

Cultural Forests of the Southern Nuu-chah-nulth: Historical Ecology and Salvage
Archaeology on Vancouver Island's West Coast.

by

Jacob Thomas Kinze Earnshaw
BA, University of Victoria, 2011

A Thesis Submitted in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF ARTS

in the Department of Anthropology

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Supervisory Committee

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Abstract

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Cedar, represented by Western redcedar (*Thuja plicata*) and Yellow Cedar (*Chamaecyparis nootkatensis*) was known as the “Tree of Life” to the Nuu-chah-nulth on Vancouver Island’s west coast, and most other groups of the Pacific Northwest. This thesis investigates the Culturally Modified Trees (CMTs), or more specifically Tapered Bark Strips (TBS), created through the extraction of cedar bark removed for all manner of material goods. CMTs are now the most common archaeological site type within British Columbia. Current regional chronologies have inherent biases that make interpretations difficult. The chronologies created through Archaeological Impact Assessments (AIAs) are weighted heavily to the contact period and the highest frequency of use corresponds with indigenous population collapse rather than peak. Investigations are made into the true distribution of existing CMT features.

This thesis details the survey of 16 recent old growth cedar clearcuts which found extensive unrecorded CMT features that have recently been logged throughout the southern Nuu-chah-nulth study region. Half of all TBS scars in exposed stumps were found embedded within healed trees, otherwise invisible to archaeologists. Comparing all AIA report dates (surveyed prior to logging activity) with all post-impact assessments surveys it was found the latter contain a greater and older distribution of scarring events corresponding to high First Nations populations before the contact period. The study also compares CMT chronologies with local histories, investigates the antiquity of Northwest Coast CMTs and the indigenous management of cedar trees to maximize bark harvests. The findings of this research hint at the expanded extent of anthropogenic forests in the Northwest Coast, the inadequate recording and heritage protections of CMTs, and what it all means for Aboriginal Land Rights in British Columbia.

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Dedication

To my Mum Jennifer Modigliani and Grandmum Mary Southam Earnshaw

Chapter 1: Introduction

Cedar was the “Tree of Life” to the Nuu-chah-nulth (Mauze 1998:235), and to most other Northwest Coast groups living within its range. The distinct Northwest Coast cultural pattern of complex hunter-gatherers and monolithic woodworking emerged alongside the first appearance of cedar-like species on this coast and has been intimately tied to it since early times. Western redcedar (*Thuja plicata*) and Yellow cedar (*Chamaecyparis nootkatensis*) have been used and revered by First Nations the length of their ancient occupation of the coast.

Their use, so embedded within all aspects of spiritual and material life on the coast, has been recorded in detail ethnographically. The lives of many First Nations groups were completely encompassed by the use of cedar products which provided shelter, subsistence tools, clothing, ceremonial regalia, art and everything in between. Cedar wood was extracted from coastal forests often without the removal of whole trees. Bark was removed from trees without causing their death. The cedar itself was considered very much alive and cognisant of the feelings and intentions of the peeler. Cedars were believed to physically reflect aspects of the human body (Mauze 1998), and to turn away from or curse harvesters who attempted bark peeling without proper training. The forest was in no way removed from village life, it was a necessary and intimately tied to the economic, spiritual and daily lives of Northwest Coast peoples. Only in the last three decades however, has research focused on the extraction of cedar wood, and specifically cedar bark from the forest. Culturally Modified Trees (CMTs) have been found throughout the coast, revealing dateable marks of cedar resource extraction. This thesis aims to shed light on how cedar’s use is reflected in the landscape and solidly establish it within the realm of anthropogenic landscapes. Research across the Northwest Coast is beginning to highlight the extensive management of landscapes to maximize the productivity of particular resources. Beaches, prairies, estuaries and rivers were altered in particular ways to promote harvesting activities. The deep forest was subject to similar intent, alteration and management.

Several core questions are considered in the following chapters. For a species that can live over 1000 years, why does the evidence of use mainly only span the last few centuries, during a period of population collapse? What are the existing biases that obscure our recording and sampling of CMTs? What is the true extent of cultural forests, and what evidence might still remain in a heavily clearcut landscape? Also, are existing CMTs adequately protected and utilized for land claims issues.

This thesis is comprised of two investigations of CMT data within southern Nuu-chah-nulth territories of Vancouver Island's southwestern coast. First I look at the gray literature from Cultural Resource Management (CRM) companies archived at the Provincial Archaeology Branch to collect the existing corpus of recorded data relating to CMTs. Second, I investigate the cedar 'archives' exposed within old growth cut blocks to extract supplementary data to add and compare to the gray literature. After collecting this archive of CMT dates I use the lens of Historical Ecology to discuss the anthropogenic nature of such cultural forests. Salvage archaeology is my tool in the process of fieldwork as dates recovered are exclusively from destroyed archaeological sites within ancient forest areas.

With wide ranging insight gained from post-impact assessments of clearcut CMT sites, my investigations are comprised of a search for representative CMT chronologies, and thoughts on what these findings suggest about the antiquity of anthropogenic forests, the practice of cedar tending, the protections of these sites and what it all means for issues of aboriginal right. The vast potential for CMT studies is found to be severely undervalued and underutilized in a landscape that is highly threatened from industrial logging.

1.1. Thesis Outline

Following this introductory chapter, Chapter 2 reviews at the history of the study region and the three First Nations within whose territory this thesis explores. Chapter 3 looks at the theoretical background of Historical Ecology and its connection with the historic misidentifications of local indigenous resource management systems. Chapter 4 looks at Cedar generally as a resource, with its associated extraction methods, cognized models and the creation of the CMT. Chapter 5 outlines the history of CMT studies on

the Northwest Coast and elsewhere. Chapter 6 is Phase 1 of my research in which I examine the existing gray literature regarding CMTs for the southern Nuu-chah-nulth region. Chapter 7 is Phase 2 of my research encompassing all the field surveys searching out previously unrecorded CMTs. It includes an outline of the sites accessed and discoveries made in Toquaht, Ditidaht and Pacheedaht territories. Chapter 8 is a multipart discussion of all findings made in my review of CMT data and field data recovery. The final Chapter 9 includes the concluding remarks and what my findings mean for Aboriginal Rights to the land.

Chapter 2: Study Region: Setting and History

First Nations presence on the Northwest Coast is often recognized in oral histories to date from first creation or arrival in times immemorial (McMillan 1999). For scientists and historians, the earliest feasible date of human arrival on the coast coincides with the exposure of land following the retreat of glaciers around 14,000 years ago (Ames and Maschner 1999:49, 60-61). Marine peoples would have moved south from Beringia as opportunities to access resources emerged along a partially exposed coast. Both the traditional and scientific perspectives suggest an interaction with the land alongside the development of rivers and the first colonization of plants and animal species in many areas of the west coast. Humans over time have made themselves a fixture on the landscape, and remain an important part of coastal environments.



Figure 1: Vancouver Island region, Northwest Coast (Bing Maps 2015; Nuu-chah-nulth border from McMillan 1999:7).

The Nuu-chah-nulth people are a related socio-linguistic group living on the west coast of Vancouver Island (Fig.1). The name itself is a recent invention meaning “all along the mountains”, replacing the erroneous “Nootka” given to them by Captain Cook

(McMillan 1999:6). Earliest known dates of human occupation on Vancouver Island's west coast are not much older than about 5000 years BP (McMillan and St. Claire 2012:99), though the absence of archaeological material prior to this period likely relates to the changing sea levels that left earlier sites on western Vancouver Island drowned or within intertidal areas. The Nuu-chah-nulth are maritime oriented, and traditionally recognized as whale and sea mammal hunters, fishermen and shellfish gatherers. They were also well known for a highly developed woodworking culture including great plank houses, large cedar canoes and carved poles (Ames and Maschner 1999:13). Linguistically there are three variations to the Nuu-chah-nulth (or southern Wakashan) language, often described as either separate languages or differing dialects (McMillan 1999:8). Most of northern and central Nuu-chah-nulth territory speaks 'Nootka', while the southern-most groups on Vancouver Island speak 'Ditidaht', and those on the Olympic peninsula speak 'Makah' (Fig.2; McMillan 1999:8). Despite these linguistic differences, the Nuu-chah-nulth consider themselves to have a common culture.

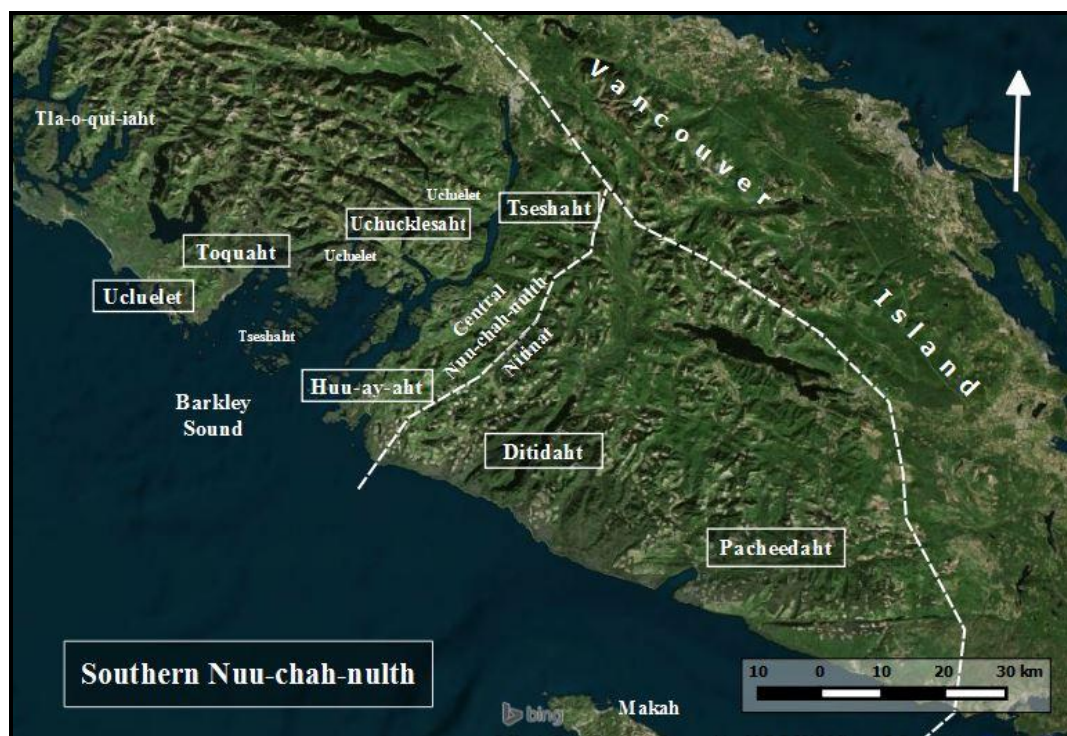


Figure 2: Southern Nuu-chah-nulth general study region (Bing Maps 2015; rough borders from McMillan 1999:7)

The study region for this project comprises the southern Nuu-chah-nulth groups of Vancouver Island from Barkley Sound south to Point-No-Point at their border with the

Salish (Fig.2). They inhabit a geographically, linguistically, and historical diverse area. Barkley Sound is comprised of a dynamic shoreline of bays and inlets, with islands and islets framed by high mountains and craggy peaks. Barkley Sound peoples are considered to be the southern part of the ‘Nootka’ subdivision of the Nuu-chah-nulth language groups. The coastline to the south is relatively consistent, broken only by rivers, long and rocky beaches and a few deep bays. Rising inland are lakes, low mountains, and winding waterways. This stretch of coast belongs to the ‘Ditidaht’ linguistic grouping and extends as far south as the border at Point-No-Point. Outside of the study region, across the Strait of Juan de Fuca and on the Olympic peninsula, lives the third division, the Makah (Arima et al. 1991:1; McMillan 1999: 7-8).

Prior to European contact Nuu-chah-nulth was comprised of many more local groups than those existing today. Some unknown number have gone extinct, while many others joined with neighbouring groups following the upheaval of the contact period (McMillan 1999:13; St. Claire 1991: 9,27; McMillan and St. Claire 1982: 10). Today there are seven local groups that live within the southern Nuu-chah-nulth study area: Ucluelet, Toquaht, Uchucklesaht, Tseshaht, Huu-ay-aht, Ditidaht and Pacheedaht. While CMT data relating to all these territories were collected, only fieldwork in the Toquaht, Ditidaht and Pacheedaht territories was pursued. I provide a brief overview of the contact period for the region (section 2.2 below), followed by a historical summary for each of the partner nations (sections 2.2.1-3 below). This period of history is highlighted not only because it represents a period of great change for the Nuu-chah-nulth, and is most represented by ethnographies and written accounts, but also because it overlaps with the best representation of cedar bark harvesting data recovered from standing CMTs (comparisons with chronologies in section 8.3.2 below).

2.1. Contact period

The first unrecorded contact between hemispheres on the Northwest Coast is likely a date unrecoverable from history. Captain Cook’s arrival on the coast in March of 1778 set off permanent change to the lifeways of local peoples, but it was likely not the first European, or external influence on the Northwest Coast. Spanish activity on the Mexican Pacific coast dates to the mid 1500s affecting southern coast trade routes (Ames and

Maschner 1999:11). Juan Perez sailed off the coast of Haida Gwaii and Vancouver Island in 1774, trading with locals who greeted them in canoes. In the mid 1700s Russians explored and traded for sea-otter pelts on the far north coast of Alaska (Ames and Maschner 1999:11). The early presence of iron tools on the Northwest Coast during the early contact period suggests a fairly consistent foraging of wrecked Asian ships on coastal beaches and headlands over the last 1700 years (Quimby 1985). Such arrivals of materials and possible outsiders may have initiated change for certain groups but to an unknown extent.

Smallpox was another visitor predating European contact. There are speculations that the smallpox pandemic of the 1520s that spread through Mesoamerica and South America may have reached all corners of the hemisphere; however evidence of its presence in the northwest is incomplete at best (Boyd 1999:14-16). Many early contact era reports and oral histories suggest smallpox did arrive just ahead of Europeans in the early 1780s. In the Salish Sea on the south end of Vancouver Island, accounts collected by Harris (1994) and Boyd (1994) suggest that the area was surrounded by epidemics that spread through Straits Salish groups in the early 1780s, well ahead of European arrival in the area. Spanish explorers Galiano and Valdes exploring the Georgia Strait in 1791 recorded evidence of people with pock marked faces and missing eyes (Boyd 1994:16). In 1792 Captain George Vancouver spoke of large abandoned villages, scattered with human skeletons in Puget Sound. While there was some suggestion that this abandonment was the result of a seasonal subsistence round, the presence of dead dogs, intact buildings and personal belongings have now thought to have been due to an epidemic (Boyd 1994:30-31). On the Saanich Peninsula at the southern tip of Vancouver Island oral traditions suggest smallpox decimated local populations around the 1780s, enabling attacks from southern Kwakwaka'wakw groups (Harris 1994: 614,625). Evidence of a past smallpox outbreak prior to contact is also noted in Ditidaht territory in 1791 (see section 2.2.2 below). These records suggest a dramatic change to several coastal societies on the eve of European contact.

Despite the apparent loss of life in some areas of the Northwest Coast prior to contact, Nuuchah-nulth territory is thought to have had a “filled landscape”, supporting a population of up to 30,000 people on the eve of European contact (McMillan 1999:193,

Arima et al. 1991:2-3). Barkley Sound is thought to have had one of the highest populations on the west coast of Vancouver Island. Spanish officers exploring the area in 1791 thought the settlement in the sound “contained more Indians than Nuca [Nootka] and Clayocuat [Clayoquot]” (Wagner 1933:149), suggesting it was more than either the 4000 they had estimated for Nootka or the 8500 for Clayoquot (McMillan 1999:24).

The central Nuu-chah-nulth groups experienced sustained trade with explorers and traders following the arrival of Cook in Nootka Sound. They were well positioned as middle men, managing the coming and going of trade of goods up and down from the area (McMillan 1999:181). Most of these Nuu-chah-nulth groups were arranged in systems of confederacies related to their geographic area; however, those in Barkley Sound and farther south were not. It might have been population pressures and large number of local groups competing for limited resources that prevented such political arrangements (Drucker 1951:110). By the late 1700s, with the growing strength of the central Nuu-chah-nulth confederacies, Wickaninnish, a powerful Tla-o-qui-aht chief, used military might to force a number of groups in Barkley Sound to trade furs through him (McMillan 1999: 202). His influence is recorded by Captain Meares to have reached as far south as Nitinaht during this time, though not demonstrably for the eastern groups of Barkley Sound (McMillan 1999:181, 202-203).

The Barkley Sound groups as well as the Ditidaht and Pacheedaht are noted in the contact period for their avid trading with Europeans (Howay 1941). The European material from this time is well represented in the archaeological record of the entire region (Sellers 2013). The trade with Europeans was a reflection of a long established trading network among all coastal tribes for materials not easily gathered within home territories. The Nuu-chah-nulth were known to have traded with their Salish neighbours for Camas and swamp rushes in exchange for cedar baskets, dried halibut and herring (Turner and Loewen 1998:58), The Ditidaht and the Pacheedaht were well known for slave trading to the T’Sou-ke (McMillan 1996:224), and for their production and trade in canoes and cedar planks. The superior quality of cedar on the west coast of Vancouver Island encouraged an active trade between the southern Nuu-chah-nulth and the Makah (Turner and Loewen 1998:59). A trail existed between Cowichan and Ditidaht territories

that was utilized in the historic period for transporting potatoes from the east coast and Halibut and Whale oil from the west coast (Turner and Loewen 1998:59).

Compared to Nootka and Clayoquot, Barkley Sound and the coastline to the south experienced far fewer interactions with foreign ships. Charles William Barkley arrived in the sound on the *Imperial Eagle* in 1787 to trade, and Captain John Meares on the *Felice Adventurer* a year later (McMillan 1999:188-189). In 1791 the Spanish *Santa Saturnina* arrived under the command of José María Narváez. Observations were made of the sound and five large villages were noted (McMillan 1999:189). The Ditidaht were visited at the village of Whyac and the Pacheedaht at Port San Juan multiple times between 1789 and 1792 by the *Columbia* trading vessel (Howay 1941; section 2.2.2 and 2.2.3). In the early 1790s few ships entered the sound and the southern coast to trade (Howay 1941), however even these ceased with the local extirpation of the sea otter and the movement of trade further north (McMillan 1999:190). It was over 50 year before outsiders returned with the aim of settlement, and commercial exploitation of the land (McMillan 1999:190; McMillan and St. Claire 1982:24). It was during these intervening years of the late 18th and the first half of the 19th century that some of the greatest changes transpired for the southern Nuu-chah-nulth; a period that was largely unobserved by western eyes (Arima et al 1991:1-3).

The ethnographic and archaeological record for the region suggests local group transformations for this period. Accounts from local informants relate histories of social upheaval and movement (Sapir and Swadesh 1955; Arima et al. 1991; McMillan 1999:207-211). American anthropologist Edward Sapir collected stories from informants relating to a series of seven wars involving tribes from around Barkley Sound during this time (McMillan and St. Claire 1982: 10). One such history relates to the Uchucklesaht's aggressive expansion into the east side of Barkley Sound and down the coast into Ditidaht territory. For a while several groups were made subordinate to the Uchucklesaht or were wiped out completely (McMillan 1999:209). Among several other conflicts, in the 1840s a particularly bloody conflict, known as "The Long War" took place between the Toquaht and their neighbours, devastating several groups and shifting local power dynamics (McMillan 1999:194; section 2.2.1). These conflicts are likely related to strained inter-group relations originating prior to contact as high populations put added

pressure on local resources. Shortages in some areas would have led to conflicts over resource territories (McMillan 1996:60). This is well represented in the ethnographic record, in which many hostilities between groups revolve around gaining control of productive territory. These tensions however were no doubt acutely exacerbated by the socio-political fallout of the fur trade, the import of European weapons (Sellers 2013: 113; McMillan 1999:185, 192-193), the influence of powerful external groups (such as the Tla-o-quiaht; Denis St. Clair 2016 personal communication) and the onset of foreign diseases.

Though there are few records from the southern Nuu-chah-nulth, this period of conflict is framed by the appearance of measles, dysentery, venereal disease and smallpox (McMillan 1999:191-192). As noted above, smallpox infested parts of the south island region prior to contact with Europeans. The supposed lack of epidemics in the early 1800s could simply be a reflection of absence of direct evidence of their spread. One of the earliest recorded epidemics was just after 1850 when smallpox was introduced to the Makah on the Olympic peninsula. Survivors, hoping to escape the disease, crossed the Strait of Juan de Fuca and infected the Pacheedaht, nearly annihilating the tribe (Boyd 1999:167-168) as well as their Ditidaht neighbours (Arima et al. 1991:288; Ditidaht First Nations 2014:10). An outbreak of smallpox is also recorded among the Huu-ay-ahts in 1868, which is thought to have killed 40 people (Bridge and Neary 2013:117). Barkley Sound, Hesquiat, Nootka Sound and Kyuquot Sound all were hit by a large epidemic in 1875 (Boyd 1999:302; McMillan 1999:192), reducing the total Nuu-chah-nulth population by a third (Boyd 1999:304). These records, however, only give a partial story of the effect that Old World disease had on southern Nuu-chah-nulth groups.

As noted above, the political landscape of the region changed greatly. Warfare and disease reduced the populations of an unknown original number of autonomous groups. Many completely disappeared from the landscape, succumbed to hostile annexation or chose to join friendly neighbours (St.Claire 1991:27). The Tseshah of Barkley Sound for example is a coalition of perhaps as many as nine previously autonomous groups that joined together for mutual protection during this tumultuous period (McMillan and St. Claire 1982:16). The groups that exist today in the study region are the descendants of a

complex re-assortment of the socio-economic units following major depopulation. In 1874 George Blenkinsop arrived in Barkley Sound and carried out a census; he wrote:

“The numerous old village sites, some of them several hundred yards in length, now overgrown in some instances with gigantic maple trees of a noble appearance, prove incontestably that the population of Barkley Sound must have been at no very remote period ten times its present number. War in former years and disease... in later years have wrought this change” (1874:10 cited in Arima and St. Claire 1991:27).

