INVESTIGATING ANCIENT SOCIOECONOMY IN *STO:LO* TERRITORY: A PALAEOETHNOBOTANICAL ANALYSIS OF THE SCOWLITZ SITE, SOUTHWESTERN B.C.

by

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Abstract

This thesis uses palaeoethnobotanical analysis as an avenue to independently investigate aspects of ancient socioeconomy among the *Sto:lo* peoples, a cultural subgroup of the Coast Salish on the Northwest Coast of North America. The research explores questions concerning the social and economic role of plant resources in this aboriginal society using a model derived from ethnographic patterns of plant use among the Coast Salish. The model specifies archaeological and archaeobotanical correlates associated with the range of site types observed within the Coast Salish seasonal round. In particular, archaeobotanical expectations are presented for the diversity, abundance, habitat, and seasonality of plant remains in each site type. Expectations generated from the model are used to evaluate the nature of site use in three temporally discrete archaeological deposits from the Scowlitz site. These are a short-term intensive use occupation called the burned orange deposit (*c.* 1000--800 bp) and two household deposits called structure 3 (*c.* 2400 bp) and structure 4 (*c.* 2900 bp). The analysis of the archaeobotanical assemblage from these deposits produced a total of 42 taxa representing 26 plant families in the form of seeds, needles, buds, tissues, charcoal, and additional plant parts. The assemblage suggests that a relatively broad diversity of local plant resources, including both plant foods and plants used in technology, was exploited in each occupation. It also reveals that plant food resources, including salal and red elderberry, were intensively processed for winter storage in two of these occupations. Together, archaeobotanical and archaeological patterning in the successive occupations indicates that site use at Scowlitz was shifting in time from a year-round village to a seasonal base camp. This thesis demonstrates the evidence for a range of plant use practices in the archaeological record

of Northwest Coast sites as well as the potential for archaeobotanical remains to contribute to site level interpretation. Increasingly broad interpretations about ancient plant use practices, and their role in past socioeconomic and political systems, will become more accessible with the integration of archaeobotanical remains into Northwest Coast research design and the development of relevant theoretical perspectives in the region.

**This thesis is dedicated, with much love,
to Betty Charlie and Clifford Hall.**

Sto:lo **social relations with non-humans are not limited to what non-*****Sto:lo*** **might think of as supernatural beings. All important natural resources in the region are considered by the** ***Sto:lo*** **to be ancestors who in the distant past turned themselves, or were turned by others, into plants and animals to be used for the benefit of the people. The** ***Sto:lo*** **consider these plants and animals to be part of their extended family, and if treated with proper respect, they will continue to provide the** ***Sto:lo*** **with the materials they need to go about their lives.**

K. Washbrook, 1995

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CHAPTER ONE: INTRODUCTION

Introduction

Palaeoethnobotany in North America is moving towards integrating the study of plants into larger social, economic, and political issues (*e.g.*, Johannessen 1993; Minnis 1992; Welch and Scarry 1995; see review in Hastorf 1999). This trend is limited, however, to regions where collection and analysis of archaeological plant remains has become standard practice in excavations. In the Pacific Northwest, researchers are constrained by the lack of standard collection or even rudimentary methodological procedures (but see Brady 1989; Greenlee 1992). Here, palaeoethnobotany has largely been limited to small-scale analyses derived from cultural resource management projects. Despite the availability of modern techniques in palaeoethnobotany, most archaeologists in this region continue to ignore its vast potential (Lepofsky in press a). Plant researchers have attempted to counter this inertia by advocating that palaeoethnobotanical goals be included in the preliminary stages of research design, and moreover, by demonstrating the value of archaeobotanical remains through their integration in larger regional issues (*e.g.*, Lepofsky in press b; Lepofsky *et al.* 1996; Peacock 1998, in press; Thoms 1989).

Following in this vein, one of the major goals of the present project is to contribute to a greater knowledge and awareness of palaeoethnobotany in the Northwest. The potential for palaeoethnobotany in this region is substantial, primarily due to the rich ethnobotanical, ethnohistorical, and ethnographic records. These sources, which depict plants as a principal ingredient in the social, economic, and ritual relations of First Peoples during the historic and protohistoric periods (*e.g.*, Compton 1993; Gunther 1945; Norton 1985; Suttles 1951a; Turner 1995, 1998), provide a wealth of information that has seldom been used to full advantage in an archaeological context. The majority of researchers have rather been content to use ethnographic analogy to interpret ancient plant use practices without reference to the archaeobotanical record. Yet to be put to greatest advantage, ethnographic sources must instead be used as a point of departure for producing testable models of ancient plant use. Such models can then, in turn, be used to interpret the patterning of archaeobotanical remains in archaeological sites.

In the case of the Northwest Coast, the role of plant resources in the economy has largely been overlooked in favour of overwhelming research attention to faunal resources, and in particular, to salmon (Monks 1987). Based on the ethnobotanical and ethnohistoric records, however, it should be evident that plant life furnished a range of spiritual and material needs to coastal populations, including foods, medicines, ritual necessities, as well as materials for construction and household manufactures (*e.g.*, Gunther 1945; Stewart 1984; Turner 1995, 1998). The growing interest in documenting various aspects of ancient plant use by aboriginal peoples on the Northwest Coast (*e.g.*, Deur 1997; Franck 2000; Lepofsky *et al.* in press; Mack 1992; Mack and McLure 1998; Turner and Peacock in press) is a long overdue but encouraging development.

This thesis focuses on ancient plant practices among the *Sto:lo*, a social and linguistic sub-group of the Coast Salish who inhabit the Fraser Valley (Suttles 1990a; Figure 1). The *Sto:lo* are one of many cultural groups of the Northwest Coast who evolved socially, politically, and economically complex cultures, beginning at approximately 2500 BP (*cf.* Ames 1994; Ames and Maschner 1999; Matson and Coupland 1995). Living along the Fraser River situated *Sto:lo* communities within proximity to an abundance and diversity of productive economic resources. Like other

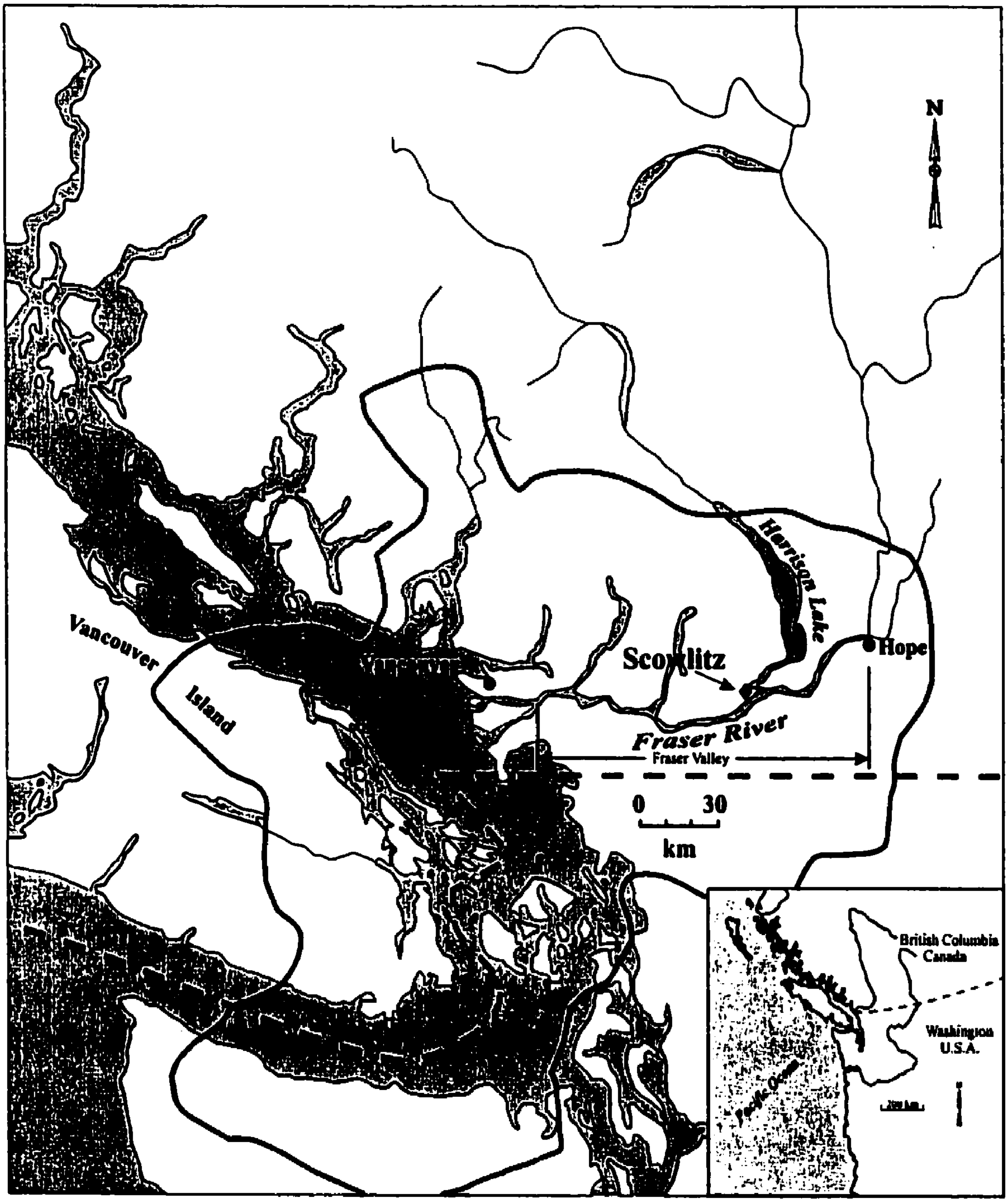


Figure 1. Map of the Gulf of Georgia showing Coast Salish territory, the Fraser Valley, and the Scowlitz site

coastal peoples, the *Sto:lo* relied on the intensive production of seasonally available resources, including salmon and other fish, mammals and plants, to provide staples for year-round subsistence (Suttles 1990a).

This study uses archaeobotanical analysis as an avenue to independently investigate aspects of ancient socioeconomy at the Scowlitz site. Located at the junction of the Harrison and Fraser Rivers (Figure 1), Scowlitz has been occupied by aboriginal peoples for at least the past 2900 years (Lepofsky *et al.* in prep). The long and varied use of this site is demonstrated by the range of deposits, including water-logged, household, mortuary, and short-term use components. Archaeobotanical data from three site deposits, which correspond to three distinct time periods, are analysed in this thesis. These are a short-term intensive use occupation called the 'burned orange deposit' (*c.* 1000-800 bp [uncalibrated]) and two household deposits called structures 3 and 4 (*c.* 2400 and 2900 bp, respectively). Archaeobotanical data from these deposits are used to address a series of questions concerning: (1) the nature of site level socioeconomy, including the use of plants in subsistence, housing, clothing, storage, and other day to day necessities; (2) human/plant interactions at the local level, such as the breadth of the economy and the nature of resource use; and (3) the nature of occupation, including the seasonality and relative permanence of occupation associated with each of the deposits.

In the first section of this thesis, I review ethnographically documented patterns of seasonal plant use and corresponding settlement strategies common to communities throughout the Coast Salish region in the post-contact period. Based on this general review, I derive archaeological and archaeobotanical correlates of plant use which link the ethnographic to the archaeological record. Specific archaeobotanical expectations are presented for the diversity, abundance, habitat, and seasonality of plant remains in different site types of the Coast Salish region. The results section is divided into two components. The first is an inventory describing the nature of macroremains recovered. The second is a qualitative and quantitative analysis of the seed and charcoal remains from the three site deposits. This analysis provides an independent line of evidence that is used, in the final section, to evaluate general hypotheses about changes in site use at Scowlitz. Evidence from the plant remains reveals that site inhabitants made broad use of the environment during successive site occupations, but that their patterns of residence were shifting through time. Changes in site use and the implications of the plant remains for the socioeconomy of site residents are explored in the final part of this study.

Plants in Coast Salish Society

The following review provides a context for understanding social and economic aspects of plant use in Coast Salish society of the ethnographic period. Since relatively limited data are available for *Sto:lo* groups (especially communities of the upper Fraser Valley such as the Scowlitz), I present seasonal patterns of plant harvest and use that were common to communities throughout the Coast Salish region. The Coast Salish region comprises a vast and diverse area that stretches from the east side of Vancouver Island, up the Fraser River to the base of the Fraser Canyon near present day Hope (Suttles 1990a; Figure 1). The review of plant use by peoples in this region is based on a range of sources, including ethnographic (Barnett 1955; Duff 1952; Jenness 1955, n.d.; Suttles 1951a, 1951b, 1955, 1990a, 1990b, 1991), ethnobotanical (Gunther 1945; Kuhnlein and Turner 1991; Turner 1995, 1998; Turner and Bell 1971; Turner and

Bouchard n.d.; Turner and Kuhnlein 1982), and traditional use studies (Galloway *et al.* 1982; see Washbrook 1995 for a thorough review of *Sto:lo* plant use; Woodcock 1996). Appendix I lists the scientific and common names for all species mentioned in the text. Table 1 presents a summary of plant use activities and associated site types within the Coast Salish seasonal round. Information in this table is derived from the foregoing references.

In Coast Salish territory of the historic period, communities spent the winter in permanent villages owned by local groups (Duff 1952). Villages were composed of multiple household or extended family groups who resided in large

Table 1. Activities involving plants in Coast Salish seasonal round and associated site type. See text for sources.

Season	**Activities involving plant use**	**Associated site type**
Winter	Production and repair of housewares and technologies; consumption of stored plant foods for daily meals and occasional feasts; production of ceremonial items	Winter village, year-round village
Spring	Consumption of fresh greens, cambium; collection of inner bark; consumption of first fruits; harvest, processing & consumption of root foods; collection of basketry items and other 'technological' plant resources	Winter village, year-round village, base camp, short-term camp
Early summer	Harvest of planks, trees and 'technological' plant resources; repair of nets, snares *etc.*; collection of medicines and spices; consumption of fresh foods; harvest, processing & consumption of root foods and berries; burning of resource patches	Year-round village, summer village, base camp, short-term camp
Late summer & early fall	Use of nets, cordage, & basketry technologies for fishing; exchange of plant foods, raw plant resources, and finished items; consumption of fresh foods; processing and consumption of late summer and early fall berries & roots	Year-round village, summer village, base camp, short-term camp
Late fall	Re-assembly of plank houses; storage of dried foods for winter; marking of edible roots; cutting of nettles; collection of fire wood; begin consumption of stored plant foods	Winter village, year-round village

plank houses built of redcedar (Suttles 1991). The damp, stormy days of winter were spent largely indoors, telling stories, playing games, and manufacturing and repairing housewares and technologies from plant products. These latter activities were divided on the basis of gender. Women used their summer stocks of plants to produce clothing, blankets, mats, baskets, and other fibrous household items (Turner and Bell 1971: 91; Jenness n.d.: 9). Men carved paddles, digging sticks, and other implements, and finished canoes, posts, and poles begun outside in fair weather (Turner 1998: 36). Stored plant foods processed in the warmer months composed a significant part of the diet.

During the winter, the social elite participated in ritual societies, spirit dancing, and public ceremonies that often required massive amounts of surplus plant foods and material goods (Barnett 1955: 255; Suttles 1960). Stored plant foods such as salal and camas were important foods used for the feasting and ceremony that were a regular feature of the annual Coast Salish winter dance circuit (Gunther 1945: 24; Suttles 1968: 46; Turner 1995: 77-78). Articles such as masks, capes, and rattles, as well as screens, dance props, and piles of cedar blankets were produced in many households during the course of the winter dance season for use as regalia and gifts (Barnett 1955:256; Turner and Bell 1971: 72).

In the spring, the growth of fresh plant foods provided great relief from the winter staples of dried fish and berries (Duff 1952: 74; Norton *et al.* 1984:226). Green shoots from a variety of plants were eaten raw and cooked (Duff 1952: 74; Turner and Bouchard n.d.: 129). When the sap started to run, cambium was scraped from favourite trees, especially cottonwood and western hemlock, for immediate consumption and storage (Turner and Bell 1971: 72, 81; Woodcock 1996: 96). Inner bark also was collected from a number of trees, particularly redcedar, for use in fibre technology (Turner and Bell 1971: 71). Closer to the end of spring, several of the juicier berries ripened, including strawberries, salmonberries, and Indian plum, and were eaten fresh (Duff 1952: 73).

By mid to late spring, most communities were beginning to pack up their winter houses, divide into households or family groups, and head for various resource harvesting areas, including those frequented for plant resources. Sites associated with resource harvest locations varied in scale and duration, from the occupation of short-term camps to the extended use of base camps and summer villages, the latter associated with permanent dwellings (Barnett 1955: 39-40, 241; Duff 1952: 25-6; Table 1). The Katzie, for example, left the Fraser River near its floodpeak and paddled to summer villages and campsites in the Alouette and Pitt River systems. They spent the warmer months collecting plant foods and basketry resources, including bulrushes, cattails, and various grasses, from the marshes and sloughs (Suttles 1955: 11, 15). On Vancouver Island, West Saanich households split into family groups and headed to their camas grounds in the Gulf Islands. Short-term camps were erected for the intensive harvest of this resource, and subsequently, the collection of other food and basketry items (Jenness n.d.: 7).

At least one Coast Salish group, a Squamish community at the head of Howe Sound, resided in their village year-round rather than dispersing to various resource camps (Barnett 1955: 31). Sedentary behaviour among this group is attributed to the wealth of local resources, particularly the richness of the eulachon fishery, which caused several Squamish groups to congregate at this location in the spring (Barnett 1955: 31). Sedentary village behaviour elsewhere on the coast appears to have been likewise related to the availability of local resources (Suttles 1962, 1968) in addition to factors such as the structure of the local sociopolitical system (Coupland and Stewart 1998). In these year-round situations, site residents would have made forays to short-term encampments to harvest seasonal resources, but at least part of the population was resident on site at any given time. During seasonal resource harvests, such year-round villages would thus have served a similar range of functions to base camps and summer villages. It seems likely that year-round occupation was a more prevalent settlement strategy among Coast Salish local groups than suggested by ethnographic accounts (see Mitchell [1994] for discussion of the relative sedentism of Northwest Coast peoples).

The harvest of root[1] resources was another major activity in both spring and fall among the Coast Salish. These carbohydrate-rich foods were processed *en masse* by Coast Salish groups for winter consumption. Roots were alternately layered with vegetation, such as skunk cabbage, in large pits or earth ovens, then steamed for several hours to days. Blue camas, which does not grow today in the Fraser Valley, was one of the most highly regarded and heavily traded plant food resources among the Coast Salish (Gunther 1945: 24; Norton 1979a; Turner 1983; Turner and Peacock in press). However, beds of many additional root foods within range of local groups were tended, harvested, processed, and consumed (Turner 1995; Turner and Peacock in press).

The harvest of plant resources used in technologies continued into the summer. Woodworkers harvested logs and planks by selecting a tree close to the water, burning through the stemwood in a notch at its base, and rough-cutting the shape before floating or towing the tree back to the village or camp (Barnett 1955: 107, 109, 110). The

[1] For simplicity, the term 'root' resources will be used here to represent the wide range of underground storage organs, such as rhizomes, corms, tubers, and roots, consumed by Coast Salish peoples.

collection of plant resources used in fibrous technologies also continued in summer, though production of these items was mostly limited to the mending and repair of nets and cordage (Suttles 1951a: 235-237; Washbrook 1996: 76; Jenness n.d: 8).

Collection and processing of plant foods was another notable summer activity. A number of plant foods, particularly berries, were gathered on an opportunistic basis and consumed fresh while in season (Duff 1952: 73). Spices for flavouring meats and fish were harvested and dried during the course of the summer (Jenness n.d.: 7). Ritual and medicinal plants also may have been gathered on summer excursions, though the private nature of their use limits the information available (Washbrook 1996: 48). Intensive processing of plant foods concentrated on a limited number of summer resources, including root foods such as nodding and Hooker's onions, bracken fern, and berries such as salal, elderberries, huckleberries, and blueberries (Washbrook 1996). Many of the berries were processed by mashing them into a jam, moulding the jam into a bark mat or a rack, and drying this substance into cakes over a fire (Duff 1952: 73; Turner 1995: 81-84, 88). Depending on the location of the harvest area, berries and roots were either harvested and processed at a short-term camp by small groups of women and children, or alternatively, were brought back to a base camp, summer or year-round village. After the harvest, controlled fires were frequently set to keep these prime resource areas open and to promote undergrowth that attracted herbivores (Duff 1952: 73; Norton 1979b; Turner 1995: 13).

Plant harvesting activities of the late summer and early fall were scheduled alongside the most significant economic activity of the year: salmon fishing. Coast Salish groups from Vancouver Island, Burrard Inlet, and possibly from points south (in present day Washington State), congregated at this time on the Fraser River to harvest massive quantities of salmon (Duff 1952: 25-26; Suttles 1990a: 457). While many of the *Sto:lo* fished from home or headed for productive areas such as the Fraser Canyon, the visiting groups occupied short-term camps or summer villages along the banks of the Fraser (Duff 1952: 25). The large amount of traffic on the Fraser River during this period created numerous opportunities for trade. Plant commodities, including dried plant foods and raw and finished technological goods, were traded among the Coast Salish as well as with neighbours to the south, east, and north (Suttles 1990a; Turner 1998). During and after the fishing season, the Katzie bog system was also frequented by a variety of Coast Salish groups for the acquisition of important plant resources including wapato, bog cranberries, crabapples, and spaghnum moss (Duff 1952: 74).

At the close of the fishing season, Coast Salish households headed home to their winter villages. At this time, communities "set their houses and graveyards in order…for winter" (Jenness n.d.:8). Shed-roof houses may have been physically re-assembled, then cleaned and stocked with winter stores. Plant foods and materials were stored in boxes, under benches, or hung from the roof (Suttles 1991). Final outdoor activities of the season included marking edible roots for spring, cutting nettle stems for fibre production at the first snowfall, and collecting fuel stores (Gunther 1945: 25; Jenness n.d.: 8; Turner 1998: 203-204).

Archaeological Expectations of Plant Use

Establishing the connection between cultural behaviour and the archaeological record is a fundamental step in interpreting cultural remains. To this end, I develop a model of archaeological and archaeobotanical correlates derived from the foregoing ethnographic review of plant use activities within the Coast Salish seasonal

Table 2. Archaeological correlates of plants used as foods on the Northwest Coast[a]

Activity	Artifacts	Features	Sites Expected
Collection	Baskets, berry combs, digging sticks	None	Year-round village, summer village, base camp, short-term camp
Food processing	Mats, grinders, knives, boiling stones, mortar and pestle, skewers	Hearths, earth ovens, drying trenches, drying racks	Year-round village, summer village, base camp, short-term camp
Storage	Bentwood boxes, baskets, bark lining, cordage	Underground pits	Year-round village, winter village
Consumption	Various implements	Hearths for cooking	All

Table 3. Archaeological correlates of plants used in technology on the Northwest Coast[a]

Activity	Artifacts	Features	Sites Expected
Collection of fuel	Hammers, bark peelers, bark scrapers, adzes, axes, mauls	None	All
Fuel use	Axes	Hearths, *in situ* burns, earth ovens, drying trenches	All
Collection of raw materials	Baskets, knives, cordage	None	Year-round village, summer village, base camp, short-term camp
Working with fibres	Bark peelers, bark shredders, bark beaters, spindle whorls, needles, awls, mat creasers, net gauges	None	Year-round village, winter village
Wood-working	Bark strippers, adzes, knives, axes, hammers, mauls, drills, chisels, wedges	Object produced, *e.g.*, canoes, posts, poles	Year-round village, winter village

a. Sources: Ames 1992; Hoffman 1999; People of 'Ksan 1980; Stewart 1996, 1984; Suttles 1991, 1955; Turner 1998, 1995; Turner and Bell 1971; Turner and Bouchard n.d.

round. Since references to plants are sparse in the Coast Salish literature, correlates of plant use are derived from both Coast Salish and other Northwest Coast sources (Ames *et* *al.* 1992; Hoffman 1999; People of 'Ksan 1980; Stewart 1996, 1984; Suttles 1991, 1955; Turner 1998, 1995; Turner and Bell 1971; Turner and Bouchard n.d.).

