 10:25.

As Figure 10:25 illustrates, three of the five radiocarbon samples from DhRk 8 appear to have been collected from the area within the Maurer house. Samples 2 (GaK-4919) and 9 (GaK-4922) represent carbonized organic matter from the bottom of the hearth trench in Unit 34 and Unit 33, respectively. Sample 8 (Gak-4921) consists of a charcoal fragment apparently located on the surface of the house floor. Both uncalibrated and calibrated (in parentheses) radiocarbon dates for these three samples are presented, as 'BP' values, below. Thus, Sample 2 dating to 4220±100 BP and Sample 9 dating to 4240±380 BP represent consistent dates from the hearth feature. Alternately, Sample 8 provides an anomalous age of 1410 ± 90 BP. These dates will be discussed in greater detail below.

The two remaining radiocarbon samples, 10 (GaK 4923) and 13 (GaK-4927), are not directly associated with the Maurer house. Sample 10, which dates to 4720±380 BP, was collected from the basal cultural deposit 4.5 m west of the structure. Sample 13, associated with what may be a second structure, was collected from a dark layer of organic sediment -- an apparent floor deposit with an associated pit feature -- located in the north side of the road cutbank approximately 20 m northeast of the Maurer house feature. The length of the exposed portion of this apparent floor layer is roughly the same as the SE-NW axis of the Maurer house. LeClair notes (C14 notes) that the depth (1.3 m below ground surface) and stratigraphic location (associated with the terminal B horizon) of the cutbank feature are similar to the Maurer house. Sample 13 provided an age of 4780±340 BP.

Assessing Radiocarbon Sample Reliability

Verification of radiocarbon sample locations from the house feature and immediate vicinity was only partially successful. The degree of correlation between the three-dimensional proveniences, material and matrix descriptions (LeClair, C14 notes) for Samples 2, 8, 9 and 10 was investigated as a means of establishing radiocarbon sample reliability. Of these, only the hearth-associated Samples 2 and 9 had reconstructible location, material and matrix descriptions. Such data for Sample 9 were documented in excavation unit notes as well as a detailed photograph of the hearth. Unit 34 excavation notes confirm these data for Sample 2. Thus, Samples 2 and 9 both represent reliable radiocarbon samples.

Table 10:6. Dated Radiocarbon Sample Data (DhRk 8).

Sample No.	GaK No.	Provenience	Sample Material (per Gakushuin)	Matrix Description (per LeClair)	Association (per LeClair)	Radiocarbon Date (calibrated)
2	4919	37.55 mS/17.10 mW; 286 cmBD (Unit 34)	humic soil	greasy black charcoal matrix; burned soil and organic matter	central hearth area	4220 ± 100 (4850)
8	4921	34.40 mS/16.00 mW; 272 cmBD (Unit 31)	charcoal	greasy black material; burned soil and organic matter	taken from the east side of the house floor and represents the burned organic material common over the floor; burned timber fragment laying on the house floor	1410 ± 90 (1310)
9	4922	36.25 mS/16.00 mW; 300 cmBD (Unit 33)	peat	greasy black burned soil and organic matter	NE corner of the hearth; 15-20 cm below the house floor - in direct association with fire-cracked rock	4240 ± 380 (4870)
10	4923	38.20 mS/24.79-24.92 mW; 79 cmBD (Unit 74)	soil	slightly greasy, black with organic matter and soil	basal cultural deposit west of house; division between the yellow brown and olive brown (deposit); immediately above sterile	4720 ± 380 (5460)
13	4927	10.00 mS/11.74 mW; (not w/in excavation)	soil	burned soil and organic matter	possible structure profile in road cut @ 20 m NE of house	4780 ± 340 (5510)

Alternately, Sample 10 is noted as being located "immediately above cultural sterile" (LeClair, C14 notes) at 79 cm BS. Cross-referencing this depth with corresponding excavation notes for Unit 79, neither the reported stratigraphic position nor the absence of cultural material underlying this sample could be verified. Contextually unreliable, the association of the radiocarbon date derived from Sample 10 remains unclear.

The anomalous date derived from Sample 8 requires explanation. Sample 8, described as a "burned timber fragment laying on the house floor" (LeClair, C14 notes), should provide a charcoal based, structurally associated date. The sample material (that is, a burned timber

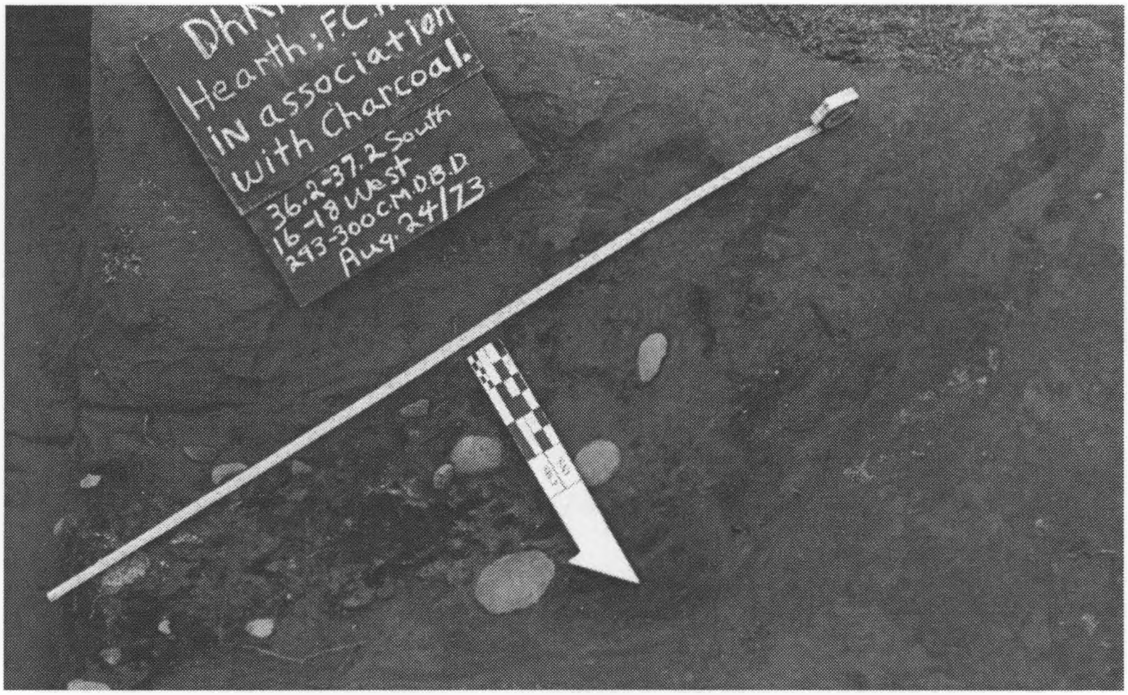


Figure 10:23. **Hearth Feature. Photo: R. LeClair.**

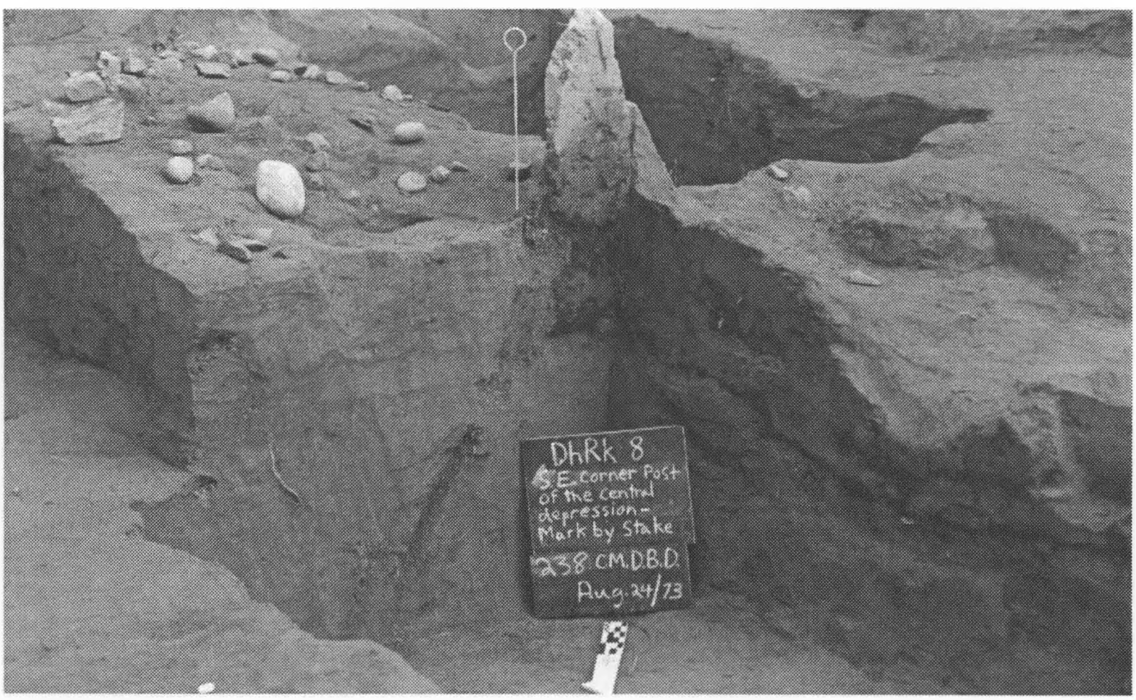


Figure 10:24. **Post Mold, Southeast Corner (Photo: R. LeClair.**

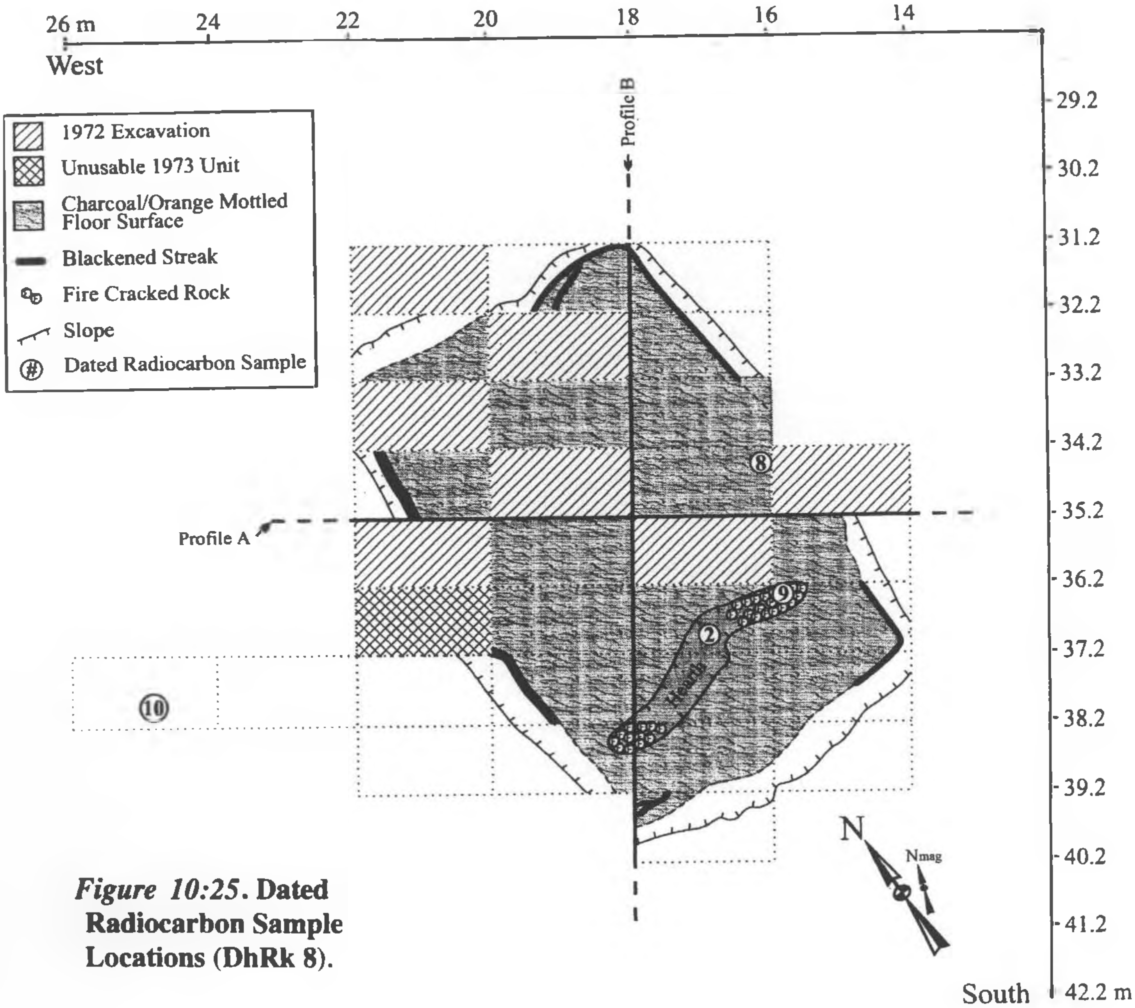


***Figure 10:25*. Dated Radiocarbon Sample Locations (DhRk 8).**

fragment at 121 cm BS, Unit 31) should represent a fairly obvious specimen laying on the floor surface. However, after having assessed the reliability of this sample, a number of discrepancies emerged. The noted provenience of Sample 8, provided above, corresponds with the bottom of the floor deposit rather than the surface. Unit 31 excavation notes nowhere indicate burned timber remains, and describe only the general char- coal and orange mottled deposit consistent across the floor.Charcoal "spots" are identified in the unit notes at 230-240 cm BD and 240-250 cm BD, located above the floor surface by a minimum of 16 cm. Thus, the context of Sample 8 was unable to be verified.

Further investigation of Sample 8 revealed that it may have been misprovenienced. LeClair's 'vertical distribution notes' and excavation unit notes both identify a carbonized log 120 cm BS in Unit 10, two meters east of Unit 31, outside the floor area. Further, LeClair's C14 notebook entry describes Sample 8 as being "taken from the east side of the floor and [does not] represents the burned organic material common over the floor..." 'Does not' was added -- apparently by LeClair, judging from the handwriting -- as an amendment to this description, adding to the ambiguity of this sample. Whether or not Sample 8 was misprovenienced, it lacks a reliable context within the Maurer site. Therefore, Sample 8 lacks utility in determining the age of the Maurer house.

The contexts of Samples 2 and 9, the two reliable radiocarbon samples with direct structural association, must be investigated for evidence of disturbance. As previously determined, the integrity of the hearth feature appears to be intact. While the post-abandonment deposition of materials from the surrounding floor deposit -- such as, charcoal, FCR and artifacts -- and collapsed superstructural remains into the hearth are possible sources of radiocarbon sample contamination, such materials are structurally associated and would not invalidate the dates derived from Samples 2 and 9. Effects of such contamination are considered to be negligible.

A more pertinent issue is the effect of the possible infilling of the central portion of the hearth trench, in Unit 34, on hearth-associated radiocarbon dates. Such infilling represents differentially discontinued hearth-use. Even so, carbonized deposits located throughout the hearth trench would result from hearth-use associated with the house occupation. Central hearth deposits would be comprised of somewhat older material than that in the lateral portions of the hearth trench, which appear to have been continually used until final abandonment of the structure. Dates derived from central hearth material should reflect the age of the house occupation, sometime prior to final abandonment. The 4220 and 4240 BP dates from Samples 2 and 9 reflect the consistency expected of radiocarbon samples from similar contexts, and indicate a tight temporal association of material from the hearth.

Methods

Very little can be said about how radiocarbon samples from the Maurer site were collected, the quantity of materials collected or how they were processed. In these regards, all that can be surmised is that Samples 2 and 9 were collected and submitted to Gakushuin University radiocarbon laboratory for dating in 1973. In 1974, Gakushuin laboratory successfully processed these samples, identifying their material composition as humic soil (Sample 2) and peat (Sample 9). While radiometric methods have significantly changed since 1974, dates produced during this era -- including those from Gakushuin -- are still generally considered valid.

The state of collected but unprocessed radiocarbon samples in the DhRk 8 and DhRk 8A collections indicate that acceptable packing and storage procedures (that is, wrapped in tinfoil and individually stored in glass containers) were implemented, but were not submitted for dating. Thus, only two of the reported seven radiocarbon dates were determined to have direct and reliable association with structural remains from the Maurer house. Samples 2 and 9, both collected from carbonized material in the bottom of the hearth, provided respective dates of 4220 BP and 4240 BP. A third reliable sample (Sample 13), which provided a date of 4780 BP was collected from the profile of what appears to be the exposed floor layer of a second structure in close proximity to the Maurer house.

Comparative Assemblage Composition

Using data compiled by Mason (1994) it is possible to compare tool proportions from the Maurer house assemblage to a representative Eayem Phase (5500-3500 BP) [6300-3800 cal BP] assemblage from the Hatzic Rock site (DgRn 23) also located in the lower Fraser River valley. While a thorough comparison of these sites is beyond the scope of this study, a broad and preliminary comparison was performed as a means of determining the general degree of inter-assemblage variability. Given the similarity in its location, apparent age and function of these sites, the assemblage from the Maurer house, if actually an Eayem Phase assemblage, is expected to be similar to that from Occupation III of Hatzic Rock.

Comparison with the Hatzic Rock Site - Occupation III, and Upper Fraser Valley Sequences

Table 10:7 presents selected combined tool frequencies and proportions from Occupation III at Hatzic Rock and the Maurer Total Floor (that is, Floor 1 and 2, not including feature fill artifacts) assemblage[12]. These two assemblages are most similar at the presented level of the comparison, that is, of broad categories of tool types. Conforming to traits considered typical of the proposed Charles Culture (Pratt 1992:289-292), both assemblages are comprised largely (roughly 80 %) of cores, expedient tools and chipped stone bifaces. While comparative tool proportions vary, it is apparent that the types of tools comprising these two assemblages are relatively similar. Only a few tool types are present exclusively in one assemblage, including microblades and microblade cores at Maurer, and stemmed bifaces, pièces esquillée, paint stones and a number of ground stone artifacts at Hatzic Rock. Comprising small relative proportions (individually < 5%), the differences associated with these artifacts are not significant in overall assemblage comparisons.

At the analytic level of simple presence/absence, a relatively high degree of similarity exists between the types of artifacts comprising the Hatzic Rock Occupation III and Maurer house assemblages. However, some degree of dissimilarity is apparent in the relative proportions of generalized tool categories. At present, these differences, possibly related to functional differences between sites, are considered to be insignificant to this analysis.

Table 10:7. Comparative Tool Proportions from the Hatzic Rock (Occupation) III) and Maurer (Total Floor Assemblage) Sites.

Tool Type	Hatzic Rock Occupation III (%)	Maurer Total Floor Assemblage (%)
Expedient Tools	41.0	62.0
Cores/Pebble Tools	29.2	21.0
Blade-Like Tools	0.0	1.0
Projectile Points/Bifaces	17.9	4.0
Misc. Ground/Battered/Pecked Stone	5.4	2.0
Misc. Tools	6.9	10.0
Total	100.0	100.0

Also significant are the similarities of the structures located at both the Maurer and Hatzic Rock sites. As described by Mason (1994), the Hatzic Rock structure is semi-subterranean, excavated 30-40 cm below original ground surface. While a clear outline of the building is obscured by a multitude of undifferentiated post-holes Mason (1994:92) concludes that it is basically square. Excluding the purported gravel bench feature -- which has an ambiguous identity as a structural feature -- from Mason's structural plan (Mason 1994:104), a rectangular to sub-rectangular shape is discernible. Based on the extrapolated outline of post-holes, the 'interior' portion of the Hatzic structure measures approximately 9.0 m x 6.5 m and is oriented north-south along its long axis. It has not been determined if planks were used in the construction of the Hatzic Rock structure. Mason states that this structure served a residential function, although this conclusion is not specifically tested. Both the artifact assemblage and structural features at Maurer and Hatzic Rock (Occupation III) share a high degree of similarity.

It is temporally informative to note the absence, in the Maurer house assemblage of artifacts such as ornaments and small points that typify Baldwin and Skamel, the later upper Fraser Valley cultural phases/culture types (See Borden 1975:62; Mitchell 1990). Thus, the Maurer house assemblage must pre-date these phases (3700-2500 BP) [4000-2500 cal BP].

Summary

In summary, I assessed the age of the Maurer house by radiocarbon dating and comparative assemblage analyses. Two reliable, radiocarbon dates of 4220 BP and 4240 BP were derived from samples directly associated with the Floor 1-associated hearth feature. A relatively high degree of similarity was found to exist between the general composition of the Maurer and Hatzic Rock Occupation III assemblages. Both sites additionally contain similar types of structures. Artifacts typical of late phases are absent from the Maurer house assemblage. In conclusion, general agreement between the results of reliable radiocarbon dates and the comparison of the Maurer house assemblage to artifact sets typical of Borden's Fraser Canyon cultural phase assemblages, supports the inference of an Eayem Phase age for the Maurer house.

Testing Question Three

Results of the above analyses can be compared to expectations developed in support of Question Three. The results of the above analyses satisfy the expectations developed for Question Three. I conclude that Question Three -- that the Maurer house is between 5500-3500 [6300-3800 cal BP] years old -- is accepted. Analyses in this section resulted in the ability to further refine the estimated age of the Maurer house, with a high degree of certainty, to approximately 4230 BP (4860 cal BP average).

CONCLUSIONS

In this study, I examined materials collected and derived by Ronald LeClair during his 1973 excavation of the Maurer site (DhRk 8). Three questions, based on LeClair's (1976) insightful preliminary interpretations of the site, were developed and evaluated using this material. Each of the following interpretations made by Ronald LeClair were validated:

1. the remains excavated at the Maurer site were those of a structural feature
2. the structure functioned as a house
3. the house was between 5500-3500 [6300- 3800 cal BP] years old

Analyses applied in the evaluation of these interpretations resulted in a number of significant additional findings, including:

1. the structure was somewhat different, both dimensionally and architecturally, than originally described
2. refinement of the age of the Maurer house to 4230 BP (4860 cal BP)

3. description of a house structure and floor assemblage from which household inferences may be drawn (see Schaepe 1998)

The analyses confirm with a high degree of certainty that the Maurer house and associated artifact assemblage belong in the Middle Period. Thorough analysis of the site data has added to the long neglected, but now quickly developing upper Fraser River valley archaeological database. Data from the Maurer house have many applications. For example, these data may be used in evaluating local differences within the Fraser Canyon culture historical sequence that have long been broadly applied to the central/upper Fraser River valley area. As a reliable comparative sample, the Maurer house component represents an intact assemblage contemporaneous with the Mayne and St. Mungo Phase sites of the Gulf Islands and Fraser Delta. Inter-site comparison between the rising number of valid 5500-3500 [6300-3800 cal BP] year old cultural assemblages in the Gulf of Georgia may prove useful in refining the Charles Culture concept and identifying local degrees of variation. Lastly, the Maurer house represents the earliest concrete evidence on the Northwest Coast of what amounts to *at least* a semi-sedentary household. The implications of this socio-economic development can potentially add significantly to our understanding of arising social complexity and inequality in this culture area. I conclude that as a valid 4200 [4800 cal BP] year old house, the Maurer site need no longer be neglected or deferentially referenced in discussions of the archaeology of the upper Fraser River locality, the Gulf of Georgia region, or the greater Northwest Coast Culture Area.

Notes

[1] The Maurer site is located in S'ólh Téméxw -- Stó:lô Traditional Territory. This study was conducted with the consent of the Stó:lô Nation.

[1] The term 'question' is applied to LeClair's findings in reference to them as preliminary statements rather than formal, i.e., evaluated, inferences or conclusions.

[1] The possibility of reexamining the Maurer feature is owed to Ron LeClair for providing both the entirety of available raw data and an intriguing archaeological platform for assessing the uncertainty surrounding this feature.

[1] A more complete evaluation of impacts to the Maurer site and feature is presented in Schaepe 1998. The Maurer feature appears to have escaped significant impact by all known activities except the 1972 excavations.

[1] Lacking faunal or botanical samples, this study was limited in nature to a lithic analysis.

[1] One of the objectives of this Opportunity for Youth-funded project was to provided a means for interested youth to obtain experience in archaeology. The Maurer site was, thus, the primary training ground for many of the 1973 field personnel.

[1] Additional taphonomic processes affecting artifact distributions, specifically, will be presented in the following section.

[1] Insufficient bulk sediment samples were collected to allow for fine-screening of a representative sample of G4 debitage.

[1] These 'strata' are largely pedogenic soil horizons which developed, in situ, in previously existing sediments. No intrinsic chronological or associational relevance is provided to the cultural remains found within them.

[1] I am aware that, with the exception of the cultural 'floor' layer, the so-called 'strata' are actually soil horizons. Given the combination of both the cultural stratum and the soil horizons in these profiles, the descriptive term 'strata' is employed for the sake of continuity and ease of communication.

[1] In order to standardize date reporting, these figures were derived by adding the amount of 1950 to the 1910 and 2830 B.C. uncalibrated dates originally presented by LeClair. Additionally, all presented dates are uncalibrated, unless otherwise noted.

[1] Radiocarbon age calibrations were based on the radiocarbon time scale calibration curves derived by Stuiver and Becker (1993).

[1] Hatzic Rock (otherwise known as 'Xaytem') data was compiled from Mason's Table 4.2 - Tool Counts and Percentages from Occupation Zones I/II

Acknowledgements

I gratefully acknowledge Ron LeClair for his ground-breaking work at the Maurer Site and for providing me with the opportunity to work with his original material. I also sincerely thank Drs. Knut Fladmark, Roy Carlson, Dana Lepovsky, David Burley and Michael Blake for their invaluable guidance on this project, and to Philip Hobler whose profound influence was greater than he knows.

CHAPTER 11

Shell Middens and Midden Burials in Southern Strait of Georgia Prehistory

DOUGLAS BROWN

Introduction

Shell midden burials dominate the prehistoric burial population of British Columbia's southern Strait of Georgia region (Burley and Knusel 1989; Cybulski 1992), but the relationship between human burials and the shell middens in which they are found is unclear. Many archaeologists have long assumed that shell middens and the burials they contain represent concurrent events (Borden 1970; Burley 1980), implying that the ancient Coast Salish placed their dead in developing refuse middens at occupied sites. Others question the assumed contemporaneous relationship of burials to shell middens, and suggest instead that in some cases the dead were place in abandoned shell middens sequestered from daily activities (Cybulski 1992; Arcas 1992). In this paper I examine the relationship between shell middens and midden burials using data from the Somenos Creek site, a small shell midden located on southeastern Vancouver Island. Archaeological evidence indicates that the Somenos Creek shell midden developed continuously over several centuries beginning around 2300 years ago, likely in association with a small settlement. Significantly, direct radiocarbon dates on a sample of burials interred in the midden show that the burials post-date the shell midden. These results imply that those living at Somenos Creek did not dispose of their dead in the accumulating refuse adjacent to occupied houses. Only after the settlement had been abandoned did people begin to bury their dead in the shell midden, an exclusive use of the site that continued for some 300 years.

Shell middens are the predominant site type forming the archaeological record of the southern Strait of Georgia region for the last 5000 years, and have provided much of the information used in the development of regional chronologies and archaeological reconstructions. In 1970, Charles Borden introduced a five-phase culture history sequence for the Fraser delta region covering the last 3000 years. All the information on what Borden then held to be the two earliest phases, Locarno Beach (ca. 800-200 B.C.) and Marpole (ca. 400 B.C.-A.D. 450), came from shell midden excavations (1970:97,99). Limited data from only two Locarno Beach phase sites provided Borden (1970:99) with few clues to the prevalent dwelling type or settlement pattern. However, the discovery of burials in shell middens at the Locarno Beach and Whalen sites led Borden (1970:99) to write that Locarno Beach phase mortuary practices "resemble those of later phases. The dead were buried, sometimes with a few grave additions, on the inland slope of the midden mound".

The much larger body of data available to Borden on the subsequent Marpole phase included information on architecture and settlement types. Borden is therefore more explicit in defining the relationship between mortuary practices, shell middens, and villages. Data from four sites prompted Borden to surmise that, in general, the historic Northwest Coast culture pattern was in place by the Marpole phase. Marpole people resided in villages, likely in large plank houses arranged in rows along the shore, and buried their dead "on the inland slope of the village midden" (Borden 1970:105). Borden understandably linked occupied villages with their accumulating shell middens. However, he associates occupied villages and active shell middens with shell midden burials, making all three coeval phenomena. Subsequent analyses of Marpole mortuary practices reiterate Borden's assertion (Burley 1980:28; 1988:59), giving rise to the untested though durable supposition that Marpole villagers buried their dead in the refuse midden accumulating behind occupied houses.

In an overview of Northwest Coast burial practices, Jerome Cybulski (1992:167) points out that there is little evidence on which to base the conclusion "that past, prehistoric midden burials on the British Columbia coast were contiguous and coeval with village occupations, although this is generally assumed by most archaeologists". Drawing on evidence from the Greenville site in west-central British Columbia, Cybulski (1992:167) suggests that villages may have been abandoned periodically, "during which time the accumulated shell refuse was used as a repository for the dead from neighbouring occupied areas"; (see also Arcas 1992:130; 1999). In other words, the dead were not placed in active shell middens, but rather in abandoned middens that served as cemeteries.

Borden and Cybulski present contrasting reconstructions of ancient Coast Salish mortuary practices that can be restated with reference to a definition of a formal cemetery as a "permanent, specialized bounded area for the exclusive disposal of [a] group's dead" (Goldstein 1981:61). The use of some abandoned Coast Salish shell middens as bounded, specialized disposal areas for the dead can be taken to reflect a mortuary practice that included the creation and maintenance of formal cemeteries. Conversely, placement of the dead in accumulating refuse middens adjacent to occupied houses implies that the ancient Coast Salish did not create and maintain formal cemeteries removed from the day-to-day activities of the living. The deliberate nature of mortuary behaviour and the fact that all societies maintain cultural parameters for appropriate disposal of the dead (Carr 1995) means that the difference between burial of the dead in developing shell middens versus abandoned shell middens is not trivial in terms of reconstructing ancient mortuary practices and the inferences drawn from those reconstructions. Data from recent excavations at the Somenos Creek site support the view that in at least some cases, shell middens and shell midden burials represent distinct cultural events, and that the shell middens of some abandoned settlements were used as formal cemeteries.

The Somenos Creek Site

The Somenos Creek site is a small inland shell midden located on the north bank of Somenos Creek, a tributary of the Cowichan River (Figure 11:1). The site first came to the attention of archaeologists in 1992 when land development resulted in the disturbance of human burials. Archaeologists called to the site recovered skeletal remains of at least 11 individuals (Warner 1993; Cybulski 1993). More than half of the shell deposit had been removed and replaced with construction fill before construction came to a halt (Figure 11:2). The remaining portion of the shell midden situated north of the construction zone formed a low 25x30 m by up to 0.50 m thick mound on the low-gradient creek bank.

The type of grave inclusions associated with five reasonably intact burials, evidence of fronto-occipital cranial deformation, and two radiocarbon assays, one of 1540 ± 70 years BP on human bone from an intact burial and another of 2510±70 years BP (uncorrected) on marine shell indicated a Marpole phase occupation to Jane Warner (1993), the investigating archaeologist. In a report prepared for Warner, Cybulski (1993) notes the considerable discrepancy between the radiocarbon ages for the human bone and marine shell. As one possible explanation, Cybulski suggests that each of the two dates may represent culturally distinct events—an early date on a shell midden, and a later date on a cemetery. Subsequent extensive excavations and radiocarbon analyses supported this proposition.

Excavations and Analysis

An abbreviated description of the Somenos Creek field and analytical methods is provided here. A full presentation of methods and results can be found in the Somenos Creek site excavation report (D.R. Brown 2000).

The mitigation objectives for the Somenos Creek site were to locate and recover through controlled excavation all human remains, and to document other archaeological characteristics of the site. Locating unmarked burials in a large area quickly, effectively, and with minimal damage to the burial features poses a significant challenge in archaeological fieldwork. Faced with this challenge, one of the goals of the project was to test the effectiveness of electronic remote sensing in locating subsurface features, including human burials. An electronic survey of the Somenos Creek site identified 6 localized subsurface peculiarities defined by anomalous conductivity measurements (Cross 1994; D.R. Brown 2000). Unfortunately, controlled excavations at each of these locations exposed only one non-mortuary rock feature, and no burials. Nonetheless, these initial six 2 x 2 meter and 1 x 1 meter excavation units along with mechanical trenching and manual cleaning of the exposed edge of the shell midden provided information on stratigraphy, content and composition of the shell midden, and most of the radiocarbon samples used to date the midden.

An alternate approach to pinpointing burials with remote sensing was to excavate the site in thin arbitrary levels in order to expose burial features. Manual excavation of such a large area would have been prohibitively expensive and time-consuming, so we employed a small tractor

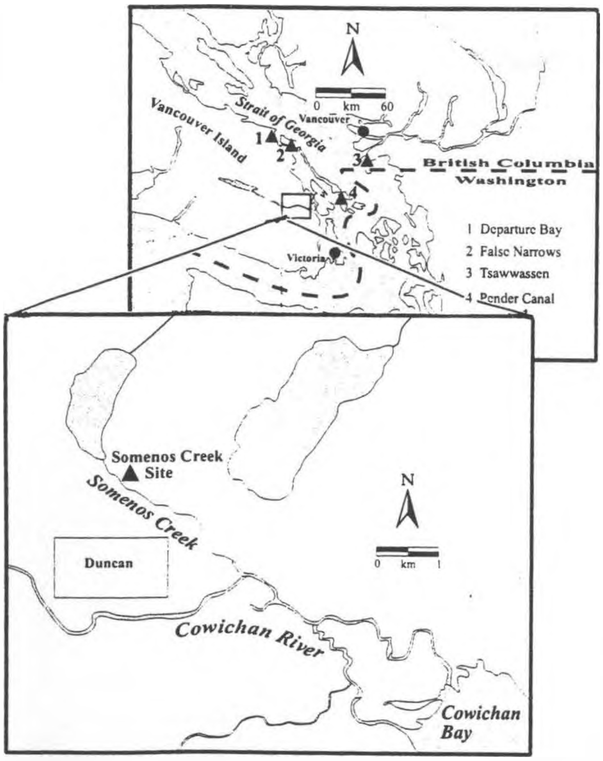


Figure 11:1. **Location of the Somenos Creek Site and other referenced Sites in the southern Strait of Georgia Region.**

equipped with a backhoe to expedite this stage of the excavations. The backhoe was equipped with a 62 cm-wide smoothing bucket (a wide backhoe bucket with a toothless cutting edge) that allowed us to remove material in 5-10 cm thicklayers. Archaeologists closely monitored the skimming operation and flagged any possible features that were then excavated by hand. With the permission of Cowichan Tribes, the recovered human remains were analyzed in the Laboratory of Archaeology at the University of British Columbia, and samples of human bone prepared and submitted for radiocarbon and stable carbon isotope analysis. Following analysis, all human remains, including those recovered in 1992, were re-interred at the Somenos Creek site in November 1994 under the direction of Cowichan Elders. Artifact and faunal analyses were also carried out in the Laboratory of Archaeology at the University of British Columbia.

Radiocarbon Dating and Site Chronology

Chronological information on the Somenos Creek site is provided by twelve radiocarbon assays (Table 11:1). Ten of the twelve radiocarbon samples were recovered during the 1994 excavations and sent to the Department of Geology Radiocarbon Dating Laboratory at Washington State University for analysis. Two of the twelve

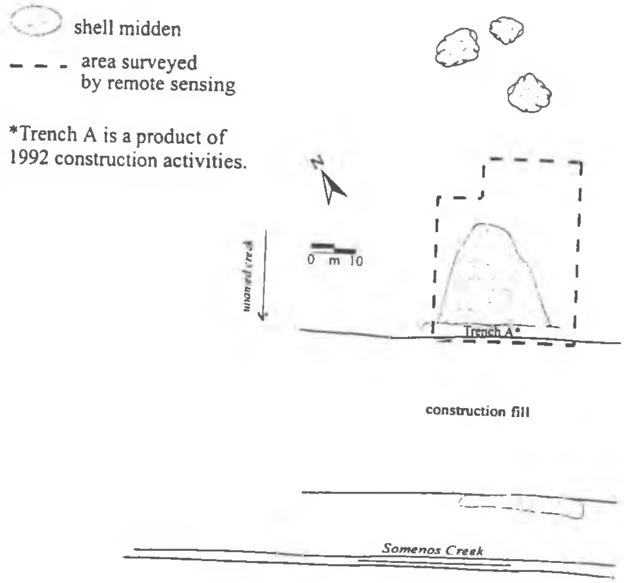


Figure 11:2. **The Somenos Creek Site.**

dates used here come from the 1992 salvage operation (Warner 1993).

Values on human bone collagen have been corrected for isotopic fractionation, as has the value for marine shell provided by Warner (1993). All dates were calibrated using Radiocarbon Calibration Program Rev 3.0.3c developed by the Quaternary Isotope Lab at the University of Washington (Stuiver and Reimer 1993). Uncorrected, corrected and calibrated values from radiocarbon assays appear in Table 11:1. With the exception of sample WSU-4618, each value is deemed to date the feature or stratigraphic unit with which it was associated. WSU-4618 was recovered from a stratum some 40 cm below the shell midden, yet is younger than the four other dates associated with the shell midden. I therefore rejected WSU-4618.

Results of the radiocarbon analysis show that prehistoric use of the Somenos Creek site divides into three periods, each reflecting a distinct cultural activity (Figure 11:4). Period I begins approximately 4000 years ago and ends around 2300 years ago when shell is first deposited at the site. Period I is the earliest, longest, and least understood segment of the archaeological sequence at the Somenos Creek site, and is discussed here only in brief. Period II follows Period I, and spans the 250-500 year period of shell midden development.

The first dated burial marks the transition to Period III some 1850 years ago. For the following three or more centuries, the Somenos Creek site was used exclusively as a place to bury the dead. There is no archaeological evidence of prehistoric use of the site following Period III.

Table 11:1. Radiocarbon dates for the Somenos Creek site.

Lab Number	Material	Archaeological Association	14C Age (years BP)	Corrected for isotopic fractionation	Calibrated Age (years BP) 1 Sigma	Relative Contribution to Probabilities
[1]WSU-4618	charcoal	Layer D	2080 ± 70		2123-1952	1.00
WSU-4619	charcoal	shell deposit	2230 ±70		2320-2284	0.21
					2276-2151	0.79
WSU-4620	charcoal	Feature A	3750 ±190		4403-4370	0.05
					4356-3872	0.95
WSU-4621	charcoal	shell deposit	2220 ±70		2317-2222	0.57
					2218-2147	0.43
WSU-4622	charcoal	shell deposit	2190 ±85		2318-2108	0.97
					2084-2077	0.03
WSU-4623	charcoal	burial (Ind. 19)	1335 ±60		1295-1226	0.69
					1215-1179	0.31
WSU-4624	bone	burial (Ind. 23)	1350 ±60	1530 ±60	1500-1466	0.22
					1450-1425	0.16
					1420-1344	0.63
WSU-4625	bone	burial (Ind. 15)	1540 ±70	1720 ±70	1699-1643	0.36
					1638-1541	0.64
WSU-4626	bone	burial (Ind. 20a)	1380 ±70	1560 ±70	1519-1385	0.94
					1368-1358	0.06
WSU-4627	bone	burial (Ind. 22a)	1660 ±60	1775 ±60	1738-1601	0.89
					1596-1574	0.10
[2]AECV-1689Cc	shell	shell deposit	2510 ±70	2100 ±70	2143-1981	0.95
					1971-1958	0.05
[2]Beta-58221	bone	burial (Ind. 1)	1540 ±70	1690 ±70	1696-1648	0.26
					1635-1520	0.74

[1] Rejected. [2] Samples recovered and reported by Warner (1993).

Period I (ca. 4000-2300 BP)

The remains of what appears to have been a large steaming or roasting feature located just north of the shell midden marked the known initial use of the Somenos Creek site (Feature A, Figure 11:2). A sample of charcoal from this feature (WSU-4620) was recovered from a thin, continuous layer of charcoal, ash and oxidized silt near the bottom of a densely packed mat of fire-altered rock. This sample returned a date of 3750±190 radiocarbon years BP. Feature A is consistent with other archaeological roasting or steaming features used to process plant or animal resources. Evidence for the re-use of rocks forming the feature and the absence of evidence for other types of site use suggest that people may have visited the site seasonally for short periods of time to harvest and process food resources. How long and how often the Somenos Creek site was used for this purpose remains unknown.

Period II, The Shell Midden (ca. 2300-1850 BP)

Three radiocarbon dates on wood charcoal recovered during the 1994 excavations and one corrected date on shell from the 1992 salvage project (AECV-1689Cc, Warner 1993) help define the period of shell midden development. Two of the dated charcoal samples, WSU-4619 (2230±70 BP) and WSU-4621 (2220±70 BP), were recovered from horizontally separated

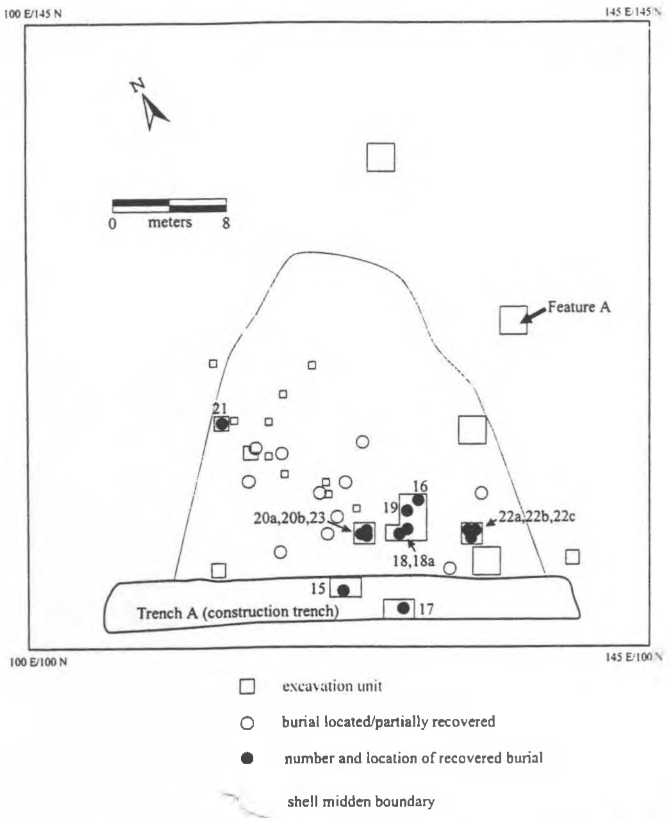


Figure 11:3. **Excavation Units and Archaeological Features at Somenos Creek.**

bands of charcoal and ash at the bottom of the shell deposit, and are assumed to correspond to the initial deposition of shell at the site. The third charcoal sample, WSU-4622 (2190±85 BP), was collected from a charcoal-rich lens at the approximate mid-level of the shell deposit. Taken together, the dates on char- coal represent a calibrated age range from 2077 to 2303 years BP for the lower half of the shell deposit (Table 11:1). At 1 sigma, the calibrated and corrected date of 1958 to 2143 BP on marine shell collected by Warner (AECV-1689Cc, 1993) overlaps with the date range for the three samples tested by the WSU radiocarbon lab. The stratigraphic position of the dated shell sample is unknown beyond the fact that it was associated with a human burial (Warner 1993:22).

No dates are available from the top of the shell midden to indicate when deposition of the shell ceased. Nonetheless, the close correspondence of the four available shell midden dates and the absence of any stratigraphic breaks that would signal a hiatus in midden accumulation suggest midden at the Somenos Creek site developed over a 250 to 500 year period beginning around 2300 years ago. This age range corresponds to the first half of the Marpole culture phase.

Shell Midden Stratigraphy and Composition

The internal stratigraphy of the Somenos Creek shell midden exhibited some continuous discrete strata, but for the most part consisted of discontinuous layers and lenses of consolidated coarse to finely crushed shell in a very dark gray (10YR 3/1) silt matrix. Intact and large fragments of shellfish valves were found scattered throughout the deposit. Occasionally, we encountered a discrete cluster of whole and nearly whole shellfish valves of a single species presumed to represent a single discard event. Shell content of the deposit ranged from 5-85 percent by volume. The shell fraction consisted of the remains of cockles (*Clinocardium nuttallii*), bay mussel (*Mytilus edulis*), little-neck clam *(Protothaca staminea)*, butter clam (*Saxidomus giganteus*), a variety of barnacle species (*Balanus spp.*), and limpets (*Fissurella volcano*) ranging from fine fragments to intact valves and plates. A seasonality study using a small sample of 9 pieces of shell (3 each of butter clam, little neck clam, and basket cockles) shows they were gathered sometime between early spring and late summer (Vanags 1996).

Shell Midden Cultural Contents

The shell deposit produced artifacts of stone and bone consistent with the Marpole culture phase (Burley 1980; Mitchell 1971). Abraders of various sizes and shapes dominate the artifact assemblage, followed by the products of ground stone and bone industries, including ground stone and bone points, ground stone knives, celts, bone awls and toggling harpoon valves. Celts and perhaps palm-size abraders indicate that woodworking activities likely took place at the site. One of the most interesting artifact types associated with the shell midden is represented by a collection of chipped slate bifaces. Some of these have abraded surfaces, and all appear to be preforms for large ground stone blades or points. The abundance of abraders and slate preforms and a dearth of chipped slate debitage suggest tool blanks were roughed out elsewhere and brought to the site to be finished.

NISP (number of identified specimens) values for vertebrate fauna show that fish remains dominate the shell midden faunal assemblage. They are represented by such species as Pacific herring (*Clupea harengus pallasi*), salmonid (*Oncorhuyncus* sp.), and spiny dogfish (*Squalus acanthius*). Mammalian remains include those of deer (*Odocoileus* sp.), harbour seal (*Phoca vitulina*), and unidentified fragments of large and small land mammals. Recovered bird remains were mostly waterfowl (Family *Anatidae*).

Fire-altered rock was found dispersed throughout the shell deposit and in several dense lenses. Lenses and thin, continuous bands of charcoal and ash were also encountered, as were lenses of burned shell and ash. Fragments of charcoal were ubiquitous in the shell midden.

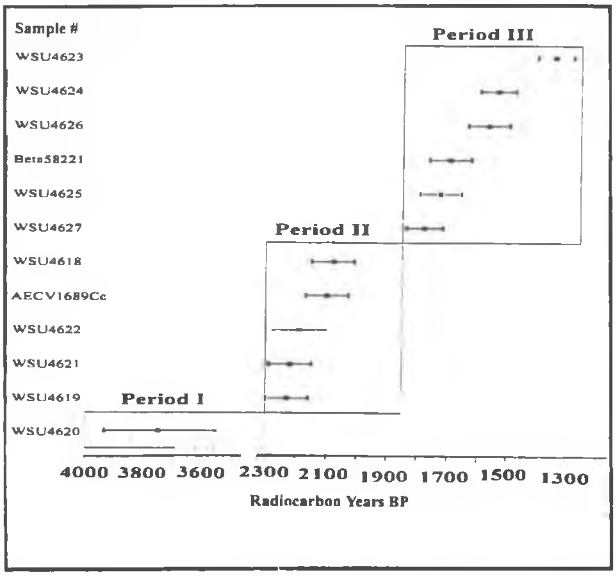


Figure 11:4. **Radiocarbon Dates and Period-boundary Estimates.**

Period III, Human Burials (ca. 1850-1250 BP)
Shortly after accumulation of the shell midden ceased, the Somenos Creek site began to be used as a place to bury the dead. Five corrected dates on human bone collagen from five individuals range from 1530±60 (WSU-4624) to 1775±60 (WSU-4627) radiocarbon years BP (Table 1). The addition of a sixth date on wood charcoal associated with Individual 19 (WSU-4623) shifts the late end of the range to 1335±60 BP. The use of old wood for the cremation event would make the actual date for this burial even younger. In any event, disposal of the dead was an activity carried out at the Somenos Creek site for at least 300 years. Mortuary activities at the Somenos Creek site mark the last known prehistoric use of the site.

Human Osteology and Stable Carbon Isotope Analysis

The remains of fourteen individuals fully excavated in 1994 are the focus of this paper. I will not discuss the ten burials encountered but not fully excavated, other than to note that at least four were slab burials and the rest unelaborated shallow pit burials.

The human remains recovered at Somenos Creek in 1994 were in generally poor condition. In many cases the cranium and long bones were crushed and fragmented. Some elements dissolved into powder during recovery, and some skeletons were incomplete. Moreover, all of the burials were encountered in the course of mechanical skimming, an operation that all too frequently disturbed the burials prior to controlled excavations. The overall poor condition of the human remains set limits on the obtainable data. Nonetheless, analyses produced enough information to make some useful statements regarding the Somenos Creek burial population.

Appendices A and B in the site report (D.R. Brown 2000) contain, respectively, the reports on the osteological and stable carbon isotope analysis of the Somenos Creek population conducted by Brian Chisholm at the University of British Columbia. Some of the results of Chisholm's analyses are presented in Table 11:2.

Chisholm found the Somenos Creek individuals to be generally more robust in comparison to the individuals of the Marpole period recovered from the Tsawwassen site on the British Columbia mainland (Figure 11:1). He is quick to caution however, that the measurable Somenos Creek sample contains only five poorly preserved adults, making it impossible to state definitively whether the two groups represent the same or different populations. Non-metric traits, on the other hand, provide no indications that the Somenos Creek individuals were from a different population than those from the Tsawwassen site. Chisholm (2000a) thinks the two samples may represent different lineages within the same population.

Stable carbon isotope analysis showed that, with two exceptions, the eleven measurable individuals from the Somenos Creek site obtained about 80±10 percent of their protein from marine sources (Chisholm 2000b). This is about 5 percentage points lower than the expected values for people living in the southern Strait of Georgia region, and indicates that the individuals interred at Somenos Creek were subsisting on lower trophic resources than others in the region. For example, the stable carbon isotope values for 14 individuals found at the Departure Bay site near Nanaimo (Figure 11:1) averaged -13.4 (Arcas 1994) compared to a mean value of -14.2 for the Somenos Creek burial sample. The variation in the two values represents a difference of one trophic level in the dietary practices between these two groups (Chisholm 2000b).

One explanation for the unexpectedly low carbon isotope values for the Somenos Creek individuals is that they were consuming relatively less salmon and more lower trophic level marine foods such as shellfish. Another possible explanation is that the people buried at Somenos Creek had relied more heavily on plant foods and/or terrestrial animals than other people in the region. The two outliers in the sample, Individuals 16 and 22a, had marine protein intake values of 52 percent and 32 percent respectively. C:N ratios for these two individuals are within the acceptable range, which means that these values are the result of actual dietary differences; they ate more terrestrial protein than the other individuals (Chisholm 2000b). Individual 16 is an infant of about 2.5 years of age. Individual 22a is an adult male of about 45 years and the oldest member of the group.

The possibility that age was a factor in diet cannot be ruled out (see for example Jenness 1934-35:71 on historic variability by age in Coast Salish diets). However, it is worth noting that Individual 18, an infant of approximately 16 months, Individual 23, an infant of three or four years, and Individual 22c, a child of approximately five years of age, all exhibit stable carbon isotope values that correlate closely with most of the adult members of the burial population. In addition, Cybulski (1993) reports a single carbon isotope value from the 1992 salvage project (Individual 1) of -15.5 per mil that translates to a protein intake from marine sources on the order of 65 percent. This individual was an adult male between 24 and 28 years of age. The fact that remarkably low stable carbon isotope values cross-cut age and sex lines suggests that these factors alone cannot explain the apparent dietary differences, at least in this small sample.

A gradual shift in emphasis on resource exploitation may explain the three incongruous stable carbon isotope readings for Individuals 1, 16, and 22a. Direct radiocarbon values are available on two of these three individuals (Individuals 1, Beta-58221 and Individual 22a, WSU-4627). The radiocarbon values show the individuals to have been among the earliest dated burials for the site, with Individual 22a *the* earliest burial (Table 1). The difference in diet reflected in the stable carbon isotope values may therefore represent a change in dietary practices over time rather than variability in diet among members of the group at a particular moment. Again, resolution of this question is hampered by the small sample size.

Table 11:2. Burial features and population data for the Somenos Creek site (1994 excavations).

No.	Age	Sex	$\delta^{13}C$	Radiocarbon Age (years BP)	Interment Type	Body Pos.	Cranial Deformation	Grave Inclusions
15	17-25	female	-13.9	1715 ± 70	pit(?)	flex	?	175 ground stone beads
16	2.5	?	-16.6	?	cairn	flex	?	no inclusions
17	15-20	female	-14.8	?	pit(?)	flex	?	no inclusions
18	15.5-16.5	?	-13.6	?	multiple/pit	flex	possible fronto-lamb.	no inclusions
18a	2.5	?	?	?	multiple/pit	disartic.	fronto-lamb.	332 ground stone beads; 71 pieces dentalia shell
19	?	?	-19.9[1]	1335 ± 60	cairn	semi-flex	?	?
20a	35-39	female	-13.9	1560 ± 70	multiple/pit	disartic.	fronto-lamb.	1 hammerstone
20b	16-25	?	-14.6	?	multiple/pit	flex/disartic.	fronto-lamb.	?
23	3-4	?	-14.6	1515 ± 60	multiple/pit	flex	?	693 ground stone beads
21	?	?	?	?	slab	flex	?	1 worked bone fragment; 1 obsidian microblade
22a	~45	male	-18.3	1765 ± 60	multiple/pit	disartic.	none	22 ground stone beads
22b	25-35	female	-13.7	?	multiple/pit	flex	?	1 nephrite adze
22c	~5	?	-14.8	?	multiple/pit	disartic.	?	9 ground stone beads
25	?	?	?	?	box	semi-flex	?	no inclusions

[1] Rejected

Burial Patterns

As mentioned above, land modification activities destroyed most of the southern or downslope section of the shell deposit (Figure 11:2). A 1992 site survey revealed the presence of a narrow strip of shell along the bank of Somenos Creek (Figure 11:2) (Warner 1993), a feature that no doubt marks the original southern extent of the shell deposit prior to land development. The number of burials interred in the missing portion of shell deposit is not known. However, extrapolating from the number of burials recovered and/or encountered in the 1992 and 1994 excavations, it seems likely that at least fifty individuals were interred in the intact portion of the site north of Trench A (Figure 11:2).

With one exception (Individual 25), each the burials excavated in 1994 was found in a shallow burial pit, though a number of variations on this theme occurred. In all cases where it was possible to make a determination, the burial pits appear to have been excavated into the surface of the shell deposit, though most pits, because the shell layer was thin, intruded into the underlying non-shell strata. Most of the burials were located within 10 meters of Trench A (Figure 11:2). This may reflect relatively better preservation conditions due to a thicker layer of shell in this area rather than the reality of an ancient burial arrangement.

Five interment types characterize the excavated burials from Somenos Creek: (1) unelaborated individual shallow pit burial, (2) slab burial, (3) cairn burial, (4) box burial, and (5) multiple interments in a shallow pit (Table 11:2). With one exception, this typology follows that used by Burley (1988) for the False Narrows burial sample. In a departure from Burley (1988:56), I treat multiple burials as an exclusive burial form. I take this approach based on evidence from Somenos Creek that shows multiple burials to be a deliberate mortuary practice, with examples occurring throughout the period during which the site was used as a cemetery.

Pit Burials (n=2)

Unelaborated pit burials formed perhaps the most problematic burial type at the Somenos Creek site. It was difficult to gauge whether the absence of a boulder over a burial pit reflected the actual burial practice, or was attributable to historic land modification and agricultural activities. Mary Stone (personal communication, 1994) reported that her grandfather was the first to farm the land on which the site is located. She related how, after especially cold winters, human remains and artifacts would appear on the surface. Given how close the shell deposit/burials are to the ground surface, boulders capping burials probably would have projected from the surface as well. It therefore seems likely that such boulders would have been removed to prevent damage to farm implements.

In addition, two burials (Individuals 15 and 17) were encountered in Trench A, where a bulldozer had removed most of the shell deposit in 1992. Though categorized as pit burials, this assignment carries with it the caveat that any boulders would have been displaced prior to our excavations. In short, the known and probable historic disturbance of boulders capping burials makes the so-called unelaborated pit burial at the Somenos Creek site the most analytically problematic of the five burial types.

Slab Burial (n=1)

The fully excavated slab burial at the Somenos Creek site featured a single, 18 kg stone slab over a shallow burial pit. Some of the partially excavated slab burials appeared to follow this pattern as well. In all cases where body position could be determined, the individual had been interred in a flexed or semi-flexed position.

Cairn Burials (n=2)

Two cairn burials represent the third burial type. They were located within half a meter of each other, and both were partially disturbed by the backhoe. Three boulders dislodged by the backhoe were associated with these two burials, though there is no way of knowing to which burial each boulder belonged. Controlled excavations exposed additional boulders *in situ* over each burial. Several cobbles and two boulders each weighing approximately 20 kg were found in place over Individual 16, an infant interred in a flexed position. One of the boulders forming the intact portion of the cairn showed heavy abrasion on one surface. No other artifacts were found in clear association with this individual.

The intact portion of the cairn capping Individual 19 featured four boulders, again each weighing approximately 20 kg. Carefully positioned atop the burial cairn was a charred, upturned fragment of a large mammal cranium. Though unusual, this detail is similar to a False Narrows burial described by Burley (1989:56) where a number of intact horse clam valves were found clustered on top of a small cairn.

The remains of Individual 19 were extremely fragile and showed evidence of having been burned *in situ*. Oxidized soil lined the burial pit and overlaid the burial itself. The hottest portion of the fire appears to have been concentrated near the cranium, which was white. Sub-cranial elements were black and yellow-brown, colours indicative of lower burning temperatures (McCutcheon 1992). Several large chunks of charred wood accompanied the burial, giving the impression that the body was burned after being placed, in a semi-flexed position, in a shallow pit. Incomplete combustion of the wood and oxidization of some of the overlying pit fill indicate that the burial pit was probably filled in before the fire died out. No artifacts were found interred with this individual.

High variability within the small sample of burned human remains reported for Strait of Georgia sites makes it difficult to explain their occurrence. Even though they are rare, burned human remains have been recovered from all three of the most recent mound and cairns (Pickford 1947), caves and rock crevices (Curtin 2002) and, of course, shell middens (e.g. Miotchell 1971; Arcas 1994). These and other problems not withstanding, one advance in the interpretation of burned human remains comes from Joanne Curtin's (2002) comparitive analysis of the Marpole burial population from the False Narrows midden with a roughly contemporaneous set of burials discovered nearby in a series of inland rock crevices and small caves (Figure 11:1). Curtin found no discernable differences in the demographic and social profiles of the two populations. She did, however, find a high frequency of certain pathologies (perimortem trauma and treponomeal disease) in the cave/crevice population and evidence for a corresponding pervasive use of fire in the mortuary treatment of cave/crevice individuals with these pathologies. Instnces of burning focused on obvious pathologies suggested to Curtin that the application of fire may have been designed to ritually cleanse the deceased or heal the spirit. This may have been the case for the individual cremated at Somenos Creek, although the condition of the remains precluded a search for pathologies.

Box Burials (n=1)

The fourth interment type found at Somenos Creek is represented by a single box burial. Individual 25 was found in a semi-flexed position embedded in a fine silt matrix stained several shades darker than the surrounding sediments. This dark patch was clearly rectangular in shape with three straight sides and three distinct right-angle corners. The end near the head was irregular rather than straight. A single boulder disturbed by the backhoe was associated with this burial. Burley (1989:55) suggests that such boulders may have served as lid weights for box burials or lids for box burials without wooden lids, though he questions the practical need for a lid weight for below ground burials. Alternate explanations for the use of single slabs/boulders and rock cairns include the symbolic suppression of the spirit of the deceased (e.g. McIlwraith 1948,vol.1:437), grave markers, and the durable remnant of some sort of funerary ritual. The association of a burned fragment of large mammal cranium at Somenos Creek and shellfish valves at False Narrows with burial cairns adds some weight to the latter explanation.

Multiple Interments (n=3)

Two shallow-pit multiple interments of three individuals each, and one burial containing two individuals, were encountered in the course of the 1994 excavations. A careful reading of the report on the 1992 salvage operation (Warner 1993) suggests that at least one group of individuals recovered at that time also may be interpreted as a multiple burial.

One of the multiple interments excavated in 1994 included an adult female, and an infant and juvenile of indeterminate sex (Table 11:2). The partial, unarticulated remains of Individual 20a, an adult female, were found adjoining, almost touching, the articulated lower skeleton of Individual 20b, a juvenile. Found immediately above these remains was the flexed, fully articulated skeleton of an infant, Individual 23. Clustered adjacent to Individual 23 were the missing skeletal elements, including the crania, of Individuals 20a and 20b. It appears as though the inhumation of Individual 20b resulted in an initial disturbance of Individual 20a. In turn, the interment of Individual 23 resulted again in the disturbance of Individual 20a, and the partial disturbance of Individual 20b. The skeletal elements of these two individuals removed in the course of digging the burial pit for Individual 23 were re-interred with Individual 23. However, the re-interred remains of Individuals 20a and 20b were not scattered in a haphazard fashion within the burial pit. Rather, the tight clustering of the remains suggests they were probably wrapped in a blanket or mat, or otherwise bound together prior to re-interment with the remains of Individual 23. Radiocarbon analysis of two of these three individuals shows that, in all likelihood, they were buried within a short time of each other (Table 11:2). The details of this multiple interment point to a series of deliberate acts as opposed to the random, accidental disturbance of burials. Finally, 693 ground stone beads formed a multi-strand necklace around the neck of Individual 23, the infant, making it the richest burial encountered in the 1994 excavations. Two other artifacts are assigned to this multiple burial—a hammer stone and a partially worked bone fragment found near the lower-most remains of Individual 20a.