This change is a reflection of a ca. 90% drop in population for Barkley Sound. Estimated by the Spanish to have had over 8500 inhabitants in 1791, the region’s populations had been reduced to what George Blenkinsop estimated was about 949 in 1874 (Bridge and Neary 2013:115). Population estimates for Ditidaht and Pacheedaht begin to appear in the 1850s but lack earlier comparisons. The combined populations are thought to be roughly 1000 (Ditidaht between 800 and 500 and Pacheedaht between 60 and 150 people) (Bouchard 1994:8-9; Ditidaht First Nations 2014:11).

The decrease in population and restructuring of political units is thought to have brought about a major change in settlements and the use of resources. Prior to contact, large populations, competition for resources and a greater number of autonomous groups forced territorially small groups to utilize resources within a confined area (McKechnie 2015:219-220). Following amalgamations and growth of single group territories the seasonal round subsistence pattern was suddenly feasible, allowing groups to move about their large territories to exploit a wider range of resources seasonally (McMillan 1999: 128-129,196; Ames and Maschner 1999: 113-115; different effects are noted for the Ditidaht seasonal round, Ditidaht First Nations 2014:7). This change in settlement pattern and disruption of settlements is confirmed in the archaeological record (McMillan 1999:203). After the end of the Long War and the cessation of most intergroup conflicts some local groups that had amalgamated within larger, protective groups began to disperse back into their ancestral areas. Various subgroups of the Tseshaht are recorded to have begun to return temporarily to seasonal camps where they had once lived year round as autonomous units (McKechnie 2015:219). Despite greater flexibility of movement to ancestral territories the amalgamated group’s main chief still maintained control over all component units, however, the head of each formerly autonomous unit

would maintain their ‘tupaatis’, or hereditary rights to manage particular fishing, hunting or collecting sites and would actively return to seek out these resources (Denis St. Clair 2016 personal communication, discussed also in section 9.1 below). This is important to note in the discussion of how remote areas were used through time in section 8.3.6. Use of the whole land appears to have been consistent, despite the affects of war and disease.

When Europeans made a re-appearance in the region in the mid 19th century, trade took on a very different structure than what had been in place earlier. Prior to 1820, before the depletion of the otter, foreign ships and outsiders participated within established indigenous trade networks (Sellers 2013:41). During the intervening years of conflict European and American traders focussed their attention elsewhere. By mid century trade had resumed in Barkley Sound with Europeans trading for dogfish oil rather than furs. This period, however, is marked by a greater presence of outsiders on the land, and a notable change in power dynamics. The establishment of sawmills on the east side of the island, and one at the end of the Alberni Canal by a company represented by Edward Stamp and Gilbert Sproat in the 1860s increased the need for oil as a lubricant (Sellers 2013:200-201). The Alberni mill employed up to 100 local First Nations individuals, after using a “demonstration of military force” to remove the Tsheshat from their village at Alberni (Sellers 2013:201). Wage labour and the introduction of trade stores around this time presented a system of trade far removed from the one previously in place (McMillan 1999:190-191; Sellers 2013:41). This new economic system was no longer under the control of local chiefs but instead involved wages paid to individuals. It is unclear to what degree or for how long local chiefs were able to control the wage labour with local mill managers (Sellers 2013:202). Several trade stores were built throughout the Sound by the 1860s, introducing a greater number of western trade goods throughout the area (Sellers 2013:204). Sellers (2013) suggests that prior to the 1860s most foreign material was used in limited ways. It is not until the last decades of the 19th century that wage labour and the trade stores spark a flood of European manufactured goods into the archaeological record. He points out however that in the archaeological assemblage for the area,

“The creative reuse that characterized the Early Period assemblage did not stop with this influx, however. The late period assemblage contains a reworked lance, pierced thimbles, ground ceramic sherds, a gamepiece, and

flaked glass ...[there was] continued use of Aboriginal manufactures such as bone points and abrasive stones through this influx. These modified European materials and late-nineteenth century Indigenous manufactures attest to continued, entirely Nuu-chah-nulth material culture in spite of the addition of new material types and forms. While this material shift was considerable, nothing was replaced immediately or entirely, though. As I argued earlier, new muskets did not replace the bow and arrow or lance, and new percussion caps did not replace flintlock designs. These were merely incorporations into an existing toolkit.” (Sellers 2013:205)

Despite this increase in external influences there appears a long period of continued traditional Nuu-chah-nulth life and trade alongside the introduced economy. Sproat's (1868:79) description of Nuu-chah-nulth trade is very telling of this in-between period of trade during a time of wage labour.

“Commodities are obtained among the Ahts [Nuu-chah-nulth] from one another by bartering slaves, canoes, and articles of food, clothing, or ornament; and from the colonists by ex-changing oil, fish, skins, and furs. All the natives are acute, and rather too sharp at bargaining. The Aht are fond of a long conversation in selling, but seldom reduce their price; living at no expense, they can afford to keep their stock of goods a long time on hand.... News about prices, and indeed about anything in which the natives take an interest, travels quickly to distant places from one tribe to another. If a trading schooner appeared at one point on the shore, and offered higher prices than are usually given, the Indians would know the fact immediately along the whole coast. An active trade existed formerly among the tribes of this nation, as also between them and the tribes at the south of the island and on the American shore. The root called gammass [camas], for instance, and swamp rushes for making mats, neither of which could be plentifully produced on the west coast, were sent from the south of the island in exchange for cedar-bark baskets, dried halibut, and herrings. The coasting [sp? coastal] intertribal trade is not free, but is arbitrarily controlled by the stronger tribes, who will not allow weaker tribes to go past them in search of customers.” (Sproat 1868:79)

The late 1800s was a period of slow transitions but also of cultural continuation following the tumultuous early and mid-century period. An increasing presence of outsiders on the land, the allotment of reserves, missionary efforts and the settlement and exploitation of resources on the land created new difficulties and changes to local lifeways (McKechnie 2015:196; Sellers 2013). The 1870 and 1880s saw the increases in First Nations seasonal work in fishery, cannery, logging and fur-sealing operations within

the Sound. Traditional resource extraction and seasonal rounds continued despite these inputs of wealth into local communities (Sellers 2013:207). By the early 1900s European goods were fixtures in local communities.

The new wealth generated by coastal communities during the fur trade, then later by the introduction of the wage economy, led to peaks in the development of material culture, trade, technology, and some cultural activities such as the potlatch (Lutz 1992:86). Potlatches continued to grow in size and frequency after the mid 1800s until the vast redistributions of wealth and seasonal work patterns chosen by First Nations was seen as counter-productive to employer and missionary goals (Lutz 1992:91). Lutz details the active participation of First Nations in the industrial labour workforce and how local communities used the capitalist economy for their own cultural purposes. For a time local indigenous people were able to fit seasonal paid work into their own economic cycles that included seasonal rounds in home territories. The beginning of the end of this period of wealth occurred in 1884 with the federal ban on the potlatch (Lutz 1992:92). Increasingly there grew a demand for year round employees, and a greater input of European goods, which both led to a great division between subsistence activities and management of resources and demands of the western wage labour economy.

2.2.1. Toquaht History

The Toquaht were once dominant, inhabiting the northwestern side of Barkley Sound, and remembered to have been the original group from which all others sprang (Sproat 1868:19). Their territory stretches from the entrance to Ucluelet harbour, along the western shore including all of Toquart and Mayne Bays (much of the peninsula at the southeastern end of Mayne Bay was controlled by the Tseshaht by the late 19th century). The territory incorporates most of the salmon rivers, lakes and watersheds draining along their coast. Most of the long western coast, aside from a few sheltered islands, is exposed to storms and is characterized by low site density (McMillan 1996: 32). Prior to contact the Toquaht are thought to have dominated over their western neighbours, the groups that would eventually amalgamate into the Ucluelet (St. Claire 1991:53). Such was their influence that they maintained control over drift rights on seaward facing shoreline in Ucluelet territory, and controlled the waterway leading to a major Ucluelet village (St.

Claire 1991:53). One of the first European accounts of the Toquaht is from the first officer on the *Jefferson* who in 1793 describes a village in Toquaht territory that was larger than any of the ones they had visited previously on the west shore of Barkley Sound (McMillan 1999:190).

Unfortunately, the contact period was particularly devastating for the Toquaht. By as early as 1793 there appears a shift in power as the Tla-o-qui-aht chief Wikaninnish of Clayoquot Sound is said to have controlled trade in the area (McMillan 1999:190). In the intervening years as western eyes focused away from Barkley Sound the Toquaht become embroiled in a many of the wars fought in the region. One of the earliest such conflicts emerged out of a territorial dispute between the Toquaht and the A'uts and Hachaa of the nearby Effingham Inlet. A contest was held to settle the matter and the Toquahts claimed victory; they were, however, attacked over the disputed land and suffered major losses. This conflict ended up pulling in the Tla-o-qui-aht and Ucluelet who destroyed the Effingham groups and led to territorial claim for the Ucluelet in Effingham (McMillan 1999:194; St. Claire 1991:31, 32). The 'Long War' of the 1840s was also a devastating one for the Toquaht. It began in the Toquaht village of Macoah when the Ucluelets roughed up some Toquaht people and damaged some buildings following a disagreement over a runaway slave. The Toquaht allied themselves with several other groups within the Sound and attacked the Ucluelet, forcing the survivors to disperse among the Tla-o-qui-aht and the Toquaht (despite their disagreements). The Ucluelet turned on their hosts, however, and with the help of the Tla-o-qui-aht killed many of them. The Toquaht scattered across Barkley Sound to live with relatives before eventually returning to Macoah and rejoining the Ucluelet. The war, however, continued with more raiding by neighbouring groups and Toquaht and Ucluelet migrations until finally gifts of women by the Ucluelet to the involved groups, ceased hostilities. Despite the low Toquaht population, the two groups separated following a Ucluelet plot to claim rights to the Toquaht River. The resulting conflict led to an agreement to cease hostilities with each other and to part ways (McMillan 1999:194).

In addition to the population loss it is thought that the Toquaht might have been at a territorial disadvantage, being positioned between two growing entities. Only a few independent groups are thought to have amalgamated with the original Toquaht during

the contact period, while both their numerous neighbours, the Tseshaht and Ucluelet, became more powerful following amalgamations of many independent local groups (McMillan 1999:210-211). Though they were one of the largest groups in the Sound, originally comprised of 11 different ‘septs’ (McMillan and St. Claire 1982:104), their population by the 1873 had collapsed to 47 individuals (St. Claire 1991:54). Such was the effect of warfare and disease.

Archaeologically there have been some indications of a change in Toquaht territory over the historic period. Several important ethnographic sites have no pre-contact archaeological components, suggesting the late development of a seasonal round subsistence pattern. It has also been suggested that the present Toquaht territory might not have the abundance of resources, or the representative villages to host the large populations suggested in early histories. This could however be a product of shifting territories during the contact period, in which the original Toquaht territory and villages might have been consumed by neighbouring, conglomerate groups such as the Tseshaht (McMillan and St. Claire 1991:10). This has important implications for how local groups collected resources and managed owned resource areas in pre-contact periods; what would have been adequate territory to sustain large early populations?

2.2.2. Ditidaht History

Ditidaht territory stretches from Pachena Point to Bonilla Point on the west coast (Arima et al. 1991: 259, 265; though not mutually supported by Huu-ay-aht) and as far inland as Lake Cowichan around Youbou (Ditidaht First Nations 2014:14). The watershed of the Nitinat River is within this large territory. To the east lie their cousins the Pacheedaht, and to the west the Huu-ay-aht of Barkley Sound. Prior to contact, the Ditidaht were comprised of a number of independent local groups named after their primary villages, and may have participated in at least a partial seasonal round subsistence pattern (Ditidaht First Nation 2014:7), while other villages are thought to have been inhabited year round (Arima et al 1991:282-287).

The central Ditidaht origin stories are unique for the area in that they suggest they migrated to their current territory. ‘Ditidaht’ itself translates as ‘people of the Diitida’, referring to a village at the Jordan River, presently in Pacheedaht territory, in which both

groups share a common history (Ditidaht First Nations 2014:5). However Ditidaht appear to have undergone two migrations. They are said to originally stem from the Olympic peninsula, crossing the Strait of Juan de Fuca first for Diitiida then on to Nitinaht. Anthropologists Haggarty and Inglis summarize a detailed account of the Ditidaht migration originally recorded by anthropologist Morris Swadesh in 1931,

“According to this tradition the people from Tatoosh Island, off Cape Flattery in Washington, got into a fight with the Ozette and were forced to abandon their home. They moved to Jordan River ... and became the Ditidaht. Here they lived for a long time. Again they got into a number of conflicts, this time with the Clallam, Sooke and Saanich. These groups banded together and attacked the Ditidaht forcing them to move again.”(Haggarty and Inglis 1986: 200-201 quoted in Ditidaht First Nations 2014)

The exact date of the Makah and Ditidaht separation is unknown, however glottochronology suggests the two languages diverged roughly 1000 years ago (McMillan 1999:8). Other stories suggest dispersal from Jordan River following the Great Flood rather than due to hostilities with their Salish neighbours. In this story a family escapes in a canoe and manages to land on Kaakaapiya (Mt. Rosander) on the shores of Nitinat Lake (Arima et al. 1991:285).

After the Ditidaht arrived around Nitinat Lake there were continued hostilities with the Makah. Supposedly the Ditidaht controlled Cape Flattery for a period before it was forcibly taken by the Makah. The Ditidaht were attacked and defeated at Nitinat Lake by the Makah, dispersing their people to Pacheedaht neighbours. It was a long time before the Ditidaht and Pacheedaht were able to defeat and expel the Makah, allowing the Ditidaht to return home (McMillan 1999:38). The Ditidaht history no doubt reinforced a militant aspect of their culture. The Ditidaht were known to have been a powerful tribe, the “terror of the coast” with a reputation as “hunters, whale-fishers and warriors” (Brown 1896:22), and for slave trading (McMillan 1996:224). Their village at Whyac, with its stockaded fortress, stood as a reflection of this reputation (Ditidaht First Nations 2014:12).

First recorded contact with Europeans is marked by a series of short interactions in the late 1780s and early 1790s. In July of 1788 a longboat on the Meares expedition was met by a Ditidaht chief named Kissan who paddled out to trade skins. The following day the crew of the longboat was attacked by the

Ditidaht on the beach following confusion over a stolen half-pike (Ditidaht First Nation 2014:8). In 1791 the crew of the American ship, *Columbia*, met with Cassacan (Kissan?) at the village of Whyac on the Nitinat Narrows.

“Cassacan we found troubled with the venereal to a great degree. this is the more remarkable as hitherto we have found the women exceeding modest; nothing could even tempt them to come on board the ship; and here they appear the same; ... this at first induced me to believe it was a disorder prevalent among them; but on questioning Cassacan, he says sometime since a vessel came to this place; to the Captain of which he sold a female prisoner or slave girl for several sheets of copper: on the vessels going away, the girl was sent ashore; he afterwards cohabited with the girl, who shortly after died; caught the fatal disease and communicated it to his wife; who, he says, has it equally as bad as himself: thus this most banefull disorder will e'er long prove fatal to this pair, and possibly spread throughout the village; making the most dreadful destruction: we dressed Cassacan, but he would not permit us to, his wife; and gave him several medicines; which he received most thankfully. Cassacan has also had the small pox; of which his face bears evident marks. (Howay 1941: 196)

Another account relates, “’Twas evident that these Natives had been visited by that scourge of mankind the Smallpox. The Spaniards, as the natives say brought it among them...” (Howay 1941:371). These accounts suggest that at this early date venereal disease was spreading among the Nitinaht, and smallpox had already affected an unknown number of people prior to European arrival. This early appearance of Smallpox among the Ditidaht is thought to be connected with the epidemics which hit groups in the Salish Sea area in the early 1780s. To what level the Ditidaht population had recovered at this time of contact can only be guessed at.

Through much of the 1800s the Ditidaht continued political and economic interactions with their neighbours in Barkley Sound, the Olympic Peninsula and Salish territory to the south. They are mentioned in European records on trading (Sellers 2013:202), accounts of war, and Indian Commission visits (Ditidaht First Nations 2014). They also survived through the devastating epidemic of the early 1850s that arrived from the Makah by way of the Pacheedaht (Boyd 1999:167-168). This epidemic, along with the Ditidaht’s involvement in Barkley Sound conflicts likely led to the peaceful amalgamation of the dispersed independent Ditidaht groups into some of the outer coast

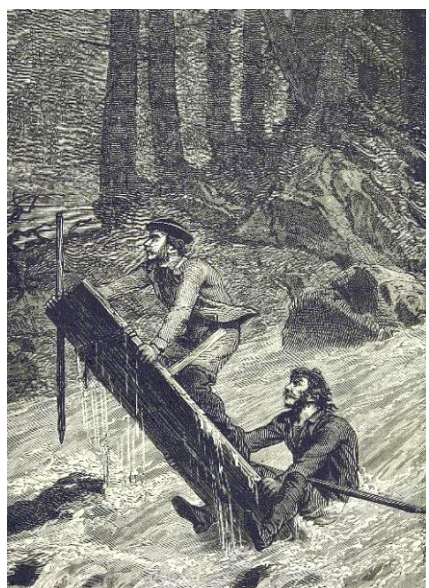


Figure 3: "Descente des Rapides Sur La Riviere Nitinaht (Ile Vancouver)"
(Whymper 1880:35).

villages included Clo-oose and Whyac (McMillan 1999:196,211). The Vancouver Island Exploring Expedition passed through Ditidaht territory in 1864 (Fig.3). They recorded several unpopulated villages along the shores of Nitinat Lake, before being received by the community at “Whyack” on the outer shores by Nitinat Narrows. The expedition made note of the massive stockaded fortress the Ditidaht had built there, and their manufacture of cedar canoes (Whymper 1868:52-54). From around this time onwards the Ditidaht participated in the introduced wage labour economy, and later on, were serviced by regular steamship runs. The Federal Government however pressured the Ditidaht to move to an area that could be serviced by roads once the

steamship runs ceased on the coast. By the 1960s the outer coast villages were largely abandoned, with family groups amalgamating at the Malachan Reserve at the northeast end of Nitinat Lake (Bouchard in Eldridge 1992:4).

2.2.3. Pacheedaht History

Pacheedaht territory stretches south from its coastal border with the Ditidaht at Bonilla Point to the Salish territory of the T’Sou-ke at Point-No-Point (Arima et al. 1991:252-253) and inland as far as the headwaters of the rivers and creeks along its coastline (Bouchard 1994:6). Much of Pacheedaht history is intertwined with their neighbours the Ditidaht. Both speak a dialect of the Nitinaht language, and share the ancestral village of Diitiida on the Jordan River (Bouchard 1994:3-4). Their origins however are different from those of the Ditidaht who likely originated from across the Strait. Anthropologist Swadesh was told by a Pacheedaht Chief that in early times the Pacheedaht spoke a Salishan language similar to their T’Sou-ke neighbours, and that intermarriage with the Ditidaht lead to the Pacheedaht adoption of the Ditidaht language (McMillan 1999:38; Arima et al. 1991:289). It is hypothesized that this adoption of the Ditidaht language by Pacheedaht might have corresponded with the arrival of the Ditidaht

from Cape Flattery on the Olympic Peninsula in ancient times (McMillan 1999:38), however this is not yet supported by any archaeological data. Another oral history suggests that Pacheedaht were once a branch or subgroup of the Ditidaht who stayed in their current territory when the Ditidaht left (Bouchard 1994:4). The name Pacheedaht, originated from their village site of P'aachiida at the head of Port San Juan Bay (Bouchard 1994:4).

Like the Ditidaht, the Pacheedaht were composed of a number of autonomous groups centred around chiefs and their families (Bouchard 1994: 5). Some of these groups were centred in San Juan Bay, while others were in sites stretched down the exposed coast (Arima et al. 1991:289-290). One such group, now extinct, known as the Qanayit'ath, is recorded in historical traditions as a tribe of 'giants' who burned all the Ts'isha:ʔath villages in Barkley Sound while the men were out whaling. Such stories suggest the involvement of various Nitinaht speaking groups in the conflicts occurring within Barkley Sound (Arima et al. 1991:290). Blenkinsop believed that "intertribal war with the Nitinats" was the reason for the Toquaht's misfortunes and depopulation in Barkley Sound (McMillan 1999:195). Much of the recorded history involving the Pacheedaht might be considered a little blurred as the entire south coast region is often referred to collectively as that of the "Nitinaht" by outsiders. The confusion of historical recorders might have led to a few misrepresentations.

By the 1858 the Pacheedaht population had been reduced to what Bamfield thought to be 20 fighting men, due to the effect of smallpox and war with the Songhees (Pacheedaht First Nations 2014:12). A few years later in the 1860s Robert Brown of the Vancouver Island Exploring Expedition reported that wars with the Clallums and Makah had reduced their numbers, along with smallpox. He also noted that at one time they had engaged in conflicts as far north as Kyuquot and with the Songhees around Victoria (Pacheedaht First Nations 2014:13). The mention of smallpox no doubt refers to the epidemic, mentioned above, which arrived from the Olympic peninsula in the early 1850s. Despite the episodes of epidemics and conflict the Pacheedaht, along with their neighbours became involved in the wage labour of the late 1800s. It appears by the time of the Vancouver Island Exploring Expedition there was a single trader living in Renfrew (Whymper 1868:55-56), possibly suggesting less contact and change as that experienced

by Nuu-chah-nulth in Barkley Sound. The general lack of many detailed historical accounts of Pacheedaht communities likely results from their extended period of relative remoteness between Fort Victoria and Port Alberni. Logging however, appears to have made an earlier appearance in this region than in others (Leversee 2014), and was well underway altering forest lands by the early 1900s.

The local histories of this region are diverse on the coast. However, issues surrounding the historical details of pre-contact population, territorial boundaries, seasonal round, population movements, resource use areas, conflict, trade, depopulation and amalgamation are not completely known. It is hoped that this thesis will help provide a base to better understand the resource use of cedar, and thus, in turn potentially provide a tool for the analysis of the human lives with which it was so intimately tied.

