CHAPTER 28

Plant Production Practices of Ancient First Nations in the Lower Fraser River Region

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Introduction

First Nations people have actively inhabited and engaged with the landscapes of the Lower Fraser River Region for many thousands of years, exploiting both its topographic and vegetative richness. Long before the remembered past, Northwest Coast First Nations relied on the seasonal bounty of plant foods, medicines, and technologies for their livelihoods (Table 1) (Deur and Turner 2005; Turner 2005, 2014; Turner and Peacock 2005). These resources were carefully cultivated and managed to enhance and sustain their productivity, size, taste, and other critical properties. Plants were managed at multiple scales from the individual to the community and landscape levels (Lepofsky and Lertzman 2008). This paper describes palaeoethnobotanical research in the Lower Fraser River Region that has characterized a spectrum of ancient plant use practices, from local small-scale harvesting to full-scale cultivation.

The Lower Fraser River is one of the richest and most diverse natural regions in Western Canada. In its lower reaches, the river traverses a gradient from continental to coastal climatic regimes, while its shores rise through a similarly diverse span of lowland to upland ecosystems. The river deposits sediments along the flatlands that form its banks, creating rich valley soils and an exceedingly fertile system of wetlands and farmlands in its delta. Archaeological evidence for the early and middle Holocene in the Lower Fraser River region is scant, but it is clear that proto-Coast Salish populations had become intimately familiar with the environments and resources of the Fraser Valley, Fraser Delta, and Gulf of Georgia regions (Schaepe 2001). They built permanent houses and became increasingly sedentary (e.g., LeClair 1976; Mason 1994, this volume; Schaepe 1998, 2001: 18), and they began to move on an intentional seasonal basis to access a range of floral, faunal, and other resources. Over time, these communities would return annually to spend the winter in plank house and pithouses, and through this sense of dwelling, would start to identify with certain terrains and watersheds that they may have called 'home' (*sensu* Heidigger 1971). Their relationship to the land and its resources deepened, and a profound sense of connection to and caring for these territories developed (McHalsie 2007; McHalsie et al. 2001).

Table 1. Common and Latin names of Plant Taxa. [1, 2]

Common Name	Latin Name
Balsamroot	*Balsamorhiza sagittata*
Beargrass	*Xerophyllum tenax*
Big-leaf and vine maple	*Acer macrophyllum, A. circinatum*
Bitter cherry	*Prunus emarginata*
Black hawthorn	*Crataegus douglasii*
Blue camas	*Camassia quamash*
Blueberry/huckleberry genus (e.g., blue-leaved huckleberry, oval-leaved blueberry)	*Vaccinium* spp. (*V. deliciosum, V. ovalifolium*)
Bog and high bush cranberry	*Oxycoccus oxycoccus, Vibernum edule*
Bracken fern	*Pteridium aquilinum*
Cattail/ tule	*Typha latifolia*
Crabapples	*Pyrus fusca*
European potato	*Solanum tuberosum*
Gooseberry/currant (e.g., black gooseberry, trailing black currant)	*Ribes* spp. (*R. lacustre, R. laxiflorum*)
Indian hemp	*Apocynum cannabinum*
Indian plum	*Oemleria cerasiformis*
Nodding and Hooker's onions	*Allium cernuum, A. acuminatum*
Oregon grape (e.g., tall Oregon grape, dull Oregon grape)	*Mahonia* spp. (*M. aquifolium, M. nervosa*)
Raspberry genus (e.g., salmonberry, thimbleberry)	*Rubus* spp. (*R. spectabilis, R. parviflorus*)
Red elderberry	*Sambucus racemosa*
Redcedar	*Thuja plicata*
Salal	*Gaultheria shallon*
Saskatoon berry	*Amelanchier alnifolia*
Sphagnum moss	*Sphagnum* spp.
Spring beauty	*Claytonia lanceolata*
Stinging nettle	*Urtica dioica*
Strawberry (e.g., wood strawberry, wild strawberry)	*Fragaria* spp. (*F. vesca, F. virginiana*)
Wapato/Indian potato	*Sagittaria latifolia*
Western hemlock	*Tsuga heterophylla*
Wild lily-of-the-valley	*Maianthemum dilatatum*
Wild rose (e.g., Nootka rose, clustered wild rose)	*Rosa* spp. (*R. nutkana, R. pisocarpa*)

1. For taxa recorded at the genus level, examples of species commonly used by Coast Salish peoples are provided.
2. Sources: BC Eflora; Turner 1995, 1998.

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Early ethnographers and historical observers, acculturated to European agricultural traditions, were not able to see or discern the complex forms of land tenure and management practiced by the Coast Salish and other Northwest Coast peoples (Deur and Turner 2005; Lepofsky and Lertzman 2008). Suttles (1951) first described indigenous plant propagation techniques in the 1950s, when he noted that the rapid adoption of the European potato by the Coast Salish rested on an established body of traditional knowledge and a history of practice within an 'incipient agricultural' tradition. Long experience propagating root foods such as wapato and blue camas allowed the Coast Salish to integrate the easily-cultivated potato rather seamlessly into their gardening repertoire in the rich deltaic soils of the Fraser River (Suttles 1951, 2005). It is these relationships between Coast Salish and the natural world that palaeoethnobotanists and other plant specialists have sought to investigate and elucidate since Suttles' seminal observations.

This chapter looks at the relationship between the ancient First Nations of the Lower Fraser River Region and the plant resources of their respective landscapes and territories. My goal is to discuss a range of ancient plant use activities discovered through archaeology and palaeoethnobotany and interpreted with the help of the ethnographic record. My analysis of twenty archaeobotanical seed assemblages from village sites, base camps and short-term camps in this region provides insights into ancient plant production practices and their relation to past settlement patterns. In discussion, I ask how these data reflect the plant production and management practices documented in the ethnographic and ethnobotanical literature of the Coast Salish. In conclusion, I revisit Suttles' thoughts on adoption of the European potato by Coast Salish communities, and its implications for past lifeways of traditional and ancient First Nations in the Lower Fraser River Region.