The archaeological correlates presented below are divided into activities related to plant foods (Table 2) and those related to plant technologies (Table 3). Correlates include the kinds of artifacts and features that should result from these various plant use activities, as well as the kinds of sites where these activities are expected. While these correlates may have some utility for site survey, they are particularly useful for identifying the nature of plant-related activities in already identified archaeological sites.

Various activities related to the harvest and preparation of plant foods are presented in Table 2. The first, 'collection', refers to the harvest of fresh plant foods during the growing season. 'Food processing' entails the preservation of a select few seasonally available plant foods through a variety of techniques such as steaming, boiling, or drying. The third food-related activity, 'storage', refers to the storing of processed foods for later use, especially winter consumption, in boxes, baskets, pits, or hung from the rafters. Lastly, 'consumption' involves eating fresh foods in season and stored foods in the winter.

Several activities are also associated with plants used in technology (Table 3). Activities related to fuel-woods can be divided into 'collection' and 'use' (*i.e.*, burning). Fuels are used for warmth, cooking, and possibly for burning discarded materials. The 'collection of raw materials' for various plant technologies includes plant parts such as roots and fibres, bark and wood, that required the knowledge of a variety of collection procedures. These raw materials were brought back to the village to be stored for later production. 'Working with fibres' consists of making mats, baskets, clothing, cordage, nets and other items, and was considered women's work. 'Wood-working' involves the production of large posts, beams, poles, and canoes, as well as the smaller scale carving of implements such as fish hooks, spoons, and dishes, and was largely the domain of men.

The archaeological correlates of plant use outlined in the tables may be useful in distinguishing between various site types. The nature, patterning, and diversity of features and artifacts may help to differentiate the nature and duration of use associated with various site types. For instance, a site with a random distribution of a single highly redundant feature type, such as processing features, and associated with a limited tool assemblage, may signal some kind of short-term camp (*cf.* Oyuela-Caycedo 1993, 1996). Conversely, a site characterized by a diversity of features that are non-randomly distributed, and associated with a generalized tool kit, may reflect a more general use base camp or village, the latter if household structures are present (*cf.* Oyuela-Caycedo 1993, 1996; Shott 1986). In particular situations the site type may not be distinguishable based on the archaeological remains, as in the case of a summer *versus* a winter village. In this situation, archaeobotanical evidence should provide further information regarding the nature, duration, and seasonality of site use (*cf.* Bonzani 1997).

Archaeobotanical Expectations of Plant Use

Based on the foregoing archaeological correlates of plant use, we can predict that the nature of the archaeobotanical record should be distinct at different site types. In Tables 4 and 5, I characterize these potential differences in plant assemblages between site types by differences in richness, evenness, density, habitat, and seasonality. These attributes can, in turn, be used in the analysis of palaeoethnobotanical assemblages in archaeological sites as a means of independently evaluating site function. The site types listed below correspond to those described in the seasonal round in Tables 2 and 3, with the following modifications. For year-round, summer, and winter villages, the expectations for archaeobotanical remains are based on patterning within a house structure specifically, since most activities related to ethnographic plant use in a village took place within the house itself. Short-term camps are further divided in this discussion into those where plant processing is present and those where it is absent.

Tables 4 and 5 represent an idealized scenario of the potential distribution of archaeobotanical remains in different archaeological site types on the Northwest Coast. The idealized, of course, is rarely realized in archaeobotanical assemblages. In most archaeological deposits in this region, as in the Scowlitz deposits that I examine, only charred remains will preserve. Charring biases the distribution of remains in an assemblage towards contexts of burning (*e.g.*, hearths, earth ovens), and against other deposits, such as floors, and sleeping platforms (*cf.* Pearsall 1989: 229). While the following expectations for archaeobotanical remains are presented as an ideal, it is recognized that important preservational and depositional biases influence the composition of every assemblage. These biases are further discussed, in the context of the Scowlitz site specifically, in Chapter Five.

The archaeobotanical correlates, like the archaeological correlates of plant use, are derived from a variety of Coast Salish and Northwest Coast sources, in addition to my

Table 4. Archaeobotanical expectations for food-related activities in different site types

Site type	Activity	Richness	Evenness	Density	Habitat	Seasonality
Year-round house	*Processing*	High	Low	Low	Local and non-local	3 seasons
	Consumption	High	High or low	Low	Local and non-local	3 seasons
Summer house	*Processing*	High	Low	Low	Local	1-3 seasons
	Consumption	High	High or low	Low	Local	1-3 seasons
Winter house	*Processing*	n/a	n/a	n/a	n/a	n/a
	Consumption	Low	High or low	Low	Local and non-local	1-3 seasons[a]
Base camp	*Processing*	High	Low	High	Local	1-3 seasons
	Consumption	High	High or low	High	Local	1-3 seasons
Short-term camp w/ plant processing	*Processing*	Low	Low	High	Local	<1 season
	Consumption	Low	High or low	Low	Local	<1 season
Short-term camp w/o plant processing	*Processing*	n/a	n/a	n/a	n/a	n/a
	Consumption	Low	High or low	Low	Local	<1 season

a. In a winter village, only the remains of storable plant foods will be present.

Table 5. Archaeobotanical expectations for technology-related activities in different site types

Site Type	Activity	Richness	Evenness	Habitat
Year-round house	*Fuel use*	High	Low	Local and non-local
	Seeds in technology	High	High or low	Local and non-local
Summer house	*Fuel use*	Low	High or low	Local
	Seeds in technology	n/a	n/a	n/a
Winter house	*Fuel use*	High	Low	Local and non-local
	Seeds in technology	High	High or low	Local and non-local
Base camp	*Fuel use*	Low	High or low	Local
	Seeds in technology	n/a	n/a	n/a
Short-term camp w/ plant processing	*Fuel use*	Low	High or low	Local
	Seeds in technology	n/a	n/a	n/a
Short-term camp w/o plant processing	*Fuel use*	Low	High or low	Local
	Seeds in technology	n/a	n/a	n/a

own inferences based on these sources. The archaeobotanical correlates are limited to activities that should be observable in the archaeological record. For activities related to plant foods, this includes processing and consumption but not collection and storage (though these latter activities may be indirectly evident based on archaeological indicators; see Tables 2 and 3). For plants used in technology, the most visible kind of remain will be charred wood, indicating the use of fuel and/or the discard of woods used originally for other purposes. There is limited potential for archaeobotanical remains from other activities related to plant technologies, including collection of raw materials and the production of household and fibrous items. Possible correlates of these activities are presented in Table 5 ('seeds in technology'), but are not discussed further in the text.

Richness

Richness refers to the variety in a given ecological assemblage (Bobrowsky and Ball 1989: 5). Indices such as the Shannon Weaver index measure sample richness but require high counts of each taxon (Popper 1988: 69). Due to problems with low counts of some taxa, richness is measured in this analysis based on the number of taxa present (*cf.* Lepofsky *et al.* 1996: 49). Expectations for sample richness are assigned a high or low rating. Since no studies are available for coastal sites with which to compare the Scowlitz data, assessments are made based on inferences derived from ecological sources (Green and Klinka 1994; Hitchcock and Cronquist 1972; Meidinger and Pojar 1991; Pojar and MacKinnon 1994).

For food-related activities (Table 4), richness should vary with the season and length of occupation. During the growing season, richness will reflect the consumption of a variety of seasonal plant foods as well as the processing of select plant foods. As a result, richness measures should be high for both consumption and processing in warm weather occupations, such as base camps, and summer or year-round households. Consumption and processing in short-term camps, however, should involve only a limited number of resources available during a short period of occupation. As a result, richness should be relatively low in short-term camps where plant processing is either present or absent. In a winter-only household occupation, richness should reflect the consumption primarily of stored plant foods and thus be relatively low.

Richness related to fuel use (Table 5) may also be influenced by the season and duration of occupation. In a year-round household, the richness of wood taxa should be high since a broad range of woods are used for multiple purposes throughout the year. Richness may also be high in a winter-only household, as fuel consumption and wood-working activities are greatest in winter. In contrast, richness associated with summer households and base camps should be relatively low, since the focus of these occupations is on resource processing, and the sources of fuel may be limited to those that are most locally abundant and/or preferred. Richness in short-term camps should also be low, since fuel needs may be the most limited among site types. In both kinds of short-term camps, where plant processing is either present or absent, however, specific fuels may be chosen for particular needs, causing richness to be particularly low.

Evenness

Evenness is the relative amount of each taxon in an assemblage, and indicates whether resources were used in similar proportions or if certain species dominated

(Bobrowsky and Ball 1989: 6). In large assemblages, especially when the total number of species is known, evenness can be measured using a variety of statistical indices (Krebs 1989: 363). In assemblages with smaller overall numbers, a percent distribution also will show the relative evenness of taxa (*e.g.*, Lepofsky *et al.* 1996). In this analysis, evenness is described as low or high. A distribution with high evenness is one where all resources show a similar degree of utilization. In an assemblage with low evenness, one, two, or several plant taxa occur in much greater frequencies than the majority of taxa, indicating a focus on those taxa.

For plant foods, evenness should vary according to the occurrence of different food-related activities on a site (Table 4). In processing locales such as base camps, summer and year-round households, primary resources will be processed in large amounts and secondary resources in lesser amounts. This differential processing should result in low evenness. Evenness should be especially low at short-term camps where the focus is on the processing of one or two plant resources. Evidence for processing in short-term camps not associated with plant processing should be entirely absent. In contrast to processing, consumption activities should lead to variable evenness in all cases. For all site types except winter-only household occupations, consumption of fresh and some processed plant foods should produce variably shaped distributions (*i.e.*, with either high or low evenness). For a winter-only village, the situation is quite distinct. The absence of processing activities leads to an evenness value based on the consumption of stored plant foods. Since consumption is contingent on which plants were processed for storage and in what quantities they were consumed over the winter, the distribution may, again, be highly variable.

Evenness measures for wood use largely relate to the range of burning activities being conducted at a site (Table 5). Wood use in base camps and summer households should be mostly related to fuel use for processing and cooking activities and domestic woodworking tasks, such as the repair and/or discard of tools. These activities may result in high or low evenness, depending on the kind of burning being conducted and the corresponding kind of fuel required, or what was available. Fuel use in short-term camps also may be limited by the species that are locally available. Unless a particular fuel is burned for a special task (which would lead to extremely low evenness), high or low evenness may result. In a winter household, fuel is at a premium for both warmth and cooking. Woods burned as fuel in the winter should include a majority of preferred woods stockpiled for winter and a minority of other wood scraps burned more occasionally, resulting in a distribution with low evenness. A year-round household, finally, combines the fuel use activities of the summer and winter. Fuels used for processing, cooking, repair, warmth, as well as the discard from other activities, should produce a distribution with low evenness.

Abundance

The third variable used in this analysis is abundance, or the relative quantity of remains. Abundance can be standardized between deposits using a density measure (Miller 1988: 73). Densities allow a comparison between or within deposits that can provide information about the nature and relative intensity of use of contexts and/or particular resources, or alternatively, of refuse disposal patterns (Pearsall 1989). In this analysis, density is measured as number of seeds/litre. Density expectations are also assigned a high or low rating.

Density of seeds may indicate a range of formation processes, such as the relative intensity of food-related activities or alternatively, the level of housekeeping associated with these activities. Ideally, base camps and short-term camps focused on plant processing, as well as summer and year-round households, should produce a high density of seeds, since processing activities at these sites involve frequent and often intensive burning. However, this picture is confounded by formational processes that differentially affect outdoor processing areas *versus* interiors of households. Whereas routine housekeeping activities such as sweeping the floors and cleaning out the hearths can be expected inside permanent household dwellings, cleaning activities should be rare to non-existent in outdoor processing areas (Hayden and Cannon 1983). As a result, charred seeds and other debris will likely accumulate at a much slower rate inside houses than in outdoor processing contexts (*cf.* Lepofsky *et al.* 1996; Stahl and Zeidler 1990).

These respective formation processes have markedly different implications for archaeobotanical patterns related to processing activities in different site types. Seed density should be high in base camps and short-term camps related to plant processing which lack house structures, and relatively low inside summer and year-round houses. Evidence for processing activities, alternatively, will be absent from short-term camps not associated with plant processing and winter house contexts.

Consumption will be subject to much the same formational processes as processing activities. Seed density should therefore be high in base camps and low in year-round, summer, as well as winter houses. In short-term camps related to processing, however, consumption levels will be low since site occupation is temporally limited. The short period of site use in short-term camps not associated with plant processing should, again, keep seed density related to consumption low.

Habitat

The habitat of plant remains refers here to whether a particular plant resource was harvested within easy access of the site (local) or from more distant locations (non-local). I define local plants as those which could be harvested within a three hour walk or paddle from a site, and thus be accessible in a day trip. Non-local resources are those beyond three hours from the site, requiring at least an overnight trip to harvest[2]. Non-local resources could, however, also be acquired through trade.

In general, resource collection strategies should reflect the nature and duration of site use. A local pattern of resource collection should be associated with occupations where processing is the primary activity, such as short-term camps, base camps, and summer households. Though non-local resources may be obtained in these contexts, they will be extremely sparse or absent from the archaeobotanical record. Resources in winter and year-round households should, in turn, reflect collection and trade throughout the year and be derived from a broader spectrum of primarily local but also non-local ecosystems.

[2] *Sto:lo* elders suggest that, in the past, subalpine areas were a five hour hike on well-maintained trails.

Seasonality

The last variable considered in this analysis is the seasonality of archaeobotanical remains. In temperate areas, plants make effective seasonal indicators since they follow a predictable annual life cycle. However, since diagnostic plant structures do not grow in the winter in temperate climates, seasonality analyses on the Northwest Coast provide direct evidence for only spring through fall site use, while winter seasonality must be inferred by indirect means. The best seasonal indicators in Northwest Coast economies are plant foods which were only eaten fresh. Stored plant foods, which formed a critical component of the diet, could potentially reflect either in season or winter consumption.

Seasonality analysis should help to distinguish between short-term, semi-sedentary, and sedentary use of a site. Seasonal indicators in year-round households should include fresh foods harvested and consumed throughout the growing season as well as processed foods stored for winter consumption. The consumption of seasonal foods and the intensive processing of plant foods will also in occur in summer households and base camps, and therefore the seasonal indicators may mirror those in a year-round household. At a short-term camp, while seasonal foods may be both consumed fresh and processed, the seasonality should be temporally limited. Finally, a house occupied only in winter should be distinguishable by the absence of seasonal plant foods that cannot be processed and the corresponding presence of plant foods that are preserved for storage.

The foregoing discussion presented expectations for the patterning of seed and charcoal assemblages for various site types that may be encountered on the Northwest Coast. While many site types will be readily apparent based on archaeological attributes alone, in certain circumstances, archaeobotanical data may be the only avenue to differentiating between sites. In particular, the diversity, abundance, habitat, and seasonality of archaeobotanical remains should reveal the range of plant-related activities occurring at a site and may, in turn, suggest the duration and nature of site use. These attributes will be evaluated for three site deposits from the Scowlitz site in the ensuing analysis and discussion.

Chapter two: Palaeoethnobotany at the Scowlitz Site

Site Background

The upper Fraser Valley, much like the Northwest Coast as a whole, is characterized by great environmental variability (Suttles 1990b). The valley spans several major topographic and elevational gradients and encompasses an abundance and diversity of plant resources. The area is classified into three biogeoclimatic zones, including the Coastal Western Hemlock zone (sea level to 900 m), Mountain Hemlock zone (900 to 1800 m), and in small patches above this, the Alpine Tundra zone (Meidinger and Pojar 1991). The majority of the land base is located within the Coastal Western Hemlock zone (further divided into a series of sub-zones, see Green and Klinka 1994) and has an extremely rainy climate (1700 to 4400 mm p.a.), cool summers, mild winters, and moderate temperatures (5.2 to 10° C p.a.; Meidinger and Pojar 1991:96). Based on palaeoenvironmental research, this climate and its attendant vegetation is approximately 5000 years old in this region (Mann and Hamilton 1995; Whitlock 1992).

The Scowlitz site is located in the upper Fraser Valley and is strategically situated at the confluence of two prominent rivers, within access to a broad spectrum of ecosystems (Figure 1). The waterways of the area, including the Harrison and Fraser Rivers, Harrison Lake, and an extensive system of sloughs and tributaries, created an important network for trade and transport in the past. Water transport also provided site residents with access to a variety of local and non-local ecosystems, including those both up and down river. Overland trails provided further routes to habitats at all elevations, including coniferous and mixed forests, meadows, prairies, and parklands (Schaepe 1999). Forested ecosystems, in particular, furnished a broad range of plant and animal foods, materials for manufactures, and destinations for spiritual retreat. The abundance and diversity of resources in the Scowlitz environs could have provided a subsistence base for year-round occupation of the site.

The long and varied use of Scowlitz reflects the importance of this site to aboriginal peoples in the past (Table 6). The long span of site use (which began at least 2900 years ago; Lepofsky *et al.* in prep), in combination with the range of archaeological components present on site, makes Scowlitz an ideal location for studies of social and economic change at the site level. In this thesis, evidence for plant use in successive Scowlitz occupations is used to inform about changes in site economy and interactions with the broader environment. To this end, archaeobotanical data are evaluated from three site deposits, the burned orange deposit, and two household deposits, structure 3 and structure 4 (Figure 2).

Table 6. Chronology of deposits at Scowlitz[a]

Approximate Years bp	Deposit and location
300 bp	Surface platform, Area A
600; 1200 bp	Wet-site, Harrison Riverbank
800-1000 bp	Burned orange deposit, Areas A and C
800-1500 bp	Mortuary complex, site-wide and beyond
2400 bp	Structure 3, Area A
2600 bp	Possible processing area, Area E
1800-2700 bp	Other household structures, site-wide
2900 bp	Structure 4, Area A

a. Source: Lepofsky *et al.* in prep.

The burned orange deposit (BOD) is a 30 cm thick accumulation of sediment that stretches along the front terrace of the site, in a 15 m wide band, from Area A to Area C

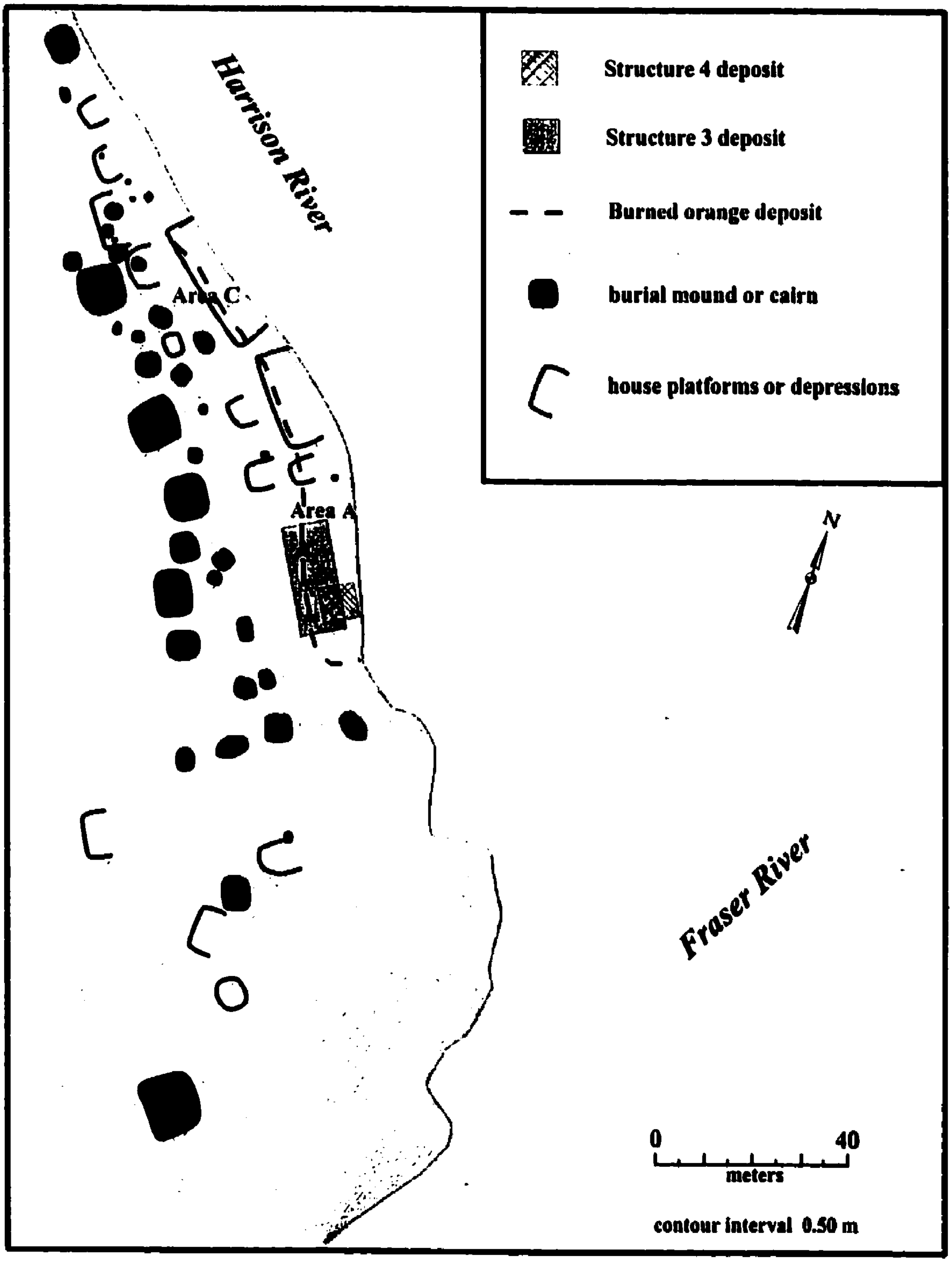


Figure 2. Plan map of the Scowlitz site showing the main features and relevant excavation areas

(Figure 2). This deposit, dated 1000 to 800 bp (uncalibrated), is composed of extensive burn features that are distributed in haphazard fashion on ephemeral overlapping surfaces. These *in situ* burns consist of layers of ash, some charcoal, and highly oxidized sediments that are rich in faunal and botanical remains. The only other features associated with this deposit, apart from the ubiquitous *in situ* burns, are a single posthole and a possible cooking pit in Area A (Lepofsky *et al.* 1999).

One of the goals of this thesis is to further our understanding of the activities that produced such intensive, sustained burning in the burned orange deposit. One hypothesis, based on the redundant nature and haphazard distribution of the features, as well as the absence of structural remains (*cf.* Oyuela-Caycedo 1993, 1996), is that this deposit represents a short-term, intensive use encampment.