The second multiple interment encountered in the 1994 excavations included an adult male, an adult female, and a child of approximately 5 years of age (Individuals 22a, 22b and 22c). The remains of all three were largely disarticulated and intermingled. Artifacts associated with this burial include a nephrite celt and a number of ground stone beads (Table 11:2).

Individuals 18 and 18a, an adolescent and an infant of unknown sex, form the third multiple interment recovered in 1994. Unfortunately, the burial was disturbed by the backhoe in the course of excavating Trench B. Several hundred ground stone beads and 71 dentalia shell fragments recovered from the backdirt of Trench B have been assigned to Individual 18a, the infant, based on the fact that no beads were found with the intact upper skeleton of Individual 18.

A possible fourth multiple interment is reported by Warner (1993) that includes the richest burial recorded during the 1992 salvage operation. A necklace composed of 17 dentalia shell fragments adorned Individual 4, a 2.5 year old of indeterminate sex. In addition, a small copper wafer found in the screen was attributed to Individual 4 based on copper salt stains on the front of the mandible (Cybulski 1993; Warner 1993). Warner does not indicate whether the remains of Individual 4 were articulated. She does report, however, that the remains of Individual 4 "were interred directly below those of Individual 1" (Warner 1993:14), represented by the articulated, flexed *post-cranial* remains of a 24-28 year old adult male. The cranium of Individual 1 was recovered along with the disarticulated remains of two adults, one female and one probable female, and a juvenile of approximately 10 years of age. A radiocarbon assay on bone collagen from Individual 1, the only dated burial from the 1992 salvage operation, returned a corrected date of 1690±70 BP (Beta-58221) (Cybulski 1993; Warner 1993).

Radiocarbon dates on Individuals 23 and 20a show that they were interred around the same time, perhaps within a few decades of each other. This suggests a similar pattern for the other multiple interments, whereby each represents a series of inhumations over a fairly short period of time intended to group a particular set of individuals. In addition, available radiocarbon values on the multiple interments (Table 11:2) suggest this was an ongoing practice at Somenos Creek during the entire period when the site was used as a cemetery.

Summary of Periods II and III

Figure 11:4 illustrates how radiocarbon dates for the Somenos Creek site cluster in accordance with three distinct activities. Of interest in this study is the temporal relationship between the activities related to shell deposition and those related to disposal of the dead. Exactly when people stopped depositing shell on the site is not clear. However, the dates for the shell midden and the dates for the human burials form two discrete clusters that show the shell deposit to be older than the burials. A Monte Carlo two sample test for significance using a mean value of 2213 for the three wood charcoal radiocarbon dates on the shell deposit against the six values on human burials showed that the mean value (2213) came up only 13 times out of 500, or 2.6 percent of the time. This translates to a probability of only 0.0026 that the two sets of dates come from the same population. These results are compelling, and provide the basis for the inferences to follow. It must be remembered, however, that the sample of radiocarbon dates for the shell midden and burials is small.

A comparison of the ranges for radiocarbon dates on wood charcoal associated with the shell deposit (WSU-4619, WSU-4621, WSU-4622) shows that all three dates overlap significantly at 1 sigma. *In situ* development of the shell midden is demonstrated by discontinuous layers and lenses of crushed shell interlaced with thin bands of charcoal and ash, the presence of small, discrete clusters of shellfish valves of a single species, and intact or nearly intact shell valves lying in a horizontal position. *In situ* midden development is also demonstrated by the presence of burned shell and ash lenses within the shell deposit. The absence of buried A horizons or other stratigraphic breaks suggest continuous, uninterrupted midden accumulation.

Taken together, the radiocarbon and stratigraphic evidence supports the view that the Somenos Creek shell deposit is a refuse midden that developed gradually over the course of at least three centuries, likely in association with a small settlement. The relatively high frequency of abraders and chipped slate preforms is consistent with a base camp type of settlement, as is the wide range of faunal remains, including the relative abundance of marine fish species and, of course, the shell debris itself. The most plausible scenario is that the shell midden developed in association with a permanent, year-round settlement that likely featured substantial houses.

Significantly, none of the recovered burials is associated temporally with the occupation that resulted in the shell midden. Instead, about 1850 years ago site use shifted from a settlement to a cemetery. The radiocarbon date distribution shows development of the shell midden ceased at or about the time the first of fifty or more individuals was interred at the site (Figure 11:4). This type of shift in site use contradicts the widely accepted view of Marpole burial practices in which the dead were buried in accumulating shell middens behind occupied houses (Borden 1970:105; Burley 1980:28). The Somenos Creek data show that at least in some cases, burial practices involved placement of the dead in abandoned shell middens.

The hypothesis that some abandoned shell middens served as cemeteries appears to account for observations reported for other southern Strait of Georgia sites. For example, stratigraphic evidence from excavations at the Departure Bay site near Nanaimo (Figure 11:1) indicates "the burials were placed into the midden deposits after the deposition of the shell during the early Marpole period" (Arcas 1994:130). Radiocarbon dates show that 5 individuals were interred in an abandoned shell midden at the Tsawwassen site on the British Columbia mainland (Figure 11:1), and suggests people were using abandoned shell middens as cemeteries as early as 4000 years ago (Arcas 1999). These examples do not imply that burials were placed only in abandoned shell middens, or that all Northwest Coast shell middens containing burials were formal cemeteries. Clearly, the full scope of the relationship of shell midden burials to shell middens has yet to be determined.

Discussion

Independent radiocarbon analyses of the shell midden and burial assemblage at the Somenos Creek site demonstrate that the shell deposit and human burials were not contemporaneous. At some point people abandoned the settlement at Somenos Creek and the site became a cemetery, a function it served for at least 300 years. This challenges the long-held assumption that southern Strait of Georgia shell midden burials are coeval with active refuse middens and occupied settlements. The evidence instead supports the view that the presence of burials in a shell midden may reflect a period during which the site was used exclusively as a cemetery.

Cross-cultural studies of mortuary practices among small-scale societies have demonstrated a strong correlation of formal, permanent and specialized disposal areas for the dead with corporate group control of crucial resources. Anthony Saxe (1970), using ethnographic data on societies from around the world, developed a set of hypotheses correlating mortuary practices with social action and societal organization. Saxe's Hypothesis 8 states that when control of restricted resources is crucial, groups are more likely to maintain formal places for the disposal of their dead than dispersed or random grave sites (1970:119). Lynn Goldstein (1981:61) reviewed the ethnographic data studied by Saxe and restated Hypothesis 8 in three interrelated sub-hypotheses. She is precise in her definition of a cemetery and the conditions under which the cemetery hypothesis accounts for details of ethnographic societies. Goldstein points out that corporate group control over crucial resources does not necessarily mean the group will have a formal disposal area, but does note that

> if a permanent, specialized bounded area for the exclusive disposal of the group's dead exists, then it is likely that this represents a corporate group that has rights over the use and/or control of crucial but restricted resources. This corporate control is most likely to be attained and/or legitimised by means of lineal descent from the dead, either in terms of an actual lineage or in the form of a strong, established tradition of the critical resource passing from parent to offspring

Goldstein also discovered the more organized and formal the disposal area, "the fewer alternative explanations of social organisation apply".

The Somenos Creek site during the period of its use as a burial repository is consistent with Goldstein's (1981) concept of a cemetery. The permanent and specialized nature of the site is demonstrated by an absence of archaeological evidence of other kinds of site use during the extended period of burial interment, and the separation of the site during this time from any potentially contemporary settlement. Defining the site as a bounded space and assigning group affiliation to the Somenos Creek burial population on the basis of archaeological evidence are more challenging problems. We found no burials outside the boundaries of the shell midden at somenos Creek, but the question remains whether this represents enhanced preservation conditions within the midden or instead reflects the deliberate placement of burials within the confines of the shell deposit. Given the association of rock cairns a d individual rock slabs with many of the burials, one potential test for determining if burials extend beyond the shell midden would be to search for individual rocks and rock clusters that may cap burial pits. In the absence of contradictory information, it seems reasonable to surmise that the Somenos Creek shell midden served as the focal point if not the demarcated area for burial placement.

I infer group affiliation of the Somenos Creek burial population based on the long-term use of an abandoned settlement as a burial site, and the presence of multiple burials. By its very nature a village site would be synonymous with the ancestors who established and occupied it, and it seems unlikely that the historical significance of a living group's ancestral village site would be diminished even if it were no longer occupied. Instead, burial of the dead in such a place would serve to express group identity and confirm an individual's ancestral connection to a people and place.

As noted multiple interments occurred throughout the period in which the Somenos Creek cemetery was in use, and their appearance seems to reflect a deliberate practice designed to place related individuals, no doubt kin, together as opposed to the accidental disturbance of older burials (see also Burley 1988:56). L Wason (199:89) in a study of the few available ethnographic examples of collective or multiple burials, found that the "groupings were always 'family' based, either extended or lineage". Such groupings were also true for the mortuary houses of the Tlingit (Krause 1956:91), and appear to be true for the historic use of mortuary houses among the Coast Salish (Barnett 1955;, Duff 1952:49, 94; Suttles 1974). Certainly DNA analysis would have helped to clarify the genetic relationship of individuals in the multiple burials, the possible relationships among the individuals in the Somenos Creek burial population, and how these individuals might be related to other groups in the region.

Based on the Sxe/Goldstsein hypothesis then, the existence of a cemetery at Somenos Creek and perhaps other Northwest coast sites implies a form of socio-economic organization in which corporate groups "function as individuals in relation to property" (Hayden and Cannon 1982:134; Hayden et al. 1996). These groups would be expected to invoke ancestral connections to validate membership rights of access to assets and resources controlled by the group, and inheritance schemes. Not surprisingly, these characteristics describe the ethnographic Coast Salish "genealogical family" (Jenness 1934-35:52) or household (Suttles 1990:464).

Many archaeologists find the Saxe/Goldstein hypothesis to be useful in the analysis of mortuary sites (e.g. Buikstra and Charles 1999; Morris 1991; se also J.A. Brown 1995). Nonetheless, the Saxe/Goldstein hypothesis is limited in its ability to account for mortuary behaviour. Operating within the processualist assumption that social organization was the proximate cause of mortuary patterning (Tainter 1978; Rothchild 1979), Saxe and Goldstein incorporated aspects of social organization and circumstances of death into their cross-cultural study to the exclusion of contextual and cultural factors. A more recent cross-cultural study by Christopher Carr (1995) found that the causes of mortuary behaviour were typically more complex and multivariate than often assumed. Carr discovered that nearly all of the aspects of the archaeological record used to reconstruct social organization were frequently influenced by balanced combinations of religious/philosophical factors (i.e. beliefs and assumptions regarding things like disease, dying, death, the soul, the afterlife, the cosmos, and so on) and social factors.

Roy Carlson (1999) provides the necessary religious/philosophical counterbalance to the discussion of shell midden burials in the southern Strait of Georgia. According to Carlson the view that shell middens are trash heaps and that midden burials represent nothing more that the expedient disposal of bodies is inconsistent with ethnographic Coast Salish religious beliefs about the sacred nature of burials and the dead. As evidence that shell midden sites containing burials are sacred sites, Carlson describes artifacts and features recovered at the Pender Canal (Figure 11:1) site that are manifestations of ethnographic Coast Salish religious beliefs and practices. Perhaps taken together, the inferences dawn from the Somenos Creek and Pender Canal sites will give rise to further questions about the role of shell middens and shell midden burials in southern Strait of Georgia prehistory.

Notes

[1] The band of shell midden close to Somenos Creek (Figure 11: 2) is within a protected zone and was therefore not included in the mitigation excavations.

[1] Unless stated otherwise, I will use corrected, uncalibrated radiocarbon values throughout this paper. Uncorrected, corrected, and calibrated values are shown in Table 11:1.

Acknowledgements

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CHAPTER 12

A New Look at Northwest Coast Stone Bowls

GRANT KEDDIE

Introduction

One morning in the spring of 1969, I went with my field-school professor, Phil Hobler, to rediscover the Bella Coola village of Anutcix (FaSu 10) near the mouth of the Kwatna River. When we located the site and its distinct shell mound features, Phil commented on how each site is different and can tell us different things. His teaching style was to have us ask questions rather than just listen to answers. When I found the first donut stone, Phil asked me to look at the evidence and tell him what it was. Today when I look at an archaeological site I ask why is this site at this particular location? When I look at an artifact I consider the evidence it presents first, and then at the classification in the text book.

Over the years I have observed the evidence on stone figures, bowls, and combinations of these. Although many individuals such as Wingert (1952), Duff (1956; 1975), Carlson (1983c, 1993, 1999) and Hanna (1996) have presented information on this subject, there are numerous specimens in private and museum collections that have yet to be included in any study. I intend here to add a few observations and a few new pieces to this varied and complex subject.

Seated Figure and Similar Bowls

I would agree with previous authors that the seated human figure bowls are primarily associated with shamanistic rituals. They are containers of power related to the interaction between

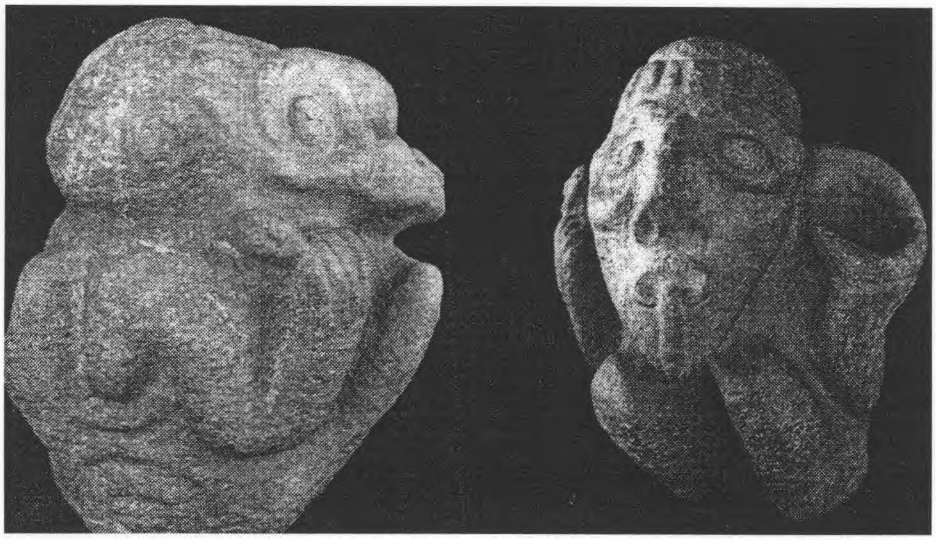

Figure 12:1. **Human Figure Bowl from a lower Columbia River private collection. (After photos by Ray Hill.)**

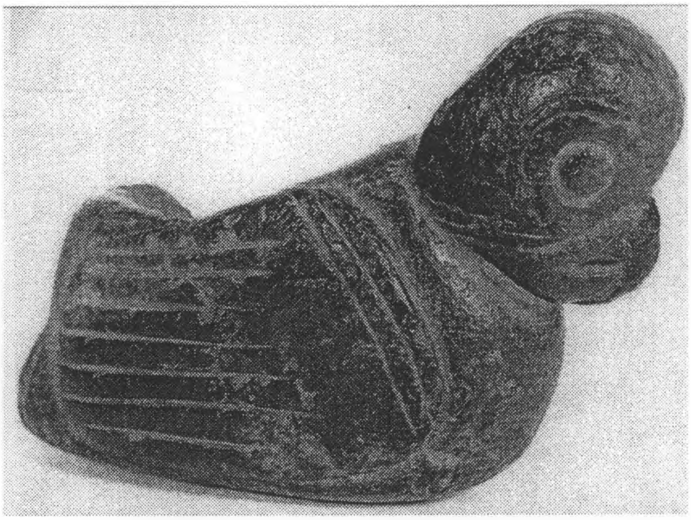

Figure 12:2. **Owl Bowl dredged from the Pitt River ca. 1890 (RBCM photo DjRpq-Y).**

humans and the spirit world. For example, Figure 12:1 from the lower Columbia River has a protruding tongue, wears a crown, and holds a rattle, all attributes associated with shamanism.

Owls, known for their strong association with shamans, are by far the most common identified birds on bowls (Figure 12:2). For example, this bowl (Figure 12:3a) from the lower Fraser River may represent an owl-human. The Lummi believe that owls have close communication with the dead and often posses the souls of the dead (Stern, 1934:81). A Saanich man, Tom Paul, said that the "saila" inside a person is the soul of an animal that has visited them in a dream. The soul becomes the "Big Owl". The shadow of a person becomes the small owl, "spalkwithe". When this owl flies through the roof of a big house it is there to talk to a medicine man or "thetha" (Jenness c.1934-36).

Figure 12:3. **Seated Human Figure Bowls. Owl-man bowl (left) (ca 15 cm high) from the lower Fraser River, (DghRpqY RBCM photo); two views of kneeling figure with bowl (right) (ca 28 cm high) from "Fraser River near New Westminster" (RBCM photos (DhRr-Y).**

Figure 12:4. **Two Views of a broken antler Harpoon with a Human Figure (missing the head) carved on its base. Saturna Is. DeRt 20:30 (RBCM photo DcRw2:1).**

Many stone figures not reported in the literature to date show similarities to those already described, but others are quite different. A unique human figure bowl (Figure 12:3b) stands in contrast to many others. It is a detailed human figure holding a bowl made of vesicular basalt, but other than the ribs, lacks the iconography usually found on either the bowl or the human. This realistic image clearly represents a fully kneeling human with a distinct round bowl on its lap. This extreme undernourished look, does, however, occur on some smaller figures with larger heads and can be seen here carved into this antler harpoon base (Figure 12:5). These extreme forms are more like later representations seen on wooden carvings on the northern Northwest Coast.

There are three examples of seated human figurine bowls from southern Vancouver Island that were ritually buried without human remains. One bowl (DcRw 2:1) was found associated with a rock pile when a large tree was uprooted 30 meters beyond a shell midden on a high bluff above Whiffen Spit in Sooke. Two human seated figure bowls were found together in a cremation pit above the Gorge waterway in south Saanich. These bowls were likely viewed as powerful objects belonging to a deceased shaman that needed to be ritually burned and disposed of away from any village. After they were dug up in a rose garden Don Abbott and John Sendy were shown exactly where they were found, and they then excavated a larger area, which included an intact cremation pit with ash lenses (Figure 12:5).

Some stone figures have attachment holes on their head or back that were probably for tying to a fixed post or wooden structure. One of the cremation pit bowls has a hollow base and two holes extending from the outside base into the hollow (Figures 12:6). This specimen, like a number of the smaller specimens, was clearly designed to fit onto, or to be pinned into a wooden post or scepter.

Analogs are known from northern China where a picture of Kuvera, known in Hindu mythology as the god of wealth is shown with a stone figure attached to his staff. Kuvera was also worshipped by Buddhists as one of the guardians of the center of the universe and the regent of the north. He is represented with snakes coming from both sides of his head and wrapped around other parts of his body. Fastened to the end of his scepter is Nakula, the Mongoose (Getty 1928:148c).

Pipes and Bowls

Borden (1983:157, Figure 8:29a) pointed out the stylistic similarity between human effigy pipes dating after 200 A.D. in the Fraser River Canyon and the more finely worked stone human sculptures. Carlson (1983c:201), linking a Saanich pipe bowl with a snake motif and the seated figure bowls, concluded that the more finely developed human stone bowl figures were actually tobacco mortars used in conjunction with pipes in the same style, and that both were employed in shamanic curing rituals involving smoking.

In further examining this question I observed all of the stone pipes in the Royal B.C. Museum collections and those represented in photographs from private collections. It became clear that there are distinct and detailed similarities between Interior pipes and Coastal bowls such as in the features of a pipe bowl face from Lytton (Figure 12:7a) and the face of a human figure bowl from near Courtenay on Vancouver Island (Figure 12:7b).

The common headpiece on these figures is probably the shaman's crown of bear claws, mountain goat horns, or teeth. Examples of teeth with double drill holes that were joined in rows

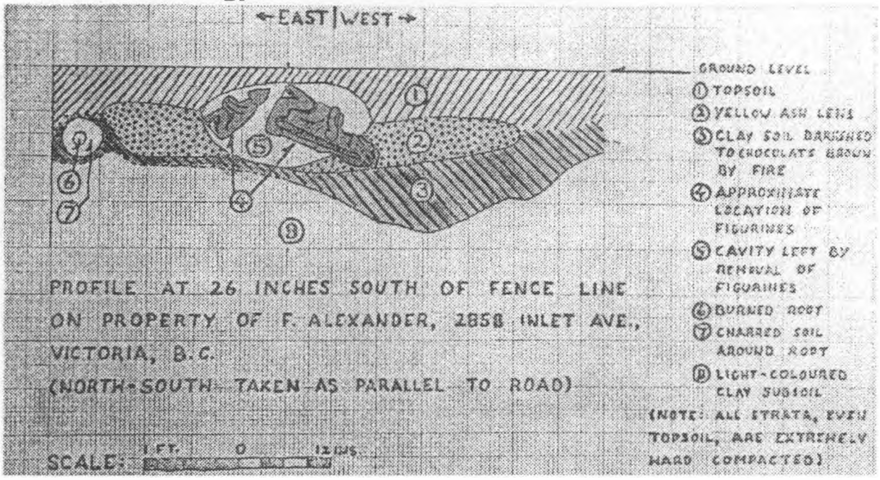

***Figure 17:5.* Profile Drawing of the Cremation Pit excavated by Abbott and Sendy in 1960 in south Saanich in which two Seated Human Figure Bowls (DcRu 87:1 and 2) had been found. One bowl is shown in Figure 12:6, and the other is illustrated in Duff (1975, Figure 30).**

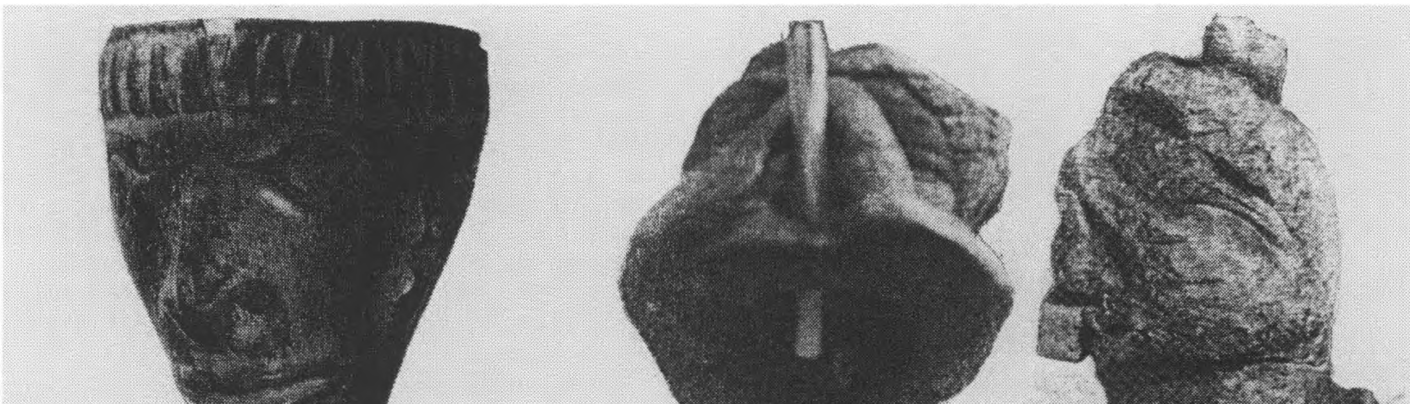

***Figure 12:7.* Headdresses on Pipes and Bowls. *a* pipe bowl from Lytton (RBCM photo EbRj 22:3); *b* head of stone bowl from near Courtney (RBCM DkSf Y:47); *c* pipe bowl fragment from lower Harrison River (RBCM DhRl 15:2).**

***Figure 12:6.* Side and Base of seated Human Figure Bowl from Cremation Pit in South Saanich. Note hollowed out base and perforation marked by a wooden peg. (RBCPM photo PN21190).**

(with spacers) have been found in archaeological sites on the southern coast. This set of dog teeth (Figure 12:8) was found by Robert Kidd and Michael Kew in 1959, associated with a burial at the Blue Heron Lagoon site on the Saanich Peninsula. A cluster of 6 small leaf-shaped stemmed points (DeRu1:24,23-2428) was also included.

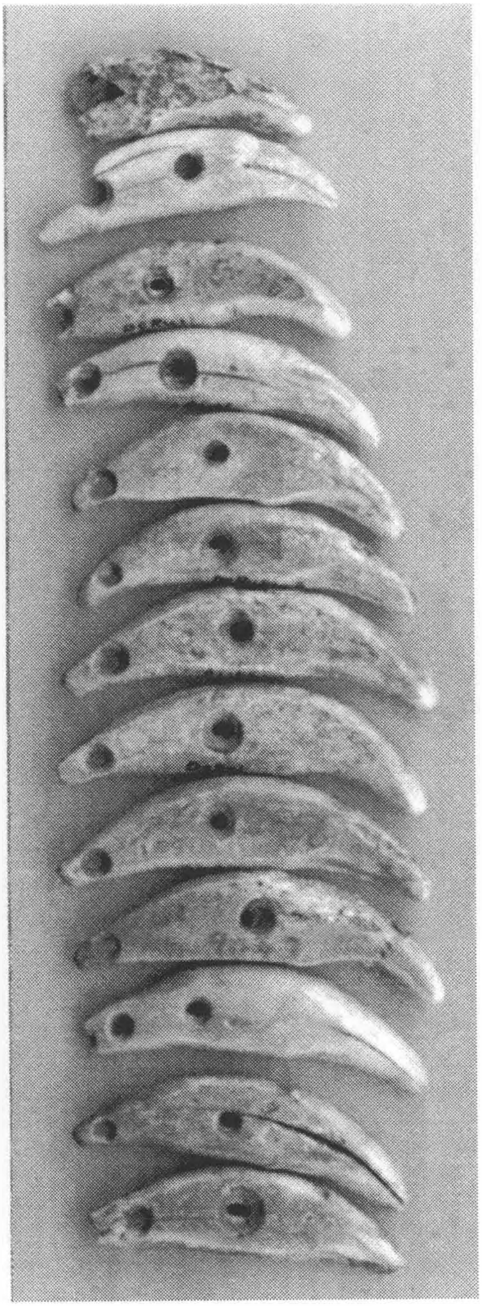

Figure 12:8. **Remains of a possible Shaman's Crown of Dog Teeth once tied together and separated by materials that have perished. (RBCM DeRu 1:1961-1971).**

My examination of the provenance of stone pipe fragments at coastal sites also supports Carlson's contention of a time association of pipes with later period stone bowls. Steatite pipe fragments are infrequently found on southern Vancouver Island and the Gulf Islands. Where they do occur they are found only in sites with components predating 1600 years ago.

The precise dating of trumpet-shaped tubular stone pipes in the Fraser Canyon can only be placed with certainty after about 500 A.D. in the Canyon cultural type (Mitchell 1990). This time corresponds with the introduction of clay and stone pipes among the Late Marine cultures of coastal Oregon (Pettigrew 1990). The evidence suggests that pipes, made with interior raw materials, occurred first on the Coast and were not used in the southern Interior until around 1200 A.D. The fact that they occur much earlier on the lower Columbia River suggests this is a topic much in need of further cross-border research.

Snake Representations

Snakes are the most common animals incorporated into the seated human figure bowls, and often occur on both sides of the human head (Figure 12:9a). Most of these motifs do not seem to represent supernatural snakes but realistic rattlesnakes[1]. Some bowls are snakes in themselves. A very small bowl from the Hope area represents a coiled rattlesnake (Figure 12:9b), as does a larger specimen (Figure 12:9c) from the Bazan Bay site in Saanich, where several human figure bowls have also been found. Snakes are also found on tubular pipes (Figure 12:7c).

Boas (1891:577) was told that on the lower Fraser River: "Rattlesnake poison is obtained by trade from the tribes on the Fraser and Thompson rivers. A powder of human bones is drunk as an antidote". Consuming dry snake venom is just as poisonous as being bitten by a rattlesnake. Although this traded poison may have been used for war arrows, it is also possible the dried snake venom was placed in these bowls and used in very small doses as a hallucinogen or in larger doses to poison enemies. Or possibly very small amounts of dried venom were mixed and smoked with tobacco.

There is a belief in the curative value of snake parts. Harmon noted that Carrier women, at the time of delivery "drink water in which the rattle of a rattlesnake has been boiled" (Lamb 1957:218). Duff (1956:27) noted the label on the Yale Bowl at the Vancouver Museum said: "The Indians say the bowl was filled with poison and was placed on or near a body laid out for burial, so that wild animals might drink the poison."

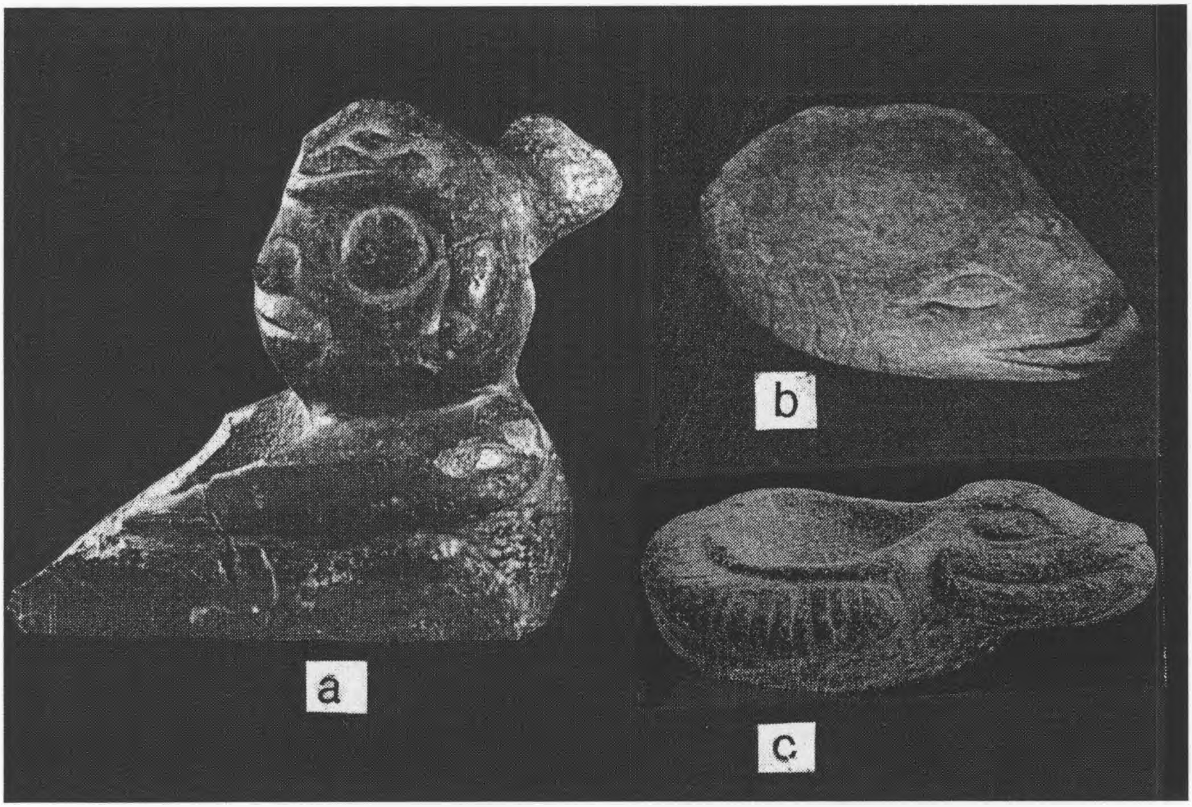

Figure 12:9. **Snakes represented on Stone Bowls. *a* Bowl (19.18 cm high) with snakes on both sides of a human's head, Chilliwack Museum Collection, (RBCM photo DghRl Y PN22187); *b* small coiled snake bowl (8.75 cm x 5.55 cm) from the Hope area (RBCM photo DiRi y:5); *c* coiled rattlesnake bowl (21.5 cm x 13.9 cm) from Bazan Bay, Saanich (RBCM DdRu 4:158).**

The rattlesnake is also represented in small ornaments (Figure 12:10), although my examination of some previously described as ornaments clearly shows by the nature of the slightly rounded and ground bases, that they were used as pestles possibly to grind tobacco in the bowls. An examination of larger wood-working hand mauls in the Royal B.C. Museum collection that have rattlesnake-tail motifs, places these - like stone pipes - in the first few centuries A.D.

Spindle Bowls

One later type of bowl may have come into use with the introduction of spinning. I would suggest that some small bowls, especially those with depressions in the bowl part (Figure 12:11a), were spinning bowls used with a sustained spindle. A sustained spindle is a type that revolves on a surface. This way of spinning is the more common type practiced in the Americas, parts of Asia, and the Pacific Islands. The control provided by the end of the spindle being in a bowl (Figure 12:11b) allows the spinner to obtain the more even tension critical in spinning, particularly when spinning short fibers.

The type of spinning seen on the Northwest coast in historic times is a rare practice. Depictions of spinning all refer to the spinning of longer wool thread that has already been prespliced by thigh rolling. However, small stone spindles that are more common in archaeological sites may have been used mainly for spinning thin strands of stinging nettle and other plant materials used in making nets and foundation material for wool capes. These may have been used in a different manner than the larger historic spindles.

One bowl (Figure 12:11b) with a depression within its bowl comes from site DcRu 19 in Esquimalt Harbour. I dated the base of this shell midden site to about A.D. 1310.[2] The highly polished and sloping inner hole suggests this bowl may have been used for supporting the bottom of a spindle. The bowl is a bird (possibly an owl) facing down with the bowl in its back.

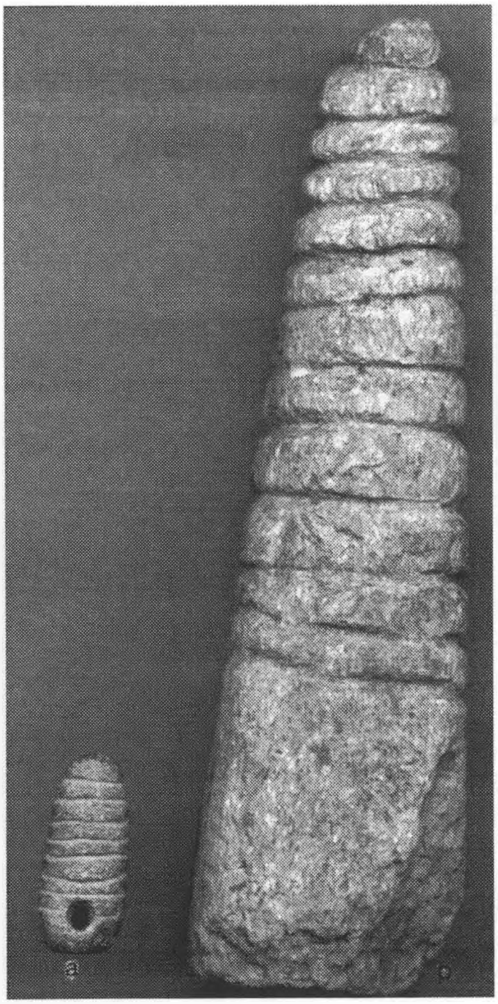

Figure 12:10. **Rattlesnake Rattle Effigies. *a* small pendant (2.5 cm high); *b* pestle (12.3 cm high) (DiRi 1:1801).**

Another possible weaving bowl (Figure 12:12) is from an unknown site on Mayne or Pender Island [3]. It has four protruding legs,. three thunderbird-like motifs around its body, and two snakes encircling its rim similar to those found on some small stone spindle whorls.

Large Human Figures without Bowls

There are many very large stone figures (Figure 12:13a) that were likely used in rituals to control the weather for the purpose of improving fishing conditions, to ensure safety in venturing out in pursuit of food, or to create unsafe conditions for enemies. This top portion of a pillar-like rock was found on the south shore of Pilot Bay (DhRx17) on Gabriola Island. With its broken off bottom piece, it is over 80 cm high, 30 cm wide, and weighs about 220 lbs. The carved top has a human head with arms held out in front. Its much larger bottom portion is un-carved and was likely planted in the ground.

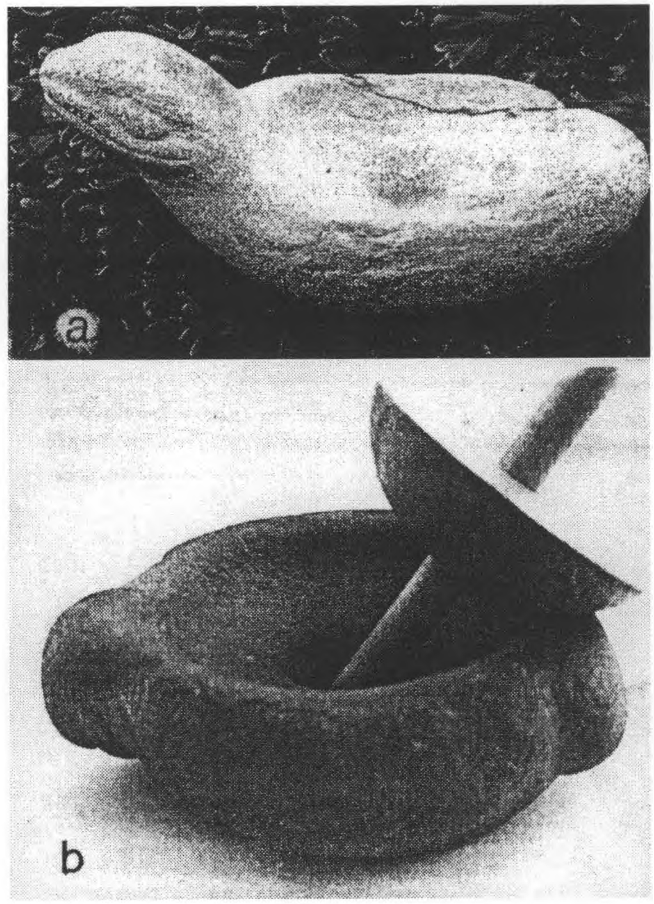

Figure 12:11. **Stone Bowls possibly used as Spindle Supports. *a* bird-shaped bowl (26.5 x 13.5 cm) with depression in the bowl (RBCM DcRu Y:12, Photo lPN19430); *b* a modern spindle in the depression in a bird-shaped bowl (14.9 x 12.3 cm) from DcRu19 in Esquimalt Harbour demonstrating possible use.**

On the southern coast appeals were often made to beings whose souls were reflected in the winds. Boas was told that at Finlayson Point in Victoria a rock was moved one way to create pleasant weather and in the other direction to create bad weather. Wind rocks were also used by the Klamath Lake people of eastern Oregon (Carlson 1959).

A Songhees named "Joseph" told about a special place where two stone pillars were located near Loon Bay. One rock was a rough block of layered sandstone with one layer forming a rim around the top that looked like a hat. The block was sitting on a glacial boulder and "seen from a distance, may easily be taken for the image of a small boy with a large hat on his head, sitting on a block of stone." The rock was called Yicsack which means "hat". Dances were performed

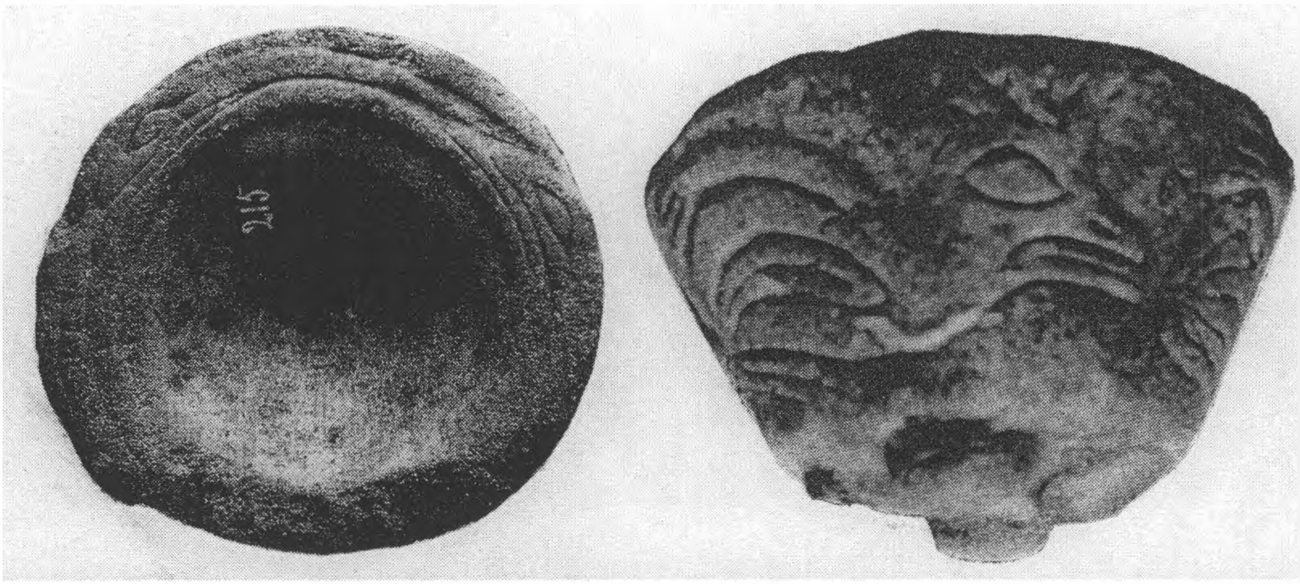

Figure 12:12. **Two views of Four-legged Bowl (dia ca. 7.6 cm; ht. Ca. 5.1 cm) from Mayne or Pender Island. Thunderbird-like designs are on the sides, and snake designs on the rim (RBCM photo PN11334).**

around the rock and it was treated with a coating of fish oil. In 1876, the sandstone slab was knocked off by cattle and broken. It was taken to Joseph's home for protection, but was returned in 1878, when bad weather prevented the Songhees from fishing.

Joseph said that about 1840, when he was a boy there had stood for many years "two square pillars about six feet high, set on end as to form a doorway". He remembered as a child going with his father on a stormy day to rub Yicsack and the pillars." The stone was last rubbed in 1880.

Lummi and Semiahmoo people told Suttles that: "At Point Roberts there were two stones in the playground behind the camp. These were painted at the beginning of each fishing season. During the first-salmon rite the boys marched around them, singing" (Suttles, 1974:178-9).

A large, meter high, carved stone (Figure 12:13b,c) was found on the prominent Grief point, south of Powell River opposite the northern tip of Texada Island. The site is a large shell midden associated with fish traps. The stone has a human figure with arms out in front carved above a massive base. The lap area has been extensively rubbed as a result of ritual activity and not as part of its construction. The figure is unique in having an owl-like bird (Figure 12:13c) carved on its chest area similar to the spiritual icons found on the bowl part of Seated human figure bowls.

Fakes

I have observed many fake stone bowls in private collections that are of recent manufacture. Many of these have been brought to the RBCM for the purpose of attempting to sell them. However, one of the larger collections of fakes is the older collection of Ross A. Brooks.

Ross Brooks[4] had a great interest in archaeology and ran a shop on Robson Street in Vancouver called "The Old Curiosity Shop". Brooks had a collection of at least 90 stone figures, mostly stone heads, that he claimed to have collected between 1944 and 1946 from a place on the lower Fraser he named "Brooks Mound". He would not reveal the site location, but produced detailed excavation notes on the discovery and description of the material. His paper *Brooks's Mound, Frazer River, B.C. Exploration Notes* by R.A. Brooks shows his preoccupation with romantic ideas about ancient civilizations, sunken continents and Velikovsky's comet.

Charles Borden wrote a report titled *Brook's Mounds and Stone Heads* in June of 1947. Borden could not make up his mind about the origin of the material, but was swayed by a report from the U.B.C. Geology Department claiming that the weathering and carving were old and not of recent origin. After the death of Ross Brooks, Borden's recommendations resulted in Dr. H. R. McMillan purchasing the collection for U.B.C. from Brook's widow, Mabel Orr Brooks, in 1950.

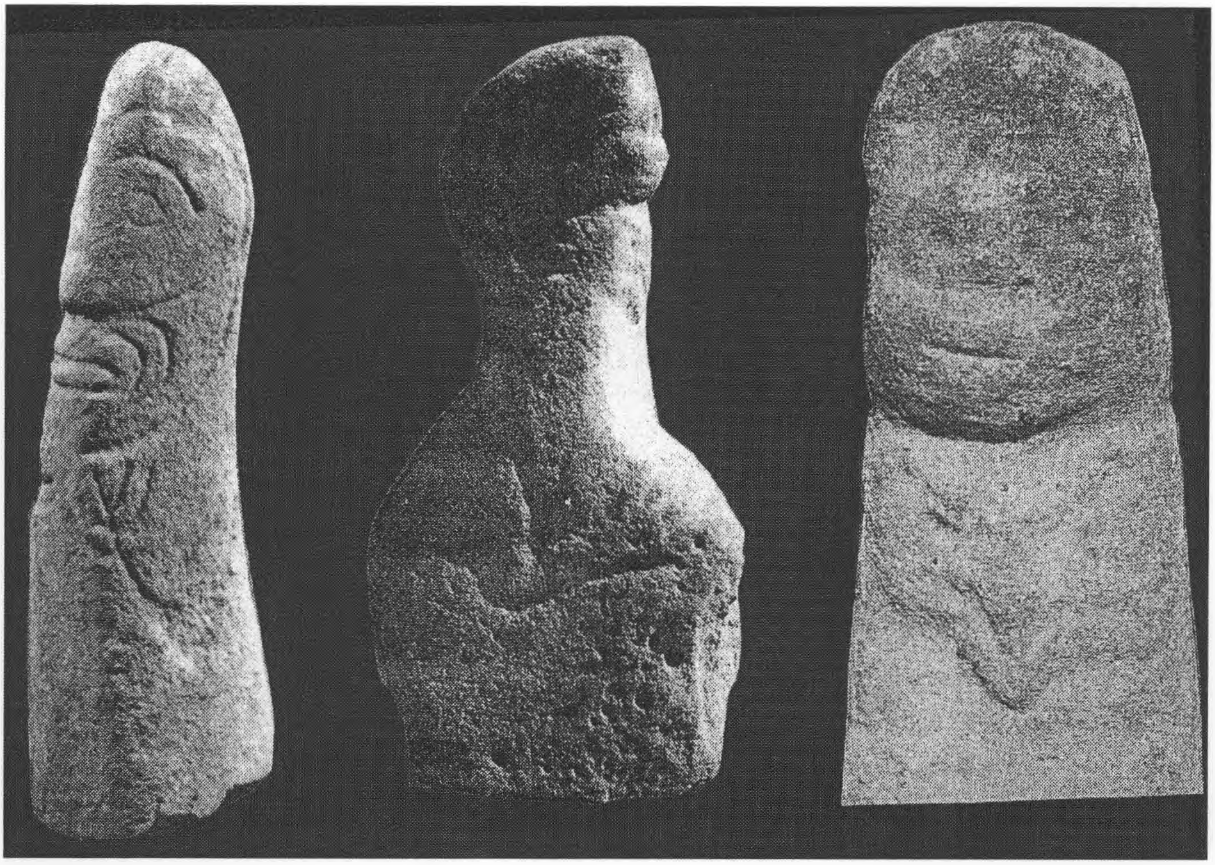

Figure 12:13. **Large Stone Figures. Left, Upper part of stone pillar from Pilot Bay, DhRx 17, Gabriola Island. Center, side view of sandstone figure from Grief Point, south of Powell River. Right, close-up of the preceding showing owl-like image on the chest (RBCM photos).**

In a 1961 letter, Wilson Duff notes "I am still interested in solving the problem of the location of the Brooks Mound". He states[5], "Only one of the stone heads [Figure 12:14] seems to fit into the archaeology of this area." I understand that geologists examined the carvings and rejected any idea that they were freshly-made fakes. So the Brooks Heads remain a puzzle. Some day we shall get a clue that will lead us to their place of origin or definitely establish them as fakes."

I examined the Brooks artifacts and archival collections at U.B.C. in 1987 and undertook further research on the subject including discussions with surviving family members.[6] Other than the stone head used by Duff in his publications and a few real, but displaced, non-stone head artifacts in the collection, I am convinced that all the rest are fakes made by Ross Brooks, or in some cases possibly recently made objects purchased in South America. Brooks was strongly influenced by early writing about stone sculptures of Easter Island. The proto-types for some of his sculptures can be seen in Easter Island carvings (see Heyerdahl, 1974, Plates 148-154). Brooks used mostly course grained igneous rocks that are easier to treat to produce a fake patina and obscure signs of recent steel tool marks. Some of the stones were coated in tar and buried in the ground or heated in a fire and then cleaned off. Some with tar still on them were likely unfinished fakes that Brooks did not clean before he died. Some items do show steel tool marks and are lacking a patina. A careful reading of the supposed field notes reveals many contradictions. It is clear to me that Brooks faked all of these notes to give credence to his fake stone heads.

Summary

Wayne Suttles noted, that within the continuum of Salish speaking peoples "there were some pretty clear cultural differences, seen especially n the distribution of ceremonial activities". It is probably safe to assume that this was the case 2000 years ago, whether we are dealing with the ancestors of recent Salish speaking populations either in whole or in a small part.

Figure 12:14. **Stone Head. One of about 90 stone figures from the Ross Brooks collection. This may be the only one that is not a fake (RBCM photo).**

Whether the two-headed serpent was an important source of vision power in the iconography of 2000 years ago, as it was in the ideology of more recent times among some Salish speaking peoples, cannot be determined. As we can see when we view the powerful iconography of Buddhist traditions as they move from Indian to China and other areas of Asia, there is mixing with and sometimes domination of local elements, but some continuities, even in light of major cultural changes.

Powerful icons can take on different historical attributes and still play an important role within a new cultural setting. Religious beliefs, such as the association of owls as messengers to the spirit world, may continue as a stream of thought that manifests itself in different iconography through time in cultures or populations that are vastly different. Owls as physical icons can move through time from spoons, to bowls, to weaving equipment, house posts and Sxwayxwey masks and change their role from powers of ritual to powers of vision or powers of wealth.

Stone bowls need to be viewed as changing phenomena on both a local and regional basis. Some stone figures may have been restricted to certain families who passed them on through their daughters as was done in historic times with the Swaywey performance privileges. This phenomenon is suggested in two reported cases (Keddie 1983). If this were the case, it might be that stylistic similarities are related to actual genetic connections between villages. Some stone bowls are strongly associated with the tobacco complex for a short period before the 4th century A.D. on the coast and possibly later in the interior of the province. The evidence suggests that some stone bowls dating to the period after about A.D. 800 may have been used as spinning bowls, even though this was not a known historic practice.

In the future we need to examine and undertake more thorough documentation of the large number and many types of stone figures within local areas. Only then will we have enough data to look at the broad picture of relations between centers within larger regions. Many of the stone figures in private and museum collections do have a site provenance and site-specific information that can be rooted out with a little detective work. More dating of these sites and the development of new fingerprinting techniques for source material should help cluster stone figure types in time and space and assist us to gain new knowledge on this subject.

Notes

1. Duff (1956, p.27) suggests that the Yale Creek bowl shows a bull snake, but the facial features are more like a Northwest rattlesnake.

2. Sample SFU 790, 1070±70, shell date with calibrated marine correction of 646 BP or A.D.1310.

3. According to a letter sent by William Doe of the Government Telegraph Service in Victoria to Harlan Smith on March 11, 1922 the bowl was from Mayne Island and "It was turned up out of a sandy bank which the road men were cutting through for a new road, about two feet below the surface". It is described as 4 inches in diameter and 3 inches high. On the Newcombe collection prints it is referred to as "ex Pender Island".

4. Reginald C. Brooke assisted Harlan I. Smith, in 1897-98, at the Eburne and other sites around Port Hammond. Smith named one of the sites "Brooke's Mound". This is a different person than Brooks and the site should not be confused with the Brooks Mound discussed here.

5. see Duff ABC #5, p.90 and Plate 14D; Duff, Stone Images, p. 175, #48.

6. Photographs of artifacts taken by Ross Brooks about 1945 were passed to Angus McDonald (son of Mabel Orr) through the Brooks Estate and donated to the RBCM, July 5, 1980.

CHAPTER 13

Growth Coloration Revisited: Assessing Shell Fishing Seasonality in Coastal British Columbia

DAVID MAXWELL

Introduction

Estimates of the season of shellfish collection or shellfish death (herein referred to as seasonality) have been made for the past 30 years using a variety of approaches. Despite the number of studies conducted (see Claassen 1998 for a review), few researchers have presented convincing results. Shellfish seasonality studies are still regarded as experimental in many instances, or are described as "having great potential"for future use. "Great potential" more than 30 years after the first study suggests an analytical technique that will never be widely applied, much less widely accepted. Problems frequently stem from a combination of erroneous assumptions about shell growth, analytical techniques, and poor sampling of both modern shellfish populations and archaeological sites.

This paper reviews my own experiments with assessing shellfish seasonality, conducted in the late 1980s with materials gathered on Pender Island in the southern Gulf islands of British Columbia. This research was undertaken using the then relatively new idea of looking at patterns of growth within an entire population of shellfish, rather than studying isolated individuals. I begin this paper with a brief review of shell growth, followed by a discussion of the methods employed in the study, and a discussion of the results. This is followed by a discussion of the role of sampling in seasonality studies, and finally a discussion of why shellfish seasonality studies have never become common place in shell midden archaeology.

Shell Growth

Although still a poorly understood phenomenon, shell appears to be produced by the deposition of calcium carbonate crystals ($CaCO_3$) on to a primarily proteinacious organic matrix known as conchiolin (Wilbur 1964). Both the calcium and carbon dioxide needed for shell growth are taken into the organism from the external environment; they are then moved into the mantle, which covers the inner growing surface of the shell, where they combine to form calcium carbonate. The organic matrix (con ciolin) is deposited as a layer on the inner surface of the shell. The crystalline substance is then deposited onto the organic matrix, with mixture of the two occurring in some species (Crenshaw 1980). Shell formation is not unidirectional, and dissolution or decalcification occurs as well.

Lutz and Rhodes (1977) hypothesize that both calcium carbonate and organic matrix are deposited during aerobic metabolism, when the shell is open to the external medium or gaping, resulting in shell construction. This is typically associated with high tide, when the water is high in oxygen content. When the oxygen content falls, during periods of shell closure, anaerobic respiration begins. This increases internal acid levels in the extrapallial fluid (which covers the mantle); the acid is neutralized by the calcium carbonate in the shell dissolving, leaving a concentration of organic material without calcium carbonate to support it. This process is repeated on a tidal basis, resulting in a growth increment. Other researchers (Day 1984) suggest that both calcium carbonate and conchiolin are deposited throughout the year, but that calcium carbonate is reduced or halted during times of stress, thereby resulting in variations in growth increment width throughout the year.

Myriad environmental factors appear to influence shell growth, and the reader is directed to Maxwell (1989) for a more detailed discussion. Minimally, shell growth is influenced by circadian rhythms (cycles of light and darkness), spawning events, temperature fluctuations, seasonal change, tides, and storms. Temperature fluctuations brought on by seasonal change are obviously those of the greatest interest to most archaeologists; traditionally, archaeological estimates of seasonality are based on the assumption that shell growth will be greatest during the summer, when water temperatures are highest. Some species do seem to respond in this fashion while others do not (see Evans 1975). Other authors (House and Farrow 1968) note little or no variation in growth rates throughout the year, regardless of temperature fluctuations. Thus, seasonal fluctuations in growth appear to be species specific, and cannot be generalized.

Methods

Claassen (1998) argues that here are essentially three ways of assessing the season of death for shellfish: (1) using oxygen isotopic data, (2) using growth increment data, and (3) using population data. These methods all have varying strengths and weaknesses, and only the latter methods are of interest here. The method employed in my Pender Island study is best described as a combination of methods 2 and 3, that is, using growth incremental data in a population of shellfish. Essentially I looked at monthly variation in growth coloration using a population of shellfish gathered on Pender Island.

Growth increment data is probably the means of assessing seasonality most widely employed by archaeologists. This has varied from studies as relatively simple as counting growth rings on shell surfaces (Weide 1969), to the more sophisticated variations on this theme involving growth measurements employed by researchers such as Ham (1982), Ham and Irvine (1975), Keen (1979) and Wessen (1982), to extremely detailed analysis of sub-daily lines (Koike 1979, 1980). Another approach has been the comparison of frequencies of growth coloration, advocated by Claassen (1982, 1986, 1991) and Maxwell (1989). Reviews of these varying approaches can be found in Claassen (1998), Maxwell (1989), and Monks (1981).

The Pender Island study employed a technique of thick sectioning (most sections in the 1-3 mm range), employed in the southeastern United States by Claassen (1986) and Quitmyer et al (1985). These sections are cut and the color of the final growth increments on the ventral margin (the leading edge of the shell) are recorded. The margin is either translucent or opaque. Modern specimens are collected on a monthly basis, and broken into percentages of fast and slow growth, which are plotted as bar graphs that characterize the growth pattern for a particular month.

The approach of looking at growth coloration across a population was selected because it offered two distinct advantages over counting growth lines or measuring growth increments. First, this approach compares the growth of an entire population, rather than simply individuals, thus taking individual variation into account; a lack of understanding of individual variability was frequently the weak link in growth increment studies. Second, growth coloration frequencies can be calculated much faster than can comparative data for any other technique, because valve sections do not have to encompass the entire length of the shell to be useable; only the last few millimeters of growth need to be assessed, compared to the entire valve for increment or line count studies. The biggest problems are the requirement that archaeological samples must also be populations; individual shells cannot be assessed, and that the technique tends to be unable to divide the year into more than two seasons (Maxwell 1989).

All shellfish were collected live from Shark Cove, near the Pender Canal on north Pender Island, and adjacent to the archaeological site DeRt-1. Specimens were removed from a variety of areas within this small cove, but covering an area no more than 100 meters in length and 30 meters in breadth. After collection, all specimens were taken directly to SFU where they were killed by freezing; however, this often occurred several hours after collection due to inherent travel time. After a span ranging from several days to several months, specimens were processed through cooking in hot (but not boiling) water, and all soft tissue was removed. The shells were then allowed to air dry for several days prior to sectioning.

Each specimen was mounted in a padded clamp and sectioned using a Buehler Isomet 11-1180 Low Speed Saw with a five inch blade; completed sections were stored in capsules. Initially the shells were sectioned from ventral margin to umbo (hinge); however, this proved very labour intensive with an average cutting time of nearly 1 hour. As the observations of interest only involved growth coloration of the ventral margin, the approach was changed and a small section of roughly 1 cm in length was removed from this area. This required an average of roughly 8-10 minutes. Time needed for assessing each specimen was minimal, and averaged less than 1 minute. Specimens were as-

Table 13:1. Pender Island Comparative Collection by Species and Month of Collection in 1987 and 1988.

Species	Feb 87	Mar 87	Apr 87	May 87	June 87	July 87	Aug 87	Sep 87	Oct 87	Nov 87	Dec 87	Jan 88	Total
Clinocardium nuttalli			7	5	6	2	6						19
Macoma sp.	20	11	8	6	34	13	18	13		2		2	126
Mya arenaria	14	19	12	1	9	15	9	3	13	22		13	126
Protothaca staminea	21	18	13	15	23	21	26	33	10	23	9	20	231
Saxidomus giganteus	12	14		29	7	12	9	14	7	12		11	140
Tresus capax		1		3			2	2		1			9
Totals	67	63	40	59	79	63	70	65	30	60	9	46	651

sessed using an American Optical binocular stereoscope at 30 power. Reflected light provided the best results for distinguishing colour at the ventral margin, although the same results were obtained using both reflected and direct light. The same results were also obtained with a lower magnification, although 30 power made it easier to distinguish margin colour. Specimens were described as *Translucent* if reflected light could penetrate them, *Opaque* if no such penetration occurred, and *Indeterminate* if they proved unreadable.

The Modern Comparative Collection

The modern comparative collection is one of the most crucial components of a shellfish seasonality study, yet, most modern collections are very small and frequently lack specimens from throughout the year. Claassen (1998) lists 35 collections from throughout North America, and only 1 includes more than 500 specimens. Collections encompassing multiple years are exceptionally rare, despite the fact that no single year can be argued as representative of a typical cycle in any region.The Pender Island collection (henceforth referred to as PIC) is large, with 651 specimens collected over a twelve month period of February 1987 through January 1988 (see Table 13:1). However, even this relatively large collection is not without problems. First, six different bivalve species were collected throughout the year; thus, the largest collection for any given species is 231 individuals of *Protothaca staminea*, the native little neck clam. No other species is represented by more than 140 specimens. Second, the collection covers only a single twelve-month period. Finally, the winter collection periods, late November and December, yielded very small samples due to extremely high low tides during the time available for gathering.

The PIC consists of *P. staminea* mentioned above, along with *Saxidomus giganteus*, the butter clam, *Macoma* sp., the bent-nose clams, *Mya arenaria*, the mud clam, *Clinocardium nuttallii*, the basket or heart cockle, and *Tresus capax*, the horse clam. Table 1 details the collection by month. Gathering was conducted following a lunar cycle of roughly 29 days, always during the lowest tide available to the author.

Results

The Overall Pattern

For the initial analysis, all species from each collection interval were combined, resulting in the pattern seen in Figure 13:1. After removing indeterminate specimens (Figure 13:2), the bulk of the collection periods are very similar in appearance, with roughly 60 percent of the collection falling into the opaque category. The only distinctive months are January and February, with opaque values of roughly 25 and 45 percent, respectively; as these collection periods were 12 months apart, it seems unlikely that their similarities are the result of a short-term fluctuation in climate. The growth coloration technique appears to divide the year into two distinct statistical "seasons," defined as winter (January and February) and summer

Table 13:2. Summary of Ventral Margin Colour by Collection Date and Species.