A brief note on terms is necessary. Palaeoethnobotany is the study of past human-plant interactions, while archaeobotanical remains are the archaeological remnants of plant use activities (Hastorf and Popper 1988:2). These terms are often used interchangeably in the literature. Plant food production is a category which implies that a cultural group is actively managing and producing wild plant and animal resources (Peacock 1998:29). Peacock suggests that the terms 'cultivation' (Ford 1985) and 'wild plant food production' (Harris 1989) are functionally equivalent, and are used as such in this paper. Both terms connote an intentional intervention in the life cycle of a plant or animal resource, and/or their wider growing environment, to enhance their accessibility or productivity, but (may) stop short of genetic modification (Peacock 1998:24). In this sense, plant food production lies between foraging and domestication on a larger spectrum, and is conducted via a range of plant management practices, described below. Latin and common names for all plant taxa discussed in this article are listed in Table 1.

Table 2. Plant Harvest and Use Activities in the Coast Salish Seasonal Round and Associated Site Types.[1]

Season	Activities involving plant use	Site types	Key species used, traded or harvested[2]
Winter	**Production and repair of housewares and technologies; consumption of stored plant foods for daily meals and occasional feasts; production of ceremonial items; fuel**	**Winter and year-round villages**	**Redcedar wood and fibre, maple, Indian hemp, tule and other fibres, stored salal, huckleberries, and root foods**
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 and year-round villages, base camp, short-term camp**	**Salmonberry shoots and berries, hemlock cambium, redcedar fibre, Indian plum**
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 and summer villages, base camp, short-term camp**	**Redcedar wood, bulrushes, cattails, beargrass, blue camas, strawberry, thimbleberry, medicinal herbs and spices**
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 and summer villages, base camp, short-term camp**	**Tule, Indian hemp, nodding and Hooker's onion, bracken fern, sphagnum moss, wapato, cranberries, crabapples, huckleberries, elderberries, salal**
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 and year-round village**	**Stinging nettle, fuel, rosehips**

1. Sources. Ethnographic: Barnett 1955; Duff 1952; Jenness 1955, n.d.; Suttles 1951a, 1951b, 1955, 1990a, 1990b, 1991, 2005; Ethnobotanical: Gunther 1945; Kuhnlein and Turner 1991; MacKinnon et al 2009; Norton 1979; Turner 1995, 1998; Turner and Bell 1971; Turner and Bouchard n.d.; Turner and Kuhnlein 1982; Turner and Peacock 2005; Traditional use studies: Galloway *et al*. 1982; Washbrook 1995; Woodcock 1996.

2. Latin and common names for all species discussed in this article are listed in Appendix 1.

3. Table adapted from Lyons (2000: 6).

Ethnographic Plant Production in the Lower Fraser River Region

By the time ethnographers, ethnohistorians, and other recorders were documenting First Nations lives and livelihoods in the Lower Fraser River Region in the 19th century, these communities were living in named villages that were part of larger sociopolitical entities, such as the Upper and Lower Stó:lō, Kwantlen, Kwikwetlem, and Katzie. These Coast Salish Nations generally practiced a semi-sedentary seasonal round that involved major residential moves between resource areas throughout the calendar year. While individual families and local communities had their own patterns of movement, many elements were commonly shared.

I present a generalized pattern of seasonal plant harvest and use for mainland Coast Salish peoples, specifying site types attended for collection and primary species collected (Table 2). Seasonal round practiced by Coast Salish communities made wide use of local ecosystems and terrains. Circumstances varied (and continue to vary) a great deal from one Nation's territory to another, wherein bogs and wetlands were the main plant-harvesting locales for many First Nations in the Fraser Delta, while territories of the Central and Upper Fraser Valley were drier and more continental, and moving into the Canyon, the growing season was more limited. Throughout Coast Salish territory, primary villages were located in lowlands, nearly always in flat, sheltered locations with safe and easy access to waterways. Highly developed slough and marsh systems of the Fraser Valley and Delta were the main arteries for the movement of people and resources throughout the region (Blake 2010; Suttles 1990). The majority of plant harvesting occurred in these low-lying area where a wide variety of species was carefully managed, and often owned and cultivated, from individual stands of cattail, to groves of Western redcedar and Pacific crabapples, to large patches of wapato, or Indian potato (Spurgeon 2001; Suttles 1955:26-27; Turner et al. 2005:155-56). In the summer months, family and hunting groups made forays into montane and alpine regions on well-developed trail systems to pursue game and harvest plant foods, particularly huckleberries and blueberries (Lepofsky et al. 2005a:224-25; Reimer 2000). After these harvests, controlled fires were frequently set to keep these prime resource areas open and to promote undergrowth that attracted herbivores, which in turn enhanced hunting productivity (Duff 1952: 73; Lepofsky et al. 2005a; Mack 1992; Norton 1979; Turner 1995:13, 1999).

Coast Salish people were proficient managers of the environment who used their deep knowledge of the natural world to intervene in the life cycle of plants under their tenure, and increase and enhance their productivity (Suttles 2005). Archaeologically, many of these behaviours are difficult to trace, as their variation from the natural baseline can be very subtle, and further, many of them do not involve the intensive burning activities that make such a clear archaeological signature (Table 3) (Lepofsky 2004; Lepofsky and Lertzman 2008). The following section explores the archaeological and palaeoethnobotanical potential of plant production activities practiced by Coast Salish communities.

Table 3. Activities Practiced by Coast Salish Plant Producers and their Archaeological Signatures.