The burned orange deposit overlaps temporally with an extensive mortuary complex at Scowlitz that was initiated at approximately 1500 bp and continued until at least 800 bp (Lepofsky *et al.* in prep). This complex consists of numerous mounds and cairns that are built up-slope from the burned orange deposit along the back stretch of the terrace (Figure 2), and extend beyond the site proper across Harrison Hill (Blake *et al.* 1993; Lepofsky *et al.* in prep). The building and maintenance of this substantial mortuary complex is suggested to represent a transformation of the social system in the local group that inhabited this area (Lepofsky *et al.* in prep), and correspondingly, a shift in the perception of the site from secular to ritual. One of the larger goals of the project is to determine how the burned orange deposit relates to the larger ritual activities conducted on site.

Two additional deposits addressed in the thesis include the household deposits from structures 3 and 4 in Area A. Structure 3 comprises the remains of a house structure, likely of post and beam construction, that dates between 2400 and 2200 bp (Lepofsky *et al.* in prep; Morrison 1997). This structure was formed by a sequence of building episodes that produced a palimpsest of floors, hearths, postholes, pits, and benches. The labour investment required to build this house suggests long-term occupation by successive generations of a local household group (Lepofsky *et al.* 1999; Morrison 1997).

Structure 3 partially overlies an earlier household deposit, structure 4, which is the oldest dated deposit on site (*c.* 2900 bp; Lepofsky *et al.* in prep). Comparatively little is known about structure 4, since only a small portion of the floor and associated features has been excavated. One important difference between these household deposits is that structures 3 is considerably larger in dimension than the earlier structure 4. This finding has important implications for the social and economic organization of site residents at Scowlitz through time.

Several important research questions revolve around the nature and evolution of successive household occupations at Scowlitz. Based simply on the labour investment involved in building and maintaining these structures, it is hypothesized that these houses were occupied on a long-term, at least semi-permanent basis (Ames *et al.* 1992; Lepofsky *et al.* in prep; Morrison 1997). The seasonality of plant remains is used in this analysis to test the relative permanence of occupation associated with the household structures. The archaeobotanical assemblage is also used to inform about the nature and diversity of plant use activities practiced by the people who lived in these houses. Combined with other lines of evidence, these findings should ultimately lead to larger interpretations about the social and economic structure of the community that resided in this ancient Scowlitz village.

The Palaeoethnobotanical Analysis

Sampling

Palaeoethnobotanical goals in this thesis are evaluated through the analysis of archaeobotanical remains from the range of contexts associated with these three site deposits. Sample selection involved two criteria: 1) samples were selected to represent the range of contexts associated with each deposit; and 2) samples were chosen from contexts with the greatest integrity. In several cases, multiple flotation samples were selected from a single feature to provide information about depositional patterns within the feature (*cf.* Lennstrom and Hastorf 1995). Due to the scale of this study, the analysis was limited to thirty-one samples; twelve from the burned orange deposit, sixteen from structure 3, and three from structure 4. Of the 31 samples, nine samples (three samples each from the three deposits) were incorporated from an earlier analysis of Scowlitz plant remains conducted by the author (Lyons 1998). Table 7 provides a description of the various feature types analysed in this study.

The flotation samples were collected over the course of several field seasons at Scowlitz, in accordance with the larger sampling strategy for the project. During successive field seasons, samples were systematically collected from 100% of floor and feature contexts. Floors samples were scraped in 1.0 litre increments from 50 x 50 cm

Table 7. Description of feature types used in the analysis[a]

Feature type	BOD samples	Str. 3 samples	Str. 4 samples	Feature description
***In situ* burn**	1106, 1108, 1300, 1320			Amorphous burn features that consist of layers of ash and charcoal, within a matrix of heavily oxidized sediments
Hearth		1332, 1338, 1386		Either shallow and deep basin-shaped hearth features; these consist of layers of ash and charcoal and are often lined with sand and associated with boiling stones
Cooking pit	1303, 1304, 1306			A shallow pit with a formed rim and associated with boiling stones; fill consists of multiple strata of charcoal-rich sediments
Midden pit		68 (7 litre bulk sample)		Any pit with a lack of stratigraphy or 'jumbled' appearance in the fill (*i.e.*, may contain a mixture of sediments, FAR, and other refuse); in the context of a house, may be capped by cultural layers, such as floors, as a result of construction events
Surface	7, 10, 19, 23, 26			A cultural layer that represents an activity surface produced from heavy use and trampling of an area
Floor		44, 56, 69, 74, 92, 96	79, 87, 88	A cultural layer that represents either a prepared or unprepared surface and located within the bounds of a house structure

a. Sources: Brown and Lepofsky 1998; Lepofsky *et al.* 1999; Lyons unpublished field notes 1998; Morrison and Blake 1998.

sub-units designated within 2 x 2 m excavation units. Features such as hearths and pits were sampled in multiple 1.0 or 2.0 litre increments, in discrete layers, where present. Because large-scale areal excavation is a slow process, numerous samples were available from the upper (*e.g.*, burned orange) and middle (*e.g.*, structure 3) deposits of the excavation, while very few were available from the lower deposits (*e.g.*, structure 4). As such, samples selected for analysis are weighted towards the upper and middle deposits.

Samples from three types of contexts were chosen for analysis from the burned orange deposit: *in situ* burns, surfaces, and a possible cooking or processing pit (Table 7). The samples include four from *in situ* burns, two each from Areas A (nos. 1300, 1320) and C (nos. 1106, 1108), five samples from ephemeral (possibly activity) surfaces (nos. 7, 10, 19, 23, 26), and three samples from a possible cooking or processing pit (feature no. 37), including two from the fill (nos. 1303, 1304) and one from the rim (no. 1306).

Samples from three additional types of contexts were selected for analysis from structures 3 and 4: house floors, hearths, and a possible midden pit (Table 7). Those from structure 3 include six samples from various house floor contexts (nos. 44, 56, 69, 74, 92, 96) and three samples from hearths (nos. 1332, 1338, 1386). A bulk sample from pit feature no. 4, a feature capped by structure 3 floor, was also analysed in order to investigate issues of sample size for seeds and charcoal at Scowlitz (no. 68, subsample nos. 1-7). Finally, three samples were analysed from the structure 4 floor (nos. 79, 87, 88).

Flotation

The majority of the sediment samples were processed by manual flotation in the field. Typical of many coastal sediments, those at Scowlitz are difficult to process due to the sinkage of light fraction consituents. To counter this, sediment samples were treated with a de-floculant (10% solution of baking soda for each 1 litre sample; 10 ml baking soda: 1 litre of water) and left to stand for ten to fifteen minutes prior to flotation. The de-floculated sample was then transferred to a bucket and flotation conducted using a steel stand fitted with valves for controlled water flow. The bucket was first filled with water, causing dispersed light materials (*i.e.*, the plant remains) to float readily to the surface. This material was poured slowly into a 0.425 mm screen, the bucket filled again, and the process repeated. This procedure retrieved the most buoyant portion of the light fraction.

In order to separate the remaining plant materials from the heavy fraction (*i.e.*, sediment and debitage), the remaining light and heavy constituents were floated again using slightly greater hand-agitation. In most cases, this motion caused further soil dispersion, allowing light materials to rise to the top. The buoyant material flowed into the 0.425 mm screen and was removed to dry at frequent intervals. When all of the light fraction had been removed, only the heavy fraction was left in the bucket. This was removed to air-dry. After drying, both the light and heavy fractions were scanned to check that our recovery of plant remains in the light fraction and lithics and faunal remains in the heavy fraction was adequate (if not, samples were floated again). Samples were then placed into labeled paper bags and stored for analysis.

Laboratory Methods

The light fractions from selected samples were weighed and sorted. Each sample was passed through a series of nested geological screens (4.0, 2.0, 1.0, 0.425 mm) that divided the sample into manageable units for analysis. With the aid of a dissecting microscope (6-40x), the 4.0 and 2.0 mm fractions were completely sorted into their constituent parts (charcoal, needles, seeds, tissues, and modern [uncharred]). Because several categories of remains are difficult to distinguish in the 1.0 and 0.425 mm fractions, these size categories were sorted for seeds and needles only.

Standard identification procedures were used to identify all botanical remains (Friedman 1978; Pearsall 1989). Identification of all remains but the charcoal was accomplished with a dissecting microscope. Wood charcoal was randomly selected from the 4.0 and 2.0 mm screen and identified using a reflected light microscope (with a maximum magnification of 400x). Twenty-five to forty charcoal specimens were identified per sample, based on sample size tests conducted during the course of analysis. Five charcoal specimens were identified from each of the nine samples incorporated from the previous analysis (Lyons 1998).

Criteria for identification and quantification of macroremains

All remains were identified with the aid of a comparative collection housed in Lepofsky's palaeoethnobotany laboratory at Simon Fraser University. Published photographic, descriptive, and procedural references also were used, when available, to aid in the identifications of seeds (Beijerinck 1947; Martin and Barkley 1961; Montgomery 1977; Schopmeyer 1974), buds (Owens and Molder 1984), and charcoal (Friedman 1978; Hoadley 1990; Panshin and de Zueew 1980). Morphological attributes were the primary criteria used for the identification of all categories of remains (see below).

Many taxa in the Scowlitz assemblage could only be identified with a certain level of confidence. A '*cf.*' before any part of a designation means that the identification is uncertain but probable. In cases where designations are uncertain, I list the reference specimens against which the archaeological specimens were compared. Phytogeographic criteria were also considered in cases where multiple species of a genera that are not anatomically distinguishable are present in the study area. For example, while both western and mountain hemlock are available within proximity to the Scowlitz site, western hemlock is the primary conifer in the area, while mountain hemlock is only available above about 900 m (Meidinger and Pojar 1991: 114). As such, the source of hemlock charcoal is very likely western hemlock.

Morphological criteria used for seed identifications include dimension, shape, and surface characteristics. The dimensions given for seeds (length x width) are intended only as a rough indication of specimen size. Both written and numeric descriptions are assigned for shape, as per Montgomery (1977: 2-3). In the plant inventory presented in Chapter Three, morphological criteria are discussed for those specimens that are either unknown below family or for cases where multiple species of a genus are present in the study area. Unknown seeds are those that are complete or nearly complete with enough defining features to enable identification. These were grouped into types and assigned a letter designation; due to laboratory procedures, not all letters are represented. Unidentifiable seeds were those lacking sufficient features for identification. These are divided into unidentifiable whole seeds and seed fragments.

Criteria for the remaining categories of remains, including charcoal, tissues, and unidentifiable plant parts, are primarily based on morphological comparison with reference specimens and published sources. Charcoal identification involved the recognition of anatomical features from the cross, tangential, and radial sections of specimens. 'Tissues' are the remains of non-charcoal vegetative tissues, including roots, tubers, and other storage organs (Hather 1993). These were identified by their amorphous, non-cellular, and often bubbley-looking structure. With an expanded comparative collection, these may be further identifiable at a later date. Lastly, plant remains that were unidentifiable or did not fit other categories were combined in a final catch-all category called 'unidentifiable plant parts'.

All macroremains were recorded by either count or weight. Seeds, needles, buds, identified charcoal, and other small plant structures were counted. Identifiable seeds were counted as MNI's, where one half or more of a seed is counted as 'one'. Unknown seed types and unidentified seeds were tallied as one each; unidentified seed fragments were also tallied as one. Weights were used for non-woody tissues as well as the modern (uncharred) component of samples. Although weights often registered as low to negligible for these constituents, counts offer no meaningful information.

In addition to total counts and weights, a ubiquity measure was assigned to each remain (Tables 8-11). Ubiquity measures the percentage of taxon presence in a sample or across a number of samples, regardless of the abundance of occurrence in each case. Presence values provide a comparative measure within a sample that controls somewhat for the differential preservation of species (Popper 1988: 61).

CHAPTER THREE: INVENTORY OF MACROREMAINS RECOVERED FROM SCOWLITZ DEPOSITS

The following is an inventory of the plant remains recovered from 31 samples (35.7 litres) in three Scowlitz deposits (Tables 8-11). A total of 42 taxa were recovered, representing 26 plant families in the form of seeds, needles, buds, tissues, charcoal and additional plant parts. The inventory is organized by family, genus and species (following Hitchcock and Cronquist 1973). All macrobotanical categories are described for each family by their relative presence (ubiquity), quantity (count), ecology, and ethnobotanical use(s) where available. Specific identification criteria are provided for seeds that are unknown, including those where multiple species of a genera are available in the study region and those identified only to family level. Where designations are secure, identification criteria were based on an examination of attributes in the comparative collection in Lepofsky's Laboratory at Simon Fraser University, in addition to published sources. Ecological information is derived from Green and Klinka (1994), Hitchcock and Cronquist (1973), Klinka *et al.* (1989), Meidinger and Pojar (1991), and Pojar and MacKinnon (1994). Ethnobotanical sources include Compton (1993), Galloway (1982), Gunther (1945), Kuhnlein and Turner (1991), Norton *et al.* (1984), Stewart (1984), Turner (1995, 1998), Turner and Bell (1971), Turner and Kuhnlein (1982), Turner and Peacock (in press), Washbrook (1995), and Woodcock (1996). Palaeoethnobotanical information is derived from Lepofsky (in press a), Patenaud (1985), Stenholm (1995, 1996), and Wollestonecroft (in prep). Ethnographic sources include Barnett (1955), Emmons (1991), and Suttles (1955, 1968).

GYMNOSPERMAE

Cupressaceae (Cypress family)

Chamaecyparis nootkatensis (Yellow cedar)

Yellow cedar occurs as only a single charcoal specimen from a hearth context in structure 3. The distribution of yellow cedar in the region is limited to upper elevations and wetter parts of the Coastal Western Hemlock zone (Meidinger and Pojar 1991:96). Yellow cedar was extensively sought-after by Salish peoples. Many kinds of implements were made from this straight-grained wood, particularly paddles, bows, utensils, and ritual paraphernalia such as paddles for dancing regalia (Pojar and MacKinnon 1994: 43; Stewart 1984; Turner 1998:67-8; Turner and Bell 1971: 70). Though yellow cedar is not abundant in the study area, its presence in the assemblage may underestimate its actual use, since the wood was used for carving and ritual activities more than as a fuel (Stewart 1984: 96, 98). Because of this bias, the wood had few opportunities to be converted to charcoal and preserved.

Thuja plicata (Western redcedar)

Redcedar charcoal is fairly ubiquitous in the Scowlitz assemblage, identified in 13 of 31 samples. Its abundance is relatively low, however, representing an average of 4% of the total count of charcoal per sample. In addition to charcoal, redcedar buds and needles were also recovered from three samples, in one case in extremely high numbers (sample no. 1300 in BOD, n=412 needles and n=86 buds).

Redcedar is a primary component of the Coastal Western Hemlock biogeoclimatic zone which dominates much of the Coast Salish region. It prefers shaded forests in cool, moist, nutrient-rich soils, and is found at low to middle elevations (Klinka *et al.* 1989:

229). This tree was the primary wood resource used by South Coast peoples (Stewart 1984; Turner 1998). Redcedar was used in the construction of monumental art and architecture, including house planks and posts, as well as canoes. Many types of household implements, such as boxes and containers, were made from redcedar. The inner bark was used for a variety of manufactures including clothing, cordage, matting, and blankets, while the roots were used especially for baskets (Stewart 1984). Redcedar wood and outer bark were both recognized as fuel sources, particularly for smoking fish (Pojar and MacKinnon 1994: 42; Turner and Bell 1971: 71).

The moderate representation of redcedar charcoal in the Scowlitz assemblage may be reflective of depositional processes: because it burns quickly, redcedar was an occasional rather than a preferred fuel source (Stewart 1984: 96, 98). The occurrence of charred cedar needles is unusual in the archaeobotanical assemblage, because the leaves do not detach easily from the branch. The abundance of redcedar needles and buds in sample 1300 may be due to the accidental charring of boughs used for bedding, as they were used among the Squamish (Turner 1998: 75). Alternatively, the charred needles and buds may be derived from some kind of special activity, since redcedar boughs were sometimes burned for spiritual cleansing among the *Sto:lo* (Washbrook 1995: 49).

Pinaceae (Pine family)

Abies (True fir)

True fir charcoal occurs as single specimens in four samples from the Scowlitz assemblage. Several species of *Abies* grow in British Columbia, though *A. amabilis* (amabilis fir) is the only species consistently found in the study area (Green and Klinka

1994). *A. amabilis* is abundant throughout the southern Coast of B.C., growing as a common component of the understorey in stands with redcedar, western hemlock, and Sitka spruce (Pojar and MacKinnon 1994: 33). *A. amabilis* is highly shade tolerant and occurs only in wetter zones in these forests (Klinka *et al.* 1989: 66). Other true firs of the Northwest Coast, including *A. grandis* (grand fir) and *A. lasiocarpa* (subalpine fir), grow at more southern latitudes and upper elevations, respectively. Although true firs cannot be distinguished based on minute anatomy, the species present in the Scowlitz charcoal assemblage, based on phytogeography, is likely *A. amabilis*.

Given that amabilis fir is relatively common in the study area today, the low representation of true fir wood in the Scowlitz assemblage probably relates to its low economic value among coastal First Nations. The brittle wood of these trees was used by coastal groups for limited technological activities, such as making fishhooks (Turner 1998: 80-81).

Abies/Thuja (True fir/redcedar)

Two specimens from a single sample were identifiable only to this combined category. Taxodioid pits, a feature shared by both genera, were recognized in these specimens. Further identification was not possible since distinguishing features, in particular the presence of ray tracheids (Panshin and de Zeeuw 1980: 474, 484), were not clearly visible in the sections.

Picea (Spruce)

Spruce charcoal was present in small amounts in 16% of the samples. Two species of spruce can be found in the region. *Picea sitchensis* (Sitka spruce), which is widespread on the northern coast of B.C., grows primarily on specialized site types, including floodplains and exposed beaches, on the southern coast of the province (Meidinger and Pojar 1991:96). *P. engelmannii* (Engelmann spruce) is exceedingly rare throughout the coast, growing only at upper elevations (Pojar and MacKinnon 1994: 37). Species of *Picea* are difficult to distinguish based on anatomical features, since all species are characterized by thick-walled epithelial cells and piceoid cross-field pits (Panshin and de Zeeuw 1980: 457-462). *P. sitchensis* (Sitka spruce), however, is the most likely source of charcoal at Scowlitz.

Sitka spruce had particular ethnobotanical importance on the northern coast of B.C. and southwest Alaska, where redcedar was scarce. Spruce wood was employed among northern Northwest Coast peoples for many technological purposes analogous to redcedar (*e.g.*, Emmons 1991; Turner 1998). Engelmann spruce, in contrast, has no recorded ethnobotanical uses. The low presence of spruce in the Scowlitz charcoal assemblage is probably indicative of the lesser ethnobotanical importance and ecological availability of this tree to First Peoples of the southern coast of B.C.

Pinus (Pine)

A single specimen of *Pinus* was identified in the Scowlitz assemblage, based on the large, thin-walled resin canals and pinoid pits (Panshin and de Zeeuw 1980: 441). It is highly likely that the species is *P. contorta* (lodgepole pine), since other pines on the

Coast, including *P. monticola* (Western white pine) and *P. albicaulis* (whitebark pine), grow only at upper elevations (Pojar and MacKinnon 1994: 39). Lodgepole pine is relatively common throughout the region, in very dry and very boggy sites (Green and Klinka 1994). The low representation in the charcoal assemblage likely reflects the less preferred status of this wood in the industries of Northwest Coast peoples (Turner 1998:90-91).

Pseudotsuga menziesii (Douglas-fir)

Douglas-fir is the most ubiquitous conifer in the Scowlitz charcoal assemblage. The charcoal occurs in 55% of the samples by ubiquity, ranging from 3 to 33% of total charcoal per sample. Douglas-fir bark may represent a large proportion of the 'conifer bark' category, since the bark of Douglas-fir was highly regarded as a fuel source (Turner 1998:96). Douglas-fir needles were also found in 6 contexts.

Douglas-fir is abundant throughout the Coastal Western Hemlock zone, preferring drier conditions at low elevations and moister conditions on montane sites (Meidinger and Pojar 1991:96). Aboriginal peoples throughout the province valued the wood of Douglas-fir for its strength and durability (Turner 1998: 96). The wood was used to make dip-nets, harpoon shafts, weir stakes, and other implements, and as mentioned above, was widely sought as a fuel source because it burns hot and relatively smokeless (Turner and Bell 1971: 71; Washbrook 1995: 36). The rotted wood was used to tan hides (Barnett 1955). Douglas-fir needles, attached to the branch, were used to cover floors, beds, sweathouses, ice-fishing holes, to layer the ground for processing meat, and to shade fish and berries (Turner 1998: 96). The ubiquity of Douglas-fir wood and needles in the Scowlitz assemblage is not surprising, considering its local abundance and ethnobotanical value.

Tsuga (Hemlock)

Hemlock charcoal comprises a small proportion of the charcoal assemblage, identified in low abundance in eight of thirty-one samples. In addition to charcoal, Western hemlock needles were recovered from 7 samples. Two species of hemlock grow in the region, *Tsuga heterophylla* (western hemlock) and *T. mertensiana* (mountain hemlock). While hemlock wood is not anatomically distinguishable to species, the Scowlitz specimens are very likely western hemlock as this is the dominant conifer of the study area. Mountain hemlock is found at upper elevations within proximity to the site.

Western hemlocks have extremely high shade tolerance, and do well in dry to wet conditions. They can tolerate sites with a build-up of acid humus and decayed wood (Meidinger and Pojar 1991:96). Aboriginal use of this tree was relatively limited; hemlock was perhaps the least preferred among local wood sources (Turner 1998: 98). This may be because its wood is not as straight and therefore more difficult to work than other available conifers. The wood was used, particularly the knots, to make curved implements such as berry hooks and fish-hooks. The branches had uses such as bedding, cleaning fish, and lining steam pits (Turner 1998: 98-99). The hemlock charcoal may be related to occasional fuel use or discard of items; charred needles may be derived from any one of these activities.

Taxaceae (Yew family)

Taxus brevifolia (Western yew)

Yew was found in 16% of the Scowlitz samples. The charcoal was recovered either as single specimens or as a moderate number of specimens in these samples (*e.g.*, in sample 1306, n=5; in sample 1332, n=6). Although Douglas-fir and western yew share a number of common features, these identifications are based on the very gradual transition from early to late wood, close, double-coiled spiral thickening, absence of resin canals, and small, uniform cupressoid pits (Panshin and de Zeeuw 1980: 493).

Yew grows as an understorey species in mature stands of Douglas-fir and western hemlock on the southern coast of British Columbia (Pojar and MacKinnon 1994:40). It is a slow-growing and somewhat uncommon species, but was an extremely desirable wood to aboriginal peoples, due to its great strength (Turner 1998:100-101). Yew wood was used for making bows, wedges, and many kinds of implements, including fishing and war clubs (Turner 1998; Turner and Bell 1971; Washbrook 1996).

Because of its slow-growing nature, yew was probably saved for specialty items and used sparingly as fuel-wood. Cases where the charcoal appears in moderate abundance in the assemblage may reflect discard of a worn-out or broken tool.

<u>Unidentified conifers</u>

About 12% of coniferous charcoal and bark could not be further identified. This was the result, in many cases, of the small size of specimens available for identification (<2.0 mm).