Collection Date	Species	Translucent	Opaque	Indeterminate	Total
February 21, 1987	*Protothaca staminea*	8	12	1	21
	Saxidomus giganteus	3	8	1	12
	Mya arenaria	2	2	10	14
	Macoma sp.	16	0	4	20
March 20, 1987	*Protothaca staminea*	4	10	4	18
	Saxidomus giganteus	2	11	1	14
	Mya arenaria	3	8	8	19
	Macoma sp.	9	0	2	11
	Tresus capax	1	0	0	1
April 21, 1987	*Protothaca staminea*	3	6	3	12
	Saxidomus giganteus	2	11	0	13
	Mya areanaria	2	2	4	8
	Macoma sp.	4	1	2	7
May 15, 1987	*Protothaca staminea*	8	7	0	15
	Saxidomus giganteus	8	21	0	29
	Mya arenaria	0	0	1	1
	Macoma sp.	4	1	1	6
	Tresus capax	1	0	2	3
	Clinocardium nuttallii	0	5	0	5
June 12, 1987	*Protothaca staminea*	2	20	1	23
	Saxidomus giganteus	2	5	0	7
	Mya arenaria	0	4	5	9
	Macoma sp.	16	6	12	34
	Clinocardium nuttallii	0	1	5	6
July 9, 1987	*Protothaca staminea*	1	16	4	21
	Saxidomus giganteus	4	7	1	12
	Mya arenaria	0	7	8	15
	Macoma sp.	10	1	2	13
	Clinocardium nuttallii	0	2	0	2
August 9, 1987	*Protothaca staminea*	2	23	1	26
	Saxidomus giganteus	1	6	2	9
	Mya arenaria	4	0	5	9
	Macoma sp.	13	1	4	18
	Tresus capax	2	0	0	2
	Clinocardium nuttallii	1	2	3	6
September 6, 1987	*Protothaca staminea*	7	22	4	33
	Saxidomus giganteus	2	11	1	14
	Mya arenaria	0	1	2	3
	Macoma sp.	10	0	3	13

Table 13:2. Summary of Ventral Margin Colour by Collection Date and Species (cont'd).

Collection Date	Species	Translucent	Opaque	Indeterminate	Total
	Tresus capax	1	0	1	2
October 4, 1987	*Protothaca staminea*	1	7	2	10
	Saxidomus giganteus	3	3	1	7
	Mya arenaria	3	4	6	13
November 1, 1987	*Protothaca staminea*	5	18	0	23
	Saxidomus giganteus	1	11	0	12
	Mya arenaria	14	1	7	22
	Macoma sp.	0	1	1	2
	Tresus capax	0	0	1	1
December 27, 1987	*Protothaca staminea*	2	3	4	9
January 24, 1988	*Protothaca staminea*	11	2	7	20
	Saxidomus giganteus	2	5	4	11
	Mya arenaria	8	1	4	13
	Macoma sp.	1	0	1	2
Totals		209	296	146	651

NB: Collection was conducted on November 29, 1987 in keeping with the lunar collection schedule; however, only a single specimen (*Protothaca staminea*) was recovered, and the valve was not sectioned.

(the remainder of the year). A chi square test (see Maxwell 1989 for details) demonstrates that there is a highly significant statistical difference between the winter and summer seasons thus created. On this basis, dividing the year into two distinctive, yet uneven seasons seems valid.

Overall, there were far more *Translucent* than *Opaque* specimens. This was true in all species with samples of more than 100 individuals except for the bent nose clam (*Macoma* sp.), where the vast majority of specimens were *Opaque*; reasons for this variation are unknown, but would appear to be a trait of the species in question. Figure 13:3 shows the frequencies of growth coloration for all species in the study; Table 13:2 details the month-by-month frequencies of each growth coloration type. All species were combined in the attempt to find an overall tendency for growth coloration to change seasonally.

Initially, it was hoped that seasonal patterns would be clear regardless of the species under observation. However, combining different species into a single monthly growth sample is problematic, and it is questionable whether these are truly representative of the collection period in general. Using this approach, it would be possible to produce a variety of growth "seasons" by with monthly samples comprised of varying ratios of species, even if all the specimens were collected on the same day.

At first glance, this appears to be a satisfying result, and suggests a potential value for the technique for Northwest Coast seasonality research. However, a closer examination of the variability *within* each species suggests that thereis no validity in combining the different speciescollected on a monthly basis. Figures 13:4-7 illustrate the ratios of *Opaque* to *Translucent* readings by month for *Macoma* sp., *Mya arenaria, Protothaca staminea*, and *Saxidomus giganteus,* respectively. These show that not only is there seasonal variation in growth coloration for each species, but also that this variation appears to be species-specific; there is thus no valid reason to combine the different species and to use these to produce an annual growth curve.

Species-Specific Patterning

Basket Cockle (Clinocardium nuttallii)

The basket cockle, shows a very low percentage of specimens throughout the year which exhibit translucent growth (9 percent), while 45.5 per cent of the specimens exhibit opaque growth. At the same time, 45.5 percent of the collection is indeterminate; however, the sample size for cockle was only 19 specimens, and the species was only encountered during the summer months (May through August) when the tides were very low. The sample is too small and lacks sufficient seasonal variation to suggest whether it is a reliable seasonal indicator

Bent Nose Clam (Macoma spp.)
Macoma spp. shows a high proportion (68.6 percent) of specimens exhibiting translucent growth; only 9.9 percent of the individuals were opaque, while the remaining 21.5 percent were indeterminate. *Macoma* is included in all collection periods except October and December; Figure 13:4 shows the ratio of opaque to translucent specimens by month. Throughout the year, the proportion of translucent specimens for this species rarely diminishes below 60 percent; June is the only collection period when this occurs. Opaque growth, on the other hand, is limited almost exclusively to the months of April through August (with a single example from November). Indeterminate *Macoma* specimens remain at a more or less constant rate of 18-25 percent throughout the year. *Macoma* does not seem to be a dependable seasonal indicator, expressing too little variation throughout the year. It is possible that the presence of a moderate proportion of specimens with opaque growth is indicative of the summer months; the presence of a single opaque specimen from the November collection casts doubt over this suggestion, and a longer collection period is needed to resolve the issue. A small collection of *Macoma* from San Juan Island (approximately 14 km southwest of Shark Cove) with a collection date of July 28 exhibits atranslucent growth percentage of 82 percent (Claassen 1987: personal communication). While this is based on only 11 individuals, it supports the observation of opaque growth being a summer month phenomenon.

Mud Clam (Mya arenaria)
This species is well-represented with 131 individuals in the collection, and is present in every collection period except December; Figure 13:5 shows the frequencies of all growth coloration readings for *Mya*. Twenty-nine percent died during translucent growth, 22.9 percent died during opaque growth, and 48 percent were indeterminate. These percentages suggest that *Mya* is a poor choice for season of death research in this region, as nearly half of the specimens collected proved unreadable. Of the specimens that could be assessed, there is a trend towards a higher proportion of translucent growth during the winter months (August through April) and a high proportion of opaque growth between May and July. However, the proportion of indeterminate specimens is always above 30 percent, and frequently greater than 40 percent. With such a high frequency of unreadable sections, it seems that *Mya* would be difficult to use in an archaeological collection, especially in light of its highly fragile nature. Itshould be emphasized that these results were obtained using observation of growth at the ventral margin, as both Hancock (1982) and Sanger (1989) report some success using the chondrophore in coastal Maine sites; it may Be worthwhile investigating use of the chondrophore on the Pacific Coast.

Native Little Neck Clam (Protothaca staminea)
The native little neck is by far the most abundant species in the PIC, with 237 specimens present; it is also the only species encountered during every collection period; growth coloration results are presented in Figure 13:6. *Protothaca* yielded 55 specimens that died during translucent growth. These were spread throughout all collection periods, but were concentrated in the winter months of January and February; May also saw a high percentage of translucent growth. 62.9 percent of all *Protothaca* specimens died during opaque growth, which falls into three distinct periods: In January, opaque growth is very low at less than 20 percent; between February and May, this proportion increases to between 45 and 60 percent; the months of June through November see consistently high ratios of opaque specimens, usually between 75 and 95 percent (with September at an anomalous 65 percent). December, with a very small sample size (n=9) shows only 50 percent. Fourteen percent of all *Protothaca* specimens were indeterminate; these were evenly spread throughout the year, with only January and April having frequencies of over 20 percent. These results suggest that *Protothaca staminea* is likely a good indicator of season of death, capable of dividing the year into three distinct time periods.

Butter Clam (Saxidomus giganteus)
The butter clam is also well represented in the PIC with 130 specimens present; *Saxidomus* was represented in every collection period except December. Of these specimens, 23.2 percent died during translucent growth, compared with 70.3 dying during opaque growth and 6.5 per

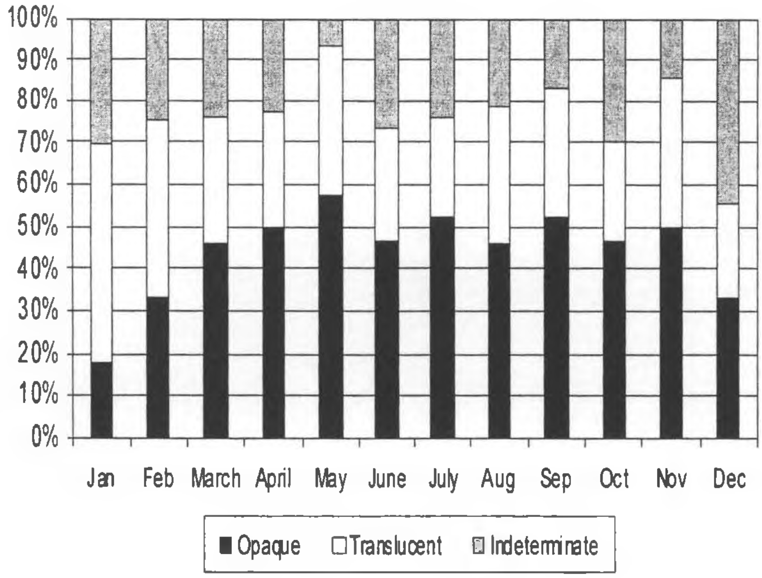

Figure 13:1. **Growth Coloration: All Species Combined.**

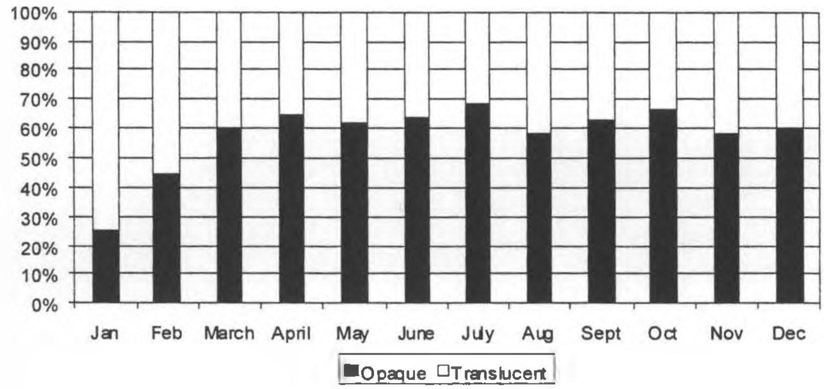

Figure 13:2. **Growth Variation Curve.**

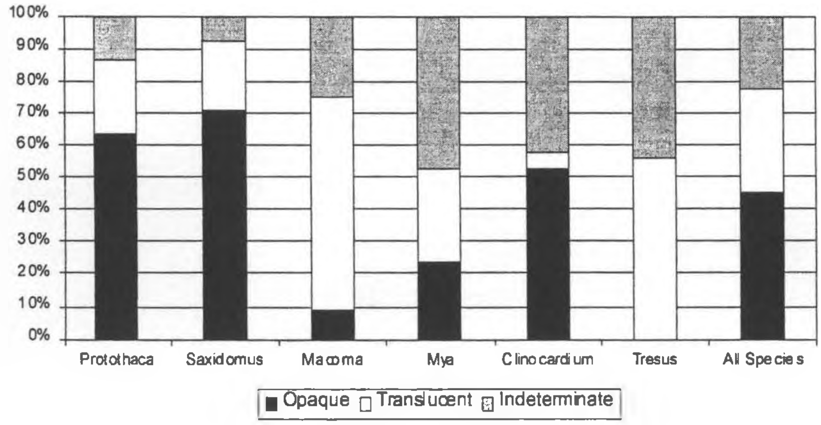

Figure 13:3. **Species Variation in Margin Colour.**

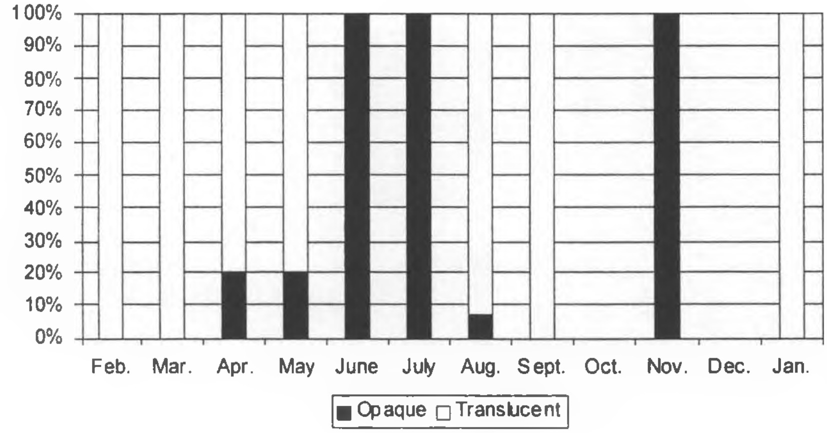

Figure 13:4. *Macoma* **spp**

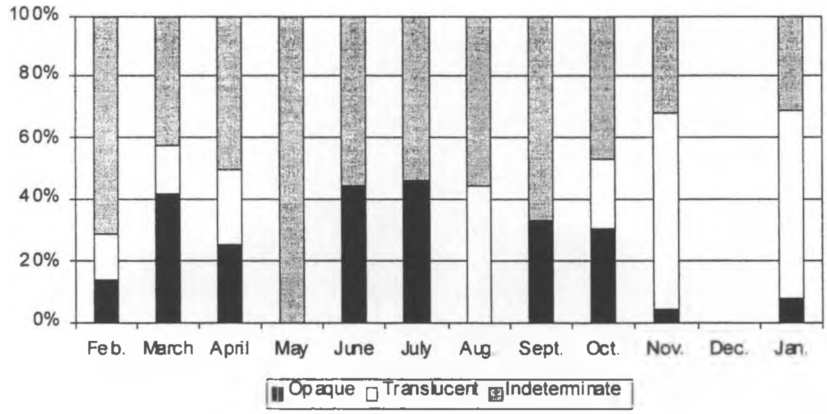

Figure 13:5. Mya arenaria.

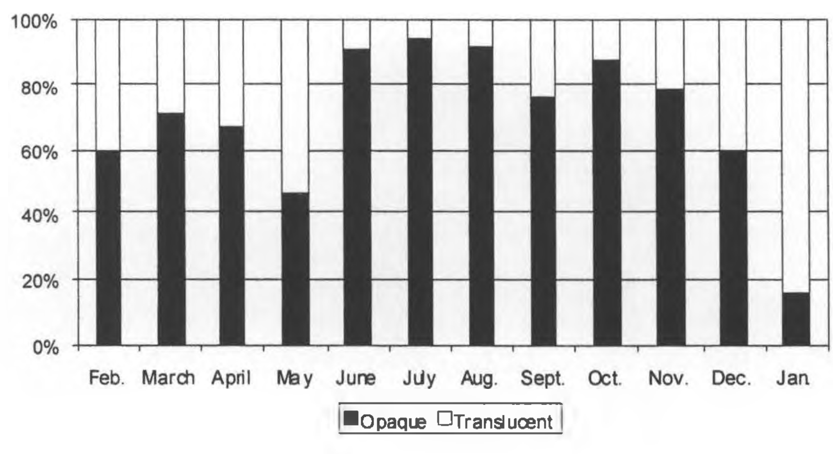

Figure 13:6. Protothaca staminea.

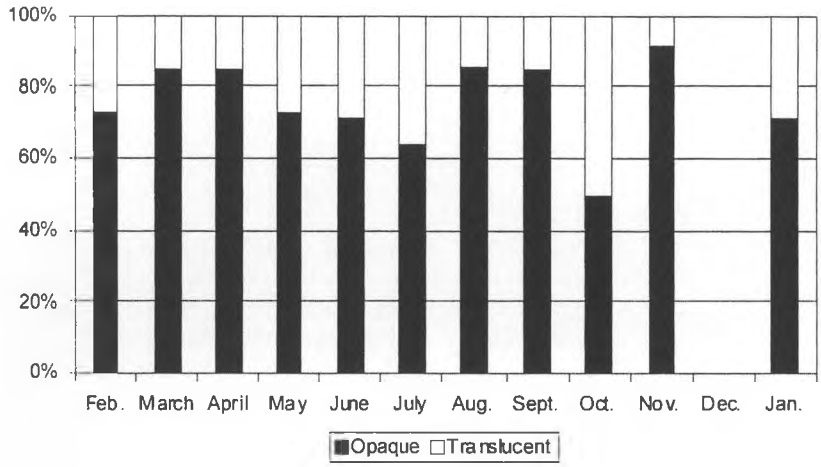

Figure 13:7. Saxidomus giganteus.

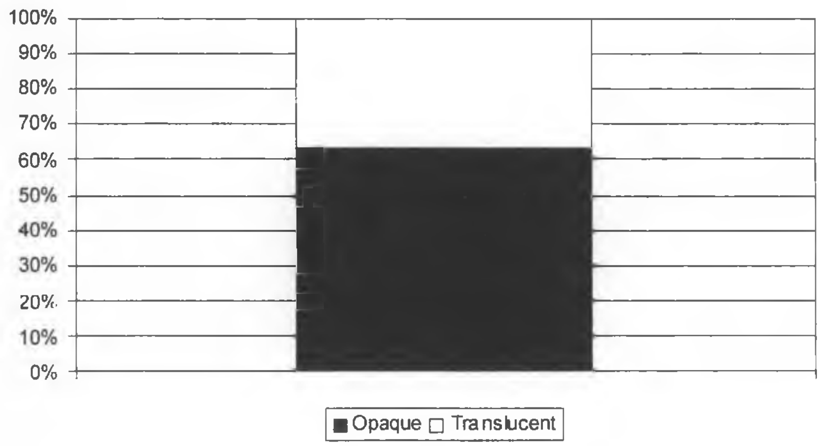

Figure 13:8. **Example 1:** ***Protothaca staminea.***

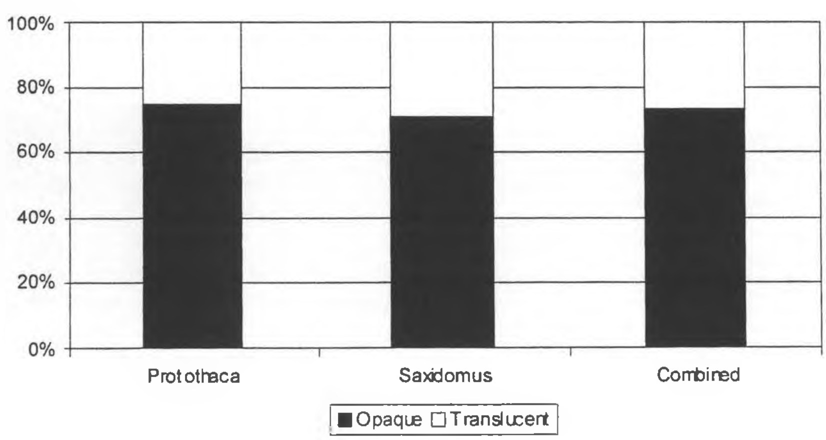

Figure 13:9. **Example 2:** ***Protothaca staminea*** **and** ***Saxidomus giganteus.***

cent yielding indeterminate readings; the frequencies of translucent and opaque growth are presented in Figure 13:7. Two trends are detected in the growth curve: Proportions of translucent growth in *Saxidomus* specimens alone are not good indicators of the season of death, as very different times of the year (eg., January and July) appear almost identical; frequencies of translucent specimens fluctuate wildly throughout the year, as can be seen in Figure 13:7. Opaque growth, on the other hand, may be a better season of death indicator, as only the months of January, October, and November have opaque growth frequencies of less than 50 percent (33.3-41.7 percent). The period of February through September shows opaque growth varying between 58.3 and 84.6 percent, with most months showing well over 60 percent opaque. Thus, opaque growth in *Saxidomus* specimens could be used to divide the year into two general seasons: a winter season of October through January, and a summer season of February through September. Unfortunately, the sample sizes for each month are not very large.

Indeterminate specimens are uncommon in *Saxidomus*, with only 6.5 percent overall; these are concentrated in the winter and early spring months (October through March), although indeterminate specimens are also present in July and August.

Horse Clam (Tresus capax)

The horse clam is poorly represented in the collection, with only 9 specimens present; the species was encountered only during the spring and summer collection periods. Within this small sample, 5 individuals died during translucent growth, and the remainder were indeterminate. The lack of variability combined with the fact that nearly half the collection was unreadable and only four months of the year are represented in the sample, make *Tresus* a difficult species to interpret. More work is needed before any decision on the practicality of doing season of death estimates on *Tresus* individuals can be assessed.

The Effects of Size on Growth Coloration

Statistical analysis was conducted comparing the relationship of valve length and weight on growth coloration (see Maxwell 1989 for a detailed discussion). This demonstrated that length or weight were only factors in the case of very small valves. Valves measuring less than 30mm in length or weighing less than 6 grams tended to produce a very high frequency of indeterminate sections, indicating suggesting that these should be taken as minimal size values for valves to be employed in seasonality studies. For larger specimens, the size of the valve under study does not seem to exert any undue influence on the coloration of the ventral margin, and is thus not likely to be a confounding variable.

Reliability

The ability to replicate results is an important consideration in any experimental technique, and two tests were conducted to determine reliability in recognizing growth coloration, the first using a non-random sample and the second a random sample. The first test involved reexamining the results for the June 1987 sample, and achieved an accuracy rate of only 63.2 percent determined by replicating the original colour designation; this is a statistically significant change in observations (see Maxwell 1989 for a detailed discussion of how reliability was measured). The second test, using a random sample of 48 specimens, yielded an accuracy rate of 77 percent, and no significant difference in observational changes. These two studies suggest that recording growth coloration can be done with an acceptable degree of accuracy; the most common change in both studies was from indeterminate to either opaque or translucent, indicating a greater familiarity with assessing sections. The June sample (non-random) was one of the first collection periods analyzed, and the low replicability of the second pass on this material is thought to demonstrate an initial lack of familiarity with assessing specimens. Results of the random sample suggest that, with practice, determining growth coloration can be achieved with an acceptable level of reliability.

Discussion

The technique of constructing a seasonal growth sequence through examination of the growth coloration of the ventral margin of marine bivalves has a number of advantages and disadvantages.

Perhaps the foremost advantage to using the growth coloration ratio technique is its inherent speed. The average amount of time needed to section a specimen ranges from 6 minutes and 40 seconds to 9 minutes and 48 seconds. The amount of time needed to assess or "read" a section ranges from 29 to 44 seconds. Thus, the technique is productive from the perspective of research time; it is possible to section fifty or more valves in one day, and to analyze three to four hundred in the same time period, allowing for the rapid analysis of large numbers of specimens. This is essential, as large numbers of specimens are needed for modern comparative data to be reliable. The speed of this technique makes it conceivable that large numbers of specimens - in the order of thousands - can be removed from archaeological contexts and analyzed, which is essential if season of death estimates are to be of use in the understanding of midden formation or changes in seasonal occupation.

A second advantage of this technique is its reliability. While the percentage of agreement from reliability tests done on this material is not as high as one might hope (i.e.: less than 90 percent), they do suggest that the technique is reliable enough to warrant further experimentation. With practice, the researcher can become quite proficient and consistent at recognizing growth coloration. At the same time, there is a certain amount of bias inherent in the technique. There is a high degree of subjectivity in interpreting the growth coloration of a valve, with a tendency for valves to appear indeterminate on first examination and either opaque or translucent on the second examination. Although the reliability study of the random sample shows that this bias is not statistically significant, it is still worth noting. While it would be possible to measure the degree of bias imparted by the researcher, it is difficult to suggest a solution to the problem. Perhaps presenting a digital image of each specimen would be useful, although it may would be cost-prohibitive.

Another problem inherent in the technique is its destructive nature. Sectioning a shell is destructive, and while the damage is minimal in most cases, it can be problematic in others. Although some would not consider this to be important for archaeological specimens, especially in light of the number of shells typically contained in a midden, it does pose problems, as fragmentation of the shell can render it unsuitable for other types of analysis. Approximately 16 percent of the modern shells used in this study fractured in one manner or another during section preparation. One would expect that the proportion would be at least as high or higher with prehistoric shells, due to their often friable nature (Muckle 1985). This potential for destruction of materials will require large samples of archaeological shell, in order to carry out types of analysis other than season of death estimates.

The biggest disadvantage to using this technique is its inability to divide the year into short, discrete seasons. Research on the Atlantic coast has demonstrated that this technique and others similar to it typically divide the year into only two seasons, usually not of equal duration (Claassen 1989; Sanger 1989; Belcher 1989: Personal Communication). This appears to be the case on the Pacific coast as well. When all species are combined, only two seasons can be distinguished. Even *Protothaca staminea*, apparently the most seasonally-sensitive species in the study, can only be broken into three distinctive seasons. It seems unlikely that comparing ratios of translucent, opaque, and indeterminate valves will ever provide a highly sensitive means of looking at short-term seasonal change.

Estimating the Season of Collection of a Prehistoric Shell Deposit

After the growth coloration ratios have been determined for the year, the researcher can use them to make an estimate of the season of collection of prehistoric materials. Two hypothetical examples will be used to demonstrate the procedure.

For the first example, a sample of forty specimens of prehistoric *Protothaca staminea* were removed from a single depositional context of a shell midden. After sectioning, this sample yielded 12 specimens (30 percent) that died during Translucent growth, 21 specimens (52.5 percent) that died during Opaque growth, and 7 (17.5 percent) specimens that were indeterminate (Figure 13:8). The procedure is to compare these ratios with the modern data, and determine which month they most closely resemble. After comparing with the values in Figure 6, it is appears that this hypothetical collection falls somewhere in the early spring, between the months of February and April. Thus, this collection period would be suggested, with March appearing to be the most similar month.

For the second example, a collection of 31 prehistoric specimens of *Saxidomus giganteus* and 51 *Protothaca staminea* are removed from the same context of a shell midden. After sectioning, the *Saxidomus* specimens contain 8 translucent specimens, 19 opaque, and 4 indeterminate specimens; the *Protothaca* specimens contain 11 translucent, 33 opaque, and 7 indeterminate examples. Again, these values would be compared with the modern data. For all individuals combined, there are 23.2 percent translucent, 63.4 percent opaque, and 13.4 percent indeterminate specimens. By species, *Saxidomus* is 25.8 percent translucent, 61.3 percent opaque, and 22.7 percent indeterminate;

Protothaca is 21.6 percent translucent, 64.7 percent opaque, and 13.7 percent indeterminate. These are shown graphically in Figure 13:9.

The specimens can be compared both as a combined sample, or as an individual sample. Combined, these ratios do not match any collection period, and would likely be assigned to the period between March and October, due to the high proportion of opaque specimens. Treated individually, *Saxidomus giganteus* could be assigned to any month between February and September, with May through July being the most similar months. *Protothaca staminea* would appear to fall between February and November, with March being the closest match.

The technique of comparing prehistoric to modern coloration ratios is quite simple in theory, and considerably more complicated in practice. It is difficult to suggest whether it is more important to closely match translucent or opaque ratios. The ratios used in the examples do not closely match any of the modern values, likely because the modern data provided was compiled during a single year. Annual variations in growth ratios are thus not taken into account. A multi-year study would be needed to establish the range of variability to be expected during any given collection period.

It seems that *Protothaca staminea* is the species most sensitive to seasonal change, as its growth coloration patterns break the year into three distinctive seasons. It is also a productive species in terms of preparation and analysis time. *Protothaca* requires the least amount of time to analyze, and does not require significantly more time to section than any other species. Finally, *Protothaca* was easily obtained, being the only species encountered during every collection period.

Both *Macoma* and *Saxidomus* also seem to be potentially useful for season of death studies. While neither has the sensitivity to change found in *Protothaca*, it is possible that they could be used for supplemental data. *Macoma* is capable of dividing the year into two seasons, and is most abundant during the summer months. This is useful, as it is apparently during the summer that the most distinctive seasonal coloration change occurs. *Macoma* also has the advantage of being one of the easiest species to section, although conversely it is one of the more difficult species to analyze. If specimens of *Macoma* are available for study, they should be utilized; unfortunately, *Macoma* tends to be uncommon in archaeological contexts. *Saxidomus*, while much less sensitive to change than *Protothaca*, appears generally to parallel the latter's growth pattern. Thus, *Saxidomus* could be another species useful as a supplement.

Saxidomus valves tend to be slow to section, but easy to analyze. Frequently encountered in midden sites, *Saxidomus* seems another good choice for study. The other species under study are less useful. I recommend that researchers avoid both *Clinocardium nuttallii* and *Mya arenaria*. *Mya* is a poor choice, having an extremely high proportion of indeterminate specimens, and a high fracture rate during both collection and specimen preparation; only the chondrophore is commonly encountered archaeologically. *Clinocardium* is also difficult to analyze and section, due the its pronounced ridges. This is unfortunate, as large lenses of *Clinocardium* valves are an occasional occurrence in Gulf of Georgia shell middens. *Tresus capax* was not gathered in sufficient numbers to properly analyze its potential as a seasonal indicator. However, further work on this species could be worthwhile, as it is frequently found in association with burials in the Gulf of Georgia, and could potentially be used to assess the season of inhumation.

Caution should be used when only one or a limited number of species is used for making season of collection estimates of archaeological shell. If, for example, *Protothaca staminea* is chosen as the modern species to be monitored at a particular site, any estimates of season of collection will only be applicable to this species. It would be erroneous to apply seasonal data from one species to another, regardless of how similar their ecology may be. It would also be erroneous to assume that all species of shellfish were collected at the same time (and only at the same time) as littleneck.

The effects of geographic variation on seasonal growth patterns also need investigation. The PIC used in this study comes from a single locality, meaning that there is no way of determining whether the results can be applied to any other locality. What is needed is a research project that will collect specimens from several different locations - preferably all at the same time - to assess the degree of difference or similarity in seasonal growth patterning. The PIC can only be used for other regions if it can be demonstrated that there is no significant difference in the growth patterning of the region. Further, it must be remembered that only a very particular activity is being monitored through this type of study, and not the full range of cultural activities that occurred at a site. Even if the season of collection of all species of shellfish at a given site could be precisely determined, it would still be invalid to assign an estimate of the period of site utilization on the basis of only shellfish data; other activities undoubtedly occurred on-site, and these may or may not have corresponded with periods of shellfish collection. Assigning a season of utilization to a multi-component site on the basis of an estimation of the season of shellfish collection is even more misleading; an estimate would be needed for every occupation to even have an inkling of how the site fit into the seasonal round, and how this fluctuated through time.

It may be necessary to re-examine the entire concept of seasonality with regard to shellfish. It is important to remember that while we are asking questioned based on what could be called cultural seasonality - such as a seasonal collection round - we are attempting to answer these questions through the use of data that is indicative of non-cultural seasonality. Shellfish will respond in the same fashion to ecological stimuli regardless of whether or not they are a food source to humans. Therefore, it seems logical that archaeologists content themselves with what information can actually provide about the season of their death, at least for now. Dividing the year into two unequal growth seasons may not be as satisfying as knowing the exact date of an occurrence, but it is the best we can do at present.

Requirements for Archaeological Samples: Midden Sampling

Obviously, there is no single "correct" way to sample a shell midden site, and the goals of the research design will determine how such sampling will proceed. However, if assessing shellfishing seasonality is a goal, there are certain considerations that should be kept in mind, in order to obtain samples that will be useful. The ideal situation would consist of a combination of cluster and stratified random sampling, with at least two clusters removed from each sampling strata. Cluster sampling is used because the samples comprise more than one shell, and therefore a cluster; stratified random sampling is also recommended as it will ensure coverage of all areas of the site, but will give greater emphasis to those areas of primary interest. Most excavation projects will probably not allow for the ideal situation; the following offer some guidelines for minimal recovery requirements.

First, shell samples from different areas of a midden should be retained for analysis; ideally this will allow for an understanding of intra-site variation in seasonal behavior; minimally, it will increase the chances of producing a useable sample. Samples should come from a variety of vertical locations to assess changes through time. At least two samples are required to assess variability; however, if this is not feasible, the sample studied *must* come from a single context, and *cannot* be a combination of different contexts, as combining different events to form a single sample would effectively render any analysis meaningless. The researcher must be reasonably sure that all the shells come from one depositional episode. Recognizing single depositional episodes within a midden is a thorny issue, although this has been achieved with some success (Stein 1992; Maxwell et. al. ND). The researcher must know the location of the depositional episode within the site. Three dimensional proveniencing of the shell cluster as a whole is essential, and shells of unknown provenience should never be included in a seasonality study.

Second, the nature of the deposit itself must be considered. It is essential to record whether the shells came from a feature such as a pit or burial, from primary refuse context or highly disturbed area of the site, from a homogeneous context or an isolated deposit. Consideration of where the sample originated is essential for interpretation of the seasonal estimate. Features of great interest to the project - such as burials, houses, and storage pits - should be sampled if they yield sufficient shell; they should not, however, be taken to represent the site as a whole. Burying a body is probably a much more unusual occurrence than gathering shellfish.

Finally, there must be an adequate number of shells for study, meaning *usable* shells. All samples must meet the criteria for study necessary for the analytical technique to be employed; thus, if ventral margin coloration is the technique to be used, then all the shells in the sample must have an intact ventral margin. Large column samples may allow for an easy way to collect shells for seasonality study; it is important not to combine shells from different levels of the column. If growth coloration is the analytical technique to be employed, then sample size requirements are always large, as there must be at least 40-60 readable shells in the sample; producing this sample size will require the recovery of considerably more shells. The minimum value of 40 is not arbitrary, as a sample of this size should allow for a normal distribution of sampling error (Thomas 1986). If multiple clusters can be removed from the site, then the clusters should all be approximately the same size, to avoid statistical problems.

Conclusion

At first glance, the growth coloration method appears to be straightforward and sufficiently productive to warrant routine use in the Northwest. There are at least 2 species, Butter Clam (*Saxidomus giganteus*) and Native Little Neck Clam (*Protothaca staminea*) that are both very common midden constituents, and both have some degree of sensitivity to seasonal fluctuations in environmental conditions such as water temperature. The approach requires the recognition of a discrete shell deposit within a midden, but under most circumstances this should not be beyond the capabilities of anyone with experience in shell midden archaeology. Given these factors, the question then is: why is shellfish seasonality not routinely studied in Northwest Coast archaeology? There appear to be two possible explanations, both closely related.

First, there is general dissatisfaction in all techniques for determining the seasonality of shellfish remains - particularly among the researchers studying these techniques - primarily due to the general inability of any approach to accomplish more than providing a very gross estimate of the time of year that a particular shell deposit was made. The results from the study described herein make it quite clear that dividing the year into uneven segments is probably the best we can hope for; similar results have been found elsewhere (see Claassen 1998), suggesting that this is not a regional problem. This puts the researcher in the position of having to justify (if only to themselves) investing time and money collecting large quantities of shell from a site, digging in such a manner as to allow the recognition of discrete shell deposits, and paying to have seasonality estimates done when the most likely result will tell them that collection occurred somewhere between March and December.

The second problem lies directly in the fact that the PIC, like virtually all other reported collections (Claassen 1998) covers a very short period of time: only a single calendar year. Global patterns of variation in water temperature such as *El Niño* and *La Niña* events (Rollins et. al. 1986) demonstrate that it is impossible to understand annual variation in such factors as water temperature on the basis of a single year or even several years. The only way in which to ensure that the pattern seen in the PIC is representative is to collect for many years. Finding funds and researchers to conduct such collection will not be easy, particularly with no guarantee of anything in the way of meaningful results at the conclusion. Claassen (1995, personal communication) informs me that samples taken from the same location for multiple years on the Atlantic coast show that seasonal variations in shell growth tend to average out over time. If this holds true on the Pacific coast, then the sharply demarcated winter variations noted in the PIC are very likely to blur over time, possibly resulting in two seasons of roughly equal duration, or possibly resulting in such interannual variation as to make it impossible to recognize any portion of the year.

As stated above, seasonality studies using shellfish remains still have "potential" some 30 years after they were introduced to coastal archaeology. Despite the shortcomings of the growth coloration technique and the PIC described in this study, I still feel that there is reason for both optimism and additional research. Optimism is appropriate, as the study results do suggest that it is possible to recognize the seasonality of a collection of shellfish using the growth coloration technique. Additional research is certainly appropriate if only to determine whether the patterning noted in the PIC is the result of a seasonal phenomena or is a product of sampling error, either within the collection or in the choice of years to collect. Long-term research is the only way to determine whether the growth coloration technique really works; until such research is undertaken, studying shellfishing seasonality will remain a technique with potential.

CHAPTER 14

Uncovering Historical Sequences in Central Coast Salish Oral Narratives

DUNCAN MCLAREN

Introduction

The goal of this paper is the exploration of the manner in which transcribed Salishan oral narratives provide insights into the sequence of human history in the Fraser River region of southwestern British Columbia. Drawing upon six different sources of transcribed oral narratives, I discovered that these orators used several different methods of sequential ordering of historical events. These methods include consensual remembering, genealogical referencing, and use of sequencing references within a given narrative to connect it temporally with another narrative. The resulting sequences are traced and tabulated for each individual source and then compared to the other sources by creating a time-space chart. Such charts are employed in other studies of the past including palaeoecological, geological, and archeological inquiries. The oral historical space-time sequence presents an interesting perspective on the human past in the Fraser Valley that both contrasts with and complements the archaeological sequence for the same region.

The Study Area

The study area used in this survey includes the valleys of the Fraser Drainage from Yale, at the lower end of the Fraser Canyon, to the Gulf of Georgia at the mouth of this mighty river. Many of the First Nations people that now inhabit the area identify themselves with the overarching political identity of the Stó:lo Nation. Stó:lo translates as 'river' (Galloway 1993) and identifies the close relationship of the people with the river. The Stó:lo Nation includes an amalgamation of numerous different groups located along the course of the Fraser River from Yale to the mouth of the Fraser at Musqeum. Several sources list traditional village sites, present reserves, or political jurisdictions of the various Sto:lo groups (Duff 1952, Suttles 1990, M. Carlson et al. 1997).

The language of the Stó:lo is referred to as Halkomelem, a language community of the greater Coast Salish language stock. There are several dialects of Halkomelem that are referred to as Upriver Halkomelem, Downriver Halkomelem, and Island Halkomelem (Galloway 1993). These dialects can be further subdivided. For example, Galloway (1993) divides Upriver Halkomelem into the Chilliwack dialect, the Chehalis dialect, the Tait dialect, and the Sumas/Kilgard dialect.

Transcribed oral narratives from the region traditionally occupied by Mainland Halkomelem speakers (Upriver and Downriver dialects) are reviewed in this paper. Two of the sources are from the close neighbours of the Stó:lo: the Squamish (a separate Salishan language community related to Nooksack), and Lummi (a Straits Salish dialect).

One factor that links all of these groups and dialects together and differentiates them from most other Northwest Coast peoples is the legendary transformer figure(s), *X̱ex̱á'ls*, who appears as the protagonist and sometimes the antagonist in many narratives. *X̱ex̱á'ls* is "the collective name for the powerful transformer sibling – three sons and one daughter of black bear and red-headed woodpecker" and is often referred to in the plural and sometimes in the singular. The relationship of the people of the study area covered in this paper is based on a common history as relayed through mutual references to *X̱ex̱á'ls*.

History through Language

Language is a means through which the social memory of a particular group of people is conveyed, shared, transmitted, and remembered. Certainly the use of any language conveys through it a learning of what has gone before. However, language is also used to describe and explain events of the past. Many different types of speech events can be used to convey the past through language. Speech events are particularly important in terms of conveying information about the past: "speech events are where communities are formed and held together" (Duranti 1997:289). Oral-historical narratives are particularly powerful social bonding mechanisms. They provide means through which commonly shared notions of time and space can be expressed. When "we remember, we represent ourselves to ourselves and to those around us. To the extent that our 'nature' – that which we truly are – can be revealed in articulation, we are what we remember" (Fentress and Wickham 1992:7).

The use of chronological references to order such remembrances enables them to be articulated linguistically, and hence re-remembered. Thus, rendering of the past as a sequence of events in the past is in and of itself an important means through which communities are bonded. All speech and narration has some inherent temporal properties. Duranti (1997:336) suggests that there is a temporality of speaking, where

> details are slowly revealed one at a time, giving different participants a chance – although by no means assuming the same authority or linguistic ability – to affect the construction of a story and the moral identities of its character.

Where details are slowly revealed one at a time a sequence of events is cast. This sequence may involve cyclical patterns, blurring the beginning back in the end, much as the sequence of seasons change but repeat themselves annually, or repeating the same themes over and over again. The sequence does not necessarily have to end at the beginning, although it might be said that at the end of every sequence there is, by necessity, a new beginning.

Galloway (1993:613-614) identifies linguistic devices that work to aid in building the temporality of Halkomelem narratives. He found that many narratives and stories that he collected and analyzed feature sentences that began with coordinating conjunctions:

> sometimes conjunction-intial sentences follow one another for a page or more. These indicate subsequent events and serve to carry on and structure the narrative.

Here the sequence of events in the narrative does not rely on the temporality of language alone, but is aided by the employment of sentences beginning with coordinating conjunctions. In this manner, various passages of a particular narrative are ordered relative to the temporality of each other.

Two different narratives may share common references to particular events that occurred in the past. The shared references are often a link (conjunction of sorts) between narratives forming a sequential relationship between the different narratives. Alternatively, one narrative may have a reference that relates it temporally to all narratives. For example, "in the beginning" is a statement that suggests that there are no narratives that come before this narrative. These types of references are referred to in this paper as sequencing references. A narrator's use of a sequencing reference demonstrates consciousness of the temporal order of events within and between narratives.

Sources

All of the sources of transcribed oral narratives reviewed for this paper have been recorded in the last 125 years.

The relevance of particular references to the tasks at hand was found to be variable. A rough categorization of sources enabled me to choose those that were most relevant to the stated goals of this project. Several sources were found to be in amalgamations of transcribed oral narratives from across North America (Morgan 1974; MacFarlan 1974; Mélancon 1967; Jenness 1960) or from the Northwestern North America (Teit 1917). Rarely is there any contextual information given in these sources as to the informants or the process of translation. In most cases little could be accomplished with these sources, as there was not enough material provided or information included to draw conclusions in regards to the relative chronology of the stories written.

All other sources included narratives exclusively from the Stó:lo region or neighbouring areas. Some of these sources were found to be more useful than others in terms of the analysis being conducted. In many instances these sources provided over-arching temporal sequences related by the narrator (Jenness 1955; Hill-Tout 1897; Hill-Tout 1902, reprinted 1978), or there were enough common references between narratives to place them in a type of sequence (Stern 1934; The Optimist 1961; Street 1974). These sources form the backbone of the present analysis.

Several other sources were found to be collections of narratives, but little was found to connect the tales due to a lack of an overarching temporal framework, a lack of internal reference, or a lack of adequate review undertaken before the preparation of this manuscript (Lerman 1976; Wells 1970; Wells 1987).

Based on direct interviews on the subject or on impressions gained from the study of Salishan culture, several anthropologists have relayed general scenerios of historical sequences. Hill-Tout (1978) seems to have been very interested in ensuring that culture chronologies were explained to him and he recorded them thus. Suttles (1990), Miller (1999), M. Carlson et al. (1997), and Bierwert (1999) all provide some general inferences about the sequence of Sto:lo or Coast Salish mythological cycles, but it is not clear if their inferences are drawn directly from informants.

Six sources from the above were chosen to conduct the analysis of relative chronologies as sequenced in transcribed oral narratives. These six sources are Hill-Tout (1897), Hill-Tout (1902, reprinted 1978), Stern (1934), Jenness (1955), Street (1974), and the Optimist (1961). The sequences devised and discussed by various anthropologists have also been included in this analysis. These include Suttles (1990), Miller (1999), Carlson et al. (1999), and Bierwert (1999). Other sources are referred to throughout the course of this paper, but are not used in constructing the final mosaic for reasons that are discussed above.

Transcription and Translation

All of the materials reviewed have been translated into English. Certainly there are many difficulties in the process of translation (see Duranti 1997:154).

There are many ways in which the sources used have undergone translation and transformation into English and transcribed forms. Often there is little information given on the actual process of translation as, for example, in many of the narratives recorded in Hill-Tout (1902, reprint 1978), but also in Teit (1917) and Stern (1934). In Hill-Tout (1897) a translator is known to have been used and to have been, at least in Hill-Tout's eyes, problematic. Hill-Tout's lack of knowledge of the Squamish language necessitated the use of an interpreter. Limitations of this process are described in the following quote from (Hill-Tout 1897:85-86):

> ...he began his recital in a loud high pitched key, as if he were addressing a large audience in the open air. He went on without pause for about ten minutes, and then the interpreter took up the story. The story was either beyond the interpreters power to render into English, or there was much in it he did not want to relate to the white man, for I did not unfortunately get a fifth of what the old man had uttered from him, and it was only by dint of questioning and cross-questioning that I was enabled to get anything like a connected narrative from him at all.

Stories told to Lerman (1976:6) were also translated by an interpreter, but with very different results:

> Harry Uslick was then seventy-nine, totally blind and partially deaf. He had been born at Sardis and had been a trained woodcrafter. He spoke little English, and the stories he told were interpreted to me by his wife. She was three years younger than he, and had also been born at Sardis.

Lerman (1976:6) suggests that Mrs. Uslick's translation added to the substance of the tales being told and that the stories became "both her own and those of her husband". The narratives told to Eloise Street by Chief *K'HHalserten* Sepass were translated by her mother Sophia Street (1974:12):

> ... I was surprised when a tall Indian appeared suddenly through the trees and sat on the other end of the log. Without a glance at me, he began to speak in a musical flow that continued for some minutes. He stopped and turned to look full at me. It was Chief Sepass. In scanty English, he asked me to take his songs and put them in a book. I agreed, and at our home during the next four years, my mother translated the songs ... During the four years, speaking mostly in Salish, the Chief gave various pieces of information.

Similarly, Old Simon Pierre's stories were translated by Simon Pierre Jr. while Diamond Jenness (1955) transcribed (Suttles 1955).

Stories collected by Galloway (1993) were transcribed in Halkomelem phonetically from tapes. Galloway then translated each sentence word for word, and then reorganized the sentences so that they follow English rules of grammar. Each stage of this translation is presented to the reader with the phonetic transcription provided above the direct translation and then the finished translation below that. This traditional Boasian approach to recording and transcribing is intended to provide the reader with many insights into the process of translation and the decisions made by the translator. The onus of translation was often undertaken by the narrators themselves. This would appear to be the case of three different informants whose stories were recorded by Norman Lerman (1976), including Bob Joe, Agnes James, Mrs. Reid, and Louis George. The stories of Agnes James and Mrs. Reid seem to have been recorded during sessions with both informants and translations were often worked out in dialogic fashion (Leman 1976:6).

The process of transcribing, rewriting, and editing various stories that were collected during interview-like sessions also plays a part in the process of translation. For this reason, the transcribers of these works also put their fingers in the realms of translation: from oral recitation to scripted format. Often decisions that were made in modes of transcription are not clear, and the 'artistic' license that is employed by some authors may distort or change important aspects of various narratives. For example, Chief Sepass was particular about the form that the English transcriptions of his tales took. Thus, he ensured that Street recorded the lines of his tales using appropriate rhythm (Bierwert 1999:94).

This exactitude can be contrasted with the rambling and dictation style transcription of Old Pierre's narratives recorded by Jenness (1955). The order in which tales are placed has an effect on how they may be read. Stern (1934) seems to have attempted a chronological ordering of the tales that he recorded among the Lummi, but it is not clear whether the tales were narrated in that order. Duanti (1997:161) suggests:

> Transcription is a selective process, aimed at highlighting certain aspects of the interaction for specific research goals

Certainly the research goals of the translator may be particularly different from those of the narrator. Sequencing references noted in transcriptions may have been highlighted in narration and downplayed in transcription or visa-versa. Any sequences that are apparent then, must be highlighted as resulting from the performative and transcriptional processes.

Many researchers note that there are Christian influences in many Coast Salish transcribed oral narratives (Suttles 1987; Bierwert 1999). Some may be concerned that such influences may take away from the 'traditional form' that these histories would have at one time had. Such distinctions are considered irrelevant to the following analysis. The conventionalisation of elements or new ways of perceiving the past into old stories would seem to be a common and ongoing character of oral histories (Fentress and Wickham 1992).

The Narrators of Six Sources Analyzed

The names of the narrators are often provided by the ethnographer or transcriber. Unfortunately, it is by convention that the ethnographer or transcriber of the story is cited rather than the narrators themselves. For this reason a clarification of the particular narrators of the materials analyzed is given. The transcribers are also discussed. The purpose of this section is to provide some insight into the process by which oral/aural transmitted information is textualized and to re-empower the narrator as having a great deal of influence in the authorship of the text. It is without a doubt that the context of performance and the relationship of the narrator and the transcriber (listener) helped to shape the overall sequences presented in the narratives. This section may also help to orient the reader to a better understanding of the nature of the sources analyzed for this project.

Mul'ks

Perhaps the clearest description of the performative context in which the narration and transcription of stories told comes from Hill-Tout's (1897:85) *Notes on the Cosmogony and History of the Squamish* that divulges the background of *Mul'ks* the narrator:

> I received a cordial reception at the hands of the chief men of the tribe, and on learning what I wanted they brought out of retirement the old historian of the tribe. He was a decrepit creature, stone-blind from old age, whose existence until then had been unknown to the good bishop, who himself has this tribe in charge. I am disposed, therefore, to think that this account has not been put into English before. I first sought to learn his age, but this he could only approximately give by informing me that his mother was a girl on the verge of womanhood when Vancouver sailed up Howe Sound at the close of last century. He would therefore be about 100 years old. His native name, as near as I could get it, is "Mul'ks." He could not understand any English, and his archaic Squamish was beyond my poor knowledge of the language, it was necessary to have resort to the tribal interpreter. This account, as a result will be less full and literal.

Sqtcten et al.

Another of Hill-Tout's (1902, reprinted 1978:67) ethnographic works, *The Ethnological Studies of the Mainland Halkomelem, A Division* *of the Salish of British Columbia*, includes a section on the Kwantlen. Very little is provided regarding the context of narration or ethnographic interview and only the following description of the narrators is provided:

> In my studies of the Kwantlen I was assisted by a native named August *Sqtcten*, of the Fort Langley Reservation, an intelligent and thoughtful Indian, who had been trained in his younger days in the mission school of the Oblate Fathers, and who had a very tolerable knowledge of English; by Jason Allard, a fairly educated half-breed; and to a less extent be an elderly Indian women named Mrs. Elkins.

Sepas

Of Chief *K'HHalserten* Sepass, the narrator of many songs and tales, much is known and described. The transcription of Chief Sepass's tales occurred over a four-year period beginning in 1911 (Street 1974:12-13), the performances taking place at Street's house. Sepass was born in the Kettle Falls region of Washington State in 1847 and moved to the Sardis region of the Chilliwack Valley after small-pox decimated the Colville peoples of the Kettle Falls region.

> The Chief said that his family group were connected to with the Nooksaaks in the state of Washington, that in British Columbia they married Cowichan or Thompson tribes people, and that they could "talk to the Susquatches" – Hairy Giants said to range the Coast Mountains. He had seen a giant skeleton in Chilliwack ... In the days of the Sun ceremonies, still celebrated every four years at the beginning of white penetration and settlement (later inevitably to be overridden by the pressure of the new regime), Chief Sepass was host to a large gathering from Pacific Coastal settlements. This was the occasion for particular rites, songs and dances, and parleys on matters of administrative concern. Two songs were sung each taking four days, *The Song of Nations*, a history, and *The Song of Generations*, a genealogy..

Hillaire et al.

The only information provided on the informant for Stern's (1934:9) monograph on the Lummi Indians of Northwest Washington is in the Introduction:

> The author is especially indebted to Joseph Hillaire, a Lummi Indian whose sincere interest in preserving the traditions of his people made him and eager and intelligent informant. Among other members of the tribe who served as informants were August Martin, Matt Paul, and Mrs. Matt Paul, William McClusky, Timothy Jefferson, and Frank Hillaire.

It is not clear whether one individual narrated the various stories in the monograph to Stern or whether several of the informants provided these stories.

Old Pierre

Anthropologist Diamond Jenness visited Katzie in February of 1936 (Jenness 1955). In the introduction to Faith of a Coast Salish Indian (Jenness 1955:5), it is remarked that:

> Nowhere did he find the religious beliefs of the Indians so well integrated, or the rites so well interpreted, as by Old Pierre, a man about 75 years of age who enjoyed a wide and honourable reputation as medicine man both on Vancouver Island and on the Mainland.

The work of Jenness and Old Pierre is one of the most often cited works of traditional Coast Salish society (e.g. Suttles 1955, 1987, 1990; Miller 1999; Bierwert 1999).

Splockton

Tsawwassen Legends is a collection of narratives that were originally published in The Optimist Newspaper of Ladner B.C. between 1946 and 1947. These stories were then printed in a collection by The Optimist (1961). The stories were collected by Geraldine McGreer Appleby, the editor of the Optimist. The narrator of most of the stories was Joe Splockton a resident on the Tsawwassen reserve.

The Chronological Ordering of Oral Narratives

In this section examples of relative ordering and sequencing references that were employed either in the context of a performance or in the narrative itself are given. This discussion is specific to the six collections of transcribed narratives that were analyzed specifically for this purpose.

The Chronological Consensus of Mul'ks Narration

Hill-Tout (1897:85) provides information regarding the means through which the ordering of Mul'ks Narration of Squamish stories was to unfold:

> Before the old man could begin his recital, some preparations were deemed necessary by the other elderly men of the tribe. These consisted in making a

> bundle of short sticks, each about six inches long. These played the part of tallies, each stick representing to the reciter a particular paragraph or chapter in his story. They apologized for making these, and were at pains to explain to me that these were to them what books were to the white man. These sticks were now placed at intervals along a table round which we sat, and after some animated discussion between the interpreter, who acted as master of ceremonies, and the other older men as to the relative order and names of the tallies, we were ready to begin.

This is the only reference to this means of ordering the narrative flow. It is particularly noteworthy that this sequencing appears to have been agreed upon consensually. For this reason, the means of order narratives in this example demonstrates the importance of creating a sequence that listeners agree upon and sanction.

Kwantlen Genealogy

Kwantlen genealogy is related in Hill-Tout (1902, reprinted 1978) as being a means of ordering events of the past. This is done by the linking of a remembered sequence of ancestors with various epics. A lineage of ancestor is a means through which narrative sequences are remembered and the sequence of narratives can be used to remember the lineage. Both provide means for diachronic oriented examinations and explanations of the past. Following Hill-Tout's (1902, reprinted 1978:69) explanation:

> Of their origin they give various mythical accounts. Among the Kwantlen proper the first man was called Swaniset, meaning "to appear or come in a mysterious manner." He was *ten sweyil* 'descendent of the sky', who suddenly appeared on the Fraser River. Another account makes the first man a *ten tumah* 'descendent of the earth'. This latter is possibly an adaptation of the Mosaic account of the first man. With him were created all the tools and utensils, and also the Coquitlam tribe as his slaves. His name is given as *Swkelselem*. The *siam*-Kwantlen [chiefly family] have a genealogical record of their chiefs for nine generations: (1) *Skwelselem* I (2) *Skelselem* II (3) *Skwelselem* III (4) *Ctalsitet*, afterwards changed to *Skwelselem* IV (5) *Sqtcten* I (*Skwelselem* IV dying without male issue the *siam*-ship passed to his sisters son; hence the change of name.) (6) *Sqtcten* II, afterwards changed to *Stltim-ten*, Which has reference to thunder (The story in connection with the change of name was forgotten. The name is a *sulia* name.) (7) *Sqtcten* III (8) *Sqtcten* IV (9) *Sqtcten* V, who is the present chief. The original signification of these names seems to be forgotten.

Many events that took place during the course of the existence of various ancestors are remembered in reference to this lineage. When "*Skwelselem* II was chief there was a mighty conflagration spread all over the whole earth, from which few people and animals escaped" (Hill- Tout 1902 reprint 1978:70). Hill-Tout goes on to suggest that this event refers to "some volcanic phenomenon". During the time of *Skwelselem* III the flood occurs and the Nooksack tribe becomes separated from the Squamish. During the time of *Skwelselem* IV a large snow storm of long duration occurs and many people starve.

The direct lineage approach to temporal ordering may or may not have a direct relationship to the temporality of average human generations. Fentress and Wickham (1992:80) note:

> These lineages and genealogies function not only as a source of information about 'real' ancestors, but also to situate a group as a clan or kinship group in relation to other such groups. In other words, lineages and genealogies also situate a group within a system of symbolic classification represented by totemic and mythological figures.

Unfortunately, Hill-Tout (1902) only published two Kwantlen narratives in full. Neither narrative was presented in relationship to the *siam*-genealogy nor contains references to other stories. In fact, the first narrative begins: "Once upon a time". Regardless, enough information is given in the section on genealogy to construct a relative sequence of historical events.

The Sequence in Sepass's Tales

Many of tales told by Chief Sepass use sequencing references. Such references operate to connect the temporality of one narrative by making temporally oriented references to other stories. These types of references are important and their usage suggests that Sepass intentionally sought to order his narratives in a cohesive and understandable sequence. It is of importance to note that not all of the narratives relayed by Sepass were found to have sequencing references. The following are some examples. From *The Beginning of the World*, the sequencing reference related to all other narratives as it implies a beginning (Street 1974:30):

> Long, long ago
> Before anything was,
> Saving only the Heavens,

From the seat of his golden throne
The Sun God looked out on the Moon Goddess
And found her Beautiful.

From *The Slollicum, Lake Mystery*, the sequencing reference occurs relative to a particular event by employing foreshadowing (Street 1974:49):

Many years ago
Before the first thought
Of the oldest man …

From *K'Hhalls, the Sun God,* the sequencing reference is connected to the order of creation and relates this narrative back to the beginning (Street 1974:55):

K'Hhalls made Tsee-ah-khum, the sun,
And Thuh-galtz, the white moon.
K'Hhalls made Kwah-sil, the stars,
And Tsu h-khil-ghil-um, the coloured rainbow

From *Tsee-o-hil, Mankind,* here the flow continues in relation to human action and the actions of K'Hhalls (Street 1974: 57):

And K'Hhalls said:
"Let him have the earth for a while.
Let him see what he can do.
Let him build a great people on earth.
I will come back."
And K'Hhalls slept.

From *Miktzal the Painter,* the sequencing references refer to the actions of K'Hhalls (Street 1974:59):

Miktzal laughed loud and long
As he looked at the bird folk,
Eager and waiting.
His painter's eye glinted with mischief.
He said:
"K'Hhalls is asleep; Why may I not be K'Hhalls
For a little while?"
He turned to his paint bowls.

Several Narratives follow which relate transformations undertaken by an awakened K'Hhalls including the flood in which humans are buried in the mud. The following narratives make indirect or direct reference to this event suggesting that they occur after the flood (Street 1974:75):

From *Quait-Tzal Spahtz, the Grizzly Bear*

Tsee-o-hil
Lay buried in the mud…

From *Khwat-Say-Lum*, the Salmon Baby (Street 1974:84):

When the flood was gone
And the banks of the streams
Rose out of the mud …

Together there is a consistent flow of a large narrative cycle within these narratives presented in *Sepass Tales*. The narratives of Chief Sepass demonstrate that there are many different ways in which sequencing references can be employed.

Linking Lummi Narratives

There are also sequencing references in the Lummi narratives recorded by Stern (1934) These are not as clearly defined as those in the Sepass Tales (Street 1974). Again different types of sequencing references were found including references to the relative position of a narrative in relation to all other narratives, cross-referenced characters, and the movement of peoples from one location to another.

From *In the Beginning* (Stern 1934:107):

Two Brothers were placed upon this earth. They first landed in the vicinity of Somane. There they discussed the problem of getting a livelihood. They concluded that salmon would not come to this place so they moved south … to both brothers, *Xelas*, the Transformer had given some important gifts – the salmon, the reef-net, the spear, *suin* and fire.

From *The Origin of Fire Making* (Stern 1934:108) The sequencing reference foreshadows the coming of Xelas:

While the Indians were assembled at *Xanetan* they heard of the coming of *Xelas*, the transformer. They prepared to welcome him with a feast.

Another story relating how *Xelas* created deer follows. Other sequencing references occur in this collection of narratives, but these are difficult to cross-reference with those from other stories due to a lack of context and the small number of stories. The story of *How the Lummi Came to Their Present Abode* is a good example of where a sequencing reference appears to be used, but there is not enough information provided to adequately form a sequential relationship. In addition, this particular narrative has specific names given to an individual actor: *Whtathum* who becomes *Skalaxt*. This figure may have specific hereditary meaning and significance much like the genealogy of the Kwantlen (Hill-Tout 1902, reprint 1978).