Activity	Description	Artifacts & Materials	Features	Arch/ Pbot Potential
Plant Manage-ment Strategies	Tending stands, weeding, tilling, transplanting, mulching, fertilizing, clearing	Digging sticks, knives, charcoal	None	Low
Harvest	Aerating soil, selective harvest, pruning, burning	Baskets, berry combs, digging sticks, cordage; hammers, bark peelers, bark scrapers, adzes, axes, mauls	None	Low
Processing	Drying or cooking foods to make them last; splitting or bundling plants for later use	Mats, grinders, knives, boiling stones, mortar and pestle, skewers	Hearths, earth ovens, drying trenches, drying racks	High
Storage	Storing foods and technologies in rafters or containers for winter	Bentwood boxes, baskets, bark lining, cordage	Under-ground pits	Medium
Consump-tion or Use	Re-constituting plant foods for eating; using plant technologies for building, weaving, fuel, etc.	Cooking and wood-working implements; bark shredders & beaters, spindle whorls, needles, awls, mat creasers, net gauges	Hearths for cooking; objects produce d: canoes, posts, poles, etc.	High

1. Sources: Ames 1992; Hoffman 1999; Lepofsky 2004; Lepofsky et al 2005; People of 'Ksan 1980; Stewart 1996, 1984; Suttles 1955, 1990, 1991, 2005; Turner 1998, 1995; Turner and Bell 1971; Turner and Bouchard n.d.; Turner and Peacock 2005.
2. Adapted from Lyons (2000:12).

Archaeological Site Types and Their Palaeoethno-botanical Potential

The sequence of activities practiced by Coast Salish plant producers is summarized in Table 3, including: cultivating, managing and tending growing stands; harvesting fruits, stalks, wood, branches, bark, fibres, roots, and other plant parts; processing plants for later use; and storage and consumption. Artifacts, materials and features related to these different plant use activities practiced by ancient and historic Coast Salish peoples are also listed in Table 3. The final column of this table shows the archaeological and palaeoethnobotanical potential of these activities. Most plant management activities have relatively few archaeological

correlates. Those with the greatest potential to appear in the archaeological record involve some form of intensive burning, including processing, consumption, and use. Food plant processing, in particular, often involved features such as hearths, earth ovens, drying trenches and racks; many of these features could be found in association with villages and base camps, and a number were similarly found at specialized short-term camps. These sites types are defined below.

The mechanics of archaeobotanical taphonomy and preservation are relatively simple. On the Northwest Coast, the wet/dry cycle incurs a rapid rate of decay in uncharred seed rain and other components of the littermat (Lepofsky 2004:376-78). Burned seeds, charcoal, and other plant parts become inert to microbial activity that fresh parts are subject to. Plant parts can be burned through both direct and indirect cultural uses of plants, or incidentally, as in the case of seed rain floating into an open fire (Minnis 1981; Pearsall 2000). However, certain conditions, such as waterlogging or desiccation, may produce extraordinary cases that yield a variety of soft-tissue plant parts that normally do not preserve, such as basketry and cordage, fleshy tubers, stems and greens. Ozette and Hoko wetsite are well-known examples of waterlogged deposits (Croes 1980, 1995), whereas Cape Addington Rockshelter provides an example in which the rapid accumulation of shell created hydrophobic deposits that repelled water, thus preserving a wide range of organics through dry conditions (Lepofsky et al. 2001, 2003a). While the vast majority of archaeo-botanical assemblages are recovered from deposits with 'standard' preservation conditions, one such extraordinary case is discussed below.

Palaeoethnobotanical Studies in the Lower Fraser River Region

Palaeoethnobotany is a relatively new archaeological application, both in the Pacific Northwest and in the Lower Fraser River Region. In early decades of excavation, plant remains were usually recovered on an *ad hoc* basis, as at the Milliken site in the Fraser Canyon (Borden 1961, 1975, 1979). In the 1980s, some experimental work was done with plant remains encountered incidentally, as at the Pitt River site (e.g., Patenaude 1985). Systematic investigations of plant remains, however, only began with the work of Dana Lepofsky in the 1990s. As a result of this short period of florescence, methodological standards and theoretical approaches are still being developed and established for the wider region (Lepofsky 2004; Lepofsky and Lyons 2013; Lyons 2011a; Lyons and Orchard 2007).

Plant remains were analyzed from twenty sites in the Lower Fraser River Region for the present analysis, ranging from very limited to very large and comprehensive studies (Table 4). The majority of studies that examine upriver sites are graduate theses and research projects, while the majority of studies focused on downriver sites are associated with cultural resource management projects. Although they vary greatly in scope and scale, the primary intention of all these analyses is to understand the ancient socioeconomic patterns and practices of different Coast Salish communities. All projects discussed focused on plant macroremains (those visible to the naked eye, including seeds, buds, needles, charcoal, etc.) rather than microremains (Table 4), though a pilot phytolith analysis was conducted on wapato plants in association with the excavations at DhRp-52 in Pitt Meadows (McNamee 2010). Extensive pollen studies have been conducted in the Fraser Valley to reconstruct paleoclimatic conditions, a very few of them in association with human histories (Lepofsky et al. 2005a, b).

The data assembled for this analysis are summarized in Tables 4 and 5. The sites are organized into three site types, including villages, base camps, and short-term camps. I define villages as multi-season settlements with multiple permanent structures, including year-round, winter, and summer villages; base camps as locations occupied for many weeks to months with moderate infrastructure, used to harvest key resources, such as fishing stations, montane hunting camps, or root roasting grounds; and short-terms camps as locations occupied for a few days to weeks with temporary shelters that were used during travel or special activities entailing a narrow harvest season. Sites are listed by their relative age – including seven village sites, twelve base camps, and two short-term camps – and their attendant archaeobotanical assemblages characterized by number of samples, number of identified seed taxa, and number of seed taxa with known cultural uses amongst the Coast Salish (Table 4). This data were compiled from grey literature reports and theses graciously made available by a variety of archaeologists and institutions.