Conifer buds

Conifer buds that were unidentifiable to species were found as one or a few specimens in four different contexts. These were likely brought to site incidentally, attached to branches for use as bedding or firewood.

MONOCOTYLEDONAE

Liliaceae (Lily family)

Maianthemum dilatatum (Wild lily-of-the-valley)

Single *M. dilatatum* seeds were found in two activity surface contexts from the burned orange deposit. This plant is a perennial herb that grows in shaded and moist, often river and stream-side areas (Pojar and MacKinnon 1994:103). Although it was not known a preferred food source ethnobotanically, wild lily-of-the-valley was eaten by various Salish groups, including the Lummi and Squamish, in both raw and cooked forms (Turner 1995: 50-51; Turner and Bell 1971: 76). Archaeobotanically, *M. dilatatum* was found in abundance, likely in an intensive processing context, at the Pitt River site in the Lower Fraser Valley (Patenaud 1985).

Poaceae (Grass family)

Eight different grass grains or caryopses were recovered from the three Scowlitz deposits. The identification of these specimens was based on the obovate to triangular shape of the grains, and in some specimens, the presence of a basio-lateral embryo. The lack of reference collections for the area, along with the lack of external features on many of these specimens, precluded identification below family. Grasses are among the most ubiquitous plant families worldwide, growing in a broad range of ecological conditions (Martin and Barkley 1961). Recovered in 23% of samples, the grasses present in the Scowlitz assemblage may have been introduced to the site for use in aboriginal technologies, such as basketry or adornment. Alternatively, since grasses are common components of human-disturbed environments, these grains may have been brought back to site attached to other economic plants and charred accidentally.

DICOTYLEDONAE

Aceraceae (Maple family)

Acer (Maple)

Maple was the most ubiquitous wood in the charcoal assemblage, representing 35% of the entire assemblage and 52% of the deciduous component. Two species of maple, *A. macrophyllum* (big-leaf maple) and *A. circinatum* (vine maple), which are indistinguishable based on minute anatomy, both grow in the study area. The charcoal in the Scowlitz assemblage is probably *A. macrophyllum*, which is much more abundant than *A. circinatum* in the study area today. Big-leaf maple is ubiquitous throughout the mainland of the south coast of British Columbia, growing on most site types, particularly moist, forested sites in low-lying areas (Meidinger and Pojar 1991:96). Its ubiquity, along with its reputation as a hot, smokeless fuel wood, made this species an extremely desirable and accessible fuel to aboriginal groups (Turner and Bell 1971:78). The wood of big-leaf maple was also widely used for carving paddles, mat creasers, spoons, combs, spindle whorls, and many other implements (Barnett 1955). The source of maple charcoal is probably related to fuel use, and additionally to other technological uses.

Betulaceae (Birch family)

Alnus (Alder)

Alder charcoal occurred in 52% of the contexts in the Scowlitz deposits, comprising 16% of the deciduous component of the charcoal assemblage. Due to the presence of uniseriate and aggregate rays, as well as scalariform plates in all species (Panshin and de Zeeuw 1980: 556), alders are indistinguishable to the species level. These specimens, however, are likely *A. rubra* (red alder), which is considerably more widespread than *A. sinuata* (Sitka alder) in the region, and is also well documented as a fuel source (Pojar and MacKinnon 1994:44). Red alder is common in disturbed areas, including avalanche tracks and wet sites such as stream-sides, at low to middle elevations (Meidinger and Pojar 1991: 96).

Red alder was considered to be the best fuel for smoking fish, including salmon and game, because it imparts little flavour to the food (Turner and Bell 1971:79; Washbrook 1996: 36). The wood was used for carving implements such as bowls, rattles, and spoons, while the bark had widespread usage as an orange-coloured dye (Turner 1998). The abundance of alder charcoal at Scowlitz likely relates to its local availability and overall utility in aboriginal technologies.

Caprifoliaceae (Honeysuckle family)

cf. Lonicera (Twinberry)

Charcoal specimens from three different contexts keyed out as twinberry (Friedman 1978). The features of this specimen include: a cross-section that is semi-ring porous with the pores arranged in multiples and chains; a tangential section with 1-5 seriate rays (but predominantly 1-2), and opposite to scalariform pitting; and, a radial section with sparsely distributed perforation plates that are usually simple and sometimes scalariform, nodular cross-walls, occasional spiral thickening, and heterocellular rays with upright cells 20+ high and 3-5 wide. Without a comparative reference specimen, it is difficult to definitively confirm this identification, because a number of shrubby, deciduous taxa occur in the study area.

According to the ethnobotanical record, First Peoples of the southern coast of B.C. did not use either species of honeysuckle, *L. involucrata* or *L. ciliosa*, (Turner 1995:141-2). Because these species are thin-branched and pithy, they seem to have low potential as fuel sources. Both species grow in wooded areas; *L. involucrata* prefers moist conditions such as stream-banks (Pojar and MacKinnon 1994:69).

Sambucus racemosa (Red elderberry)

Red elderberry seeds were the most ubiquitous at Scowlitz, recovered from 81% of the samples. In overall count (n=144), their abundance is second only to salal. The high representation of red elderberries in the Scowlitz deposits is consistent for archaeobotanical assemblages throughout the Northwest Coast (Lepofsky in press a). Red elderberries are abundant throughout the region, growing in open forests and fresh clearings at low to mid elevations (Pojar and MacKinnon 1994:70). Blue elderberries (*S. cerulea*) also grow sporadically in British Columbia, but their distribution is largely limited to southern Vancouver Island and points south (Pojar and MacKinnon 1994: 70). Based on available comparative specimens, *S. cerulea* seeds tend to be slightly larger than those of *S. racemosa*, though the shape and surface patterning is very similar. The archaeological specimens from Scowlitz most closely approximate the size range of *S. racemosa*.

Ethnographic sources describe red elderberries as a staple dietary item (Turner 1995:67). When the berries ripened in mid to late summer, they were collected in bunches using a pole with a hooked end. The berries required cooking before consumption, since their bitterness can cause nausea (Pojar and MacKinnon 1994:70). For large-scale processing, the stems were removed and the berries steamed for many hours in a pit or bentwood box, then dried into cakes on a rack over a fire (Turner 1995:68). The processed cakes were often eaten with cakes of sweeter berries, such as huckleberry or salal (Turner 1995: 68).

The ubiquity of elderberries at Scowlitz and in archaeobotanical assemblages throughout the Coast may be related to a number of factors. First, because the berries must be cooked, they are undoubtedly exposed to fire more than other kinds of berries. Second, the berries are widely available and easily processed. Third, the berries are known ethnobotanically as a staple resource, a case that seems to be affirmed in the past by the abundance of elderberry seeds in archaeobotanical assemblages throughout the Northwest Coast.

Chenopodiaceae (Goosefoot family)

Chenopodium (Goosefoot)

Chenopod fruits were found in charred form in 11 contexts in the burned orange and structure 3 deposits. While their ubiquity in structure 3 was low, chenopods were recovered from 75% of burned orange deposit contexts. *Chenopodium* species are found throughout the Americas and Eurasia, usually in association with agricultural and disturbed sites (Pojar and MacKinnon 1984:311). A single species of chenopods, *C. rubrum*, is indigenous to coastal British Columbia (Pojar and MacKinnon 1994:311).

Though chenopods are likely a weedy inclusion in the Scowlitz deposits, it is possible that the plant had some uses. While there are no reported ethnographic uses of the plant among aboriginal groups in the Northwest, Stenholm (1995) has suggested that the fruits may have been consumed in earlier times by aboriginal peoples. In several areas of the Americas beyond the Northwest, the fruits were consumed as either wild or cultivated plant foods (*e.g.*, Cowan 1985; Kuhnlein and Turner 1991; Minnis 1985; Pearsall 1988).

Compositae (Aster family)

A single achene from an aster was recovered from a pit context in the burned orange deposit. Because of its very worn surface, this specimen is discernable only to family. This specimen is identified as an aster based on its shape (rhombic [33] to transversely elliptic [8-9]), flatness, and dimensions (0.9 x 0.3 mm). No remnant pappus is apparent on this specimen. Asters are a cosmopolitan plant family represented by numerous species throughout the province.

Cornaceae (Dogwood family)

Cornus canadensis (Bunchberry)

One bunchberry endocarp was recovered in the Scowlitz seed assemblage from an *in situ* burn context in the burned orange deposit. Bunchberries grow as low perennials in moist areas and ripen in early fall (Turner 1995). Although various aboriginal groups in British Columbia consumed bunchberries, they were not among the most preferred berries; in fact, the Sechelt called them "the one that pretends to be salal" (Turner 1995:71). The reason for the low representation in the Scowlitz seed assemblage may be in part be related to their secondary economic importance and in part related to taphonomy, since the berries were eaten fresh and not processed (Turner 1995:71).

cf. Cornus (Dogwood)

A single specimen of charcoal from the structure 3 assemblage keyed out to *Cornus* (Friedman 1978: 69). Anatomical features of this specimen include: a cross-section that is diffuse porous with a pore arrangement that is largely solitary; a tangential section with uncrowded, scalariform to opposite pitting, scalariform perforation plates, and rays 1-5 that are seriate, and; a radial section with heterocellular rays and a lack of spiral thickening. The source of uncertainty related to this identification is derived from the small size of the specimen and lack of comparative materials. The specimen may either be *C. nuttalli* (Pacific dogwood) or *C. sericea* (red-osier dogwood), as both species are widespread in mixed stands across southern British Columbia (Pojar and MacKinnon 1994:51; 90). Red-osier dogwood is, however, much more common in the study area today. Turner (1998:168) notes that red-osier dogwood was used by groups upriver from the *Sto:lo* as fuel for smoking fish.

Ericaceae (Heather family)

Arctostaphylos uva-ursi (Kinnikinnick)

Single *Arctostaphlyos* nutlets were recovered from an activity surface associated with the burned orange deposit and the floor of structure 3. Two species of *Arctostaphylos* grow in British Columbia. *A. uva-ursi* (kinnikinnick) is a low, trailing evergreen shrub common throughout the coast on dry, well-drained slopes and bluffs (Pojar and McKinnon 1994:67). *Arctostaphylos columbiana* (hairy manzanita) is an erect or spreading evergreen that is limited in extent to sunny, dry areas in the southwest corner of the province (Pojar and MacKinnon 1994: 67). *A. uva-ursi* measures 4.3 x 2.5 x 2.0 mm and is obliquely elliptic in long section (Montgomery 1977: 104). Neither photographic nor reference specimens are available for *A. columbiana*, primarily because the species is so uncommon. Among other species in the genus, some have stony seeds that are coalesced like *A. uva-ursi*, such as *A. patula* and *A. glandulosa*, and others that comprise a solid stone, such as *A. glauca* (Schopmeyer 1974: 228). Though exact measurements were not available, the size of the nutlets varies between these species. Based on dimensions and distribution, it is extremely probable that the specimens from Scowlitz are *A. uva-ursi*.

The rather mealy berries of kinnikinnick (*A. uva-ursi*) were eaten raw and cooked by various Salish peoples; in addition, the leaves of this plant were used as a smoking tobacco (Turner 1995:76). Kinnikinnick berries ripen in late summer but stay on the plant well into the winter, while the leaves are available for harvest throughout the year (Pojar and MacKinnon 1994:67). The source of seeds in the Scowlitz deposits may be derived from either of these uses.

Gaultheria shallon (Salal)

Salal was the most abundant species in the seed assemblage, and third in ubiquity after red elderberry and *Rubus*. These seeds were distinguished from *Vaccinium*, the closest-resembling species, based on the consistently larger size and rounder surface features of these specimens. *G. shallon* was recovered in both small and large numbers from 42% of the samples. This variable distribution likely reflects two depositional processes: low quantities indicate that the berry was consumed incidentally in the season of harvest; high quantities suggest that this resource was processed for later use.

Salal berries were perhaps the favourite of all fruits on the Coast, because of their sweetness and wide availability (Turner 1995). Salal is among the most dominant understorey shrubs of coniferous forests in the Coastal Western Hemlock zone (Meidinger and Pojar 1991: 98). The berries of this shrub ripen in late summer and were picked by the cluster. Processing involved removing the stems and mashing the berries into a jam, cooking them or leaving them to sit, and finally, pouring the 'jam' into frames to dry into cakes over a fire or in the sun (Turner 1995:78; Turner and Bell 1971: 83). The cakes were rolled and stored for winter food. Salal cakes were a widely traded and coveted food source, and were also used as feast food (Gunther 1945; Suttles 1968). As suggested, the notable presence of salal at Scowlitz probably derives from in season consumption as well as intensive processing of this important resource for winter storage.

Vaccinium (huckleberry, blueberry)

Vaccinium charcoal was identified in a wide range of contexts, in 11 of 31 samples. Identification below genus is not possible because all species share a diffuse porous distribution, heterocellular rays, close, fine spiral thickening, and scalariform plates (Friedman 1978: 77). The presence of this charcoal is interesting, since it likely relates to the processing of berries in this genus. Eight species of huckleberries and blueberries grow at varying elevations throughout the coast. The most prodigious of these in the study area are upright spreading shrubs that prefer moist to dry coniferous forests. These include *V. parvifolium* (red huckleberry), *V. ovalifolium* (oval-leaved blueberry) and *V. alaskaense* (Alaskan blueberry), which grow at low to subalpine locations and are abundant in the Coastal Western Hemlock zone. *V. membranaceum* (black huckleberry) is also an upright, spreading shrub that is a common under-storey component associated with mountain hemlock and amabilis fir in the Mountain Hemlock zone (Green and Klinka 1994; Meidinger and Pojar 1989: 101, 117; Pojar and MacKinnon 1994: 54-5). Other *Vaccinium* species include low, mat-forming shrubs such as *V. deliciosum* (blue-leaved huckleberry), found in southwestern B.C. in open forest and subalpine meadows, *V. uliginosum* (bog blueberry), an erect to prostrate shrub found in bogs and alpine tundra, as well as creeping species such as *V. vitis-idaea* (lingonberry) and *Oxycoccus oxycoccos* (bog cranberry), which also grow in bogs as well as subalpine and alpine areas throughout the length of the B.C. coast (Pojar and MacKinnon 1994:54-59). *Vaccinium* berries ripen from mid summer to fall, depending on species and location. Red huckleberries, which are perhaps the most abundant in the study area, ripen in mid to late summer (Turner 1995: 88). Huckleberries and blueberries were among the favourites of all berries consumed by First Nations peoples on the coast.

The abundant presence of *Vaccinium* charcoal in the Scowlitz deposits may be a result of processing practices. Vaccinium berries may have been collected by 'pruning' the bush, or breaking off branches to be stripped of berries (Turner and Peacock in press). For red huckleberries (*V. parvifolium*), the "Sechelt used to smoke-dry the berries using the branches of the bush as part of the fuel" (Pojar and MacKinnon 1994:57). Smoke-drying of huckleberries and blueberries is also mentioned among Central and North Coast First Nations of B.C., especially the Tsimshian, who dried the berries in this manner for trade (Compton 1993: 237, 245, 249). Although no *Vaccinium* seeds were recovered from the deposits, the ubiquity of the charcoal suggests that the berries were harvested and brought back to site on the branch. The berries would then be removed and the branches used as fuel for processing. Alternatively, *Vaccinium* wood might have been a locally available and convenient (though small-branched!) wood source.

Fumariaceae (Fumitory family)

Dicentra formosa (Pacific bleeding heart)

Seeds from the genus *Dicentra* were recovered from two individual contexts in the burned orange deposit. There are two species of this genus in the Northwest. *Dicentra formosa* (bleeding heart) is a common perennial that grows on moist forests and stream-sides, from low to mid elevations, on the south coast of British Columbia (Pojar and MacKinnon 1994: 313). *Dicentra uniflora* (steer's head) is another species in this family found in the Northwest, which is limited in distribution to areas south and east of the study region (Pojar and MacKinnon 1994: 313). The seeds of *D. formosa* are approximately 1.9 x 2.4 x 1.4 mm in dimension and characterized by their smooth, glossy, black surface. No photographic or comparative references were available for *D. uniflora*. Based on distribution and seed characteristics, the archaeological specimens from Scowlitz are very probably *D. formosa*.

A single reference to aboriginal use of Pacific bleeding heart comes from the Twana of Washington, who apparently pounded and boiled the roots into an infusion intended to eliminate parasites and worms (Skokomish Indian Tribe 1995). No additional uses are mentioned for this plant in coastal ethnobotanies. The seeds in the Scowlitz deposits were most likely accidentally introduced as seed rain, but may also have been deposited either through incidental collection with economic species or medicinal uses.

Grossulariaceae (Currant family)

Ribes (Currant, gooseberry)

Two currant seeds were recovered in the Scowlitz seed assemblage, one in an *in situ* burn in the burned orange deposit, and one from the floor of structure 3. *Ribes* species are found in a variety of habitats throughout the region, often in moist and open sites at low to middle elevations. All nine coastal species were eaten fresh but not processed by aboriginal groups, as they are considered too small to harvest (Pojar and MacKinnon 1994: 84-6). Trailing black currant (*R. bracteosum*), probably the most widely used berry in this genus, was harvested in August and September (Pojar and MacKinnon 1994: 86). The two currant seeds in the assemblage are likely a product of incidental deposition during consumption of local currant species in the season of availability.

Labiatae (Mint family)

Satureja cf. douglasii (Yerba buena)

Possible yerba buena seeds were found in one context in the burned orange and two contexts in the structure 3 deposits. These seeds have a finely reticulate surface and basal depressions, are elliptic in shape (3-4; Montgomery 1977), and measure 1.25 x 0.8 mm. While the archaeological specimens are very close to reference collection specimens of yerba buena, the designation is uncertain since the reference collection of plants in the mint family was incomplete. Yerba buena is an aromatic perennial that grows in open and coniferous forests in the southern half of the province (Pojar and MacKinnon 1994: 245).

Yerba buena was used widely for cooking and medicinal purposes among coastal First Nations. The leaves were used to make teas and tonics, the latter of which was thought to be good for the blood (Turner 1995; Turner and Bell 1971: 84). The leaves were also rubbed on the body by hunters to disguise their scent (Turner and Bell 1971: 84). Seeds in the Scowlitz deposits may have been introduced through any one of these uses.

Polygonaceae (Buckwheat family)

Polygonum lapathifolium (Dock-leaved smartweed)

A single achene of *Polygonum lapathifolium* was recovered from the burned orange deposit. There are numerous smartweeds that grow in the region; most are weedy and grow in moist to wet conditions throughout the southern half of the B.C. coast (Pojar and MacKinnon 1994: 127). This specimen is identified as *P. lapathifolium* (dock-leaved smartweed) based on its dimensions (0.75 x 1.3 mm) and surface characteristics (smooth with a faintly stippled surface and a central depression). It is likely a weedy inclusion in the deposits since there are no recorded ethnobotanical uses for this species.

Portulacaceae (Purslane family)

cf. Portulaca

A single seed possibly identified as *Portulaca* was derived from a structure 3 floor context. This seed is transversely broadly elliptic (7) in shape with prominent papillae on its surface and a base with an obvious caruncle. Its dimenions are 0.7 x 0.7 mm. No reference specimens were available to compare with this specimen, however, it appears most similar in shape and surface characteristics (particularly the sculptured surface papillae) to *Portulaca* (Montgomery 1977: 169).

Rosaceae (Rose family)

Crataegus douglasii (Black hawthorn)

Six hawthorn endocarps were recovered from four samples in the burned orange deposit. Black hawthorn is a large shrub or small tree found in moist, open sites, especially edges and waterways, on the South Coast (Pojar and MacKinnon 1994:73). It is the only hawthorn which grows in the region.

The fruit is a dry and seedy drupe that was eaten by Salish peoples, fresh and probably dried, usually with grease (Turner 1995:112). As a food source of secondary importance, it is not surprising that hawthorn is represented in relatively low abundance in the deposits. It is unclear why hawthorn seeds appear to have been consumed in the burned orange but not the household deposits.

Fragaria (Strawberry)

Strawberry achenes were found in low abundance in five samples, one in the burned orange deposit and four from structure 3 contexts. These achenes may either be *F. vesca* (tall strawberry) or *F. virginiana* (blue-leaf strawberry), both of which grow in clearings and woodlands on the southern coast of British Columbia (Turner 1995:113). Tall strawberry is abundant at the site today. Blue-leaf strawberry is, alternatively, more common in the Interior of the province (Pojar and MacKinnon 1994:183). *F. virginiana* produces slightly larger seeds than *F. vesca*, but their surface characteristics are very similar (Montgomery 1977: 178). The specimens from Scowlitz appear to correspond most closely to comparative specimens of *F. vesca*.

Strawberries were a favoured spring fruit among Northwest Coast peoples. They are too juicy to dry for storage, but were coveted for their sweet flavour. Since strawberries are spring-ripening, and the berries were only eaten fresh, the presence of the fruits is a good indicator of spring seasonality.

Potentilla (Cinquefoil)

A single *Potentilla* achene was recovered from an *in situ* burn context in the burned orange deposit. While the size (1.0 x 0.6) and shape (obliquely ovate, 38-39; Montgomery 1977) of this specimen confirmed that it was from this genera, the surface characteristics and overall poor condition of the seed prevented a further level of identification.

More than ten species of *Potentilla* grow in open areas, wetlands, meadows, and rocky slopes at all elevations, throughout South Coast areas of British Columbia (Pojar and MacKinnon 1994: 186-187). Of these species, *P. pacifica* (Pacific cinquefoil, silverweed) had the greatest ethnobotanical value among First Nations peoples. Cinquefoil grows on wet sites on or near the sea; on the Central Coast, it was cultivated in intertidal gardens, along with springbank clover (*Trifolium wormskjoldi*), as an important feast food (Boas 1921; Deur in press; Turner and Kuhnlein 1982; Turner and Peacock in press: 11-12). Because multiple species of *Potentilla* are found in B.C., as well as the fact that Scowlitz is outside the distribution of *P. pacifica*, the specimen from the burned orange deposits is likely an accidental introduction.

Pyrus fusca (Pacific crabapple)

Two specimens of crabapple charcoal were identified in the Scowlitz charcoal assemblage, one each from the burned orange and structure 3 deposits. Crabapple is a common tree on moist sites and edges at low to mid elevations throughout the coast (Pojar and MacKinnon 1994:48). It is the only species of this genus that grows in the region. The wood of crabapple is hard and durable and was valued by the Coast Salish for making implements such as digging stick handles, spoons, tongs, fish hooks, bows and wedges (Turner 1998; Turner and Bell 1971; Washbrook 1995). Washbrook (1995: 37) mentions that among the *Sto:lo* crabapple wood was used as a fire-drill.

There is a possibility that individual crabapple trees or stands were cultivated and owned by local or regional groups. On the Central Coast of B.C., "the harvest from either single trees or 'crabapple gardens' was controlled by families or chiefs" (Turner and Peacock in press). Crabapple gardens may also have been cultivated in Coast Salish territory, among the Katzie (Suttles 1955; Woodcock 1996). Crabapple trees were a valuable cultural resource, and may have been available in anthropogenic habitats, in addition to their natural distribution. Crabapple trees can be found in the environs of the Scowlitz site today. The low representation of crabapple charcoal at Scowlitz may relate to its minor importance as a fuel. The stray specimens recovered may be the result of discard during the production, recycling, or discard of implements.