Old Pierre's Katzie Genesis

The Katzie Book of Genesis, as Jenness (1955) calls Old Pierre's historical narrative of the Katzie people, is one of the most clearly and concisely ordered sequence of events of all the material reviewed. The Katzie book of Genesis includes the succession of many intertwined narratives all arranged in historical sequence. It is unlikely that Jenness had much influence in the ordering of these stories or in guiding the performative context along these lines. This ordering is attributed to the genius of Old Pierre himself (Jenness 1955:5) who uses a combination of genealogy, the presentation of the history as a single narrative, and many sequencing references as guides. The Genesis is described by Old Pierre as "not a mere fairy-tale, but the true history of my people, as it was taught to me in my childhood by three old men whom my mother hired to instruct me" (Jenness 1955:10). The following are some examples demonstrating the use of sequencing references. The first is the commonly used opening sequence reference that is related to the sequence of all narratives by introducing the first human beings (Jenness 1955:10):

> When the Lord Above created these first human beings, the land was strangely different from what it is now ... in the waters of the sea and the rivers there were clams and mussels, but no salmon, eulachon, or sturgeon, no seals, and no sea-lions.

Another sequencing reference involves the tracing of environmental changes such as the introduction of certain animals into the area (Jenness 1955:12):

> He then led her to the water's edge and said: 'My daughter, you are enamoured of the water. For the benefit of generations to come I shall now change you into the Sturgeon".

Pierre also directly links the sequence of characters in his narratives by foreshadowing (Jenness 1955:21).

> Thus *Swaneset* accomplished two great deeds for the benefit of mankind: he brought eulachon down from the sky, and he brought the sockeye salmon from a far-away country ... A rumour now reached the Indians on the Lower Fraser that three brothers, accompanied by twelve servants, were coming from the west to finish *Swaneset*'s work.

Another example of a type of sequencing reference is the means through which Old Pierre links human activities to catastrophic events.

> Slowly the Indians multiplied again after the great flood, and the Lord Above who was watching them saw once more they were too numerous in the land (Jenness 1955: 33).

It is clear that there are many types of sequencing references that Old Pierre draws upon, and the examples used are by no means exhaustive. These sequencing references act much in the same manner as the coordinating conjunctions that Galloway (1993) noted in many Upriver Halkomelem narrative speech events: as devices and tools used to connect the narrative into an integral and temporal structure. The sequencing references employed by Pierre seem to have much in common with those used by Sepass (Street 1974) and in the Lummi Narrative recorded by Stern (1934).

Certainly Old Simon Pierre's recounting of the Katzie Book of Genesis to Diamond Jenness is of great value in terms of understanding the relative chronology of historical event that occurred in the region. Suttles (1955:6) suggests:

> ...the integration of the myths themselves into a coherent cycle is rare, if not unique among the Coast Salish. The plots and incidents exist in other bodies of myths but remain separate elements. And the coherent explanation of the social and the ceremonial in light of this cycle of myths is so unusual that Jenness asks whether it is the normal expression of Katzie culture or the expression of the genius of a single man, Old Pierre. Regardless of the answer, the expression itself has intrinsic value. It reveals at least one possible interpretation of Katzie myth and Katzie life.

Certainly in terms of a cohesive sequence of historical events, Old Pierre's narratives are extremely detailed in their relative chronological ordering. However, as is the premise of this paper, and unlike Suttles (1955) ruminations above, the integration of the stories into " a coherent cycle" is not necessarily rare or unique.

Joe Splockon's Orderings

Joe Splockton ordered his narratives much in the same manner as many other narrators, by using sequencing references. Splockton's narratives are not as specific to other stories in all cases. Temporal references are made to all other narratives such as "the beginning", the first Tsawwassen settler, the collapse of one village or another. From the Legend of the First Tsawwassen Settler the sequencing reference refers to the first man (The Optimist 1961:21):

> *Tsaatzen* is the man in the Delta totem. He was the first man to discover and live in this part of the country. He came from up in the hills.

From the Legend of the Cranberry Bog the sequencing reference refers to the first white man (The Optimist 1961:37):

> This legend of long ago begins with a story about a man it is said was the first white man to arrive in this neighbourhood. Some claim that the first white man was called Portugee Joe.

From The Legend of the Dancing Fisherboy the sequencing reference relates to the age of the first man at Tsawwassen (The Optimist 1961:51):

> The first man at Tsawwassen was an old man. Now, according to stories of olden times – and some believe them still – there were three persons going around the world: three brothers, who could change anyone into anything they wished.

Anthropological Orderings of Salishan Narratives

Several researchers note that there are two different narrative types recognized by Halkomelem speakers. The *sx̱wox̱wiyám* is a narrative that relays events of the distant past, often described or conveyed as the mythological past (Galloway 1993; Suttles 1990; M. Carlson et al. 1997; Bierwert 1999). Alternatively, the *sqwélqwel* is a narrative that is an "historical narrative, narrative of recent events, or news" (Galloway 1993:613). As with the mixing of types of speech events, the *sx̱wox̱wiyám* and the *sqwélqwel* are often found together in a single narrative, and it is often not possible to classify a narrative as being either one or another (M. Carlson et al. 1997:193):

> This stems primarily from the fact that both types of narratives illustrate various realities that often exist simultaneously. The narratives shared by the Stó:lo often do not make a distinction between a distant history that was and a contemporary history that is, or a distant history that is unreal and a contemporary history that is real. There is no line drawn between the mythical/ supernatural/ spiritual and the natural/ordinary that cannot be bent. Even the inferred difference between the past and the present, or a supernatural versus a natural experience, can be blurred (yet the distinction between a *sx̱wox̱wiyám* and a *sqwélqwel* are clear to Stó:lo elders).

M. Carlson et al. (1997) struggle to identify exactly where the distinction between these two narrative types lies. The basis of M. Carlson et al. (1997) and Galloway's (1993) differentiation seem to be based on the dichotomy of real versus unreal or mythical versus historical, which, as is apparent from the quote above seems to be a difficult realm to explore in regards of differentiating these types of narratives. While the emic differentiation may be blurry or complex in identifying one type from another, a review of these two different types of narratives presented in contrasting form in Galloway (1993) and M. Carlson et al. (1997) provides insight into the some of the differentiating features. Thus, rather than struggling with the real/unreal dichotomy, I would argue that the placement of the narrator in the narrative is in some cases a defining feature. Whereas the *sqwélqwel* often includes the narrator in the narrative, for example using personal pronouns such as "I" or "my cousin", personal signifiers of the narrator tend to be absent from *sx̱wox̱wiyáms*. A further distinction is that *sx̱wox̱wiyám* tend to be set in a past that occurred before the life history of the narrator or an immediate ancestor thereof, and the sqwélqwel occurs in the more recent past.

Suttles (1990:466) discussion of Central Coast Salish mythology is limited to a division of the historical sequence into two distinct eras:

> In the myths there was an age when the world was different, its people were like both humans and animals of the present age, and it was full of dangerous monsters. The myth age ended when *xé'ls* the Transformer came through the world, transforming monsters and other myth-age beings into rocks and animals, and setting things in order for people of the present age.

Discussion

The results of the temporal analysis of oral historic sources from the study area are presented in Table 14:1 which is organized by placing the sequences of the narrators in columns. Different eras of the sequences are then identified by the rows. Only episodes that were temporally linked by the narrators are included. The occurrences of common events are linked across rows of the table where possible. The last column I have added to provide a means of delineating each era of the created sequence. A careful review of the constructed table will reveal to the reader how the sequences of these different historical narratives share much in common when they are cross-referenced in this manner. It is clear that chronological sequences between narratives can be pieced together. The orators themselves pieced these sequences together for the listener (reader). Certainly themes reappear and repeat themselves frequently through the course of these sequences, particularly, reoccurrences. The destruction and reconstruction of human communities often reoccur. Such repeated themes contribute to the classification of the narratives as cycles (e.g. Suttles 1955). There is also a linear trajectory of the related narratives. Researchers have often dichotomized cyclical and linear chronologies into non-Western (or subordinate) and Western (or dominant) modes of temporal classification (eg. Connerton 1989:19-20). Hymes 1990) description of temporality in Northwest Coast mythology attempts to clarify (muddle) this dichotomization:

> It would be a mistake to think of a strict linear sequence, one age wholly replacing another. It would be more useful to think of a center and a periphery. There is indeed the great divide of transformation, when beings that are humanlike in voice and action became entirely animal, being overcome and diminished or simply choosing to take on their later characteristics and habitats ... the established world is the center, which the events and beings of the narratives encircle at a distance. One can go out to the periphery, as on a quest for spiritual power. The periphery can come closer, as in the winter season, when power may be displayed in dramatic dance and song, and myths brought to life in words. Especially when the myths are travels of a trickster or transformer, they bring within the confines of the winter house origins in a world of summer.

The findings of this analysis would suggest that elements of both temporal frameworks present themselves in many different ways in the narratives analyzed. Indeed, the temporality of language would preclude that any linguistically based communication can recognize both cyclical and linear time frameworks. Cyclical narratives may contain linear attributes, just as linear narratives can contain cyclical attributes. It must be stressed that one does not necessarily preclude the other.

An Historical Sequence of Transcribed Oral History

The basic premise of Table 14:1 is drawn from the same types of charts used in archaeology. The placing of oral narratives into this type of sequence has been undertaken before (Linklater 1993). One of the first charts of this sort used to order archaeological cultures is attributed to V. Gordon Child in 1932, whose charts detailed the archaeology of Europe "in terms of a complex mosaic of culture" (Trigger 1989:170) and became the prototypes for the format that archaeologists adopted to illustrate chronological and geographical relationships between archaeological cultures. Such charts are of particular use as they provide a means to visually display differences and similarities of contemporaneous archaeological cultures through time. These types of charts can also be useful in displaying the relative histories of transcribed oral narratives. The chart created from this analysis provides a visual means of displaying the mosaic and relative temporality of different narrator's sequences of past events.

Archaeology and Oral Sequences Compared

Both the archaeological and oral historical sequences for the study area provide insight into the human history of the region. However, there seems to be few similarities in regards to perceived phases or categories in these two types of sequences. For example, there seems to be no equivalent of the shift from the Locarno Beach to the Marpole culture type in the oral historical sequence. Whereas the phases of the archaeological sequence are based primarily on frequencies of artifact types and ascribed radiocarbon dates, the temporal markers of the oral historical sequence seem to be based on large-scale changes, both environmental and social.

Differing perspectives of the past are revealed when one considers the archaeological and oral historical sequences. Recent interpretations of the archaeological sequence are characterized by gradual change (Mitchell 1971, 1990; Matson and Coupland 1995). Environmental upheavals rarely figure into the archaeological sequence with the exception of the shift from the Milliken to Mazama Phases in the Fraser Canyon (Mitchell and Pokotylo 1996). These two phases are separated by a layer of Volcanic ash that represents the massive eruption of Mount Mazama 6600 years ago. Otherwise the archaeological sequence of the study area is interpreted as a slow and gradual process with change occurring and developing out of each antecedent phase. Few catastrophes or environmental factors are given for changes in the sequence, with the notable exception of a perceived 'stabilization' in salmon stocks around 5000 BP [5730 cal BP] (Fladmark 1975)..

Table 14:1. Space-Time Grid of Oral Historical Sequences, Central Coast Salish Region.

Mul'ks – Squamish 1897	Hillaire et al. Lummi 1928-29	Joe Splockton Tsawwassen 1946-47	Sqtcten et al. Kwantlen 1902	Simon Pierre – Katzie 1936	Chief K'Hhalserten Sepass – Chilliwack 1911.	Oral Historical Era
-In the beginning there is water everywhere and no land.					-K'HHalls creates the sky, thunder, lightening, fierce wind, sun, moon, stars, rainbow. -K'HHalls sees the first human from the sky.	-The beginning.
-The Great Spirit makes land appear, lakes and rivers, trees, animals and the first man.	-Two brothers placed on this earth.	-Tzaaten came to Tsawwassen from the hills. -Tsawwassen was an Island at this time.	-Swaniset is the first human to appear in the area. - Skwelselem I.	-Creation of groups of people (including Swaniset), leaders, and sun, moon, season's and rainbow. -Only clams and mussels for people to eat.	-Sun and moon's longings mingle and create the world. -Sun's letter of love to moon falls and creates land. -Moon's tears creates the water. -From thoughts, longings, and loving came trees and flowers. -Moon and Sun leap into the sky and their new love creates humans.	-The first humans.
			- Skwelselem II. - Possible Volcanic eruption (may be related to the shattering of Sheriden Hill described by Simon Pierre).	-Three white rocks created. -Creation of the north and west winds Sxwa'yxwey mask (and other masks) given to Musquem. -Creation of sturgeon and owl-like bird. -Pit meadows drained and sloughs created. -Swaniset climbs arrow ladder to the world above. -Swaniset shatters Sheriden Hill. -Seagulls created. -Eulachon created. -Swaniset plays lehal. -Many animals are human in form. -Swaniset marries sockeye daughter. -Swaniset brings salmon up the Fraser.	-K'HHalls sleeps. -Mankind walks the earth in defiance of K'HHalls. -Miktzal paints the birds.	-Before the tranformation.
	-Xelas grants gifts to the first people: the salmon, reef-net, spear, deer and fire. -Xelas convinces Mt. Baker's wife,Whateth, to lie down.	-The first man at Tsawwassen was an old man. -Three brothers arrive and begin to changes things. -Old man is changed into a deer.		-Khaals comes from the West. -Begins to transform people into rocks. -Prophesizes that Tsawwassen island will become joined to the mainland. -Changes people into animals (raven, mink, wolf, kingfisher, racoon, crane, supernatural beings, sucker fish, beaver, muskrat, sandhill, goats, cranes, geese, eagle, wolf, black bear, grizzly, deer, seals).	-K'HHalls awakes. Turns Sky-ak (the magician) into mink. -K'Hhalls creates the sucker from Gekt the boaster (similar to the creation of deer in Pierre). -Turns were-wolf into mosquitos.	The age of transformation

Table 14:1. Space-Time Grid of Oral Historical Sequences, Central Coast Salish Region (cont'd)

Mul'ks – Squamish 1897	Hillaire et al. Lummi 1928-29	Joe Splockton Tsawwassen 1946-47	Sqtcten et al. Kwantlen 1902	Simon Pierre – Katzie 1936	Chief K'Hhalserten Sepass – Chilliwack 1911.	Oral Historical Era
				-Deer fence invented. -Deer fence forbidden. -Thunder controlled by sya'ykwel.		World transformed.
-Great spirit makes the waters rise and all are drowned except for Cheatmuh, son of the first man Ka-la'na, and his wife.			Skwelselem III. Great flood overwhelms the people and shatters the tribes.	Flood. Refuge on golden ears and Mt. Cheam.	-Flood. -Human's die. -K'HHalls watches from the sun. -K'HHalls calls human from the mud after the deluge. -K'HHalls sleeps again.	The great flood.
-The population re-establishes itself				-The population re-establishes itself.	-Grizzly awakes and remembers the days before the flood. -Hy-o-hah-lah takes Grizzly to the world above. -Squirrel, sunk, raccoon, mink, and grouse rescue Grizzly. -Different tribal groups are created. -Grizzly remembers salmon from the days before the flood. Beaver and friends travel to salmon village on the ocean. -Bring salmon up river.	After the flood.
-Cheatmuh dies and the Great Spirit sends a great snow-storm. -The snow covered everything. Starvation and cold.			-Skwelselem IV. -Great famine occurs caused by a prolonged snowstorm. -The Coquitlam are forced across the river from New Westminister.	-Cold and snow sent. -Starvation ensues.		The great snow.
-The population re-establishes itself			-Sqtcten I	-The population re-establishes itself		After the snow.
-Salmon become covered with sores and blotches. -A loathsome skin disease breaks out			-Sqtcten II -Sqtcten III	-News from the east of a great sickness.		The great sickness.
-Vancouver arrives		-Portugee Joe arrives and marries an Indian woman and lives of Reed Island.	-Sqtcten IV	-Europeans arrive on the Fraser.		The Arrival of Europeans.
			-Sqtcten V			

The oral historical sequence is much more concerned with profound environmental and large-scale social change the most profound of these being the Transformation, the Great Flood and the Long Snow. Indeed, these are the types of events that make stories interesting and thus, repeatable and memorable. Whereas the archaeological sequence of the study area is concerned with the gradual, the oral historical sequence focuses on the punctuation of catastrophe and upheaval.

Since the oral historical sequence includes reference to environmental upheaval there is some possibility for comparisons between palaeo-ecological and oral historical data. It is impossible to be certain about absolute dates for events in the oral historical sequence. Regardless, the relative temporality of events for the oral historical sequence has striking similarities with the sequence of events that occurred in the study area since the last glaciation at the narrative level (See Schaepe 2001.).

The oral historical sequence provides a relative temporal framework for the study area that suggests when the first people arrived here the land was unoccupied by other humans. Similarly, the palaeo-ecological model for the study area suggests that the area was likely uninhabitable before 13,000 [cal 15,600] BP as a result of the large-scale glaciation of the region (Armstrong 1981:12; Mathewes 1973; Clague et al. 1982). After the arrival of the first human, the local and presently identifiable fauna of the area begin to become established as related by the oral historical sequence. Along the same lines, this period is characterized by the establishment of species in formerly glaciated regions (e.g. Hebda and Frederick 1990). The coming of *Xals* brings about great transformation in terms of the landscape, people, and ecology (McHalsie et al. 2001). Similarly, the events that occur around deglaciation bring about serious environmental shifts that any animate being would have to contend with though profound change and adaptation (Armstrong 1981). The great flood brings about yet another catastrophe in the sequence of the oral histories. Similarly, The Pleistocene/Holocene transition in the lower Fraser River and adjacent Strait of Georgia is marked by a catastrophic flood event resulting from the sudden draining of a large ice dammed lake in the in the B.C. interior (Conway et al. 2001), This flood event occurred between 9800 and 9160 [cal 11,200-10,300] BP, deluged this part of the region, and deposited a thick layer of clay on the floor of Georgia Strait.

Following the flood, according to the oral-historical sequence, there was a period of relative stability during which populations recovered, salmon were reestablished, and people thrived. In comparison to the events of the late Pleistocene climatic conditions during the Holocene are relatively stable. The archaeological record of the Holocene reflects this stability in the interpretation of gradual change over several millennia. Few long terms and large-scale catastrophic events are related by the palaeo-ecological, oral historical, and archaeological data during this time (there are certainly short lived tectonic and volcanic episodes). The long-term stability of this period provides little upheaval for oral historical temporal references. Conversely, the stability of this period provides accumulations and centralization of human activity so as to provide highly visible and accessible concentration of archeological material of the type that archaeologists like to take advantage of, particularly since 4500 years BP [5200 cal BP] (Clague et al. 1982: 603). Some ecological change does occur during this period including the gradual rise of sea levels and the complimentary growth of the Fraser Delta (Williams and Hebda 1991). The growth of the Fraser delta is referred to in the oral historical sequence where Tsawwassen is said to have been an island before it became connected to the mainland. The next great change referred to by the oral historical data is the onset of the Great Snow. This may coincide with the Little Ice Age that may have increased hardships in the area by lowering average temperatures around 1350 BP [1220 cal BP]. Clearly there are many similarities in the sequences created by these diverse means of historical inquiry.

Conclusion

This analysis of transcribed oral narratives has sought to discover ways in which historical events are sequenced in narration. The results of this analysis found many different ways in which sequences can be produced including consensual remembering, genealogical referencing, and employing sequencing references during the course of relating a narrative. The resulting space-time chart of the sequences provides a coherent and clear unfolding of historical events for the region studied. Comparative efforts undertaken in this paper reveal that the oral historical sequence provides an overall narrative that is consistent with post-Wisconsin glaciation historical events described in palaeo-ecological, geological, and archaeological studies in the study area when all are considered in tandem.

Acknowledgements

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CHAPTER 15

Interpreting Style in Early Nuxalk Masks

LISA P. SEIP

Introduction

When interpreting style there is often an underlying implication of an evolution from crude beginnings to relatively more technologically advanced styles, and this implication is then reflected in chronological typologies. Some Northwest Coast researchers have assumed that carving only really began to flourish during the contact period with the introduction of metal tools and commercial pigments. Evidence from the archaeological record, however, indicates that at least on some parts of the coast the tradition of carving Northwest Coast masks is over 3500 [3825 cal BP] years old (Carlson 1983d, 1983c; 1993). Carlson (1983d:127) suggests that Nuxalk style (see Holm 1983:40-41) may have been present by at least 1200 AD, although the data for this inference are very limited. Examination of ethnographic documents and museum collections as well as interviews with the Nuxalkmc indicate that among the Bella Coola the mask styles or sub-styles are dependent on the contexts and functions of masks, and that a simple to complex typology of masks has no evolutionary significance. The results of research for a thesis entitled *Early Nuxalk Masks* (Seip 2000) are presented in this paper.

A collection of 384 ceremonial items, which include both masks and some associated theatrical props were examined. These objects were collected from the Bella Coola Valley between 1880 and 1926, and constitute nearly all of the Nuxalk masks in North American museum collections. This research focused on the presentation of a culturally meaningful typology. Analysis of the style used in the masks suggests that the style used by an artist reflected the function and purpose of the item. This paper first presents a brief background on the collections and then reviews the typology.

Background

On the Northwest Coast between 1880 and 1926 collectors came to the Northwest Coast from around the world to collect items of material culture as an attempt at "salvage anthropology" (Cole 1985; Gruber 1970). At this time smallpox epidemics decimated Native populations (Boyd 1999), missionaries arrived, and the Canadian government introduced the Potlatch law (Cole 1985). Anthropologists believed that these factors would cause the disappearance of Native cultures and they set out to record what they could. Among those anthropologists and other researchers who arrived in the Bella Coola Valley during this time were Philip Jacobsen, Franz Boas, Harlan I. Smith and Thomas McIlwraith. Although Philip Jacobsen (1891a; 1891b; 1894; 1997) was the first to arrive in the Valley, most of our knowledge about the ceremonial life of the Nuxalkmc at the turn of the last century comes from the work of Franz Boas (1891a, 1894, 1895, 1898); Thomas McIlwraith (1927, 1948), and Harlan I. Smith (1920-24, 1925a, 1925b, 1925c, 1991).

The Bella Coola Valley is located on the central coast of British Columbia (Figure 15:1). The language spoken in the Bella Coola region is called Nuxalk and the speakers of this language are referred to as the Nuxalkmc. While only the inhabitants of the Bella Coola Valley formerly referred to themselves as the Nuxalkmc, it is now the preferred name for the entire Native population (Kennedy and Bouchard 1990: 338). The Nuxalkmc have more commonly been called the Bella Coola. In the 1920s 45 village sites were recorded in the Bella Coola Valley (McIlwraith 1948). These villages were located along South Bentinck Arm, at Kwatna Bay, at the head of the Dean Channel on the Dean and Kimsquit rivers and at the head of North Bentinck Arm on

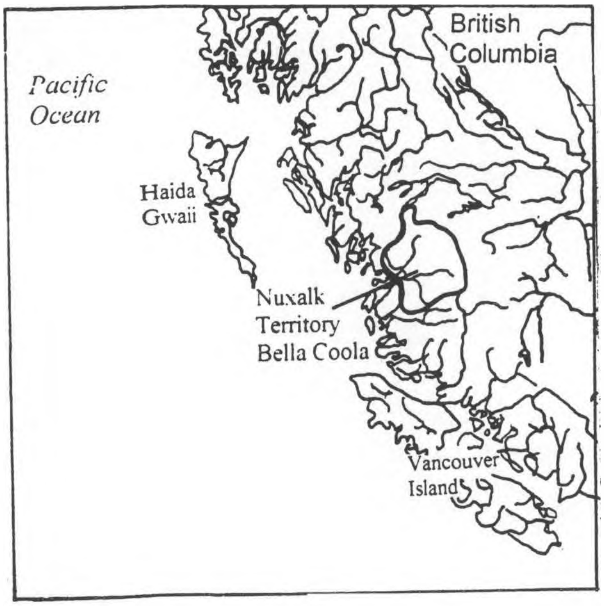

Figure 15:1. **Map of Northwest Coast of British Columbia.**

the Bella Coola River (Figure 15:2). Archaeological research conducted in the Bella Coola Valley suggests the valley may have been occupied for some 10,000 [11,400 cal BP] years, although the archaeological record is not continuous over much of this time span due to site loss through flood plain instability (Hobler 1990).

While anthropologists have always been interested in the way that collected materials fit into the cultures that produced them, it has only been recently that more systematic efforts at understanding the cultural contexts of items collected at the turn of the last century have been undertaken. There has been a considerable amount of research on the archaeology of the Central Coast (Carlson 1979; 1983d; 1984; 1987; 1993; 1996b; Hall 1998; Hobler 1970; 1982; 1990a; 1990b; Hobler and Bedard 1989; 1990; Prince 1992) and much done on the ethnography and linguistics (Olsen 1935; 1940; 1954; 1955; Baker 1973; Davis and Saunders 1980; 1997; Kennedy and Bouchard 1990; Kirk 1986a; Kolstee 1977; Lopatin 1945; Storie and Gould 1973; Stott 1975 a and b). The question of the feasibility of examining the cultural contexts of materials collected at the turn of the 19th century remains of interest today (Black 1997; Jonaitis 1978; 1981; 1986; 1988; 1991; Seip 1999). These collections provide us with a link between the present and the prehistoric past. Ethnographically the Native technologies of the Central Coast that stand out the most are the working of wood and plant fibers; large houses, massive carvings, canoes, bark clothing, basketry, and matting. Because of factors of preservation such items are all represented poorly if at all in most archaeological inventories (Hobler 1990:298).

Another complex in the ethnographic pattern that is seldom seen in the archaeological record is "ceremonialism with its related emphasis upon wealth and social rank" (1990:298). Analysis of the masks and associated items may give us a better idea of the

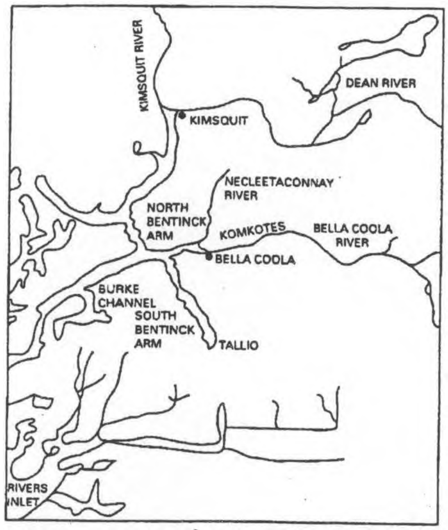

Figure 15:2. **Map of Bella Coola Territory (Based on McIlwraith 1948).**

material and ceremonial culture of the Nuxalk at the time of contact and assist in the interpretation of the archaeological record. The placement of the masks into a culturally meaningful typology assists us in exploring the relationship between style and context.

Typology

Archaeologists who use style theory suggest that stylistic behaviour is a form of information exchange (Durkheim 1947; Hodder 1982; Wiessner 1983; Wobst 1977; Sackett 1977, 1989; Singer 1982). In order to create a culturally meaningful typology the masks were first examined in their original social context. Understanding how each mask was used allows an evaluation of the style expressed in the masks. "Style is always grounded in some cultural context or frame of reference" (Conkey and Hastorf 1990:2). Style is defined as a distinctive, characteristic mode of expression or execution. People use style to communicate information, such as group affiliation, social status, and social boundaries. First the application of a time period narrative typology to this collection is evaluated, then the method used to create the typology and, the original social context of the masks is reviewed and the typology is then presented.

Analysis of the collection revealed that there are too many variables affecting style to create a typology that traces changes in style throughout time. Typologies created by archaeologists for evaluating material culture are dominated by time period narratives that may not actually be measuring changes throughout time. Conkey and Hastorf (1990:2) suggest:

> stylistic types (as defined by Krieger 1944) created the time-space divisions of the past and the archaeological "cultures". By our style types and definitions, we create the past. Some of the effects of this have been the detachment of the types from their past; and in addition, the past has become our own creation. As in art history, archaeologists have used style in a way that detaches from these cultural materials what may have been their original message and function . . . reducing them to patterns, samples. (Sauerlander 1983: 254).

One of the variables that has significantly inhibited the creation of a time based typology is the existence of individual village style. According to McIlwraith (1948), at one time there were at least forty-five villages in Bella Coola territory. Examination of the historic photos and drawings of the various village sites indicates that each village had a somewhat different artistic style expressed in the house fronts. These styles ranged from very structured Northern style designs, which included the use of ovoids and spilt-U's (Figure 15:3), to more naturalistic styles that had neither ovoids nor split-U designs (Figures 15:4,5). These various styles coexisted in Nuxalk territory. If we can assume that the style of house fronts is similar to the style expressed in the masks then the differences we see in the style of masks may be more of a factor of the village the mask came from than a refection of a true change in style caused by time. As many of the masks only have the region from which they were collected mentioned in the museum records, controlling for the variable of the village of origin is impossible.

While some Nuxalk artists interviewed believed a few of the masks may be older in age than others, it was difficult to find evidence that the differences in style they noticed were a result of age alone. One set of masks that was

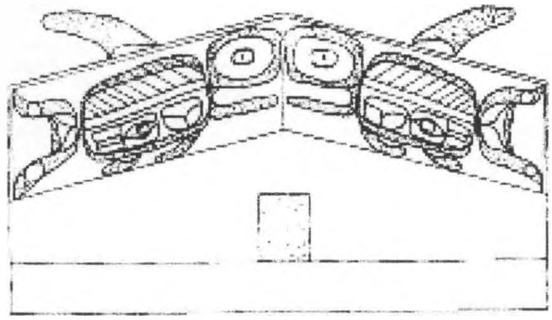

Figure 15:3. **House Front of the Gens Tokwa's depicting a Killer Whale (Based on Boas' drawing 1891:410).**

identified as possibly being older was collected in 1920 from Captain Schooner (Figure 15:6 and 15:7). These masks were collected at the end of the collection period and no information about the age of the masks was obtained from the seller. They exhibit unusual design elements such as straight edged triangles and cut out semicircles. However, these are not unusual when compared to the house front designs published by Boas in 1891a (Figure 15:3, 4, 5). What complicates matters more is that the materials used to manufacture these masks do not differ from other masks that were collected throughout the collection period. The variation in style we see is better explained by individual artist style and village of origin rather than period of manufacture. Until methods of dating the masks can be found it does not appear that a typology tracing change throughout time can be done.

Conkey and Hastorf (1990:3) suggest that there are two postures archaeologists use in defining style. These are

> from seeking clues as to the meanings of and contexts in which the styles of cultural materials were "at work" in that culture, to the manipulation of attributes or patterns in these materials as measures of certain cultural phenomena that we want the styles to 'reveal' to us

As mentioned earlier, the social context and function of a mask will have a significant impact on the style used to create it. The process of creating the typology for the masks included reviewing all of the published and unpublished ethnographic material on the ceremonies of the Nuxalk. Margaret Stott's (1975) previous study of Bella Coola ceremony and art was quite limited with respect to creating a culturally relevant typology, in that there is only a brief presentation of the various functions of the masks. and the Sisaok and Kusiut societies. Understanding the various functions the masks had is the key to creating a culturally meaningful typology. This section will clarify the various functions of masks in each society. Stott (1975:90-91) says:

> In the materials prepared for ceremonials, there was a major difference between Sisaok and Kusiut practices. For Sisaok performances, masks of the characters that the host was entitled to use or that he had borrowed for the occasion were carved by a number of individuals who he commissioned. They were made before the time of the celebration, and were retained to be used again after the dancing had ended.
>
> `In contrast, masks for Kusiut performances were not made prior to the time of celebration. Kusiut ceremonies took place over four day periods; the preparation of masks being part of the ritual. On the second day, the Kusiut host requested individuals to carve masks and other paraphernalia for him. Wood was cut for the masks, and the carving began. On the third day, the carving was completed, and the masks were painted. The knowledge of their production was a secret shared only within the ranks of the Kusiut society. The masks were used during the public dances performed on the fourth day and were burned at the secret closing rites that night. Their destruction helped insure that the secrets of the society would remain the property of the initiated.

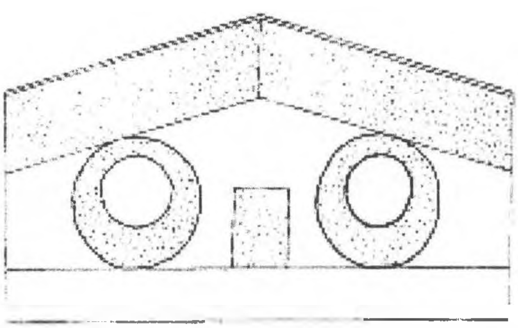

Figure 15:4. **House Front of the Gens Tl'akwamot, representing the Moon (Based on Boas' drawing 1891:410).**

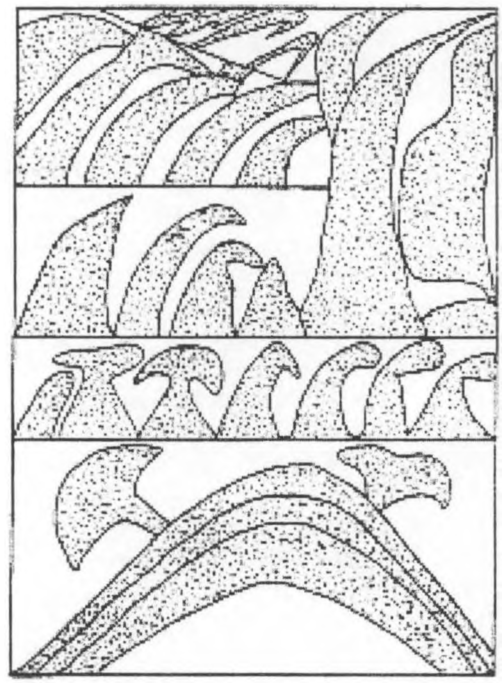

Figure 15:5. **Crest Design of the Gens Smo'en "showing the mountain Suwak'c with two clouds near its submit; above a mackerel sky"(Based on Boas' drawing 1891:411).**

There are a few problems with this statement that need to be addressed before the revised typologies are presented. McIlwraith's (1948) work confirms that the masks of the Sisaok were carved and retained for later use, but what Stott hasn't addressed is that some Kusiut ceremonies can go on for as long as 27 days. For example Noakxnums' ceremony (McIlwraith 1948:57) and other Kusiut rituals were performed whenever the associated natural phenomena occurred. McIlwraith (1948 vol. 2:208) states that the "dancers whose patrons are Thunder, Earthquake, Sun or Moon do not confine their dances to the ceremonial season, but perform whenever a manifestation of their patron occurs". Many of the more difficult dances of the Kusiut, such as the Scratch, Cannibal, Breaker, Fungus and Kusiotem, "require weeks of preparation" (1948:24). Stott suggests the difference in style we see in Bella Coola masks is a result of the two different societies; however there are many masks of the Kusiut society, (for example Thunder, Fire and the Hao hao), that are elaborately carved and curated just like those of the Sisaok. Therefore, her suggestion that it is the ceremonial society alone affecting the

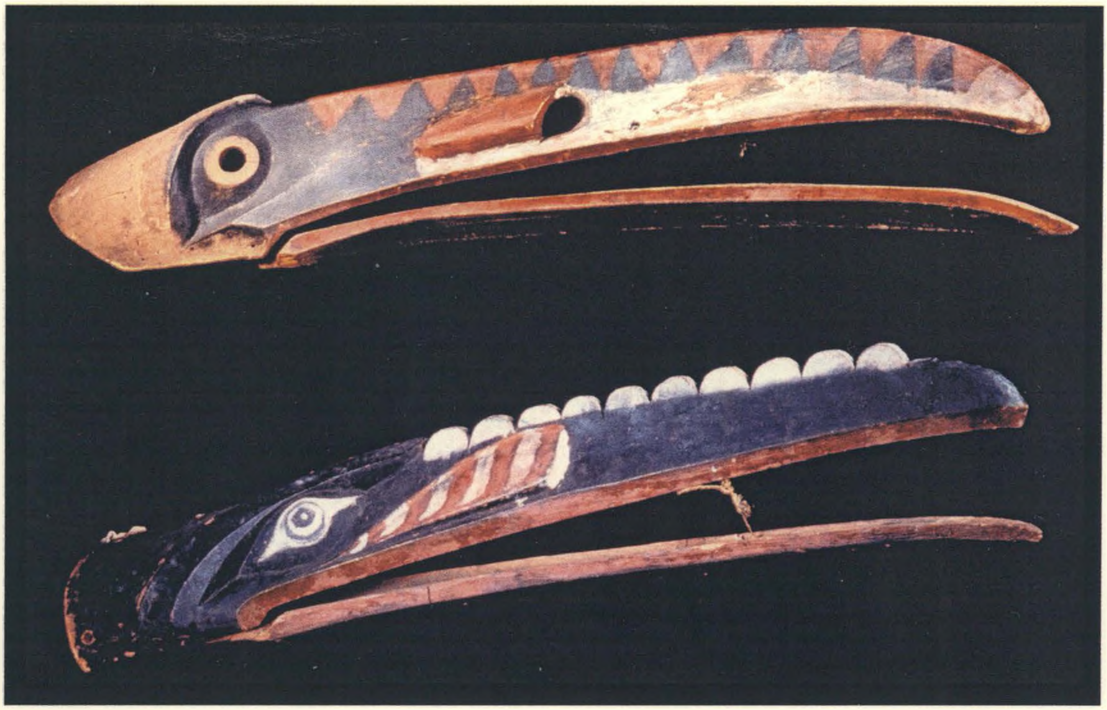

Figure 15:6. **(upper) Hao Hao Mask (Canadian Museum of Civilization VII-D-284).**
Figure 15:7. **(lower) Hao Hao Mask (Canadian Museum of Civilization VII-D-285).**

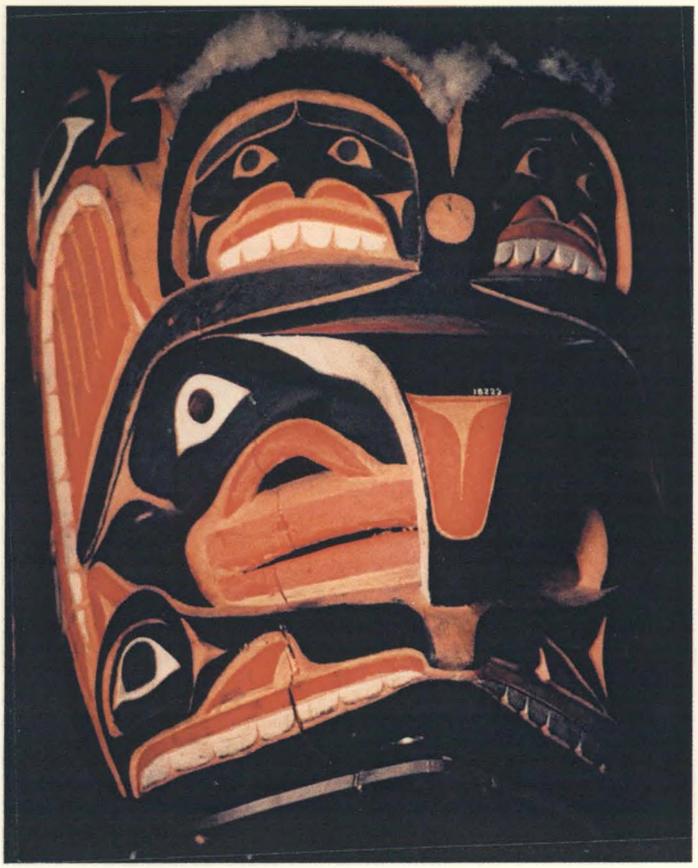

Figure 15:8. **Sisaok name Mask, Sinoken (Field Museum 18223).**

Figure 15:9. **Sisaok Clan Identification Head Ornament (Eagle transforming, Chicago Field Museum, 18221).**

style used in the masks is not entirely correct. Analysis of the collection indicates that the type of ritual and the importance of the supernatural being portrayed are the variables which have the greatest impact on style.

Ceremonial Societies

Within the Kusuit and the Sisaok are subsocieties based on rank. They are both considered to be secret societies. The Sisaok perform all of their ceremonies publicly and the Kusuit perform both private and public ceremonies. The purpose of this section is to review the functions of each society.

According to McIlwraith, there was also an A'alk society. There is very little information about it. From the 1870s onwards there were many changes in the rituals performed by the various societies, so much so that by the time McIlwraith arrived both the A'alk and Sisaok societies had almost ceased to exist (McIlwraith 1948 vol. 1:273). He (1948:274) states that "it is even possible that some of the facts recorded in connection with Sisaok ceremonial really belong to A'alk rites". Analysis of the collections reveal that no masks were recorded as belonging to the A'alk society. Accordingto Fillip Jacobsen (1893:9), who was collecting in the Bella Coola Valley thirty years before McIlwraith arrived, "all masks in green, blue or red color belong to the Sissauch, the black masks belong to the Kosifute dance". In the collections, however, there are many masks identified as belonging to the Kusiut which have green, blue and red painting on them. The presence of these contradictory statements suggests that either the ethnographers were confused or the Nuxalk ceremonial complex was in such a state of change that informants themselves did not know the difference.

The A'alk and Sisaok societies are closely related and both perform rites during potlatches. McIlwraith describes the A'alk society as being very similar to the Sisaok with the only major difference in the age of the members, the A'alk members being younger than those of the Sisaok. Both the Sisaok and the A'alk societies are involved in validating inherited names. According to McIlwraith (1948 vol. 1:274-275):

> the right to perform an A'alk dance depends upon a duly validated ancestral prerogative of which the obvious mark is an A'alk name. Some of the first people brought down such designations and dances with them from above in the beginning of time, a few were acquired on this earth as gifts from supernatural beings . . . the mask usually represents the guise adopted by the first user of the name; if the prerogative were obtained on earth, it portrays the being from whom the right was received.

As the A'alk society performs during Sisaok rituals, it may be a division of the Sisaok. The headdresses worn by members of the A'alk are identical to those worn by the Sisaok (McIlwraith 1948:275). Both performed a variety of rituals which focused on assisting its members through major life changes. These life changes included aging, the giving of new names, validating ancestral names, marriage, divorce, and death. As no masks were recorded as belonging to the A'alk, for the purpose of this typology only Kusiut and Sisaok masks will be discussed.

The function of the Kusiut society is very different from that of the Sisaok and A'alk societies. As the Kusiut society deals with the acquiring of siut, supernatural powers, the masks created by them often represent supernatural entities. The Kusiut (McIlwraith 1948:284)

> comprises a large number of individuals bound together by the possession of supernatural patrons and claiming to possess supernatural power . . . the Kusiut are well organized and regulated; its members are proud of their powers, and scornful of those who lack the same.

According to McIlwraith (1925: 710),

> all Kusiut ceremonials had one of three origins. Some, with the necessary regalia, were brought from above by the first people, others were originated by visitations of siut to a mortal, while others still were initiated by powerful staltm of his own initiative.

The rituals performed by the Kusiut are intended to create a sense of awe in the uninitiated. The identity of the supernatural patron depicted is not always clear to the uninitiated due to the use of symbolic codes in the designs that only members can interpret.

The style used in the masks of the Kusiut has a greater range than those of the Sisaok. The style can range from appearing to be hastily carved simple masks with only black pigment being used to very elaborately carved masks entirely covered with many colors. These differences in style reflect the ceremonial function of the mask. The symbolism used in rites held by members of the Sisaok society is intended to convey clear messages to the audience, while the symbolism of the Kusiut is intended to convey clear messages only to its members.

Mask Types

There are many different styles that coexist in the Nuxalk repertoire that were used depending on the ceremonial function of the mask. There are seven distinctive groups of masks based on ceremonial function. These are:

Sisaok masks
clan identification masks and head ornaments;
mortuary masks
name masks;
children's masks
public ridicule masks;
Kusiut masks
masks which are burnt
supernatural patron masks.

The function of each of the societies is discussed first and then the types are presented.

Sisaok Clan Identification Masks and Head Ornaments

The ceremonial context and function of a mask play significant roles in the style expressed in it. When people talk about what they consider Bella Coola style they are often referring to the style expressed in the masks and head ornaments used for public display of clan identification at potlatches. These ceremonial items are used in ceremonies where people from many different villages attend. It is in this setting, where members of the audience may speak a different language than the host, that visual symbols are used to communicate messages. The masks are a visual way of communicating that the host of the potlatch is part of, for example, the Bear clan of Bella Coola. Clans consist of people descended from a common ancestor. The masks of this category are finely carved and painted. Animals and animals transforming into humans dominate designs used in these items This feature relates to the Nuxalk belief that their ancestors came from Nusmata as animals, and when they arrived in the Bella Coola Valley they removed their cloaks and took human form. For the identification of masks and head ornaments belonging to the Sisaok society we require an understanding the nature of the Nuxalk belief system about how the world is organized, the functions of the society and the types of rituals they perform. In describing how the Nuxalkmc believe they came to this world McIlwraith (1948:36) states:

> the manner in which the Bella Coola arrived is cleared stated. Around the walls of Nusmata were hanging a number of bird and animal cloaks, representing ravens, eagles, whales, grizzly bears, black bears, and a few others. Atquntam asked each individual which of these cloaks he preferred to wear. One selected a raven, another an eagle, and so on. Each donned his choice from the wall and immediately became the bird or animal chosen. Atquntam gave each man or woman one or more names, and some food in compressed form; then sent him down in avian or mammal form. Even the animals could travel through the air like birds, and each landed on the peak of a mountain in the Bella Coola country, took off his cloak, and reassumed human form. The discarded covering floated back up to Nusmata. . . . This myth is fervently believed in Bella Coola. Even Christian Indians, though they readily admit the biblical creation as applied to the white race, remain convinced of the manner in which their ancestors came into being.... Nusmata is not only connected with the history of an individuals ancestors; it enters into his own future as well. When a Bella Coola dies, his spirit travels back on the path of his ancestors from generation to generation until it reaches the spot where the first one came to earth; there it assumes the bird or animal cloak used on that occasion and floats aloft to Nusmata to live forever.

McIlwraith describes this society as a chiefly society and the rituals it conducts are mainly concerned with assisting people through transitions in life. As this is the main function of the society it is important that the people present be able to understand the messages communicated by the masks.

The head ornaments used by the Sisaok fall into three categories: crowns, frontlets and forehead masks. Crowns are those head ornaments which have a cedar bark headband onto which the head, wings or fins and tail of the animal being portrayed are attached, with the head of the creature resting on the wearer's forehead, the appendages on either side of the head and the tail at the back of the wearer's head (Figure 15:15). A crown at the American Museum of Natural History in the form of an eagle is carved of wood with just the head of

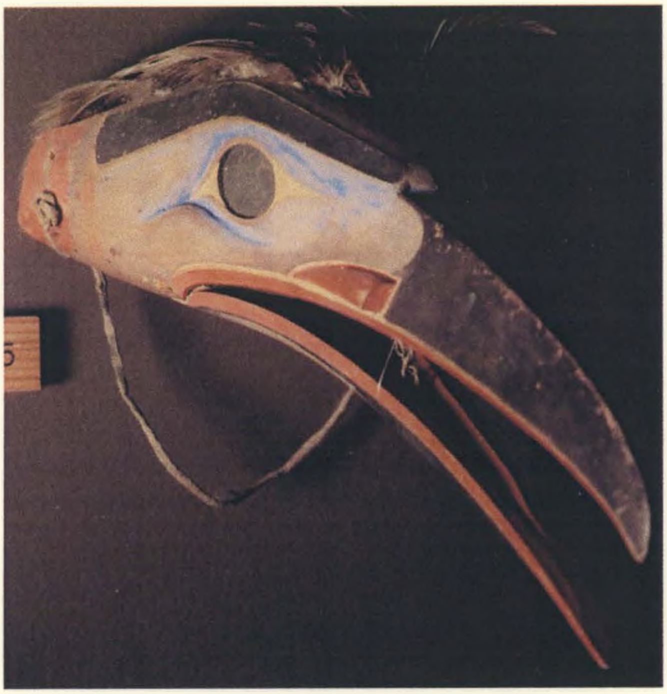

Figure 15:10. **Sisaok forehead Mask, Raven (Chicago Field Museum 18178).**

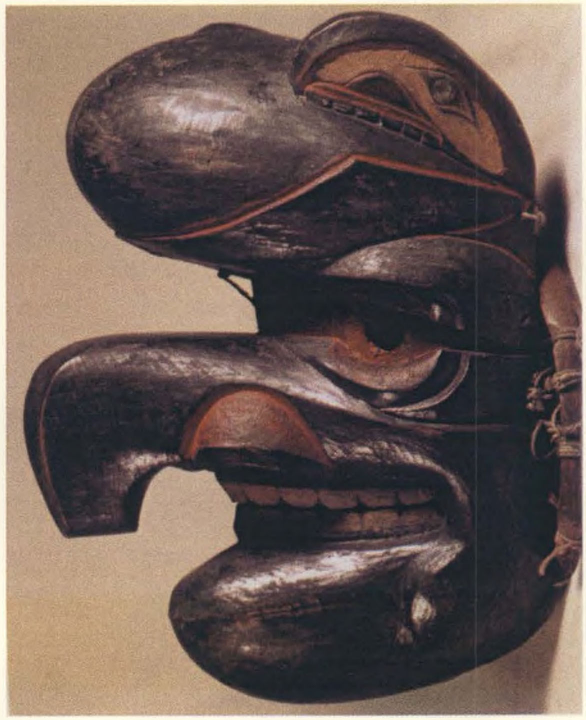

Figure 15:11. **Kusuit Supernatural Patron Mask, Thunder (National Museum of the American Indian 19/0838).**

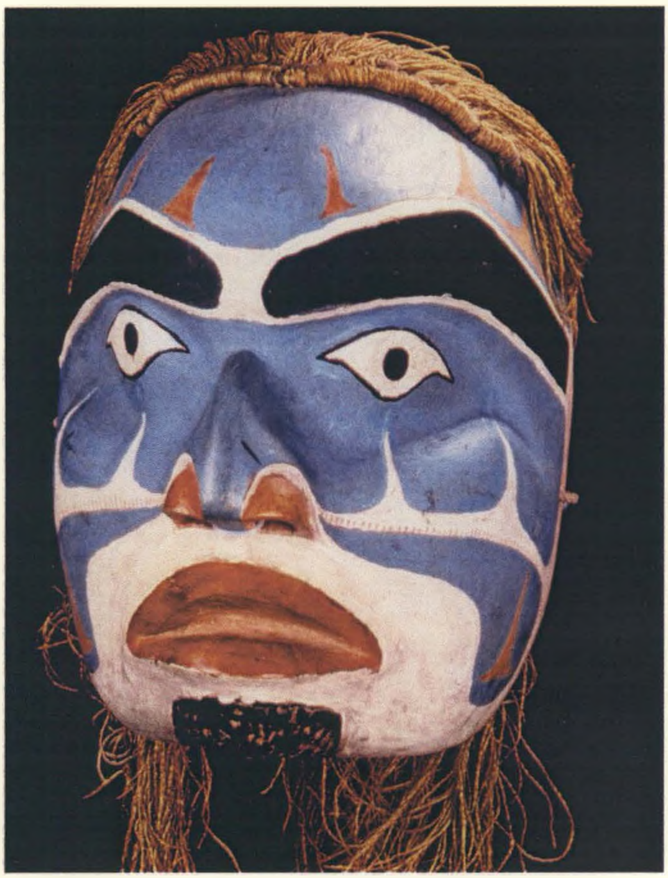

Figure 15:12. **Sisaok Mortuary Mask (Ghost, Canadian Museum of Civilization, VII-D-202).**

Figure 15:13. **Sisaok Child's Mask (Chicago Field Museum, 18930).**

Figure 15:14. **Sisaok Name Mask (Sinoken, American Museum of Natural History, 16/1518).**

Figure 15:15. **Eagle Crown. (Chicago Field Museum, 18190).**

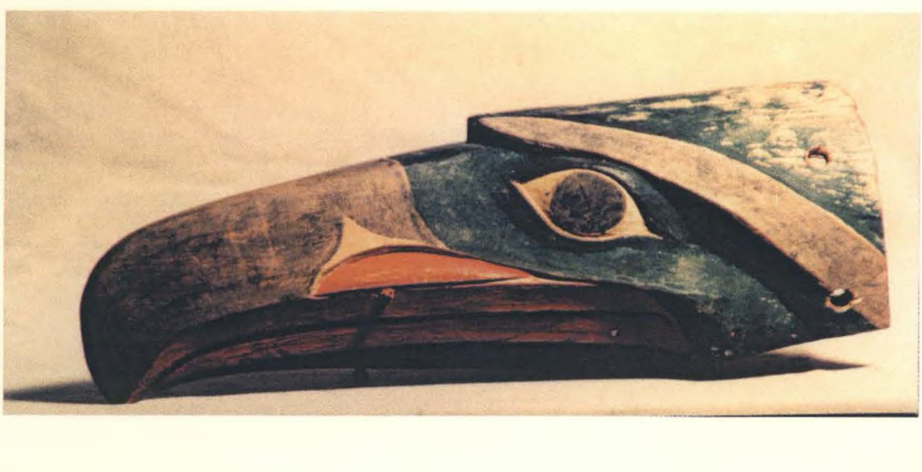

Figure 15:16. **Sisaok Face Mask, Raven. (Vancouver Museum AA 107.**

the animal repeatedly portrayed around the edge. Frontlets sit on the forehead and are usually accompanied by ermine skins that are worn around the head. Figure 15:9 illustrates the imagery of transformation that is characteristic of many items in this category; notice that the human-like face has an eagle beak but below the beak is a human mouth. Forehead masks are similar in style to the masks but sit on the forehead of the wearer (Figure 15:10). Ritually these types of head ornaments serve a different function than the masks as the wearer does not take on the spirit of the entity being portrayed but rather is communicating to the guests at the potlatch his/her family's original animal cloak. It is like wearing your ancestral story or name on your forehead.

The masks are used during potlatches in performances that illustrate the clan story of how the first ancestors came to this world. All of these masks take the form of animals or animals transforming into humans. Animals associated with the clan stories include bear, killer whale, fin back whale, wolf, deer, raven, eagle, and owl. Unlike the head ornaments the face of the wearer is completely hidden. The mask of a Raven from the Chicago Field Museum (Figure 15:16) illustrates the portrayal of pure animal form while the Vancouver Museum's AA107 depicts an Eagle transforming into a human (Figure 15:17).

Sisaok Name masks

Sisaok name masks are used in the passing on of hereditary ancestral names. They are different from the clan identification masks in tha t they are not illustrating the clan animal but an ancestor whose name and story is being passed on. Therefore the imagery used on these masks is different and more difficult to interpret without the context of a story and name. Unusual and multiple imagery beyond the transformation of animal to human characterize these masks.. Each mask represents a story in which an ancestor plays a role. For example there are two masks that are associated with the name Sinoken. This is an ancestor's name associated with the Raven clan and the story associated with it involves a "fin back whale boy with two faces". The imagery on the mask gives the viewer cues about the story that goes with the name, rather than being intended to represent one entity. First lets look at the story Jacobsen collected with this mask (Figure 15:8) then we will examine the symbolism used. Jacobsen (1893) recorded the following story:

> It is said that very long ago a ghost by the name of Yakis lived on a small island Jellakla or Goose Island outside of Bella Coola. He had a brother, of course our old friend the raven, qwaxw. Every night Yakis heard that his brother qwaxw was engaged with some mysterious work and finally he found out that he had invented and was making wooden whistles (tayak). When he had four boxes full he went with them to the Skeena river or Nesskabts. His daughter accompanied him and when they came there he asked if anybody would marry her. There was no lack of suitors even trees and stones wanted to be her husband. The raven, however, declined to accept any of them. Finally he discovered in the East a great light which came nearer and nearer. This was the Sun whom he accepted as the husband of his daughter. She then left for Heaven with her husband and after some time returned with four children. The oldest was a big boy who looked like a finback whale with two faces. His name was Sinoken and it has been inherited from father to son. The persons at present wearing the mask also received the same name.

The main character in the story associated with the name Sinoken, is a fin back whale boy with two faces. An examination of the mask (Figure 15:8) reveals two faces above the eyebrows with a circle in the middle, representing the boy who looked like a two-faced finback whale, the circle representing the whale's blow hole. The bottom of the mask is qwaxw, the raven, on either side. The face in the middle is qwaxw's daughter who married the Sun, who has human like lips that are covered by the beak, suggesting that she has the ability to transform into a human. From bottom to top then, is qwaxw, his daughter and her son Sinoken. Who then is on the side of the mask? At the upper edge is an eye with an open mouth. This represents the ghost, Yakis, who went with qwaxw and his daughter to find a husband; his image frames the central three characters in the story. His presence in the story is further emphasized by the use of green on the faces of the mask which is symbolic of the land of the ghosts (Seip 2000:91). How then is sun represented in this mask as part of the story? Take a look inside of Yakis' mouth where there are five red lines that extend from the eyebrows of qwaxw 's daughter.

Red is used not only to mark liminal places but also to represent light (Seip 2000:84). The red lines surrounding qwaxw's daughter are symbolic of her marriage to the Sun. This example illustrates the importance of placing the mask into the context of the ceremony it was used for, otherwise the imagery on the mask has no meaning to us. It cannot be interpreted out of its ceremonial context.

The name Sinoken can be portrayed in a mask in very different ways. The mask of Sinoken from the Field Museum Chicago (Figure 15:8) illustrates the entire story associated with the name while the one from the American Museum of Natural History (Figure 15:14) depicts the ancestor alone. These masks illustrate that while an artist may take certain liberties in the design of a mask, in order for it to be a successful and useful ceremonial item it must contain recognizable cues that indicate the entity being portrayed. While these two masks are very different in style and imagery what makes them recognizable as Sinoken is the presence of the two faces and cues that a whale is being portrayed. The mask of Sinoken at the American Museum of Natural History depicts a whale-like creature in form which refers to Sinoken through the design on the ears. Each ear has a face in the center with a moveable mouth; on either side of the faces is the distributive design of a whale fin and a circle (which again is symbolic of the whale's blow hole). Nuxalk artists can use very different ways of depicting the same thing; it is the mark of a good carver to be able to reinterpret the story in new designs while maintaining the cues required for identification.

Masks that are associated with names always have a story that goes with them, so when a person is given a name during a ceremony they are also being given a story. To illustrate these stories masks are used. Although at first glance the imagery used in these masks may appear difficult to read, when one knows the story attached the imagery and symbolism become clear.

Sisaok Mortuary Ceremony Masks

The next category of masks are those used in mortuary ceremonies a year after a person has died. These masks are called ghost masks and are used to represent the soul of the departed person who is returning in the ceremony. Their imagery ranges from realistically carved human face masks to representations of the animal cloak of the departed person. The main difference in the animal masks used in mortuary ceremonies to those used in other potlatch settings is the way in which the mask is painted. Masks used in mortuary ceremonies always have the entire surface of the mask painted, first with a base of white onto which a design in blue or green with red is applied.

The Canadian Museum of Civilization in Ottawa has a collection of masks from chief Samuel King that were used in a mortuary ceremony which exhibit this type of painting. These masks include human faces (Figure 15:12) and animal faces. All of them exhibit the white base with the colored design on top.

The masks used by the Sisaok during funeral ceremonies contain certain cues about their function. During McIlwraith's (1925:594) 1922 field season he observed the funeral ceremonies of Mrs. Samuel King. For the funeral ceremony it was decided that she would "reappear as Eagle, Raven and Blackfish, three of her ancestral stories for which the necessary masks were available". McIlwraith (1925:605) describes the following:

> . . . a man entirely covered with a white sheet so that the only part of his body visible was his bare feet. On his head he wore a mask of the eagle, from his back projected one of the blackfish, and to his chest was one of the raven . . .In the old days the carpenters would have worked for weeks fashioning an elaborate masked representation of the three, as it was they could use only what masks happened to be in existence and were forced to sew these onto the white sheet.

Harlan I. Smith purchased several ghost masks from Chief Samuel King, illustrating the symbolism used in masks associated with funeral rites. The use of animal masks in this ceremony refers back to the origin stories of the Nuxalk and their belief that the departed person returns to the land above in the animal cloak of his or her ancestors.

Figure 15:17. **Sisaok Clan Mask., Eagle. (Vancouver Museum AA 107).**

Figure 15:18. **Kusuit Mask, Rainwater-Dripping-From-The-Roof (Royal British Columbian Museum, 6395).**

Masks used by Children

Another type of rite carried out by the Sisaok *is nusaxk*amx. This rite is carried out by the children of chiefs and is intended to teach them "the principles of present-giving and indebtedness" (McIlwraith 1948:289). The rite is intended to mimic a real potlatch, but the young person (about ten to twelve years of age) gives miniature gifts (canoes, boxes, blankets, etc.) to his/her guests who are about the same age. Like the holder of real potlatch he/she validates a name, which has been chosen for him/her by the elders, and performs the dance associated with it. This practice may account for the miniature canoe models and houses in museum collections and also for smaller than usual masks (Figure 15:13).