Chapter 3: Theoretical Background

Can't see the forest for the trees.

Cedar on the Northwest Coast is known to be prolific, and evidence of CMT use has now been uncovered all corners of coastal forests. The proliferation of forest use among local First Nations groups is well known and clearly evident; yet like research into other resource management systems on the coast it has been sorely overlooked in academic studies. Western accounts of Nuu-chah-nulth history have largely focused on political inquiry and outsider observations. Until recently there was minimal scientific interest in resource harvesting activities of communities living in coastal landscapes prior to contact, and how they were changed over the last 250 years (Deur and Turner 2005:23). Europeans often considered the aspects of life they were familiar with in ethnographic interviews, and made assumptions about the rest. Recent studies have begun to discuss the management of local ecosystems within cultural systems (Anderson and Wohlgemuth 2012; Deur 1999, 2002; Deur and Turner 2005; Groesbeck 2012; Lepofsky and Lertzman 2008; Mobley and Eldridge 1992, Turner et al. 2013 etc.). The forest presents itself as one of these managed environments. CMTs not only represent human involvement in forest ecosystems but also have the important distinction of archiving data regarding forest use.

Historical Ecology stands as the most appropriate theoretical framework from which to understand the relationship between humans and the biosphere, peoples' tenure to the land and management of ecosystems (Baleé and Erickson 2006). Its focus of study is principally on landscapes, as it incorporates both temporal and spatial characteristics. Over time human intent and action becomes embedded into landscapes through non-random patterns of human modifications that can be accessed and interpreted (Baleé and Erickson 2006). The research program of Historical Ecology is well suited for the analysis of culturally modified forests across the Pacific Northwest, as we will see the inscription of human action on the land is extensive on the Northwest Coast.

3.1. Historical Ecology

The processes of history are among Historical Ecology's primary concerns when considering the structure of natural environments and the human cultures embedded within them. A focus on this historical relationship necessitates a re-assessment of many assumptions; especially the concept of nature that is entrenched within western cultural narratives. The human relationship with the land has been seen as having advanced beyond the bounds of nature: culture as a distinct entity. These assumptions stem from the 'naturalization' (Yanagisako and Delany 1995) of conceptual structures—suppositions as natural truths— which inherently create boundaries within one's worldview. These cultural perceptions gravitate towards interpretations of the environment within categories that are biased towards hierarchy, cultural metaphors, and nature/culture divide. In appreciating historical ecological processes, ideas regarding culture and nature can be rearticulated into a renewed understanding of humans' place in the world. Historical Ecology's focus on history "extends its boundaries beyond human institutions—economies, class and gender systems, political organizations, cultural rituals—to the natural ecosystems which provide the context for those institutions" (Cronon 1983: xv). On the Northwest Coast and elsewhere this allows researchers to reject dichotomies of a forager/agriculturalist and savage/civilized hierarchy, but rather engage with the indigenous subsistence patterns and long term interactions with the land. The study of Historical Ecology on the coast can be a reconceptualization of the nature/culture divide and outdated classifications, focusing instead on the history of dialectical processes inscribed onto landscapes and culture (Baleé and Erickson 2006, Cronon 1983).

Through much of post-industrial scientific study, human culture has been seen as unique and outside of nature, based in assumptions that human use of the land was generally harmful (Botkin 1992:1); culture was seen as inherently removed from the natural world. Early ecological anthropology's concern with adaptation assumed "cultural accommodations to the environment" (Biersack 1999:8-9); environmental determinism suggested that humans would carve out a niche into the pristine wild. "The very notion of adaptation entails that niches exist in the environment prior to the organisms that fill them" suppressing the fact the environmental 'niches' inhabited by humans are produced through long term human-nature interactions (Biersack 1999:9; Botkin 1992:24). In this

sense, nature is not a container which holds something, but instead is a construction or artifact itself (Biersack 1999: 9), retaining the physical evidence of human cultural agency (Ingold 1992:14).

Studies in Historical Ecological processes have largely done away with arguments supporting environmental determinism (Baleé and Erickson 2006:2). As described below, human interactions with local environments are dialectical rather than deterministic. The flexibility of ecosystems to forces of change and disturbance, coupled with human cultural adaptability and ingenuity results in a dynamic system of landscape creation over time and at different scales. While environments can initially control the range of choices available to a population at a given time, culture can reshape aspects of the environment in responding to available choices. The reshaped environment then presents a new set of possibilities for cultural change and creation. Over time a cycle of mutual determinism (Cronon 1983:13) and reciprocity between nature and human culture emerges (Rappaport 1984). In this sense, “human life is poised amid multiple, irreducible orders of natural and cultural determinism, [in which] there can be no environmental determinism” (Biersack 1999:7). Rappaport has argued that anthropology should consider human groups as populations, in the sense of biology, acting within ecosystems. The “study of man the culture-bearer cannot be separated from the study of man as a species among species” (Rappaport 1984: 242); cultural rituals and actions can serve as a regulatory function keeping human populations and ecosystems operationally within range of each other. When one considers human groups to functionally exist as other living populations of species do, one can see the cultural and ecological function of ritualistic behaviours (229). In a dialectical relationship with ecosystems ritual can “operate not only as a homeostat-maintaining a number of variables that comprise the total system within ranges of viability—but also as a transducer—‘translating’ changes in the state of one subsystem into information and energy that can produce changes in the second subsystem”, this then “maintain[s] coherence between subsystems at levels either above or below which perpetuation of the total system might be endangered” (229). Not to be overly reductionist, Rappaport suggests this regulatory interaction between cultures and ecosystems is down to binary variables; if continued natural change within an ecosystem exceeds certain limits a cultural group has one of two options: act, or not (233). This

action however may occur at a number of different scales, and will feed into a multitude of exchanges with the environment in which both ecosystems and culture are altered. Culture cannot be seen as an autonomous whole, but rather as a tool by which populations create a niche in the environment (Rappaport 1984:233; Biersack 1999:6).

Western science's understanding has been grounded in an 'operational model' which is deeply based in observation and fact, whereas many indigenous groups understand the world within a 'cognized model', conceived through ritual and cultural action within systems. 'Cognized models' are not always observable to western perspectives but have functional and adaptive criteria that elicit behaviour which fits the material situation of those who share them, and are important aspects of a population's adjustment to an ecosystem (Rappaport 1984:235). It follows that just because a culture conceives a world through processes of ritual, which may be misunderstood by a Westerner, this doesn't mean that the actions of those rituals do not reflect clearly onto the land. No matter a society's various socio-economic, political and cultural criteria, their impacts are inscribed onto the land in distinct ways (Baleé 2006:76, 77).

3.1.2. European perspective

The history of the European colonial enterprise is one of landscape misinterpretation. Repeatedly, as Europeans spread around the globe they were confronted with distinct locally developed models governing human interactions with nature. Their arrival in 'new' lands was marked by Eurocentric understandings of the landscapes they encountered. There was a narrative of culture in opposition to nature, the nature/culture divide. The concept of human's place in the environment was born out of unique culture history that had become 'naturalized' (Yanagisako and Delany 1995) into the European worldview. The European continent itself was largely altered through centuries of intensive agriculture and development, in which ecosystems had evolved on the margins and within farmland and bocage habitats. In traditional folklore, wild or forested areas, beyond the gates and walls of the country "lived space", were seen as "hostile and opposed to human agency" (Harkin 2000: 50). The world of the deep forest was uncivilized, outside of the realm of culture.

Colonialism was facilitated by the writings of European surveyors, anthropologists, officials and the like as they spread out across the land. Scientific accounts propagated boundaries and divides in the landscape. Vast empty areas were recorded in stunning, romantic detail, surrounding fixed and isolated pockets of savage culture (Willems-Braun 1997:16-17). The Vancouver Island Expedition records the ‘wilds’ of Vancouver Island.

“We found banks thickly timbered, and where the Douglas pine, spruce, and hemlock had grown under favorable circumstances, the place resembled a beautiful park; but for the most part a tangle of underbrush, mingled with fallen logs in all stages of decay, and woods in all degrees of luxuriance” (Whympers 1868:64, Fig. 4)



Figure 4: "Une Foret de L'île Vancouver", Vancouver Island Exploring Expedition
(Whympers 1880:31).

In describing the expansive forests surrounding coastal villages, anthropologist Franz Boas speaks of emptiness,

“The overwhelming solitude and stillness of the shores, the monotony of the dark pines and cedars, of the channels and of the roaring cascades beget a longing for the sight of human work, of human habitation, that swallows the admiration of the magnificent scenery” (Boas 1896:229 quoted in Oliver:2007).

While many colonial observations of the land occurred at a time of low indigenous population levels, this passage is largely borne out of an assumption of human separation from the land. The surveys and journals of George Herbert Dawson (Surveyor General

of BC) are suggested by Willems-Braun to have commoditized the land to serve as a resource “available for political and economic calculations” (1997: 16). The natural world was recorded and collected in all its scientific precision, as were the “primitives” described in a language and discourse that laid them outside the narrative of the modern state (Willems-Braun 1997: 16). Likewise Gilbert Sproat (*Justice of the Peace*) describes the Barkley Sound region by recording natives as being spatially “fixed” at certain sites on the land, surrounded by a sea of unused space. The indigenous peoples were seen to move across the land, “leaving little trace of occupation”, and “few claims of possession” (Willems-Braun 1997:50). Whymper makes note of the Cowichan peoples’ place naming on the Cowichan River, “Every locality on its banks had appropriate native names. One fresh verdant spot near a deserted Indian lodge was Saatlam, ‘the place of green leaves;’ another, an open prairie in the woods was Qualis, ‘the warm place.’” However, in his next thought “...we found the forest getting thicker, the trees largerOne cedar near this spot measured thirty-five feet in circumference.... In this country very valuable timber is necessarily useless at the present time, from the fact that there are ... no available means of transport to the coast...” (1868: 66). Mary Louise Pratt has argued that the science of Natural History “extracted specimens not only from their organic or ecological relations with each other, but also from their place in other people’s economies, histories, social and symbolic systems” (1992:31). In the same sense the writings of early Europeans described indigenous peoples as being extracted from their larger context and isolated at certain locations such as villages and typical resource procurement sites (Willems-Braun 1997: 17). This separation of humans from the land surrounding them is deeply woven into the Canadian consciousness. The landscape was a “... primal world of nature, an unclaimed and timeless space occupied by plants and creatures, but not organized by societies and economies; a world whose only history was about to begin” (Willems-Braun 1997:16-17). In actuality local First Nations’ history was deeply embedded and evident across the land. These features of the land however remained hidden as they reflected a unique relationship with the local environment that had evolved over millennia.

3.1.3. Physio-mimetic ecosystems

On the Northwest Coast, well before the onset of European contact and change, growing populations and increased complexity had likely initiated, or resulted from the increased intensification of particular resources (Deur 1999). It has been suggested that this was helped by the creation of physio-mimetic structures in the landscape: a process of “mimicking or enhancing certain conditions that foster plant growth under natural conditions” (Deur 2002:13). As structures, they were not wholly apart from the surrounding landscape, but instead expanded, or made more efficient, the processes and structures already in existence within the area such as the capacity of perennials for vegetative regeneration (Turner and Peacock 2005).

A patchwork of open oak forest and prairie in an otherwise forested environment stretched from southeastern Vancouver Island to northern California. These lands were anthropogenic, and would not have existed in their form without consistent fire management by indigenous peoples (Anderson and Wohlgemuth 2012; Beckwith 2006). In Oregon, clearings were made on south facing slopes in the densely settled spruce-hemlock rainforests to produce root vegetables and berries (Deur 1999: 141). In coastal estuaries of British Columbia gravel beds and sedge meadows were terraced, bordered, weeded and fertilized with ocean debris for root crops such as Pacific silverweed and springbank clover (Deur 2002:11, 2005; Lepofsky and Lertzman 2008:135). Across the Northwest Coast intertidal clam gardens were constructed to maximize shellfish harvesting. Large stone walls were built to hold back beach sediment creating relatively flat beach surfaces at certain intertidal levels, which maximized the habitat of particular shellfish species (Groesbeck 2012: 1,11). Whapato (“Indian potato”) was planted and harvested extensively in wetlands (Deur 2002:16) within beds of gravel. Tending of crab-apple trees was noted by several European explorers along the west coast. Gilbert Sproat wrote on Vancouver Island in the 1860s, “The natives are as careful with their crab-apple trees as we are of our orchards; and it is a sure sign of their losing heart before intruding whites when, in the neighborhood of settlements, they sullenly cut down their crab-apple trees, in order to gather the fruit for the last time without trouble... (Turner, Smith and Jones 2005:178)”. This manipulation of landscape and plants created ‘agro ecosystems’

which maximized many foods and resources over time. It is thought the incredible abundance of fish and marine mammal resources that were available to populations on the coast both helped to facilitate the emergence of these physio-mimetic creations (when population expansion demanded increased resources), and hindered their development as primary forms of subsistence (Deur 1999:147)

Revelations about indigenous management have led to deeper understandings of the existence of so-called “complex hunter-gatherers”, and blurred the divide between primitive foragers and complex agriculturalists. The existence of human as landscape architects, transforming ecosystems and tending species to their own needs, yet who are not fully dependant on intensive agriculture has forced re-evaluation of the assumed ‘progress’ from hunter-gathering to agriculture, and the concept of a ‘wild’ nature. Northwest Coast cultures augmented their “hunting and gathering” practices with the creation of agro-ecosystems and cultivation. Such a breadth of resource collection is no different from the various groupings of subsistence practices that would have persisted together around the world for millennia: foraging, low-intensity cultivation, intensive agriculture, hunting and pastoralism (Deur and Turner 2005: 15). Rather than a hierarchy of subsistence patterns it has become clear that context, history and cultural-ecological processes shape how culture interacts with and alters landscapes. Anderson and Wohlgemuth argue that plant management “must not be viewed in isolation, but rather in broader context of prehistoric subsistence systems and how these systems fit within and impact dynamic and diverse ecosystems” (2012:190).

This understanding of the intensification and management of altered micro environments along the coastal edge and drier rain shadow regions has revealed Northwest Coast peoples as landscape architects implicated in pervasive anthropogenic change to ecosystems. These ideas however have not yet been widely applied to the deep forest, away from the burned prairies, raised beaches and harnessed rivers. Cedar resources represent the primary material culture of most Northwest Coast groups and yet regional studies of their extraction and affect on the land and culture have been limited (section 5.1). The extensive and continuous removal of cedar from the landscape has often received only passing mention in anthropological material. It was thought to require

only limited forays into an otherwise hostile and uninviting forest. Anthropologist Phillip Drucker writes,

“The woods, seen from the water, seem to form an impenetrable mantle over the irregular surface of the land. After one finally breaks through the luxurious growth along the margin, he finds himself in a dark gloomy moss-covered world... It is scarcely to be wondered at, what with the ruggedness of the rockbound mountainous terrain and the dense tangle of vegetation, that **the native population for the most part frequented the woods but little.**” (1951:8-9, emphasis added)

Archeological work within the anaerobic conditions of ‘wet sites’ has found that over 90% of artifacts on the Northwest Coast are made of wood or fibre, with only 5-10% made from the stone, shell or bone found in most excavations (Angelbeck 2008:125-126). This extraction of forest resources, especially the cedar represented in coastal material culture, must be reflected throughout coastal landscapes. To the end of this chapter I outline indigenous conceptions of place within coastal forests of the Nuu-chah-nulth before delving into Chapter 4 and the reflections of cedar use within throughout the Northwest Coast.

3.2. Indigenous conceptions of “place” in the deep forest

All aspects of Nuu-chah-nulth life were in some way interwoven with the bark of yellow and red cedars. Drucker suggests that the culture itself can be framed in reference to cedar,

“From the time the newborn infant’s body was dried with wisps of shredded cedar bark, and he was laid in a cradle padded with the same material and his head was flattened by a roll of it, he used articles of these materials every day of his life, until he was finally rolled up in an old cedar-bark mat for burial” (Drucker 1951:93).

Cedar objects were often central to indigenous ritual life; births, deaths, burials and all other rituals made use of cedar, medicinally and spiritually. Waste products of babies and young girls going through puberty were burnt, buried or hung in association with cedar trees. The cedar itself was a metaphor for growth, strength and longevity (Mauze 1998: 237). Cedar were thought to be sentient, possess a soul and responded to the feelings people held towards them. Many groups thought cedars could understand human

language, and would beg the tree to allow them to extract its wood or bark (Mauze 1998:241; Stewart 1984: 113). Franz Boaz working with the Kwakwaka'wakw recorded "words of praise" spoken to the cedar before harvesting of its bark.

"Look at me friend! I come to ask you for your dress. For you have come to take pity on us; for there is nothing for which you cannot be used. For you are really willing to give us your dress, I come and beg you for this, Long-Life Maker. For I am going to make a basket for lily-roots... out of you. I pray, friend, not to feel angry on account of what I am going to do to you. And I beg you, friend, to tell our friends about what I ask of you! Take care, friend! Keep sickness away from me, so that I may not be killed by sickness or in war, O friend!"(1921:619)

This reference to 'dress' is analogous to the personification of trees in indigenous languages. Cedar bark was the 'clothes' that were worn by the tree. Often terms relating to trees were synonymous with the human body: flesh as wood, skin/clothes as bark, face as profile, arm as branch, and leg as root. In the Tlingit language an old tree was called "blood", while a young one was called "cartilage" (Mauze 1998:239). A cut tree or one that had all its bark removed was said to have been "killed" (Mauze 1998:239). Boas again notes, "they do not take all of the cedar-bark, for the people of the olden times said that if they should peel off all the cedar-bark... the young tree would die, and then another cedar-tree nearby would curse the bark-peeler so that he would also die" (Boas 1921 quoted in Turner and Peacock 2005:123). Similarly, if a person arrives without proper training, the tree will avoid being peeled,

"It is said that a cedar turns about, it does not like the one who looks for it without having trained and therefore shows its bad (side); consequently even though he has recently gone along that way, the one who seeks cedars without trained says, 'I have gone along that way and found nothing.'... the one who has trained sees a good cedar there"(Sapir and Swadesh 1939:183)

The belief of the tree as a living, respected being is consistent throughout descriptions of its place in indigenous societies up and down the coast (Stewart 1984; Mauze 1998).

The vast number of uses that were found for cedar within Northwest Coast cultures is well reflected in the rituals, beliefs, metaphors and associations local people had for the tree. In many ways the material culture and ritual behavior attached to cedar in daily lives truly made the forest the "homeland" of Nuu-chah-nulth thoughts and identity. CMTs themselves represent a material manifestation of this human relationship

with the landscape, and the embedded sense of place in the forest. Cultural forests were imbued with such meaning and history that the characteristics of both human society and the forest itself began to reflect each other. This “attentive involvement” is the context by which humans are involved in the creation of landscape. “... the form is the embodiment of a developmental or historical process, and is rooted in the context of human dwelling in the world” (Ingold 1993:170). This relationship with forests, and systems of management, pull the landscape into the realm of the ‘built environment’ (Ingold 2000: 79,173-174)

3.2.1. Cognized models

The use of cedar forests on the Northwest Coast and the changes made to them over time may not have been immediately understandable to outsiders observing the landscape. While western science has run on an ‘operational model’ based in observation and fact to understand the world, many indigenous groups employ a ‘cognized model’, conceived through ritual and cultural action within systems. ‘Cognized models’ are not always observable to researchers but have functional and adaptive criteria that elicit behavior which fits to the material situation of the people, and is an important aspect of a population’s relationship to an ecosystem (Rappaport 1984:235). This follows that a society’s various socio-economic, political and cultural criteria will impact, and be inscribed onto, the land in different ways (Baleé 2006:76, 77). In this sense, “dwelling” in the land is seen as a landscape shaper. Ingold (1993) suggests that the landscape never actually pre-exists for people to live within it, but instead dwelling in the land is a form of building and shaping, of both landscapes and identities. As such there is no end result, but a continuous work in progress in which ideas of place are formed and help shape the landscape. No matter how grand, empty and timeless the ancient cedar forests of the Nuu-chah-nulth might appear, they did not exist in their physical and perceived form before people dwelled within the land. Human actions physically and mentally constituted the place that it was to become, and the landscape constituted the people they were to become. Human presence in forests, through the creation of trails and extensive harvesting of bark and wood shaped the structure of many forests. This cannot be truer than for the Nuu-chah-nulth and other Northwest Coast group’s use of cedar forests.

When considering cultural forests of the Nuuchahnulth, how do we begin to understand human relationship with the landscape or, for that matter, how did they understand their relationship with the land? Ingold suggests the perspective of many different indigenous groups:

“[T]here are not two worlds, of nature and society, but just one, saturated with personal powers, and embracing both humans, the animals and plants on which they depend, and the features of the landscape in which they live and move. Within this one world, humans figure not as composites of body and mind but as undivided beings, organism-beings, relating as such both to other humans and to non-human agencies and entities in their environment” (Ingold 2000:47).

Likewise, the Northern Ojibwa’s concept of a “person” is not that of a human but goes beyond that to the “inanimate” entities that are part of their world (Nadasdy 2003:83). The Nuuchahnulth’s physical world is also viewed as an “integrated entity” (Ingold 2000:47), one that deserves the same time, respect and bonds with which the human relationships are bestowed in the social sphere of the village.

3.2.2. Ingold’s Tree

Ingold suggests that a tree “embodies the entire history of its development from the moment it first took root” (1993:167). This powerfully constitutes a place, which, before its conjunction with human lives, did not truly exist as it did when it was used, or as it does now. People living within forest are inherently

“bound up in the life of the tree as is the tree in the lives of the people.... At one extreme, represented by the solid trunk, it presides immobile over the passage of human generations; at the other, represented by the frondescent shoots, it resonates with the life-cycles of insects, the seasonal migration of birds.... In a sense, then, the tree bridges the gap between the apparently fixed and invariant forms of the landscape and the mobile and transient forms of animal life, visible proof that all of these forms, from the most permanent to the most ephemeral, are dynamically linked under transformation within the movement of becoming of the world as a whole” (Ingold 1993:168).