The following analysis is limited to an examination of cultural seed taxa, primarily because seed taxa are the most frequent type of macroremain reported in the region. Cultural seed taxa are defined as those with known traditional uses by Coast Salish Peoples for food, medicines, technologies, and other purposes. While the respective data sets assembled for this analysis are on the whole rather well reported, there is certainly variation in how data are identified, analysed, interpreted, and presented. In certain cases, particularly with earlier analyses, the lack of standardization in approaches to sampling, processing, and quantification largely precludes quantitative comparison with other sites. Nevertheless, the diverse – and growing – body of palaeoethnobotanical evidence from sites in the Lower Fraser River Region, and the Northwest Coast more broadly, reflects a long, continuous, and changing use of plant resources and ecosystems by ancient and historic First Nations in the region, and an encouraging trend towards the increased use of palaeoethnobotany as a tool to answer questions of local and regional socioeconomy.

Patterning in Seed Richness by Site Type

The site types used in this analysis include three rather general categories – villages, base camps and short-term camps – that are reflected in the ethnographic and historic

Table 4. Summary of Palaeoethnobotanical Investigations at Twenty Lower Fraser River Region Sites.

	Approximate dates BP[1]	No. of samples analysed[3]	Identified Seed Taxa (n)[4]	Cultural Seed Taxa (n)[5]	Identified Charcoal Taxa (n)	Location/ Notes	Source Reference
Village Sites[1,2]							
DhRn-29	10,000-2500	12	-	-	2	NE Stave Reservoir; *possible* village site	McLaren 2003; McLaren and Storey 2010
DhRp-52, Dry site	5300-3100	41	15	7		Katzie Slough/ Pitt Lowlands	Lyons and Leon 2010
DhRp-52, Wet site	4800-3200	60	31	8		Katzie Slough/ Pitt Lowlands	Lyons et al 2010
Sxwoxwiymelh/ Katz	2500-2000	43	11	5		Upper Fraser Valley	Lenert 2007
Qithyil, structure 3	Ca. 2400	9	8	6	9	Lower Harrison River	Lepofsky and Lyons 2003; Lyons 2000
Port Hammond	2000-1500	7	6	3		Lower Fraser River	Antiquus 2001
Hiqelem	1500-contact	9	11	6		Upper Harrison River	Ritchie 2010
Welqamex	Ca. AD 500-historic	13	6	2		Upper Fraser Valley	Graesch 2006, n.d.
Base camps							
Milliken	9000/8100	Ad hoc	1	1		Fraser Canyon	Borden 1961, 1975, 1979; Mitchell and Pokytylo 1996
Xay:tem	7000-4500	Unknown	11	3	12	Mid Fraser Valley	Ormerod 2002
Mccallum	6200-5500	34	7	2	5	Upper Fraser Valley	Lepofsky and Lenert 2004; Lepofsky, this volume
Pitt River	4400-200	Unknown	4	4		Lower Pitt River	Patenaude 1985
Park Farm	4200-300	Unknown + 47[6]	12	4		Pitt Highland/ Katzie Slough	IR Wilson 2009; Spurgeon 1984, 1998, 2001
Telep	Ca. 3000	3	-	-		Katzie Slough	Peacock 1981
DhRr-74	1100-300	7	15	7		Lower Fraser River	Lyons 2011
Scowlitz, burned orange deposit	1000-800	7	5	3	14	Lower Harrison River	Lepofsky and Lyons 2003; Lyons 2000
DhRo-28	Late Period	7	-	-		Stave Delta	McLaren 1999, 2003
Lhawathet	360-140	24	5	4	5	Chehalis River	Lepofsky et al. 2006; Springer and Lepofsky 2008; Springer 2009
DhRp-16	Proto-historic	7	11	7		Lower Fraser River	Leon et al 2012
Lhó:leqwet	300 - historic	15	16	7	6	Upper Harrison River	Ritchie and Springer 2011
Short-term camps							
DgRs-56	Marpole/ Developed Coast Salish	3	7	3		Burns Bog, Fraser Delta	Lyons 2009; Golder 2006
DgRl-32	300 - 200	5	9	2	5	Mid Fraser Valley	Schaepe et al. 2005

1. Note that no attempt has made to standardize dates, though most reported are calibrated. The dates listed above are considered approximate measures.
2. The sites used in this analysis were divided into site types based on the original researchers' assessments. It should be acknowledged, however, that discerning sites types can be difficult, and that the designations given here are in some cases somewhat arbitrary.
3. The majority of samples in respective assemblages are 1-2 litres, but there is some variation between sites.
4. The number of identified taxa (NIT) is used here as a richness measure for archaeological plant taxa, a rough estimate of the breadth of plant use on site (Lepofsky and Lyons 2003). Taphonomic circumstances must also be factored in, such as unusual circumstances of preservation, as well as the extent of sampling (see discussion in text).
5. These taxa represent seeds with recorded traditional uses by Coast Salish Peoples for food, medicines, technologies, and other purposes.
6. The 47 samples analyzed by IR Wilson (now Stantec) lack taphonomic analysis and are thus excluded from consideration here.

records of coastal First Nations. These site types can usually be distinguished in the archaeological record based on an analysis of multiple lines of evidence. For instance, an examination of the range of features found on a site and their archaeobotanical contents yields much information about the types of activities conducted on site, their season and duration (Tables 2 and 3; and see Lepofsky and Lyons 2003; Lyons 2000).

I compare the average richness (measured as NIT or number of identified taxa) of cultural seed taxa for these three site types. For the purposes of this analysis, multi-component sites are divided by component if their archaeobotanical assemblages were analyzed separately. Due to the limited number of sites used in this analysis, no attempt is made to analyse these assemblages by their relative antiquity. This work will await a time when more archaeobotanical data exist for this region.

Certain expectations attend this analysis (Lepofsky and Lyons 2003). Villages, as communities that were potentially occupied for the longest duration of the year and exhibited the broadest spectrum of plant use (and other) activities, should yield the greatest richness of plant taxa associated with these activities. Base camps may be occupied for significant portions of the seasonal cycle but fewer plant use activities are expected to be conducted than at village locations, and this should be reflected in more moderate richness of plant taxa. Plant use activities at short-term camps should be rather limited and contingent. Plant remains may reflect incidental consumption of plant foods eaten while focusing on other activities, or processing of particular in-season plant foods or technologies.