Rosa (Wild rose)

Six rose achenes were recovered from two Scowlitz deposits, 4 from the burned orange and 2 from structure 3. Roses are common shrubs throughout the region; they are found on site types including shorelines, thickets, meadows, and open woods (Turner 1995:119). Several wild rose species grow in the area, including *Rosa acicularis, R. gymnocarpa*, *R. nutkana*, *R. pisocarpa*, and *R. woodsii*. Among the comparative collection specimens, there was a great deal of overlap in the range of variation in the size and shape of the achenes. In terms of size, however, *R. gymnocarpa* was on average the largest (4.5 x 3 mm), followed by *R. nutkana* (4 x 3 mm), *R. pisocarpa* (3.5 x 2.5

mm), *R. woodsii* (3 x 2 mm), and *R. acicularis* (2.5 x 2 mm). By shape, *R. nutkana*, *R. pisocarpa*, and *R. woodsii* are irregular and angular, *R. gymnocarpa* is similarly shaped but with more rounded edges, while *R. acicularis* is long and thin, tapering to a point. The Scowlitz specimens also display a range of variation, but fall within the size range and fit best with the angular and irregular shape of *R. nutkana* and *R. pisocarpa*.

The Vancouver Island Salish may have eaten the shoots of these shrubs in spring and the fruits in the fall (Turner 1995). Many Coastal and Interior groups also ate the petals and used rose hips (hypanthium) to make tea (Kuhnlein and Turner 1991:248-9). Sources differ as to whether the *Sto:lo* consumed rose hips. Apparently, some groups gathered rose hips in the fall (Washbrook 1995: 17), while others consumed them only as famine food if needed in the winter, since the fruits remain on the branch (Kuhnlein and Turner 1991: 249).

The abundance of rose achenes in the Scowlitz deposits indicate that they were collected for some use, possibly as food or to make tea. Their collection indicates late August to winter seasonality.

Rubus (Raspberry)

Rubus endocarps were recovered from 45% of samples from all deposits, in each case in low numbers. A number of *Rubus* species are found in different ecosystems of the Coast. *R. spectabilis* (salmonberry) is found in abundance today on the Scowlitz site and its environs. *R. parviflorus* (thimbleberry) is also found within the site area, though not as commonly as salmonberry. Salmonberries thrive in moist to wet sites, in disturbed areas at low to upper elevations, and often grow as thickets (Pojar and MacKinnon 1994:76; Turner 1995:126). Thimbleberries also prefer open, fresh conditions.

Morphologically, the comparative collection specimens reveal a great deal of variation in the size of seeds within and among *Rubus* species. On the whole, *R. spectabilis* are slightly larger, flatter in cross-section, and with a larger length to width ratio (approximately 2.75: 1.5) than *R. parviflorus* (2:1). The Scowlitz specimens also vary considerably in size. They tend to approximate *R. spectabilis* more in shape and *R. parviflorus* more in size. Considering the variation between specimens, the shrinkage from charring, and other taphonomic processes, it is difficult to identify the various specimens to species (n=37). I tend towards *R. spectabilis* because of the size and shape characteristics. However, the designation is left at the more general level of genus until more reference specimens are available.

The fresh greens of both salmonberries and thimbleberries were consumed by coastal groups in early spring. When the berries ripened, they were also eaten fresh in the spring and summer. Salmonberry was the first among coastal berries to ripen, in the late spring. It was a favourite berry that was consumed in abundance by local groups when fresh, but was too fleshy to dry for storage (Turner 1995:127; Washbrook 1995: 17). Thimbleberries ripened throughout in the summer, and were not nearly as sought-after as salmonberries, possibly because thimbleberries do not ripen simultaneously on the branch . They were processed by some groups, such as the *Nuxalk* and *Kwakwaka'wakw*, on the Central Coast (Turner 1995: 124-125), but apparently not by the *Sto:lo* (Washbrook 1995:18). Since it is unlikely that either salmonberries or thimbleberries were processed at Scowlitz, the method of deposition was probably by incidental charring during in season consumption of these fruits.

cf. Rubus (Raspberry)

A small number of charcoal specimens recovered from two contexts in the structure 3 deposit keyed out as *Rubus* (Friedman 1978). These specimens have the following characteristics: the cross-section is semi-ring porous; the tangential section has scalariform and opposite pitting, rays 4-8 seriate, simple and occasionally scalariform plates, and nodular cross-walls, and; the radial section has no spiral thickening and heterocellular rays composed of very wide and tall bands of upright cells. *Rubus* charcoal is not distinguishable beyond genus level. The presence of *Rubus* charcoal in the structure 3 assemblage may be accidental, or alternatively, if fuel was in high demand, *Rubus* wood may have been used as fuel because it was readily available.

Salicaceae (Willow family)

Salix/Populus (willow/cottonwood)

The category willow/black cottonwood accounts for these genera in the family Salicaceae. Willows and cottonwood are difficult to distinguish anatomically because a very clear radial section is required to detect homocellular *versus* heterocellular rays (Friedman 1978). Because this section is difficult to obtain, *Salix* and *Populus* have been grouped together in this analysis. Charcoal from this category was identified in fourteen of thirty-one samples, ranging from single to more than 10 specimens. Both taxa grow in open and disturbed environments, usually on wet sites such as stream and river edges

(Pojar and MacKinnon 1994:46; 87-9). Both species are both locally abundant in the Scowlitz site environs today.

Aboriginal groups used willows and cottonwoods for a variety of purposes. Coast Salish peoples used various willow species to make rope from the bark and to construct bows from the wood (Turner 1998: 200-1). Willows are not mentioned as a fuel source in the ethnobotanies. Conversely, the wood of cottonwood was considered a valuable fuel, while the roots of cottonwood were dried for making friction fires (Turner 1998: 195-196). Cottonwood bark was employed in making containers and the wood used to make small dugout canoes (Turner 1998; Washbrook 1995: 38).

Both willows and cottonwoods were likely used on a constant basis by site residents. Willow was more likely employed for cordage and other fibrous technologies, since the branches are wispy and hard to collect. Cottonwood, on the other hand, may have constituted an easy and reliable fuel source in addition to being a technological resource.

Urticaceae (Nettle family)

Urtica dioica (Stinging nettle)

Two stinging nettle achenes were found in contexts from the burned orange and structure 4 deposits. The presence of these achenes is not surprising since this tall perennial plant reproduces prodigiously in wet, open, and especially disturbed habitats, such as human occupation sites (Pojar and MacKinnon 1994: 309). Stinging nettle is a main component of the vegetation at Scowlitz today.

Stinging nettle was an important source of fibre among Coast Salish peoples. The stems were collected for winter processing when the plants were mature and beginning to die in early fall, often October (Turner 1998: 203). The stems were dried for several days, then prepared by intensively pounding and rolling the inner stem pith on the thigh, with a maple implement (Turner 1998: 204). The fibres were used for making fish-nets, snares, and other fibrous goods. Stinging nettle seeds in the Scowlitz deposits may have been charred accidentally during the collection and preparation of the plant, or alternatively, introduced into the deposits as seed rain.

Unidentified deciduous charcoal

Unidentified deciduous specimens composed 8% of the deciduous portion of the charcoal assemblage. These specimens were usually in very poor condition, such that sections were very difficult to make and features difficult to discern.

Unidentifiable charcoal

Very few specimens were completely unidentifiable (n=13). In most of these cases, the charcoal was so decayed that it disintegrated during the preparation of the slide, in others, the features in the wood were no longer recognizable.

Unknown Seed Types

Type A---Type A seeds were recovered from sample 1320 in the burned orange deposit and sample 68-1 in structure 3. The shape of this seed is depressed obovate (52) with dimensions 1.5 x 1.2 mm. The seed coat is thick (approximately 0.2 mm) but largely eroded.

Type B—Three quarters of a Type B seed was identified in sample 1106 from the burned orange deposit. This seed fragment was in relatively poor condition with an eroded seed coat. The seed is oblong (15) to elliptic (3) with dimensions 0.7 x 0.2 mm.

Type C—This seed type was identified only in sample 1108 from the burned orange deposit. It is irregularly shaped, but closest to depressed ovate (43), with dimensions 0.5 x 0.3 mm wide.

Type E—Three type E seeds were identified: a single type E seed was recovered from sample 1304 in the burned orange deposit and two type E seeds from sample 1332 in structure 3. These seeds are obovate (48), 1.2 x 0.5 mm in dimension, and have a smooth surface.

Type G—One Type G seed was recovered from sample 1303 in the burned orange deposit. This seed measures 1.2 by 0.75 mm. It is reniform (depressed obovate; 52) and it has a faint pattern of surface reticulation.

Type H—Type H seeds were found in samples 1304 and 1306, both contexts from feature 37 in the burned orange deposit. This seed type is 0.85 x 0.3 mm, with a faintly stippled surface. This seed is oblong (15-16) to slightly ovate (3-4).

Type I—Type I seeds were recovered from samples 1300 and 1304 in the burned orange deposit. These seeds are 0.6 x 0.6 mm, irregularly shaped (closest to very broadly ovate; 41), with large 'dimples' in their surfaces.

Type J—A single Type J was identified in sample 1106. The fragment is thick, with a ridge down its centre and heavy fissures in the seed coat.

Type M—Type M is a seed fragment from sample 26. The surface is smooth, shiny, and finely stippled. There is an obvious caruncle at the end of a ridge down the seed's centre.

Type O—A single type O seed was identified in sample 1306 from the burned orange deposit. This seed is long and flat (1.2 x 0.75 mm) with two basal depressions. The shape is oblong (15-16) and the surface faintly stippled.

Type P—A type P seed was recovered from sample 1320 in the burned orange deposit. It is 1.0 x 0.5 mm in dimension, with an obovate (48) to triangular (76) shape, and a shiny, smooth surface.

Type Q—Type Q was identified in sample 1106 from the burned orange deposit. It is broadly elliptic (5) with a faintly stippled surface. Its dimensions are 0.4 x 0.5 mm.

Type R—Three type R seeds were identified, one from sample 1106 in the burned orange deposit and one each from samples 68-7 and 44 in structure 3. These seeds are almost heart-shaped (very broadly obovate; 51), 0.4 x 0.4 mm in dimension, with a finely stippled and slightly shiny surface finish.

Type S—Type S seeds were identified in sample 1106 from the burned orange deposit and sample 68-7 from feature 4 in structure 3. These seeds have a depressed obovate shape (53) and a 'knobby' surface with a very eroded seed coat. They measure 0.75 x 0.4 mm.

Type U—A type U was also identified in sample 1106. This seed has an ovate (39) to broadly obtriangular (89) shape. The narrow end of the triangle is 0.2 mm, the wide end is 0.6 mm, and the length is 1.0 mm.

Type V—One type V seed was recovered in hearth sample 1386 from structure 3. This seed is slightly assymetrical ovate (39). It has a faint ridge around its centre and is flatter below the ridge and rounder above it. It is 1.7 mm in length and 0.8 in width.

Type W—A type W seed was identified in sample 23 from the burned orange deposit. It is broken, but probably was 0.75 x 0.5 mm in dimension. Its shape is elliptic (4) to oblong (16) and its seed coat relatively robust.

Unidentified whole seeds—Whole seeds are considered unidentifiable when diagnostic features, such as the seed coat, are missing. Five unidentified whole seeds were recovered from the Scowlitz deposits; three from the burned orange and two from the structure 3 deposits.

Unidentified large seed fragments---Large seed fragments were recovered from 3 samples each in the burned orange and structure 3 deposits. Though fragmentary, these pieces should be identifiable with a larger comparative collection because there are so few large seeds on the Northwest Coast.

Unidentified small seed fragments---Small seed fragments were recovered from over 60% of samples. These fragments would be very difficult to identify further.

Unidentified plant parts---This category includes fragments comprising various plant parts, such as carpals and thorns. They are not considered to be further identifiable.

Unidentified tissues---This category includes non-charcoal vegetative tissues that likely represent the charred remains of root foods such as rhizomes, tubers, and other storage organs. At this time, these remains are not identifiable beyond this general category.

CHAPTER FOUR: QUALITATIVE & QUANTITATIVE ANALYSIS

Introduction:

Thirty-one archaeobotanical samples analysed yielded abundant archaeobotanical remains in the form of charcoal, seeds, needles, buds, tissues, and various small plant structures. As described in the previous chapter, forty-two taxa from twenty-six plant families were recovered from the burned orange, structure 3 and structure 4 deposits (Tables 8-11). Over twenty additional taxa were represented by specimens that could not be identified.

This chapter provides qualitative and quantitative analyses of the archaeobotanical remains recovered from the burned orange and structure 3 deposits. I present analyses of the source, diversity, abundance, and seasonality of the seed assemblages from these two deposits, followed by analyses of the source, diversity, and abundance of the respective charcoal assemblages. Due to the small number of flotation samples analysed from structure 4 (n=3) and the paucity of plant remains recovered from them, the analysis of this deposit is limited to qualitative observations about the source and seasonality of the plant remains.

The Seed Assemblage

Source of Seed Taxa

Interpreting the source of plant remains is an integral component of understanding processes of deposition and preservation in an archaeobotanical assemblage (Pearsall 1988: 224-225). The source of seeds (and other macroremains) can be derived from both natural and cultural processes in modern and ancient times (Minnis 1981). Natural

Table 8. Charred Plant Remains from the Burned Orange Deposit in Areas A and C

CONTEXT					SEEDS (N)																		
Area/Deposit/Feature no.	Context type[a]	Sample no.	Volume (l)	Weight (g)	*Arctostaphylos uva-ursi*	*Aster*	*Chenopodium*	*Cornus canadensis*	*Crataegus*	*Dicentra formosa*	*Fragaria*	*Gaultheria shallon*	*Maianthemum dilatum*	Poaceae	*Polygonum lapathifolium*	cf. *Potentilla*	*Ribes*	*Rosa*	Rosaceae	*Rubus*	*Sambucus racemosa*	*Satureja* cf. *douglasii*	*Urtica dioica*
A/BS	S	7	1	6.04			1												1	1	1		
	S	10	1	6.16			1														5		
	S	19	1	12.9					1			1	1						1	2	1		
	S	23	1	8.58										1					1		1		
	S	26	1	9.8	1				2			2	1						1	1	7		
A/BOD/37	PF	1303	1	17.4			1					7								5	12		
A/BOD/37	PF	1304	1	19.7			1					6		1	1					5	21		1
A/BOD/37	PR	1306	1	18.15		1	2			1	1			1						2	4		
A/BOD/38	B	1300	1	23.6			3											2	1	3	20		
A/BOD	B	1320	2	14.55			19	1	2	1		4		1			1		1	3	4	1	
C/BOD	B	1106	2	14.73			5					135				1		1	1	3	26	1	
C/BOD	B	1108	2	10.56			1		1			3						1		2	5		
TOTAL			15		1	1	34	1	6	2	1	158	2	4	1	1	1	4	7	27	107	2	1
Ubiquity (%)					8	8	75	8	33	17	8	58	17	33	8	8	8	25	58	83	100	17	8

CONTEXT			SEEDS (N)																				NEEDLES (N)					OTHER				
Area/Deposit/Feature no.	Context type[a]	Sample no.	Type A	Type B	Type C	Type E	Type G	Type H	Type I	Type J	Type K	Type M	Type O	Type P	Type Q	Type R	Type S	Type U	Type W	Unidentifiable seeds	Unidentifiable seed fragments	TOTAL[b]	*Pseudotsuga menziesii*	*Thuja plicata*	*Tsuga heterophylla*	Unidentifiable	TOTAL	Conifer bud (n)	Tissues (g)	Unidentified plant part (n)	Bone (g)	Modern (g)[c]
A/BS	S	7																				4										0.2
	S	10																			1	6										0.2
	S	19																				7			1		1					0.2
	S	23																	1		5	4							Ng[d]			0.5
	S	26										1								2	2	18									Ng	1.8
A/BOD/37	PF	1303					1														17	26	1		1	2	4		Ng			0.61
A/BOD/37	PF	1304				1		1	1												11	39	1				1	1	Ng		Ng	0.9
A/BOD/37	PR	1306						1					1								22	14				1	1		0.01			1.06
A/BOD/38	B	1300							1		1										10	31	5	412	12	3	432	86	Ng	1	Ng	1.03
A/BOD	B	1320	1											1							9	40		2			2	1	Ng	1	Ng	2.24
C/BOD	B	1106		1						1					1	1	1	1		1	45	178	5	1	1	1	8		Ng	2	Ng	0.7
C/BOD	B	1108			1																6	14	6		3	1	10	2	0.04		Ng	0.49
TOTAL			1	1	1	1	1	2	2	1	1	1	1	1	1	1	1	1	1	3	128	381	18	415	18	8	459	90	0.1	4	0.05	8.92
Ubiquity (%)			8	8	8	8	8	17	17	8	8	8	8	8	8	8	8	8	8	17	83	100	42	25	42	42	67	33	67	25	50	100

a. Context Types: B=in situ burn; PF=pit fill; PR=pit rim; S=surface.
b. Seed fragments not included in seed totals.
c. All uncharred plant materials are modern.
d. Ng=negligible.

Table 9. Charred Plant Remains from the Structure 3 and 4 Deposits in Area A

CONTEXT					SEEDS (N)																							NEEDLES (N)				OTHER				
Deposit/Feature no.	Context type[a]	Sample no.	Volume (l)	Weight (g)	*Arctostaphylos uva-ursi*	*Chenopodium*	*Fragaria*	*Gaultheria shallon*	Poaceae	cf. *Portulaca*	*Ribes*	*Rosa*	Rosaceae	*Rubus*	*Sambucus racemosa*	*Satureja* cf. *douglasii*	*Urtica dioica*	Type A[b]	Type D	Type E	Type F	Type R	Type S	Type V	Unidentifiable seeds	Unidentifiable seed fragments	TOTAL[c]	*Pseudotsuga menziesii*	*Tsuga heterophylla*	Unidentifiable	TOTAL	Tissues (g)	Conifer bud (n)	Unidentified plant part (n)	Bone (g)	Modern (g)[d]
B10/4	P	68-1	1	50.5										1	1			1									3					Ng[e]				0.3
	P	68-2	1	54.7																							0					Ng				0.3
	P	68-3	1	53.9								1		1	1											1	3	2			2	Ng			Ng	0.2
	P	68-4	1	52.5					1			1			1												3					Ng				0.05
	P	68-5	1	54.6																						4	0		1	1	2	Ng				0.05
	P	68-6	1	53.2					1							1										3	2					0.1				0.4
	P	68-7	1	54											1	1						1	1			5	4		1		1	Ng		5		0.3
Str 3	F	44	1	11.24																		1				1	1									Ng
	F	56	0.7	5.2									1		1										1	1	2								Ng	0.3
	F	69	1	16.7				2						1	2				1						1	2	6	2			2	Ng	1		0.1	0.7
	F	74	1	18.93	1										7											1	8									0.2
	F	92	1	13.88											2											1	2									0.4
	F	96	1	5.94		1	5	1		1	1															1	9					Ng			Ng	1.1
Str3/48	H	1332	2	128.8		1	1	1						3	14					2						8	22								Ng	1.08
Str3/47	H	1338	2	163.1			2	50							3												55					Ng		2		7.01
Str3	H	1386	1	84.1			2	1						5	2									1			11									0.9
Str 4	F	79	1	8.25																							0									2.3
	F	87	1	20.13											1		1									1	2									2.8
	F	88	1	18.7				1	2				1		1						2					1	7					Ng				2.3
TOTAL			20.7		1	2	10	56	4	1	1	2	2	10	37	2	1	1	1	2	2	2	1	1	2	30	140	4	2	1	7	0.19	1	7	0.14	20.7
Ubiquity (%)					6	11	22	33	17	6	6	6	11	22	72	11	6	6	6	11	11	11	6	6	11	72	84	11	11	6	22	55	5	10	25	100

a. Context Types: F=floor surface; H=hearth; P=pit.
b. Seed types correspond to those in Table 8.
c. Seed fragments not included in seed totals.
d. All uncharred plant materials are modern.
e. Ng=negligible.

Table 10. Wood Charcoal from Burned Orange Deposits in Areas A and C

CONTEXT				SPECIES (N)																	
Area/Deposit/Feature no.	Context type[a]	Sample no.	Volume (l)	*Picea* sp.	*Pseudotsuga menzisii*	*Taxus brevifolia*	*Thuja plicata*	*Tsuga* sp.	*Acer* sp.	*Alnus* sp.	*cf. Pyrus fusca*	*Vaccinium* sp.	*Salix/Populus*	Conifer bark	Deciduous bark	? coniferous	? deciduous	Unidentifiable	% coniferous[b]	% deciduous	TOTAL
A/BOD	S	7	1													4	1		80	20	5[c]
	S	10	1													4	1		80	20	5
	S	19	1		1				26				11				2		2	98	40
	S	23	1													1	4		20	80	5
	S	26	1		1		1		35						1	2			10	90	40
A/BOD/37	PF	1303	1		3	1	2		12	9		6				5	2		28	72	40
	PF	1304	1	1			1	2	6	2		1				2			40	60	15
	PR	1306	1		2	5			2					5		1			87	13	15
A/BOD/30	B	1300	1		8			6	7	4		1		2		11	1		68	32	40
A/BOD	B	1320	2	3	13		3	1	3	5		1		4		5	1	1	74	26	40
C/BOD	B	1106	2		10		5	1	4	2	1	8	1	4		2	2		55	45	40
	B	1108	2	1	3		1	1	2	2		1		3		1			67	23	15
TOTAL			15	5	41	6	13	11	97	24	1	18	12	18	1	38	14	1			300
Ubiquity (%)				25	67	17	50	42	75	50	8	50	17	42	8	92	67	8			

a. Contexts: B=In situ burn; PF=pit fill; PR=pit rim; S=surface.
b. Percentages from specimens identified to the level of conifer/deciduous.
c. Samples where n=5 incorporated from a previous analysis (Lyons 1998).

Table 11. Wood Charcoal from the Structure 3 and 4 Deposits in Area A

CONTEXT				SPECIES (N)																								
Deposit/Feature no.	Context type[a]	Sample no.	Volume (l)	Abies/Thuja	*Abies* sp.	*Chamaecyparis*	*Picea* sp.	*Pinus* sp.	*Pseudotsuga menzisii*	*Taxus brevifolia*	*Thuja plicata*	*Tsuga* sp.	*Acer* sp.	*Alnus* sp.	*cf. Cornus* sp.	*cf. Lonicera* sp.	*cf. Pyrus fusca*	*cf. Rubus* sp.	*Salix/Populus*	*Vaccinium* sp.	Conifer bark	Deciduous bark	? coniferous	? deciduous	Unidentifiable	% coniferous[b]	% deciduous	TOTAL
B10/4	P	68-1	1				1		1				21	2					11				3	1		12	88	40
	P	68-2	1		1								18	7		1		1	9	2			1			5	95	40
	P	68-3	1					1	2				23	4					7					3		7	93	40
	P	68-4	1		1				2		1		13	10				3	3	6				1		10	90	40
	P	68-5	1							1			21	7					3	5			1	1	1	5	95	40
	P	68-6	1				2						21	9	1	1	1		4	1						5	95	40
	P	68-7	1								1		18	7		1			3	10						3	97	40
Str 3	F	44	1																				1	4		20	80	5[c]
	F	56	0.7						7		4	1	13						4			1	6	2	2	47	53	40
	F	69	1		1				4		1	1	20						4				2	2	5	26	74	40
	F	74	1																				1	4		20	80	5
	F	92	1																				4	1		80	20	5
	F	96	1																				2	3		40	60	5
Str 3/48	H	1332	2			1			4	6	1		7	13					5				3			27	73	40
Str 3/47	H	1338	2		1				8		15			2							2		1	1		90	10	30
Str 3	H	1386	1	2					3	1	5	2		4					2		2		4			76	14	25
Str 4	F	79	1																				3	2		60	40	5
	F	87	1																				2	3		40	60	5
	F	88	1						3				19						11				2	1	4	14	86	40
TOTAL			20.7	2	4	1	3	1	34	8	28	4	194	65	1	3	1	4	66	24	4	1	36	29	12			520
Ubiquity (%)				5	20	5	10	5	45	15	35	15	55	50	5	15	5	10	60	25	10	5	78	72	78			

a. Contexts: F=floor surface; H=hearth; P=pit.
b. Percentages based on charcoal identified to the level of conifer/deciduous.
c. Samples where n=5 were incorporated from a previous analysis (Lyons 1998).

sources can include seeds brought in by modern and ancient seed rain. Seeds deposited by cultural sources are derived from human actions. Methods of deposition are either through direct resource use, where plants were intentionally brought to the site for use, or indirect resource use, where plants were introduced to the site incidentally, for instance, attached in some manner to purposefully collected plants (Minnis 1981; Pearsall 1989).