Masks used for Public Ridicule

The Sisaok also performed ceremonies which involved publicly ridiculing others, for example for being stingy, performing an error in ritual or for any socially unacceptable act. Unlike the rituals used for major life events these rites do not involve the calling down of supernatural powers. A good example of the difference in the imagery used in masks created for these types of ceremonies can be seen in those ridiculing a person who has deserted a husband or wife. McIlwraith's informant told him that when the wife of a chief deserts him, he would hold a ceremony in which he wears "a lynx skin belt, a headdress of weasel skins, and sometimes above that a huge representation of the female organs". If a staltmc wife is deserted by her husband, the women would carry out the same rite; "the deserted wife dances wearing on her head a representation of the testicles and penis, the latter connected with strings so that the dancer can make it assume the erect attitude: (1925:615). In these ceremonies anyone in the audience may; call out unsavory details about the deserter's pubic organs and these are "incorporated in the songs till they have become as foul as possible" (1925:614). The imagery and symbolism used in these rites are intended to be clear to the audience; the message conveyed is repeated over and over again in the ceremony via song, dance and the visual imagery used in the masks and head ornaments.

Kusiut Supernatural Patron Identification Masks

These masks communicate to the viewer the supernatural patron of the dancer. These are he most elaborately carved of the Kusiut masks and are curated by the owner. Masks that fall into this category are the central supernatural entities used in the rituals associated with Thunder (Figure 15:11), Earthquake, Sun or Moon, and Elaqo'tla (the Hamatsa of the Kwakwaka'wakw). The stories are different from the clan stories because they occurred after humans had been transformed from animals. The rituals they are used in explain an event that happened in the past to a related family member where supernatural assistance was acquired. Most of these masks are carved long before the ceremonies occur and are curated in the same way as the Sisoak masks.

These masks are finely carved and elaborately painted. One of the most common attributes of these masks is the presence of black pigment on the face. Only masks of the Kusiut have black faces. Only masks in this group will have the addition of animal parts such as jaws, teeth and the claws. The masks which are used in association with these masks are often made in the days preceding the ceremony and are less finely carved. They fall into the next category. It appears that the quality of carving and painting used on the masks is dependent on the importance in the ceremony of the entity being portrayed.

Masks of the Kusiut that are Burned

These masks are carved in the four days preceding the Kusiut rite and are intended to be burned after the ceremony. They are characterized by little painting and crude carving. They are made of a great variety of materials, ranging from fungus, cedar bark, shells, sea urchins and other natural materials to wood. Masks in this category are those that are used in association with the Kusiut supernatural patrons, for example the assistants of the Elaqo'tla dancers, the supernatural visitors who follow Thunder, such as the winter wren, rabbit, mosquito, snail, the clowns and Rainwater-Dripping-From-The-Roof (Figure 15: 18), and the assistants of the moon (McIlwraith 1948). Other masks that are included in this category are used in the telling of oral traditions relating to the explanation of how the universe is ordered and how it was created. Examples of these masks include Alk'un'tam, the North and South winds, the Mother of the flowers, and the plants and flowers.

Discussion/ Conclusion

Analysis of the collection indicates that a culturally meaningful typology can be created by first determining the ceremonial contexts in which the masks were used, and then placing the masks into meaningful types based on context. The typology based on ceremonial context revealed that the style expressed in the masks is dependent on how quickly the masks are carved and whether or not they are intended to be curated. Many of the characteristics we might normally attribute to the age of a mask are in fact more a function of the context in which a mask is used. For example, it is generally assumed in a time line that the style of a mask would evolve from the more crudelycarved (which would be the oldest) to the more finely carved and that this is a function of the introduction of metal tools. However, what we have seen in the typology of masks organized by context is that right up to the end of the collection period "crudely" carved masks were still being made for use in the Kusiut society, often by the same artist who was creating very finely carved masks.

The Nuxalk masks examined can be seen as coming from a bridge that links the archaeological past of the Nuxalkmc with the present. They are not preserved in the archaeological record and yet their presence suggests that they were once part of that past. The collections examined here, have revealed much about the use of style in the Bella Coola Valley during the ethnographic period. This understanding of the ethnographic use of style may assist archaeologists with better interpretations of the artifacts found in the archaeological record.

Acknowledgements

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CHAPTER 16

Culture Contact at Kimsquit in long-term Regional Context

PAUL PRINCE

Introduction

Scholars of colonial encounters have long advocated the use of archaeology to provide a long-term perspective on culture contact that would help to place Native responses into broad temporal and cultural contexts. However, the nature of the archaeological record is such that contact period sites often lack sufficient temporal depth to accomplish this goal., Instead excavation provides only glimpses of phases of the contact process and its effects on limited aspects of aboriginal life that are difficult to place in a broader context. In this paper, I examine the archaeological and ethnohistoric records of the Kimsquit locality, where Hobler investigated a series of sites extending from prehistory through the entire contact period. When considered in regional context these data provide a long-term perspective on cultural change and continuity. From this perspective, I attempt to isolate some of the ways in which material culture and architecture were used to express a sense of cultural identity unique to Kimsquit throughout the contact period.

Central Coast Research and Culture Contact Studies

The Kimsquit area is located at the head of Dean Channel, and includes the mouths of the Dean and Kimsquit Rivers (Figure 16:1). Historically it is home to the Kimsquit division of the Bella Coola (Nuxalk) Nation. Hobler conducted fieldwork there from 1968-1972 during the early stages of his Central Coast archaeology project. The goals of the project have been reviewed in detail elsewhere (Hobler 1970, 1983, 1990). For the purposes of this paper, I wish to stress the importance of the project's broad geographic and temporal coverage for contextualizing local cultural changes and continuities experienced by people at Kimsquit through the contact period.

The Central Coast project can be characterized as long-range in vision and organic in nature. It continued to evolve in order to undertake new avenues of investigation as data came to light, and yet was conceived and continued under a unifying and un-compromised variant of the direct historic approach. The direct historic approach was intended as a holistic course of research, utilizing ethnographic, archaeological, historic and environmental information, and was to be comprehensive in its temporal and geographic coverage. In practice, however, most scholars limited themselves to defining sequences of temporal changes and inadequately integrated historic and prehistoric data sets (Johnson 1999; Lightfoot 1995). One of the flaws was a significant under-investigation of the contact period itself. Hobler's project averted many such short-comings by diligently gathering and synthesizing information on the development of historically known cultures within a single culture area from all of the major geographic zones present (fjords, outer coast, river valley and subalpine), and treating time in a fluid manner, which down-plays culture historical classifications of phases in favour of broader shifts in cultural behaviour (Hobler 1990:298). Most importantly for this paper, the historic period was investigated directly, as part of a temporal continuum, in all of its archaeological manifestations: material culture, architecture, regional settlement pattern, domestic village sites, European trading posts, regional settlement pattern, rock art, wooden monuments and mortuary contexts (Hobler 1986).

While this project spanned the major paradigm and fashion shifts of archaeology in the 1960s-1990s, scholars of culture contact cur-

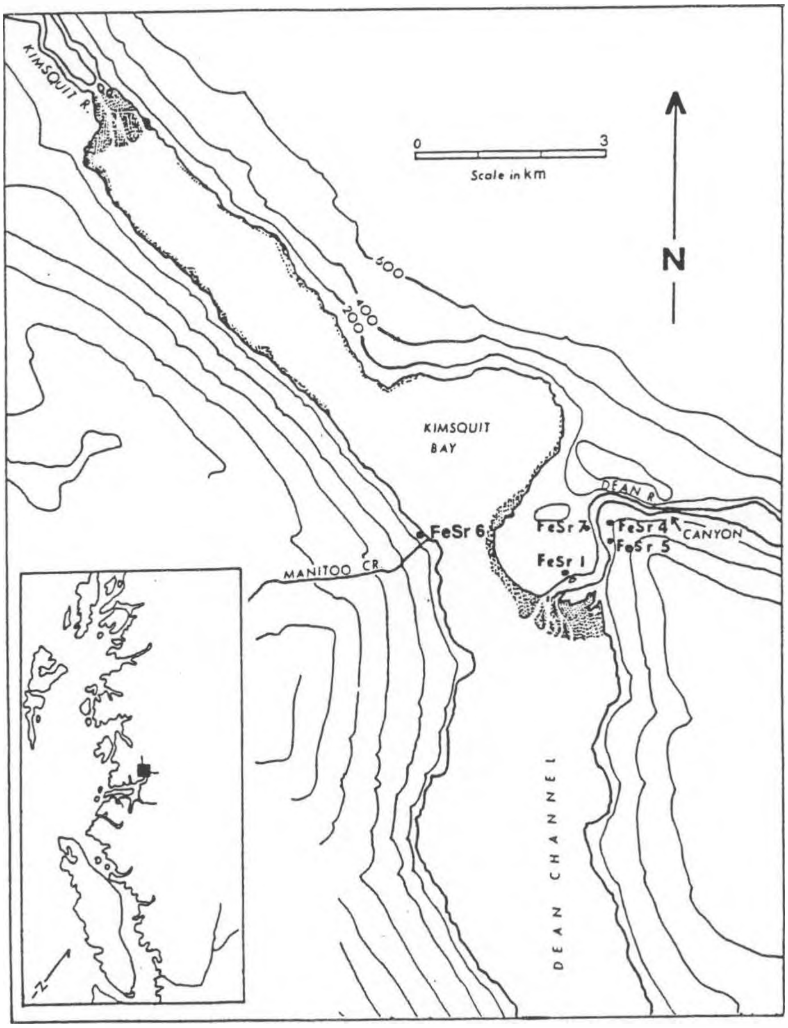


Figure 16:1. **Map of Kimsquit Sites Discussed in Text.**

rently advocate such a comprehensive treatment and stress the need for a long-term, multi-contextual perspective (Lightfoot 1995; Lightfoot et al. 1998; Kirch 1992; Trigger 1989:331). Among the benefits of a long-term perspective in culture contact situations are a professed breakdown of the barriers between history, ethnohistory and prehistory, leading to a more humanistic treatment of the past (Lightfoot 1995:211); an understanding of change for all parties in contact as part of established patterns, rather than as sets of disruptions (Wolf 1982); and contribution to a more responsible use of ethnographic analogy. While Hobler has nowhere described his research in precisely these terms, his body of work has provided the material for a long-term perspective on the Central Coast, including culture contact at Kimsquit.

Archaeological Research at Kimsquit

Consistent with the larger Central Coast project, Hobler sought information on all of the temporal periods and archaeological contexts represented at Kimsquit. Thirteen sites were recorded below the canyon of the Dean River and on the channel, including villages, petroglyphs, cultural depressions and a cemetery. Investigations were limited to mapping and surface inventory at most of the sites -including a village of semi-subterranean houses at the mouth of Manitoo creek, FeSr 6, Nuxwilst (Figure 16:1). Four habitation sites near the mouth of the Dean River saw substantial excavations, providing a record of material culture and architectural changes extending in an unbroken sequence from the 18^{th} to 20^{th} centuries AD, and intermittently back perhaps to 7000 BC.

Specifically, FeSr 5, Axeti, is a hilltop site, 22 m above the river and 1.5 km upstream from the fjord, with a probably protohistoric house platform,, and a thin shell midden with a mixed assemblage of protohistoric to late prehistoric material culture and Early Period microblades, cobble tools and a lanceolate biface. There was probably a hiatus of several thousand years between these components.

FeSr 4, Nutsqwalt, is a large village of 23 rectangular house-pit depressions, 500 metres upstream from FeSr 5, whose assemblage of artifacts and thin cultural deposits seem to represent a brief occupation sometime between AD 1770-1830 (Prince 1992, 2002). FeSr 7, Nutal, is a small village, directly across from Axeti, with what were probably cobble variants of house mounds documented in the Bella Coola Valley, and more substantial shell midden deposits (Hobler 1972:95). The artifact assemblage here includes a large amount of worked copper and manufactured European items, which I place at AD 1780-1850. FeSr 1, Anutlitx, is a large village including the remains of cedar planked houses, milled lumber

Figure 16:2. **Interior of Planked Post-and-Beam House, FeSr 1, 1970. (Photo: P.M. Hobler).**

cabins and shallow midden deposits (Hobler 1970, 1972; Prince 1992). One traditional house was still standing at the time of Hobler's excavations (Figure 16:2). The material culture here is primarily manufactured European items and there is a variety of written, cartographic and photographic documentation from the 19th and early 20th centuries for this village (Prince 1992, 2002; Figures 16:3 and 16:4). The other sites are not referred to outside of oral tradition (McIlwraith 1948 I:15). Based on these data, I place the occupation of FeSr 1 at AD 1850-1927.

Indigenous Technology at Kimsquit

Indigenous material culture and architecture are well represented at Kimsquit sites from late prehistoric to early historic contexts. When compared to other Central Coast sites (Figure 16:5), and the early component at FeSr 5, they, contribute to a long-term perspective on cultural development and European contact. At FeSr 5, FeSr 4 and FeSr 7 stone tools (excluding debitage) comprise 89.4 %, 98 % and 49.4 % of the excavated assemblages respectively (Table 16:1). In contrast to several other Central Coast sites (FaSu 2, FaSu 1, FaSu 19), bone tools are rare at Kimsquit, probably as a result of poor preservation due to the lack of dense shell midden (Hobler 1990; Prince 1992). The Kimsquit assemblages also have a narrow range of tool types with ground stone adzes and hammerstone grinders being ubiquitous - as is typical of late prehistoric fjord zone sites of the Central Coast (Hobler 1990).

But Kimsquit is also different from other fjord zone sites in several regards. After ground stone (pecked and ground and polished), the most frequent stone artifacts in the Kimsquit assemblages are flaked - mainly cobble spall and chopper tools, bifaces, retouched and utilized flakes. Waste flakes also occur in moderate numbers at the three early Kimsquit sites (Table 16:2). The majority of the debitage at each site is greenstone flakes lacking ground facets. At FeSr 4, large portions of these are small (15-25 mm maximum dimension) and may represent greenstone adze maintenance or the final stages of their manufacture before grinding (Prince 1992:152). At FeSr 5 and FeSr 7, the majority of the debitage is 25-60 mm in maximum di-

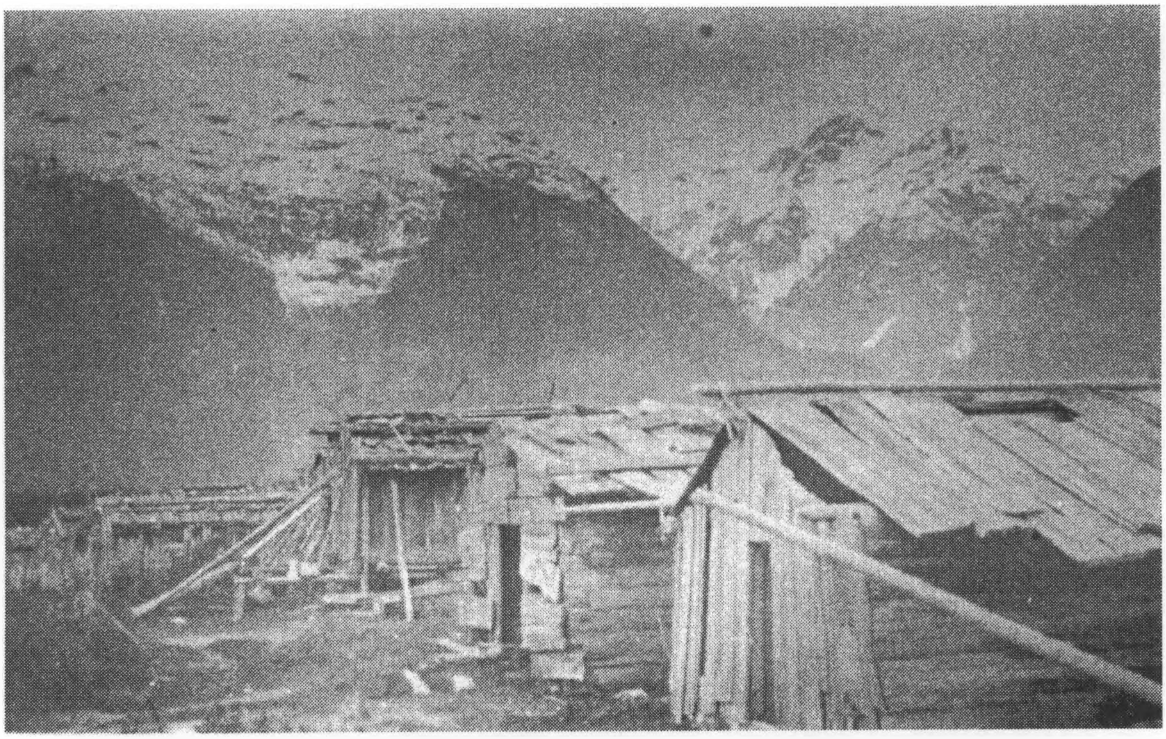


Figure 16:3. **The Village of Anutlitx (FeSr 1) as it Appeared in the Early 1900s in a Photograph by Indian Agent Ivor Foughner.**

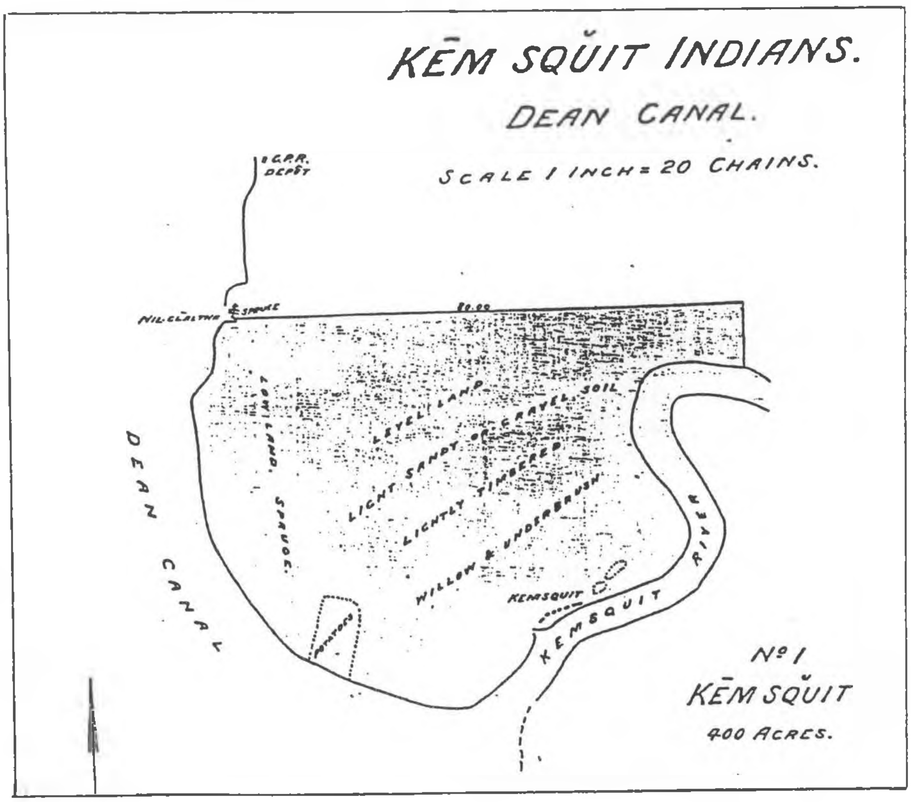


Figure 16:4. **Map of the Kimsquit Reserve Showing the Row of Houses at the Village of Anutlitx (FeSr 1) as drawn by Reserves Commissioner O'Reilly in 1882.**

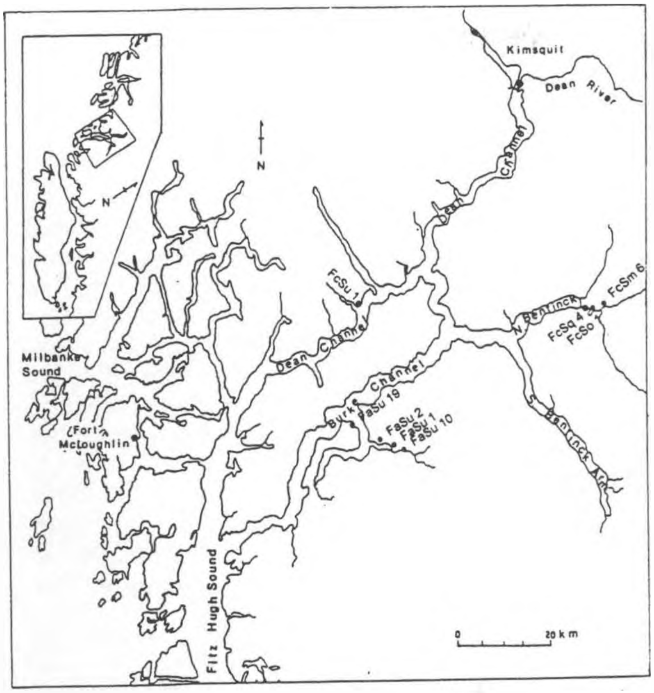


Figure 16:5. **Map of Central Coast of British Columbia showing Bella Coola Valley and Kwatna Inlet Sites discussed in Text.**

mension and may represent the production of flakes for expedient purposes, rather than primary adze reduction (Prince 1992). The moderate importance of flaked stone technology in the three early components at Kimsquit stands in marked contrast to late prehistoric assemblages from Kwatna Inlet, where flaked stone is rare, and late prehistoric and early historic components in the Bella Coola valley, like Nusqalst (FcSo 1) and Qwliutl (FcSm 6), where flaked stone is by far the most abundant material (Hobler and Bedard 1989, 1990, 1992). The abundance of flaked stone in the Bella Coola Valley sites probably reflects their inland location and economic orientation towards salmon and terrestrial game for which flaked stone cutting and processing tools are well suited, and their proximity to interior sources of obsidian and local greenstone (Hobler and Bedard 1989). The intermediate character of the Kimsquit sites in terms of flaked stone may reflect their geographic position between fjord and river valley, an economic adaptation to both zones, and their position in trade between the interior and coast. Both of these points coloured the degree, nature and timing of Kimsquit' involvement in European trade and colonization later, and so continued to contribute to its unique cultural character. Obsidian at Kimsquit, for instance, was obtained from Anaheim peak before and after European contact, which is accessible by grease trails up the Dean River. This material was used for microblades in the early component at FeSr 5 and continued to be used in small quantities at FeSr 4 and FeSr 7. The source of greenstone is uncertain, perhaps Mt Nusqalst in the Bella Coola Valley, or a local source in Dean Channel. At any rate, the use of these materials reflects not only a continuance in preference for lithic materials, but also in the direction of physical or social-economic contacts for people at Kimsquit - to the Interior and Coast - a factor that continued to be important when European materials, became the dominant items exchanging hands. The Dean and Kimsquit Rivers were both routes of communication to the Carrier people historically, with whom the Kimsquit exchanged salmon and marine resources for furs (Bouchard et al. 1988), and these corridors also brought a small amount of attention from Euro-Canadians, who explored them as possible railway routes (Smith 1874, 1877; Horetzky 1877).

Another characteristic of the Kimsquit stone tool assemblage is the recycling of greenstone adze material. Greenstone is brittle and prone to splinter during adzing. Items recycled from fractured greenstone adzes at Axeti and Nutsqwalt include ground stone projectile points, a knife and utilized flakes (Figure 16:6). Recycling adze fragments is not unique to Kimsquit, occurring also at Qwliutl and Nusqalst, but it does provide an important precedent for the conservation of raw materials seen later in the use of copper and iron.

There are also distinctions apparent in the tool types within the ground stone category that set Kimsquit apart from its inner coast neighbours. Circular stones, one of the defining characteristics of the contemporaneous Kwatna Phase sites (AD 1400- Contact) (Carlson 1983d) in Lower Dean Channel (FcSu 1) and Kwatna Inlet (FaSu 1, FaSu 2 and FaSu 19) are absent at Kimsquit (Table16:3). This may mean that a different form of tool was used for the same practices, be they net sinkers or spindle whorls, or that the associated activities (netting fish in the channel, or weaving) were not as important. Most curious are differences in hammerstone grinder form at Kimsquit. Hammerstone grinders are ubiquitous in fjord zone sites, and common in Bella Coola Valley sites as well, but their function is equivocal. These are loaf-shaped cobble implements, made of hard igneous rock, typically with one heavily ground, flat surface, a square butt and light pecking, or heavy battering at one, or both ends. They may have functioned as combination grinding and hammer implements (Carlson 1970:4), used in wood working activities - an interpretation I favour given their association with adzes. McIlwraith's (1948 II:380) ethnographic informants, however, reported that they were throwing pieces, used in what must have been a very popular game. Regardless of the function of hammerstone grinders, Kimsquit sites appear distinct in having a high frequency of edge trimmed or half-edge trimmed variants, with flaking, or battering along one or both of the lateral edges (Figure 16:7). This characteristic is consistent at the Kimsquit sites up to the mid-19th century. Whether a matter of stylistic preference or function, I argue it represents a separate way of doing things at Kimsquit, analogous to the modification of commonly used and widespread materials in later contexts.

Table 16:1. Stone Tool Types and Frequencies at Excavated Kimsquit Sites.

Artifact Type	FeSr 1 f	FeSr 1 %	FeSr 7 f	FeSr 7 %	FeSr 4 f	FeSr 4 %	FeSr 5 f	FeSr 5 %
Chipped Stone								
Pebble Choppers			1	.6	1	.7	5	3.7
Chipped Stone Adze					1	.7		
Cortex Spall Tools			6	3.7			2	1.5
Utilized Flakes			3	1.8			4	2.9
Retouched Flakes			1	.6	3	2.1		
Bipolar Objects					9	6.2	5	3.7
Projectile Points			3	1.8	3	2.1	3	2.2
Drill					1	.7		
Microblades							7	5.1
Cores			2	1.2	1	.7	1	.7
Miscellaneous					2	1.4	1	.7
Sub-Total			16	9.7	21	14.6	28	20.5
Pecked & Ground Stone								
Abraders			1	.6	15	10.4	8	5.9
Hammerstones			5	3.1	7	4.9	6	4.4
Hammerstone Grinders			24	14.7	2	1.4	4	2.9
Edge Trim. Grinders			19	11.6	1	.7	30	22
Half Edge Trim. Grinders			8	4.9			8	5.9
Hand Mauls			2	1.2	2	1.4	1	.7
Miscellaneous			4	2.4	4	2.8	1	.7
Sub-Total			63	38.5	31	21.6	58	42.5
Polished Stone								
Adze Blades & Frags			2	.2	85	59	32	23.5
Knife					1	.7		
Projectile Points							3	2.2
Hand Maul					1	.7		
Miscellaneous	1	2			2	1.4	1	.7
Sub-Total	1	2	2	1.2	89	61.8	36	26.4
Total	1	.2	81	49.4	141	98	122	89.4

The indigenous architecture recorded by Hobler at Kimsquit also shows important distinctions over time, most notably in the construction of rectangular semi-subterranean house villages at FeSr 4 and FeSr 6. Since the rectangular house pit depressions at FeSr 4 date from the late 18th to early 19th century, it is likely that those at FeSr 6 fall in this time range, or slightly earlier. McIlwraith's informants claimed both were occupied "at the time of Mackenzie's visit" [1793] (McIlwraith 1948 I:15-16). This form of architecture is poorly understood, because it does not meet ethnographic expectations and is not widely represented archaeologically. A single rectangular house-pit depression was recorded by Smith (1925) somewhere in Bella Coola, and 2 others in Kwatna Bay at FaSu 2 and FaSu 10 by Carlson (1971). These depres-

Table 16:2. Frequency of Debitage at Excavated Kimsquit Sites.

Site	Basalt	Green-stone	Quartzite	Obsidian	Andesite	Quartz	Other	Total
FeSr 7	1	53	6	6	3		1	70
FeSr 5	5	22	5	12	1	1	2	48
FeSr 4	2	54			1	1		58
Total	8	129	11	18	5	2	3	176

sions are smaller in plan than those at Kimsquit and significantly deeper. The Kimsquit depressions seem to represent small rectangular houses with semi-subterranean floors, and with walls probably abutting, or just above the earthen bank of the pit (Figures 16:8, 16:9; Prince 1992:104-105), They do not appear to be sunken hearth pits within a larger planked house, which is the more familiar form of Northwest Coast architecture. Two house pits were double pits; a ridge of earth divided them into separate areas (Prince 1992:107-109).

The semi-subterranean architectural form seems to have been replaced by above ground house forms in the 19th century. Hobler recorded late 18th and early 19th century mounds at Nusqalst (FcSo 1) that probably were the bases of large cedar-planked houses whose corners were supported by pilings with their hearths resting on the mound surface (Hobler and Bedard 1989). This is one of the local forms of architecture described by Mackenzie. (1967:284). Vancouver (1984 III:929-936) also noted houses perched on pilings during his reconnaissance of the Central Coast channels. The archaeology of the late 19th century village of Snxlhh (FcSq 4) in Bella Coola more clearly indicates the house platform style of architecture (Hobler and Bedard 1990). The earth and stone mounds at FeSr 7 were probably an early 19th century variant of house platforms at Kimsquit, that was not recognized as such during Hobler's initial investigations. However, mounds of earth and midden are also evident below some of the late 19th century houses at FeSr 1 (Hobler 1970:79). To this architectural style, small, ground level milled lumber cabins were slowly and sporadically added (Figure 16:10).

What accounts for the shifts in architectural style? Nuxalk oral traditions (Boas 1898:64, 79, 87, 123) make reference to underground houses in the Bella Coola valley, which sound like interior pit houses and may be evidenced by shallow, circular pit houses (FcSm 5 and FcSm 6) investigated by Hobler near the forks of the Atnarko and Talchako rivers (Hobler and Bedard 1992). One of the houses at FcSm 6 dates to AD 1170±80 (Hobler and Bedard 1992:40). There are also references to sunken rectangular winter lodges among the Nuxalk (Kennedy and Bouchard 1990:327). It could be that the semi-subterranean houses at FeSr 4 and FeSr 6 simply represent winter residence, but this does not explain why this style of house is neither present after the early 1800s, nor common in Nuxalk territory beyond Kimsquit. It could also be that these sites represent a blending of cultural traditions unique to Kimsquit - that is a combination of semi-subterranean lodges and rectangular planked house architecture. Kimsquit, situated at the end of a long inland arm of the coast, is a likely place for such a meeting of cultural traditions. McIlwraith's oral traditions and myths indicate that Kimsquit in general and Nuxwilst (FeSr 6) in particular were multi-ethnic communities, Nuxalk and Heiltsuk, with strong connections to the interior (1948 I:15-18, 21-22). Further, the residents of Nuxwilst are said to have been given the rectangular, semi-subterranean house style by an ancestor figure (McIlwraith 1948 I:341), and that this community eventually fissioned with one branch, called the Istamx, migrating to the lower Dean Channel and joining the Heiltsuk (Olson 1955:321). It is tempting to speculate that one or the other components of the community began their migration in the interior, or otherwise borrowed a variant of interior architecture, and that the cessation of semi-subterranean architecture represents the splitting of the community. The switch to elevated house forms could also have been a practical adaptation to periodic flooding and river channel changes. Some of the houses at FeSr 4 are truncated by a dry river channel, which may account for the brief occupation of the site (Hobler 1972:92; Prince 1992:100). Hobler (1989) has documented an inner coast and river valley trend towards location of villages on backwater sloughs and the elevation of houses on stilts and mounds in the 18th

Table 16:3. Artifact Types Inner Coast Sites.

Artifact Type	Fe Sr 7	Fe Sr 4	Fe Sr 5	Fa Su 2	Fa Su 1	Fc Su 1
Chipped Stone						
Pebble Chopper	X	X	X			
Adze		X				
Cortex Spall	X		X			
Utilized Flake	X		X	X		
Retouched Flake	X	X		X		X
Bipolar Object		X	X			
Projectile Point	X	X	X	X		
Drill		X				
Core	X	X	X			X
Knife				X		
Pecked & Ground Stone						
Abrader	X	X	X	X	X	X
Hammerstone	X	X	X	X	X	X
Hammerstone Grinder	X	X	X	X	X	X
Edge Trimmed Grinder	X	X	X			
Half Edge Trim. Grinder	X		X			
Hand Maul	X	X	X	X	X	X
Circular Stone				X	X	X
Bark Shredder				X		
Grooved Sinker				X		
Anthropomorph				X		
Polished Stone						
Adze Blades & Fragments	X	X	X	X	X	X
Greenstone Knife		X				
Greenstone Point			X			
Ground Slate Point				X		
Ground Slate Knife				X		
Hand Maul		X				
Bone and Antler						
Wedge		X				
Bone Tube			X			X
Awl	X			X	X	X
Projectile Point	X		X	X	X	
Composite Harpoon Part				X	X	X
Scapula Point				X	X	
Spindle Whorl				X		
Bark Beater				X		
Ring				X		
Pendent				X	X	
Perforated Tooth				X		
Notched Tooth				X	X	
Ground Shell				X	X	

and 19th centuries, which may have afforded security from bears, invaders and especially high water.

Explaining the origins and function of the semi-subterranean architectural tradition at Kimsquit and the switch to elevated forms are subjects requiring further research. Regardless of the explanation preferred, I suggest that the architecture at Kimsquit represents both a separate cultural tradition and identity for Kimsquit, and a precedence for the borrowing and blending of traits in unique ways that continues through the contact period. In this sense, architecture is consistent with trends I have described in material culture and raw material - as variants of a broader Central Coast pattern.

European Contact

Being a remote location, direct European contact came late to Kimsquit and was sporadic until the late 19th century (Table 16:4). The first written record of encounters with the Nuxalk were left by Mackenzie who traveled overland to Bella Coola in 1793, and thence by canoe to Dean Channel, and Vancouver who circumnavigated King Island in 1792-93. Vancouver reached the head of Dean Channel in June, 1793 and observed some form of native settlement at the mouth of the Kimsquit River, but did not make a landing (Vancouver 1984 III:929). Both Vancouver and Mackenzie noted significant quantities of European metal and cloth among people on the Central Coast, which probably spread through native trade networks. I thus define the approximately 25-year interval prior to their accounts as a protohistoric period.

The interval from 1793-1833 was marked by frequent ship traffic to the Central Coast for trade and exploration. Fitzhugh and Milbanke Sounds wereimportant ports of call (Howay 1973; Menzies 1923:102). Since Kimsquit was remote and difficult to reach by sail, European goods probably continued to arrive indirectly (Prince 2002:54). The land based fur trade began on the Central Coast in 1833 with the establishment of Fort McLoughlin at Bella Bella, to which the Kimsquit people came as visitors (Tolmie 1963:292, 303, 307). Fort McLoughlin continued to be the dominant place of contact until fur trading steam ships could reach remote villages directly, which resulted in the closure of the fort in 1843. Trade from steam ships operated in conjunction with smaller land based stores at Bella Bella and Bella Coola

Table 16:4. Modes of European Contact at Kimsquit.

Mode	Date AD
Indirect/Protohistoric	1770-1793
Maritime Fur Trade	
& Exploration	1793-1833
Fort McLoughlin	1833-1843
HBC Ships & Small Posts	1843-1910
Railway Surveys & Royal Navy	1870s
Indian Affairs	1870s-1920s
Missionaries	1880s-1920s
Fish Canneries	1900-1920s

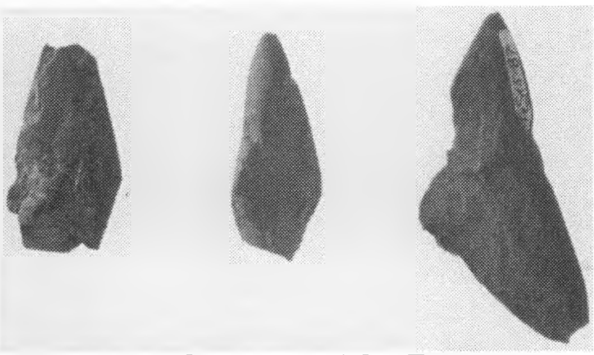


Figure 16:6. Greenstone Adze Fragments reycled into Projectile Points from FeSr 5.

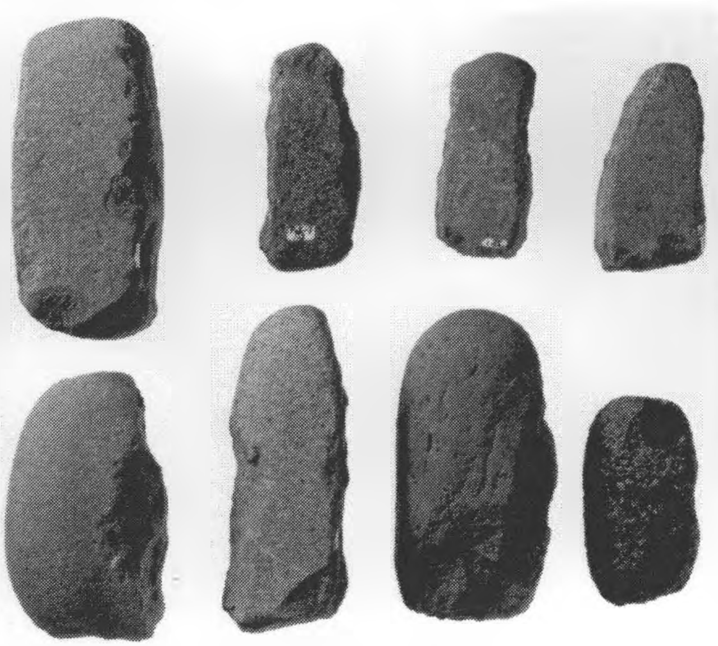


Figure 16:7. Edge Trimmed Grinders (Top Row) and Half-Edge Trimmed Grinders (Bottom Row) From FeSr 7.

until the 1910s (Hobler and Bedard 1990; Prince 1992:46). In the 1870s various government agencies, including the Canadian Pacific Railway, Royal Navy and Indian Affairs began a series of more intensive, but unsustained contacts at Kimsquit with the intentions of pacification, assimilation and exploration for the purposes of developing aboriginal lands and administering to local populations (Prince 1992:48, 2002:54). Attempts at missionizing began in the 1880s from bases at Bella Coola and Bella Bella, and from the Methodist steamship *Glad Tidings* (Prince 2002:55; Kennedy and Bouchard 1990:337). Development eventually came to Kimsquit around 1900 in the form of two fish canneries rather than Euro-Canadian colonies (Hobler 1972:89). These ceased operation in the 1920s (Prince 1992:63; Pacific Fisherman Yearbook 1929:55-56).

Throughout the late 18^{th} to mid 19^{th} centuries, the presence of Europeans on the Central Coast did not present much of an intrusion to the Kimsquit people. The intention of fur traders was to conduct commerce, rather than to instill change (Fisher 1977). The Kimsquit people were involved in this commerce indirectly during the maritime fur trade, then at their own prerogative through trips to the land based fur trade posts. This is not to say that no changes occurred in aboriginal culture. The possible fission of Kimsquit communities at FeSr 4 and FeSr 6, and the oral traditions of the Istamx migrations are roughly coincident with the earliest European presence on the Central Coast. Throughout the Central Coast region, Hobler (1992) also noted a trend towards abandonment of the inner channel zone and suggests there may have been gravitation towards the outer coast to access trade. Coast wide epidemics of small pox have also been proposed for as early as the 1770s, with a well documented epidemic 1836-38 that may have reduced Bella Coola speaking populations by as much as 46% (Boyd 1990:137, 141). These events would surely have had significant consequences for regional balances of power and territorial and social boundaries, which have yet to be researched. The point I wish to make here is that whatever changes did occur were of aboriginal prerogative. To judge from the sparse European observations of Kimsquit

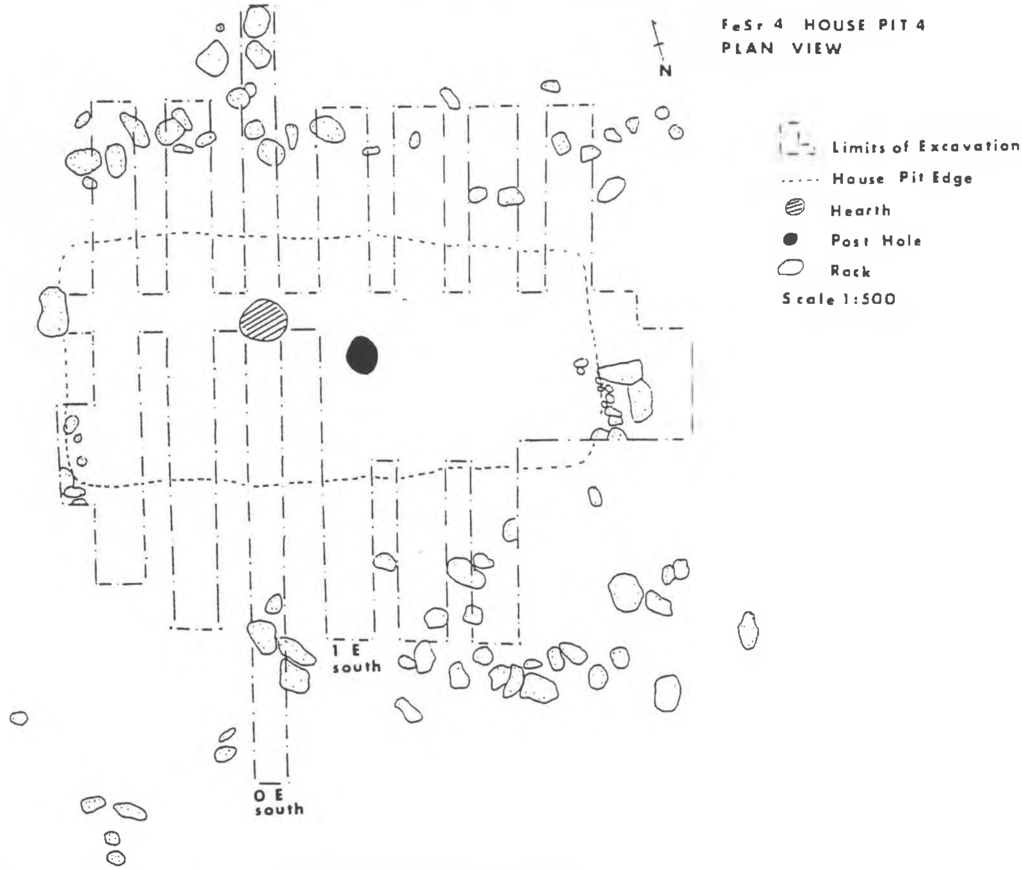


Figure 16:8 **Planview of House-Pit 4, FeSr 4.**

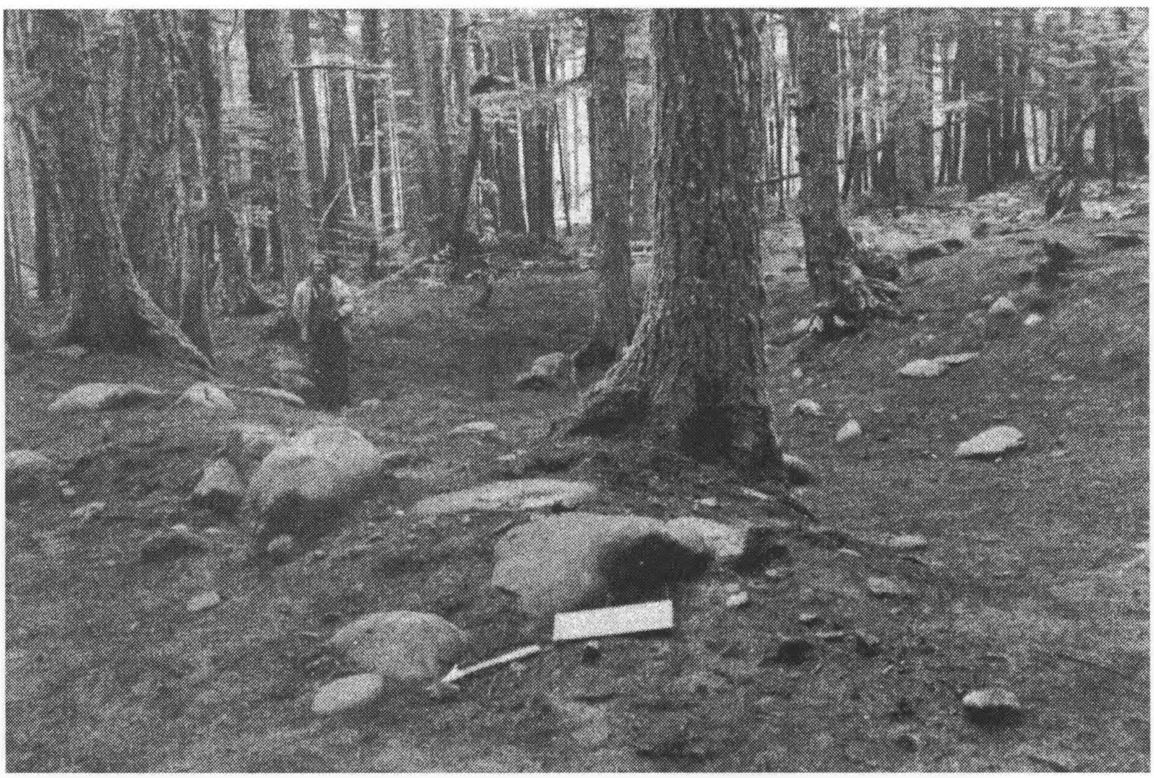


Figure 16:9. House-Pit 4, FeSr 4, Prior to Excavation. Photo: P.M. Hobler.

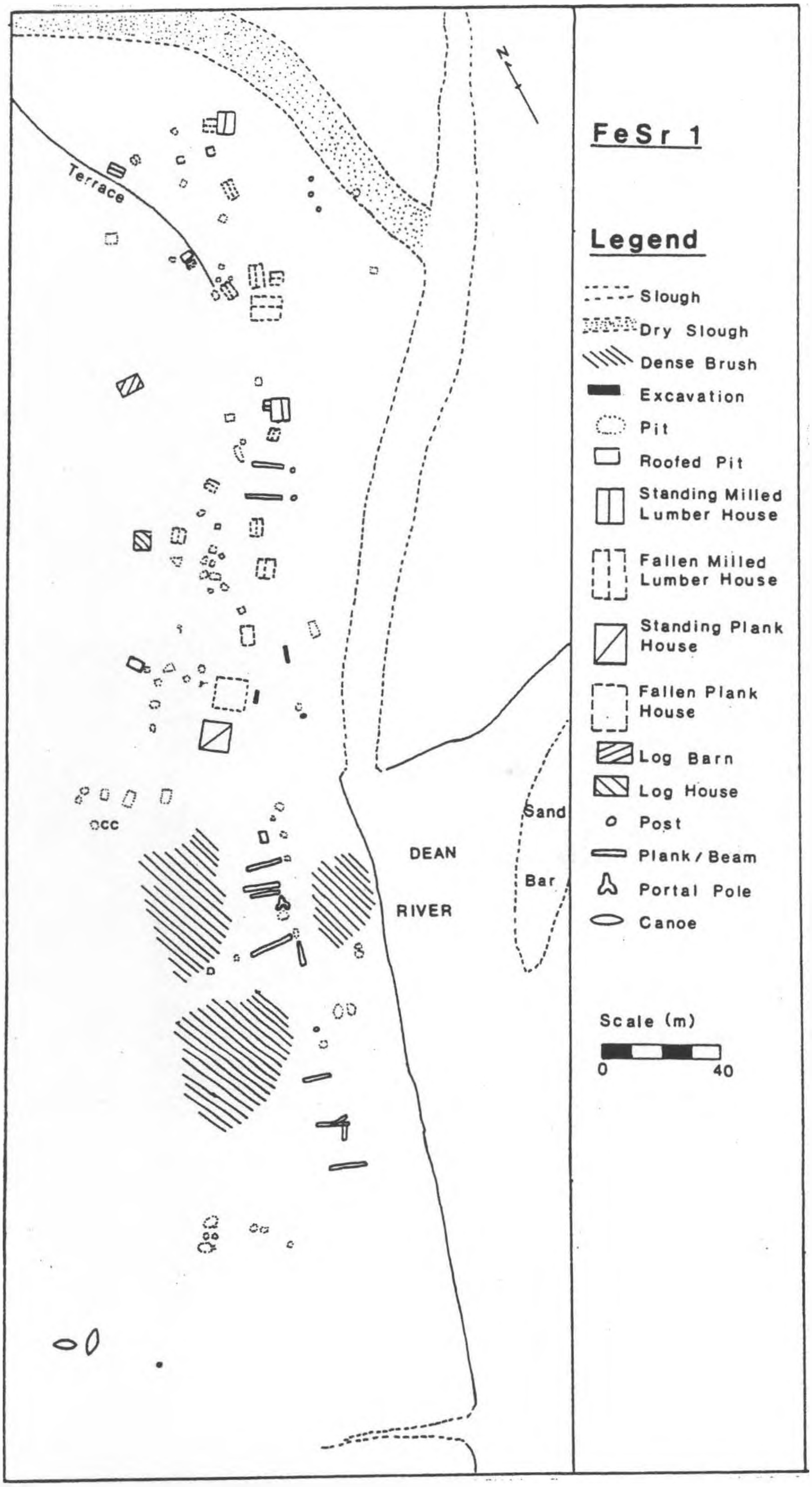


Figure 16:10. **Map of FeSr 1.**

they regarded the newcomers with caution and conservatism. Vancouver (1984 III:928-929) observed people at Kimsquit and nearby Skowquiltz, but was unable to coax them near. Kimsquit visitors at Fort McLoughlin in the 1830s seem to have been businesslike, and spent more time socializing with the Heiltsuk and other aboriginal groups than the Europeans (Tolmie 1963:307; Prince 1992:41-42). They probably regarded the European post as an opportunity to acquire new sources of wealth and to interact with their neighbours. Once Kimsquit was visited directly by steamship fur traders they are vividly described as a very conservative community. Fur trader Compton, who visited Kimsquit between 1859-62 by steam ship, described them as "most uncivilized", and their village as being "in a more filthy condition than that of any Indians I have ever met with" (1869:12). He further characterized all Bella Coola speakers as backwards, for instance wearing traditional clothing or only a blanket, and depending on hunting and gathering (1869:28-29). Soon after Compton made his observations, Native people on the Central Coast again suffered from a small pox epidemic (1862-63). Bella Coola populations may have been reduced by as much as 58 % (Boyd 1990:142). This event has been suggested to have ushered in a series of significant cultural "losses" in terms of traditions, knowledge and practices throughout aboriginal British Columbia (Fisher 1977). At Kimsquit, a reordering of settlement and population occurred, with the Kimsquit River (Satskwmx) local group abandoning their village on the Kimsquit River, and amalgamating with the Dean River Kimsquit (Sutslimx) at Anutlitx, but the two groups retained their respective lines of descent and rights to territories (McIlwraith 1948 I:18).

The Kimsquit continued to be regarded as reclusive, backwards and occasionally volatile throughout the 1870s-1920s (Smith 1874:42, 66; Canada 1900:267, 1903:262, 1904:298, 1915:98; Vancouver Daily World, Sept 13, 1913; Bella Coola Courier, May 26, 1917). The government made an attempt to stem this situation as early as 1877 when the Royal Navy shelled Anutlitx, based on allegations of piracy and murder (Harris 1877a, 1877b; Powell 1882), but in effect to demonstrate the consequences of nonconformity (Gough 1984). Despite this, and a growing economic dependence on wage labour at local fish canneries in the early 1900s, the European records indicate that until its eventual abandonment in the 1920s due to a dwindling population, Kimsquit exercised an unusual degree of autonomy. They refused a resident missionary (Canada 1900:263, 1903:262, 1904:298, 1905:271, 1915:88), declined western medicine (Edwards 1980:10; Canada 1897:88), and continued to potlatch (McIlwraith 1948 I:340). The Kimsquit also made bold requests of Indian agents including compensation for the shelling (Canada 1882:142; Powell 1882), the adoption of children to bolster their population (even specifying preferred race) (Canada 1901:271), and additional reserve lands (Canada 1916 I:255). At the same time they clung to traditional housing and residence patterns (Canada 1912:203; Figures 16:2, 16:3).

The Kimsquit seem to have been particularly assertive in their attitude towards Christianity. All indications are that Christianity was rejected outright until at least 1908. Censuses state they were all "pagans". From 1909-1912, they were suddenly enumerated as all Methodists; in 1913, they were once again listed as pagans, and from 1917-1924, the numbers suggest a gradual conversion (Prince 1992:60). The 1909-1912 censuses may simply be wrong, especially since the Reverend William Henry Pierce (1933:48) of the Bella Coola Mission reported that the Kimsquit never accepted Christianity. However, Reverend Thomas Crosby (1914:194) stated in his memoirs that at "Kimsquit, up the North Bentinck Arm, we have another little church". Although he placed it in the wrong location, he must have been referring to Kimsquit because he described the mission at Bella Coola, at the head of North Bentinck Arm in the previous paragraph. The McKenna-McBride reserves commission lists a church among the public buildings at Kimsquit in 1913 (Canada 1916 I:228), supporting Crosby's statement. Perhaps the church operated from 1909-13, after which the congregation backslid. Bolt (1992) has described the Coast Tsimshian experiments with Crosby's Methodist mission, in the hope of being seen on equal footing with Euro-Canadian society, while milking new opportunities to protect their cultural identity. When these goals were not realized, Methodism was abandoned. A similar experiment with Methodism may have occurred at Kimsquit. Even if the adoption of Christianity were not such a calculated maneuver, it need not imply a complete conversion of faith. McIlwraith (1948 II:521) found that many "Christian" Nuxalk merely considered the Christian God as another being to enhance the Native pantheon. I have argued that this syncretism of religion occurred at Kimsquit and extended to the mortuary complex where Christian symbolism was incorporated alongside indigenous potlatch and clan images and long-held beliefs in the afterlife, and is thus consistent with the theme of cultural survival (Prince 2002). Even in abandoning their last village, the Kimsquit maintained a sense of identity by joining their kinsmen in Bella Coola, and exercising their rights to the Kimsquit and Dean rivers through trap lines (Bouchard et al. 1988:10) and eventually the establishment of a traditional cultural rediscovery camp.

Post-Contact Trends in Material Culture

In the material assemblages of the sites associated with European contact we see over time a decrease in the numbers of stone and bone artifacts, and increase in manufactured European items (Table 16:5). There is an emphasis on the recycling of metals in the early and middle stages of the contact process, especially at FeSr 7. I have argued that this pattern represents a gradual introduction of European trade goods in the late 18th to mid 19th centuries, with the selection of items occurring without pressure, and their reworking into ornaments and tools being governed by their fit with indigenous cultural categories (Prince 1992). Most of the objects of Euro-American material and Native manufacture (Table 16:6) have functional equivalents in stone or bone that have been found at Kimsquit or the Kwatna sites such as bone and shell pendants and rings for copper ornaments, bone for iron awls, ground and chipped stone projectile points for iron, bone and antler wedges and stone adzes for iron chisels, retouched and utilized flakes for copper blades and utilized scrap, and debitage for metal scrap. There are few similarities in style or form between artifacts made of metal and those made of indigenous material, but as discussed below, there are strong functional similarities, which extend to the selection of items entirely of Euro-American manufacture as well.

To a certain extent, there is also a continuance of artifact manufacturing technology, with a transference to new material (sheet metal). Where recognizable, the most common method of reducing metal to a manageable size was by folding it back and forth until it broke (Table 16:7). Cutting with metal sheers occurred less frequently, and sawing is evident on only one item in a late context from FeSr 1. These methods are more likely to have been employed by Native craftsmen than by European metal smiths. The most common methods of shaping a piece of metal into its final artifact form included sharpening edges by abrasion; drilling or punching holes for suspension or attachment to another surface; rolling sheet metal into tubes; or a combination of the above methods (Table 16:8). A variation on the rolled copper technique was to fold over and flatten the edge of a sheet to produce a strong edge. Folding and flattening could be repeated to produce rod like strands that were annealed, as in examples from Nusqualst (Hobler and Bedard 1989). A nose ring from FeSr 4 may have been manufactured in this manner (Figure 16:11).

There are precedents for the metal working technology employed at Kimsquit. Cold hammering and annealing of native copper is known to have occurred on the Northwest Coast, so these methods and the material may not have been entirely foreign to the Kimsquit. More obvious resemblances to indigenous manufacture, however, are in the production of sharp edges by abrasion, as was practised on ground stone and bone, and perforating by

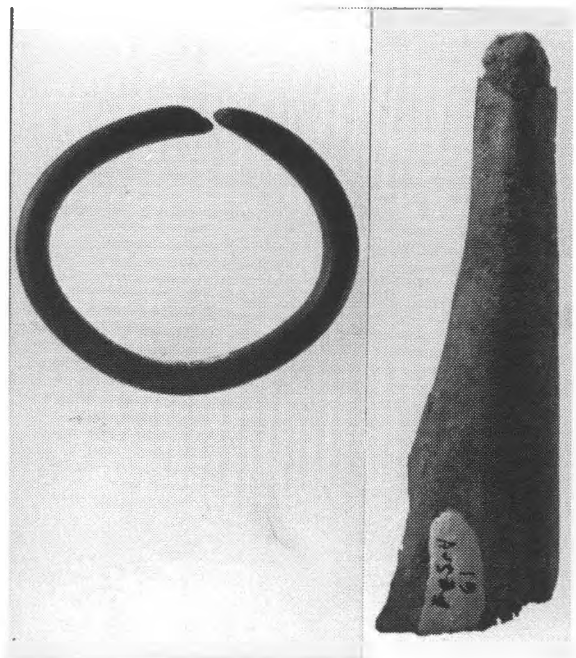


Figure 16:11. **Nose Ring and Rolled Cone of Copper from FeSr 4.**

punching, as was likely performed on hide, to judge from the incidence on the Central Coast of bone awls. Perhaps the greatest similarity between Native metal working and indigenous technology was the expedient manner in which usable pieces of sheet metal were produced, and the high frequencies of expedient flakes and adze fragments represented in the early components. This can be thought of as part of a process of recycling materials, also represented in the early assemblages. The samples from FeSr 5 and FeSr 4 are very small, but the sample from FeSr 7, includes a large amount of unutilized scrap, most of which is very small pieces of copper (averaging 2.81 x 2.32 cm), which were probably recycled several times

Table 16:5. Proportions of Major Artifact Classes in Excavated Kimsquit Sites.

Artifact Class	FeSr 1		FeSr 7		FeSr 4		FeSr 5	
	f	%	f	%	f	%	f	%
Euro-American Manufacture	392	95.4	14	8.6			2	1.5
Euro Material Native Made	15	3.6	63	38.7	2	1.4	5	3.7
Local Material Native Made	4	1	86	52.8	142	98.6	129	94.8
Total	411	100	163	100.1	144	100	136	100

Table 16:6. Artifacts of Euro-American Material and Native Manufacture at excavated Kimsquit Sites.

Artifact Type	FeSr 1 f	FeSr 1 %	FeSr 7 f	FeSr 7 %	FeSr 4 f	FeSr 4 %	FeSr 5 f	FeSr 5 %
Ornaments								
Tinkling Cones	4	1	1	.6	1	.7		
Perforated Thimble			2	1.2				
Rod Armour			1	.6				
Wire Bead			1	.6				
Nose Ring					1	.7		
Finger Rings			2	1.2				
Spirals/ Hoops	2	.5						
Rolled Copper			3	1.8				
Incised Copper			1	.6				
Utilitarian								
Hooked Objects	2	.5						
Metal Patches	4	1						
Awl							1	.7
Projectile Point			1	.6				
Chisel			1	.6				
Formalized Blade			2	1.2				
Unformalized Blade			3	1.8				
Copper Rod							1	.7
Utilized Scrap			1	.6				
Unidentified								
Perforated Copper			2	1.2				
Shaped Objects			2	1.2				
Rolled & Folded Copper							2	1.5
Unutilized Scrap	3	.7	40	24.5			1	.7
Total	15	3.7	63	38.3	2	1.4	5	3.6

before being discarded or lost. I suggest these heavily used pieces of metal are analogous to the recycled and utilized greenstone adze flakes at the earlier sites.

The only significant technological replacement during these early to middle stages of culture contact would seem to have been reworked copper implements for stone adzes in the FeSr 7 assemblage, and this does not occur until metals were in seeming permanent supply from Fort McLoughlin and steam ships. These patterns are typical of situations of indirect and sporadic European contact (Bradley 1987; Vanstone and Townsend 1970; Rogers 1990). One of the interesting things about Kimsquit is that this phase in the material response to contact persisted so long. This is undoubtedly a function of the remote location of Kimsquit and a need to curate and recycle goods that were probably harder to attain than it was for their neighbours. It is also consistent with the selective attitude of the Kimsquit towards Europeans and a tendency to maintain established categories of material culture and the associated cultural activities, such as wood working, hunting and personal adornment and prestige.

By contrast, the archaeological assemblage of the late 19th and early 20th centuries at FeSr 1 shows a near total replacement of indigenous material culture by items entirely of Euro-American manufacture (Table 16:5). Some archaeological studies conclude that the adoption of Euro-American artifact forms without modification implies a higher degree of acculturative change, involving the adoption of new activities (Bradley 1987; White 1974). It has been noted, however, that Euro-American manufactured items can be put to uses contrary to what they were designed for, without modification, but totally consistent with Native values and practices (Wike 1951:95; Banta and Hinsley 1986:122; Prince 2002). Therefore, archaeologists need to carefully establish the contexts of exchange and use of Euro-American goods before interpreting their presence as indicating drastic change (Rogers 1990). In the case of FeSr 1, the sudden abundance of Euro-American goods corresponds to an increase in their availability in the late 19th century, with the opening of the Hudson's Bay Company store at Bella Coola, and then of fish cannery stores locally. Many of the items were probably adopted for their convenience over local manufacturing, their functional efficiency and perhaps as a matter of fashion. Many indigenous technological skills were lost (i.e. flint knapping) or fell into de-

Table 16:7. Methods of Reduction of locally made Metal Artifacts.