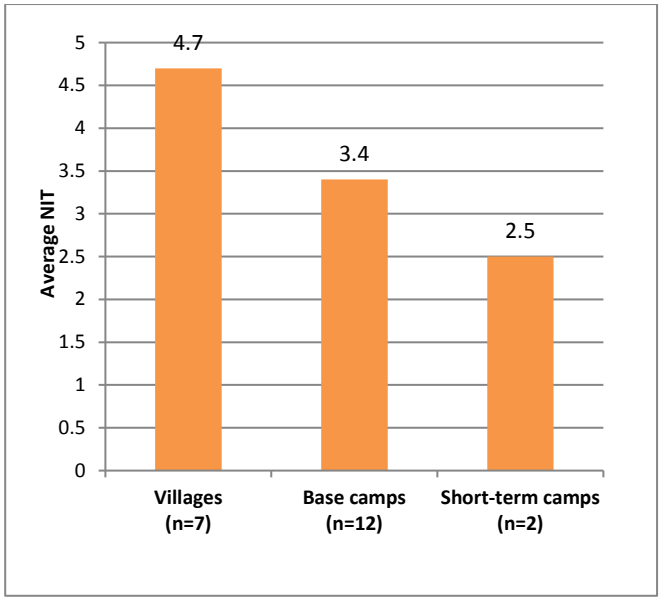

Figure 1. Comparison of Average Richness (NIT) for cultural seed taxa from 3 site types in the Lower Fraser River Region.

I compare average richness figures for twenty sites in the Lower Fraser River Region based on the NIT figures for cultural plant taxa presented in Table 4 (Figure 1). While it shows an intriguing distinction in richness values between site types that is in accord with expectations, these results are not statistically significant due to limited sample size. The trend shown may be meaningful, but needs to be re-evaluated as more archaeobotanical data accrue. Several examples developed below look at richness patterning within different sites.

Data from seven villages are used in this analysis. Those that have had extensive samples analysed, such as DhRp-52 in Pitt Meadows, have a high richness of cultural seed taxa (n=11 for wet and dry sites combined) (Lyons et al. 2010; Lyons and Leon 2010). House features from Qithyil (formerly known as Scowlitz) and Hiqelem, in the Central Fraser Valley, show an abundance of economic plant food species (n=6 each; for Qithyil, this figure is associated with Structure 3 deposits), including red elderberry and salal, whose berries were likely processed, stored, and reconstituted for later consumption on site, as explored below (Lyons 2000; Ritchie 2010). Village assemblages tend to have considerable breadth because of the range of plant-related activities being conducted on site and the general length of annual occupation, which allowed for in season use of plant resources for food, technologies and household manufactures that would become charred in cooking and processing fires.

Many base camps were occupied for several months of the year, within the growing season. Intensive harvesting and processing of a variety of plant, animal, and mineral resources occurred at base camps. Twelve base camps are included in this analysis. Several, such as DhRr-74 and DhRp-16 in the Fraser Delta, and *Lhó:leqwet* on the Harrison River, have richness values for cultural seed taxa on par with nearby villages (n=7 for each of these sites; Leon et al. 2012; Lyons 2011b; Ritchie and Springer 2011). These assemblages similarly exhibit an abundance of ethno-botanically known economic species, in addition to a suite of secondary plant foods and technologies. As with other site types, species present tend to reflect the local ecological niche. As with villages, spices, leaves, root foods, plant medicines, and foods eaten as greens are generally absent due to preservation and taphonomy issues.

Two short-term camps are represented in this analysis. One of these camps is clearly focused on plant processing, DgRs-56 in Burns Bog, and the other on fishing, DgRl-32 in the mid-Fraser Valley. These assemblages show a narrow breadth of harvesting and consumption reflective of a relatively short occupation and highly seasonal collecting. Site DgRs-56 has three cultural seed taxa, with a single taxon in abundance, bog cranberry (Golder 2006; Lyons 2009). Bog cranberry was a highly desired species amongst the Coast Salish, and was dried for consumption and storage. Growing only within particular ecological parameters, it was harvested in the fall and widely sought in trade (Suttles 1955:26-27; Turner 1995:86-87). Site DgRl-2

Table 5. Ubiquity of Edible Plant Taxa from Archaeological Sites in the Lower Fraser River Region.[1,2]

	Villages							Base camps										Short Term camps		Ubiquity (%)[4]		
Sites	DhRp-52 - dry	DhRp-52 - wet	Port Hammond	Qithyil - structure 3	Hiqelem	Welqamex	Katz	Pitt River	Park Farm	DhRr-74	DhRp-16	Mccallum	Milliken	Xay:tem	Qithyil - burned orange	Lhawathet	Lhó:leqwet	DgRs-56	DgRl-32	Delta sites (7)	Valley sites (10)	All sites (17)
Region[3]	FD	FD	FD	FV	FV	FV	FV	FD	FD	FD	FD	FV	FV	FV	FV	FV	FV	FD	FV			
Common name																						
Bitter cherry								x	x				x							29	10	25
Black hawthorn		x									x						x			29	10	25
Blueberry genus					x	x	x			x						x		x		29	40	50
Bog cranberry										x	x							x		43	0	25
Crabapple		x						x												29	0	12
Gooseberry				x																0	10	8
Indian plum								x												14	0	8
Lily-of-the-valley								x												14	0	8
Oregon grape	x								x		x									43	0	25
Raspberry genus	x	x	x	x	x		x			x	x	x		x	x	x	x		x	57	80	71
Red elderberry	x	x	x	x	x	x	x			x	x			x	x	x	x		x	57	80	71
Salal	x	x		x	x		x		x	x	x			x		x	x	x		71	60	65
Saskatoon berry												x					x			0	20	12
Spring beauty							x													0	10	8
Strawberry			x	x																14	10	12
Wapato		x																		14	0	8
Wild rose	x						x								x		x			14	30	33