In his paper on “The Temporality of the Landscape” Ingold (1993:152) attempts to use this focus on time to move beyond a “sterile” European focus on “the naturalistic view of the landscape as a neutral, external backdrop to human activities” to one that sees it as a mental and symbolic ordering of space; making it an instigator and outcome of identity making processes. Basso states that this “place consciousness is homologous with historical consciousness” together they form “a way of constructing social traditions and,

in the process, personal and social identities (Basso 1996:7). The human presence within cedar forests and use of cedar is clearly reflected in the identities of Northwest Coast groups. Culture was shaped by and entangled with cedar.

3.2.3. The Trail

“I once found one of our women more than two miles from the village, on her knees in the woods, with her eyes shut, and her face turned towards heaven, uttering words in a lamentable tone, among which I distinctly heard ‘Wocash Ah-welth’, meaning Good Lord, and which has nearly the same signification with Quahootze. Though I came very near her, she appeared not to notice me, but continued her devotions ; and I have frequently seen the women go alone into the woods, evidently for the purpose of addressing themselves to a superior being, and it was always very perceptible on their return, when they had been thus employed, from their silence and melancholy looks” (Jewitt 1815:179).

The deep forest was visited by Nuu-chah-nulth for many purposes, though few can be divided into purely economic or spiritual. The landscape of managed forests requires the movement of populations across the land. Movement led to the development of corridors of bark harvesting that stretched through segments of forests (Eldridge 2013:11). These trails would act as arteries linking the hub of the village to the liminal space of the cedar stands and beyond to sacred sites, resource collection areas, or distant trading partners. They provided physical access to places that were otherwise only contemplated in the mind’s eye. Harkin suggests they are the “best example of interpenetration of landscape and human intentionality’s.... Trails, becoming increasingly efficient with use, deliver people into the heart of the forest to extract resources and to encounter nonhuman beings and sources of supernatural power. As the trail becomes increasingly characterized by human intentionality, humans who travel the trail become increasingly shaped by the nonhuman forest” (2004:393) Nuu-chah-nulth, he suggests, considered trails to be a sort of private knowledge that could be widely known but was likely shared in very limited social circles. “Trails led to economic resources and, perhaps more importantly, to loci of power well beyond the circumscribed social space of the village” (Harkin 2004:393).

3.2.4. The Scar

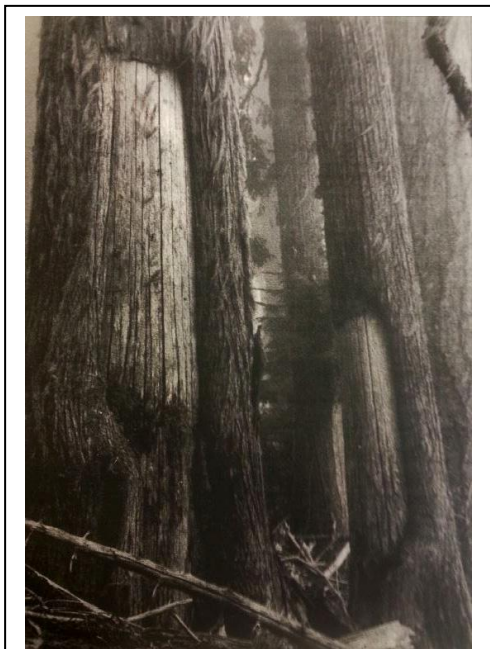


Figure 5: Rectangular bark stripped CMTs in Gifford Pinchot National Forest Washington (USDA USFS 1987 in Mack 1996:2; reproduction courtesy of USDA USFS).

Ingold suggests that “[i]f every object is to be regarded as a ‘collapsed act’, then the landscape as a whole must be understood as the taskscape in its embodied form: a pattern of activities ‘collapsed’ into an array of features” (Mead 1977[1938]:97). Activities are incorporated, more so than inscribed into the land. They are not just markers, but rather indications of use, continually affecting and altering the pattern of use of successive visitors. Cultural forests of the Nuu-chah-nulth are, in effect, a landscape of these “collapsed acts”. Each modification on each tree represents a time, a person, a ritual, and a movement through the landscape, or many (Fig.5). In this way, the forest becomes an intensely

temporally charged place; an embodiment of its history intertwined with human lives.

Cultural scars on trees would mark past actions of family and community members, slowly healing with each subsequent visit to the stand. In this sense history was physically inscribed in the landscape for the people who moved through the forest. Harkin (2004) states that the Nuu-chah-nulth used these places in order to remember events. Physical features represented anchor points for memory and ancestral narratives to those who dwelled there. When considering trail maker trees, the scar may “signify the esoteric knowledge of a single individual, family, or small community” has of a certain resource, vision quest, grave or destination (Harwood and Ruuska 2013:150). That knowledge, remaining in the landscape over time can be passed from one generation to the next with different interpretations of value. If lost over time through torn memory or death, the feature in the land remains with the potential to be repurposed for different use, different values, or as potential beacons for the rediscovery of its lost use.

The deep forest was considered a liminal zone that embodied an intensely inhabited place, “saturated with the habits of mind and body, with traces of ancestors and

their actions.” Such places aided in the construction of “social traditions and in the process, personal and social identities” (Harkin 2004:390), and to dwell within them was to “engage perceptually with an environment that is itself *pregnant with past*” (Ingold 1993:153 emphasis added). The depth of attachment and meaning of these forests can only be heightened beyond Ingold’s perceived value system in a forest made up of CMTs being actively utilized in daily social, spiritual and economic. These trees held so much cultural value and engrained history that they provided some of the most “potent and visible” symbols of identity and social processes (Rival 1998:1).

Chapter 4: Cedar

Two species of cedar are prolific on the Northwest Coast: western redcedar (*Thuja plicata*) and yellow cedar (*Chamaecyparis nootkatensis*; Pojar and Mackinnon 1994:42-43). By far the most common species is western redcedar, which stretches deep inland from the coast between the Alaskan panhandle and southern Oregon, and from northern Idaho to south and central eastern British Columbia (Stewart 1984:23). Yellow cedar's range is more restricted and includes higher elevation coastal areas in a similar but more northerly footprint (Stewart 1984:23). Yellow cedar shares many of the same characteristics of western redcedar, however it is considered a higher quality resource and was sought in remote locations for wood and extremely strong, satin-like inner bark (Stewart 1984:25).

Cedar is the "Tree of Life" for the Nuu-chah-nulth (Mauze 1998:235). Its use in First Nations material culture and attached spiritual significance cannot be overstated. Every ritual and material object likely incorporated some part of either the red or yellow cedar tree. Durability and workability of the wood made it the foundational material of homes, poles, canoes, and boxes. The strong fibre of bark, and branches, and long roots made it ideal for use in clothing, blankets, mats, cordage, nets, and baskets. No other material approached cedar in importance.

Paleobotanical studies suggest that a cedar-like species first appeared around the Fraser River in the early Holocene. Between 10,000 and 6,000 years ago cedar were present, but thinly distributed across much of the coast, until a change in climate likely induced a steady growth in abundance. By about 5000 and 2500 years ago Western redcedar experienced a peak in numbers, reaching co-dominance with western hemlock (*Tsuga heterophylla*; Hebda and Mathewes 1984:711-712). The emergence of cedar helped shape the Northwest Culture pattern, characterize by large scale woodworking and reliance on cedar material goods (Hebda and Mathewes 1984:712). Archaeological evidence of cedar wood and bark use has appeared in Northwest Coast wet-sites dating as far back as 3000 years before present. At the Glenrose site near Vancouver there are suggestions of general woodworking between 5000 to 8000 years ago (Stewart 1984:26-27). Planks recovered at an archaeological site on the Fraser River delta suggest plank

houses were built at least as early as 3500 years ago (Hebda and Mathewes 1984:712). This evidence, while not complete, serves to suggest the time depth of cedar use on the Northwest Coast. Section 8.2 delves deeper into the questions of antiquity of cedar use.

4.1.1. Logging and cedar planking

Both species of cedar are sought for their wood, however, unless otherwise noted most descriptions of cedar woodworking relate to western redcedar which was more commonly used. Straight-grained, light-weight, insulating, and splittable, are all distinctive traits that made cedars, especially western redcedar the most desirable for woodworking on the coast. Cedar could be steambent, allowing for manipulation of cut and carved wood into bentwood boxes, drums, cradles and canoes (Stewart 1984:47). Western redcedar produces its own fungicide; a toxic oil that prevents rot in older trees (Stewart 1984:22), which helps fallen trees or dead snags to remain preserved for centuries after death (Daniels et al. 1997). Its chemical qualities made it durable for many technologies in the wet temperate rainforests of the coast, especially in house building. Beautifully carved house posts and beams supported massive buildings for long periods of time. Cedar wood was not limited to use in storage and shelter but all number of materials: poles, masks, planks, benches, paddles and bailers, digging sticks, fishing hooks, roasting sticks, arrows, whistles, basket frames and coffins -to name a few- were made with cedar (Stewart 1984:93-111).

Drucker's (1951:79) informants suggested that trees were rarely felled when the required amount of wood was less than that of a full pole. Redcedar required for planks, canoes and other material was often extracted from standing trees. Tall, straight cedars sought by woodworkers would grow back from the shoreline and could rarely be felled without scarring the surrounding trees. It is important to note that once a tree has been culturally or naturally scarred, the death of the cambium layer and the creation of healing lobes introduces isolated rot, negating its use for anything other than bark extraction. Many of the large trees that blew down in wind storms would have been useful for the extraction of larger canoes, planks or poles without causing additional damage to intact stands (Arcas 1996b:151).

Wood was extracted from standing cedars by chiselling cavities above and below the area of the trunk that was to be removed. These cuts could reach nearly to the centre of the tree. Wedges were driven in downward from the upper cut until a pole could be fitted in. The tree was then left, allowing wind movement and pressure of the pole and wedges to expand the split. When revisited the wedges and pole would be lowered as needed until the entire plank of wood ‘popped’ off (Drucker 1951:79-80; Stewart 1984:40-43).

For the creation of poles or larger canoes, certain trees were often chosen for felling. Where the trees were felled often depended on their intended use. Trees on the shoreline would be easy to transport via water but usually contained more branches and knots (Drucker 1951:80); those in the dark areas of the forest took longer to transport out but were often of better quality wood (Stewart 1984:37). The two most common techniques for felling trees found in a study on Meares Island were to use chisels to girdle around the entire base or undercutting and burning of a cavity deep within one side of the tree. A tree, destabilized like this, would often be left to fall naturally (Arcas 1986b:153-155). Logs that had to be moved a distance to water for transport were pulled by large groups of men along small log skids to lessen drag through the forest. On the water several canoes would pull the log to its destination. Logs that were turned into canoes were shaped at the site of either the felled tree or extracted wood (Stewart 1984:53-54).

4.1.2. Cedar bark stripping

Cedar bark as a resource was of central importance to Northwest Coast peoples, consequently bark peeling was prolific. The inner bark of both western redcedar and yellow cedar was utilized everywhere these species were present on the land. The proliferation of the extraction and use of the bark was my primary justification for its focus of study. In this thesis, while CMT logging data are used to some degree, the vast majority of exact dates and samples are from bark stripping events. The spatial distribution of these features in the landscape represents a far less limited range than those of logging.

The timing of bark peeling is dependant on the arrival of spring when sap began to run. For the southern Salish it could appear as early as April, for the Haida, as late as

July (Stewart 1984:113). For the southern Nuu-chah-nulth the collection of bark usually began in April or May, with larger trees peeled a little later (Arcas 1986c: 65; Bouchard 1994:38; Stewart 1984:113). Groups of women aided by men (Drucker 1951:93) would head out to the woods and to particular stands of cedar. Certain areas of forest were often owned by individuals or lineages. The Nuu-chah-nulth were intensely concerned about concepts of ownership, in particular, who held rights over which resource sites (Bouchard 1994:7, Deur and Turner 2005:161, Drucker 1951:247). Cedar stands would have been no different and would likely have been regularly revisited by the same family or group until such time as the ownership of the resource changed hands (McMillan 1996:19, 60).

Yellow cedar are often restricted to elevated inland areas inland, whereas stands of western redcedar are relatively common across the land. In many instances modified tree stands have been found several km inland from water bodies and in remote areas that are hard to reach (Stafford and Maxwell 2006). People were willing to travel great distances to harvest the resource, but also bark peeling occurred as a result of happenstance on unrelated inland journeys. Berry patches have often been associated with CMT sites, pointing to the overlap of resource collection sites or the extraction of bark in the creation of crude baskets for carrying berries (eg. Mack 1996). The trees chosen for their bark would usually have tall and straight trunks no wider than two hand spans (Stewart 1984:113) or 60 cm wide (British Columbia, Archaeology Branch 2001:28) and have minimal or no branches in the lower section of the trunk. A cut at the base with a chisel or knife, would allow the whole bark strip to be pried off down to the cambium. The peeler, backing away, would pull off the bark high up the trunk. If the peeler didn't have an incline to walk up while pulling the bark, a cord could be attached to the end of the strip to allow for the required leverage needed to get a long piece (Stewart 1984:114). The tapered off bark would be ripped from high on the trunk, then the inner bark separated from its outer bark, folded and packed into a backpack bundle for transportation off-site (Arcas 1986c: 65; Drucker 1951:105; Stewart 1984:114). Back at the village the bark was unravelled and dried for about a day. Usually the bark would be stored until winter when there was more time for creating material goods. After storage the inner bark would need to be soaked to be made flexible again for weaving (Turner et al. 1983:70).

Cedar bark can be processed in different ways depending on the product being created. For twine and cordage bark was divided into thin strands and spun together; for clothing bark was beaten to make it softer; for baskets strands of varied width would be woven into a checkerboard pattern (Turner et al. 1983:70). Waterproof hats and capes were made from tightly woven red or yellow cedar bark strips that had been pounded soft. Yellow cedar was preferred for the creation of blankets. They were made by the spinning and weaving of inner cedar bark with dog hair and cottonwood bast fibre (Turner et al 1983:70).

4.2. Culturally Modified Trees (CMTs): Typology and Morphology

Any tree that has been altered by indigenous people as part of a traditional use of the forest (Stryd and Feddema 1998; British Columbia, Archaeology Branch 2001) is a CMT. In Northwest Coast forests they represent resource extraction events of local peoples. As described above, the Western redcedar (*Thuja plicata*) is by far the most common tree species in use, and the species most frequently associated with cultural modifications; however its weighted representation among CMTs on the Northwest Coast is also somewhat a product of its long lifespan and resistance to both infection and rot. The Western redcedar is found widely along the coast, whereas the yellow cedar (*Cupressus nootkatensis*) was usually found at higher elevations, and was more highly prized for its bark.

Most CMTs can be distinguished by two forms: wood extraction, and peeled bark. The process of logging on the coast created distinct residual structures in the forest that reflected different forms of resource management. The nine different types of aboriginally logged CMTs cited in the BC CMT handbook include canoe blanks (abandoned canoe construction), stumps, plank-strip scars, notches, cut logs, chopping, test holes (for felling or resource extraction), logging detritus, and sections that are missing from fallen or standing logs (Stryd and Eldridge 1993). The dating of CMTs associated with indigenous logging is usually limited to determining the age of a nurse tree growing over the modified wood or a felled tree; which establishes a minimum date of the feature. Many indigenous logging practices killed the tree, leaving features to

slowly decay and confounding exact dating. Other extraction techniques, such as test holes, planks, notches and rectangular scars often do not result in the death of a tree and can thus be dated in similar fashion to Tapered Bark Strip (TBS) scars.

Bark stripped cedars most commonly refer to the TBS trees that have a horizontal cut in the trunks bark about 1 to 1.5 metres above the ground. The bark is then peeled vertically to a narrow point where it can be ripped off. This ‘bark stripped’ category of CMT also includes ‘girdled’ strips that completely remove bark from around the base, and ‘rectangular scars’ that use upper and lower horizontal cuts to remove rectangular ‘boards’ of bark. The practice of girdling trees was less common (Turner and Peacock 2005:123) and results in the death of the tree. They are rare in the landscape and undatable without a master tree ring chronology (for dendrochronological study). Rectangular scars are less consistently found on the coast as the extracted boards have less generalized purposes (usually temporary shelters, containers, roofing material; British Columbia, Archaeology Branch 2001). They are thought to be more consistently found on the north coast and farther inland along the coast (Mobley and Eldridge 1992:104), though they have also been discovered dispersed elsewhere.

Other types of living CMTs not covered in this study include trail marker scars, arborglyphs (often in the form of carved faces on trunks), and culturally burned trees. These are modifications to trees intended to convey messages, or signify ritual, rather than the specific use for resource extraction. Some burned trees may be the result of prescribed burning. My focus will be on those cedars utilized for the extraction of cedar bark, and to a lesser extent data recovered from indigenous logging activities.

4.2.1. Compartmentalization of injury

At the heart of cedar scarring, both cultural and natural, is the process of compartmentalization. Trees are unable to move or retreat from destructive forces and are incapable of healing themselves to the degree that animals can. The tree has no capacity to regenerate dead or injured tissue, only to create new cells in new locations. They “compartmentalize” the wound, walling off the damage or encroaching infection by

strengthening existing boundaries in the wood. Tissue is also generated by the cambium layer in the form of new annual rings.

A tree has evolved as a highly compartmentalized plant that walls off injury rather than heals it (Shigo 1979:12). There are four main walls within a tree that stand as barriers to spreading infection. The first three walls are pre-existing and are strengthened following injury; they are also movable with the advancement of infection (Shigo 1979:1). Tissues existing at the time of injury create chemical boundaries as the tree and introduced pathogens interact. Wall one is created following infection by “plugging the vertical vascular system above and below the wound” (Shigo 1979:12), and thus preventing vertical spread. Wall two is comprised of the last layer of cells to form in each annual growth ring. As such it wraps completely around the tree with each ring, and prevents the inward spread of infection. Wall three is a series of ‘sheets’ that make up radial walls spreading out, irregularly from the centre of the tree, resisting lateral spread. Wall four is created after the injury as cambium builds a structural and chemical separation between the wounded tissue and the new annual rings that grow over top; this wall contains chemicals that are toxic to decay organisms (Shigo 1979:13, Shigo 1984:193, 201-202). These four walls prevent decay from spreading in all four directions out from the original wound. The successive annual rings that grow atop wall four eventually create the TBS scar crust and healing lobes that close in the open wound, or scar face (see external identifiers of TBS below).

Boundary creation following injury can be “very beneficial” as long as the remaining cells, or newly created cells outside of the protective walls are sufficient for normal functioning (Shigo 1984:193). In a cedar, clearly some portion of the bark has to be left for the “normal functioning” of some upper portion of the tree. The creation of healing lobes expands this initial suppressed level of functioning as the wound slowly compartmentalizes and the tree responds to preserve its life (Arcas 1986b:199).

4.2.2. Tapered Bark Strips

Tapered Bark Strip (TBS; Fig 6) scars are by far the most common of all CMT features as they rarely kill trees and allow continued growth. It is this type of feature that

is the primary focus of this thesis, due to its proliferation on the coast, long lifespan, distinct features and accuracy of dating.



Figure 6: Young TBS CMT examples from Prince Rupert Harbour BC, 2015. Note stages of early lobe growth between 2 and 10 years approximately.

Identification of TBS scars as categorically cultural, like other CMTs, is only possible with the presence of tool marks or notably straight, horizontal edges at the base of the scar. These marks are often not visible as the wood in the peeled area dies, and is prone to some level of decay (Arcas 1986b:188). All other identifying features of bark strip scars (described below) are individually suggestive of cultural origins especially when taken together. When considering all external features of the tree and those found in tree-ring analysis (cross-section), confidence in assigning cultural origins “can approach certainty” (Arcas 1986b: 109). On Meares Island the rate of misidentification of

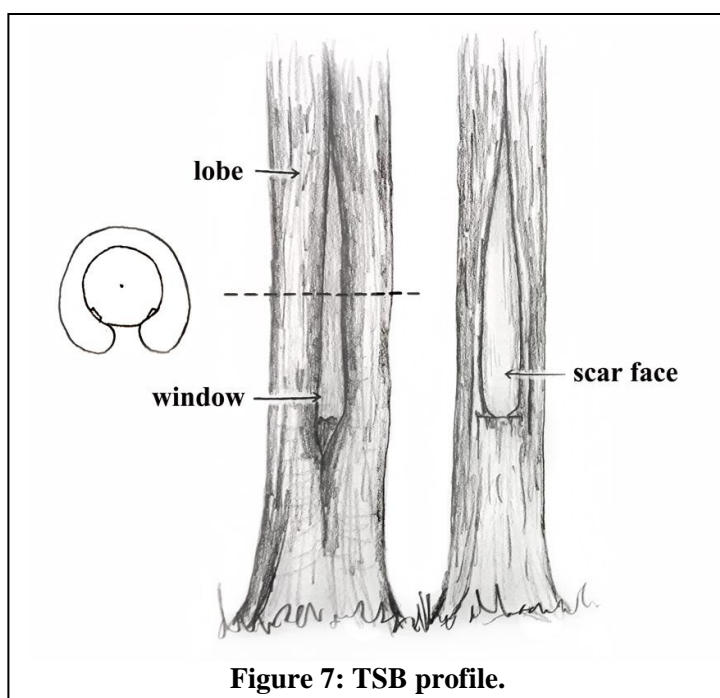
natural scarring as cultural was only at 1% of 300 trees (Arcas 1986b:109). It is important to note however that there has been minimal research into the scarring of trees (Shigo 1979, 1984, 1985), and cultural versus natural cedar scarring other than the Meares Island CMT study (Arcas 1986b) and a few others (Eldridge and Eldridge 1988; Eldridge 1997a). These studies are well overdue for reinvestigations and continued research to better solidify understandings of scarring morphology and variation in natural scarring processes.