Site	Folding	Cutting	Cutting & Folding	Sawing	Unid.	Total
FeSr 1	1	7	1	1	5	15
FeSr 7	14	6	3		40	63
FeSr 4					2	2
FeSr 5	3		1		1	5
Total	18	13	5	1	48	85

cline (i.e., carving and weaving) during this period throughout the Northwest Coast (Duff 1964:76), and the same is true of Kimsquit. But when we consider the functions of new items there may not have been as much economic and social change as it would seem (Table 16:9; Figure 16:12).

The bulk of the manufactured goods at FeSr 1 are associated with woodworking and construction, activities of long importance, if we consider adzes and hammerstone grinders in the same category. The new building tools, hardware and fasteners were also adapted to "traditional", non-European projects, such as plank houses and grave houses (Prince 2002). Much of the remaining Euro-American material is of ambiguous significance. Many domestic items, ceramic tableware for instance, were valued historically within the Northwest Coast prestige system, especially as potlatch gifts (Blackman 1976; Marshall and Mauss 1997), while in everyday life in the 1920s, ceramics functioned as communal dishes among the Nuxalk (McIlwraith 1948 II:528), analo gous to wooden vessels. Medicine bottle glassalso makes a large part of the domestic refuse. As noted, traditional medicine was not entirely abandoned in favour of western practices. The Kimsquit people may also have used patented medicines for other purposes; several Indian agents noted intemperance (Canada 1904, 1906, 1912). The only items in the hunting group are rifle cartridge cases, replacing Native made projectiles and making a traditional activity more efficient (the earlier muskets never fully did). The clothing-adornment category includes pieces of every-day work clothes, which probably came into common use in the late 1870s or 1880s because of their convenience and the efforts of Indian Agents, missionaries and cannery operators who wanted Natives to at least look White. More strictly ornamental items in this category include glass trade beads and a brass brooch, which were inexpensive items, but may have adorned ceremonial regalia or other prestigious articles.

The practice of refashioning metal goods into useful implements and ornaments also continued at Anutlitx, although to a much lesser extent than at Nutal. The persistence of this activity represents some continuance of not only technologies developed earlier, but of the importance of recycling, finding expedient material solutions to problems (i.e. metal patches) and the creation of ornamentation. Notably, the three artifacts of local material at FeSr 1 include a bone gaming piece, an item equated with the survival of Native enthusiasm for gambling (McIlwraith 1948 II:379). These trends in late 19th-early 20th century material culture are thus consistent with written impressions of the Kimsquit' selective attitude towards the adoption of Euro-Canadian culture and persistence of indigenous practices.

Conclusions

I have argued that the people of Kimsquit made a concerted effort to maintain a sense of cultural identity and coherency throughout the historic period. I think this is most strongly indicated in the written records of the late 1800s to 1920s, in the persistence of planked house architecture, and in the innovative incorporation of European elements within the mortuary complex (Prince 2002). The material excavated by Hobler also shows a gradual

Table 16:8. Methods of Shaping Locally Made Metal Artifacts

Site	Folding & Flattening	Rolling	Drilled Holes	Punched Holes	Abrading	Other	Ushaped	Total
FeSr 1		6		5		1	3	15
FeSr 7	2	7	1	3	5	3	42	63
FeSr 4		2						2
FeSr 5	3				1		1	5
Total	5	15	1	8	6	4	46	85

Table 16:9. Artifacts of Euro-American Manufacture at Excavated Kimsquit Sites

Artifact Type	FeSr 1 f	FeSr 1 %	FeSr 7 f	FeSr 7 %	FeSr 5 f	FeSr 5 %
Domestic						
Bottle Glass	57	13.9				
Ceramics	33	8				
Spoons	3	0.7				
Clock Parts	2	0.5				
Woodstove	1	0.2				
Iron Cauldron			2	1.2		
Kerosene Lamp	2	0.5				
Construction-Hardware						
Cut Nails	188	45.7				
Wire Nails	21	5.1				
Wrought Nails	2	0.5				
Screws	2	0.5				
Tacks	5	1.2				
Axe Head	1	0.2				
Bail Fastener	1	0.2				
Saw Blade	1	0.2				
Flat Glass	1	0.2	5	3.1		
Lock Plate	1	0.2				
Key	1	0.2	1	0.6		
Door Knob	1	0.2				
Hinge	3	0.7				
Barrel Strap	1	0.2				
Hunting Group						
Cartridge Cases	3	0.7				
Gunflints			3	1.8	1	0.7
Butt Plate			1	0.6		
Clothing Adornment						
Buttons	20	4.9	2	1.2		
Beads	16	3.9			1	0.7
Boot Eye	1	0.2				
Brooch	1	0.2				
Safety Pin	1	0.2				
Buckle	1	0.2				
Miscellaneous	23	5.6				
Total	392	95.4	14	8.5	2	1.4

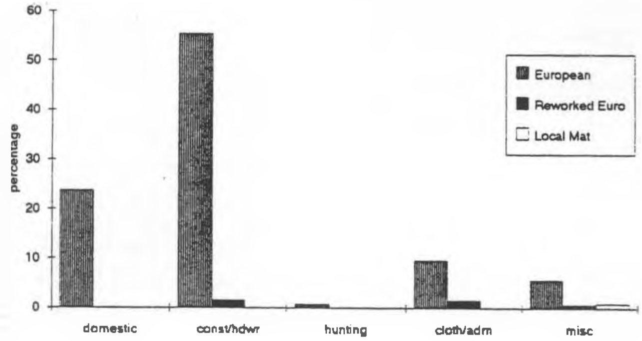


Figure 16:12. **Proportions of Artifacts by Functional Group Category at FeSr 1.**

and selective incorporation of Euro-Canadian material culture, proceeding through a phase of treating trade goods essentially as a raw material to be adapted to forms of Native design, and ending with the use of predominantly un-modified manufactured goods within indigenously meaningful contexts.

I have argued further that the cultural principles governing adoption, modification and manipulation of Euro-Canadian material culture were formed over the long-term. I attempted to isolate some of the continuities between clearly post-contact and earlier practices and attitudes to material expression at Kimsquit. This includes the recycling of lithics in late prehistory and of trade metals throughout contact, employing some of the same technological principles on both materials and using odd pieces for expedient purposes.

In many respects, Kimsquit always stood out from its neighbours, with a cultural identity that was deemed worth preserving, although with some redefinition, throughout the contact period. This trait is most notable in the emphasis on flaked stone technology, edge trimming of hammerstone grinders and construction of rectangular semi-subterranean houses before contact and during its early to middle stages. Arguably, such differences in material expression and the social and economic structures behind them both influenced the degree and nature of Euro-Canadian contact and are consistent with the Kimsquit people's response to the problems and opportunities it brought. Whether one agrees with my interpretations, the local and regional patterns I have discussed demonstrate one of the many values of Hobler's research. Without his detailed sampling and well grounded syntheses of the many geographic and temporal contexts of cultural remains throughout the Central Coast, we would not be able to isolate, compare and interpret long-term trends such as occur at Kimsquit.

CHAPTER 17

Wapato: Fact, Fantasy and Fiction

T.C. SPURGEON

Introduction

Wapato (*Sagittaria latifolia* Willdenow), a tuberous starchy carbohydrate food-plant, is frequently mentioned in ethnographies and archaeological reports concerned with the Katzie First Nation (KFN). First mentioned in the "*Fort Langley Journals*" of 1827/30 (Maclachlan 1998) and subsequently in local ethnographies (Jenness 1955; Suttles 1955, 1987a) and archaeological reports (Crowe-Swords 1974; Patenaude 1985; Peacock 1981), wapato has not been addressed critically in terms of it's archaeological and historic context, nor has its archaeological preservation potential been assessed. While it has been studied in detail by botanists (Brayshaw 1985; Clark and Clay 1985; DeLesalle and Blum 1994; Fassett 1966; Kaul 1985; Lieu 79; Marburger 1993; Pojar and Mackinnon 1994; Wooten 1971) and to a lesser extent by archaeologists (Darby 1996; Hather 1991, 1993; Kubiak-Martens 1996; Neumann *et al.* 1989) wapato in Katzie territory is not well understood. This paper is essentially a summary of Spurgeon (2001), addressing many of the issues associated with understanding wapato to enhance future archaeological interpretations of its pre-contact use.

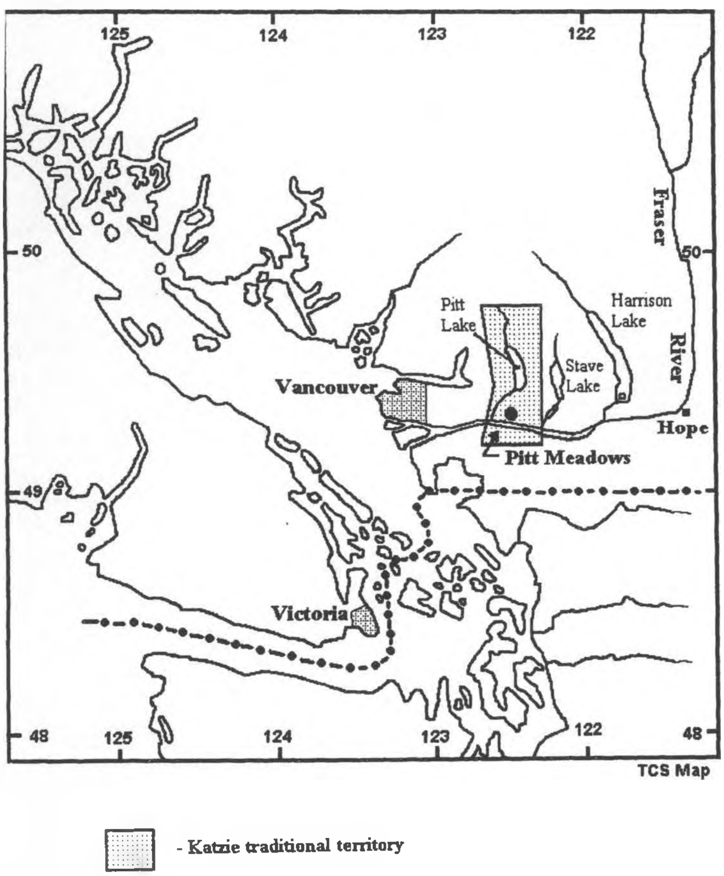


Figure 17:1. **Katzie Traditional Territory.**

The need for research into wapato can be justified on several fronts. As a dietary source of starch wapato would have been a predictable and abundant complement to diets, which were high in protein. This fact accounts for its apparent popularity as a foodstuff and a trade item. Wapato species occur widely throughout the world and are abundant in the Pacific Northwest, especially along the lower reaches of both the Columbia and Fraser rivers. In wetland areas it could have been the object of cultural manipulation, including water management activities, to increase its abundance and production. There is a fleeting mention of such horticultural behaviour in one ethnographic account (Haeberlin and Gunther 1930:21). Much of what has been written in ethnographies and historical references is frequently taken out of context and a critical accounting of the sources is infrequent. The frequent inclusion of wapato in local archaeological reports is a case in point where much is made of wapato via ethnographic analogy and the direct historic approach, but ultimately no identification of wapato remains from archaeological contexts is provided. Hence, there is a need to assess its potential to survive in archaeological contexts and to predict where it might be found.

In view of the importance of wapato to the KFN, especially as regards traditional use studies in the environmentally sensitive Pitt Lowland area, a better understanding of what has happened to wapato since the time of first contact with Europeans is warranted. A critical and contextual review of the extant data on wapato helps fulfill this need while at the same time contributing to the creation of a predictive model for the archaeological occurrence of wapato. This review includes both a critical look at native language data relevant to wapato and the outcome of a wapato tuber charring experiment intended to provide an identification methodology. A host of important information about wapato is presented and the importance of critical, contextual and experimental analysis is established concurrently. The result reveals a need for researchers to break free from the common archaeological paradigms currently prevalent for the area in question.

Area of Study

This study focuses on the traditional territory of the Katzie First Nation (Figure 17:1). Katzie traditional territory, approximately 50 km up the Fraser River from the ocean, is located within the Georgia Depression and the Coast Mountain physiographic regions. The lowland areas of Katzie territory are just a few metres above sea level and prior to the advent of modern diking in 1892 (Collins 1975) were flooded annually by the Fraser River freshet. For linguistic purposes the area of study has been expanded outwards from the Fraser Valley to include adjacent Coast Salish speaking neighbours shown in Figure 17:2.

Today, low-lying areas are still subject to seasonal and daily water level fluctuations. On a daily basis there are tides which ebb and flow in the regionally dominant drainages of the Fraser and Pitt Rivers, affecting the lower reaches of the Alouette River and Widgeon Creek drainages, and Pitt Lake. During the middle-Holocene, as the Fraser delta migrated southwestwards, the Pitt Polder area was part of a large estuary. Tidal Pitt Lake is located in a former fiord, long cut off from the ocean by sea level change (Ashley 1977). The daily tidal reversal continues to build a delta front, which presently extends ca. 6 km into Pitt Lake (Ashley 1977). Mountains rising to elevations of 1,500 metres and more surround Alouette and Pitt Lakes. Rising vertically, from lowland to highland elevations in successive order, the area is contained within the Coastal Douglas Fir, Coastal Western Hemlock and Subalpine Mountain Hemlock Biogeoclimatic Zones. Driver (1998) provides a more detailed description of the geology, vegetation and wildlife. Figure 17:3 shows the lowland/highland distribution of terrain in Katzie traditional territory.

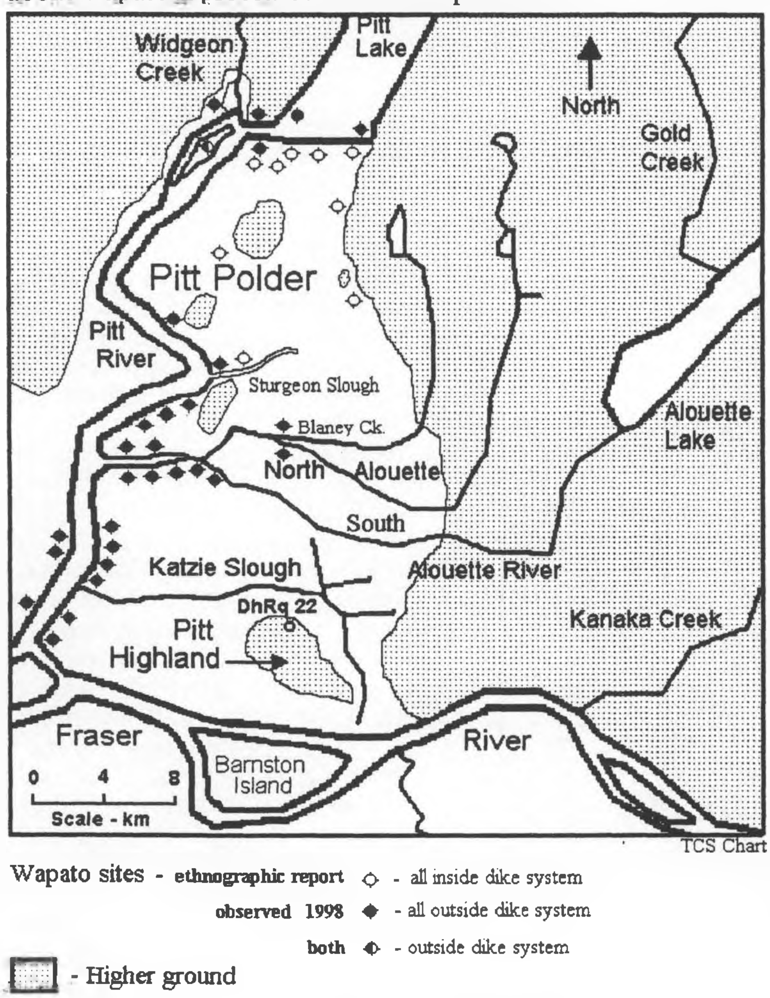
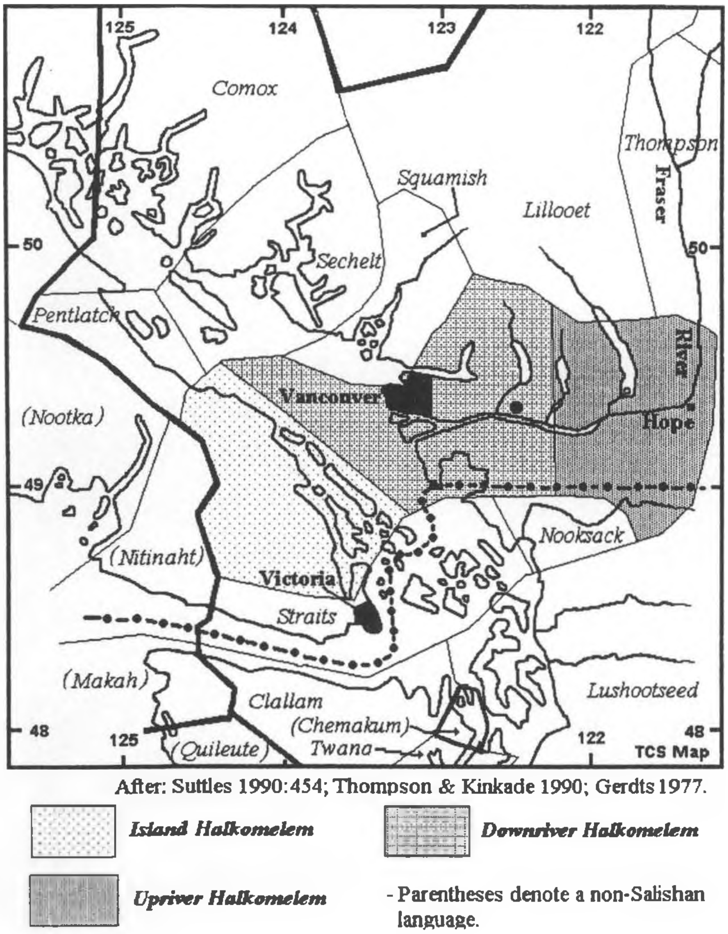


Figure 17:2. **Halkomelem Dialects of Salish.**



After: Suttles 1990:454; Thompson & Kinkade 1990; Gerdts 1977.

Figure 17:3. **The lowland/highland Distribution of Terrain in Katzie traditional Territory in the Pitt Polder/Pitt Meadows Lowland.**

What Is Wapato and Where Is It?

Wapato, also known as arrowhead, arrow leaf, Indian potato, swamp potato and duck-potato, produces starchy tubers, which were an ethnographically known food source for native groups throughout much of North America. Indeed, its "Old World" cousin *Sagittaria sagittifolia* is equally as common in Asia and Europe where it was widely consumed by people. *S. latifolia* is widespread in Southwestern British Columbia (Brayshaw 1985; Pojar and MacKinnon 1994; Turner 1995) and especially prevalent in the low wetland areas of the Fraser Valley. Two maps in Brayshaw (1985:136-137) show *S. latifolia* less widespread elsewhere in British Columbia than the related *S. cuneata* that is widespread outside the lower mainland area (Brayshaw 1985:45). Suttles (1955:16 Map II) provides a place name map for Katzie traditional territory that includes at least nine wapato locations. More will be said later about the relevance of ethnographic reports for wapato in the Pitt Meadows lowland area.

S. latifolia (Figure 17:4) is variously described as a marsh, semi-aquatic or aquatic herbaceous perennial with its above water foliage having leaves of a characteristic arrowhead shape (Borman *et al.* 1997; Brayshaw 1985; Pojar and MacKinnon 1994). There is consensus that wapato is most often found in the margins of water bodies at depths less than 1 metre, most commonly in depths of less than half a metre and pH readings of 5.9 - 8.8 (Marburger 1993:251). It is a member of the Alismataceae or Water Plantain family. Its characteristic arrowhead shaped leaves, and white three petalled flowers easily identifies Wapato. The plant produces tubers 1 to 3 cm in diameter in the substrate of shallow waters (Figure 17:5). The starchy tubers are storage organs produced from the plants' horizontally creeping underground stems or rhizomes. *S. latifolia* reproduces vegetatively from the tubers and sexually from seeds. The fruits are flattened beaked achenes (Figure 17:6). The production of tubers and achenes varies considerably with growing conditions (Marburger 1993). Widely used today for wetland enhancement, restoration and creation, this C_3 species tolerates and assimilates high levels of nutrients and heavy metals, and is eaten by insects, waterfowl, mammals and fish (Brayshaw 1985:45; Marburger 1993; Piper 1906).

S. latifolia is found in both monoecious (bisexual) and dioecious (unisexual) forms (Brayshaw 1985:45; Marburger 1993:249-50; Wooten 1971). Monoecious plants bear both male (staminate) and female (pistillate) flowers on an individual plant whereas dioecious plants have their male and female sex organs on separate individuals (Capon 1990:173). Marburger (1993:250) notes that "dioecious forms are more limited in their ability to reproduce sexually, since out-crossing is obligatory."

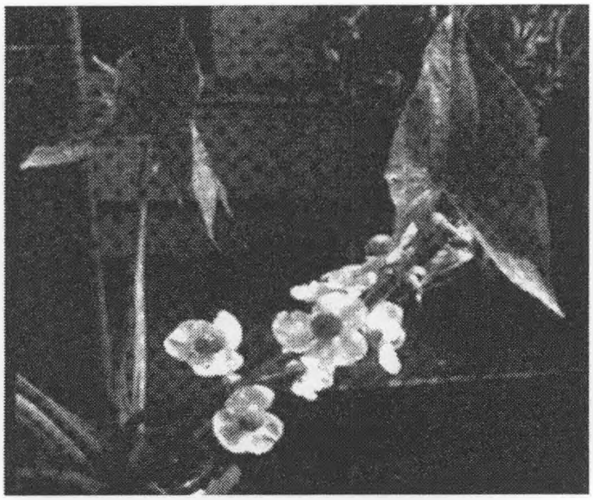


Figure 17:4. **Wapato Leaves and Flowers.**

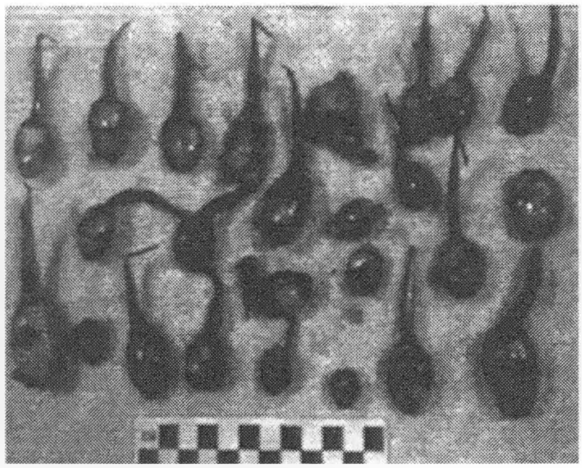


Figure 17:5. **Wapato Tubers.**

The Katzie and Wapato

The Katzie, who are Halkomelem language speakers, are included in the lower Fraser River Stalo sub-group and are one of the Central Coast group of Coast Salish peoples (Suttles 1990:453). Katzie territory encompasses the easternmost portions of the municipalities of Port Coquitlam and Coquitlam west of the Pitt River, portions of Surrey and Langley south of and adjacent to the Fraser River, and includes Fort Langley. The Katzie feature prominently in the "*Fort Langley Journals*" of 1827/30 (see Maclachlan 1998). For detailed accounts of Coast Salish and Katzie ethnography consult Barnett (1955) and Suttles (1987a, 1990).

In the past the Katzie utilized the abundant natural resources of the region in an annual round of fishing, hunting and gathering. Because their traditional territory encompasses such a variety of natural settings the Katzie had ready access to fresh and saltwater fish, a wide variety of mammals and birds, and a plentiful supply of plants. The Fraser River supported resident sturgeon and seasonally plentiful salmon, as well as other saltwater species such as eulachon and seals. The Katzie used all these species (Driver and Spurgeon 1998; Suttles 1955; Woodcock 1996).

The Katzie seasonal round had approximately 12 months divided into 10 counted and two supernumerary months, the first of which coincided approximately with the calendar month of June (Jenness 1955:7). A variety of hunting, fishing and gathering activities occurred throughout the year culminating in pot

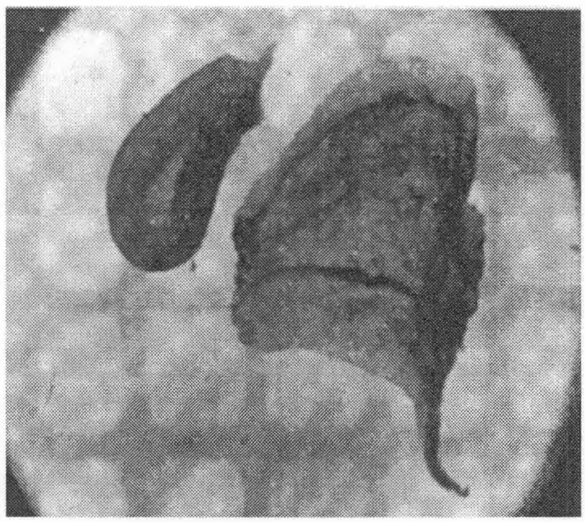


Figure 17:6. Sagittaria latifolia **(Wapato) Achene and Embryo. 1 mm background grid.**

latch and dance ceremonies at main villages during January and February. During the rainy, cold winter period the people stayed close to the main village, engaging in local food procurement activities not requiring extensive travel. In October the wapato harvest began and continued through November (Suttles 1955:27). I have harvested wapato into the month of April. Wapato patches, either owned by families or the tribe, were located on the west bank of the Pitt River around Siwash Island, on the flats north of Sturgeon slough,, and a shared patch near the head of Sturgeon Slough (Suttles 1955:27).

Some reports describe wapato harvesters wading in water and dislodging the tubers with their toes, or using canoes and pulling the plants free from the substrate (Pojar and MacKinnon 1994:337; Suttles 1955:27; Kuhnlein and Turner 1991:71; Turner 1995:37). It is not too great a leap to speculate that specialized tools similar to camas (*Camas quamash)* digging sticks (Haeberlin and Gunther 1930:20; Kuhnlein and Turner 1991:86) were used to augment the foregoing methods, although such perishable tools are not likely to be preserved archaeologically. The cultivation of introduced potatoes (*Solanum tuberosum*) eliminated the necessary requirement of entering water during the cooler months of the year to harvest wapato.

There are many cross-cultural examples of the use of digging sticks. One example is associated with the cultivation of taro (*Colocasia esculenta)* in Oceania (Sillitoe 1983; Oliver 1989). Golson and Steensberg (1985:347-384) discuss a wide variety of such digging stick implements used for several millennia in all phases of taro cultivation in the New Guinea Highlands.

Wapato Cooking and Nutrition

Mainly a starchy tuber of high water content, wapato provides a ready source of dietary carbohydrate. Wansnider (1997:2) states three reasons for cooking foodstuffs: 1.) to "advance the digestion process, so that more energy and nutrients can be obtained from any one mouthful of food" 2.) to "reduce the chance of illness by killing food-borne bacteria and parasites and by eliminating toxins that occur or develop in some tissues" 3.) so "spoilage bacteria are eliminated and water, needed by bacteria to grow, is reduced, so that the storage life of food may be extended." Cooking is an important factor in wapato nutrition as starch is not readily digested in the human gut without such processing (Englyst and Hudson 1997:9; Galliard 1987:3). Galliard (1987:3) notes that "because uncooked starch is poorly digested in the human alimentary tract, the main function of the various methods of cooking starchy materials is to convert starch granules to a form that can be attacked readily by the amylolytic enzymes of the digestive system."

Once harvested wapato tubers could be stored fresh, raw and unwashed, for several months according to Kuhnlein and Turner (1991:71). Wapato is reported as being eaten raw (Turner 1981:2341), cooked in hearths or hot ashes and in pits (Fladmark 1986:106; Haeberlin and Gunther 1930:23). Barnett (1955:60) indicates direct heating, steaming and boiling as the main cooking methods used by the Coast Salish but does not specifically mention wapato. Haeberlin and Gunther (1930:23) state that for the Puget Sound Indians "the principal methods of cooking were boiling with stones, steaming in a pit and roasting by an open fire." They refer to various kinds of roots and tubers, but do not specifically indicate a cooking method for wapato, instead noting that potatoes were pit cooked covered with sand. Boiling is the cooking method for wapato according to Anderson (1925:134). Turner (1995:3) and Batdorf (1990:67) report wapato tubers being cooked in hot ashes. Annie York, informant of Nancy Turner *et al.* (1990:113), describes the pit cooking of large quantities of wapato tubers. Kuhnlein and Turner (1991:71) state that wapato tubers were "prepared for eating by boiling, or baking in hot ashes, or in underground pits, after which they could be eaten immediately or dried for long-term storage or trading." Darby (1996:69) indicates roasting in ashes or boiling as the most frequently mentioned cooking methods for wapato. The Katzie cooked wapato tubers as needed by baking them in hot ashes according to Suttles (1955:27). Fladmark (1986:106) attributes the use of clay lined roasting pits for processing wapato to influences reaching the coast from the Plateau. An AD 1749 report indicates that *S. latifolia* roots were either boiled or roasted in hot ashes by the Indians of the Missouri River region (Gilmore 1991:13). Porterfield (1940:46) reports that in China the tubers were boiled much as they cooked taro, *Colocasia*. Also in China, Simoons (1991:111) reports wapato tubers being baked, boiled or steamed. It is likely that boiling, steaming and baking were the cooking methods variously used by native peoples of the Northwest Coast to prepare wapato for consumption.

While important nutritionally as a foodstuff, it should be noted that *S. latifolia* and its Asian relative were also used medicinally. Arnason *et al.* (1981:2243) report *S. latifolia* being used by the Iroquois to treat night crying in babies, and by the Ojibwa to treat indigestion, the former as an infusion and the latter as roots steeped with coneflower. Porterfield (1940:47 and 1951:18) notes a number of therapeutic uses for arrowhead: "Bruised leaves are applied to infected sores, snake and insect bites, and as a powder to itching diseases. The eating of raw tubers is said to be dangerous, producing fluxes and hemorrhoids and inducing premature birth." Woodcock (1996) makes no mention of Katzie use of *S. latifolia* for medicinal purposes.

Table 17:1. Nutrient Composition of *Sagittaria latifolia* (Wapato).

Reference	Species	Kjoules $x10^3$	Calories	Protein (g)	Carbohydrate (g)	Ash (g)	Lipid (g)	Calcium (mg)
H.H. Norton	*S. latifolia*	15.06	3.60	0.16	0.80	0.06	0.00.	0.35
et al. 1984	*S. tuberosum*	15.73	3.76	0.10	0.85	0.04	0.00	0.35

- per gram dry weight

- cont'd.

Iron(mg)	Magnesium (mg)	Zinc (mg)
0.41	0.63	0.03
0.03	1.09	0.02

Reference	Species	Food energy (kcal)	Water (g)	Protein (g)	Fat (g)	Carbohydrate (g)	Crude fiber (g)	Ash (g)
Kuhnlein &Turner 1991	*S. latifolia*	103	68	4.7	0.2	20.0	0.8	1.5

- per 100 g fresh weight

- cont'd.

Thiamine (mg)	Riboflavin (mg)	Niacin (mg)	Vitamin C (mg)	Calcium (mg)	Phosphorus (mg)	Sodium (mg)	Potassium (mg)	Magnesium (mg)	Zinc (mg)	Iron (mg)
1.60	0.25	1.4	5.0	12	165	22	922	51.0	0.7	6.6

- per 100 g fresh weight

Reference	Species	Water	Protein (g)	Food Energy	Fat (g)	Ash (mg)	Ca (mg)	P (mg)	Fe (mg)	Na (mg)	K (mg)	Riboflavin (mg)
Horton (1987)	*S. tuberosum*	80 %	2.1	76 (kcal)	0.1	0.9	7.0	53.0	0.6	3.0	407.0	0.04

- per 100 gram edible portion

Speth and Spielman (1983) point out the importance of carbohydrates in hunter-gatherer diets particularly during lean periods when meat lacks sufficient fat content. This lack leads to several nutritional problems, among them elevated metabolic rates with correspondingly higher caloric needs and deficiencies in essential fatty acids. They indicate that carbohydrates are seen as an excellent substitute for the missing fats, with hunter-gatherer groups resorting to trade and limited cultivation activities to acquire needed carbohydrates. Wapato is potentially one such source of carbohydrate and was traded and sought after by groups not having local supplies of the tuber. Wapato may have provided a predictable carbohydrate balance to a largely protein diet based on salmon. A brief summary of nutritional values for wapato is shown in Table 17:1. For a detailed listing of nutritional values from a variety of researchers see Spurgeon (2001, Table 1).

Wapato Trade

Wapato has been associated particularly with the Katzie whose traditional territory includes the Pitt Meadows and Pitt Polder lowland areas where it once grew in abundance. The Katzie and their neighbors maintained relationships based on the growing and trade of wapato. Whether the movement of wapato in the Fraser River region was restricted to trade or also involved free access to wapato for some outsiders is unclear. Wapato acquisition by coastal and interior peoples from the Fraser Valley peoples, was common (Suttles 1955:26; Turner *et al.* 1990:113). The Straits and Halkomelem Salish people on Vancouver Island acquired wapato from the Katzie as did the Squamish (Kuhnlein and Turner 1991:70). Turner (1997:160) mentions the Lower Nlaka'pamux of the Spuzzum area acquiring wapato from the Halkomelem people of the Fraser Valley. Katzie territory is reported to have patches that were shared with annual fall visitors. In one instance a large number of people congregated for the harvest at the confluence of the Pitt and Fraser Rivers (Maclachlan 1998:40).

The existence of prehistoric trade routes in British Columbia is well established (Ames and Maschner 1999:170-76; R. Carlson 1994:307-50). Primarily based on lithic evidence, especially obsidian, there is no reason to suspect that perishables such as wapato were not involved prehistorically given the ethnographic evidence for trade in numerous other perishable items not normally found in the archaeological record. The *Fort Langley Journal: 1827-30* (Maclachlan 1998:40) records the passage up-river on 21 December 1828 of Cowichan canoes laden with camas from Vancouver Island to be cached with salmon from the fall to use as food over the winter. Camas was rare in Katzie territory according to Suttles (1955:27) so it is possible that camas was one item used in trade for wapato. That such trade took place could be demonstrated archaeologically by finding charred wapato archaeologically on the Island and charred camas in sites of the Fraser Valley.

Comparison of wapato distribution, language, and its potential for trade on the Columbia and Fraser Rivers is illuminating. This 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. The major river drainages 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. On the Columbia River wapato was involved in trade both up and downriver (Boyd 1996:149; Ray 1938:120; Ruby and Brown 1976:99). Darby's (1996) wapato research is centered 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.

Potential Problems Evident in Studying Wapato

To fully understand wapato it is necessary to recognize several potential problems that must be considered in addition to the aforementioned issues of critical ethnography, historical context and lack of archaeological evidence. These problems include: 1. the paucity of comparative paleobotanical materials, 2. the potential presence of research, informant and gender bias in ethnographies, 3. the considerable passage of time from first contact to the recording of ethnographic data, 4. the relative lack of archaeological survey and excavation for the area of concern, 5. the potential for bias and misunderstanding of historical information pertaining to First Nations people, and 6.) the early diffusion of the potato (*Solanum tuberosum*) into the area (Brown 1868; Suttles 1987a) and the consequent potential for confusion. These issues will be addressed briefly in the following discussion, which critically reviews pertinent ethnographic information and contextualizes historical data.

Language

Halkomelem is a Central Salish sub-family language existing as a "long continuum of intergrading dialects showing considerable diversity, but with mutual intelligibility throughout" (Thompson and Kinkade 1990:37). There are three dialects, referred to as Chilliwack, Musqueam and Cowichan by Thompson and Kinkade (1990:35), and frequently as Upriver, Downriver and Island dialects (Gerdts 1977:17; Suttles 1990:453-454). The three dialect divisions are more or less in consonance with cultural and ethnographic divisions presented by a variety of researchers (see Duff 1952; Mitchell 1971 and 1990; Suttles 1990). Suttles (1998) discusses the difficulties the different Halkomelem dialects presented the English speaking recorders of *The Fort Langley Journals* when they recorded native group names. Prominent among these is the substitution of the sound *l* in the upriver dialect for the sound *n* in the Downriver and Island dialects (Thompson and Kinkade 1990:37). Figure 17:2 shows the Salishan languages of the regions adjacent to the Fraser Valley study area, plus the three-part dialect division of the Halkomelem language.

Table 17:2 contains a short-listing of Coast Salish and adjacent neighbouring language words for *S. latifolia* and *Solanum tuberosum* in various Northwest Coast native languages. The list of words provides a preliminary glimpse at the potential value that linguistics study has to further archaeological research focused on wapato. For more details regarding the words see Spurgeon (2001). In the following commentary the number(s) enclosed in square brackets [#] corresponds to the number given each word listed in Table 17:2.

Wapato [1] is the Chinook Jargon trade language word for potato. This Pidgin language was used along the coast from the California/Oregon border to the Alaskan Panhandle at least since the time of contact with Europeans. Chinook Jargon, which has vocabulary accretions from indigenous native languages of the area, as well as French and English, should not be confused with Native American Chinookan languages (Thompson and Kinkade 1990:41). Wapato as a jargon word for potato has a similarity with the Spanish words "batata" or sweepotato and "patata" or potato. It is not always clear from the literature whether wapato refers specifically to *S. latifolia* or *S. tuberosum* – the domesticated Irish or white potato. Today, it is generally conceded to refer to both, the latter having more or less replaced the former after its early introduction to the region (Suttles 1987a). Brown (1868:379), referring to *wappattoo (S. sagittifolia*), states " Since the introduction of the potato the use of the roots of the *Sagittaria* has much declined, and the name is now trans-

Table 17:2. Wapato Glosses.

1. wapato - Chinook Trade Jargon; also known as *S. latifolia*, Indian potato, arrow leaf, duck potato, swamp potato, wapatoo; also reported as wap'to (Le Jeune 1924).
2. x^{w}aq'^{w}o_l_s - a distinct word for *Sagittaria latifolia* used by Katzie (Suttles 1955:27).
3. sq__w_ - what visiting tribes to Katzie area called wapato (Suttles 1955:27).
4. scous or skous - Halkomelem for wapatoes or *Sagittaria latifolia* (Duff 1952:73).
5. skă_us - northern Straits, Halkomelem, Nooksack, word for tuber (Suttles 1987a:142).
6. sqéws - Lummi (Suttles 1987a:144).
7. sqáwc - Samish, Klallam and Northern Puget Sound (Lushootseed) (Suttles 1987a:144).
8. ska_us or ska_wec - Southern Straits, Klallam and Samish (Suttles 1987a:143).
9. s-qawc or sqaúc - Squamish for potato (Kuipers 1970:65).
10. s-qawc - Mainland Comox for spud, potato (Davis 1968:84).
11. skawi_s_l'_ - derivative word for the whole *Sagittaria* plant (Suttles 1987a:143).
12. s.píq^{w}uc or s.páyq^{w}uc - Puget Salish for potato; arrowhead plant, wapato (Hess 1976:340).
13. sp_q__ c - Twana for arrowhead or wa_p_tu (Elmendorf 1960).
14. q'^{w}aß/q'^{w}úl's or q'^{w}_ß/q'^{w}úl's - Nlaka'pamux Interior Salish for *S. latifolia* (Turner *et al.* 1990).
15. s-qawc - Lillooet (van Eijk 1997:246).
19. sqig^{w}c - Coeur d'Alene from qig^w "dig roots" reconstructed as s-qawc (Kuipers 1970:65).
20. qa.wac - Nootka for potatoes (Sapir and Swadesh 1939:292).
21. ska_w_s - Nootka word for potato (Suttles 1987a:143 from Dr. Morris Swadesh) - in error.
22. skow-sh_ t - Haida word for potato (Dawson 1880:113B in Suttles 1987a:143).
23. _wa - Klamath for root (wild potato or *S. latifolia*) and potato (Barker 1963:80, 524-5).
24. ma'mptu - Tualatin branch of Kalapuyan word for *S. latifolia* (Zenk 1976:85 in Darby 1996:63).
25. ma_mpDu - Tualatin or Wappato Lake dialect of Kalapuya for wild potato (Jacobs 1945).
26. páapa - Lake Miwok (Penutian) for potato (Callaghan 1965).
27. wáala - Lake Miwok (Penutian) for Indian Potato (*Sagittaria latifolia*) (Callaghan 1965).
28. wakxa't - Wishram word for wapato (Spier and Sapir 1930:183 in Darby 1996:66).
29. tuk-hát or tuk´-hut - Chinook for wappatoo root (Gibbs 1863).
30. káßwats - Quileute for potatoes (from Chinook Jargon), (Powell and Woodruff 1976).
31. _síßxa_ - Quileute for root (edible), (Powell and Woodruff 1976)

ferred to the potato." Suttles 1987b:138-9) suggests several possible early sources for *S. tuberosum* on the Northwest Coast, all attributable to the presence of Russian, English and Spanish maritime explorers prior the close of the 18th century and to fur-traders early in the 19th century. There are no reported accounts, which discuss the possible influx of potatoes to the Coast Salish area through native trade prior to these early white contacts. This is in contrast with *S. latifolia*, which was widely traded by native peoples living along the Fraser and Columbia Rivers.

The existence of distinctively separate words, x^{w}aq'^{w}o_l_s and q'^{w}aß/q'^{w}úl's or q'^{w}_ß/q'^{w}úl's [2 & 14] for wapato in the Thompson and Katzie areas may be significant as indicators of where *S. latifolia* grew and as words that existed before the more common *scous* or *skous* [4] variants and *wapato* [1] terminologies arrived.

There are numerous words, which appear similar to sq__w_ [3] and include all of [4, 5, 6, 7, 8, 9, 10, 15, 19, 20 & 21]. These encompass an area, which includes Howe Sound, the Fraser Valley, Vancouver Island, Puget Sound and the Gulf Islands, Lillooet and Northern Idaho. Kuipers (1970:65) notes an etymological similarity for [9 & 19] which involves Squamish and Coeur D'Alene, both Salish languages separated by some distance. Hess (1979) has reported the wavelike nature of the distribution of native words for *deer* in much of the same territory in which *wapato* words based on sq__w_ [3] variants indicate similar patterning. He suggests that Halkomelem, as a centrally located Central Coast Salish language, served as the originator for the spread of the different words for *deer* (Hess 1979:10). The role of Halkomelem speakers of the lower Fraser in river trade has already been noted, and this is consistent with the middlemen role speculated upon by Hess (1979:16) when he suggests that Halkomelem may have been "quite widely known - perhaps as an incipient pidgin, parallel to the case of Chinook along the lower Columbia River." A similar development for *wapato* words should not be surprising for the Halkomelem dialects and those other languages in the Gulf of Georgia and Puget Sound areas immediately adjacent to the Halkomelem speakers.

The use of the word *wapato* is related to trade and was generally applied to both *Sagittaria latifolia* and *Solanum tuberosum*, particularly in more recent times. Given the nature of Chinook Trade Language trade would have facilitated cross-language communication and the associated passage of native language variants between adjacent dialects and close language neighbours. The movement of wapato throughout the Halkomelem area down the Fraser River and across the Gulf of Georgia, up the Fraser River to Lillooet and Thompson country, and into Howe Sound to Squamish is evident in the word morphology similarities. There is no similarity in word morphology between the Fraser River associated languages and those of the Columbia River groups [24 & 25], the other well known *S. latifolia* growing and trade area. For more distant language groups there is little word morphology similarity in evidence which may be a function of Chinook Trade Jargon usage and limited contact due to distance from the Fraser Valley. The lack of similarity suggests differing native language origins for *wapato* words for these distinct areas, a problem made more difficult to resolve with the advent of the Chinook Trade Jargon and the rapid spread and common use of the term "wapato."

Quileute [30] and Nootka [20 & 21] words for potato appear similar. Suttles (1987a) indicates the Nootka word [21] is in error, but the similarity of the Nootka word [20] to the Lushootseed word [7], the Southern Straits [8], Squamish [9] and Mainland Comox [10] words is apparent. All of these languages are immediately adjacent to Halkomelem, and in the case of Nootka perhaps provided the language link to Quileute via the Olympic Peninsula and the Makah, or alternatively the adjacency of Lushootseed and Straits may have influenced the Quileute usage.

While not strictly a language problem, 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 likely refer to wapato as *Sagittaria sagittifolia*, 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 form of the plant. Coupled with the variable native language words and meanings when referring to wapato and potatoes, the issue is further complicated.

There are several other tuber species in the Pacific Northwest that are frequently 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), Broad-Leaved Starflower (*Trientalis latifolia*) as "Indian potato" (Pojar and MacKinnon 1994:322), and the Yellow Avalanche Lily (*Erythronium grandiflorum*) as "Indian potato" (Turner *et al.* 1990:121). The potential for confusion is obvious where proper botanical nomenclature is not used in conjunction with common names. It is likely that linguists and ethnographers frequently confused these species with wapato. Table 17:3 lists these species with the native language word for each. Fortunately, it appears that the native language words for these species are distinct from those related to wapato. It can only be hoped that ethnographers and other historic recorders accurately documented native language words so as to preclude this kind of confusion.

Bias

Recognition of bias is an important consideration in critically reviewing available information. 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 there is often a counter-charge that it is not the original research that is at fault, 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"; and 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 in line with his or her commitments (Hammersley and Gomm 1997:1.1).

Communication in the form of verbal accounts, written records and observed behaviour is the basis upon which the historic and ethnographic information researchers use was recorded. Communication implies something in the way

Table 17:3. Native Language Names for Selected Species of Food Plants.

Common Name	Botanical Name	Native Language Word	Source
Spring Beauty	*Claytonia lanceolata*	skwe_kwí_em (Okanagan-Colville)	Turner *et al.* 1980:113
Mariposa Lily	*Calochortus macrocarpus*	/m_q_=ú[_]pe_ (Thompson)	Turner *et al.* 1990:119
Broad-Leaved Starflower	*Trientalis latifolia*	/ciq^{w}=ó[q^{w}]pe_ (Thompson)	Turner *et al.* 1990:245
Yellow Avalanche Lily	*Erythronium grandiflorum*	s/k-ém-ec (Thompson)	Turner *et al.* 1990:121

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 of 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 at least includes an informant and a recorder, (leaving out the ultimate user for the moment), some of the problems are:

- recorder qualifications - writing ability, language understanding
- recorder and informant comprehension - what is really meant?
- informant knowledge and biases - gender, width of view (family, community) and validity
- informant distance in time from the activity being recorded
- distance in time the recording takes place from the activity being recorded
- translation problems - is a potato a potato?
- do informants intentionally mislead or are they misinformed?
- do recorders inject their biases and is the research itself biased?

Glavin (2000) 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." Such questions pertaining to Katzie traditional territory are examined elsewhere (Driver and Spurgeon 1998).

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 floral analysis are less evident. Faunal analysis is more prevalent than botanical analysis that is only 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 west 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, as is evident in the emergence of paleoethnobotany on the Northwest coast (Lepofsky 2002; Lepofsky *et al.* nd; Loewen 1998; Lyons 2000).

Ethnography and History

The potential entry of myriad biases into the historic and ethnographic record regarding wapato must be accounted for. There are a host of identifiable entry points for misleading information or bias to come into play when studying wapato in Katzie territory. It is useful to address the numerous historic changes since contact that have influenced our present knowledge of wapato use and our confidence in using the direct historical approach and ethnographic analogy as methods to infer prehistoric practices. Table 17:4 presents post-contact influences, which have regionally affected our modern understanding of this plant resource.

Table 17:4 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

Table 17:4. 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 19th century, ending by 1930. Mainly second growth left, large forest fires burned remainder, ending logging.
Agriculture	Mainly since dyking - reduced access, increased biotic disruptions.
Dyking	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/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

to or loss of archaeological sites. Represented in the table is an almost continuous series of impacts with both one-time and cumulative affects 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 coupledwith the relatively late or, depending on viewpoint, recent gathering of ethnographic data (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 (1987a:16 footnote 2) notes that personal recollections of the oldest informants did not date back earlier than the 1870s and 80s, a situation that raises questions 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 1827-30 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 (1987b:145) suggests that in addition to meeting their own food needs the natives also grew them because they had cash value at nearby trading posts. In contrast, the Fort Langley Journal (Maclachlan 1998:112) notes potatoes (*S. tuberosum*) from the Fort being used as payment to native labourers in May 1829. Brown (1868:380) notes that native grown potatoes (*S. tuberosum*) commanded higher prices, even from white men, than any other potatoes. More discussion of the impacts can be found in Spurgeon (1998a).

A factor further complicating our knowledge of wapato is the aforementioned rapid influx of the common potato (*Solanum tuberosum*) following first contact with Europeans as documented by Suttles (1987a). 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.

Analysis of the following quotation illustrates 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 original George Barnston quote from "The Fort Langley Journals 1827-30" (Maclachlan 1998:40) appears in different sources. The handwritten 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 summer. 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 most recent version of the quote from Maclachlan (1998:40) appears as follows:

> 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.

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 up-river (Suttles 1987b: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.

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)

Paleoethnobotany

It is widely reported in archaeobotanical literature that charred tuber remains are difficult to identify in archaeological contexts (Hather 1991), and that tubers as food may "leave little waste and are rarely burned" (Ford 1979:300). In part, Hather (1991) attributes this situation to the lack of a developed identification methodology. Pearsall (1989:165) notes that in spite of their prehistoric subsistence importance, macroremains of underground storage organs are sparse. She attributes this to problems of preservation and identification difficulties.

In his study of Near Eastern grass seeds, Nesbitt (1997:181) notes three reasons for the importance of charring studies in archeobotany. First, he indicates that some seed characters (for example: color, appendages, relief) may no longer be visible on charred remains. Second, he states that some seed characters may remain visible but become distorted. Finally, some seeds are less likely to survive and will thus be underrepresented in the archaeological record. Pearsall (1989:440) attributes difficulties identifying charred remains to the species level to charring often destroying delicate structures and distorting specimen size and shape. Nevertheless, she (Pearsall 1989:173) states that "by studying the overall form of root or tuber material, external characteristics, anatomical structure, or a combination of these , it is often possible to identify archaeological material."

A survey of the more recent charring experiment literature reveals that charring experiments have not focused upon wapato or other tuberous plants but on seeds/fruits. Hather (1993) provides an example of wapato tuber charring aimed at the identification of parenchymous tissues, although he used *S. sagittifolia* not *S. latifolia*. The study is specifically intended as a guide to identifying a variety of charred parenchymous tissues.

Archaeology

The traditional territory of the KFN contains several excavated archaeological sites: Carruthers (DhRp 11 - Crowe-Swords 1974); Pitt River (DhRq 21 - Patenaude 1985); Telep (DhRq 35 - Peacock 1981); Port Hammond (DhRp 17 - Smith 1903) and Park Farm (DhRq 22 - Spurgeon 1984, 1994, 1996, 1998b). Paleobotanical remains were specifically looked for in the last four excavations listed but none were found there or in the other excavations.

Elsewhere, several reported instances for the archaeological presence of *S. latifolia* or *S. sagittifolia* are noted. In Poland, Kubiak-Martens (1996) reports the presence of the latter species at the Calowanie site. Neuman *et al.* (1989) report the possible presence of Sagittaria species in coprolites from the Dryden Cave site in Colorado. At the Duwamish Number 1 site in Washington state Stenholm (1987) reports the occurrence of what she calls PET (possible edible tissue) which may well turn out to be wapato. Melissa Darby (pers. comm.) has indicated that wapato is present archaeologically in the Columbia River area. Essentially, there has been very little archaeological work addressing wapato, this in part attributed to the lack of an identification methodology (Pearsall 1989) and the still uncommon inclusion of paleobotanical methods in research designs (Lepofsky 2002).

Environment

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 ethnographies. In order to better understand the present day climate of the Pitt Polder area, especially for the colder months, a regular weekly set of qualitative and quantitative measurements was recorded at six locations for the 69-week period between December 11, 1997 and April 04, 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 than that experienced in the last decade.

The information recorded included: date, time (local), water temperature, air temperature, general sky condition, precipitation, wind, water level fluctuations (to record seasonal, tidal or dyking/pumping influences) and for flowing water locations *i.e.*, Blaney Creek, the current direction. The recording sites are all located in the Pitt Polder, north of the North Alouette River. The sites were selected judgmentally after a lengthy period of familiarization and observation based upon access, maximizing coverage of the Polder area and providing a mix of inside/outside the dike system sites. The distance from the more southerly - Blaney Creek, to the northernmost - Grant Narrows is only 8.9 kilometres. 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 17:5 and 17:6.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 observations taken during this period over parts of three years, the resulting water and air temperature ranges being shown in Table 17:5. During the 42 observations 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

Table 17:5. Selected Water/Air Temperature Ranges October through March - Degrees C.

	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

air temperatures that I felt did not encourage wading in the water. Several instances of ice-covered water were also noted.

The general pattern of warm summers and cooler winters is evident in Figure 17:7. 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 pattern is consistent with the expected wetter winter period. The cooler temperatures of the wapato harvest period 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, my hands rapidly stiffened and tolerable exposure times were very short.

Finding Wapato

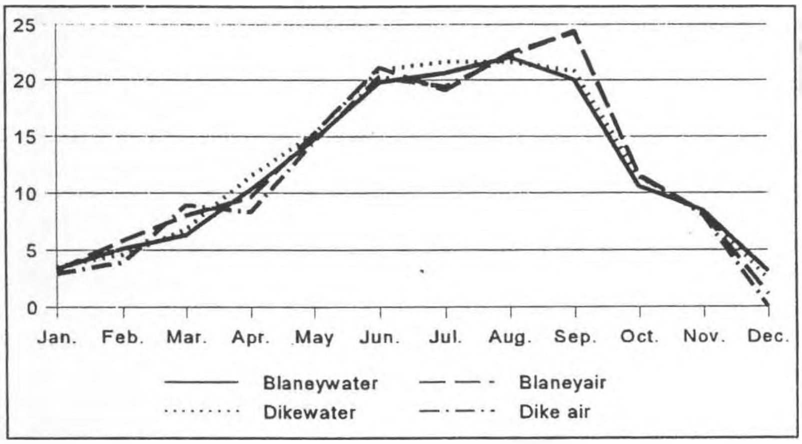
During 1998 I recorded wapato patches on the banks of the Fraser and Pitt Rivers, the lower reaches of Blaney Creek, the North and South Alouette and the Alouette River main channel below the forks. Wapato is also present on the Pitt River fronting IR4, in Widgeon Creek and slough and on Siwash Island. 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 km was surveyed by foot and canoe. Ongoing reconnaissance continues to reveal new 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 typical of those behind dikes. Marburger (1993:250) indicates wapato grows in inland and coastal freshwater marshes, around the margins of lakes andponds, 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) has 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 14-15 times as many achenes as those growing in hard-packed clays. She further notes that above and below ground plant biomass is higher in sandy loam sites than in silty clay sites along the Mississippi River.

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 fluctua-

Table 17:6. Monthly Average Water/Air Temperatures - %C. Observation period from 1 Apr. 98 to 31 Mar. 99 - 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	8.0	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	22.0	22.4	21.6	22.1	-	-
September	5	20.0	24.3	20.8	24.4	17.5	22.0
October	4	10.6	11.6	11.4	11.5	12.9	11.6
November	5	8.4	8.2	8.2	8.0	9.3	8.0
December	4	3.1	1.1	2.4	0.0	4.8	0.75

Figure 17:7. **Average Monthly Water/Air Temperatures Degrees C.**



ions 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 17:8 shows reported wapato sites from Suttles (1955: Table 1, Map II) and those wapato patches observed by Spurgeon 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 3in 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 pp. 27 in Suttles 1955).

Based on my observations the notion that wapato remains hidden below ground if not extensively cultivated, is not correct. This false view is likely the result of several factors that once understood render wapato easy to find. These include 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 hidden below ground level making it important to have knowledge of the patch locations to effect the fall/winter tuber harvest, 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 protect immature foliage from predation. Familiarity with the location of patches is necessary to facilitate fall/winter tuber harvesting, a time when the distinctive foliage would no longer be in evidence. Planning around high and low tides is another complication that required attention as the lowest tides are not always conveniently present in daylight hours or during the season of interest. To not properly plan these activities would potentially lead 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 minus 8 to plus 13 degrees centigrade and water temperatures fall between minus 1.0 to plus 15.0 degrees centigrade (see Figure 17:6), a rather cool mix for wading. 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 that perhaps the many conditions and impacts attendant upon successful cultivation and harvest of wapato rendered the popularity of the introduced common potato (*Solanum tuberosum*), inevitable.

A final word on harvesting methods is 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. The natural detritus contained in the substrate further complicates this difficulty. It simply may be that the substrates in pre-diking times were less compacted and were not so fouled with modern detritus easing the

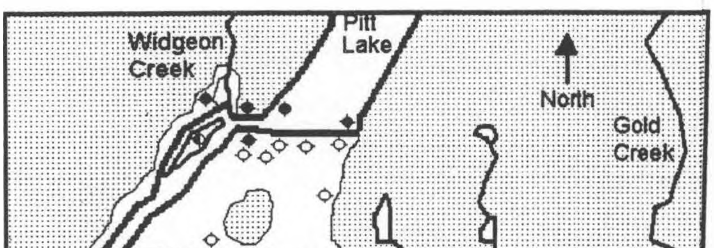


Figure 17:8. **Wapato Locations.**

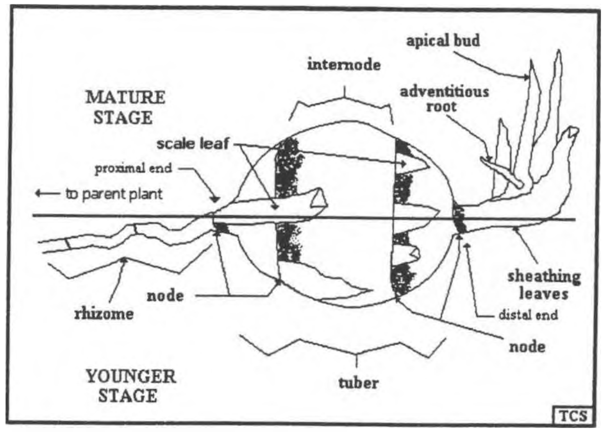
effort required to dig with toes. Furthermore, several attempts have been made to pull tubers from the substrate using the above ground foliage for gripping. In all instances the foliage has been torn away with no movement of the buried tubers evident. Again the nature of the modern substrate may preclude 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 1987b:137 in reference to *S. tuberosum*; Turner 1979:33), there is little likelihood of such tools surviving in archaeological contexts unless waterlogged conditions exist.

Identifying Charred Wapato

Based on much of the foregoing plus the noted lack of an identification methodology it seems prudent to establish a preliminary model for finding and identifying wapato remains. The experiment reported here was concerned with charring wapato tubers in a variety of heat and temporal regimes to ascertain if any remains might be expected archaeologically and the form such remains might take. Reference should be made to Spurgeon (2001) for all the details of the experiment that cannot be presented here due to space demands.

Archaeological macro-remains of roots and tubers can be identified based on external characteristics, anatomical structure or a combination of both (Pearsall 1989:173). If the shape of macroremains is not distorted by charring, and not all seeds and fruits are distorted badly, then differentiation based upon shape should still be possible (Pearsall 1989:440). Some features of gross morphology may be preserved to aid in identification. Features such as "nodes, scars left by the detachment of rhizomes, stolons, roots, scale leaves, buds, petioles and other aerial parts" may be of use for macroscopic identification (Hather 1993:5). Other identification criteria used by Hather (1993:4-8) for charred tissues include character of the parenchyma, charcoal colour, lustre and hardness, surface characteristics and cavity patterning. See Figure 17:9 for details of wapato tuber morphology.

The main variables associated with charring are time or duration of heating, the temperature achieved and whether the charring atmosphere



- younger stage shows tuber just after harvest.
- mature stage shows tuber breaking dormancy.

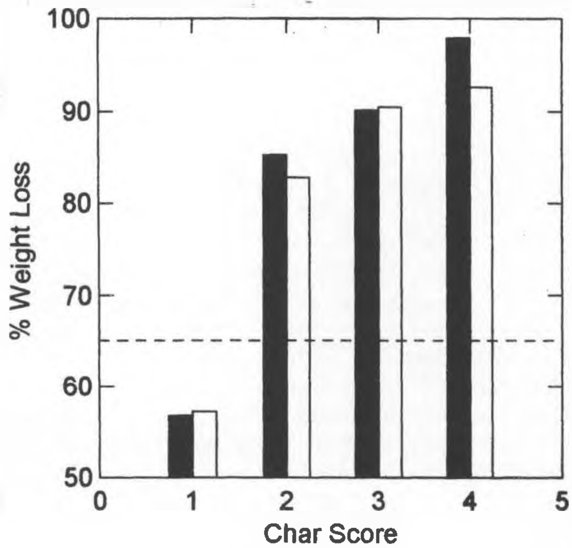
Figure 17:9. **Wapato Tuber Morphology (after Brayshaw 1985:47, Sculthorpe 1967:344, and Turner 1995:37).**

is oxygen rich or reduced. In addition to duration, final temperature and oxygen available, Smart and Hoffman (1988:172) indicate that for wood (they include a variety of plant tissues in the wood category) size, moisture content and tissue chemical composition are all factors in the outcome. Prolonged heating at higher temperatures produces only ash, while too short a period of heating will not result in charred remains that have the potential to be preserved in archaeological features. Temperatures ranging from 150^0 C to 250^0 C are reported as the region of onset for morphological changes in ancient and modern cereal grains based on comparative Electron Spin Resonance spectroscopy studies (Hillman *et al.* 1985:57). Smart and Hoffman (1988:172) indicate that charring can occur at temperatures below 200^0 C given enough time. In the range ca. 200-280^0 C they note "thermal decomposition produces primarily noncombustible gases and char." At temperatures above these thermal decomposition produces flammable gases, tars that burn when enough oxygen is present resulting in less char and more ash (Smart and Hoffman 1988:172). There is a linkage noted between temperature and charring period according to Hather (1993:viii). A possible confounding factor is whether the charring atmosphere is oxygen rich or reduced - a rich atmosphere produces complete burning of combustible plant remains, whereas oxygen reduced conditions at the base of a fire prevents complete combustion.