1. Only archaeological taxa are shown, which for all sites but one means charred seed taxa. Uncharred seed taxa are listed for the DhRp-52 wetsite in Pitt Meadows; dry site seed taxa are listed in a separate column.
2. The generic term 'seed' is used here to represent all botanical fruits such as achenes, drupes, nutlets, capsules etc.
3. 'FV' denotes Fraser Valley and 'FD' Fraser Delta. Site locations are listed in Table 3.
4. In the ubiquity calculations, data from the DhRp-52 wet and dry site assemblages are combined, as are data from respective components of the Qithyil site (Structure 3 and the Burned Orange Deposit).

has only two cultural seed taxa in its assemblage, red elderberry and a raspberry species (probably salmonberry or thimbleberry), each in very low frequency and clearly harvested incidentally as a sideline to the salmon fishery (Schaepe et al. 2005).

Patterning in the Edible Plant Data

I examine patterning in the edible plant taxa by comparing the ubiquity (percent presence) of species across all sites with seed data in the Lower Fraser River Region (n=17). The edible plants are species whose parts were consumed ethnobotanically by Coast Salish Nations; these species constitute a subset of the cultural seed taxa. The primary expectation for this analysis is that key economic species, which were processed and stored *en masse*, should be indicated by relatively high ubiquity values, and secondary species by lesser values. My assumption is that key economic species were widely available at different site types and in different ecosystems. The main exception is specialized species, such as certain wetland and upland plant foods, which are only available in particular ecological niches. While these species were prized trade items, they should appear only rarely at sites in whose catchment they do not grow (Lepofsky and Lyons 2003; Lyons 2000).

Presence and ubiquity values for edible plant taxa from sites in the region are grouped by site type (Table 5). In

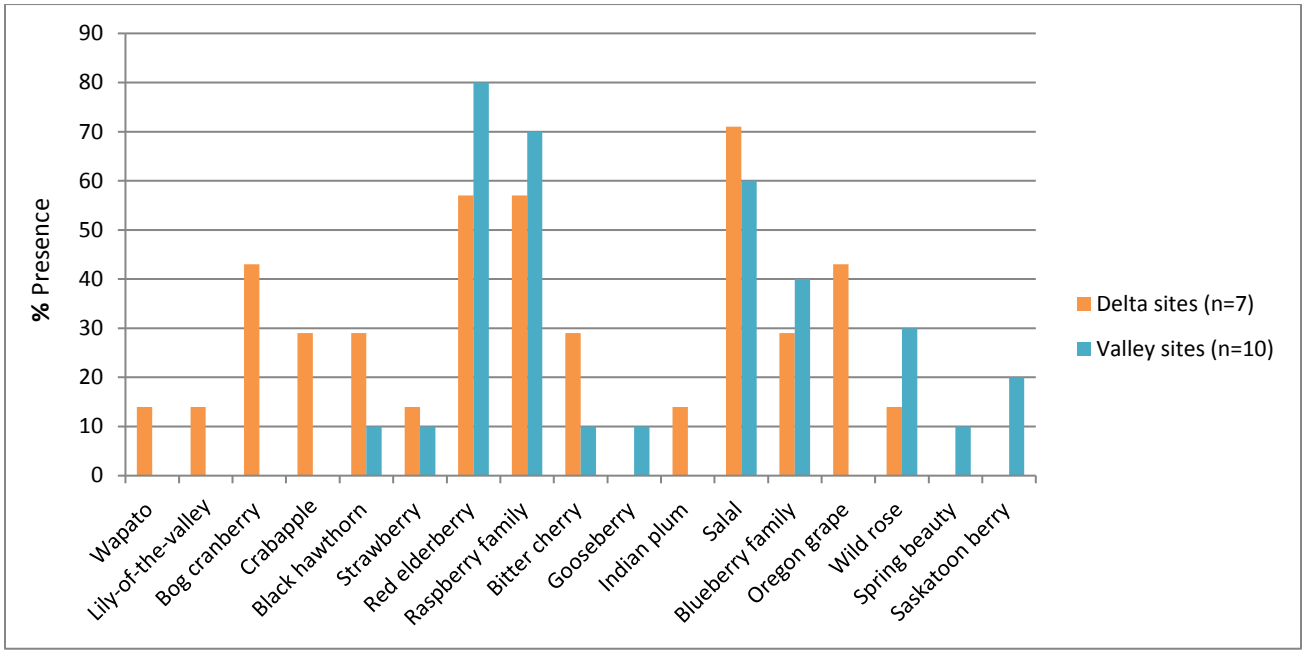

Figure 2. Percent Presence (Ubiquity) of Edible Plant Taxa from Lower Fraser River Valley and Delta Sites (organized on a spectrum from species growing in wetter habitats [left] to drier habitats [right]).

order to compare the presence of taxa in different ecological niches, the data are demarcated as Fraser Valley sites, whose ecology is relatively drier, and Fraser Delta sites, whose ecology is relatively wetter. In the final three columns I calculate ubiquity (percent presence) of individual taxa for valley sites (n=10), delta sites (n=7), and all sites (n=17). I compare ubiquity figures for Fraser Delta *vs.* Valley sites in Figure 2. The seed taxa are organized along the x-axis by their relative light and moisture requirements, with species growing in comparatively wetter habitats beginning on the left and graduating to species growing in relatively drier habitats on the right (M. Piorecky pers. comm. 2012). The majority of the plants represented are 'generalist' species that can grow in a variety of ecological conditions, so these designations may be somewhat arbitrary. For instance, salal is a common component of the shady understory of coastal western hemlock zone (Meidinger and Pojar 1991) forests throughout the Northwest Coast, but it will also tolerate the drier segments of bogs (Hebda 1977:43).