I divided the seeds recovered in the burned orange, structure 3 and 4 deposits at Scowlitz by their potential sources. The sources are derived from the ethnobotanical record for the Coast Salish, and in some cases, for Northwest Coast groups more broadly. The first two categories in Table 12 are from seeds potentially linked to direct resource use. These include seeds from plants consumed as foods, beverages, and native tobacco, and seeds collected incidentally attached to other plant parts used in technology. The source of seeds in the third category is unknown, since these plants have no known uses on the Northwest Coast. Many of these seeds are, however, derived from plants that are weedy colonizers and may therefore have been deposited incidentally into the deposits, for instance, as seed rain. A number of seeds have several potential sources and are listed in more than one category. All of the seeds present in Table 12 are available within the site environs today and likely were in the past as well.

The largest category is seeds from plants that could have been consumed as foods, beverages, or as tobacco. Of these, nine taxa are berries, which, according to ethnobotanical sources, were eaten fresh. Two of these, salal and red elderberry, were also consumed in dried form (Turner 1995: 68, 78). Two additional seed taxa are from plants that may have been consumed as tea at Scowlitz, one made from wild roses

(Kuhnlein and Turner 1991: 249; Turner 1995) and the second from the leaves and stems possibly of yerba buena, a plant in the mint family (Turner 1995: 104).

Table 12. Potential source of seed taxa in the burned orange and household deposits[a]

Potential Plant Use	Taxa	Source/Nature of Use	BOD	Str. 3	Str. 4
Plants Consumed as Foods, Beverages, & Tobacco	Black hawthorn	Berry eaten fresh	X		
	Bunchberry	Berry eaten fresh	X		
	Gooseberry	Berry eaten fresh	X	X	
	Kinnikinnick	Berries eaten or leaves smoked	X	X	
	cf. Potentilla	Roots consumed	X		
	Red elderberry	Berry eaten fresh & processed	X	X	X
	Rose	Rosehip used for tea & famine food	X	X	
	Salal	Berry eaten fresh & processed	X	X	X
	Salmonberry	Berry eaten fresh	X	X	
	Strawberry	Berry eaten fresh	X	X	
	Wild lily-of-the-valley	Berry eaten fresh	X		
	Yerba buena[b]	Plant parts used for tea	X		
Seeds introduced with plants in technology	Grasses[b]	Technological use	X	X	X
	Stinging nettle[b]	Stems used for fibre production	X		X
No known ethnobotanical use on the Northwest Coast	Aster spp.[b]		X		
	Goosefoot[b,c]		X	X	
	Smartweed[b]		X		
	Pacific bleeding heart[b]		X		
	cf. Portulaca[b]			X	
Total Taxa (N)[d]			43	22	6

a. Sources: Galloway 1982; Gunther 1945; Hitchcock and Cronquist 1973; Kuhnlein and Turner 1991; Pojar and MacKinnon 1994; Turner 1995, 1998; Turner and Bell 1971; Turner and Kuhnlein 1982; Washbrook 1995.

b. It is assumed that any species in the table also could be introduced incidentally by humans or other agents. These species, in particular, are aggressive or 'weedy' colonizers that grow today in the site environs and are thus likely candidates of incidental introduction into the deposits.

c. Goosefoot has no known ethnobotanical uses on the Northwest Coast, but was consumed groups in other parts of the Americas. See text for further explanation.

d. Total taxa include unidentified types not listed here.

Additional seeds retrieved from the Scowlitz deposits may or may not have been derived from plants that were consumed as foods. The source of kinnikinnick, for instance, may be related to consumption, as these berries were commonly eaten by Northwest Coast groups (Turner 1995: 76-77). Alternatively, the source may derive from the use of the plant's leaves (with seeds attached) as a smoking tobacco (*cf.* Turner 1995: 76-77). The source of a possible *Potentilla* achene recovered from the burned orange deposit is also questionable. While this specimen could not be identified below genus, many *Potentilla* species have considerable value among Coastal First Nations. On the Central Coast, for instance, *P. pacifica* was cultivated in intertidal gardens as a root food used for feasting (Boas 1921; Deur 1997; Turner and Kuhnlein 1982; Turner and Peacock in press). The source of this specimen remains unknown, however, due to the level of identification.

The source of chenopods (goosefoot) in the Scowlitz assemblage is uncertain, since this plant has no known ethnobotanical uses on the Northwest Coast. Chenopod fruits were, however, ubiquitous in the burned orange deposit and present in structure 3. In several areas of the Americas such as Eastern Canada (Kuhnlein and Turner 1991), the Southwest (Minnis 1985), the Southeast (Cowan 1985), and the Andes (Pearsall 1988), chenopods were collected wild as well as cultivated as a domesticated food source. Chenopods were abundant in two Interior B.C. sites, Keatley Creek (Lepofsky 2000) and site EeRb 140 in Kamloops (Wollestonecroft in prep), as well as in a number of sites in Washington state (Stenholm 1995, 1996). The small size of the chenopods at sites in the Northwest, including Scowlitz, seems to argue against the idea that the fruits were consumed, but the ubiquity of these seeds leaves this question open.

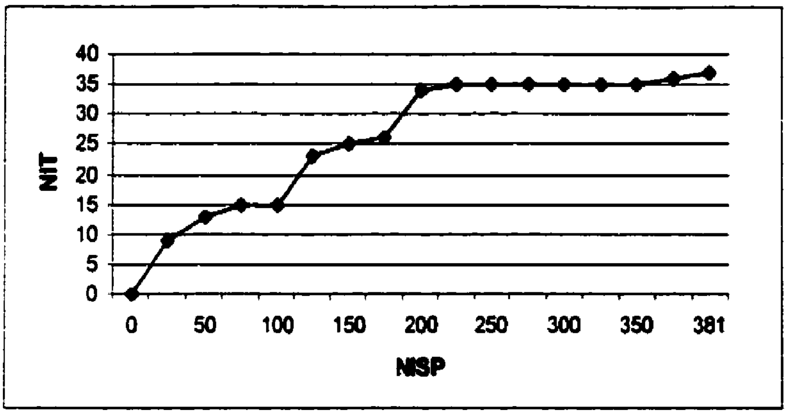
A number of seeds were introduced into the Scowlitz deposits with plants which, according to the ethnobotanical record, were used in technology. This category includes several grasses as well as stinging nettle. The grasses, which were recovered from all deposits (n=8), may have been employed in aboriginal technologies such as making mats or basket adornments (Turner 1998). However, the family level of identification prevents assigning a more specific source. Stinging nettle seeds, recovered in small quantities from the burned orange and structure 4 deposits, may have also been deposited through technological use. The stems of stinging nettle were collected in the fall and processed into a twine for making nets, snares, tumplines, and other fibrous manufactures (Turner 1998: 203-204). It is possible that the seeds from the Scowlitz deposits were incidentally collected during the processing of the stem for its fibre and accidentally charred. As suggested in Chapter One, seeds derived from plants used in technology are indirectly deposited in the archaeobotanical record and thus poorly represented in the seed assemblage.

Richness of Seed Taxa

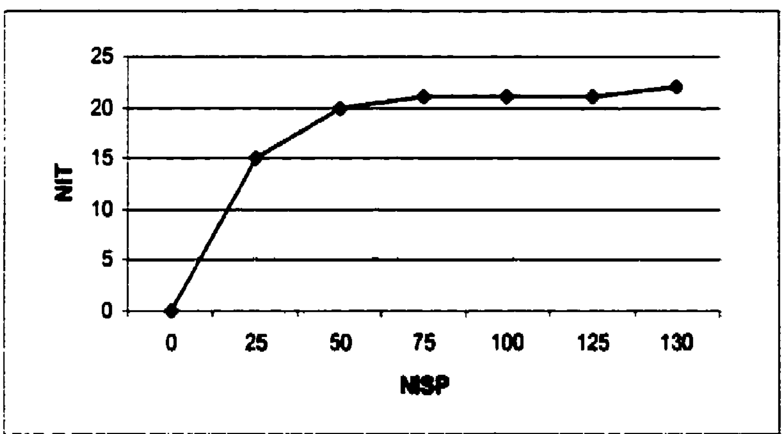
Sample richness is greater in the burned orange deposit than the structure 3 deposit, based on either the number of identified seed taxa[1] (BOD n=26; structure 3 n=14; the structure 4 assemblage is insufficient to assess richness measures) or the number of identifiable taxa (including identified and unknown seed taxa; BOD n=43, household n=22; *cf.* Lepofsky *et al.* 1996: 49). While the seed assemblage from the burned orange deposit has nearly twice the sample richness of that from structure 3, both

[1] This measure counts identified taxa as one each, including each member of the Rosaceae, since these taxa are distinguishable from each other, though presently not further identifiable.

deposits have relatively high richness, based on ecological sources for the study area (Green and Klinka 1994; Meidinger and Pojar 1991; Pojar and MacKinnon 1994). To examine whether the difference in richness between deposits is due to different sample sizes, I plotted the number of identified taxa against the number of identified specimens



3a.



3b.

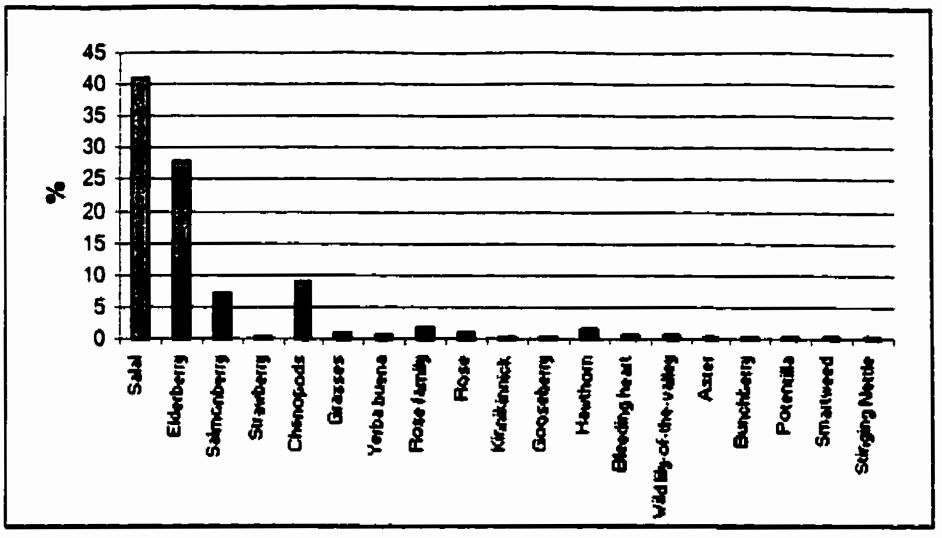
Figure 3. Number of identifiable seed taxa (NIT) plotted against number of identifiable specimens (NISP) from the (a) burned orange and (b) structure 3 deposits. NIT is based on identifiable taxa.

recovered (Figure 3). For both the burned orange (3a) and structure 3 (3b) deposits, the slope has nearly leveled, indicating that the number of taxa is approaching the true maximum number of taxa in each deposit (Krebs 1989: 187). These plots suggest that the size of these two samples is sufficient to compare sample richness between them.

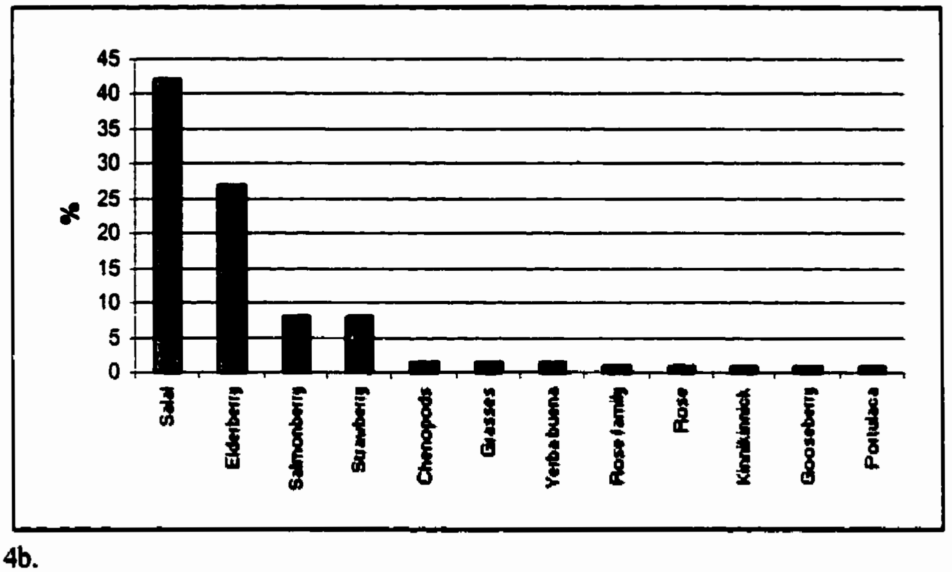
The difference in richness between the burned orange and structure 3 deposits can be explored by examining which taxa are present in each of these deposits (Table 12). Seeds from all potential sources, particularly major plant food resources, are represented in both deposits. One important difference between deposits, however, is that the seed assemblage from the burned orange deposit is composed of a much greater proportion of single identified and unknown seeds (see Figure 4; unknown seed types not shown). Identified taxa found only in this deposit include species that were considered supplemental plant foods, eaten seasonally and in small numbers, such as bunchberry and gooseberry (Turner 1995), and particularly, species that may have been accidentally introduced into deposits as seed rain, such as smartweed and chenopods. This difference in seed composition between the two deposits likely relates to differences in formation processes between deposits. In particular, there is a much greater potential for weedy species such as those derived from seed rain to be exposed to charring in an outdoor activity area, like the burned orange deposit, than within a house structure, such as structure 3 (see Chapter Five).

Evenness of Seed Taxa

Despite the greater richness of seeds in the burned orange than the structure 3 deposit, the overall shape of the distribution of species is quite similar in both assemblages (Figure 4). Evenness in both distributions is low; based on criteria outlined in Chapter One, this may reflect the use of major and minor plant resources by site residents during each occupation. Salal and red elderberry are the two most common species in both assemblages, followed by a number of less abundant species.



4a.



4b.

Figure 4. Percent distribution of seed taxa in the (a) burned orange deposit and (b) structure 3 deposit. Frequencies were taken as a percent of identifiable taxa.

Together, salal and red elderberry comprise the vast majority of seeds in the burned orange and structure 3 assemblages (BOD=69%; structure 3=67%). Both taxa are also present in the structure 4 assemblage (Table 12), though the low overall sample size precludes further interpretation. Historically, both salal and red elderberry were consumed in season as well as processed for winter use by the Coast Salish (*e.g.*, Turner 1995; Washbrook 1995). Salal berries, especially, are described by Turner (1995: 77) as "without a doubt the most widely used and plentiful fruit on the coast".

Many Coastal peoples also consumed red elderberries in abundance, often in combination with other berries to increase their sweetness (Turner 1995: 67; Washbrook 1995: 23). These berries had to be cooked before consumption because raw elderberries are said to have caused nausea (Pojar and MacKinnon 1994: 70). After being steamed in a pit or a bentwood box, the stems, seeds, and skins of the berries may have been removed before consumption (Kuhnlein and Turner 1991: 149). The fact that red elderberries had to be cooked before consumption may explain why these are the most common berries in archaeobotanical assemblages on the Northwest Coast (Lepofsky in press a: 22; Lepofsky *et al.* in press).

Many additional plant food taxa are represented by limited numbers in the Scowlitz assemblage (Figure 4), indicating that they were eaten only incidentally in season or on occasion. Two spring-ripening species that were favourites among Coastal First Nations, strawberries and likely salmonberries (Turner 1995: 113, 126-127), occur in low numbers in both the burned orange and structure 3 deposits. Because they are too juicy to dry, both these species were always consumed fresh (Washbrook 1995). Several of the more rare species in the assemblage were known as supplemental food sources that were eaten fresh and never processed (Turner 1995). These include gooseberries and kinnikinnick in both deposits, and black hawthorn, bunchberry, and wild lily-of-the-valley in the burned orange deposit. No incidentally consumed species were present in the structure 4 assemblage, though this result is likely due to small sample size rather than cultural behaviours.

Abundance of Seed Taxa within and between Deposits

As emphasized by Pearsall (1988: 97), "reliable interpretation[s] depend on understanding the processes that led to deposition and preservation of remains." Following from this, examining patterns of seed abundance (measured as density of seeds/litre) within and between deposits can increase our knowledge of depositional processes on site. At Scowlitz, seed densities are remarkably different between deposits. The average density of seeds in the burned orange deposit is four times that in the structure 3 deposit (BOD n=25.4 seeds/litre; structure 3 n=7.4 seeds/litre; insufficient data is available from the structure 4 assemblage to calculate density measures). As suggested earlier, differences in formational processes which resulted in a greater charring of seeds in the burned orange deposit likely explains this great discrepancy (see Chapter Five for further explanation).

Seed densities within deposits at Scowlitz also appear to be heavily influenced by formation processes. To evaluate the effects of different formation processes on specific contexts, I compared the density of seeds in *in situ* burns in the burned orange deposit to hearths in structure 3 and surfaces in the burned orange deposit to floors in structure 3. *In situ* burns from the burned orange deposit have more than double the seed density of structure 3 hearths (BOD *in situ* burns n=38 seeds/litre, structure 3 hearths n=18 seeds/litre). Surfaces associated with the burned orange deposit also have nearly twice the seeds of structure 3 floors (BOD surfaces n=7.8 seeds/litre, structure 3 floors n=4.0

seeds/litre). The greater density of seeds in burns and surfaces in the burned orange deposit may relate to a greater intensity of burning in this deposit, to the relative level of 'clean-up' associated with these contexts, or to both of these factors.

A comparison of the ratios of seed densities among these contexts, however, shows a similarity in depositional patterns between contexts in the burned orange and structure 3 deposits. In both deposits, the overall density of seeds from burn contexts (*in situ* burns and hearths) is approximately five times higher than from surfaces and floors (BOD *in situ* burn: surface, 5.3:1, structure 3 hearth: floor, 5.3:1). When the ratio of the two most abundant individual taxa, salal and red elderberry, are examined, salal is found in greater densities in burn contexts than surface/floor contexts (BOD *in situ* burns: surface, 5.7:1, household hearth: floor, 4.1:1). Red elderberry, on the other hand, is more common on surfaces/floors than in burn contexts in each deposit (BOD surface: *in situ* burn, 1.6:1, structure 3 floor: hearth, 2.3:1).

The reason for the divergence in depositional patterns between salal and red elderberry may relate to differences in the processing of these two resources. This is suggested by a comparison of the ratios of salal: elderberry in cooking pit no. 37 and *in situ* burns in the burned orange deposit. Salal is proportionately higher in *in situ* burns than in the cooking pit (2.7:1), while elderberry shows the reverse ratio (1:1.9). Turner (1995: 78) suggests that for processing, salal was mashed and then either boiled or left to stand in a box, then poured into moulds and dried over a fire (Turner 1995: 78). Red elderberries, in contrast, "could be steamed overnight in pits, [with] the leaves bent up at the edges to hold the juice, or boiled in tall cedar boxes using red-hot stones" (Turner 1995: 68). The resultant 'jam' was dried on racks over a fire. The fact that red elderberry was ethnographically processed in pits, while salal was not, may explain the high density of red elderberries in cooking pit no. 37 and the corresponding low density of salal. It remains unclear why salal shows a much stronger association with hearths and *in situ* burns and red elderberry with floor/surface contexts at Scowlitz. This patterning may relate to processing conventions of site residents in the past, or alternatively, to other depositional processes.

Seasonality of Plant Remains

Seasonality analysis is an important step in investigating the nature of site use associated with an occupation. Seasonal indicators from Scowlitz suggest that the site was inhabited for at least three seasons of the year during the occupations of the burned orange and structure 3 deposits (Table 13). While the structure 4 assemblage is small, the seasonality of the assemblage also tentatively follows this pattern.

The most definitive seasonal indicators in both the burned orange and structure 3 deposits are foods that were only eaten fresh in season. Spring ripening species which are too juicy to dry for storage, including strawberry and what is probably salmonberry (see Chapter Three), are present in both deposits. Summer plant foods consumed fresh are also represented, including small numbers of gooseberry and yerba buena in both deposits, and bunchberry and wild lily-of-the-valley in the burned orange deposit. Chenopods, which may have been a food source at Scowlitz, also bear fruit in summer. Chenopods are represented by single specimens in structure 3 and more substantial numbers in the burned orange deposit. Lastly, fruits available from mid summer to fall, but which can stay on the branch through the winter, were also recovered in small

Table 13. Seasonal indicators in three Scowlitz deposits

Burned Orange Deposit	**<--Spring-->**	**<--Summer-->**	**<-----Fall----->**	**<---Winter[a]--->**
Salmonberry[b]	(-----fruits[c]-----)			
Strawberry	(-----fruits----)			
Gooseberry	(------fruits---------)			
Red elderberry	(--------fruits[d]----------)			
Bunchberry		(----fruits---)		
Wild lily-of-the-valley		(----fruits-------)		
Yerba buena		(----leaves---------)		
Salal		(------fruits[d]---------)		
Wild rose		(----leaves; twigs-----)	(--------fruits[e]-------->	
Bleeding heart		(-----------------)		
Black hawthorn		(-------------------fruits------------------->		
Chenopod		(----------------)		
Kinnikinnick		(-----leaves--->--------fruits---------->		
Stinging nettle			(----stems----)	
Conifer buds	--bud dev't----)		(-bud dormancy-->	
Structure 3 Deposit				
Salmonberry[a]	(-----fruits-----)			
Strawberry	(-----fruits----)			
Gooseberry	(------fruits---------)			
Red elderberry	(--------fruits[d]----------)			
Yerba buena		(----leaves---------)		
Salal		(------fruits[d]---------)		
Wild rose		(----leaves; twigs-----)	(--------fruits--------->	
Chenopod		(----------------)		
Kinnikinnick		(-----leaves--->--------fruits---------->		
Stinging nettle			(----stems----)	
Conifer buds	--bud dev't----)		(-bud dormancy-->	
Structure 4 Deposit				
Red elderberry	(--------fruits[d]----------)			
Salal		(------fruits[d]---------)		

a. Winter seasonality is indirectly obtained by the presence of stored plants or inferred based on the use of plant parts that stay on the branch through the winter.
b. Salmonberries are a probable identification, see Chapter Three.
c. Plant parts with known ethnobotanical uses are listed in parentheses.
d. These plant foods are consumed fresh as well as in processed form.
e. An arrow denotes that seasonality extends into the next season.

numbers from two deposits. This includes black hawthorn in the burned orange deposit and kinnikinnick and wild roses in both the burned orange and structure 3 deposits. Plants recovered from the seed assemblages that were not used as foods also indicate site seasonality. Pacific bleeding heart, which is likely a weedy inclusion in the burned orange deposit, goes to seed late in the summer and into the fall. Stinging nettle, which may have been collected for technological purposes, produces seed in early to mid fall.