Wapato tuber charring was conducted under controlled laboratory conditions using a Thermolyne Type 30400 Furnace, rated at 5500 watts that employs a single temperature set point controller with a temperature range of 204^0 C -

982%C. In this instance randomly selected tuber pairs were subjected to temperature regimes of 200, 250, 300 and 350%C. The durations for each of the four temperature regimes were runs of 30, 60, 90 and 120 minutes. This experiment accounts for atmospheric variation by heating tubers in both ambient and reduced furnace conditions to determine the regime(s) likely to produce useful charred remains. To test reduced regimes several researchers have simply covered the subject crucible or placed the specimen in sand or wood-ash (Boardman and Jones 1990:3; Goette *et al.* 1994:12; Hather 1993:ix). Fine washed dry sand is used as the reducing agent in this experiment. Thus, there were sixteen runs involving 32 moist tubers with each run heating a sand covered and an uncovered tuber.

A variety of data was recorded before and after the tuber charring. After charring the resulting remains were assessed for charring extent. Charring extent was scored as 1 for incomplete (not completely turned to charcoal) , 2 for complete (completely turned to charcoal), 3 for some tissue ashing or destruction (some charcoal turned to ash), and 4 for complete ashing (all ash, no charcoal, very fragile). Each crucible with its contents was weighed after cooling. This result subtracted from the pre-heating weight gives an indication of tissue and moisture loss. Remains permitting, details of their general morphology such as fragmentation or tissue loss were recorded for each tuber. Figure 17:10 shows Char Score plotted against Percent Weight Loss for all 32 of the tubers.

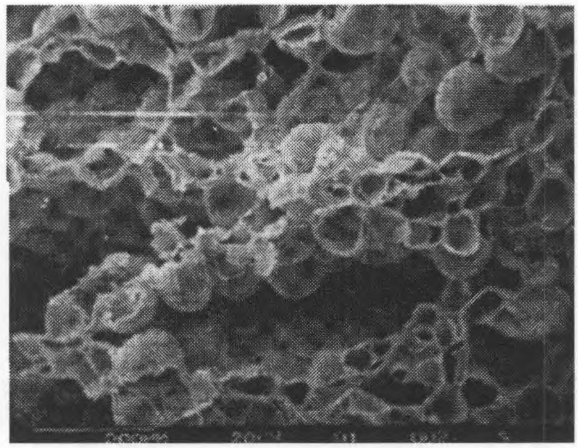


Charring Environment ■ Ambient □ Reduced

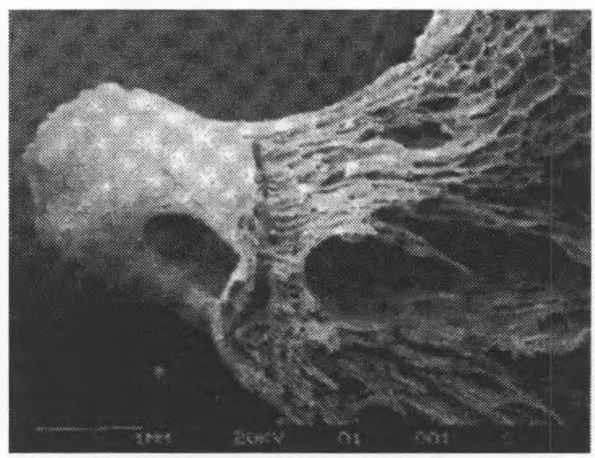
Char Score 1 incomplete charring
2 complete charring
3 some tissue ashing or destruction
4 nearly complete ashing

-----------------% water content of wapato tubers

***Figure 17:10.* Wapato Tuber Charring showing the per cent of Weight Loss and Char Score.**



A.



B.

***Figure 17:11.* SEM Photomicrograph of Charred Wapato Tuber.**

Perusal of the data reveals that the charring results using wapato tubers are generally consistent with the time/temperature/results as described by Smart and Hoffman (1988). Lower temperatures and times produced incomplete charring while the higher temperatures and longer times resulted in complete charring and

Figure 17:12. **Low Power Microscope Image of Charred Wapato Tuber (nodal line at 20X).**

at the higher extremes ashing or destruction. For specimens that were not completely ashed or consumed it was found that the tubers retained their general shape with some shrinkage.

At the shortest time/lowest temperature end of the scale tubers were caramelized but not charred and a characteristic caramel/molasses smell was noted. It is possible the caramelized or partially ashed remains would survive in archaeological deposits, although the more fragile ashed parts or the partly cooked inner tissues would probably not last for long periods. The heat hardened outer portions of some of the caramelized tubers would likely have the best survival potential. The tubers that were completely ashed were very fragile and deemed unlikely to leave any preserved macroscopic remains archaeologically. Due to their fragility it was difficult to record some parameters.

Of note, while preparing the charred remains for SEM and photomicrography it was found that the completely charred tubers were quite robust. To have an uncrushed or relatively undamaged surface to photograph it is necessary to snap the whole tubers in half. Cutting them would crush or otherwise damage the surface. In the event, whole tubers grasped in fingers and snapped were found to be not all that easy to break. This may give some small measure of the tubers potential to survive in the archaeological record. Attempts to snap whole tubers even a year after they were charred produced a similar result. Of course the partially or completely ashed tubers were much more fragile.

The charring experiment answers questions regarding the potential to find identifiable charred wapato tuber remains in archaeological contexts. Charring wapato tubers in a controlled environment where the remains are easily recovered makes it possible to observe the morphological characteristics of the resulting charred remains. At the same time the temperature/time conditions conducive to the experimental production of charred tuber remains can be evaluated. Using SEM, low power microscopy and naked eye observation it is apparent that charred wapato remains can be identified on the basis of generalized shape, charred tissue lustre, features of the tuber nodes, internal structure patterning and parenchyma tissue similarities with comparative specimen. Figure 17:11A, B show SEM images of internal parenchymous tissue and the apical bud emerging from a charred tuber. Figure 17:12 shows a low power microscope image of the nodal area of a charred wapato tuber. A similar nodal area in detail is shown in SEM imagery in Figure 17:13 A, B. Scale leaf remains are visible in 13A as are the scale leaf vein/stem entry perforations in 13B. The general shape of the charred tuber remains and presence of nodal characters can be used to eliminate other tuber, bulb and corm species in the study area that might be confused with wapato. Charred tuber remains can be compared to the published results of others to determine similarities in morphology where possible. The final results can be used along with ethnographic information to construct a model for the archaeological preservation of wapato remains and contexts that subsequently can be field-tested. The charring experiment results indicate that one can expect identifiable wapato tuber remains in archaeological contexts given the vagaries of taphonomic processes.

Archaeological Model of Wapato

The archaeological model for finding wapato in the area of the Pitt Polder and adjacent higher ground is constructed around the availability of relatively dry conditions underfoot for processing, the availability of firewood and rock, the likely plant tissues to be processed and the potential for providing shelter from the winter period elements. Integral to the model building is the critical and contextual analysis of pertinent ethnographic, historic and environmental information. Given that wapato was likely widespread in the lowland area prior to the advent of diking and the existence of numerous waterways providing ready access from camp and village sites, it seems reasonable to conclude that access was not a major challenge even during the winter period when the tubers were available.

The relative paucity of usable high ground that is not bedrock indicates that the highland areas rising similar to islands in the lowland were of major significance for food processing. Indeed, it is likely these areas were significant for many other purposes as well. Prehistorically, or at least pre-diking, dry conditions for earth-oven cooking and the potential to erect shelter would best be found on the elevated areas of the Pitt Polder. Food processing sites involving holes in the ground or plant materials harvested during the winter are probably located on higher ground.

Several of the higher elevation areas such as Sheridan/Menzies Mountain, Swaneset and Little Pine/Big Pine provide rock supplies for hearths and heating elements and were likely wooded making the gathering of firewood easier than in the wet lowland areas. While rock is less prevalent in the vicinity of the adjacent higher ground of Maple Ridge and Pitt Meadows it was not too Distant. It is probable that these locations had tree cover, a source of firewood.

It is likely that the only remains of *Sagittaria latifolia* to be preserved will be pieces of charred tubers. Other parts of the plant were less likely to have been preserved through charring. The achenes have some potential to enter the site (Minnis 1981) and be charred. Several tubers were allowed to air dry during my research, and a year later were still intact and extremely hard such that a pressure from a thumbnail barely dents them. Storage caches of dried wapato might be found in village sites.

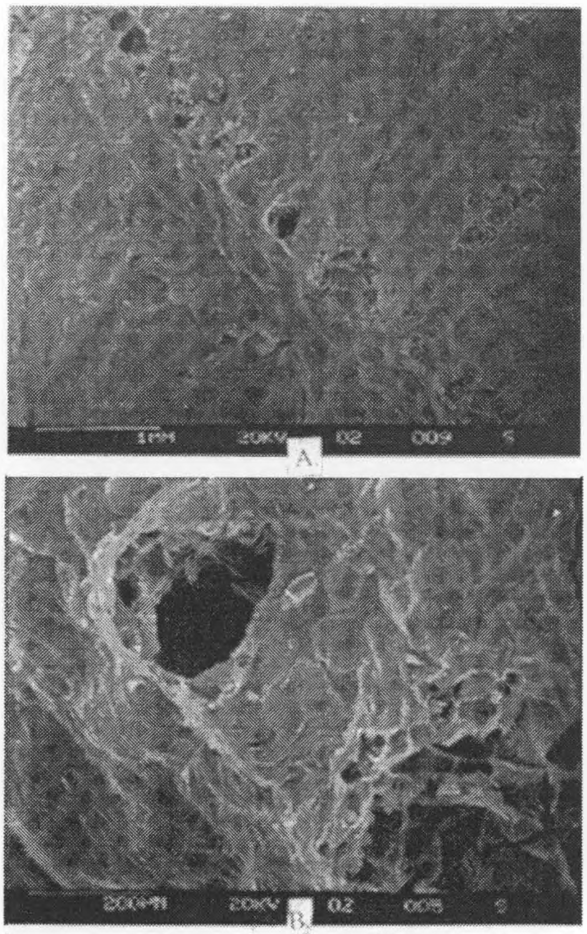


***Figure 17:13.* SEM Photomicrograph of charred Wapato Tuber.**

Although directed at Katzie territory, the model has elements applicable elsewhere. Identification parmeters for charred wapato were established by the charring experiment and can be applied in other locales. Perhaps not all elements of the model are applicable or available elsewhere, but certainly each has its appropriate place in archaeological research.

Summary

Hodder (1991:151) says we can only understand the human world through asking questions of it. Interpretation and understanding in his view emanate from an endless spiral of asking logical questions and seeking logical answers. Just as Hodder (1992) employed the notion of an hermeneutic spiral, I have experienced a journey of several years along a critical and contextual spiral to arrive at a better understanding of wapato. Movement along the spiral is bi-directional and in fact the spiral I have negotiated has two strands. One strand has lead to the clarification of many issues pertaining to wapato use and set the stage for future wapato research by developing an archaeological model for the prehistoric occurrence of wapato and establishing a methodology for the identification of charred wapato remains. The other spiral strand has simply reemphasized the value of conducting in-depth critical and contextual analysis of relevant ethnographic, historic and environmental information to achieve clearer and more accurate interpretations.

The double spiral has led to a number of conclusions pertaining to the original research and leaves us with additional questions warranting more journeys along the hermeneutic spiral Charred wapato remains from archaeological sites can be identified using the methodology developed. Notwithstanding, while wapato is often mentioned in local archaeological reports such remains are as yet to be identified. Wapato has been affected by diking in the Pitt Meadows Lowland/Pitt Polder area such that it is no longer found at ethnographically identified locations that are within the dike system. This could be the case elsewhere in the Fraser Valley. In terms of "Fact, Fantasy and Fiction" of the title, enough has been learned to put most information and ideas about wapato into the appropriate category.

CHAPTER 18

Clocks, Lamps, Cups and Stuff: Nineteenth Century Ceramic Use Among the Heiltsuk

ALEX MAAS

Introduction

This study provides an analysis and interpretation of a 19th century ceramic assemblage from Fort McLoughlin-Old Bella Bella (FaTa 4), a Heiltsuk-European contact site on the outer Central Coast of British Columbia. Fort McLoughlin, a short lived Hudson's Bay Company fur trade post built in 1833 on Campbell Island in Lama Passage and abandoned ten years later in 1843, was the impetus for the coalescence of the Heiltsuk community known as Old Bella Bella. The community grew up around the fort and survived its abandonment by almost 60 years. European trade goods, including ceramics, were available through the Hudson Bay Company and other suppliers throughout the history of the community. Excavated in 1982 by Philip Hobler, the assemblage under examination is comprised of ceramics recovered from three separate components at Old Bella Bella: the fort compound, a traditional Heiltsuk house, and a later small single family Heiltsuk house (Hobler et al. 1983). The overall objective of this study is to use this assemblage as a database from which to examine inter-ethnic dynamics and the processes by which European goods were adopted and integrated into traditional Heiltsuk society.

The Central Coast, specifically that area of coastal British Columbia between Douglas Channel to the north and Rivers Inlet to the south is approximately 240 km in length (Figure 18:1). Archaeological interest in the area began with Drucker's surveys and excavations in the late 1930's. It has continued and intensified, particularly in the last two decades, with work done by researchers associated with Simon Fraser University and others (Drucker 1943, 1950; Apland 1974; Hill and Hill 1974; Carlson 1976; Hester 1978; Luebbers 1978; Pomeroy 1980; Hobler et al. 1983; Streich

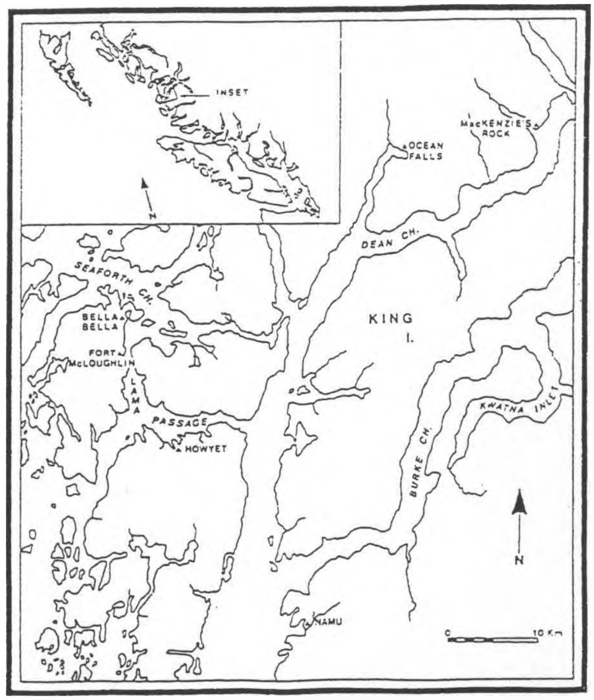


Figure 18:1. **Excavated Central Coast Sites.**

1983; and Cannon 1989). A number of these investigations have identified historic components and several have produced ceramic collections. Notable in this context are the excavations done by Carlson (1976) and Hobler et al. (1983, 1989) in the Bella Coola and Bella Bella regions and Prince's study of Hobler's excavation data from Kimsquit [this vol.]. Despite the body of work already accumulated, little research pertaining to the specific study of ceramics has been done for the Central Coast, and archaeological collections of ceramics from the area have remained largely unexamined. This study attempts to provide an initial contribution to such an analysis.

Of particular relevance to this study is the work of three researchers: Richard Lueger (1981), Louise Jackson (1991), and Yvonne Marshall (1993). With this work, a pattern for the incorporation of 19th century ceramics at contact sites has begun to emerge and the potential of ceramics for archaeological interpretation is beginning to be recognized.

Lueger's (1981) study of the ceramic collection from the village of Yuquot on the west coast of Vancouver Island is based on excavations at Yuquot in 1966. Two distinct historic components were found. The first dates to the Spanish occupation of the site in 1789 when it had been abandoned by the Nuu-chah-nulth. This component included Mexican Majolica and coarse Hispano-Mexican earthernware. The second component, which is more similar to the Old Bella Bella collection, represented the Nuu-chah-nulth reoccupation subsequent to 1795 and consists in large part of late 19^{th} and early 20^{th} century tablewares from Britain and, to a lesser extent, other parts of Europe (Lueger 1981). Through ceramic analysis Lueger was able to confirm, archaeologically, the presence of the 18^{th} century Spanish garrison, and show transitions in the domestic and social lives of Nuu-chah-nulth communities in the 19^{th} and 20^{th} centuries.

To the north in southwestern Alaska, Jackson (1991) reanalyzed ceramic collections from six sites excavated in the 1960s (Oswalt and Vanstone 1967; Townsend 1970; Oswalt 1980). The Alaskan ceramics are also late 19^{th} and early 20^{th} century wares. As stratigraphy was shallow at the Alaskan sites, the authors hoped to use British ceramics to establish a chronology and a settlement pattern. Further, they hoped to examine changes in First Nations technology.

At the time of the original investigation in the 1960s, comparative material for the identification of ceramic patterns had not yet been collected, and analysis of the sherds did not progress beyond initial classifications into ware types. Two decades later Jackson (1991) was able to identify the sherds according to a system of decorative types and pattern designs and to establish both a chronological and interpretive key to explain settlement patterns and cultural dynamics.

Yvonne Marshall (1993) made surface collections of ceramics from 17 Vancouver Island sites in the Mowachaht and Muchalaht areas, and established a ceramic chronology for the sites based upon 19th and 20th century decorative types. Her examination of vessel function also mirrored the interest in ceramic selection and use that was a part of the previous studies. As a direct result of this approach, these studies were able to examine cultural dynamics and lifestyles through the analysis of ceramic refuse.

The Problem

For the Heiltsuk the use of fur trade goods intensified with the establishment of Fort McLoughlin in 1834. However, it is unlikely that major changes in the Heiltsuk cultural system occurred during the fort's brief existence (Hobler 2000, Harkin 1988). Between abandonment of the fort in 1843 and the 1880s, access to European trade goods was via steamship and consequently more intermittent. The adoption and incorporation of domestic items of European material culture expanded in the 1880s with the opening of the salmon canneries, the subsequent transition to wage labour, and the arrival of Methodist missionaries at Old Bella Bella (Crosby 1914; Pierce 1933). Hobler (2000) has hypothesized a rapid replacement of much of Heiltsuk material culture with European items during this period. Further, the shift in economic and material relations, and the missionary presence, resulted in major changes to social, economic and religious aspects of Heiltsuk culture (Olson 1954, 1955). The majority of these changes took place in the 30 years between 1870 and 1900 (Drucker 1950; Olson 1955; Hobler et al. 1983). The initial incorporation of European goods into the Heiltsuk material culture inventory and later adjustments in the social, economic and religious spheres of Heiltsuk society are intertwined in complex ways.

This complexity is illustrated by the transition in Heiltsuk architectural styles (Hobler 1983; 1987). Within a few years of the establishment of the mission in 1880 the entire population moved from large communal residences to small European style single family homes. Tolmie's 1835 census showed some 25 or more people per household (Tolmie 1963: 306). By the early 20^{th} century the average had become four per home (Large 1909: 8-10). While signs of culture change, such as the rapid appearance of European architectural styles, are apparent, the motivations for these changes are complex and their explanation may be more than archaeological investigation alone can decipher. They require an explanation that attempts to understand change in the full historical context. Having said this, it must be borne in mind that 19^{th} century historic documents for the Central Coast carry their own biases and are influenced by European secular and religious attitudes (Crosby 1914). The archaeological record has the potential to balance this bias and to provide a kind of objectivity.

Archaeologists have often made reference to utility theory in offering explanations for the adoption of new items of material culture. The explorer and trader, John Meares (1967), notes trade in ceramics as early as 1789. And yet their function in the Heiltsuk material inventory could not have been primarily expedient. Why then were ceramics of interest from the earliest days of the Maritime fur trade? If practicality was not the prime motivation, perhaps ceramics have a potential to offer broader insights into the dynamics of Heiltsuk cultural change. In a recent archaeological study of Arikara contact relations, Daniel Rogers (1987:226) has suggested that:

> Another means of monitoring the relationship between material change and social dynamics, in very particular instances, is to consider the role played by individual ethno-historically documented artifacts. Such an undertaking is different from the general category approaches cited above, in that it is applied under limited and very controlled circumstances. Furthermore, it is not an attempt to correlate material and social change at a general undifferentiated level. From an individual artifact class point of view it would, for instance, be useful to establish the link between items known to be of consistent worth, or that were in demand on the basis of cultural preference alone, with the observed archaeological usage of these objects.

Ceramics may be considered an example of an item of European material culture that was clearly "in demand on the basis of cultural preference alone" in the sense that European ceramics provided no apparent utilitarian improvement over indigenous equivalents. The Heiltsuk material inventory included a complete complement of wooden and stone cooking and eating utensils adapted to the specific requirements of Northwest Coast consumption customs (Drucker 1950). As I will show, particular kinds of European ceramic vessels were in demand because they had qualities that made them useful in a different way, a way which was nevertheless consistent with already existing Heiltsuk material culture categories. What these qualities were and how they fit into the larger ideological construction of Heiltsuk culture is a major theme of this study.

More specifically, Terry Klein (1991), in his examination of consumer behavior models for the study of ceramics at mid 19th century sites in the United States, has suggested that archaeologists often extrapolate from a given ceramic assemblage to general statements on the social and economic status of the site occupants. His review of the models used to explain purchasing patterns suggests that many diverse and interrelated variables play a part. He (Klein 1991:88) states:

> Given the heterogeneity of 19th century society, this jump from ceramic vessels to the behavior of social or economic groups has no solid basis

He recommends that the research be limited to "household specific contexts" as the most appropriate level at which to conduct this kind of analysis. By building on findings from a number of household studies, it may then be possible to draw broader conclusions regarding social or economic behavior (Klein 1991).

The ceramic assemblage from Old Bella Bella is well suited to such small-scale analysis. It is composed of vessels from two different kinds of Heiltsuk houses, and the Hudson's Bay Company fort compound, later the site of an independent trading post. Both of the latter served as a source of supply for the village. Therefore, following on from Klein's argument, I have attempted to explain the archaeological evidence by situating ceramic adoption and use in the larger 19th century Heiltsuk social and economic context.

This study is greatly facilitated by the use of local company requisitions and inventories. These supply much of the detailed information needed to interpret the archaeological record. Records are available for the trading posts at Old Bella Bella and Bella Coola in the late 1870s and early 1880s (Feak 1870; H.B.Co. B.B. 1876-82; Kennedy 1877; Charles 1883). This was an important transitional period during which salmon canneries were established and Methodist missionaries and government agents arrived in the community for the first time (Crosby 1914; Pierce 1933).

Objectives and Hypotheses

The words "adoption" and "use" reflect the objectives of this study. The word "adoption" raises a question about the progression of ceramic use as a gradual process over the course of several decades, and therefore implies a time-depth study. Much of current research in ceramics (Klein 1991, Jackson 1991), poses questions about the role ceramics played initially in First Nations-European trade and how ceramics came to be a part of the exchange process. For example, in Southwestern Alaska, Jackson (1991) has shown that tea was the vehicle by which ceramics first came to be used in a First Nations-Russian trading context. In contrast Burley (1989:97) found that in the case of the Metis of the Northwestern Canadian Plains ceramic use originated "with an initial concern for female status and etiquette in Red River fur trade society" and ultimately functioned in the spheres of social organization and integration. It is important to ask how and why ceramics became an item of trade, what kind of selection process determined the items available through Hudson's Bay Company supplies and how this changed over time.

The second key word, "use" raises the question of the function or meaning of ceramics in their adopted context. Once something is known about which types of ceramics were, or were not, being selected, questions can be asked about their sphere of use in the overall pattern of Heiltsuk material culture. As a result, three objectives are identified for this study:

1. The description and analysis of the Old Bella Bella ceramic assemblage.
2. The establishment of a ceramic chronology with which to verify the integrity of the assemblage and test the proposed settlement sequence for the site.
3. The examination of the process of adoption and function of ceramics in Heiltsuk culture in the last half of the 19th century.

Historical Overview

The 1982 excavations at Old Bella Bella and Fort McLoughlin were conducted at the first major European trading centre on the Central Coast. Fort McLoughlin, built by the Hudson Bay Company in 1833, was one in a series of coastal forts established by the Company in the early decades of the century, in an attempt to better monopolize the Coastal trade, much of which was being lost to the Americans. There was no previous Heiltsuk settlement at the site (Tolmie 1963), nor did archaeological excavation discover any indication of a prehistoric component (Hobler et al. 1983).

The history of the town began when a process of nucleation by several of the Heiltsuk bands took place in Lama Passage at the beginning of the 19th century. This partly aggregated population moved to McLoughlin Bay shortly after the fort was built in 1833. William Fraser Tolmie (1963), trader and physician at Fort McLoughlin from 1833 to 1836 notes the initial appearance of Heiltsuk residences in his diary in the mid 1830s. The village consisted of a row of large traditional houses that had grown up along the beach front on either side of the fort where they can be seen in the earliest photographs of the town in the 1870s. Occupation of the site continued and developed over the rest of the century despite the abandonment of the fort in 1843

Historic records for the town are scant between fort abandonment in 1843, and 1880 when the mission was established. Excavation has shown that European trade goods began to enter the archaeological record in quantity once Fort McLoughlin was established. The fort's existence was short lived and abandonment took place only ten years after its inception. Trade was continued in the ensuing period via the Company's steamship "The Beaver", but in much diminished quantity. With the fort's closing the Heiltsuk's initial position of primacy in the Central Coast fur trade ended (Hilton 1990).

In 1866 Morris Moss, an independent trader, opened a small trading post on the site of the original Fort McLoughlin and was supplied with goods for trade by the Hudson's Bay Company (Hobler 2000). Four years later the Company reasserted their claim by taking over Moss' business through their trading store at Bella Coola. This situation continued until the Hudson's Bay Company sold both the Bella Bella and Bella Coola stores to John Clayton, a former employee, in the 1880s (Charles 1883; Kopas 1970).

By 1877 the Heiltsuk had made the transition to a cash economy. In that year the Hudson's Bay Company ceased to engage in any form of exchange except that done with cash, credit, or furs at the trading posts in Bella Bella and Bella Coola. Previously the Company had accepted their own blankets in trade for other goods at the posts (Charles 1877). As the fur-market was by now in decline, the new company policy encouraged wage employment as the means to the necessary cash to purchase goods at the trading posts. By 1880 the post requisitions for Bella Bella note a dramatic increase in the sale of household items and building materials (H.B.Co. B.B. 1876-1882). A salmon cannery opened in Rivers Inlet in 1883 employing both men and women and by the 1890s almost the entire Heiltsuk population was so employed (Crosby 1883). Throughout this period, the missionary logbook makes ongoing reference to the desertion of the village during the canning season (Bella Bella Mission Journal 1880-1924).

In 1880, a Methodist mission was established in the village. The missionary logbook records that the Reverends Crosby and Tate along with Mrs. Tate arrived accompanied by a large load of milled lumber in September of 1880 (Bella Bella Mission Journal 1880-1924). Immediate construction of a mission house was begun and was soon followed by various other European style buildings. Construction soon included more than 30 small frame houses and eventually a full sized church (Figure 18:3). By the end of the 1890s further expansion had been thwarted because large portions of the southern half of the bay, on which much of the original Heiltsuk settlement had grown up, was owned by the operator of the trading post, John Clayton. At this point, the whole village, was abandoned. In a short time residents moved 2 km up Lama Passage to the new town site of Waglisla.

Following a smallpox epidemic in 1862-1863, the Heiltsuk population was reduced from 1300, estimated by Tolmie in 1835 (1963: 320), to 300 individuals by the 1890s (Large 1968: 5). Previous epidemics in the late 18th century and early decades of the 19th century had already taken their toll and the 1835 figure cannot be considered representative of the pre-contact Heiltsuk population (Boyd 1990:137). Shortly after the epidemic began in 1868, Thomas Crosby, head of the Methodist missionary effort in British Columbia, traveled the Pacific Coast administering smallpox vaccines. It was during this trip that he first understood the need that could be filled by medical missionaries (Crosby 1914).

These facts in combination inclined some Central Coast communities to look to Europeans for "both a cause and a cure" (Harkin 1988: 201) and set the stage for the beginning of missionary programs on the North Pacific Coast. By the early 1870s, events had culminated in what the Methodists referred to as an "evangelist revival" (Crosby 1914) that began in Victoria and spread to many First Nations communities in all parts of British Columbia over the next two decades. By 1880, after some hesitation on the part of the Heiltsuk, Crosby had assigned the Reverend Tate and his wife to establish the Bella Bella mission at the invitation of the Chiefs (Pierce 1933). By the early 1890s the Bella Bella Mission had become a centre for Methodist missionary activity on the Central Coast.

As with other parts of the Coast, a new social mobility arose due to access to cash and created opportunities for ceremonial display and social advancement (Codere 1961). This was largely because the devastation of smallpox and other epidemics resulted in a shortage of appropriate inheritors for traditional chiefly positions. For the first time, by the early 20th century, women among the related Oowekeno had been given certain ceremonial roles not normally allowed to them because there were no men to inherit the right (Stevenson n.d:88). The disruption in social organization was further reflected in the restructuring of household living arrangements and the move to single family residences.

Agnes Knight, a young unmarried missionary woman, arrived in Bella Bella from the relatively pastoral reaches of Southern Ontario in 1885 on her way to Port Simpson to take up her new position as Matron at the "Crosby Home for Native Girls". In her *Reminiscences* she notes that, in her estimation, Bella Bella was one of the "prettiest Indian villages on the Coast" because (Knight n.d. 10):

> The huge old houses in which they lived in the old heathen days had even then been replaced by neat cottages and a wide wooden sidewalk which made it quite pleasant to go visiting from house to house. In some of the heathen villages one has to go through mud or clamber over a rocky beach to get about at all.

A dramatic decline in the Heiltsuk population during the 1860s and 1870s was followed by a fundamental change from communal to nuclear living. An average of 25 persons per household was reduced to four persons per household (Tolmie 1963: 306, Large 1909: 8-10). Although the missionaries encouraged this transition, it was made possible by the population decline and the advent of new material relations. Traditionally the larger family lineage had been solely responsible for the organization of production and consumption. With the opening of the salmon cannery and new social mobility brought about by access to wage employment, single families were in a position to establish independent households.

In 1881, barely a year after the Reverend Tate's arrival, the Heiltsuk Chief Hae´mzit took the opportunity of a visit by superintendent of Indian Affairs, I.W. Powell, to request that a saw mill be built so that they might cut the lumber for new houses (Canada 1882 in Harkin 1988: 295). For the Methodists, saw mills were integral to their campaign for acculturation. It was with some satisfaction that Crosby (1914:75) wrote of the changes brought about by the successful establishment of the nearby mill:

> The saw mill that had been built started a new state of things in that once heathen village. A great number of families now began, out of their small savings, to put up little "Christian" homes, of three or four rooms each, and thus got out of the old heathen lodges or community houses, where four or five families had often been herded together. This entailed much work in preparing plans for houses and streets. This continued for some years until the village began to show a quietly civilized appearance. Finally every heathen house was removed and nearly every family, by their own industry, had a nice, little, separate home. In later years a much better class of house was built, and we could say we had a Christian village.

These changes had broad ramifications for Heiltsuk material culture, including the adoption and use of a variety of European household items, including ceramics.

Archaeological Research

The excavations at Old Bella Bella were a joint project of the Heiltsuk Band and Simon Fraser University. Band members were involved at all stages of the project including the planning and later field work. The Heiltsuk Cultural Education Centre provided much of the organizational support and invaluable access to their well documented archival files. The Band Council gave official support to the project in the form of permission to excavate. During early discussions with the committee of Elders the archaeologists asked about their reasons for wanting the site excavated. In response, one of the older women joked that they were interested in the kinds of china patterns their ancestors had used (Hobler pers. com. 1994).

Site Description

The 1982 excavation of Old Bella Bella was intended to explore each aspect of the 19th century occupation. The original site extended about 600 meters along the beach front and comprised roughly 50,000 sq. m. in size. The excavated area represented approximately 1% of the total remains. Excavations were carried out in three areas of the site. The goal of the excavators was to examine each area for architectural remains and material culture (Hobler, Pyszczyk, Horsfall, Streich 1982). The excavated structural remains include the palisade and structures of Fort McLoughlin (Units 1 through 18), one of the traditional Heiltsuk houses (Units 31-49), and one of the small single family Heiltsuk residences built of milled lumber (Units 50-61) (Figure 18:2). Units 19 through 30 were intended to test the projected areas of the church, school, and mission house. The field work produced quantities of ceramics (Table 18:1). Ceramic assemblages from the communal Heiltsuk household and the later nuclear family household are indicative of ceramic use in two very different types of households. The nature of these household changes, particularly with reference to changing architectural styles and population demographics has been explored respectively by Hobler (2000) and Harkin (1988).

In Hobler's analysis archival photographs, dating from the 1870s, were used to infer the origins of the settlement at Old Bella Bella (2000). One can see that the village had extended from the river on the south end of McLoughlin Bay northward along the beach some two thirds of the way to the north end of the bay. Hobler suggested that the gap in the distribution of the traditional long houses in the 1870s photographs represents the beach frontage from the original Fort that had been abandoned some 30 years at the time. The large clearing located approximately in the middle of the photograph shows the location of the original fort compound. The excavators postulated that the small store built in 1866 had been situated in the middle of the original fort compound. By this time no indication of any remaining fort structures could be seen in the photographs. Hobler's analysis of the archival photographs confirms the rapid shift in settlement pattern and house types after 1880. In less than two decades traditional houses were almost completely replaced by small frame built houses. By the end of the century the community had outgrown the site and the decision was made to relocate the community 2 kilometers up Lama Passage to the present day site of Waglisla.

Table 18:1. Excavation Areas.

Type of Feature	Excavation Unit	Ceramics recovered
Fort structures and Palisade	1 through 18	N=152
Traditional House	31 through 49	n=58
Frame House	50 through 61	n=272
Trading Store	Surface Collection	n=40

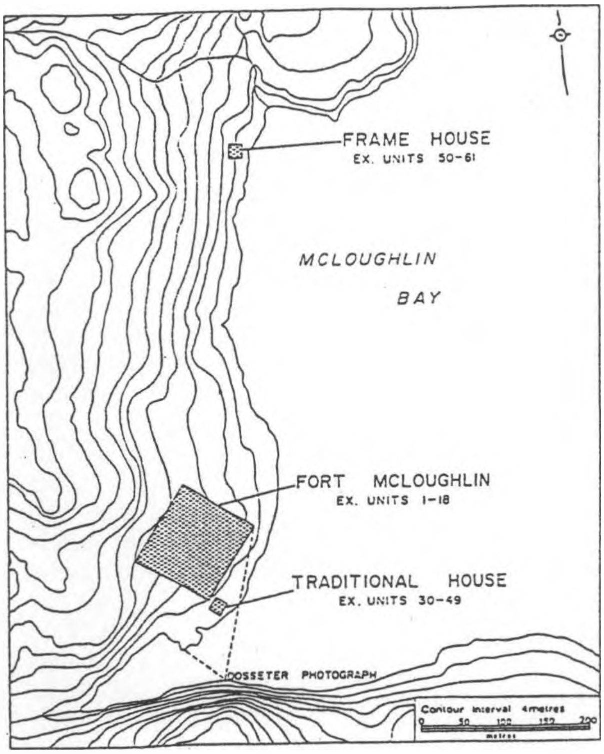


Figure 18:2. **Excavated areas, FaTa 4. From Hobler et al. 1983.**

The Traditional House

The location of the traditional house was determined using a technique that employed an enlarged archival photograph fixed to a plane table that had been set up over the spot from which the photograph had originally been taken (Hobler et al. 1983). The excavated house is likely the second one on the left of the fence surrounding the store (Figure 18:3). Surface clearing revealed several superimposed shallow drifts cut into a slope at the back of the house. These indicate attempts to level the site and may indicate a sequence of structures or modifications to the original house. Local informants state that no longhouses remained in this area of the site by the 1890s. A variety of surface features indicated a brief 20th century occupation unrelated to the large plank house. The general area of the house was numbered unit 30 for the cataloguing of surface finds. Excavated units were numbered 31 to 48, for a total of 18 units, which produced 3321 artifacts.

Several utilized obsidian flakes were likely made during the historic occupation. Quantities of window and bottle glass as well as glass beads, iron nails and miscellaneous iron fragments, copper (ornaments and construction materials), brass (ammunition), ceramics (vessels and pipe fragments), hide (shoes), flint (gun parts), and animal and plant fibres were recovered.

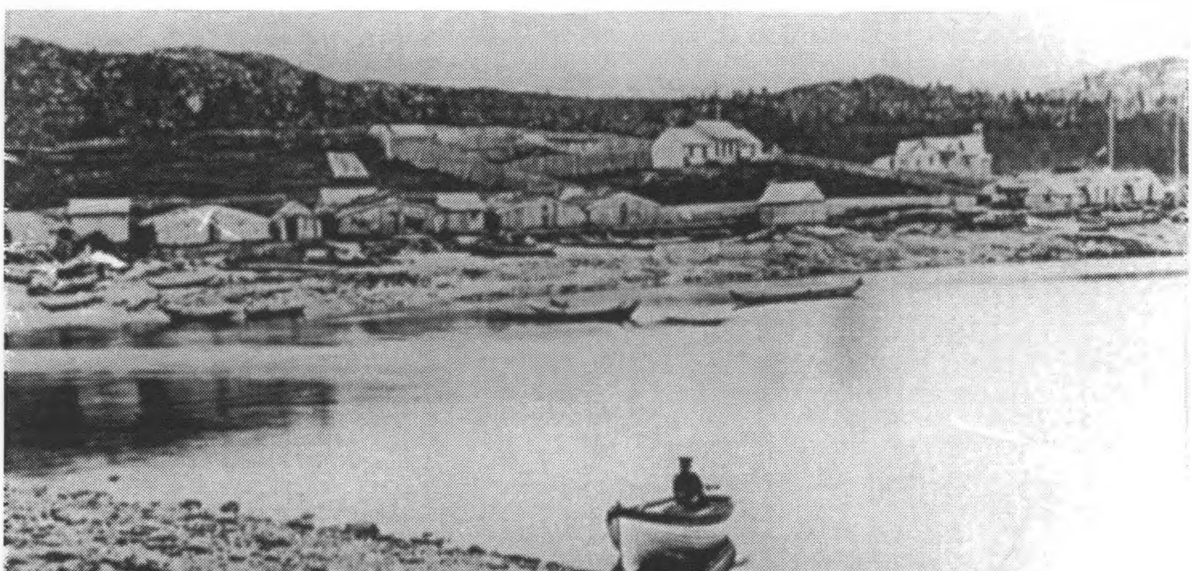


Figure 18:3. **Photograph of Old Bella Bella, early 1880s by Dossetter (B.C.P.A. B-3570).**

The Frame House

Most of the frame houses were built on the upper and lower terraces above the beach at the north end of the bay. Much of the area was logged in the 1970s and large portions of the residential remains were destroyed. An undissturbed area was located on an upper terrace 175 to 300 M north of the site datum. The remains of at least three houses were identified by standing and fallen floor support posts, fallen beams, rock features and artifacts found on the surface and in the littermat. The most complete of these three was designated unit 91. Surface clearing revealed the remains of a brick chimney, scattered brick, and a rock wall. However, it proved more difficult than anticipated to define the exact boundaries of the house due to missing posts and the ambiguity of a number of the architectural features. Houses tended not to be built directly on the ground due to the uneven and rocky nature of the terrain in this area of the site. Instead floors were supported by pilings. This was a distinct break from the Heiltsuk pattern of ground level houses with earthen floors. Excavation units were numbered 50 through 60 and produced a total of 2085 artifacts. The surface collection produced 74 artifacts.

Fort McLoughlin

Excavations in the area of the fort focused on identifying architectural remains with the goal of defining the original boundaries of the compound and fort palisade. Little is known about construction techniques for coastal forts and the excavators hoped to determine how the demands of a coastal terrain and availability of different sizes and kinds of timber affected construction methods relative to those of interior forts. A grid coordinate system was established for the fort area with a permanent datum (00 m) marked by a buried metal bar at 10.92 m above the tide level and tied to two permanent landmarks. Both landmarks were marked by metal bolts. All excavation units, numbered 1 through 18, were dug in 10 cm levels, and all matrix was screened through quarter inch mesh screen. Total artifacts for this area numbered 2434.

Surface features include a large row of rocks extending across the southern section of the area thought to represent support for the fort's southern palisade wall. Three long test units were excavated in the east and north, as well as in the south areas of the grounds, in an effort to locate fort boundaries in these areas. The southern back corner of the fort was most easily discerned because it had been dug and probably blasted into the hillside. A clear double ditch gives evidence of the front half of the north side palisade. The southwest area of the compound was investigated for evidence of the west wall. This area was also defined by a row of rocks and surface depressions extending at right angles to the southern rock feature. This was the location of the later 1866 trading store and many surface features and artifacts were evident in the area. Surface collections were made but excavations in this area were not done as the original fort occupation was the primary focus of investigation.

Within the fort compound the soil matrix was composed of 60 % angular medium sized gravel mixed with soil and organic material. This differed distinctly from the natural stratigraphy outside of the fort compound, indicating that gravel had been imported likely for the purpose of leveling the building site. Two types of stratigraphy were evident in excavated units within the compound. Within units near the stone wall feature (4, 5, 8, 10, 11) artifacts were found in the top 10-15 cm of the matrix. Units further away from the wall (6, 7, 9) produced cultural remains throughout the entire 30-35 cm depth of the gravel matrix indicating disturbance. Excavators postulated that later plowing for gardens in these areas had mixed artifacts throughout the matrix and destroyed much of the structural evidence of the original fort.

Ceramic Collection and Analysis

The collection consists of 522 sherds. After cataloguing, sherds were sorted by unit number and excavation area. Each sherd is described by decorative style, vessel type, paste, and where identifiable, pattern name. This facilitated computer sorting by area and vessel type. As sherds were cross mended, a record was made of all the catalogue numbers related to each vessel, and a number was then assigned to each vessel. After cross mending, 99 individual vessels were identified.

In general the ceramics range in fabric from a coarse buff coloured earthenware to high-fired stoneware and highly decorated semi-vitrified ware. The most common fabric found across the site as a whole was white transfer printed earthenware (Figure 18:4). Stonewares consisted primarily of high fired utilitarian vessels, crocks and jars, all of which are classified as crockery. Semi-vitrified ceramics tend to be high fired ironstone which was a Staffordshire innovation and response to competition from the French porcelain market in the 19th century. A small number of Asian and other unidentified sherds were present.

The data from the collection and their archaeological context are supplemented by Hudson's Bay Company inventories available for the seven years between 1876 and 1882 (H.B.Co. B.B. 1876-1882). This analysis is further supported by archival and historical records to provide a broad picture of ceramic adoption and use in Heiltsuk material culture.

The ceramic collection from Old Bella Bella is analyzed first from the point of view of its technical and stylistic attributes and then from the perspective of the distribution of these traits over the various parts of the site. In building a methodology to interpret this research, I started with the larger question of why ceramics were initially adopted into Heiltsuk culture. Traditionally the Heiltsuk produced no ceramic vessels. Cooking was done in wooden and bark containers with the aid of heated rocks. Carved wooden dishes, many very elaborate in design, were used for eating and drinking. Thus, this study must ask what kinds of ceramics were initially selected, and when and how these ceramics became a part of Heiltsuk material culture. Specifically, how was the function of European ceramics distinct from indigenous equivalents, and how or did they replace traditional Heiltsuk cooking and eating utensils?

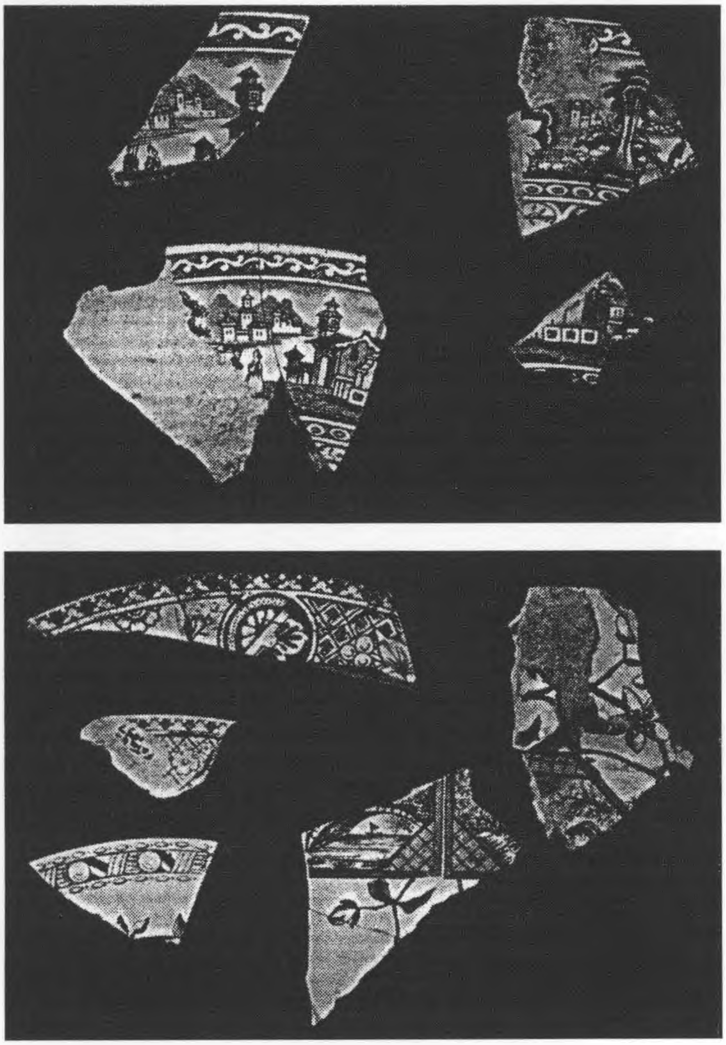


Figure 18:4. **White Transfer Printed Earthenware patterns popular in the last half of the 19th century. Above, "Italy" made by Charles Meigh & Sons. And below, "Sitka" (top left) made by Thomas Hughes.**

A preliminary analysis of the collection indicated that vessels associated with each of the three excavated areas: the fort compound, the traditional house, and the frame house, showed different patterns of ceramic distribution (Belokrinicev 1982). Since each of these areas of the site represent different times and activities I hypothesized that further analysis might shed light on Heiltsuk-European trade relations and socio-functional motivations as they pertained to ceramic use. To this end, a more detailed examination of the collection based on decorative style and vessel function was conducted. My chronology uses a combination of decorative types and specific pattern identifications. (This was important for the purposes of ensuring that results of the vessel form analysis for each component of the site were representative of those components.) Combined with an examination of the historical documentation, this allowed for a reconstruction of the events relating to the use of the various parts of the site and to the adoption and use of European ceramics by the Heiltsuk during the latter part of the 19th century.

A perennial question concerns the integrity of the site and the possibility of mixing (Hobler et al. 1983). Could refuse from one area have made its way to other parts of the site during occupation or afterward? This problem is particularly a concern within the fort compound where there was occupation during the initial fort period (1833 to 1843) and in the later trading post period (1866-1899). Stratigraphy is shallow and some units within the fort compound show signs of disturbance, the probable result of small scale gardening. In some cases the excavators were able to distinguish between the earlier and later occupations on the basis of stratigraphy and surface features, particularly in those units known from historic photographs to have been in close proximity to the trading post. In other units this was not possible. For this reason, the ceramic sample from both the fort occupation and the later trading post are analyzed together as a single assemblage and viewed primarily as the source of supply for the other two components.

As a measure of possible mixing, particular attention is paid to the distribution of cross mends across the site. With one exception, sherds belonging to the same vessel were recovered in the same unit or in adjacent units within the same component. This suggests that vessels were likely recovered from the location in which they were last used or that pieces of a broken vessel were discarded together. If assemblage integrity had been compromised by disturbance, more cross mends from disparate parts of the site might be expected. A further benefit of the cross matching process is that it allows for analysis to take place on the level of whole vessels. Thus many of the graphs and charts present figures based on numbers of whole vessels. There are 99 vessels across the three components including 40 for the fort component, 30 for the traditional house, and 29 for the frame house.

Decorative Types and Chronology

The first stage of analysis involved the inventory and classification of all excavated and surface assemblages during the 1982 field season. While a preliminary analysis of ware type was undertaken in 1982 (Belokrinicev 1982) revisions were required in order to answer questions specific to the present study. A classification based on decorative type was chosen, rather than ware type as has been common practice in historical archaeology.

Surface decoration is often a sensitive temporal marker allowing vessels to be assigned to general time periods reflecting production dates, regional availability, and market demand. This information was used to assign relative dates to the site assemblages, allowing for verification of the sequence of building construction at the site. Eight different decorative types were defined for the site. These include: Transfer Printed Wares, Undecorated Plain White Wares, Plain Coloured Wares, Moulded Wares, Sponge Stamped Wares, Multi-Banded Wares, Hand Painted Wares and Decal Printed Wares.

Transfer Printed earthenwares and Plain White wares are by far the largest categories across the site as a whole (Figure 18:5). Plain white wares include vessels variously labeled "Royal Ironstone", "stone china", "white granite", as well as other unmarked white earthenware. "Ironstone" and "Stone China" are trade names belonging to improved semi-vitreous earthenwares produced by Mason, and Spode/Copeland, respectively in the early decades of the 19th century. However, variations of these ware types, produced by many different pottery firms, developed in the second half of the century and a range of terms was used to describe them. Plain White wares continued to be popular into the 20th century. Miller uses the general term "white granite" to distinguish these later plain white and moulded wares from the decorated stone china ware of the early part of the century (Miller 1991:5). Requisitions for plain white and transfer printed cups, basins and bowls appear in relatively equal numbers on the order forms from the Bella Bella trading post in the late 1870s into the 1880s (H.B. Co. B.B. 1876-1882).

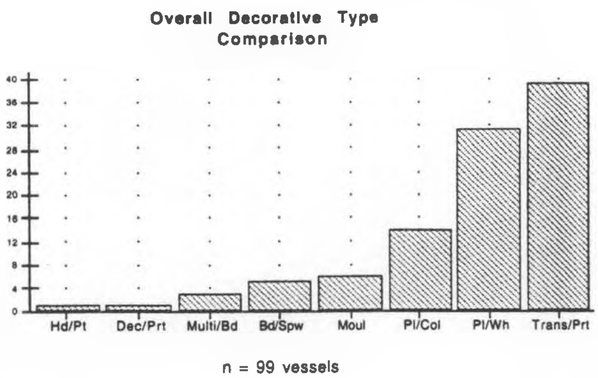


Figure 18:5. **Fata 4 Old Bella Bella overall site distribution for decorative types, count-based on whole vessels.**

Underglaze Transfer Printed earthenware was recovered from all three components. The dominant pattern colours were blue and brown with smaller amounts of green, red and black. Japanese influenced designs in subdued greens and browns became popular beginning in the 1870s through the end of the century (Majewski 1994:5). A high proportion of transfer printed ware from the fort units are indicative of these later styles sold from the trading post after the 1870s. Several brown transfer print vessels in the Japanesque style have also been recovered from the units associated with the frame house.

Plain Coloured wares are the next largest category, and consist primarily of stoneware vessels including crocks, jars, and other vessels relating to food storage. These wares are not temporally specific, and are found in relatively equal proportions across the site.

The Moulded category incorporates a relatively small number of white and coloured tableware with raised decoration. The Wheat pattern, consisting of a border of intertwined-shafts of grain, was typical of this category. It first became available in the 1850s and was prolific by the 1880s (Sussman 1985:7).

A very small number of Sponge Stamped and Multi-Banded vessels were recovered in units associated with the trading store and the traditional house. These styles became available in Canada in the 1840s and 1850s and continued to be popular into the 1920s (Collard 1967:133; Miller 1991:6). While expected, given their temporal range, none were recovered from the frame house. Both decorative styles were popular at other late 19th century Northwest Coast contact sites (Leuger 1981; Jackson 1991; Marshall 1993).

Finally, Decal ware was an overglaze transfer print decoration in production after the 1890s (Lueger 1981). This category is represented by one vessel found in association with the frame house.

In combination with pattern identification, decorative style comparisons between the three components have been useful in establishing time frames for each ceramic sample. They permit a percentage breakdown of the assemblage, to be classified according to decorative type, for each component of the site (Table 18:2, Figure 18:6, Table 18:3).

Excavation units associated with the fort and later trading post have produced a higher proportion of Transfer Printed ceramics over either house type. One of these vessels has been dated to the period 1830-1850 and another to post 1873 (Table 18:3). The predominance of transfer print vessels may be a reflection of the role of the fort as a source of supply for the village. Excavation units likely associated with the later trading post have produced ceramic dates which postdate the fort and span the period 1860 to the 1890s, the transition period between the two house types.

The traditional house has produced a broad range of decorative types and one pattern date, spanning the period 1825 to 1899. The majority of ceramics found in this component are Transfer Printed and Plain White wares, examples of Plain Coloured, Sponge Stamped, Multi banded, and Moulded wares were also present. The frame house component has produced the largest proportion of Plain White wares reflecting the wide availability of serviceable White Granite in the second half of the 19th century. It was the only component to produce examples of Decal ware, a decorative type in production after the 1890s, and examples of the Wheat Pattern.

In general, the dominant decorative types between the two houses were transfer printed and plain white wares respectively. The earlier traditional house produced relatively equal numbers of both types; in contrast, the frame house showed a marked increase of plain white over transfer printed wares. As both decorative types appear on the inventories and were thus available during the period 1876-1882, this may be indicative of the increased utilitarian use of the more economical white wares.

Pattern Design Identification

A second typology was constructed using pattern design identification. Once designs and their corresponding dates were established, these were correlated with the components at the site. The historical records indicate a site chronology in which the establishment of Fort McLoughlin in 1833 preceded the Heiltsuk settlement by one or two years. Hobler (2000) has shown that the traditional Heiltsuk houses co-existed with, and outlasted the fort by three or more decades, and were themselves gradually replaced by the frame built residences of the post 1880s missionary period. Ceramics from each component have produced dates consistent with these time frames (Table 18:3).

Decorative type analysis has supported the chronological integrity of the three ceramic components within the site and shown them to be consistent with the historically documented stages of building construction over the course of the 19th century at Old Bella Bella.

Vessel Form and Function

A third stage of analysis involved an examination of vessel form and function for each component. This provides information

Table18:2. Decorative type percentages from each component with number of vessels in parentheses.

	Fort McLoughlin Compound	Traditional House	Frame House
	n=40 vessels	n=30 vessels	n=29 vessels
Transfer Print	50 (20)	30 (9)	31 (9)
Plain Whiteware	27 (11)	27 (8)	47 (14)
Plain Coloured	10 (4)	16 (5)	10 (3)
Multi-Banded	5 (2)	7 (2)	0
Moulded	5 (2)	10 (3)	4 (1)
Sponge Stamped	3 (1)	10 (3)	0
Decal Print	0	0	4 (1)
Hand Painted	0	0	4 (1)

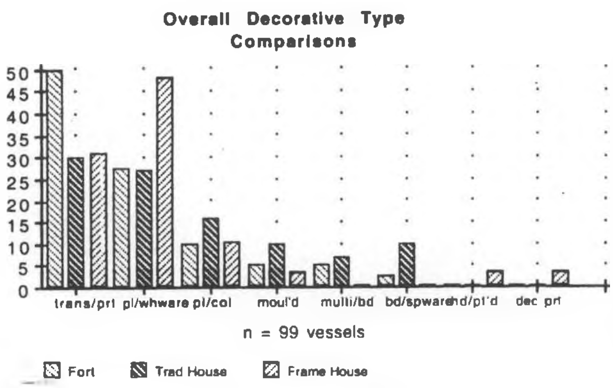


Figure 18:6. **Percentage Breakdowns for Individual Site Components, numbers represent whole vessel counts.**

about the type of vessels being selected, the context in which they were being used at the site and changes over time. Vessel function is inferred by examining each reconstructed vessel and placing it into one of nine vessel categories, including: 1) Washbasins; 2) Bowls; 3) Crocks, Jars, Bottles and Jugs; 4) Cups; 5) Saucers; 6) Plates; 7) Soup plates; 8) Serving and Ornamental dishes and; 9) Unidentified. The distribution of vessel forms by site area can then be tallied (Figure 18:7, Table 18:4, Figure 18:8).

The distribution of vessel forms by site component is discussed below. In tahe traditional and frame houses cups and saucers by far predominate and bowls of different sizes are found in quantity. Initially small and medium sized bowls and wash basins were separated into two categories, but historical evidence indicates the wash basins served the same function as the smaller bowls in that they were used for serving food rather than for washing (H.B.Co. B.B. 1876-1882). Dinner and soup plates increased and outnumbered bowls and basins in the frame house over the traditional house. This difference may indicate the incorporation of European food stuffs which, unlike the liquid based stews of the Heiltsuk, were more easily consumed from flat vessels. The predominance of these vessel forms is consistent with findings from other ceramic studies at contact sites in North America (Lueger 1988; Burley 1989; Jackson 1991; Marshall 1993). Historical evidence further indicates that cup and saucer sets had become an item of exchange in the potlatch.

The Fort Grounds (Units 1 through 18 and Surface Collection)

The units associated with the fort have produced a large proportion of basins, bowls, and crocks - such as might be used for the storage and preparation of food. As well, a good cross section of tea and tableware with similar numbers of plates, cups, and saucers and a slightly smaller number of serving dishes were found. Most are of a strong but inexpensive earthenware. Where stoneware vessels are associated with the fort units, they are the high-fired utilitarian items, relating to food processing and storage. Of the eight categories of vessel types identified at the site, each was well represented within the fort sample giving the impression of an assemblage with all the expected elements of European ceramic usage (Figure 18:10). The high percentage of unidentified vessels in this component is likely indicative of disturbance in many of the units associated with the fort compound. This would be expected of an area that is known, from the photographic records, to have been plowed for gardens attached to the trading post. As previously noted, excavations of the site indicated

Table 18:3. Patterns and Decorative Types by Location and Date.

	Fort McLoughlin 1833-1843	Traditional House 1830s-1870s	Trading Post 1860s-1890s	Frame House 1880-1890s	Maker or Possible Supplier*
1780-20th Century	*Blue Willow*	*Blue Willow*	*Blue Willow*		*Various*
1825-50		Broseley			R. Elliot*
1830-50	Foliage				R. Elliot*
1840-70s	Flow Bl Willow				Various
1840-1920	Multibd'd Ware	Multibd'd Ware	Multibd'd Ware		Various
1848-20thC.		Ruins			W.T. Copeland
1850-1900			Pattern #3 Unident'd (Sussman)		W Boucher*
1850-1920		Sponge Stamped Ware	Sponge Stamped Ware		Various Scot & Eng Pottery firms
Post 1873			Hawthorne		W.T. Copeland
1851 1861				Italy	Charles Meigh & S.
1860 1894				Sitka	Thomas Hughes
1860-1900				Wheat	Boucher or Fairbairns*
Post 1890s				Decal	Various

* Suppliers as distinguished from manufacturers (Sussman 1978).

Table 18:4. Percentage Breakdown of Vessel Types For Each Component vessel counts are provided in brackets.

Vessel types	Fort McLoughlin Compound	Traditional House	Frame House
	40 vessels	*30 vessels*	*29 vessels*
Unidentified	20.0 (8)	3.3 (1)	10.5 (3)
Bowl	15.0 (6)	20.0 (6)	6.9 (2)
Basin	10.0 (4)	0 (0)	6.9 (2)
Saucer	12.5 (5)	26.7 (8)	24.1 (7)
Plate	12.5 (5)	6.7 (2)	13.8 (4)
Cup	10.0 (4)	23.3 (7)	27.6 (8)
Crock	10.0 (4)	13.3 (4)	3.4 (1)
Serving /Orn	7.5 (3)	6.7 (2)	3.4 (1)
Soup plate	2.5 (1)	0 (0)	3.4 (1)

that several of the units, in areas near the trading post, showed signs of disturbance while others thought to be associated with the original fort occupation did not (Hobler et al. 1983).

The Traditional House (Units 31 through 49)

Cups, saucers and small bowls dominate the ceramic assemblage of the traditional house. The traditional house component in general presented the impression of a much more selective use of European tableware over the fort component, with fewer vessel forms present (Figure 18:10). As suggested earlier, this may be indicative of the adoption of ceramics into established Heiltsuk artifact categories. Small and large ceramic bowls were appropriate for the liquid based stews typical of Heiltsuk dietary patterns and would have been most similar to the traditional wooden bowls already in use. Supporting evidence for the incorporation of European ceramics into pre-existing First Nations artifact categories is found in Southwestern Alaska, where Jackson (1989) has noted that cups and saucers had been incorporated as grave goods in the mortuary complex of Native Alaskans by the 1880s where they served as status and prestige items. Utilitarian crockery made up a fourth category perhaps indicating the introduction of European dry goods and a growing need for vessels which could be used to store or process them.