4.2.2.1 Identification

Culturally bark stripped trees have a number of characteristics that make them distinguishable from other natural scars that may occur on cedars. The majority of these features have been studied on western redcedar. Yellow cedar however, appears to heal slightly differently and has not undergone the intensive comparative study between natural or cultural scars that redcedar has.

External identifiers of TBS

Lobes: All TBS on trees older than a few years are framed on two sides with healing lobes that slowly advance to cover the scar face (Fig.7). They are usually long and narrow, start above the base of the trunk (Arcas 1986b: 188) and taper to a close at the top. Short scars that taper quickly suggest a natural event (Arcas 1986b: 188).



Scar face without bark: The peeled bark leaves a scar face, between the lobes, of dead wood that is unable to regenerate. This scar should not have any residual bark on it (British Columbia, Archaeology Branch 2001:28; Arcas 1986b:108-109). The presence of bark suggests any number of natural events

that would not have completely removed the bark (section 2.5.2).

No branches in scar: Large branches are usually absent on cultural scars (British Columbia, Archaeology Branch 2001:28, Arcas 1986b: 188), as they would obstruct the peeling of bark. However, I have identified smaller branches in recent cultural scars around Saanich, Vancouver Island and in Prince Rupert Harbour.

Uphill slope: Cultural scars are usually found on the uphill and side-slope faces of the tree, but rarely downhill (British Columbia, Archaeology Branch 2001:28). Walking uphill facilitates a better angle for peeling. Peeling the downhill side of a tree would likely require a wrap-around strategy to the uphill side; however, the peel could be more prone to getting caught on branches and tearing off early.

Other scars: The presence of other CMTs in the area, or more cultural scars on the same tree, is suggestive of an actively utilized and accessible area, increasing the likelihood of the scar's cultural origin. A solitary, suspected CMT might have a lesser chance of identification as cultural after future analysis (Arcas 1986b: 189).

Scar crust: Suspected cultural trees with an open 'window' to the scar face between lobes can often be identified as cultural by reaching behind a lobe and feeling a 'scar crust' (Fig.9). In the space obscured by the lobe, at the border of the original scar face, one should feel a long, vertical and smooth crust (British Columbia, Archaeology Branch 2001:28, Arcas 1986b: 187; Mobley and Eldridge 1992:97). This feature is created as annual rings advance over the smooth scar face in the first years following injury. This dense wood eventually ceases to be created when the expanded post-injury ring growth slows and grows rings at a greater angle to the scar face. The scar face itself begins to rot and gives way to the pressure of new and advancing annual rings. Often the advance of new rings will push down into the vacant space left by the rotting scar face, causing the lobe to curl inwards and wrap around itself.

Internal identifiers of TBS

Viewing a cross section of a TBS scar within a cookie or wedge sample often reveals some of the most important features suggesting cultural modification.

Scar crust: The scar crust is the most important feature, along with tool marks, for identifying cultural origin. In a cross-section sample a crust can be easily found and identified, whereas access to feel the crust can be difficult on standing trees (Fig.8). Natural scar faces often have rougher edges that either arrest the advance of annual rings (creating a pinch of annual rings that intersect on the rough wood where the crust should be), or create a scar crust that is very wavy and rough (Arcas 1986b:108). A cultural scar should appear as “a dense, dark, evenly-curving layer laid down at the scar/lobe interface while this scar face is still solid” (Eldridge and Eldridge 1988:2).

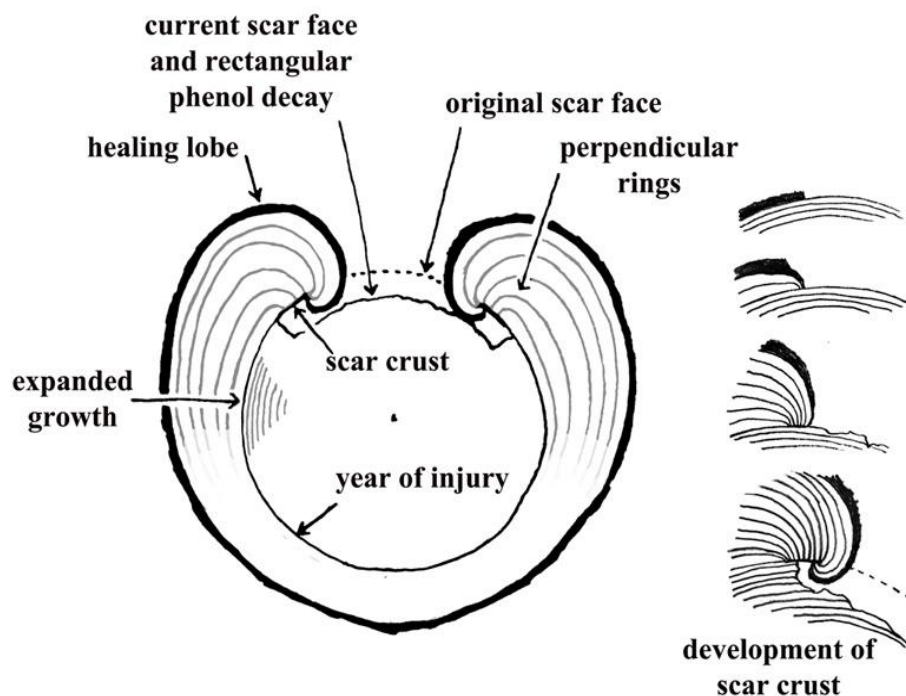


Figure 8: TBS cross-section, notable features (features outlined in Arcas 1986b).

Expanded growth: Following the year of injury the tree produces expanded early and late wood growth rings (Fig.8). Often this post-injury expansion of rings might stretch around the entire tree, but sometimes it may only be present in growth rings adjacent to the scar crust (Arcas 1986b:187).

Right angles: As a result of this expanded ring growth and development of a curve in the lobe, the early rings of the advancing lobe should intercept the scar crust at right angles after several years (Fig.8).

Phenol Staining: Due to compartmentalization processes (section 4.2.1 above) a relatively dark area of heartwood will parallel the original scar face (Fig.8). This is an antimicrobial boundary produced by the tree to contain the infection introduced by the peeling event (Shigo 1985:96-97; Hennon 2010). A rectangular distribution of this ‘phenol stain’ (squared rotting pattern around scar crusts [Fig.8]) would suggest the type of evenly distributed injury caused by cultural bark peeling.

Percentage peeled: Trees that have over 50% of their bark removed are likely to be cultural. Natural forces rarely remove over 50% of the bark from a tree in a single event and in a way that would leave a scar crust (Morley Eldridge 2015 personal communication).

Original tree size: As mentioned earlier, due to the age and poor quality of inner bark, trees larger than 60cm were rarely peeled (British Columbia, Archaeology Branch 2001:28; Arcas 1986b:189). Large trees are less likely to host external tapered bark scars. Rectangular scars of bark sheets, often used for house siding and emergency shelters, may be seen as removed from larger trees (Mobley 1989:69 cited in Mobley and Eldridge 1992:98). The stripping of larger trees is discussed further in section 5.2, in cases of multiple scarring.

There are many ways to identify visible cultural bark strips, however an unknown number of trees host ‘embedded’ scars (Eldridge and Eldridge 1988:42-43). These are scars that have been completely ‘entombed’ by their healing lobes, and are thus almost invisible from the outside. These scars may only appear as linear creases in the side of a tree, or as the bark covered face of a larger cedar tree (Arcas 1986b:98-99). In current archaeological assessments these trees are overlooked, and are usually only found accidentally within stem rounds taken from trees with open scars. The presence of these

embedded scars is one of the central questions of this thesis and is thoroughly discussed in the following sections.

Natural Scarring

There are a number of factors that can cause the scarring of cedars, other than resource procurement by humans. The Meares Island CMT Study (Arcas 1986b:100-109) did a thorough analysis of the internal features of naturally and culturally scarred cedar trees to determine some of the morphological differences between the two (including detailed diagrams). The following are some of the major natural disturbance factors causing scarring on cedars.

Windfall: Cedars injured by other wind felled trees often exhibit damaged or lost wood on the scar face, and bark that is not fully removed. This rough surface arrests the advance of annual rings over the scar face, preventing the creation of a smooth scar crust. In the small sections where a windfall scar might cleanly remove bark from the scar face, a scar crust might form, but it is often characterized by misshapen rings (Arcas 1986b:101-103).

Rock fall: Similar to windfall, rock fall involves damage to scar face wood and alteration of the development of scar crust (Arcas 1986b: 103-104)

Broken branches: Branches that break from a tree can remove sections of bark in the process of falling. This resembles 'die-back' (below). Small branches that rip from a tree usually fall off due to gravity or wind after the natural die-off of the branch. Connected tissues holding a branch in place have usually already been severed, preventing an added pull on the bark (Arcas 1986b: 104).

It is suggested that live, medium or large branches ripped from a trunk and pulled downwards might mimic a cultural peel; the circumstances causing this would likely be rare. Falling trees have been observed to break off large branches that peel a narrow but sometimes widening strip of bark on its way down (Stefan Zeglen 2014 personal

communication). Certainly such an event is possible but likely identifiable as such on a standing tree.

Bark die-back: Nutrient deficiency or standing water can lead to bark die-back that could potentially be misinterpreted as cultural in certain circumstances. However, it is more often characterized by the lack of a scar crust, decreased annual rings at the edge of the scar face, and the lack of curled rings in the healing lobe (Arcas 1986b: 105-106)

Bark bruise: When the tree experiences a physical trauma, sufficient to damage or kill the cambium layer but not remove the bark, a ‘bark-bruise’ results. The cambium might slowly continue to produce rings before dying off. In these scars, bark persists on the scar face inhibiting the development of a scar crust. Also the development of post injury annual rings is very different from those expected on a cultural scar (Arcas 1986b: 107-108).

Other possible natural forces that weren’t focused on in the Meares Island Study include the potential for scarring from burning and bear (or other animal) activity.

Burning: Lightning and wildfires might also produce scarring features similar to cultural scars (British Columbia, Archaeology Branch 2001:144, 2015; Morley Eldridge and Kira Hoffman 2015 personal communication); however the fire scarring of redcedar is very poorly known. Cedar bark is highly flammable in medium-high intensity burns (2015, Kira Hoffman 2015 personal communication). Lower intensity burns that do not kill the tree will likely leave burn marks on the scar face and remnant older bark.

A fire history created around Clayoquot Lake, just north of the study region, found natural fires to be largely determined by topography. North facing slopes experienced no fire for over 1800 years, while those facing south had burned within the last two centuries and likely several times over the last 1800 years (Gavin et al. 2003: 583). Specific sites however, did not experience recurrent burns due to the exhaustion of fuel loads. They suggest south aspect slopes could have experienced >200 year intervals

between burns (Gavin et al. 2003:583). Scars created by such rare burns are likely to leave multiple, identifiable scars, in a localized area, that all date to a single event.

Bears: Bears have been known to scratch cedars to access the cambium layer during spring feeding. Such scarring is seen by both black and grizzly bears, though more commonly the latter (Paul Hennon 2014 and Kyle Artell 2014 personal communications; British Columbia, Archaeology Branch 2001:145). Clawing and biting at a trunk is unlikely to be misinterpreted as cultural; however, two areas on the Northwest Coast exhibit localized behaviours that in exceptional circumstances could result in cultural-like scars. In SE Alaska some islands have been noted for a technique of grizzly bear bark stripping. In May, before the abundance of good quality foods, grizzlies can bite the trunk of the cedar horizontally and peel off the bark. This leaves distinctive canine tooth marks for a number of years (Hennon 2010; Hennon 2015 personal communication). Gilford Island in the Broughton Archipelago of BC, home to black bears, contains clusters of stripped cedars that resemble “hula skirts”, having been bark peeled all the way around (Scott Rogers 2015 personal communication). This latter example would girdle the tree and kill it. While the technique of bear bark stripping could approach that of humans on occasion, it seems unlikely that such features could be misinterpreted on a large scale.

4.2.2.1 Methods for Dating

In temperate zones of the planet, trees produce visible annual growth rings due to seasonality. The cambium layer beneath the inner bark of the tree produces layers of new wood in the spring and early summer. In the early growing season conifers produce an ‘earlywood’ that is light and soft, while at the end they produce a dark and dense ‘latewood’. ‘Earlywood’ consists of large thin walled cells and ‘latewood’ of small and thick walled cells (Arcas 1986b: 74). Such clear differentiation of growth from year to year makes it possible to count the age of the tree, or in our case, the age of injury to the tree. The study of tree ring growth is known as dendrochronology, but more specifically for our purposes: dendroarchaeology.

The extraction of these rings for dating cedar modifications is possible, with varied degrees of accuracy, in three different ways: Increment boring, wedge sampling and disk sampling.

Increment core: The method of dating with the least negative impact on the tree is also the most prone to inaccuracies. A 5mm increment borer sunk into a cedar healing lobe at the correct angle can be used to intercept the scar crust giving a rough estimate of time depth; it is however very difficult from the outside of a tree to guess where the scar crust might be and how wide the original scar face was.

A core can also be drilled into the side of the tree to intercept the distinct expansion of growth rings following injury; however there is not always a clear change in ring growth. On younger and relatively intact TBS trees a core can be taken through the scar face (that might have lost many of its annual rings) and the living opposite side of the tree and compared against one-another.

These methods however are all obscured by the rot present in most CMTs and the inability to track potential annual rings that are missing in the cored area (British Columbia, Archaeology Branch 2001:113-114). Also the size of these trees and their healing lobes often exceed the length of the increment borer.

Wedge sample: A handsaw or chainsaw is used to cut a partial cross-section or wedge out of one of the healing lobes of a standing tree. This ideally recovers the scar crust, expanded ring growth and all the rings following injury. However wedge samples are also thought to create 'danger trees' that must be felled according to Worker's Compensation Board Regulations (British Columbia, Archaeology Branch 2001: 113).

Disk/Cookie sample: Such samples provide complete cross-sections of the modification to be used for analysis. Often these samples are taken by archaeological consultants when mitigation is not an option for a forestry company and it is decided that the standing CMTs must be removed. Fallers often help archaeologists extract these samples using chainsaws. This type of sampling involves the killing of the CMT, yet results in the clearest representation of the features of injury and all existing growth rings.

Wedge and Disk samples can be sanded down to better view the features of the cross-section. On cedars, rings can become so tight that a microscope becomes necessary to tally age. As will be discussed in the Phase 2 methodology section (7.1.2), the technique for analysing TBS trees in this project was most similar to the cookie sample method. Stumps of recently cut TBS trees were viewed and analysed in the field. While not as exact as processing a cookie sample in the lab it was capable of a satisfactory level of identification and date estimates. A few samples were cut off a small proportion of the trees found in the field and analysed after drying and sanding.

Year one on a bark stripped cedar is the first to have encroached onto the exposed cambium layer to create the scar crust. It is the farthest away from the scar face and the curl of rings in the lobe. Basically it is the first post injury ring with a notable terminus, which is where the first annual ring grew up adjacent to the recently exposed and thus dead, inner cambium. If scar crusts and the surrounding area are rotten, one can use the inferred curve of the scar crust to point along the path of the last outer ring prior to bark stripping. Often this allows one to find the expanded rings that grew immediately after the injury.

The rings are counted outwards, away from the centre of the tree. If rot around the scar crust obscures the year of injury, or the tree has died prior to sampling the best that can be hoped for is an estimated minimum date. To gain an exact date the ring of injury must be found, and the rings between it and living bark on the outside must be visible.

Chapter 5: CMT chronologies

CMT sites are amongst the most common archaeological sites on the Northwest Coast (McMillan 1999: 48). Every cedar product created on the coast left a “photonegative” of its extraction in the surrounding forest (Rautio et al. 2014:138). Before the age of industrial logging, many of those imprints remained as archives within forests, detailing use of countless generations of people. Today much of the coast has been extensively logged, with only fragmented islands of ancient forest remaining. However, due to the rate of old growth logging a vast collection of CMT data has been collected within compliance documents over the past few decades; almost exclusively by Cultural Resource Management (CRM) companies (Stafford and Maxwell 2006).

CMTs represent the only abundant, spatially anchored and datable archaeological artifact regularly produced for millennia. Cedar as a resource was universally used, not specified to rank, leisure or labour, utility use or aesthetic. Taken together, CMTs collectively “have a higher informative value than the summed single values” of individual trees (Andersson 2005:31). Across a landscape they can be seen as a ‘pulse’ of generalized manufacturing within First Nations villages, a record of movement across the land, and can provide any number of insights into aspects of indigenous life. When researched at the right scale, frequency of harvesting and spatial distribution is likely to overlap with socio-political activities within indigenous societies. CMTs may be the only way to access socio-political trends in areas where historical and ethnographic histories are minimal (Pegg 2000:86).

Few, if any, prehistoric archaeological features can be dated exactly both temporally and spatially. Wilson Duff explains the conundrum of tying histories in with ethnographic material; the prehistoric world on the coast contains “many developments [which] cannot be dated and must be left ‘floating in time,’ or can be dated only in relation to other developments, and where the units of time, when they can be determined, are not years, but centuries or even millennia” (1964:8). It has been argued that collecting CMT data into chronologies of frequency of use, temporally anchored to landscape, can aid in the interpretation and dating of particular social, political or economic ‘developments’ that appear in ethnographies or oral traditions (Andersson 2005; British Columbia, Archaeology Branch 2001; Eldridge 1997b; Maxwell and

Stafford 2006; Mobley and Eldridge 1992; Moss 2011:135; Pegg 2000). Frequency of use reflects the activities of communities over centuries. Enough dates collected in the landscape may detect notable upsets or changes in patterns of use, which can be connected with local histories that are currently ‘floating’ in time. They can also be used to corroborate and contribute to historical dates that are fixed in time.

The dating of stands of trees can also show the frequency of use within generational time. Tight clusters of peeling events often stretch over decades or centuries, physically representing the oral tradition and memory attached to generations of families’ or community’s return to specific places in the forest. Changes in frequency might relate to changes in hereditary ownership, loss of memory of place, change in forest structure (Mobley and Eldridge 1992: 93), or represent single events (competitive potlatching of Newcastle Block, Eldridge and Eldridge 1988:55).

As they are collected spatially, chronologies can be collected over particular areas and compared to neighbouring lands or against larger surrounding regions to determine notable changes in use across the land. These can be used to infer movement of people and seasonal rounds (Morrisson and Shepard 2013), and socio-political changes in the land (Pegg 2000). Spatial bark harvesting patterns on certain landforms have been interpreted as patterns of hereditary ownership through time (Eldridge and Eldridge 1988:55). Intensity of harvest represented in both density of peeled trees and multiple peeled trees, or trail markers, can give insight into the evolution of trail networks (Mack 1996:29) and human presence in particular forests over time and space (Andersson 2005; Eldridge 2013; Ericsson et al 2003). Ownership of trails has also been noted in the creation of arboroglyphs, or faces carved into trees (Blackstock 2001:84, 91, 130).

5.1. History of CMT studies

5.1.1. International studies

Plant and tree use has been documented ethnographically around the world. Tree modification is a common legacy among all forest dwelling peoples to some degree (Maxwell and Stafford 2006:2; Turner et al. 2009). Evidence of tree use however is less common, possibly due to deforestation, changes in forest management practices over

time and the natural mortality rates of trees. Research and documentation, in association with memory of traditional use has been largely limited to Sweden, Australia, and North America. The following is a sample of studies relating to human use of trees and forests around the world, and the emerging research into tree modifications.

Turner et al (2009) pull together a vast collection of data regarding tree modifications throughout North America, Europe, Africa, Oceania and South/Southeast Asia. The diversity of modifications outlined is divided into three categories: incidental, intensification or marking. The first has to do with the incidental scarring from the harvesting of the trees resources. Intensification involves coppicing, pruning and training of limbs to encourage enhanced or desired growth. Finally, marking of the tree can denote some cultural purpose, be it spiritual, property, trail, or art. The depth of humans' use of trees and their importance across cultures are well defended in the paper. Ostlund et al. (2009) and Andersson (2005) offer thorough outlines of other international research into CMTs.

Sweden

Rikard Andersson's (2005) doctoral thesis was based on five articles co-authored by Andersson and Ostund, among others. He argues the high potential for CMTs to archive a record of human activities across the land, especially when combined with existing traditional ecological and local ethnographies. He also outlines the concept that CMTs challenge the idea of a 'pristine' forest residing outside the influence of humans.

Ostund et al. (2009) provide a synthesis of the traditional use of the inner bark of pine for food and medicine in northern Scandinavia and across North America. Arguing for the protection and study of CMTs they highlight the spiritual practices involved in the extraction of bark, and the valuable data that can be extracted from dating them. They also provide a thorough summary of the history of pine CMT research in North America, beginning in 1951 with Thain White's study of pines in western Montana (2009).

Ericsson et al. (2003) record the loss of trail marker trees in boreal Sweden due to logging; also the resulting disappearance of the chronology documenting trail use over time, with some trees dating to the early 1500s. Ostlund et al. (2004) use AMS C-14 dating and dendrochronology to extend the evidence of inner bark use by Sami people in northern Scandinavia back to 2800 BP (2004). Rautio et al. (2014) record the "magnitude

and spatiotemporal patterns of inner-bark harvesting” in a northern Swedish nature reserve. Findings suggested varied intensities of bark use by Sami people across almost every decade between the late 1500s through the late 1800s.

Australia

Carver’s (2001) thesis defines the criteria for identification of scars on southern Australian trees associated with the removal of canoe blanks. As most of the actual canoes themselves no longer exist the remaining trees provide much needed information relating to their creation. Morrison and Shepard’s (2013) Cape York CMT study used modified trees to examine the patterns of wild food production by local indigenous people, particularly of honey and wax. Their data suggested there was an intensification of wild food collection in areas where non-indigenous economic systems predominated, implying increased involvement with settler culture.

North American studies

Harwood and Ruuska (2013) examined the distribution, social memory and “personhood” of modified trees of the Upper Peninsula in Michigan and local Ojibway communities. The researchers self reflect on the western bias dividing the world into the animate and inanimate, human and nonhuman realms.