Seventeen species of edible plants, represented by seed taxa, are identified within Lower Fraser River Region archaeobotanical assemblages. Several key economic species are represented by high ubiquity values at both valley and delta sites, including red elderberry, salal, and members of the raspberry and blueberry genera (Turner 1995). The fruits of all of these taxa were processed *en masse* for winter consumption; all are widely recovered in archaeobotanical assemblages in the Northwest (Lepofsky 2004; Losey et al. 2003; Martindale and Jurakic 2004).

Fruits of the raspberry genus were relished by Coast Salish peoples in their respective growing seasons, and many were also dried for storage and later consumption. A variety of blueberry and huckleberry species grow in upland areas of the coast, and as such, their presence at the lowland sites represented in this analysis may reflect their late summer harvest from montane camps and transport back to winter villages. Secondary taxa are generally represented by medium to low ubiquity. These include taxa consumed fresh in season or on an occasional basis, or used for a specific and short-term purpose: lily-of-the-valley, black hawthorn, wild strawberry, bitter cherry, gooseberry, Indian plum, Oregon grape, and wild rose (Turner 1995).

A suite of species associated with particular ecological conditions groups at each end of the spectrum (Figure 2). Wapato, bog cranberry, and Pacific crabapple are often associated with Katzie people of the Pitt Polder lowland (Spurgeon 2001; Suttles 1955, 1990, 2005; Turner et al. 2005), and with the Nations of the lowlying Fraser Delta more broadly. These species were owned, managed, and traded at large scales. In the post-contact period – and likely well before this time – Coast Salish families from the Fraser Valley and Vancouver Island visited Katzie communities following the fishing season to trade for these food items, in addition to sphagnum moss (Duff 1952:74). At the other end of the spectrum, spring beauty and Saskatoon berry are found in the drier areas of the Central Fraser Valley (Figure 2). Both of these species are primarily found in the dry British Columbia Interior and were commonly exchanged for coastal foodstuffs during the fishing season in the Fraser Canyon (Duff 1952:73-74; Turner 1998:134).

Local Pre-Contact Period First Nations Plant Production Practices

Pre-contact period inhabitants of the Lower Fraser River Region had much in common with their descendants, the Coast Salish peoples of the Contact period and forward. Deep and wide-ranging ecological knowledge is apparent in the seasonal round and associated plant production activities of ancient and historic Coast Salish communities (Tables 2 and 3). The social landscape of Coast Salish cultures was formed around this knowledge, and structured to capitalize on successive suites of resources as they came into season (Suttles 1987a). In this discussion, I ask how the archaeo-botanical data assembled from twenty archaeological sites in the Lower Fraser River Region compares with and reflects documented plant use activities, knowing that archaeological data is seen through a series of filters and can never match the reality of living cultures.

Two primary plant use activities can be directly inferred by looking at a combination of the edible plant taxa and archaeological data: processing and consumption. All of the village and base camps, and some of the short-term camps, used in this analysis have features and artifacts related to burning, such as hearths, earth ovens, roasting pits, and/or boiling stones. Many of these features were used to process plants. Red elderberry, one of the most ubiquitous species recovered in Northwest Coast assemblages, was harvested in vicinity of lowland sites and often pit-cooked (Kuhnlein and Turner 1991: 149). At the Pitt River site, hundreds of thousands of wild lily-of-the-valley seeds were recovered from large rock-lined hearths and earth ovens (Patenaude 1985: Appendix I-4), likely processed *en masse* for preservation and later consumption. Plant food consumption was universal at all site types. Edible plants are recovered from the burn features listed above, and also from refuse dumps, such as the large shell midden at Port Hammond (Smith 1903; Rousseau et al. 2001:84-86).

Other plant use practices can be indirectly inferred from the archaeological and archaeobotanical evidence. Harvest and storage are two of these activities, which required a great deal of ecological and preservation knowledge, but are difficult to detect archaeologically. Coast Salish women generally harvested plant foods using burden baskets for collecting and carrying, and stored processed plant foods in baskets and boxes placed on shelves or underneath benches (Stewart 1973, 1984; Suttles 1987a:55). These containers are very rarely found in the archaeological record, as in the wet site deposits from the Qithyil and DhRp-52 villages (Bernick 1994, 1998; Hoffmann 2010; Hoffmann et al. 2016). Harvest is occasionally inferred through the recovery of a woman's prized possession, her digging stick. It can also be inferred, of course, by the archaeobotanical taxa recovered on site.

An additional set of plant use practices is even more difficult to discern in the past, including plant management and production. These practices have most convincingly been documented at a wet site in the Fraser Delta. At the Charles Phase site of DhRp-52, a large garden underlain by a one-course-thick, human-laid rock bed and densely packed with wapato tubers in growing position was found next to a large residential site (Hoffmann et al. 2016). An abundance of digging stick tips lay broken and buried tip-down within the garden. The density of tubers in this wetland garden was greatly intensified under the tenure of the residents, as they altered the environment to ensure prime growing conditions, and later decreased after the site was abandoned and turned slowly to bog (Hoffmann et al. 2016). The site existed alongside an ancient, tidally influenced marsh, part of a larger slough system that created ideal conditions for cultivating wapato. This site challenges both the timing and the nature of plant production practices by ancient inhabitants of the Lower Fraser River Region and the Northwest Coast more broadly. Wapato has not been recovered archaeologically before in the Pacific Northwest.