Conifer buds provide another indicator of site seasonality. Unidentified conifer buds were recovered as single specimens in one structure 3 and several burned orange deposit contexts. A large number of redcedar buds (n=86) were additionally present in an *in situ* burn context in the burned orange deposit. In general, conifers buds are initiated at the end of the growing season, lie dormant through the winter, and develop into cones or leaves in the spring. Redcedar bud initiation generally begins in late summer, and similarly, development occurs at the beginning of the growing year (Owens and Molder 1986: 9). The presence of unopened buds at Scowlitz suggests that either living conifer branches, with buds attached, were collected between late fall and spring, or that felled branches were collected (with buds attached) in any month of the year. The former possibility is more likely since branches which eventually fall off coniferous trees are usually those that have been dead for a long time and are therefore devoid of buds.

The most ambiguous but intriguing seasonal indicators at Scowlitz are plant foods that were processed for later consumption. As discussed above, salal and red elderberry are two species known to be processed ethnographically that were abundant in both the burned orange and structure 3 deposits, and also present in structure 4. Red elderberry ripens in early to mid summer, but remains on the bush for a longer period, while salal ripens in late summer to early fall (Turner 1995; Washbrook 1995). Elderberries were processed for immediate consumption as well as for storage. Salal was consumed fresh or processed for later use. The presence of processed plant foods in three deposits at Scowlitz has important ramifications for interpreting the socioeconomy of site residents. These include the implications of intensive processing for storage in all deposits, as well as the possibility of year-round residence in association with the household deposits (see Chapter Five).

The Charcoal Assemblage

Source of Charcoal Taxa

Similar to the seed assemblage, the charcoal assemblage at Scowlitz could be derived from a variety of sources (Table 14). The potential sources of charcoal demonstrate that a variety of woods were exploited for fuel and various technologies. The majority of species represented in the assemblage could have been collected within the environs of the Scowlitz site (Green and Klinka 1994; Meidinger and Pojar 1991; Pojar and MacKinnon 1994).

Several species, including big-leaf maple, Douglas-fir, red alder, and a combined category of willow and cottonwood, are known ethnobotanically as preferred fuel woods among Coast Salish peoples (Gunther 1945; Turner 1998). These and additional woods in the assemblage were used for purposes such as construction and implement-making, as well as tanning and dyeing operations. Redcedar, arguably the most important tree to Northwest Coast peoples, was used for a suite of manufactures, from clothing and baskets, to cordage and canoes (Stewart 1984; Turner 1998: 71-78). Yellow cedar and spruce, which are less available in the Coast Salish region than on the north coast of British Columbia, had several uses analogous to redcedar (Turner 1998: 67-68, 87-89).

Table 14. Potential sources of wood taxa in the burned orange and household deposits[a]

Species	Fuel[b]	Technology[c]	BOD	Str. 3	Str. 4
Deciduous Taxa:					
Big-leaf maple	P	I	X	X	X
Cottonwood/ Willow	P	C, I	X	X	X
cf. Crabapple		I	X	X	
cf. Pacific dogwood		(I), (T)		X	
Red alder	P	I, D	X	X	
cf. Rubus		I		X	
cf. Twinberry[d]				X	
Vaccinium	O[e]		X	X	
Coniferous Taxa:					
Douglas-fir	P	(C), I	X	X	X
Pine	O	(C), (I)		X	
Redcedar	P	C, I, T, D	X	X	
Spruce	(O)	(C), (I), (D)	X	X	
True fir		I, (T)		X	
Western hemlock	(O)	I, T, D	X	X	
Western yew		I	X	X	
Yellow cedar		(C), I		X	

a. Sources: Gunther 1945; Stewart 1984; Turner 1998; Turner and Bell 1971. All sources are specific to Coast Salish use, except those in parentheses, which refer to Coastal peoples in general
b. P=preferred; O=occasional
c. C=construction; I=implements, tools; T=tanning products, D=dye
d. No ethnobotanical uses are recorded for twinberry.
e. *Vaccinium* may have been used as fuel for smoke-drying berries, see text.

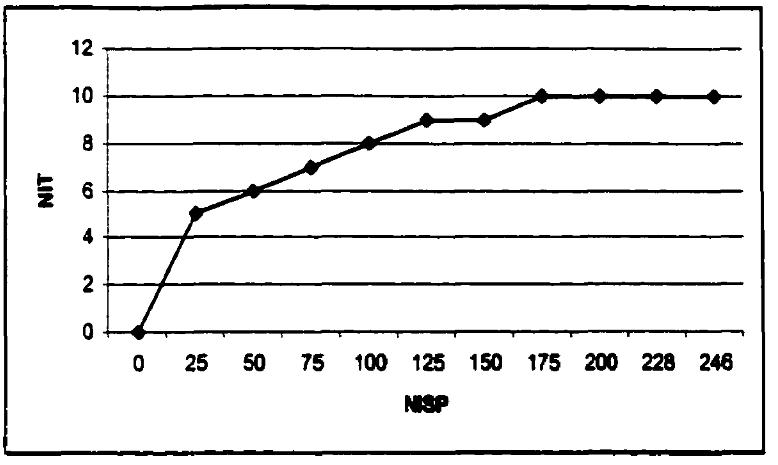
Many implements, such as bows, handles, and digging sticks, were made from the hard, resilient woods of western yew and crabapple (Turner 1998: 100, 183). Fishing implements, as well as dyes, tanning and cleaning solutions, were, alternatively, made from the wood of western hemlock. The branches of hemlock, with needles attached, were highly valued for bedding (Turner 1998: 98-99). Only one taxa recovered from the

Scowlitz charcoal assemblage, tentatively identified as twinberry, does not have recorded ethnobotanical uses.

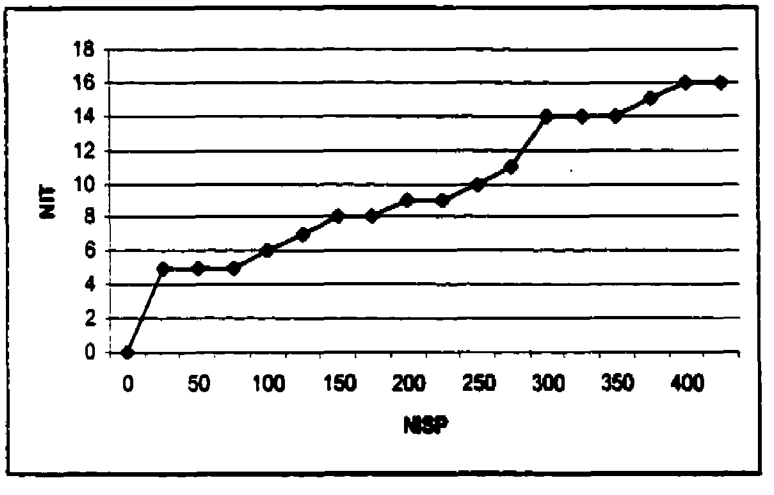
The source of charred *Vaccinium* wood may be related to the processing of *Vaccinium* berries (huckleberries and blueberries) rather than the direct use of the wood itself. The branches of *Vaccinium* tend to be thin and pithy and thus would have made poor fuel. *Vaccinium* berries were favoured by all Coastal First Nations (Turner 1995: 81-90). These berries were sometimes collected by 'pruning' the bush, that is, by breaking off branches to be stripped of berries (Turner and Peacock in press). For red huckleberries (*V. parvifolium*), the "Sechelt used to smoke-dry the berries using the branches of the bush as part of the fuel" (Pojar and MacKinnon 1994: 57). Smoke-drying of huckleberries and blueberries is also mentioned among Central and North Coast groups, especially the Tsimshian, who dried the berries in this manner for trade (Compton 1993: 237, 245, 249). Although no *Vaccinium* berries were recovered in the Scowlitz seed assemblage, a possible explanation for the source of the charcoal is that *Vaccinium* berries were harvested on the branch and brought back to the site to process. On site, the berries would have been removed from the branch and smoke-dried using the branches as fuel.

Richness of Charcoal Taxa

Like the seed assemblage, a diversity of charcoal taxa is represented in the burned orange and structure 3 deposits (the structure 4 charcoal assemblage is insufficient for diversity measures). However, contrary to the seed assemblage, which was richer in the burned orange than structure 3 deposit, charcoal richness is greater in the structure 3 than the burned orange deposit (Table 14; BOD n=10 taxa, structure 3 n=16 taxa). This



5a.



5b.

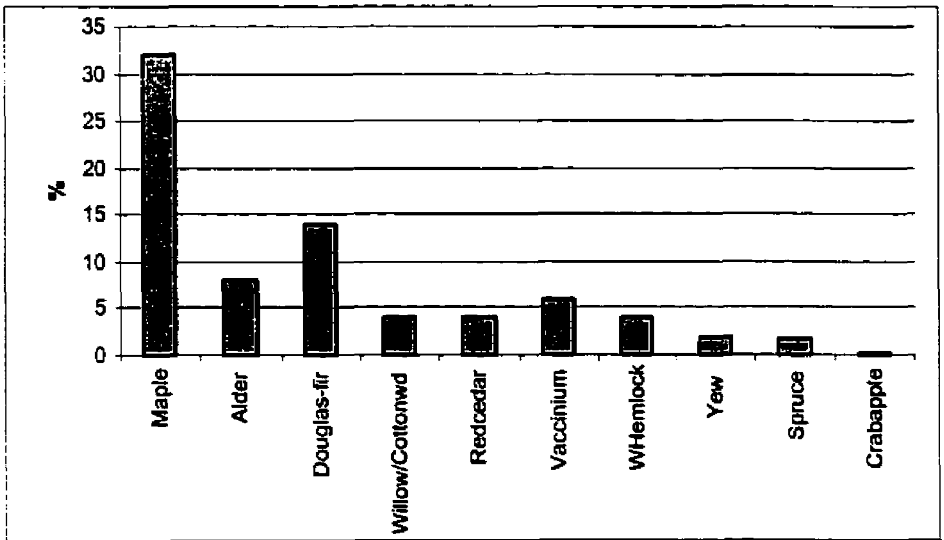
Figure 5. NISP plotted against NIT for charcoal assemblages from the (a) burned orange deposit and (b) structure 3 deposits. Calculations used all specimens identified to genus.

difference is especially dramatic when the number of identified taxa (NIT) is compared to the number of identified specimens (NISP) in each deposit (Figure 5). For the burned orange deposit, a sample of 175 specimens was sufficiently large to identify the 10 charcoal taxa (5a). For the structure 3 assemblage, though the examination of 480 specimens resulted in the identification of 16 taxa, the slope indicates that the sample is not adequate to represent the richness of species in this deposit (5b). Thus, the difference in richness between the two deposits is even greater than the current sample indicates.

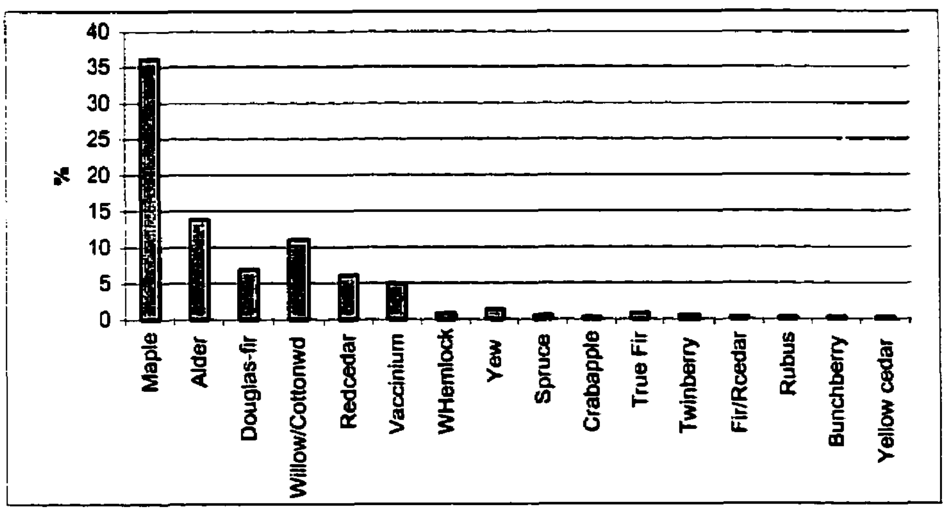
Evenness of Charcoal Taxa

In contrast to the difference in sample richness between deposits, evenness of taxa in both the burned orange and structure 3 assemblages is low (Figure 6). Like the seed assemblage, the distribution of taxa in both these deposits shows those with both high and low frequencies, indicating the use of both primary and secondary resources. Notably, the structure 3 assemblage has a much greater number of species known ethnobotanically to be used in aboriginal woodworking technologies rather than as fuels (Table 14). Their presence suggests that a greater variety of wood-related tasks were associated with this occupation.

The major components of both assemblages are fuel-woods, followed by woods used more occasionally as fuels and in other technologies (Table 14). Together, big-leaf maple, Douglas-fir, red alder, redcedar, and willow/cottonwood comprise the majority of the charcoal assemblages in both the burned orange and structure 3 deposits (In BOD, these comprise 64% of all taxa and 81% of taxa identified to the genus level; in structure 3, 70% and 87%, respectively; Figure 6). Big-leaf maple dominates both assemblages, suggesting it was the most accessible and/or preferred of fuel woods (32% of all taxa and 42% of taxa identified to the genus level in BOD, 37% and 44%, respectively, in structure 3; Figure 6).



6a.



6b.

Figure 6. Percent distribution of wood taxa in the (a) burned orange and (b) structure 3 deposits. Frequencies were taken as a percent of taxa identified to genus.

The notable presence of *Vaccinium* charcoal is probably directly connected to fuel use. *Vaccinium* is the fourth most abundant wood in the charcoal assemblage from the burned orange and the sixth most in that of the structure 3 deposit (In BOD, 6% of all taxa and 8% of taxa identified to genus level; in structure 3, 4.5% and 5.5%, respectively). As suggested above, the presence of this charcoal may indicate the processing of *Vaccinium* berries (huckleberries and blueberries) on site; the similar distribution in each assemblage may reflect continuity in the processing of this resource in the Scowlitz area through time.

The frequency of redcedar charcoal in both deposits likely underestimates the actual use of this species among Coast Salish cultures (4% of all taxa in each charcoal assemblage, 6% of those identified to the genus level). Although all Coastal peoples employed redcedar in a wide range of technologies, the use of both red and yellow cedar for fuel seems to have been somewhat limited. Cedar, evidently, burned too quickly for ordinary cooking, since it contains little pitch, but was employed in a more limited capacity for smoking hides and fish because it burns with little smoke (Pojar and MacKinnon 1994: 42; Stewart 1984: 96, 98). The relatively low representation of particularly redcedar in the Scowlitz assemblage underscores the influence of depositional and preservational biases in an archaeobotanical assemblage, which will be discussed further in the following chapter.

Archaeobotanical patterning in the Scowlitz deposits

The foregoing analysis has shown that several differences exist in the composition of the seed and charcoal assemblages from the burned orange and structure 3 deposits (Table 15). While the archaeobotanical data from structure 4 is sparse, it still provides sufficient data for a number of qualitative comparisons. The summary of archaeobotanical patterning presented in Table 15 is used, in the following chapter, to evaluate the nature of site use during successive occupations at Scowlitz.

Table 15. Comparison of the richness, evenness, abundance, habitat, and seasonality of seed and charcoal assemblages from three Scowlitz deposits

	Burned Orange Deposit	**Structure 3 Deposit**	**Structure 4 Deposit[a]**
Seed Assemblage			
Richness	High	High	n/a
Evenness	Low	Low	n/a
Density	High	Low	n/a
Habitat	Local	Local	Local
Seasonality	3 seasons	3 seasons	2 seasons
Charcoal Assemblage			
Richness	Low	High	n/a
Evenness	Low	Low	n/a
Habitat	Local	Local & non-local	Local

a. These assessments are tentative due to the small sample size from structure 4.

CHAPTER FIVE: PLANT USE AT SCOWLITZ

Introduction

In Chapter One, I presented expectations for the nature of archaeobotanical remains that could be associated with various archaeological site types in Coast Salish territory (and the Northwest Coast more broadly). These expectations suggested patterns for the diversity, abundance, habitat, and seasonality of plant remains derived from activities related to plant foods and technologies. Chapter Four presented analyses of the archaeobotanical assemblages from three Scowlitz site deposits. In this chapter, I use these analyses (Table 15), in conjunction with the archaeological data, to evaluate the nature of site use during respective site occupations. I then turn to a broader discussion of the implications of these findings for settlement patterns, plant use, and socioeconomy in *Sto:lo* territory.

The Burned Orange Deposit

The burned orange deposit, dated to 1000-800 bp, is the youngest of those examined in this analysis. This deposit, located at the front terrace of the site (in Areas A and C; Figure 2), is composed of multiple, ephemeral surfaces which contain overlapping *in situ* burns. The deposit exhibits a notable lack of structural remains. Archaeologically, the haphazard distribution and redundant nature of the features in the burned orange deposit (*cf.* Oyuela-Caycedo 1993, 1996), in combination with the lack of structural remains, suggests that this occupation served as either a base camp or short-term encampment.

The seed assemblage from the burned orange deposit

The substantial seed assemblage recovered from the burned orange deposit provides independent evidence for site use from the archaeological remains. This assemblage suggests that intensive plant food processing and plant food consumption were focal activities during this occupation. Activities related to technology can also be inferred from the seed assemblage. Patterning in the seed assemblage from the burned orange deposit is consistent with expectations for either a base camp or summer household occupation, which are largely indistinguishable based on archaeobotanical expectations (but see abundance discussion below; Table 15).

In Chapter One, I suggested that base camps and summer households should produce high seed richness as a result of food processing and consumption activities. Burning activities in the burned orange deposit, which were probably related to plant food processing, produced an assemblage with seed richness that was nearly twice as high as that produced in the burned orange deposit (BOD NIT=22; structure 3 NIT=43). The richness of seeds in the burned orange deposit is likely connected to the frequency and indiscriminate nature of burning associated with the open-air processing environment. Evidence for this hypothesis is found in the variety of plants represented in the seed assemblage. These include plant foods that were both intensively processed and incidentally consumed in season, seeds used in technologically that were indirectly deposited, and a number of weedy, airborne species that were accidentally charred.

Low seed evenness, in turn, in the burned orange deposit, also reflects the presence of plant food processing and consumption activities consistent with a base camp or summer household scenario. In the burned orange deposit, low evenness in the seed assemblage is the result of a high frequency of a small number of species and a much lower frequency of others. Primary plant food resources, including salal and red elderberry, were those processed (as well as consumed) in large quantities, while a range of secondary resources were consumed incidentally and charred in much smaller quantities. These latter resources include a suite of fresh plant foods such as hawthorn, rose hips, and likely salmonberry. Plants used in technology are also represented in low quantities in this deposit, by grasses and a single stinging nettle seed.

Abundance measures are where expectations for base camp and summer household scenarios diverge. In Chapter One, I suggested that high seed density should occur in outdoor processing contexts, as a result of the high rate of accidental charring and particularly, from the lack of site 'clean-up'. Conversely, housecleaning should be a much more prominent activity in households within a village context, including a summer house, and therefore result in low seed density. High seed density observed in the burned orange deposit appears to relate the former case, where an absence of cleaning was associated with outdoor processing areas (which are ubiquitous across the deposit) and where intensive and frequent burning was conducted. The high density of seeds in all contexts of the burned orange deposit, in concert with the lack of structural remains, supports the scenario of a base camp rather than a summer household (see below).

The habitat of plants represented in the seed assemblage from the burned orange deposit indicates an overwhelming pattern of local collection. Local resources were expected to be the primary source of foods and materials in warm weather occupations, such as base camps and summer households. Plants represented in the seed assemblage from the burned orange deposit are entirely local.

Finally, seasonal indicators from the burned orange deposit suggest a spring through fall occupation of the site. This evidence implies that Scowlitz was occupied on a consistent basis by at least a small group of people for many months. This assessment fits expectations for either a base camp or summer household, where site residents were harvesting and consuming plant foods, as well as collecting and perhaps repairing plants used in technology.

The charcoal assemblage from the burned orange deposit

Patterning in the charcoal assemblage from the burned orange deposit, alternatively, conforms to expectations for a base camp, summer household, or short-term camp. As seen in Table 5, charcoal patterning in each of these site types is indistinguishable. In the burned orange deposit, charcoal richness is low, indicating that woods were used for a limited number of purposes, in this case, fuel requirements for processing activities. Evenness is also low, with the distribution of taxa again reflecting a focus on fuel-woods. Species present in high frequencies include Douglas-fir and likely big-leaf maple and red alder, which are ethnographically documented fuel sources among the Coast Salish. Those present in lower frequencies are primarily fuel-woods used on a more occasional basis (*cf.* Turner 1998; Washbrook 1995). The habitat of wood taxa in the burned orange charcoal assemblage is local, corroborating a predicted strategy of local resource exploitation in a base camp, summer household, or short-term camp.

Site use in the burned orange deposit

The various lines of archaeological and archaeobotanical evidence from the burned orange deposit provide different insights about site use during this occupation. The archaeological evidence, particularly the lack of structural remains, suggests that the site was only occupied during the warmer seasons, as either a base camp or short-term camp, when short-term dwellings might be erected. However, evidence for three seasons of use, provided by seasonal indicators in the burned orange deposit, argues against a short-term camp and for a base camp or summer household occupation. Based on density of seeds, the burned orange deposit meets the expectations of a base camp. This interpretation is supported by limited diversity in the charcoal assemblage, which bears out expectations for either a base camp, summer household, or short-term camp scenario. Taken together, the archaeobotanical and archaeological patterning argue that the burned orange deposit represents a base camp occupation focussed on subsistence-related activities (but see discussion below).

The Structure 3 Deposit

The structure 3 household deposit in Area A was occupied at least a thousand years earlier than the burned orange deposit, at *c.* 2400 bp (Lepofsky *et al.* in prep; Figure 2). Based on the permanence of its archaeological features and evidence for constant refurbishment of this structure, it was hypothesized that structure 3 represented at least a semi-permanent occupation. This house may have been occupied as part of a summer, winter, or year-round village.

The seed assemblage from the structure 3 deposit

The structure 3 seed assemblage suggests that intensive plant food processing and plant food consumption, as well as extensive wood-working practices, were major activities conducted during this occupation. The patterning in the seed assemblage most closely resembles expectations for summer and year-round households (Table 15). It differs from a winter household, alternatively, based on the presence of plant food resources that were consumed fresh.