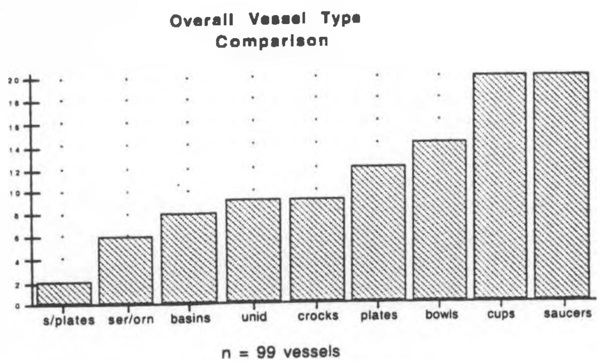


Figure 18:7. **Fata 4 Old Bella Bella Vessel Form Distribution, (numbers=whole vessels).**

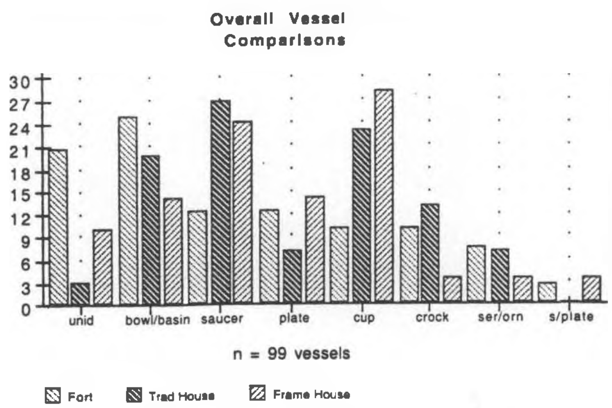


Figure 18:8. **Fata 4 Old Bella Bella. Comparison of Vessel Types from each Component, (numbers=whole vessels).**

No large basins were recovered in the traditional house, although the Hudson's Bay Company records for the period 1876 to 1882 clearly indicate that washbasins and serving bowls were being ordered almost exclusively during this period (H.B.Co. B.B. 1876-1882).
The Frame House (Units 50 through 60 and Surface Collection)

The high usage of specific kinds of table wares, namely cups and saucers and bowls, seen in the artifact assemblage of the traditional house, is repeated in units associated with the frame built house (Figure 18:11). However, there was greater variety in vessel type with all forms represented by at least one vessel. Significantly, dinner plates were the third largest category while tableware in general far out numbered utilitarian crockery. In fact the percentage of vessels pertaining to practical functions such as storage was the lowest for this sample. Given the increased use of European foods such as flour, sugar potatoes and grains as indicated in the historic inventories (H.B.Co. B.B. 1876-1882) of thelater trading store, this percentage might have been predicted to be higher, however, it may be that traditional Heiltsuk storage containers such as wooden boxes were being used for this purpose.

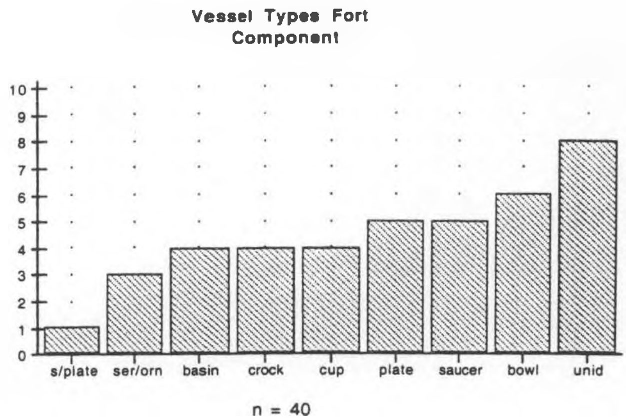


Figure 18:9. **Vessel distribution, fort component, (numbers=whole vessels).**

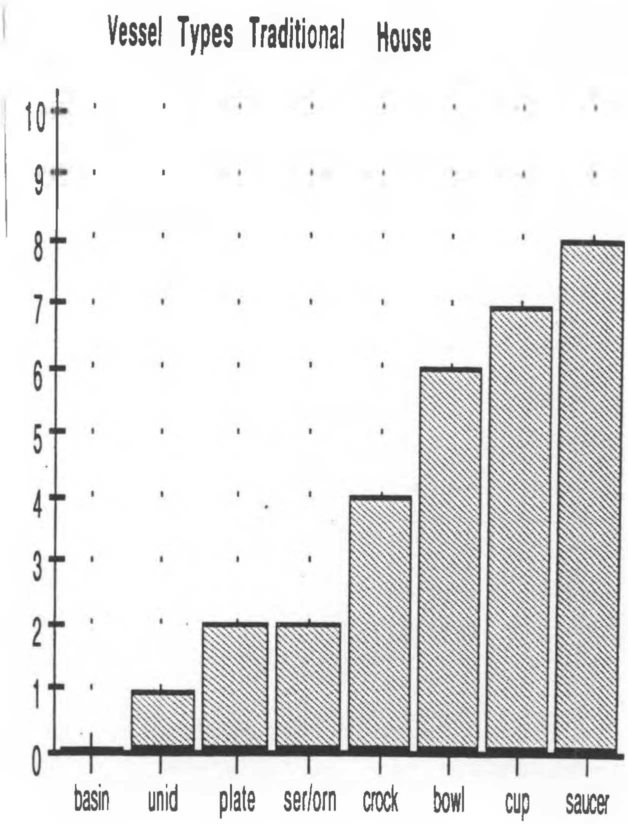


Figure 18:10. **Vessel distribution, traditional house, (numbers=whole vessels).**

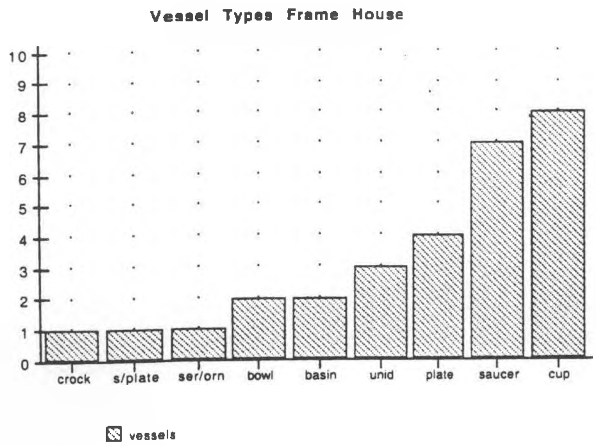


Figure 18:11. **Vessel distribution frame house component, numbers=whole vessels.**

Archival Evidence of Ceramics

Correspondence between the operators of the Bella Bella and Bella Coola posts, as well as a series of Hudson's Bay Company requisitions, invoices and year-end inventories are available for study. These cover the transition period 1876 to 1882 directly before and after the arrival of the Methodist missionaries (Table 18:5). It should be noted here that the figures in Table 18:5 for the years 1879, 1880, 1881 and 1882 were taken from year end inventories, while, figures for the years 1876, 1877 and 1878 were compiled from requisition lists for goods ordered from Victoria twice per year, there being no inventories available for these years. In general these records indicate a marked increase in the diversity of vessel forms after 1880. Further, there is the appearance for the first time of particular vessel types not in use before, as well as the disappearance of other vessel types which had previously been popular.

During the late 1870s directly prior to the Methodist arrival, bowls - specifically large transfer printed washbasins - were in high demand as well as a selection of large serving bowls in varying sizes. An examination of ongoing correspondence between Hudson's Bay Company outfitter Charles Jones at the Bella Bella store with his superior James Kennedy at the Bella Coola store some 150 km. away, confirms the initial popularity of these colourful transfer printed washbasins. Sending Jones instructions for the winter stock order of 1877 Kennedy advises him that "Cheap white blankets will be much in demand, altho others are not much in demand", and "wash hand bowls of different sizes sell well" (Kennedy 1877).

Washbasins and larger bowls were the only forms consistently ordered until 1880 and these by the dozen. Further, as the decade closed an increase in variety can be discerned in the diversity of sizes and decorative types being requisitioned from the Hudson's Bay Company storehouses in Victoria (Table 18:5). Interestingly, there was also an initial order in February 1876 for two dozen sets of cups and saucers and half a dozen soup plates and jugs. The jugs were of different sizes but most of them were too small to have been used in combination with the washbasins. It may be that these latter items - cups, saucers, plates and jugs - were not yet in demand. After their initial appearance on the requisition lists they do not reappear until the year end inventory of 1880, after the arrival of the Methodist missionaries at Old Bella Bella.

By the early 1880s, a much expanded variety of vessel types was being ordered in quantity. Cups and saucers, a selection of jugs in different sizes and soup plates reappear, and dinner plates appear for the first time. As new items were appearing others were disappearing. The large washbasins, by this time arriving in all colours and sizes, were replaced with a greater selection of smaller individual sized bowls including a large order for six dozen "small glass bowls" in 1881, the year after the mission opened. By 1882 the year end inventories show no washbasins of any kind in stock. By contrast, quantities of cups, saucers, small bowls, jugs, soup plates, and dinner plates can be found.

An 1897 notation in the diary of Caroline Tate (1870-1933:102) the wife of the Reverend Tate, a Methodist missionary at Bella Bella in the late 1880s, confirmed the trend we see in the earlier inventory records and suggested that cups and saucers had become an item of exchange at potlatches.

> We are told that in some houses there are as many as two hundred cups and saucers that they have received at potlatches.

These findings are consistent with other Northwest Coast ceramics studies. In an analysis of surface finds recovered during survey work in Nootka Sound (Marshall 1991:139) reported that initially, bowls were the most common vessel form with cups making up a significant second category. Over time, this pattern reverses itself and cups become more prolific than bowls. In his ceramic study of the Nuu-chah-nulth reoccupation at Yuquot Lueger (1981:160) has said:

Table 18:5. Ceramic inventories for the period 1876 to 1882 from Hudson's Bay Company records for the trading post in Bella Bella (H.B.Co. B.B. 1876-1882.

	1876	1877	1878	1879	1880	1881	1882
Washbasins L	27	22	12	28	2	3	
Washbasins M				14	1		
Washbasins M				11			
Washbasins S				5	2		
Chamber pots		6		5	2	2	
Cups/Saucers	24 sets				30 sets	22 sets	4 sets
Bowls L 2 qt			4				13
Bowls M 1 1/2			4		2	1	2
Bowls M 1 qt	27	10	4		2		
Bowls S 3 pt					3	5	
Mess bowls L							8
Mess bowls M						12	
Mess bowls M						12	
Mess bowls S							20
Sm glass bowls						72	
Mess jugs 1 qt	2						
Mess jugs 3 pt	2						1
Mess jugs 1 pt	2					2	2
Dinner plates						8	8
Soup plates	6					6	6

> as for forms, small bowls and cups were by far the most common ceramic objects recovered from excavations

That ceramics had made inroads among those items of European manufacture desired by the Heiltsuk from the earliest days of the maritime fur trade is evidenced by an entry in John Meares (1967: 368) journal of 1789 relating to the trade of:

> coats, jackets, trowsers, pots, kettles, frying pans, wash hand basins, and whatever articles of a similar nature could be procured, either from the officers or the men.

However, their function in the Heiltsuk food production and consumption complex was not necessarily the one Europeans had intended, at least not initially.

It would seem from an examination of the Hudson's Bay Company inventories (Table 18:5) that large coloured earthenware washbasins, the largest kind of ceramic bowl form available, were among the first items of ceramic manufacture to enter Heiltsuk material culture. It has been suggested here that large ceramic bowl forms were consistent with the communal usage of traditional Heiltsuk serving dishes, and thus desirable. Lueger has made a similar suggestion with regard to washbasins recovered from Yuquot (1981:163). Subsequently, with the move to single family dwellings in the latter part of the century the record indicates a transition to a greater diversity of ceramic vessel types and ones designed for individual use. Over time washbasins and large bowl forms gave way to smaller ceramic vessel forms and increased numbers of cups and saucers. Historic records (Blackman 1976; Tate 1897) indicate that cups and saucers had been incorporated into the Heiltsuk potlatch complex by the 1880s.

Summary

This ceramic analysis accomplishes several related goals. Initially. the historically documented sequence of building construction at the site was verified using decorative types and pattern identification. The ceramic assemblage was correlated with the approximate dates for each component and was found to be representative of them. Evidence of patterning was then sought in decorative styles and vessel forms. This aspect of the analysis showed a differential pattern of distribution in vessel and decorative types between the fort component and the two house types. Both houses produced similar types of ceramics - primarily cups, saucers, and bowls with minor variations in frequency and diversity of vessel form within each component. However, plain white wares superseded transfer printed wares in the frame house, possibly reflecting the later increase in cheaper wares for everyday use as distinct from the more expensive decorated potlatch items. Overall, the most obvious pattern was the much more selective use of particular types of vessels in the two Heiltsuk components over the broader range of vessel forms represented in the fort compound.

Archival evidence in the form of Hudson's Bay Company inventories and correspondence, diaries etc., has been used to expand our understanding of the archaeological evidence. It has been particularly useful in formulating explanations for the ceramic distribution patterns in the two Heiltsuk houses. References to tea cups, given as gifts at potlatches, indicated that these forms, so numerous in both Heiltsuk assemblages, had taken on a cultural function beyond their expected European meaning. In the case of washbasins the archaeological evidence helps to clarify the historical documentation. While washbasins are not especially common in the archaeological record of the two Heiltsuk houses, their consistent appearance on year end inventories requires explanation. When their function was considered in the context of a general preponderance of bowl forms in the archaeological record, their role as communal serving dishes becomes apparent. Therefore in this study the combined use of both types of evidence has been invaluable in arriving at a fuller analysis of the ceramic assemblage.

Dating with Spode-Copeland Transfer Printed Ceramics

Transfer-printing technology, as used by Spode-Copeland, was first developed in the mid- eighteenth century. The dating system used for Spode-Copeland ceramics consists of a date range during which ceramics bearing the pattern were manufactured. It begins with "the date the pattern was introduced and ends with the latest date for which there is evidence that the pattern was considered usable by the factory" (Sussman 1979:10) Sussman notes that patterns were not used continually throughout this range, and that the copper transfer print plates were commonly re-etched, reintroduced sometimes after a long hiatus of non-use, and occasionally re-registered.

Spode-Copeland produced tens of thousands of patterns, each one registered with a number in their factory pattern books (Sussman 1979). The beginning date for the range is established from the number assigned to each pattern's first appearance in the pattern books. Using dated watermarks in the pattern books, supplemented by other evidence, Whiter (1970) has produced a dating sequence for the first pattern series which included 10,000 patterns and ended in 1852. At that time a second series, the "D" series was introduced, the first 300 numbers of which were devoted to old patterns with slight changes. When this series reached 10,000, a third series which distinguished bone china patterns from earthenwares was begun in 1874. This series carried well into the 20th century.

The following discussion lists pattern and decorative styles and their distributions at the site. It emphasizes those patterns and types that have been most useful in building the site chronology.

Blue Willow 1720s-20th Century (Figures 18:15 and 18:16)

Sherds belonging to two vessels in the blue willow pattern were recovered from the fort compound, a saucer from units 6, 7, 9, 11, and 14 and a cup from unit 10. Two more vessels in this pattern were recovered from the units associated with the traditional Heiltsuk house. This pattern was produced by Staffordshire potteries throughout the 18th to 20th centuries. The only excavated examples that have been identified at a Hudson's Bay Company fort were manufactured by Copeland and Garrett between 1833 and 1847 and were found at Fort Vancouver on the Columbia River (Ross 1976). As Fort Vancouver, first occupied in 1829, was the nearest administrative centre for Fort McLoughlin it is plausible that ceramics in this pattern were arriving at Fort McLoughlin during the period of the fort's occupation.

Late Blue Willow 19th century (Figure 18:15)

Numerous sherds (FaTa 4 -245, -246a, -259, -260, -636, -884, and -962, vessel no. 20) in this well known pattern, all belong to a saucer and were found in units 6, 7, 9, 11, and 14. These units, although within the fort compound, have produced ceramics with later dates than the period of fort occupation. They are likely associated with the small store built within the fort compound after 1866. They are the same units which produced the Hawthorn pattern below dated after 1873. This version of blue willow is the later of two versions of the pattern produced by Spode-Copeland from the late 18th through to the 20th century.

Flow Blue Willow 1840-70 (Figure 18:18)

A rim fragment belonging to a cup (FaTa 4-0472 vessel no. 30), exhibits a crude version of the blue willow pattern on both sides. The pattern details run into each other giving the appearance of a flow blue effect. This vessel was not manufactured by Spode-Copeland as the ware type is coarse and the pattern of too poor a quality. The technique was produced by the introduction of chlorides during the firing process. Vessels of this type were most popular in Canada during the 1840s and 1850s (Collard 1967: 118). The sherd was recovered in unit 10 in association with what is likely the northern section of the fort palisade. The date of this pattern's popularity in Canada would put this vessel in the correct time period for association with the fort occupation or shortly thereafter.

Broseley 1825-1850 (Figure 18:16)

This large sherd belongs to a fluted cup (FaTa 4 -1498 vessel no.76). It came from unit 47. A common pattern, Broseley was manufactured by a number of Staffordshire potteries other than Spode-Copeland and this example is one of the non-Copeland versions, possibly supplied by Robert Elliot (Sussman 1978). It is similar to the Blue Willow pattern with its Chinese scene but is most often found in a lighter blue. Later in the century the pattern appeared in dark blue as well. Except for those examples manufactured by Spode-Copeland, ceramics in this pattern can be dated 1825 to 1850 (Sussman 1978). This vessel is representative of many of tea cups found in association with the traditional Heiltsuk house.

Foliage 1830-1850 (Not illustrated)

This small sherd (FaTa 4-0746, vessel no. 43) was found in unit 18 along with numerous other ceramics and fur trade artifacts in a shallow midden in the southwest corner of the fort compound. The midden immediately to the west of a line of rocks, is associated with two shallow surface depressions. The area from which this item was recovered is thought by the excavators to be contemporaneous with the original fort occupation. The sherd is too small to identify to vessel type.

Sussman lists this pattern as one of the non-Copeland patterns occasionally found at Hudson's Bay Company posts (1978) where it dates to the period 1830 - 1850. This period of non-Copeland supply has been sourced to the London china merchant Robert Elliot (Sussman 1978). Where this pattern has been identified on Hudson Bay Company sites, including the present example, it is only found in light blue (Sussman 1978). The introduction of new colours by the Staffordshire potteries began in the 1830s, following the ubiquitous cobalt blue (Collard 1967). Transfer printed vessels in brown, pink, lavender, green, orange, grey, and light blue were immediately popular in British North America.

Dipped or Multi-banded Wares 1840-60 (Figure 18:19))

Sherds from two vessels, recovered from units in the traditional house, are designated as multi-banded ware (FaTa 4-243, -619, -622, -649, -684, vessel no. 19 in units 6, 14, and 32) and (FaTa 4- 1461, vessel no. 75 in unit 46). Vessel no. 19 was the only vessel in the entire ceramic collection with sherds which were cross matched from units associated with more than one component: the fort compound and the traditional house.

Both are bowls which is typical as this is a decorative technique used primarily for utility wares. Dipped ceramics, which include multi-banded wares, is a term applied to various ware types all of which, were decorated with a coloured slip applied to the clay body before it was bisque fired. Most underglaze decoration was applied to the bisque fired body (Miller 1991:6). Other terms for some of these ware types include; banded, mocha, blue banded and variegated. Dipped or Dipt decoration was commonly limited to bowls, mugs and pitchers. They were the least expensive vessels of this type available in the latter part of the 19th century (Miller 1991). Banded decoration, was applied mechanically or by hand with a brush as the vessel was turned on a wheel and was particularly suited for hollow wares such as the bowls recovered here. Banding usually consisted of a series of thin bands on either side of wider bands. Especially popular after the 1840's were the blue banded and multi-banded wares. Blue banded wares continued to be produced into the 20th century (Miller 1991:6).

Examples of blue and multi-banded wares found among the vessels recovered from the traditional house and the fort compound can likely be attributed to the period after fort abandonment when traditonal houses were likely still in use. Vessel no. 75 from unit 46 is an example of the blue banded utility bowls referred to above, many of which have been recovered from collections on the West Coast of Vancouver Island (Marshall 1993) and could be late 19th or early 20th century.

Figure 18:15. **Examples of transfer printed soup Plate in the Japanesque pattern Sitka made by Thomas Hughes (upper left) and Saucers (right) from Old Bella Bella.**

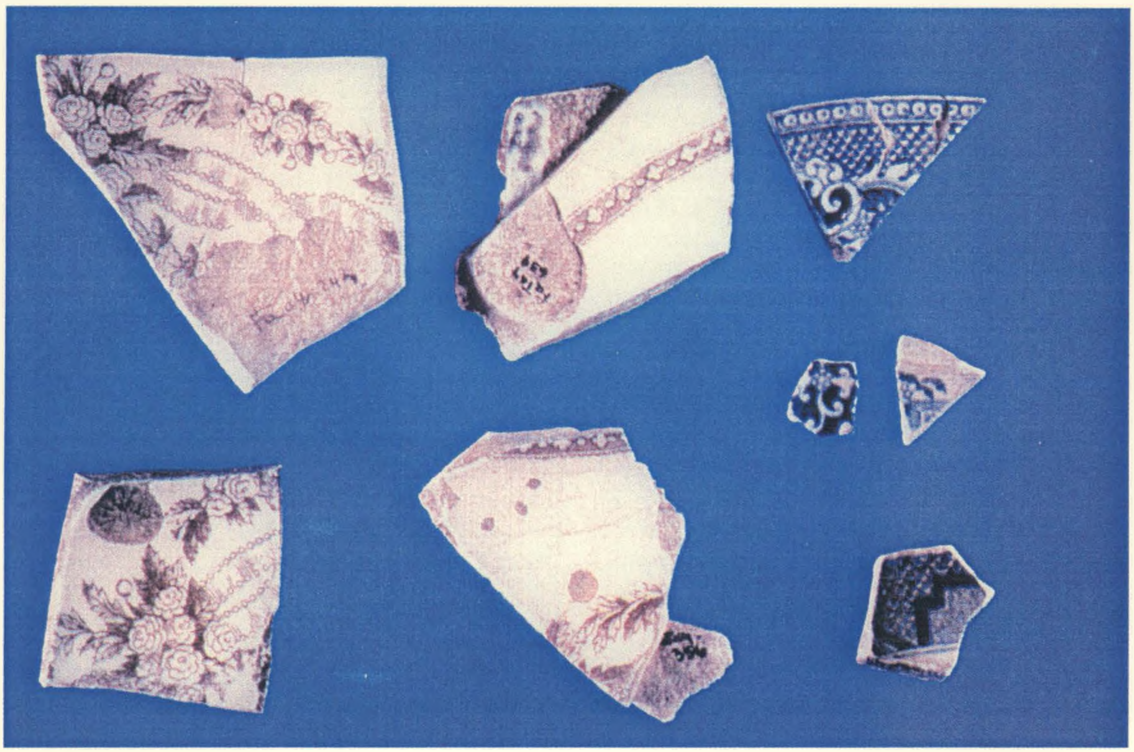


Figure 18:16. **Examples of transfer printed Earthenwares from Old Bella Bella. Wash basin in Hawthorne pattern (Spode-Copeland, left) and saucer in Blue Willow pattern (right).**

Multi-banded 1840-60 (Figure 18:19)

Two vessels, both bowls, are designated as multi-banded wares. They were recovered from units associated with the later trading store (FaTa 4-243, -619, -622, -649, -684, vessel no. 19 in units 6, 14, and 32), (FaTa 4-950a, vessel no. 53 in unit 11). All examples of blue and multi-banded wares from units associated with the fort compound can likely be attributed to the period after fort's abandonment when the trading store was in operation.

Ruins, Spode-Copeland 1848-20th century (Figure 18:19)

Several pieces of a deep bowl were found in this pattern (FaTa 4 -727, -761 and -1202, vessel no. 41) in units 33 and 34. This vessel is a medium sized serving bowl and is dark blue. Typically this Spode-Copeland pattern has a border of acorns and oak leaves framing central panels illustrating various scenes of ruins in rural settings. Also known as Melrose, it was registered in 1848 and was manufactured through to the 20th century.

Sussman's Unidentified No. 3 c 1850-1900 (Figure 18:18)

Sherds (FaTa 4-601b vessel no. 35) likely belonging to a bowl in an unidentified pattern are referred to as Unidentified No. 3. They were recovered from unit 15 at the northern end of the fort compound. The pattern has been found at Hudson's Bay sites identified in Sussman's study of non- Copeland ceramics (1978: 70). It is found only in dark flow blue with what appears to be a peacock motif. It can be dated to the latter half of the 19th century. While the manufacturer is unknown, it was likely supplied by William Boucher, a London china merchant who made annual shipments of ceramics to the Hudson's Bay Company from 1852 to 1877, concurrent with supplies sent by Copeland and Garrett (Sussman 1978).

Cut Sponge Stamped Ware 1850-1920 (Figures 18: 19, 18:20)

Three sponge stamped vessels were recovered, all in units associated with the traditional house. These are two cups (Fata 4-0091 vessel number 7, and FaTa 4-1507, -1529 vessel number 79) and a bowl (FaTa 4-775, -794 vessel number 5) from units 40, 31, and 46 respectively.

My designation is a decorative type rather than a specific pattern. Sponge ware describes a style of brightly coloured decoration applied with a cut sponge which was often accompanied by banding and hand painting. Sponge stamped wares without hand painting were more common after the introduction into Staffordshire potteries of cut sponges in the late 1840's (Turner 1923:149; Miller 1991:8). Initially used on tea wares, after this date, table and toilet wares were more commonly decorated in this manner. Although the forms available were the same as transfer printed vessels, the clay bodies tended to be of a heavier and coarser manufacture. Sponge stamped wares were among the least expensive decorated wares available during their period of popularity (Finlayson 1972:118; Miller 1991:8) and were apparently especially in demand for export purposes (Jewitt 1878: 564; Leuger 1981: 128).

Sponge stamped designs are usually small florets in symmetrical arrangements with rim banding in contrasting colours. Normally referred to as sponge or spatter ware, it is some times called Portneuf in Canada, after a Quebec village were it was mistakenly thought to have originated. It often has no marker's mark but was exported from England and particularly from Scotland to Canada between 1840 and 1920 (Lueger 1981: 128). Collard has stated that vessels decorated in this manner first arrived in Canada in the 1850's (Collard 1967: 133, 146), however, Finlayson (1972: 55) dates the peak of Scottish sponge stamped ware production at 1880 to 1910.

Wheat 1860-1900 (Not Illustrated)

The wheat pattern is found in the Old Bella Bella collection in the form of a small plate (FaTa 4-463, -470, vessel number 29) from unit 91, the general designation for the frame house. This pattern is an example of moulded ware consisting of a raised rim decoration of grain and sheaf-like grasses. It came into production after 1848 when the first raised grain pattern was registered; over the next four decades twenty more patterns were registered in similar designs (Sussman 1985). It was very popular in the last quarter of the 19th century, and Sussman suggests that most vessels in this pattern are datable to the 1860s and 1870s (1978). Sussman (1985) has further noted that this design is found only on the semi-vitrified white earthenware commonly known as white granite (ironstone).

Hawthorn, Copeland and Garrett ca 1873 (Figure 18:15)

The Hawthorn pattern appears in the form of a brown-transfer printed wash basin found in the fort component (FaTa 4-242 etc., vessel number 18). Pieces of it were recovered from units 5, 6, 7, 11 and 14. These units are in close proximity to each other in the southwest section of the fort grounds and produced the highest number of ceramics found anywhere in the fort component.. The soil matrix in units 6, 7 and 14 (all co-joining) suggests some disturbance. Structural wood found in units 5, 7 and 14, consist of a squared log that had been placed in a shallow trench in unconsolidated bedrock. This is probably a building sill timber similar to those used by the Hudson's Bay Company at interior forts.

Excavated pieces of the Hawthorne pattern manufactured by W. T. Copeland are found at Hudson's Bay sites and are date marked 1873. Date marks, as distinguished from makers marks, were introduced in 1870. Copeland (1990) states that the date indicates the year in which the pattern was first used and not the date of manufacture. No date range is given for this pattern. Supporting evidence for the authenticity of the 1873 date can be found in the absence of this pattern from Fort Vancouver II which dates 1829 to 1860. If 1873 can be accepted then the Hawthorn basin and the other vessels coming out of the top 20 cm of units 5, 6, 7, 11, and 14 must post date the fort building represented by the sill log in unit 7.

Decal, post 1890s (Not Illustrated).

Decal ware is a cheap late 19th and early 20th century innovation represented at Old Bella Bella by a single cup (FaTa 4-189 -206 - 210 -329, vessel number 9) found in units associated with the trading store. It consists of an overglaze decoration, transfer printed on to white earthenware. The decoration has a tendency to rub off with wear and the pattern on the Old Bella Bella example is barely discernible. Lueger (1988) indicates that this decorative type dates primarily to the 20th century.

Makers Marks

Makers marks were not present or incomplete for most vessels recovered from Old Bella Bella. One complete and three partial marks were found. A Chinese mark (Figure 18:17) on a blue transfer printed rice bowl from the surface (FaTa 4-976, vessel number 95) confirms the Asian origins of some of the study ceramics. The mark consists of four Chinese characters that tentatively date the vessel 1911-1923 (Chen, per comm.). An assortment of Chinese ceramics were recovered from Old Bella Bella. These likely were acquired from Chinese cannery workers after the salmon canneries opened in the 1880-1890s.

A very small underglaze blue curved line, probably a worker's identification mark, was found on the blue transfer printed saucer (FaTa 4-123 -etc., vessel number 10). Unobtrusive marks were often used by individual pottery workers to identify their own vessels, as one method of payment was by vessel. The potter was paid when the completed vessel was received by the factory in a condition free of defects (Godden 1971).

The words "AN" possibly from "England" are found on a brown transfer print dinner plate (FaTa 4-159 etc., vessel number 12). The pattern, a brown floral transfer print has not been identified. It does not appear to be a Copeland and Garrett design but is in the Japanesque style popular in the 1880s.

Finally, an uncollected bowl (unit 56, frame house) displayed a crest without a manufacturer's name. A photograph of this mark reads "Imperial Ironstone" with the lion and unicorn crest (Belokrinicev 1982). The maker's name is obscured, and as many similar crests exist, this mark could belong to any one of the many manufacturers using the royal arms during the 19th century.

Other Central Coast Sites

Three vessels (Figure 18:22) with unidentified patterns matching Old Bella Bella pieces, have been recovered from excavations at Snxlhh, FcSq 4, in the Bella Coola Valley (Hobler 1990). Another Central Coast site at Kimsquit (Prince 1993), has produced one complete makers mark which matches a Bella Coola piece (see below). Makers marks from Snxlhh (Hobler 1990) are illustrated here in the interests of future analyses of Central Coast ceramic collections (Figures. 18:22, 18:23)

Although no Copeland and Garrett marks have been found to date at any Central Coast site, several specific patterns, belonging to this manufacturer, have been recovered at Snxlhh (Hobler 1990) and Old Bella Bella. As well two vessels made by Mellor, Taylor & Co., one with the designation "Royal Ironstone China" (Prince 1992) from the Kimsquit excavations and one with the designation "Semi - Porcelain" from Snxlhh (Hobler 1990) are illustrated in Figure 18:24. This pottery, located in Burslem, Staffordshire produced hard wearing ironstone china ceramics for export and, to a lesser extent, the domestic market. Mellor, Taylor & Co. was in operation between 1881 and 1904 (Godden 1971).

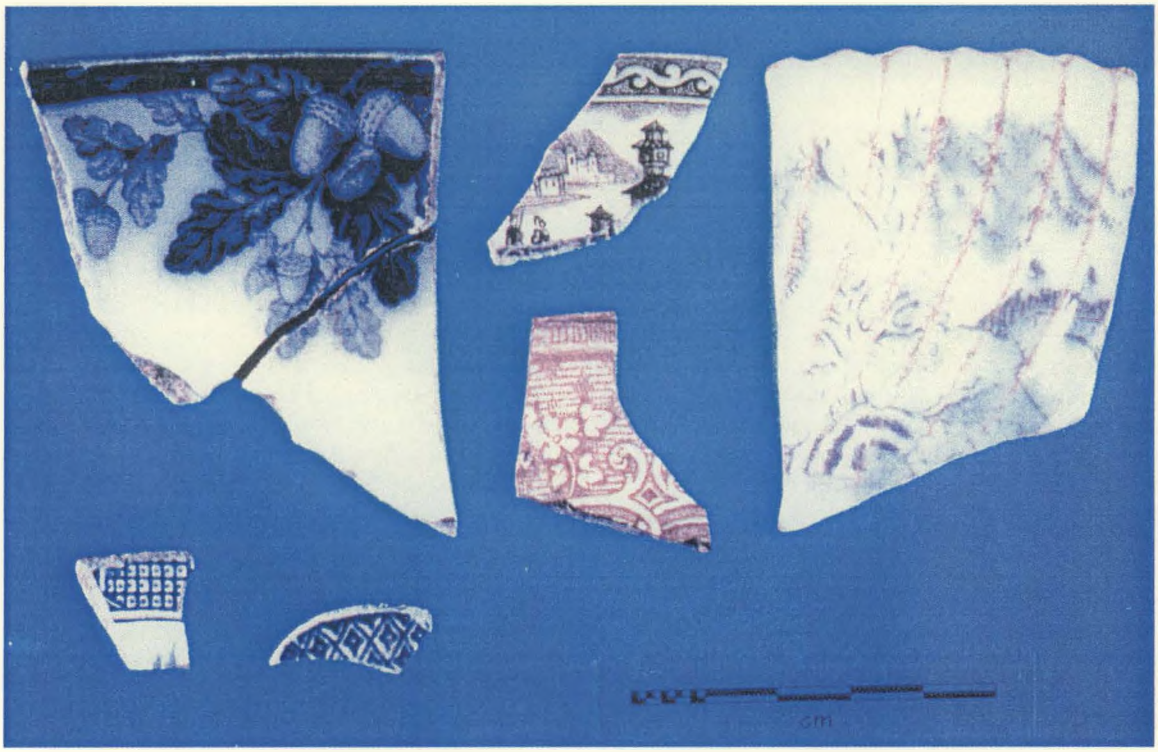


Figure 18:17. **Examples of brown and blue transfer print Earthenwares. A bowl in Ruins pattern (Spode-Copeland, top left), cup in Broseley pattern (non-Spode, top right), saucer in Blue Willow (non-Spode, bottom left) and saucer in italy (top middle) from Old Bella Bella.**

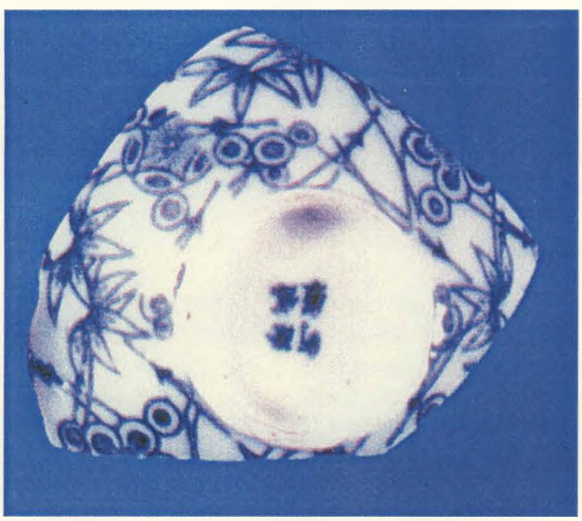


Figure 18:18. **Example of Chinese Ceramics from Old Bella Bella.**

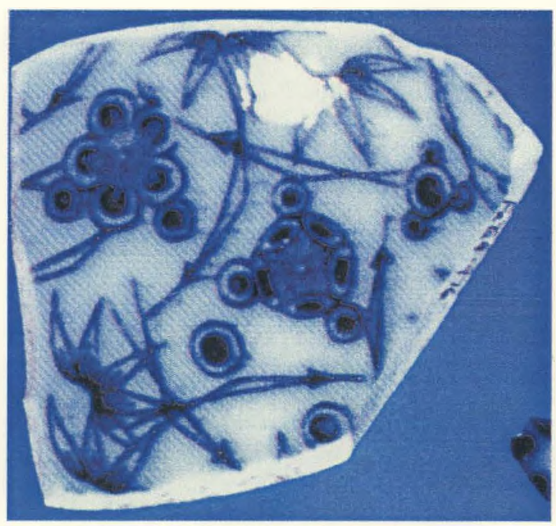


Figure 18:19. **Reverse of Chinese Bowl at left.**

Figure 18:20. **Examples of Cut Sponge Stamped-Hand Painted Cup (right) and Multi-banded Bowl (left) from Old Bella Bella.**

Figure 18:21. **Cut Sponge Stamped soup Plate from a private Collection (Mason Davis) of "potlatch plates".**

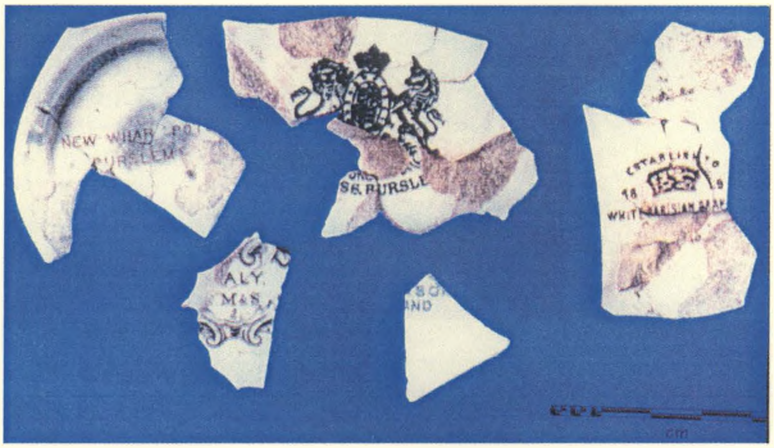


Figure 18:22. **Makers Marks on Ceramics from Snxlhh) (FcSq 4) at Bella Coola.**

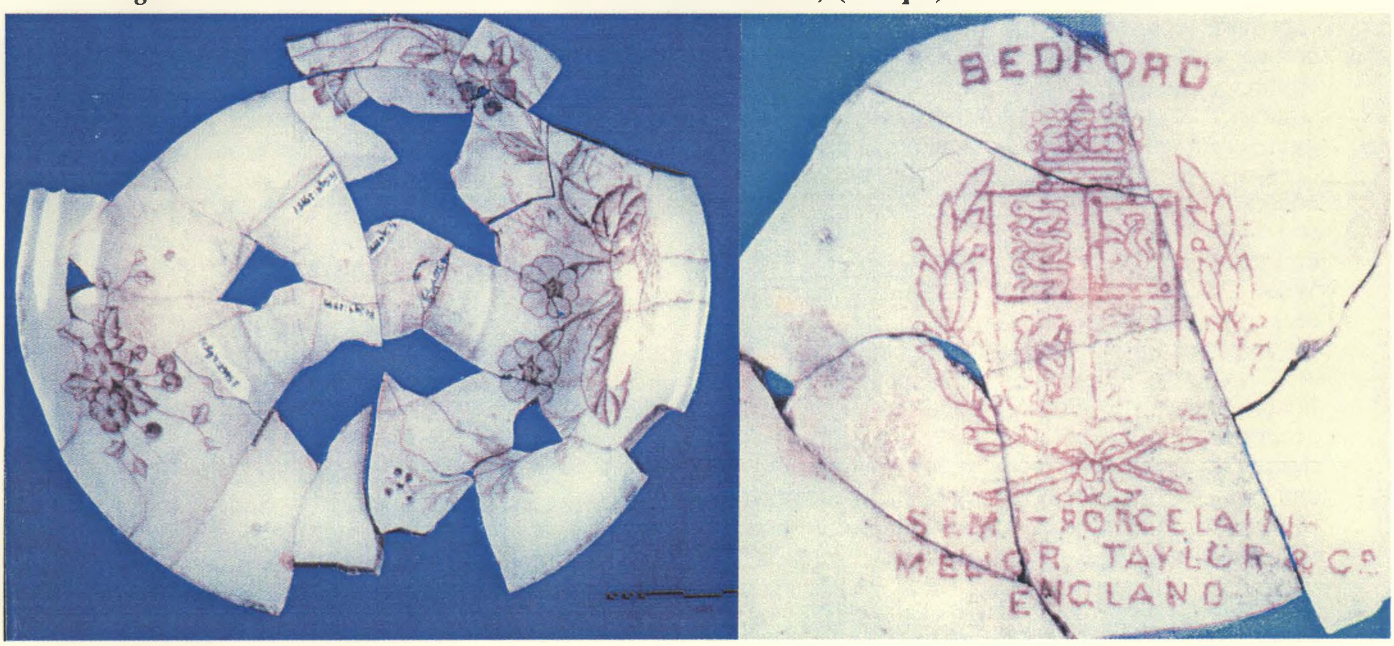


Figure 18:23. **Reconstructed transfer print Plate fron Snxlhh (FcSq 4) Bella Coola (left) with maker's Mark clearly defined on the reverse (right).**

As Bella Bella, Bella Coola, and Kimsquit were all supplied by the Hudson's Bay Company trading posts at Bella Coola and Old Bella Bella (Charles 1883; Kopas 1976; Prince 1992) ceramic wares produced by the same Staffordshire manufacturers would be expected at all three sites. As further analysis is done of ceramic collections on the Central Coast, comparison between sites should prove a useful method of identifying ceramic patterns and manufacturers not identifiable on the basis of a single collection.

Discussion and Conclusions

Theories of Culture Change

Material culture, is the principal tangible means by which archaeologists examine the process of change within culture. In the present study of trade ceramics we must attempt to understand the processes of selection and adoption of new items and to view these in the larger context of 19th century Heiltsuk life.

The Process of Incorporation: Adoptive and Adaptive Strategies

The cultural mechanisms by which a First Nation community dealt with change prior to contact determined the ways in which it dealt with the European arrival. Michael Harkin (1988) has argued that the Heiltsuk attempted to incorporate and thereby control new concepts and technologies on their own terms. A complex dynamic was created when Heiltsuk strategies for change combined with European strategies for cultural interaction. Rogers argues that inter ethnic dynamics require an understanding of the "historic social interaction context" (1990:213), this involves an understanding of the motivations on the part of both cultures in the contact situation (Trigger 1978; Wolf 1982). The historical archaeologist must seek an inter-ethnic dynamic by examining the relationship between material change in the archaeological record and social change in the historical record. Contact relations are most accurately explained when the economics of the fur trade are seen in the context of the "social process of exchange" as it was perceived by First Nations, a process in which indigenous populations applied a culturally determined set of expectations about who "Euro-Americans were and how thcy might be expected to behave" (1990:214). This understanding allows for a consideration of the specific function that items of material culture may have in a social context. As stated by Rogers:

> In many cases objects function in a social and symbolic way to define cultural categories by providing physical referents. To understand the process of adoption or exclusion of various kinds of goods requires considering the role objects play...In order for an object to be adopted as part of a material inventory it must make some kind of cultural sense (Rogers 1990:215).

Traditional Forms of Giving

Just as the social context of trade implied expectations of Europeans, so long established trade relations between aboriginal groups led to expectations of one another. Rogers notes that trade was tied to obligations and duties within the social context of aboriginal culture itself. And within this context, trade goods were valuable as a means to increased wealth and prestige (Rogers 1990:216). This interpretation is supported for the Central Coast of British Columbia, in the records of fur traders at Fort McLoughlin. They indicate that trade goods were viewed by the Heiltsuk as wealth items that could be displayed and given away at potlatches thereby increasing the status of the host (Dunn 1844; Work 1945).

Earlier studies of the Northwest Coast have suggested that the basic unit of social organization, the family lineage, acts as a corporate entity under the chief, who is in turn, the recipient of resources and goods for the purposes of redistribution (Wike 1951). In fact the Heiltsuk say of these relations; "a chief dies with nothing" reflecting the trustee relationship of a chief to the group (Harkin 1988:260). The form of this re-circulation of goods has been assumed to be the indigenous potlatch system. The potlatch is an anthropological construct; the Heiltsuk have no specific word for "potlatch", the closest term meaning simply "to invite" (Harkin 1988:262). The distribution of goods, however, is an integral part of life-cycle and rank-marking events.

Traditional forms of giving in Heiltsuk culture fell into two general categories, both marked and unmarked. The first of these Harkin defines as: "...any marked material giving, which is to say giving which is formally counted as by a hereditary counter using tally sticks. A precise mental record was kept of all such transactions. This requires a countable medium" (Harkin 1988: 262). Unmarked exchange took place outside of this sphere and was characterized by the exchange of subsistence and luxury items. European trade, and the eventual move to a cash economy, initiated new material relations which brought about the circulation of unrestricted objects and the introduction of "a class of persons with whom unrestricted but marked exchange could possibly occur" (Harkin 1988: 269). Harkin has argued that the early maritime fur trade of the 1790s initiated this type of exchange.

> Animal skins were traded for more particular manifestations of power. These trade items were particularized not in being named, but in being unique, rare or at least novel...Thus in the early maritime fur trade period there was a great demand for items of adornment (Harkin 1988:270). The ceremonial nature of this trade is seen most clearly in the use of these items of adornment in the dlu´elae´xa, one of the two series of the Winter Ceremonial. Thimbles reportedly received from Vancouver were sewn into a dancing apron worn in a dlu´elae´xa performance observed by Tolmie in 1834 (Tolmie 1963:295). The connection between a particularized other and a particularized object and sphere of exchange, in the context of the fur trade, can be seen in the dlu´elae´xa dancing apron..The thimbles sewn into it are particular thimbles given by a particular named being, Vancouver (Harkin 1988: 272-9).

The First Schooner

The Heiltsuk narrative quoted below provides an account of an occurrence of contact. It describe s a culturally mediated response to European arrival and sheds some light on the initial position of trade goods in the Heiltsuk cultural context. The story of "The First Schooner", collected by M. Harkin in 1985 was, in fact, related to him as a two part narrative. The first part depicts the arrival of a European trading vessel in Heiltsuk waters. The narrator, Gordon Reid Sr., provides some insight, in metaphorical terms, into the importance of this event from the Heiltsuk point of view.

In the first part of the narrative, an old couple fishing on the beach are taken onto a newly arrived steamship and given European food and clothing and then set back into their canoe with sacks full of objects; "White people already had everything then -clocks, lamps, cups and stuff and so forth" (Harkin 1988: 72). When they get back to the beach, the people make them put their bark clothing back on before they are permitted to get out of their canoe. At first, the older couple are "paralyzed" at the sight of the ship and are sent back to the beach with unknown objects which are initially rejected by the people. Nevertheless, these objects ultimately represent the introduction of European trade goods into the Heiltsuk material inventory.

The Role of Ceramics in Gift Giving

The narrative makes specific mention of cups as one of the first trade goods. Certainly of the range of ceramic vessel forms available to the Heiltsuk in the 19th century, cups and saucer are by far the most common in the ceramic assemblage, making up roughly 50% of the vessels from both the traditional and the frame house components.

Ceramics further signify categories of meaning within the broader pattern of Heiltsuk culture. In the area of ceramic studies in historical archaeology, consumer behaviour theory, has been used to explain the adoption of new items of material culture. Material objects are understood to act as communicators of cultural categories which serve to structure the larger physical and cognitive world. Material culture as a whole becomes a corporeal framework upon which the categories of culture are seen (Douglas 1982).

Historical records indicate cups, saucers, soup plates and wash basins were given away in large numbers at potlatches during the latter part of the 19th century (C. S. Tate 1870-1933; Blackman 1977; Marshall 1993). The type of goods in high demand for distribution at potlatches, tended to be items of uniform quality that could be easily counted and therefore kept track of (Wike 1951:90). This is a criteria well matched by European ceramic vessels.

Blackman notes that Haida potlatch goods were selected because they were "mass produced, cheap, and available in quantity, Hudson's Bay blankets, washbowls, teapots, mirrors, platters, yard goods, and even furniture were ideally suitable as potlatch goods. Though the goods were alien, the attitude towards them was traditional. As potlatch wealth they were not utilitarian. 'they think low of you if you use what you receive,' Haida informants told me. The new potlatch wealth like the old was simply recycled "(Blackman 1976: 407).

Large collections of ceramics, including teawares, are found on the Coast even in the present day. In her biography of Florence Edenshaw Davidson Margaret Blackman describes her subject's modern kitchen: "The most eye catching feature of Nani's kitchen is the long bank of open shelves along one wall, which display some two hundred bone china cups and saucers (Blackman 1982:11).

Ethnographic Evidence of Adoptive and Adaptive Strategies

The initial tendency was to adopt those items of foreign manufacture which were most readily incorporated into pre-existing cultural constructs. These were the constructs most closely associated with aboriginal artifact categories such as items of adornment and objects used in the ceremonial and potlatch complex. Archaeological evidence from the Central Coast demonstrates this point well.

In an archaeological study of the acculturative response to trade on the Central Coast, Hobler (1987) compared three groupings of sites in an early, middle and late historic time period for degree of acculturation based on presence, quantity and type of trade goods. The earliest sites produced items of aboriginal manufacture and trade copper reworked into objects that were most likely used in a ceremonial or ornamental context. The second grouping of artifacts from the middle period sites consisted primarily of glass which was more common than metal. The late site grouping, which included the excavations at Old Bella Bella, produced the highest proportion of nails and iron objects and, the lowest proportion of copper and brass ornaments. Hobler suggests, initially, the most desirable trade goods were the ones most easily manufactured into objects used in the ceremonial complex: copper reworked into collars, brass nose rings, and iron and copper tinklers (used on dancing costumes). On the other hand, trade goods with apparent utilitarian purpose, from the Euro-centric view point, were the last artifacts to be incorporated into the aboriginal material inventory (Hobler 1987).

A related study deals with data from Hobler's excavations at four Central Coast sites near Kimsquit (Prince 1992; Ch. 16, this vol.). For the three earliest sites the majority of trade goods had been reworked using aboriginal technology to reproduce aboriginal artifact categories in the new materials. The only example of a replacement of a aboriginal artifact category, prior to the onset of a cash economy was the use of iron adze blades in lieu of stone.

An example involving ceramics specifically is documented at archaeological sites on the West Coast of Vancouver Island and in the Bella Coola region. Here small pieces of European ceramic appear to have been intentionally reworked by flaking and grinding (Hobler 1994; MacMillan pers. comm. 1992). The shapes of these sherds suggest they functioned as inlays in wooden carvings replacing the traditional shell inlays.

On the east coast of North America, Miller and Hamell (1986: 316) have documented another example of an adaptive use of ceramics in the early historic period: "playing pieces from the Plumstone Bowl or dice game made from white glazed majolica and delft fragments have been found at 17th century Seneca sites. Majolica and delft fragments have also been reworked into small circular gorgets and pendants, analogues of more traditional shell fragments. In all of these cases, the new materials were incorporated with similar traditional materials into a shared ceremonial context".

As the eastern fur trade continued into the 18th century, the ceremonial nature of the early trade was lost to the demands of European capitalism. Utilitarian items were more exclusively sought, and the trade in metal knives, hatchets, kettles, and cloth rose while the demand for glass beads dropped, reflecting the shift in trade goods with symbolic value to those with greater practical utility. The decreasing symbolic function of trade goods is perhaps further conveyed in the eventual prohibition by the Northern Iroquois of glass beads in their burials. (Shimony in Miller and Hamell 1986:327).

On the Northwest Coast, Duff (1964:57) has similarly suggested that European trade goods were seen initially in the same context as objects of aboriginal manufacture with spiritual and ceremonial significance. Harkin argues that the Heiltsuk soon attempted to normalize relations with Europeans by assigning them roles in the Heiltsuk cultural context as competitors (1988:102). Thus Europeans initially represented an unknown outside force which was then incorporated by way of setting up competitive, and therefore trading relations.

In summary it is proposed that the Heiltsuk incorporated new items of material culture by adapting their use to fit the Heiltsuk world view. The initial tendency was to adopt those items of foreign manufacture which were most readily incorporated into pre-existing cultural constructs. Further, these cultural constructs were the ones associated with Heiltsuk artifact categories including objects used in the ceremonial and potlatch complex. This may be especially the case for ceramic objects, items frequently having value in European culture as symbols of status. European perceptions were likely conveyed to the Heiltsuk in subtle ways, for example the context in which ceramics were used at Fort McLoughlin. The initial view of European trade goods as imbued with derivative symbolic meanings analogous to established Heiltsuk artifact categories dissipated in the face of changes to the "social process of exchange" (Rogers 1990:214).

With the transition in material and social relations and the shift to a cash economy Heiltsuk attitudes to the use of European goods, including ceramics, underwent changes. In the post 1880s period missionary women had a role in the further incorporation of domestic items of material culture.

Changes in Ceramic Use

European women played an integral part in the evangelizing efforts of Methodist missionaries on the Central Coast. Church doctrine held that in the model of a "good and well ordered Christian home" (Crosby 1914) one could find the essence of Methodist values. It fell within the realm of women's work to set this example.

Both in England and North America, the 19th century saw the culmination of a change in European family structure which had begun in the previous century with the separation of male and female roles into public and private spheres (Coonzt 1988). These changes had their roots in an earlier economic shift away from the family as a productive unit to male heads of households as primary wage earners outside the home (Woloch 1984). Growing industrialization lead to increasing class stratification and the identification, particularly among the middle class, of women's roles within the private spheres of family and children. As a result, the place of women became more solely focused in the household and an elaboration of all things domestic followed. This phenomena found expression in the popular women's literature of the early 19th century and has been referred to by historians as the "cult of domesticity" (Coonzt 1988).

Recently the material expression of this aspect of 19th century women's roles has been explored in the context of ceramic studies (Shammas 1983; Wall 1987; Burley 1989; Klein 1991). Diana Wall (1987), in her study of the households of middle and upper class women in 19th century New York City, identifies an elaboration through time of ceramic vessels used in dining. This elaboration is seen in an increase in decoration, in the number of decorative styles available and in the relative cost in items of ceramic tableware. She has argued that this pattern is indicative of an increasing ritualization of dining behaviour in the mid 19th century. Thus she has been able to identify and trace archaeologically the increasing domestication of women's roles, a phenomena well documented in the historical records (Klein 1991).

The Victorian period, saw the appearance of separate dining rooms in homes, of matched sets of china, increased attention to the regulation of table manners, table decoration, and social behaviour associated with dining, and in general, an elaboration in all aspects of consumption behaviour. Dining became a ritualized activity, designed to reinforce the growing middle class social order. "Architectural plan books of the period describe a good dining room as a space which reinforces the spiritual unity of the family" (Clark 1988, Klein 1991:80).

Methodist women were products of the Victorian era (C. S. Tate 1870, Knight 1885-7, Hendry 1882). Single Methodist women came to the Northwest Coast, often from Ontario, as teachers and nurses, or as matrons at the "Homes for Native Girls" established at Port Simpson and Victoria. After several years of work, the women usually married a missionary husband and, once married, were considered equal partners in their husbands' life work (C. M. Tate 1870; Crosby 1914). Many spent their lives working at missions up and down the Coast. Mrs. Crosby, wife of the Reverend Crosby, was considered a fine example:

> Among the many agents who elevated the missionary undertaking in my estimation were the wives of the missionaries and the other women who were devoting their time, lives and talents to the uplifting of the Indians whom I visited; and no Christian woman in all my travels seemed more richly endowed and better suited for furnishing a lovely home and life model than your own beloved wife. In the Church and in the home, Mrs. Crosby was just such a wise, gentle, thoughtful, and apt woman as must ever exert a quiet and yet powerful influence in the hearts and homes of those who were permitted to come within her reach. (E. Odlum to T Crosby in 1910, in Crosby 1914: 400)

The missionaries were a part of the growing middle class population of English Canada. Consciously or unconsciously they conveyed the elements of this cultural code to the Heiltsuk. In the context of an increasing domestic emphasis, missionary women promoted the acceptance of Victorian refinements. Such rituals as the taking of tea, and proper dining with the use of the appropriate dinner service, were understood to be a necessary part of the creation of a "good Christian home". The act of dining was, in itself, an opportunity to reinforce spiritual values conveyed along with the use of the necessary items of European material culture through the institution of the Methodist "Homes for Native Girls". Here domestic duties and housekeeping skills were the primary subject of curriculum and included the preparation and serving of food (Knight 1885-7).

As the 19th century saw an elaboration of European items relating to household functions, these goods became available for trade at the Bella Bella trading post. Hudson's Bay Company inventories barely a year after missionary arrival show an expansion in European goods of all kinds but particularly items associated with the construction and maintenance of homes. Ceramics availability increased after 1880. Items already available, such as cups and saucers, were ordered in larger numbers. There was also the appearance of new items: dinner plates, soup plates, and a diversified selection of individualized serving dishes including an order for six dozen small glass bowls (H.B.Co. B.B. 1876-1882). This trend is evident in the archaeological record of Old Bella Bella where greater diversity is found in the ceramic vessel forms of the later frame house over to the traditional house.

Many of these new practices promoted by missionary women were contrary to the consumption and feasting customs of Northwest Coast First Nations. Changes were not always accepted without resistance, Harkin notes the retention of communal dining spaces in the new houses built after 1898 following the move to Waglisla. He states:

> There was a great need for public conformation of meaning, particularly with respect to liminal events such as marriage, death, or the taking of a name. Indeed, a name is considered even today to have been lost or forfeited if it is not maintained by making a distribution of goods. The floor plans of the houses built in the new village reflect this necessity; many houses, unique in design in other respects, had a large space like a public hall on the ground floor in which to hold such ceremonies. (1988: 300).

The communal nature of production and consumption patterns continued to structure many aspects of Heiltsuk life, this was particularly true for the women. The traditionally cooperative nature of food collecting and preservation activities continued. The missionaries complained that the women were more culturally conservative than the men because they persisted in these activities requiring pooled labour among households. (I. Large 1905). Nevertheless, the archaeological and historical records discussed above show a general trend toward an increasingly individualized consumption pattern from the more traditional and communal one. This transition, found in the ceramic assemblage over time, is demonstrated in the adoption and use of items of European tableware, dinner plates , soup plates etc., and particularly in the shift toward the use of ceramic vessels designed for individual rather than communal consumption.

The transition from traditional to European style houses, with the accompanying shift from lineage to nuclear family living, infers dramatic changes in the social and economic structure of the Heiltsuk community. This then has implications for the changing pattern of Heiltsuk ceramic use. Missionary women promoted the increased use of ceramic tableware along with other domestic items of European material culture in developments which paralleled socio-economic changes in Heiltsuk society. The historical and archaeological record shows a move to European architectural styles which precipitated a transition to an increasingly individualized food preparation and consumption pattern in Heiltsuk society.

Concluding Remarks and Broader Patterns

A two part argument has been used to advance explanations for the ceramic distribution patterns found in the archaeological record at Old Bella Bella. The record shows that 19th century European ceramics were incorporated into Heiltsuk material culture. Further, selection took place with regard to the specific vessel and decorative forms considered desirable. Finally, the record indicates that a transition in vessel use took place over time.

In the early part of this chapter, the initial adoption of ceramics is examined in the context of theories of selection which relate to the incorporation of new items of material culture in general. It is then argued that ceramics were adopted into already established Heiltsuk artifact categories and their use incorporated into pre-existing cultural complexes. Ceramics, as luxury items, were desirable initially in the Heiltsuk ceremonial complex because they functioned in the same context as communal wooden serving dishes and as gifts at potlatches, and perhaps in pendants and carvings as analogues of traditional shell inlays.

Over time, in the face of changes in the social and material relations of late 19th century Heiltsuk society, ceramic use took on a new meaning. The transition in living arrangements, reflected in the shift in architectural styles, had ramifications for the adoption of all European material culture items of a domestic nature and ceramics were no exception.

The transition to single family living, was a fundamental change with implications for every other aspect of Heiltsuk life. The missionaries were a factor in this change. Methodists brought with them a different way of seeing the world, theirs was the new post-industrial religion. From their inception in Britain, Methodists had been well known for their opposition to local pre-industrial traditions, to everything in fact which was contrary to a morally disciplined and ordered life as they perceived it. Heiltsuk houses were the antithesis of missionary values and goals for acculturation. In his reminiscences Reverend Crosby outlines the duty of the missionary which included attention to the living conditions of his congregation:

> There is no better teaching than the object lesson of a good and well ordered Christian home. If he is walking "in His steps," the teacher...should be willing to show how to build a nice little home, from the foundation to the last shingle on the roof.... he should make an effort to get them out of the wretched squalor and dirt of their old lodges and sweat houses into better homes. (Crosby 1914:73/74).

in their preference for "nice little separate homes" (Crosby 1914: 75), each one removed some distance from its neighbour, the Methodists were expressing in material terms the elements of a broader European world view. As a product and reflection of European culture Methodist values were often opposed to those of the Heiltsuk. The missionaries emphasized separation rather than incorporation, the individual rather than the group, hierarchical rather than egalitarian social and economic structures, and specialized rather than cooperative labour, among the fundamentals of a good Christian lifestyle.

By contrast, Heiltsuk traditional houses were reflective of a different world view. A traditional Heiltsuk house symbolized the founding of a lineage, and in the oral histories, of society itself. This is reflected in an organic building design with parallels to the human body (Boas 1928; Olson 1954, 1955). The corporate lineage was the traditional unit of economic production and consumption and therefore structured the fundamental subsistence strategies of village life itself. During the contact period, by incorporating the practices of wage labour and single family living, the Heiltsuk made changes to the economic and social patterns which organized their community and these were made manifest in the material world of houses and the objects in them.

This study has discussed the adoption and use of ceramics in the context of material culture incorporation. Thus the passing comment of a Heiltsuk Elder in reference to the china patterns used by her 19th century predecessors, or the considerable collections of cups and saucers still to be found in some modern day First Nations kitchens are perhaps the most telling statements on the place of ceramics in Heiltsuk culture. In adapting the use of 19th century teawares and other European ceramics within indigenous cultural categories, the forbears of the present day Heiltsuk brought these items of European material culture into the Heiltsuk sphere of meaning and thereby made them their own.

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