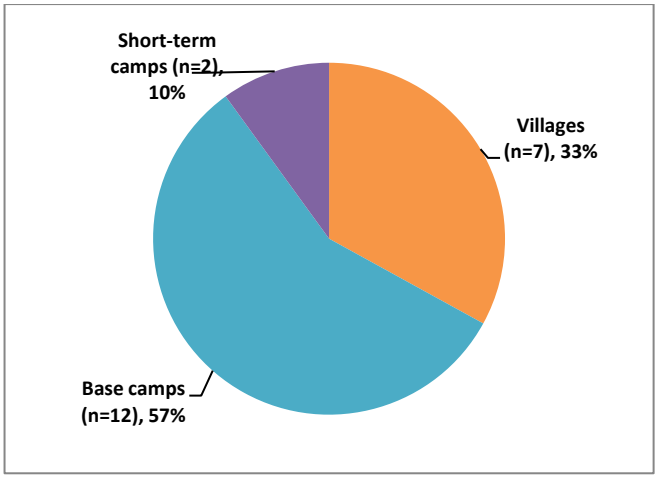

Figure 3. Percent Distribution of Site Types with Archaeo-botanical Assemblages in the Lower Fraser River Region.

Coast Salish people moved around the wider landscape in planned and purposeful ways, traveling by canoe throughout the sloughs and backwater systems of the Fraser River system. In this densely forested and mountainous environment, water transport was often the most direct route between domestic and harvest locations. Travelling by water also permitted the hauling of large amounts of raw materials, including plant foods, basketry materials, undressed logs, and the like (Blake 2010). As they traversed the landscape, peoples managed plant resources through practices discussed earlier, such as digging and aerating the soil, mulching with charcoal as fertilizer, pruning and coppicing to keep plants productive, and burning to maintain prairies and enhance berry patches (Lepofsky and Lertzman 2008; Turner 1999; Turner and Peacock 2005). The archaeological signatures of these activities are not only very low, but these activities would usually have been conducted at harvest locales and short-term camps well away from large settlements. I present the distribution of the twenty sites used in this analysis as three site types in Figure 3. The vast majority of these sites are either villages or base

camps (90%), while short-term camps represent only a small minority (10%). This distribution is likely the inverse of the original settlement system. Minimal representation of short-term camps means that the 'hinterland' of the seasonal round – sites used for resource extraction, hunting, traveling, ritual and other purposes – are vastly under-represented in archaeological knowledge. This minority includes alpine and sub-alpine sites, wetlands and rock shelters (Bernick 1998; Franck 2000; Lepofsky et al. 2005a; Mierendorf 1999; Reimer 2000, 2003, 2006, 2011; Ritchie and Springer 2011).

Evidence for community and landscape level plant management in the 'hinterland' of the seasonal round of Northwest Coast Peoples has proved to be very elusive to document (see overview in Lepofsky and Lertzman 2008). Lepofsky and colleagues have sought evidence for prescribed burning in the prairies and highlands of the Fraser and Skagit Valleys and wider south coast region, but have to date found that these small-scale fires are very difficult to distinguish from natural burns in the soil profile (Lepofsky et al. 2003b, 2005a,b). Cheryl Mack has identified montane blueberry and huckleberry drying features in the Cascade Mountains of Washington State (Mack 1992; Mack and McClure 2002), while Sandra Peacock (1998) has used earth ovens in the Southern Interior of British Columbia as a proxy to understand balsamroot processing. Perhaps the clearest evidence for landscape level use of plant resources is the widespread presence of culturally modified trees throughout the Pacific Northwest (Mobley and Eldridge 1992; Turner et al. 2009). These forms of evidence imply concerted levels of management by the ancient First Nations people of the Pacific Northwest at the stand, community, and landscape levels.

Conclusions and Recommendations

Suttles (1987b:148) astutely observed that Coast Salish peoples were food producers, long before contact, of a kind not akin to the European tradition. Whereas European gardening relied on propagating plants from seed in rows within a prepared garden space, Coast Salish gardeners propagated plants vegetatively, preparing the soil for potato planting with digging sticks in natural prairies, and banking the edges with the rocks and roots cleared from the garden space. Suttles (1987b:144-45) suggests that these were "practices of long standing" gained from their knowledge of cultivating other root foods, particularly blue camas and wapato. In fact, before the introduction of livestock, blue camas, potatoes, and other plants were grown together on Whidbey Island (Suttles 1987b:146), and other sites on southeastern Vancouver Island.

It has taken the last sixty years for ethnobotanists and palaeoethnobotanists to garner and publish a range of evidence to support Suttles' claims. This has often been an uphill battle since the archaeological evidence for plant production is difficult to distinguish from the natural baseline because of the subtleties of these plant management practices, which tend to mirror the natural structure of forest ecosystems (Lepofsky and Lertzman 2008; Turner 2014). Further, popular anthropological belief in the lack of an active plant producing tradition on the Northwest Coast has been very difficult to shake. Palaeoethnobotanists are working hard to help fill the still substantial gaps in knowledge about plant production amongst the region's ancient First Nations. Different types of analyses are being used to detect elusive categories of plant data, such as greens, root foods, plant medicines, and transplanted species. This includes the analysis of various kinds of plant microremains – particularly phytolith, starch grain, and scanning electronic microscopy – and genetic studies including ancient DNA (Lepofsky and Lertzman 2008). Ongoing development of standardized methods and procedures related to sampling, processing, identification, and quantification will also help to ensure the comparability of results within and outside of the region (Lepofsky 2004; Lepofsky and Lyons 2013; Lyons 2011a; Lyons and Orchard 2007).

Additional research directions should focus on continuing to develop baseline archaeobotanical data for different site types across the region and establishing models to detect the presence of different plant use activities. Practical directions include sharing results at a broader scale and encouraging consulting and research archaeologists to consider including a palaeoethnobotanist in projects, routinely collecting samples during excavations, and working with a palaeo-ethnobotanist to process, analyze, and interpret recovered data (Lepofsky and Lyons 2013).

This chapter has examined only a small sub-set of the palaeoethnobotanical work being conducted in the Pacific Northwest. Direct evidence for the presence of sophisticated plant management practices throughout the Northwest Coast is increasingly difficult to refute. Our understanding of ancient plant production amongst First Nations of the Lower Fraser River and wider region will continue to grow and flourish as the questions and techniques used to approach this research continue to be developed, refined, and shared across cultural and disciplinary boundaries.

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