The variety of plant-related activities in either a summer or year-round occupation was expected to produce a seed assemblage with high richness. The seed assemblage from structure 3, while lower than the burned orange deposit, is still relatively high (NIT=22) with relation to the ecological diversity of tree species in the region (Green and Klinka 1994; Meidinger and Pojar 1991; Pojar and MacKinnon 1994). The primary difference in the seed assemblages from the burned orange and structure 3 deposits relates to formational processes. In particular, weedy species that were abundant in the burned orange deposit were largely lacking from the structure 3 assemblage. This situation probably reflects the fact that weedy species are less subject to incidental charring in an enclosed structure (*i.e.*, the house proper) as opposed to an outdoor activity area (*ie.*, like those associated with the burned orange deposit). Consistent with this hypothesis, the majority of seed taxa in the structure 3 assemblage are plant foods, followed by a very low representation of plant used in technology and weedy species.

The evenness of the seed assemblage was expected to be low in any household occupation, in accordance with an economy that demanded large-scale processing and/or storage of a select number of seasonally available resources. Evenness in the structure 3 seed assemblage is indeed low, and as with the burned orange deposit, the distribution of species reflects the use of a few major and a number of minor resources. Salal and red elderberry were, again, the primary plant foods in the economy of site residents during this occupation. A range of additional plant resources consumed incidentally in the season of harvest includes strawberry, gooseberry, and possibly yerba buena. As mentioned, plants used in technology were limited to a small number of grasses.

The abundance of seeds in the structure 3 assemblage was considerably lower than in the burned orange deposit (structure 3 n=6.3 seeds/litre; BOD n=25.4 seeds/litre). This corresponds with the differences in formational processes between houses and outdoor activity areas. Consistent with expectations, housekeeping activities, such as the sweeping of floors and cleaning of hearths, appear to have removed a large amount of small debris from household contexts (*cf.* Lepofsky *et al.* 1996; Stahl and Zeidler 1990). Such cleaning activities likely resulted in a slower build-up of refuse in structure 3 and a correspondingly lower density of seeds than in the burned orange deposit.

The habitat of plants represented in the seed assemblage should reflect the use of both local and non-local ecosystems in winter and year-round households, and local ecosystems in summer households. The plants found in the structure 3 seed assemblage are derived from only local habitats (but see results for wood charcoal below). These include a wide variety of plant foods, as suggested above, as well as a lower quantity of weedy and technology-related plant resources. Although a variety of non-local resources were probably obtained through travel or trade during this occupation, their sparse archaeobotanical presence would have made them difficult to recover without very large samples.

Seasonality is a key variable in identifying the period of village occupation. Summer and year-round households, on the one hand, should be distinguishable by the presence of fresh plant foods, and winter households, on the other, by their absence. In the structure 3 assemblage, seasonal indicators provide evidence for at least three seasons of occupation, from spring through fall. In order to differentiate between summer and year-round occupation, indirect evidence, such as archaeological attributes, must be employed (see below).

The charcoal assemblage from the structure 3 deposit

The charcoal assemblage from structure 3 conforms to expectations for both year-round and winter households. In Chapter One, I suggested that both year-round and winter occupations should be associated with high charcoal richness, as multiple wood species would be used for various technological activities throughout the year. The high richness of wood taxa indicates that wood use was certainly diverse in the structure 3 occupation (NIT=16).

Evenness in the assemblage was low, again reflecting the use of both major and minor wood resources. As with the burned orange deposit, wood resources present in high frequencies were predominantly fuel-woods. Those that occurred in lower frequencies, in this case, include species used ethnobotanically in various technological industries, including construction, implement-making, tanning and dyeing, and more occasionally as fuels (Table 14).

The habitat of the woods in structure 3 represents a strategy of primarily local collection. A limited number of species may also have been harvested beyond the immediate environs of the site. Resources potentially collected at upper elevations include true fir and yellow cedar, each of which occurs in small quantities in the charcoal assemblage from structure 3. The presence of non-local wood resources is consistent with expectations for both year-round and winter villages. In either case, site residents may have harvested resources in multiple local and non-local areas throughout the year, and brought these goods back to site for use and/or further processing. Plant resources used in technological activities may have been gathered or acquired from areas to the south, in the Interior, or on the coast.

Site use in structure 3

Taken together, the various lines of archaeological and archaeobotanical data from structure 3 suggest that this occupation represents a permanent, year-round village. The most salient archaeological characteristics of this dwelling are the permanence of the structural remains and the evidence for ongoing refurbishment, which indicate the likelihood of continual, long-term occupation. The seed assemblage suggests either a summer or year-round household occupation. This evidence includes the presence of plant foods consumed fresh from early spring through the fall, and additionally, two species, salal and red elderberry, that were dried for storage. Storable species indicate that intensive processing activities and/or winter occupation (during which dried foods were consumed) were a feature of this occupation. The wood charcoal data supports an interpretation of either winter or year-round occupation. The broad diversity of woods in the charcoal assemblage, derived from local and possibly non-local ecosystems, suggests that a spectrum of wood-working tasks was associated with this occupation. In concert with permanent structural remains, the seed and charcoal assemblages most strongly argue that structure 3, along with the village that surrounded it, was occupied as a year-round household.

The Structure 4 Deposit

The structure 4 deposit, lastly, was occupied at least several generations earlier than structure 3 (*c.* 2900 bp; Lepofsky *et al.* in prep). Little archaeological information is available for this house, except its approximate dimensions and a few of its features. The three archaeobotanical samples analysed from the structure 4 deposit were derived from the floor deposits which lie on top of sterile deposits. These samples yielded few plant remains, which permit only qualitative comments.

The archaeobotanical record of structure 4, while sparse, bears a number of similarities to the later structure 3 (Table 15). Both salal and red elderberry are present in the structure 4 plant remains, suggesting that the economic importance of these species had a long history among Scowlitz occupants. Species present in the charcoal assemblage, including big-leaf maple, red alder, and Douglas-fir, are primarily fuel-woods, which is consistent with later deposits. The sample size, however, is insufficient to comment on the diversity or relative abundance of taxa. Plants represented in both the seed and charcoal assemblages from structure 4 are local to the site area. While little more can be said about this deposit without further analysis, the archaeological and archaeobotanical data together at least suggest some continuity in how the Scowlitz site terrace was used between the occupations of structures 3 and 4.

Discussion

At the outset of this study, I outlined a series of questions to be addressed with archaeobotanical data from three site deposits. Questions were formulated concerning aspects of site level economy, local human/plant interactions, and at the most general level, the nature of site use and socioeconomy associated with these respective occupations. Subsequently, hypotheses were developed to test the nature of occupation associated with these various deposits, and in particular, to determine how these findings articulated with settlement patterns documented in the ethnographic seasonal round of the Coast Salish. This section focuses on interpreting the nature of plant use and socioeconomy related to site use during the burned orange and structure 3 occupations. Because the data are sparse, the structure 4 deposit is not discussed further. I conclude the section with a discussion of the nature of the archaeobotanical assemblage recovered from Scowlitz and its socioeconomic implications for site use.

As suggested in the foregoing section, archaeobotanical and archaeological characteristics of the burned orange deposit fulfill the expectations for a base camp site in the Coast Salish seasonal pattern. During the period of occupation, residents were involved in the harvest, incidental consumption and intensive processing of primarily local plant food resources, as well as the collection and use of available woods, predominantly for fuel. The site probably also functioned as a launching point for access to nearby resource areas, including the uplands, the extensive system of sloughs and marshes in the area, and the Fraser Canyon. It appears that site residents departed Scowlitz in the fall with their various stores to return to a winter village, located elsewhere.

This scenario suggests that the occupation of the burned orange deposit may have been largely analogous to the warm weather base camps documented in the ethnographic Coast Salish seasonal pattern, and also encountered in the archaeological record of the Coast Salish region and in adjacent areas. Based on faunal analysis, multiple season base camp occupations have been identified at sites in Coast Salish territory including Park Farm, near Pitt Meadows (Spurgeon 1994), Locarno Beach in Vancouver (Matson and Coupland 1995), Pender Canal (Carlson and Hobler 1993; Hanson 1995) and Valdes Island (McLay 2000; 1999) in the Gulf of Georgia, as well as at sites in Makah territory including the Hoko River wet/dry and rockshelter sites on the Olympic Peninsula (Croes 1995; Huelsbeck 1980; Wigen and Stucki 1988).

While activities during the burned orange deposit appear to fit an ethnographically-documented niche in the Coast Salish settlement pattern, an important question remains regarding how the burned orange deposit relates to contemporaneous mortuary activities occurring at the Scowlitz site. As suggested in Chapter Two, the burned orange deposit overlaps temporally with an extensive mortuary complex at Scowlitz that was initiated at *c.* 1500 bp and continued until at least 800 bp on site (Blake *et al.* 1993; Lepofsky *et al.* in prep). The subsistence-based nature of the activities associated with the burned orange deposit seems to confound the picture of the site as a spiritual place. Yet, from 1000 to 800 bp, the use of the front of the terrace appears to have been retained for such secular activities as harvesting and processing. If these activities were indeed secular, and the burned orange deposit does represents a base camp occupation focused on processing, this area of the site may perhaps have been mentally and/or physically compartmentalized from the sacred areas of the site by its users.

If, on the other hand, activities associated with the burned orange deposit are involved in some manner with the mortuary complex, the archaeological and archaeobotanical evidence needs to be cast in a different light. The intensive burning that characterizes this deposit, in this case, could be related to a range of ritual practices. Burning is documented among indigenous peoples of the Northwest Coast as a practice of transformation or change (Kew 1990: 479). Intensive burning and processing activities at Scowlitz may relate to the offering of foodstuffs as grave goods to 'feed the dead' (Carlson and Hobler 1993), a practice known today among the Coast Salish (Jenness n.d.: 94; Kew 1990: 479). However, given that domestic foods may be used to 'feed the dead', it could be difficult to differentiate this kind of ritual activity from the subsistence-related activities specified in the foregoing model. While it has not been the intent of this thesis to evaluate ritual activities related to the burned orange deposit, one avenue of future research may be to develop correlates of ritual *versus* secular site use at Scowlitz, in order to clarify the nature of activities associated with this deposit.

The occupation of structure 3, *c*. 2400 bp, raises a different set of questions about the nature of site use at Scowlitz. As with the burned orange deposit, the composition of the archaeobotanical assemblage in structure 3 suggests a range of activities, in this case, conducted on site throughout the year. Activities in the growing season were much like those associated with the burned orange deposit: fresh plant foods were harvested and consumed, while select plants, and probably various fauna, were intensively processed. In this scenario, some of the elder and youngest members of the population likely resided on site through the warmer months, while other task or family groups traveled to adjacent areas to harvest various resources. In the fall, these various groups would have returned to site, with their dried and traded goods, to settle in for the winter. At this time, wood stores would be stocked for the cold season, dry nettle stems cut for processing into fibre, and the various root foods perhaps marked for spring harvest. We can further hypothesize that food-related activities in the winter would have involved the cooking and consumption of plant foods on a daily basis, as well as the organization of small and large feasts, for both social and ceremonial purposes.

Evidence for a year-round, multi-activity occupation at Scowlitz is a notable departure from the ethnographic seasonal pattern of the Coast Salish, and furthermore, stands in direct contrast to what limited ethnographic information we have for Upper *Sto:lo* groups. Duff (1952: 85-86), for instance, suggested that Upper *Sto:lo* populations were few in number and more transitory in settlement patterns than their down-river relations. Based on a wider ethnographic and archaeological sample of settlement patterns throughout the Northwest Coast, however, evidence for year-round occupation is not so scarce. Permanent year-round villages have been archaeologically documented, based on faunal remains, at village sites such as Yuquot, Hesquiat, and Toquat on the outer West Coast (McMillan 1999), at Ozette and Wayatch on the Olympic Peninsula (Huelsbeck and Wessen 1995), at Buckley Bay on the east coast of Vancouver Island (Keen 1974; Wigen 1980), and at the McNichol Creek and Boardwalk sites in Prince Rupert Harbour (Ames 1998; Coupland and Stewart 1998; Coupland *et al.* 1993).

The advent of year-round settlement at Scowlitz *c.* 2400 BP fits with the larger picture of increasing social and economic complexity throughout the coast. Beginning around this time, large-scale processes such as the onset of resource intensification and an emerging pattern of regional sedentism had a major influence on Northwest Coast cultures (Ames 1994; Ames and Maschner 1999; Matson and Coupland 1995). The relative sedentism of local groups on the Fraser River should come as little surprise since it was these communities that lived alongside substantial salmon runs and within range of multiple economic plant resources, and for this reason, were inundated by an annual onslaught of summer visitors (*cf.* Barnett 1955). Logistically, because of the abundance and easy access to resources throughout this territory, there seems little reason for *Sto:lo* groups *not* to have resided year-round on the banks of the Fraser River. Year-round residence, moreover, may have served as a method of maintaining social control over a given territory through the ownership and use of productive resource patches (*cf.* Suttles 1968, 1960).

The range of variation in seasonal mobility indicated by the Scowlitz deposits has clear implications for the archaeological investigation of settlement patterns throughout the Coast Salish region. Mobility patterns, as suggested earlier, displayed a great deal of variation between local groups on the coast throughout the ethnographic period. If seasonal patterns also displayed significant temporal variation, then ethnographic accounts may not be a sound measure of the mobility of populations in the past (*cf.* Acheson 1995; Ford 1989; Mitchell 1994; McMillan 1999: 213). In cases such as the *Sto:lo*, where ethnographic data is sparse, archaeological evidence may be the only avenue for reconstructing past settlement systems. A particularly fruitful approach, as clearly demonstrated in this thesis, is to develop hypotheses derived from ethnographic accounts that can be tested using ecofactual evidence, including floral and faunal remains.

While the archaeobotanical assemblage yielded important information about site use at Scowlitz, the assemblage itself also considerably expands our knowledge of archaeobotanical data in Northwest Coast sites. As with all forms of archaeological data, particular biases are inherent to charred archaeobotanical assemblages. Due to the processes of deposition and preservation, the Scowlitz assemblage is inevitably 'missing' large pieces of information. However, while certain categories of remains are altogether absent from the picture, such as fresh greens and plant used as medicines and in ritual, other categories of plant remains may have a subtle presence or be otherwise accessible.

One kind of plant remains that has a subtle presence in the Scowlitz assemblage, primarily due to depositional and preservational biases, is archaeological tissues, or the remains of charred root foods. This category likely represents carbohydrate-rich root foods collected and processed by Northwest Coast peoples, such as tubers, bulbs, corms, and rhizomes. Archaeological tissues are present in small amounts in most samples at Scowlitz (see Tables 8 and 9), and also have been identified at sites throughout the Northwest (*e.g.*, Lepofsky *et al.* in press; Lyons 2000; Wollestonecroft in prep). While tissues cannot be identified beyond this broad category at this time, their archaeological potential is great. Current research is developing appropriate methodologies, including the use of SEM, to increase recognition and identification of root foods, which comprise an important dietary item in many indigenous societies worldwide (Hather 1993; Hather and Mason in press).

Perishable organic materials, such as fibrous items used in plant technologies, are another category of plant remains scarce to absent in a charred assemblage. At Scowlitz, we are fortunate to have evidence for a range of organic remains in the wet-site deposits

(Bernick 1994) which provide a complement to the charred assemblage. Organic materials recovered from Scowlitz include substantial pieces of basketry, mats, cordage, and a wood-hafted ground slate knife (Bernick 1994). These items were made from plants that are entirely missing from the charred assemblage, including sedges and rushes, as well as those that are poorly represented, such as redcedar. Redcedar, not surprisingly, is by far the dominant type of material recovered from the waterlogged deposits at Scowlitz.

While the foregoing analysis and discussion have concentrated mainly on economic aspects of site occupation and plant use at Scowlitz, an array of social information lies embedded within these economic activities. Using the economic information documented in the data in combination with ethnographic and present-day cultural behaviors, I present a brief foray into some of the social and ritual practices that may have occurred in Scowlitz society.

The plant harvest season was a very social time in the Coast Salish calendar. Berry-picking among coastal peoples, for instance, often involved a large and boisterous entourage of women, children, and the elderly (Turner 1995: ix; Woodcock 1996: 96). These excursions included day trips into the site environs and family camping trips into more distant subalpine areas (Duff 1952: 73). Formal and *impromptu* feasts, from small family gatherings, to large, inter-village events, were also organized as a regular feature of the harvest season (Suttles 1968; 1960). Large events, especially, allowed young people to meet and socialize and people of all ages to take part in events such as canoe-racing and slahal. A bumper harvest further provided the opportunity to fulfill certain social obligations. Surplus plant foods, when available, were used in an informal kind of exchange between Coast Salish parents-in-law, as a way of acknowledging and affirming sociopolitical bonds between families (Suttles 1960).

Similar to social practices, ritual practices were also embedded in the economic cycle of the Coast Salish. First fruit ceremonies were conducted by many communities when the salmonberry harvest commenced (Norton *et al.* 1984: 225). Among the *Sto:lo*, this kind of ceremony, much like those conducted for the first salmon, served to bring people together and to thank the Creator for providing them with a wealth of resources (Carlson 1997: 3-5). Ritual and ceremonial feasts also brought a broad section of the community together (Kuhnlein and Turner 1991). In preparation for these events, members of the community, today as in the past, would take on tasks that they had special knowledge of and/or entitlement to (Suttles 1958). Several kinds of etiquette revolved around the preparation, serving, and consumption of plant and other kinds of foods (Kew 1990: 479; Turner 1995: 17). Ceremonial events also provided a means of instructing young people in how things should be done properly. Children and adolescents were an integral part of the annual ritual and ceremonial cycle, and learned the ways of their ancestors from the actions and words of their parents and grandparents.

This thesis demonstrates the evidence for a range of plant use practices in the archaeological record of Northwest Coast sites as well as the potential for archaeobotanical remains to contribute to broad level interpretation. The archaeobotanical assemblage from Scowlitz provides a strong line of evidence that has been used to address questions concerning site use and settlement, in addition to the social and economic uses of plants in the past. Because of its great potential, the current limited application of palaeoethnobotanical techniques on the Northwest Coast is an issue that needs to be redressed. A concerted effort is required by archaeologists and palaeoethnobotanists alike to continue exploring methodological issues such as field sampling and analytic techniques. As palaeoethnobotanical research develops into a field of study in its own right on the Northwest Coast, its capacity to address a broader range of social, economic, and political questions will grow in tandem.

Appendix I: Scientific names of plant species mentioned in text

Plants referred to in the text are listed below by family, genera, and species as per Hitchcock and Cronquist (1973). Scientific and common names follow Pojar and MacKinnon (1994).

PTERIDOPHYTA

Polypodiaceae (Fern family)
- bracken fern (*Pteridium aquilinum*)

CONIFEROPHYTA: GYMNOSPERMAE

Pinaceae (Pine family)
- amabilis fir (*Abies amabilis*)
- Douglas-fir (*Pseudotsuga menziesii*)
- Engelmann spruce (*Picea engemannii*)
- grand fir (*Abies grandis*)
- lodgepole pine (*Pinus contorta*)
- mountain hemlock (*Tsuga mertensiana*)
- Sitka spruce (*Picea sitchensis*)
- subalpine fir (*Abies lasiocarpa*)
- western hemlock (*Tsuga heterophylla*)
- western white pine (*Pinus monticola*)
- whitebark pine (*Pinus albicaulis*)

Taxaceae (Yew family)
- western yew (*Taxus brevifolia*)

Cupressaceae
- yellow cedar (*Chamacyparis nootkatensis*)
- western redcedar (*Thuja plicata*)

ANTHOPHYTA: MONOCOTYLEDONAE

Alismataceae (Water plantain family)
- wapato, Indian potato (*Sagittaria latifolia*)

Cyperaceae (Sedge family)
- sedges (*Carex* spp.)
- bulrush, tule (*Scirpus americanus*)

Juncaceae (Rush family)
- rushes (*Juncus* spp.)

Liliaceae (Lily family)
 blue Camas (*Camassia leichtlinii, C. quamash*)
 nodding or Hooker's onion (*Allium acuminatum*)
 wild lily-of-the-valley (*Maianthemum dilatatum*)

Poaceae (Grass family)

Typhaceae (Cattail family)
 cattail (*Typha latifolia*)

DICOTYLEDONAE

Aceraceae (Maple family)
 big-leaf maple (*Acer macrophyllum*)
 vine maple (*Acer circinatum*)

Araceae
 skunk cabbage (*Lysichiton americanum*)

Betulaceae (Birch family)
 red alder (*Alnus rubra*)
 Sitka alder (*Alnus sinuata*)

Caprifoliaceae (Honeysuckle family)
 black twinberry (*Lonicera involucrata*)
 orange honeysuckle (*Lonicera ciliosa*)
 blue elderberry (*Sambucus cerulea*)
 red elderberry (*Sambucus racemosa)*

Chenopodiaceae (Goosefoot family)
 Goosefoot, chenopods (*Chenopodium album* and *C. rubrum*)

Compositae (Aster family)

Cornaceae (Dogwood family)
 bunchberry (*Cornus canadensis*)
 Pacific dogwood (*C. nuttalli*)
 red-osier dogwood (*C. stolonifera*)

Ericaceae (Heath family)
 bog cranberry (*Vaccinium oxycoccus*)
 bigberry, eastwood, greenleaf, and hairy manzanita (*Arctostaphylos glauca, A.glandulosa, A. patula, A. columbiana*)
 huckleberries and blueberries (*Vaccinium alaskense, V. deliciosum,*

V. membranaceum, V. myrtilloides, V. ovalifolium, V. parvifolium, V. uliginosum)
kinnikinnick (*Arctostaphylos uva-arsi*)
salal (*Gaultheria shallon*)

Fabaceae (Pea family)
springbank clover (*Trifolium wormskjoldi*)

Fumariaceae (Fumitory family)
Pacific bleeding heart (*Dicentra formosa*)
steer's head (*D. uniflora*)

Grossulariaceae (Gooseberry family)
currants and gooseberries (*Ribes bracteosum, R. divaricatum, R. lacustre, R. laxiflorum, R. lobbii, R. sanguineum*)

Labiatae (Mint family)
yerba buena (*Satureja douglasii*)

Polygonaceae (Buckwheat family)
dock-leaved smartweed (*Polygonum lapathifolium*)

Portulaceae (Purslane family)
spring beauty, Indian potato (*Claytonia lanceolata*)
common *Portulaca* (*Portulaca* sp.)

Rosaceae (Rose family)
black hawthorn (*Crataegus douglasii*)
blue-leaf strawberry (*Fragaria virginiana*)
Indian plum (*Oemleria cerasiformis*)
Pacific cinquefoil, silverweed (*Potentilla pacifica*)
pacific crabapple (*Pyrus fusca*)
salmonberry (*Rubus spectabilis*)
saskatoon, serviceberry (*Amelanchier alnifolia*)
tall strawberry (*Fragaria vesca)*
thimbleberry (*Rubus parviflorus*)
wild rose (*Rosa acicularis, R. gymnocarpa, R. nutkana, R. pisocarpa*)

Salicaceae (Willow family)
black cottonwood (*Populus balsamifera* spp. *trichocarpa*)
willow (*Salix* spp.)

Urticaceae (Nettle family)
stinging nettle (*Urtica dioica*)

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