Nicolai’s (2013) thesis looked at the practice of bark stripping western redcedar trees at a single site in the Rocky Mountains of Montana. He analysed the spatial pattern of bark collection since the 1960s, and the morphological characteristics of the bark strips themselves. Josefsson et al. (2012) researched bark peeled ponderosa pine trees in the Bitterroot Mountains in Montana. Their study found that while density of bark harvesting was high (343 scars on 274 trees), not all usable trees were harvested. Ages ranged from 1600 through early 1900.

5.1.2. Northwest Coast studies

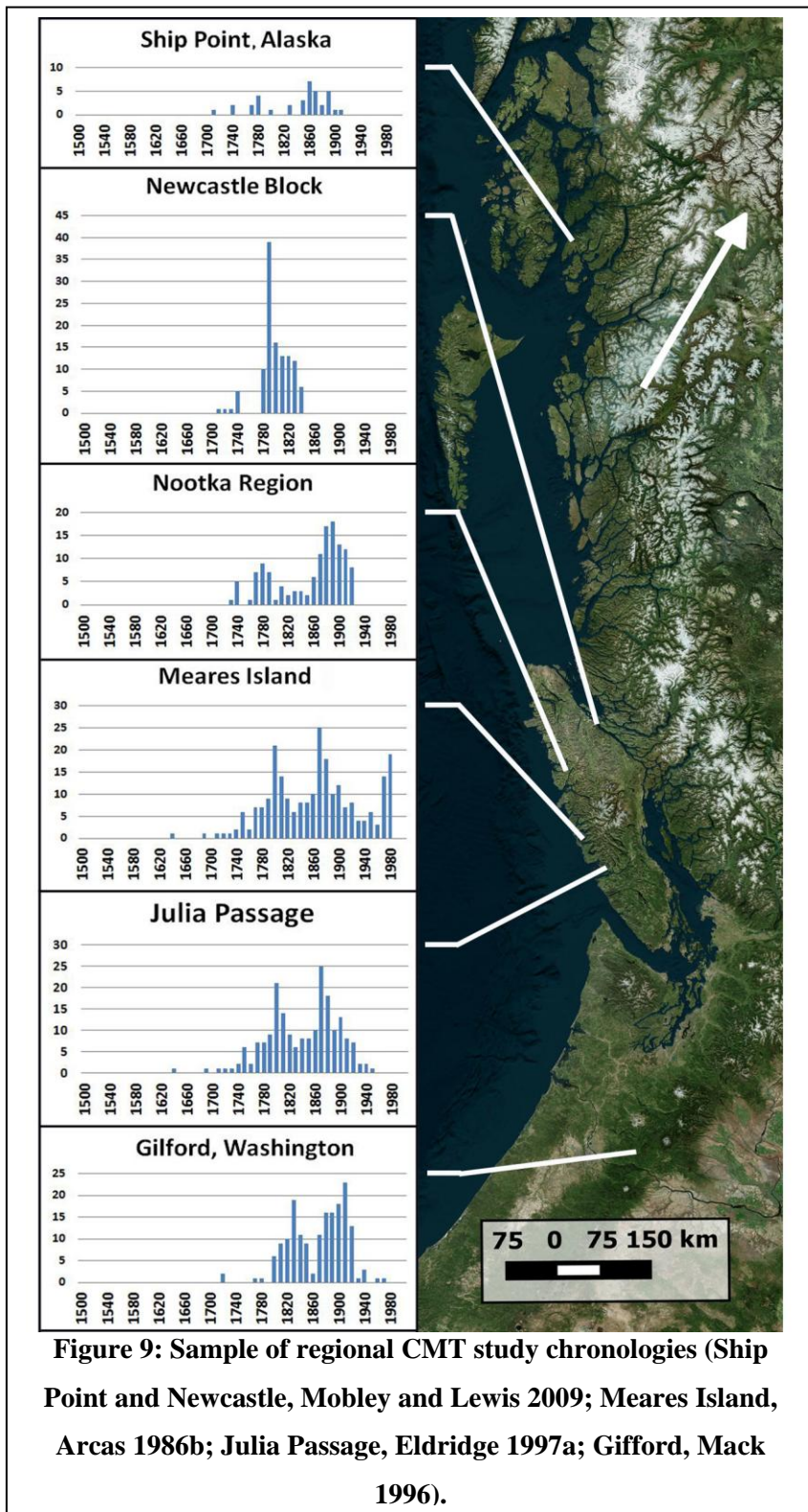
The first western account of a CMT in British Columbia comes from Alexander Mackenzie in Bella Coola valley in 1793, who noted the hemlock cambium that was being processed in the village was the result of all the stripped Hemlock trees that he had seen in the area (Stryd and Eldridge 1993:187). The use and importance of cedar and the

products of other trees has been well evident to most outsiders arriving in coastal villages from the very start of written accounts.

The first notable CMT research carried out in British Columbia was undertaken by Russel Hicks in the mid 1970s. He recorded bark peeled and logged CMTs on the coast, and using wedges cut from scar lobes, he dated about fifty stripping events (Stryd and Eldridge 1993). The 1980s was host to several CMT studies and research (well outlined in Stryd and Eldridge 1993:187-190), leading to the Meares Island studies of 1984 and 1985 (discussed below). Following some resistance, CMTs predating 1846 were granted protection through the Heritage Conservation Act in the early 1990s (Mobley and Eldridge 1992:105). Initially inland forestry areas were considered too low potential for archaeological sites (Quentin Mackie personal communication 2016). As a result of these protections however, and the continuation of old growth logging, the vast majority of CMT studies in British Columbia began to be performed by CRM companies. This has often been in the form of Archaeological Impact Assessments (AIAs) that survey and inventory the potential impacts of proposed developments (Eldridge 1997b:6). These are largely in the form of unpublished compliance documents, not publicly circulated, filed at the Provincial Archaeology Branch (and hosted in an online database). However, a number of noteworthy CRM and academic studies have been performed on the coast, mostly revolving around cedar bark harvesting, indigenous logging and cambium collection.

Meares Island in Clayoquot Sound was the setting for the first major investigations into CMTs in the province. Logging had been proposed on the island, however a 1982 archaeological study (Mackie 1983) found hundreds of CMTs within 100m of the shoreline. A total of 10 km² on the east coast of the island was surveyed in 1984 ahead of logging activity. In 1985 another CMT survey was conducted for the Ahousaht Indian Band and Tla-o-qui-aht First Nation, in response to the bands' claim to territorial rights to the forest on the Island. The two CMT studies sought to collect data regarding the spatial and temporal distribution of tree modifications on the island, but also to develop a standard for the identification of cultural versus natural cedar bark stripping scars (clear overview of study in Stryd and Eldridge 1993:190 and Mobley and Eldridge 1992:93-94). The results of the studies laid the ground work for the

identification of cultural bark-strips and future study design (British Columbia, Archaeology Branch 2001; Eldridge and Eldridge 1988).



The Newcastle block in Johnston Strait, Vancouver Island, surveyed by Eldridge and Eldridge (1988; Fig 9) of Millennia Research was notable for a number of reasons. It included a post-impact assessment which provided access to cultural scars embedded within trunks that were not visible prior to the logging activity; post-impact assessments as part of AIAs are rarely done in coastal forest blocks. It also found clear patterns of use for the site, which ended abruptly in 1847. The majority of the CMTs were found about 200m from shore, suggesting possible conflict over

resources and hereditary ownership of the stand. Finally, a large number of strips were removed in a single year, 1798, implying a mass harvest for some event or potlatch (Eldridge and Eldridge 1988:111). Julia Passage (Eldridge 1997a; Fig.9) was another large site in Barkley Sound, surveyed as a post-impact assessment by Millennia Research returning a large number of dates, including the oldest living CMT recorded at that time, dating to AD 1137.

Hanson Island on the northeast coast of Vancouver Island became a focus of logging protests in the early 1980 and 1990s. The Kwakwaka'wakw argued for the island's protection. Archaeological surveys of the island found several CMT sites along with trails, pictographs and middens, temporarily delaying logging operations. The logging company then hired its own archaeologists who found 75 additional CMTs, and claimed that forest usage of the island was relatively low (Angelbeck 2008:132-133). This led to Garrick's (1998) full CMT inventory of the island. They documented 1,878 CMTs on the island, and argued that there was evidence of 700 years of forest use. Following further action by logging companies, in 2003 the province announced that the forests on the island would be protected from development and extraction (Angelbeck 2008:133).

Marshall (2002) investigated the ethnographic and CMT data related to cambium utilization for the Carrier First Nations of the Nechako Plateau. Mobley and Lewis (2009; Fig.9) outline the analysis of 23 bark stripped trees at Ship Point in Southeast Alaska, dating between 1718 and 1912. Despite being a dangerous stretch of coast the site represents persistent use and multiple bark harvests from single trees. The chronological results are compared with other British Columbia and Washington studies. The comparison study from Washington is Mack's (1996; Fig.9) archaeological data recovery of two dozen CMT sites in Gifford Pinchot National Forest. A total of 183 dates were collected from the sites spanning 1720 to 1944, largely represented by bark stripping for the purpose of baskets to carry huckleberries from berry picking sites. The resulting chronology is used, like Pegg (2000), to tie in with local histories. The epidemics recorded for the mid 1800s in the area show a clear slump in bark harvesting. The spatial data of the CMTs also give useful insights into historic trails and periods of trail use (Mack 1996:29).

Pegg (2000; Fig.9) pulled together the chronologies created from the wedge sample dates taken during the Meares Island studies, along with dates collected by Arcas Consulting in and around Nootka Sound between 1989 and 1997. These chronologies were compared against local First Nations histories to find parallels. The chronologies showed a bimodal pattern peaking in the late 1700s to early 1800s, and again in the late 1800s. The first peak was suggested to be a time of fur trade competition and disease, in which an increase in funerals and name taking ceremonies led to greater harvests of cedar. The lull between the peaks was seen as the cessation of the coastal fur trade and the increase in regional conflicts and warfare. The later peak was thought to be connected with the arrival of the cash economy. There were larger displays of wealth at ceremonies and potlatches, with greater frequency due to the high mortality of the period. Pegg's work is one of the first notable interpretations of bark harvesting frequency on the coast.

A number of other Northwest Coast papers argue strongly for the interpretive power of regional CMT studies (Eldridge 2013, Garrick 1998, Mobley and Eldridge 1992, Stafford and Maxwell 2006, Prince 2001, Stryd and Feddema 1998). Unfortunately the momentum of academic interest in CMTs did not carry much beyond the 1980s and early 1990s, past the establishment of archaeological protections. As noted above, CMT data collection persists in this province but almost exclusively within the realm of CRM, with the exception of a few independent studies that include CMT chronologies. Vast archives of data are collected but, as is the case with most CRM archaeology, limited to project boundaries and budgets. The data that are produced are descriptive, of limited circulation, and often difficult to find. Pegg explains that the collection of CMT data has largely focused on the management of heritage resources, while "there has been little interest shown on the part of archaeologists in developing the interpretive potential of CMTs" (2000:77). That being said, almost three decades of CRM work involving CMTs has led to a wealth of fragmented knowledge and data stored within archaeological site reports that, taken together, must be considered an extremely valuable, though under-utilized resource.

Some recent articles have delved into the general importance of culturally modified forests, though less into interpretive study. Angelbeck (2008) discusses the context of industrial logging that surrounds traditional forests and indigenous forest

usage. Several case studies are used to outline the role CMTs have played in conflicts between logging companies and both First Nations and environmentalists. He suggests there is a need for better protections of cultural sites in forests, a system of audits, a transition to more ecosystem-based forest management, and greater First Nations participation in forestry decisions. Oliver (2007) looks at the social construction of landscape through practice on the land. The examples he uses are both cedar bark stripping and the management of berry gardens in inland regions along the coast. He finds that the economic and social nature of landscape cannot be seen separately when looking at use of resources. The land itself is an embodiment of interaction with ecosystems and provided people with a sense of place. He suggests that the social sphere is reflected well beyond that of the village, but out to the landscapes of the annual round.

5.1.3. Embedded Scars

The Meares Island Study first noted the appearance of embedded scars inadvertently (Arcas 1986b:23,100). It was recorded that cultural bark strips could completely heal over themselves, often leaving no external trace of their presence. In a probabilistic sample on the Island, six embedded scars were found within yellow and western red cedars. Five of the six were recorded as cultural due to the presence of scar crusts, a wide original scar, and dates that coincided with the dates of adjacent CMTs (Arcas 1986b:98-99). The concern of the researchers was that “[t]here must be an undetermined number of other internal scars in the sampled population. Not only could there be additional internal scars in the trees that had wedge samples removed, but there must be hidden scars on trees not even sampled. The result of these hidden scars is that any estimate of total numbers of bark-strip features in a population will be conservative if it is based only on external scars.” (Arcas 1986b:99) In regards to CMT studies on the Northwest Coast, this is an important point to consider for later. The recorded number of CMTs found in any location on the coast must be considered a deeply conservative estimate of what actually exists in a region, and likely biased towards younger features (Angelbeck 2008:126).

Eldridge and Eldridge’s Newcastle Block study (1988) sought out a ratio of visible to embedded scars during their post-impact assessment survey. Some 15 of their samples had closed healing lobes, with another 14 that had completely sealed themselves

by the reconnection of annual rings. They found that for every 1.65 open scars within the sample there was one embedded scar. Conservatively they suggested that for every 6.57 trees with open scars, there was one with only embedded scars.

The problem with embedded scars of course is their invisibility within standing trees. Sometimes a crease might be seen of appropriate length. Most often however they are completely entombed within the trunk. CRM reports often note the possibility of embedded scars being found during extraction of disk samples, though very few appear to argue that their assumed presence is justification for post-impact assessments, or expanded site protection. It is hoped that the findings of this study will shed some light into the issue of embedded scars, and their importance to the future of CMT studies.

The first phase (Chapter 6) of this research encompasses review of the gray literature referencing CRM companies collection of data related to CMT sites within southern Nuu-chah-nulth territories. The second phase (Chapter 7) outlines the fieldwork portion of the research in which clearcuts were visited for the purposes of extracting data from logged CMTs.

Chapter 6: Research Phase 1

6.1. Cultural Resource Management data

As of a decade ago Stafford and Maxwell (2006:4) found there were an estimated 4500 recorded CMT sites of all types on the British Columbian coast, with a conservative estimate of 20,000 CMTs in the provincial registry. Roughly half of these CMTs have dates associated with them; usually only a small portion of the trees in those sites get dated. One third of all known CMT sites in the province were recorded on Vancouver Island's west coast, largely within Nuu-chah-nulth territory. The number of recorded CMT sites has grown exponentially since 2006 with ten years of continued old growth logging and archaeological assessments (RAAD 2015; Leversee 2014)

The first half of my study was to amass a collection of all known CMT data and dates from within southern Nuu-chah-nulth territories (Ucluelet, Toquaht, Uchucklesaht, Tseshah, Huu-ay-aht, Ditidaht and Pacheedaht). Initial searches online made it clear that there was a large and growing collection of CMT sites in the Barkley Sound and Nitinat Lake regions. Following this work, the second phase of the project was to supplement the CRM data with dates collected by myself in areas with less existent CMT data. The following outlines existing CRM CMT data from the southern Nuu-chah-nulth region and is a foundation for my later field investigations and data analysis.

6.2. Methods

I accessed the Archaeological Branch of British Columbia's Remote Access to Archaeological Data (RAAD) application online. Through a systematic survey of the Borden grid I reviewed all 'Detailed Site Reports' associated with all archaeological sites of southern Nuu-chah-nulth territories. I extracted basic data from all recorded CMT sites including type and number of CMTs, species, number affected by development, dates and number of dated samples, accuracy of dating, recorder, source and comments (Appendix II). Initial access to the site reports was relatively straightforward: selecting Borden grids, downloading PDFs of all site forms and searching the document with 'CMT' as a keyword. The majority of site forms however had very limited detail on the precision of dates, the method of extraction, and the current condition of the site. Some were hard to

determine whether the site had been affected at all, or what data had been added to or removed from the form with each site revisit. Several times it was clear that the site had been impacted but there was either no record of CMT samples having been taken for dendrochronology work or it was indicated that samples had been taken but there was no indication of extracted dates.

When information was minimal, or there was no record of the dates supposedly taken, I would seek out the permit alteration reports associated with the form. The Provincial Archaeological Report Library online had some reports but many had to be tracked down either as hardcopies at the Archaeology Branch or as PDFs directly from the CRM companies involved (due to the several years of processing backlog of reports at the Archaeology Branch). Baseline Consulting and Millennia Research had surveyed most of the new CMT sites within my study region and were able to provide the majority of recent CRM data.

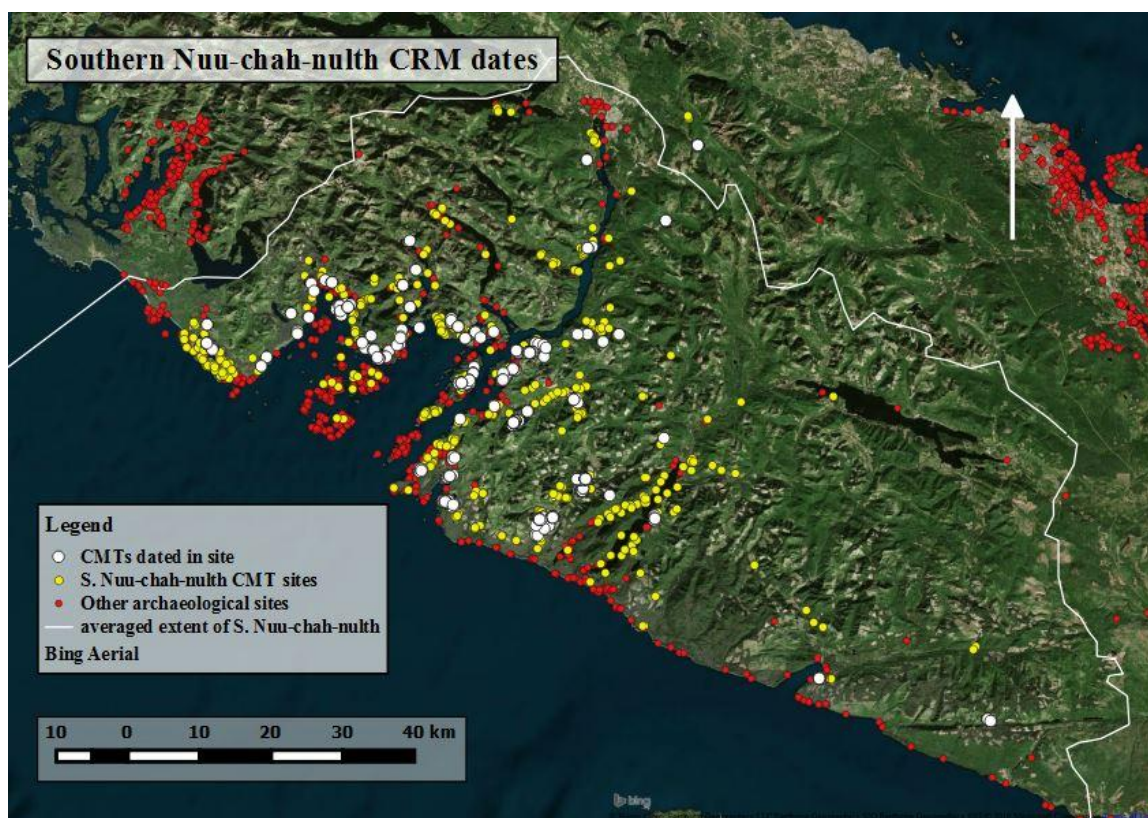


Figure 10: Dated CMT sites within southern Nuu-chah-nulth territories (Bing Maps; RAAD 2015)

6.3. CMT numbers

The majority of dates were found in the Barkley Sound watershed, with limited numbers to the northwest of Nitinat Lake, and very few in Pacheedaht (Fig.10). This is largely a reflection of early industrial logging in the southeast (Leversee 2015) prior to archaeological protections for CMTs, and the more recent old growth logging around Barkley Sound in the age of archaeological assessments. The whole region was found to have around 642 recorded CMT sites containing a total of well over 8092 CMTs; over 4896 of which were tapered bark strip trees (totals include many either imprecise or minimum CMT counts within reports). Almost 30% of sites contain single CMTs, and 45% of sites contain either one or two. Often these very small sites may neighbour a few other small sites but they represent what is thought to be minimally used stands. Another 6% of sites contained over 50 CMTs each, and 2% of sites contained over 100 CMTs each.

Before constructing chronologies by recording frequency of use, it is essential to understand the bias in representation and the factors that will play into skewed interpretations of frequencies later. Figure 11 shows the amount CMTs sites within the study that fall within certain size categories. It should be reiterated that the sites containing single CMTs represent 30% of sites across the land but only 2% of known CMTs. On the other hand, large sites containing over 100 CMTs represent just 2% of sites, but 30% of known CMTs. This illustrates the bias of spatial clustering of CMTs across the landscape. Large stands of many CMTs indicate potential for studies into the patterns of use over space and time. However a few of these large sites, surrounded by many small and dispersed sites may distort data towards the pattern of use only represented in a few intensively used sites. In some areas the largest sites may represent over half the existing dates, while the dozens or hundreds of small sites with better spatial distribution may only contain a small portion of existing dates.

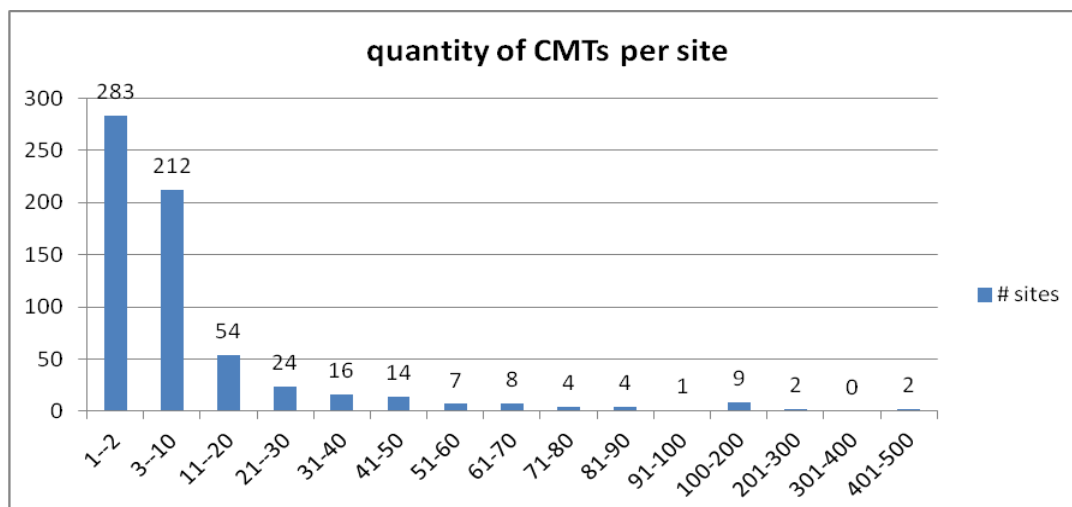


Figure 11: Size of CMT sites in southern Nuu-chah-nulth region

6.4. CMT dates

When a section of forest is to be cut, despite the presence of CMTs, a logging company can apply for a ‘site alteration permit’ (Angelbeck 2008:128) from the Archaeology Branch to log CMTs once archaeologists have recorded the tree’s cultural features. The mitigation process is the source of a vast majority of the dates that have been collected by CRM companies in British Columbia. Of the 642 total CMT sites, 145 sites had dates extracted from them. The roughly 747 trees in these sites produced 859 dates, thanks to the presence of 58 multiply scarred tapered bark strips.

Similar to the total number of CMT sites and features, the problem of spatial bias is clear when looking at the quantity of dates coming from sites across the landscape (Fig. 12). The 69 smallest CMT sites, containing two or fewer recorded dates, represent half all all dated sites, but only 10% of all dates for the region. The two largest sites represent 17% of all the region’s dates. This creates a biased representation in the landscape towards two localized areas. Ideally one would hope that more medium to large stands of datable CMTs could be found across a region for which chronologies could be overlapped and interpreted.

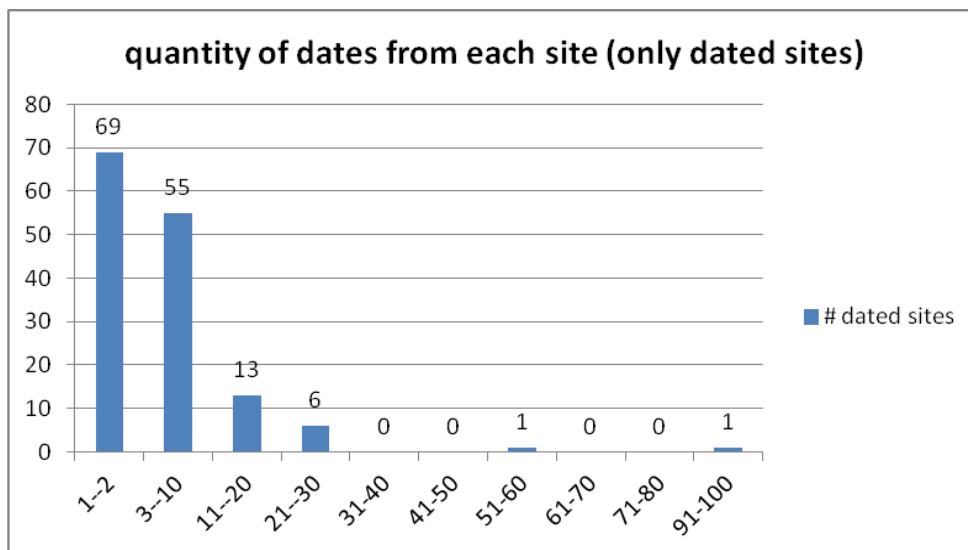


Figure 12: Number of dates taken from different sized sites (RAAD 2014).

One notable reason for the minimal dates from smaller sites is that it appears as if far too few CMTs are actually being sampled. Many site forms did not clarify the number of CMTs that were removed from each block. Often this is due to the fact that CMTs were avoided in the clearcut. Sometimes however it is due to the lack of post-impact assessments that could audit the protection of such trees. In Figure 13 I collect data from both the entire region and only the sites where the number of CMTs that were removed were clearly recorded, in order to better estimate the percentage of samples that have been dated. Some 151 sites in the region have clearly recorded the removed CMTs in associated site forms. These 151 sites represent about 3960 documented CMTs, 1450 of which were removed or affected by logging or development. Of these 1450 CMTs only 657, or 45% were dated. Fewer than 50% of those resulted in exact dates. For damaged or destroyed sites, exact dates appear to represent less than 22% of the removed trees and just 8% of the total number of CMTs recorded on those sites. These numbers must be considered conservative figures as data on site forms regarding CMT removal are often extremely vague and scattered.

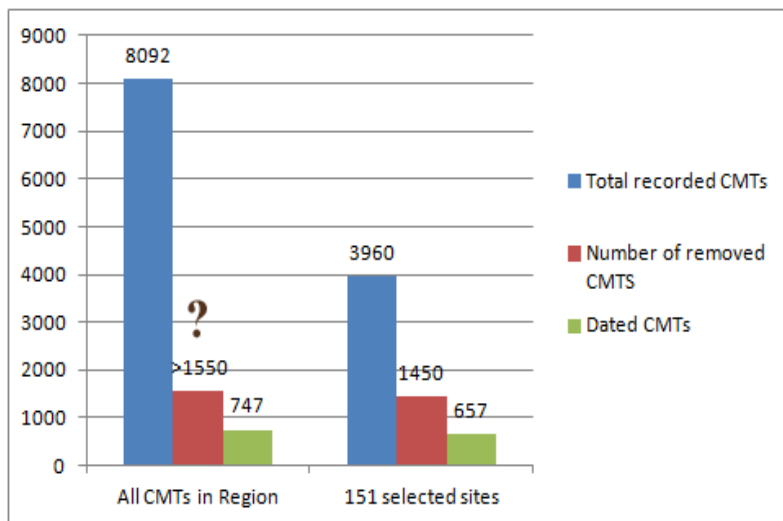


Figure 13: Recorded, removed and dated CMTs (RAAD 2014).

It is suggested that when 30 or fewer CMTs of a particular type are being removed from a site, archaeologists should generally be sampling around 100% to be statistically representative (Muir and Moon 2000:23). For all sites that had adequate data, it appears that those containing between 1-30 CMTs reached 100% sampling coverage only 30% of the time. Excluding the sites with only one or two CMTs, sampling reached 100% only 13% of the time in sites up to 30 CMTs. In half the sites fewer than 50% of the trees were sampled. Though some of these sites may have had mixed types of features (requiring different sampling methods), and much of the data are relatively unclear, there is a strong suggestion of inadequate representation at most CMT sites (Figs 14-16).

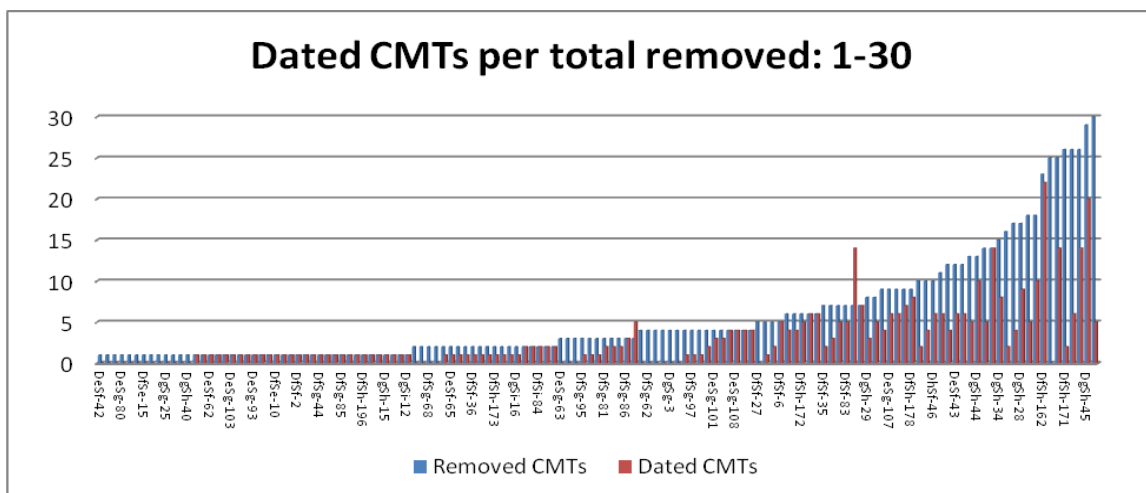


Figure 14: Dated CMTs per total removed: 1-30 (RAAD 2014).

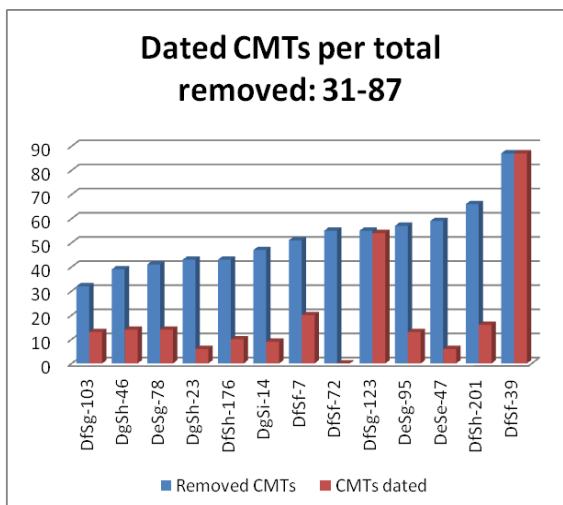


Figure 15: Dated CMTs per total removed: 31-87 (RAAD 2014).

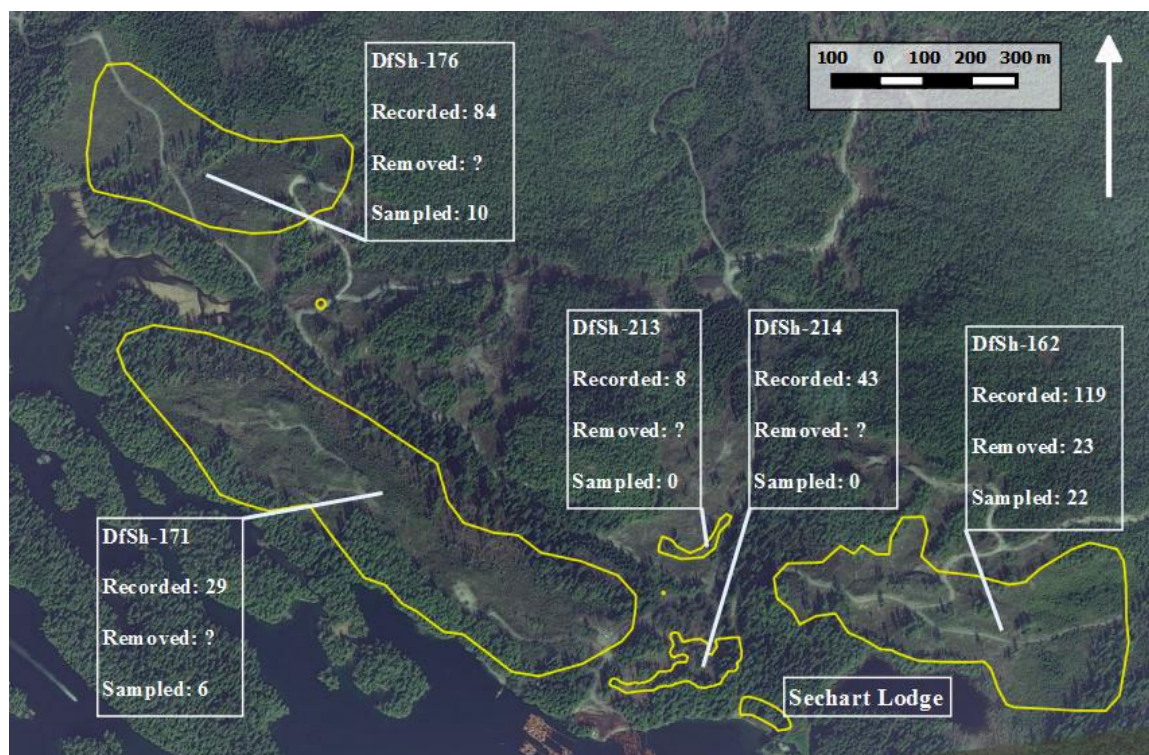


Figure 16: Example of inadequate representation, unrecorded CMTs removed from sites: North of Sechart Channel, Barkley Sound. RAAD records for altered CMT sites (2015).

The lack of regular post-impact assessments or audits make it impossible to determine what the true number of CMTs logged and removed from sites has been. For sites that do have clear reporting of mitigation efforts and sample sizes, there does not appear to have been adequate sampling of the CMTs removed from sites. A number of

other discrepancies confounded my collection of data regarding removed and sampled CMT features.

- 20 sites within the study region record the extraction of a total of 100 CMTs, representing 125 dates, but did not include a record that any trees had been removed from the sites (this did not include trees left standing after increment borer samples). How would no trees have been removed if there were disk samples taken to extract dates? Did these represent sites that had 100% sampling?
- In an aerial image search it seems that a number of sites, not said to have been dated or sampled, were affected by large scale clearcut logging. It is possible that some CMTs were avoided, or that some reports have been delayed. However, from the images it seems unlikely for all (example Fig. 17).



Figure 17: Example of CMT logging destruction in imagery: Snowden Island, Toquart Bay, Barkley Sound (RAAD 2015).

- Many sites were avoided, but left standing within or adjacent to large clearcuts, exposing them to higher risk of windfall. Current protections for archaeological sites only require a 10m buffer around standing CMTs (Archaeology Branch, MFLNRO 2015). The CMTs which are affected by windfall as a direct result of clearcutting will very rarely, if ever, be recorded as 'removed' from a site due to a lack of regular audits.

Stafford and Maxwell (2006) have critiqued the sampling process of CMTs in a similar analysis of CMTs with a particular region,

“One Borden grid, DIs, located south of Kyuquot Sound on the west coast of Vancouver Island, was examined to check the quality of CMT dates, especially bark stripped dates. This area provides 159 bark-stripped dates just under half of which are reported as exact. Considering an additional 48 CMTs were also sampled but yielded no dates, we are barely mitigating the loss of the living features, and are not getting the representative sample needed. For an archaeological feature that can be so precisely dated we are not doing very well (2006:6).

There appears to be an extreme under-sampling of features from CMT sites that have had alteration permits granted by the Archaeology Branch within southern Nuu-chah-nulth territories. No doubt this lack of representative samples is a problem elsewhere in the province. The failure to adequately catalogue CMT archives and related site data in the province appears considerably more concerning when one considers the discussion of embedded scars following results of the southern Nuu-chah-nulth surveys in Chapter 8.

Southern Nuu-chah-nulth Chronologies from CRM data

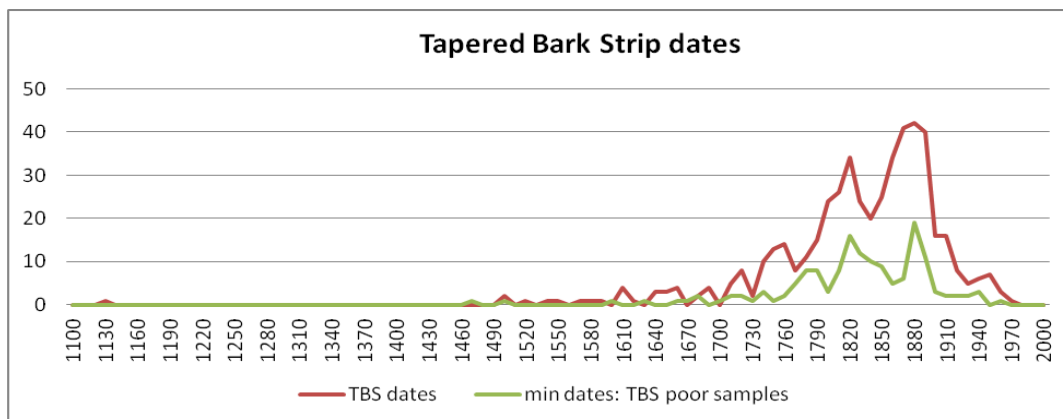


Figure 18: Tapered Bark Strip CRM dates southern Nuu-chah-nulth (RAAD 2014).

The red line of the TBS chronology in Figure 18 is a collection of all exact dates from the region. The green line largely represents samples, that either due to rot or method of extraction (increment borer), were minimum dates, and are an unknown age older than that which is shown. Its mirrored reflection with the exact dates suggests some informational value to collecting poor samples together in chronologies.

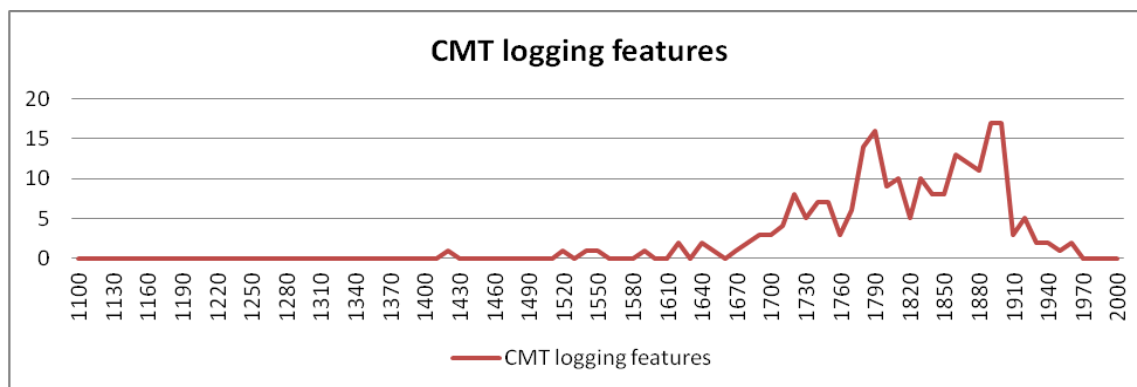


Figure 19: CRM recorded CMT logging features (RAAD 2014).

The CMT logging features in Figure 19 (as described in section 4.3) are dates of nurse trees growing on logging features. These can be considered, on average to be roughly anywhere between 10 and 25 years older than the dates existing in the chronology due to the crudely estimated time it takes for a seedling to successfully establish itself on a stump (Pegg 2000:80; Mobley and Eldridge 1992:101).

6.5. Phase 1 Discussion

The chronologies appear to have a similar bimodal form, noted in the other chronologies made for the west coast of Vancouver Island (Pegg 2000). While these data likely provide useful information it is important to know the factors that are giving the chronology its shape. The biased weight of data towards certain region's sites was mentioned above, however so too is the lack of very young and very old dates, and the large spike in frequency in the 19th century.

Very recent dates are underrepresented to a degree in the sample. CMTs are usually only protected if they predate 1846, so examples that appear considerably younger are rarely recorded as protected features and are not entering into the registry. Also recent CMTs are not limited to old growth forests; they have been occurring throughout the age of industrial logging and are present in many second and third growth sites not surveyed for archaeological potential. Often these sites are associated with more modern population centres, roads and recent trails (Bonner and Eldridge 2001:63)

The frequency of harvest in this chronology appears the inverse of what it should be. The most dates appear in a period of greatest depopulation, while the fewest represent a period of the greatest local population prior to contact. Generally this pattern of dates is

due to preservation. As one descends deeper into time the chronological dates fall off, older CMTs inevitably disappear due to death and decay, and those that do remain are harder to identify than their younger counterparts (Stryd and Eldridge 1993:216). However, cedars are known to grow over 1000 years; the oldest recorded western redcedar, which stands at Cheewaht Lake in the study area, is dated to over 1212 years old (Stoltmann 1993), and the oldest Yellow cedar is 1693 years (McKinnon 2003). Indigenous people have been using cedar for thousands of years, and yet the CMT record is only strong for the last 3 centuries. There is reason to suspect that decay is not exclusively the determining factor in visibility of ancient CMTs. My initial questions following the collection of the CRM dates were related to bias in the regional sample and loss of data in the process of removing CMTs.

- Are single CMTs and other small CMT sites representative of random chance tree modifications by individuals moving across the land or are they indicators of larger use sites?
- Is it possible to record nearly 100% of recoverable CMT data during post-impact assessments of clearcut CMT sites?
- Are embedded CMT scars representative of older CMTs? Following depopulation of the contact period, might the knowledge of many CMT stands have been lost, leaving abandoned CMT stands to heal over themselves and become invisible as giant ancient trees in the landscape? Aside from natural degradation of CMTs, are embedded scars the main reason for their lack of a stronger record of ancient CMTs?

The survey of clearcuts, associated and not associated with known sites, quickly became clear as the best solution to all these questions. Post-impact assessments of massive old growth clearcutting events allow for excellent conditions for the collection of data that would otherwise require x-ray vision to complete in a standing forest.

Chapter 7: Research Phase 2

7.1. Methodology

The primary goal of the field survey was to contribute as many additional CMT dates as possible to the regional CRM archive and to survey the land in a way that would produce the most representative sample of CMT data in those areas which would include the most ancient scars. I outline this process below: first with the general survey design, then with issues I faced in the field, and finally the site descriptions and associated findings.

7.1.1. Site locations

During the successful application for permit with the Archaeology Branch of the provincial government (2014-0162) I communicated with the seven local First Nations whose traditional territories comprise the study region. I did not hear back from the Ucluelet, however the Uchucklesaht, Tsheshat, Huu-ay-aht, Toquaht, Ditidaht and Pacheedaht all replied with support for the work. I ended up signing agreements to work with the last three.

While the Toquaht had many dated sites within their territory, I thought it would not hurt to strengthen an existing large sample of CMTs to better interpret potential chronological parallels with historical events. The Pacheedaht and Ditidaht both had far fewer recorded CMT sites compared with Barkley Sound, despite an extensive ethnographic record of forest use (Bouchard 1994, Bouchard and Kennedy 1991, Eldridge 1992, Turner et al. 1983). A collection of many dates from their territories would be required to create any sort of meaningful timeline of forest use.

For every survey I was accompanied by a number of volunteers to aid in the collection of data and identifications. Eleven friends and co-workers came out over the course of two years, some several times, and others once. Six First Nations representatives came out for various surveys. Out of all the assistants about half had experience in archaeology, and only about five in CMT surveys.

With the primary intent to gather as many dates as possible I had originally planned to do a sample of half increment boring of standing trees and half clearcut surveys. I quickly learned the difficulty in acquiring accurate dates from identifiable

standing CMTs on the coast. Goliath scarred cedars provided no indication of where their entombed scar crusts were in relation to the scar face. When it was clear where to core, the increment borer was too short or rotted wood filled my drill. After a few days of bewilderment in the woods we visited a clearcut surrounding DgSh-62 and DgSh-63 in which we were quickly able to identify numerous TBS CMTs. The intended plan from that point onwards was to visit only clearcuts for dating purposes.

The survey and sampling strategy was characterized thus:

1. Visit and find as many CMTs within known or newly discovered CMT sites inside the three territories (Toquaht, Ditidaht and Pacheedaht), utilizing clearcutting activity as a tool for revealing scars, and for each territory:
2. Visit one existing CMT site that has been partially or totally clearcut and seek out TBS scars that were missed during the Archaeological Impact Assessment.
3. Visit one clearcut in the vicinity (<1km) of other CMT sites that had not been found to contain CMTs and record if any were missed.
4. Visit three or more cedar clearcuts disassociated with known archaeological sites and record if they contain missed CMTs.
5. Aside from the post assessments of known CMT sites, most surveys of clearcuts were limited to counts of about 100 cedar stumps, in 10-15m spaced transects across sites. Only cedars that were over about 40cm in diameter were approached, examined and counted, in order to conserve time and maintain consistency in the area covered by surveys.

Survey areas were usually identified ahead of time. RAAD provided a detailed overview of known CMT sites. Bing Maps and Google Earth provided relatively up-to-date aerial images of recent clearcuts. An old growth and logging map of the south island (Leversee, 2015) provided hints at which logged sites were recently old growth. A backroads map book was used to navigate to most of the sites. Due to various issues faced in the field (below), survey areas were often chosen opportunistically if they appeared to have good potential.

7.1.2. Recording

CMTs that were thought in the field to be cultural were cleaned off with bristle brushes, photographed, waypointed with a GPS, measured and had their features noted. Due to the varied number of identifiable cultural features within the CMT cross section, a form was filled out in the lab detailing the features present. All features suggesting cultural origins were noted and described (detailed in section 4.2.2.1 above).

- scar crust present, smooth and flat
- percentage of scar face peeled (greater amount is more likely cultural)
- expanded post-injury ring growth
- perpendicular intercept between annual rings of lobe and scar crust
- uphill, sideslope facing
- rectangular phenol staining
- associated cultural features (on same stump or nearby)

There appears to be no universally used confidence scale for accurate identification of cultural TBS scars. As mentioned earlier, without obvious tool marks and view of a full scar in profile it cannot be determined unequivocally that a scar is indisputably cultural. However, with enough features collected, an approach to that level of confidence can be attempted. This collection of features and analysis of photographs led to a grade on a self-made confidence scale of cultural origins.

<59% = unclear

60-69% = possible

70-84% = probable

85-100% = confident

A few scores under 50% were downgraded and not included in survey numbers. Scars that rated a 50-59% are considered 'unclear'. These were the "fence sitter" samples that had enough features to be interesting, but nothing that could be considered conclusive in any way. All unclear dates are excluded in this thesis. Everything above 60% confidence I considered useful for analysis as I may have been fairly conservative in my early

surveys, not giving appropriate weight to features like scar crusts and trees that had most of their bark removed.

Dates were initially extracted from the field with a cordless circular saw. A long cut was made from the first year on the scar crust out towards the nearest, outer-most annual ring. These were mounted on long pieces of scrap wood and sanded down with 200 grit sandpaper (400 grit for tighter rings) and counted under a microscope. Most of these counts provided an exact date but as I did not have a full disk sample I buffered the date by 5 years to account for possible missing rings.

The circular saw was a very useful tool for extracting relatively precise dates with a long ‘wedge-core’; however as fieldwork progressed, time constraints and charging issues slowed the pace of fieldwork. We found that taking counts in the field could provide rough age estimates that would be suitable for the aims of this study. Three counts would be made of the rings and then compared, either by three different people or two counts by one individual and one count by another. The resulting totals were averaged. We would then each make an estimate about how many rings might have been missed overall, thus creating an estimate buffer year. Ideally in the future a chainsaw would be a great tool not only for collecting wedge and disk samples, but also for cleanly cutting off the torn wood and rot that obscured so many stump features. Lack of training and concerns for safety were the primary reasons for not using one.

All stumps were noted to have either open or closed healing lobes in the field. “Closed” scars had healing lobes that were or appeared to have been touching, effectively closing the window to the scar face. “Open” scars had healing lobes that were not touching other wood, and provided visual or physical access to the scar face. As will be described in section 7.1.3.2 there was a fairly large intermediate category of scars that were labelled as “~Open”. These stumps either had lobes that were so nearly closed that they would have been hard to identify, or had rotted lobes that obscured any external identification.

7.1.3. Discussion of methods

All the sites visited had to be old growth, have safe access, be accessible (not overgrown and not gated) and within permitted territory. Another consideration was that

a site had primarily contained cedar. This was due to the assumption that other forest types would have fewer CMTs, and that thinly scattered cedar clearcuts would take too long to cover in order to reach a 100 stump target. Several sites were suggested by the three First Nations partners, however not all of these had the above features necessary for survey.

7.1.3.1 Access

There were many factors that prevented access, or truncated surveys.

- Until I found a detailed old growth map of the region we wasted a lot of time attempting to access second growth forests, or old growth clearcuts that had completely overgrown and were inaccessible.
- Several roads had locked gates, fallen trees, rockslides, or alder forests preventing access.
- Aerial imagery did not always depict the degree of slope in many of the clearcuts, which on a few occasions turned out to be too dangerous to climb.
- Several old growth sites had low percentages of cedars within them. Several others were found to have an assortment of hemlock, Douglas-fir and/or Sitka spruce with only a very old age class of cedars that had largely rotted centres.
- Evidence of bear and wolf scat was everywhere due to the abundance of berries in the summer (salal, salmonberry, huckleberry, black huckleberry, trailing blackberry, Himalayan blackberry, wild strawberry, wild raspberry). Sightings of bears prior to surveys changed several day plans, but sightings during survey rarely affected work. One cougar sighting happily occurred out of the car window at Nitinat Lake.
- Rain, heat, dehydration, heights, wildlife, bees and falling snags and trees were all regular conditions of the field that were taken into account at the start of every day.

Due to these access issues it was hard to stay committed to the original structure of site visits. Generally we visited all appropriate types of clearcuts in each territory, but we were largely forced to look for accessible logged old growth cedar a reasonable distance from our campsites. A great many sites were more overgrown than online

aerial images had implied. Several surveys were stopped halfway through when it became clear that the redcedar was limited in the surveyed area.

7.1.3.2. Identification

There were a number of important factors that suggest the numbers of CMT dates found in the field were only a partial representation of all existing CMTs in the survey area.

- As all the trees had been removed and only stumps were being recorded a number of features were impossible to identify, notably tool marks on the scar face, and length of the bark strip. The trauma of the logging event, age of the stumps, accumulated saw dust and wood, and explosion of early successional plant species made it very hard to note features on the scar face and external lobes. This weakened the potential for more confident identifications
- A few stumps had been cut so low on the scar feature that it was hard to determine confidently whether the standing tree would have had a partially open, closed, or sealed window to its scar face. In most cases the identification of an open or closed scar was likely accurate as most scars are widest at the bottom.
- Surprisingly many of the old growth stumps were cut relatively high, allowing an intersection with the bark peel scar. However, an unknown number of CMTs would have been cut too low, no doubt erasing many TBS scars.
- Many cultural-looking scar crusts were ignored on the larger TBS stumps, due to the tree's age and size at the time of bark stripping. It has been suggested that few people bark stripped cedars over 60cm (British Columbia, Archaeology Branch 2001:28; Arcas 1986b:189). These scar crust features were usually not recorded in this study; however those that were are discussed in section 8.4 on cedar tending and multiple bark harvesting.
- Many of the largest cedar stumps had rotted cores in excess of the diameter of a strippable tree. Often the curve of tree rings suggested phantom lobes (Garrick

1998) echoing out from the scar of the disintegrated original tree. There is no way to tell whether these represent very ancient natural or cultural scars, and they were not recorded.

- A surprisingly large number of stumps in several of the surveyed sites were covered in large slash piles. It is hard to determine what number of trees would have been missed due to this obstacle, but many likely were. The oldest CMT recorded on this study (7.1.1 and 8.2) was only found on the third revisit to the site as it was almost entirely covered by a large slash pile.
- Clearcuts are also crossed by roads that have completely removed an unknown number of trees in their entirety.
- Most of the volunteers were initially unfamiliar with the identification of TBS scars in stumps. I did my best to train every new person I had in the field. However, it usually took a full day before most began to find cultural looking scar crusts and healing lobes. This may have resulted in many potentially missed features.

Chapter 7.2. Site Descriptions and Results

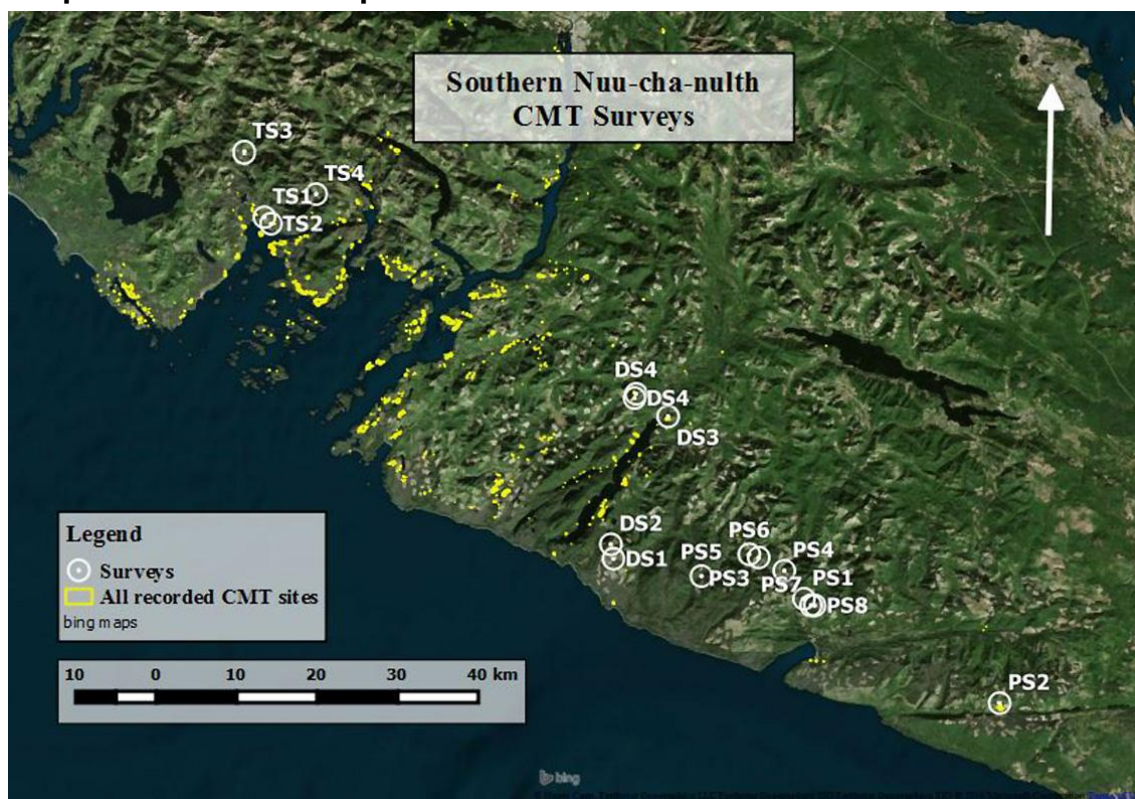


Figure 20: Southern Nuu-chah-nulth study survey areas (CMT sites, RAAD 2015). TS: Toquaht Survey, DS: Ditidaht Survey, PS: Pacheedaht Survey.

Over the course of 13 months between August 2014 and September 2015, I and small rotating groups of 17 volunteers went on 12 separate trips to various regions within the study area to collect data from clearcuts (Fig.20). A great many sites were visited, and several surveys were abandoned due to various obstacles in the field. Sixteen surveys were walked: four each for Toquaht and Ditidaht and eight for Pacheedaht. One additional unrecorded site was discovered in Pacheedaht territory while I was not working on surveys for this project. It relates to this thesis and is described at the end of the Pacheedaht Survey descriptions.

7.2.1. Toquaht Surveys

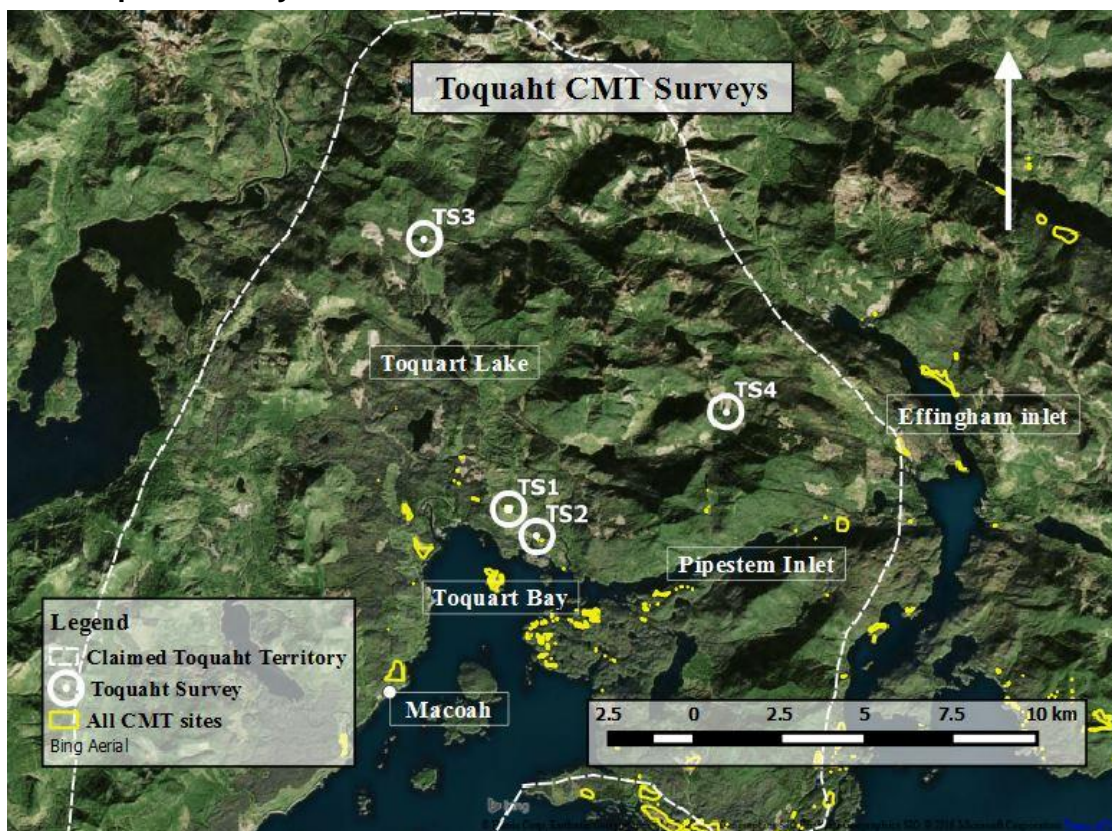


Figure 21: Toquaht survey areas (CMT sites, RAAD 2015).

Toquaht territory (Fig.21) is in the northern end of Barkley Sound, centred at Macoah in Toquaht Bay. The entire territory has been heavily impacted by decades of industrial logging activity; however, its relatively well-maintained logging roads provide access to massive and dramatic river valleys, lakes, and high peaks.

The Toquaht were the first to respond to and support the study. I visited the band office with my proposal and explained my methodology and purpose in dating CMTs within Toquaht territory. The arranged agreement was to present the study's findings to the band, date the logging features at the Secret Beach Campsite (run by the band office) and provide a write-up for signage at the campsite for the public. Two of the Toquaht tree fallers showed me the CMT features at the Secret Beach Campsite just north of Macoah and gave advice on areas to explore in the territory. They suggested a number of sites including DgSh-62 and 63 inland from Toquaht Bay.

Toquaht surveys 1 and 2 were in the vicinity of Toquaht Bay and the entrance to Pipestem Inlet. Survey 3 was far inland, north of Toquaht Lake. Survey 4 was in the east

of the territory towards Effingham Inlet (Fig.22). We camped at TS1 for all the surveys within the territory.

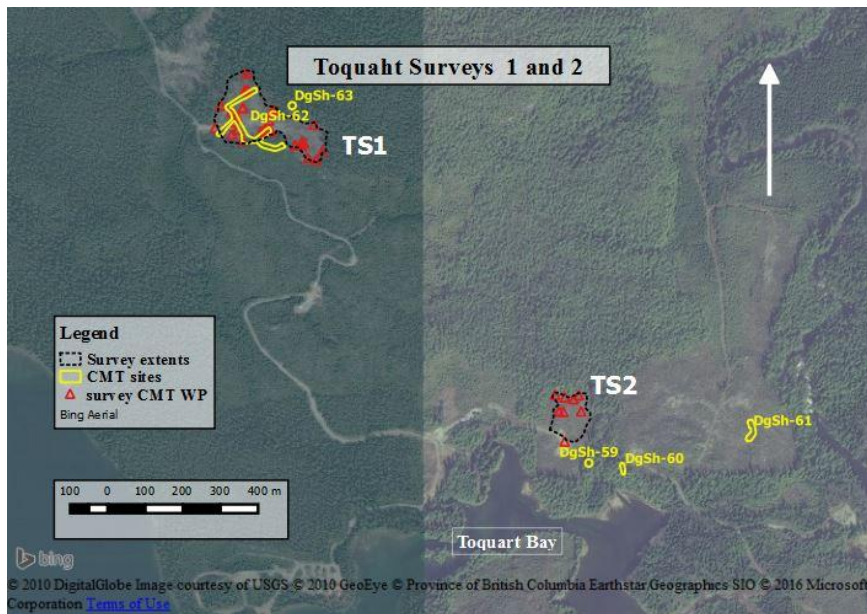


Figure 22: Toquaht surveys 1 and 2 (CMT sites, RAAD 2015).

7.2.1.1. Toquaht Survey 1

Associated recorded archaeological site: Yes, overlaps

DgSh-62, 63- 18 bark strip trees

Unrecorded CMTs: Yes, 18 CMTs, 19 Dates

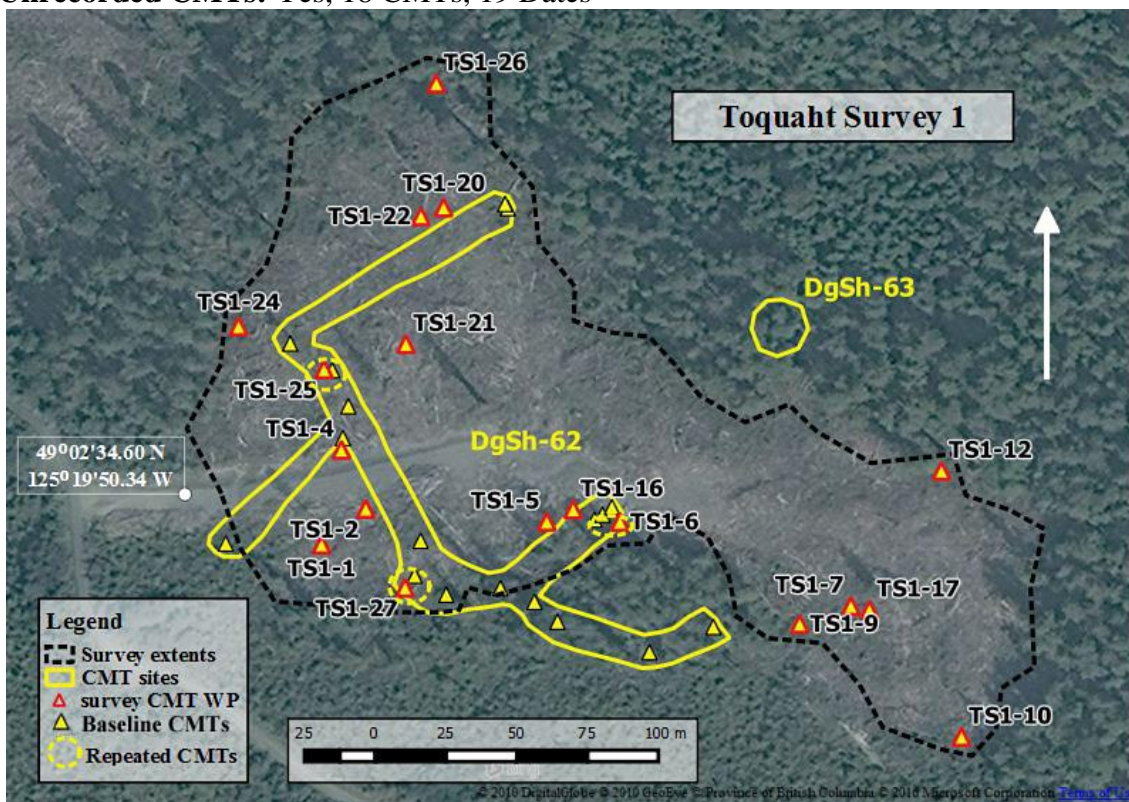


Figure 23: Toquaht Survey 1 (CMT sites, RAAD 2015).

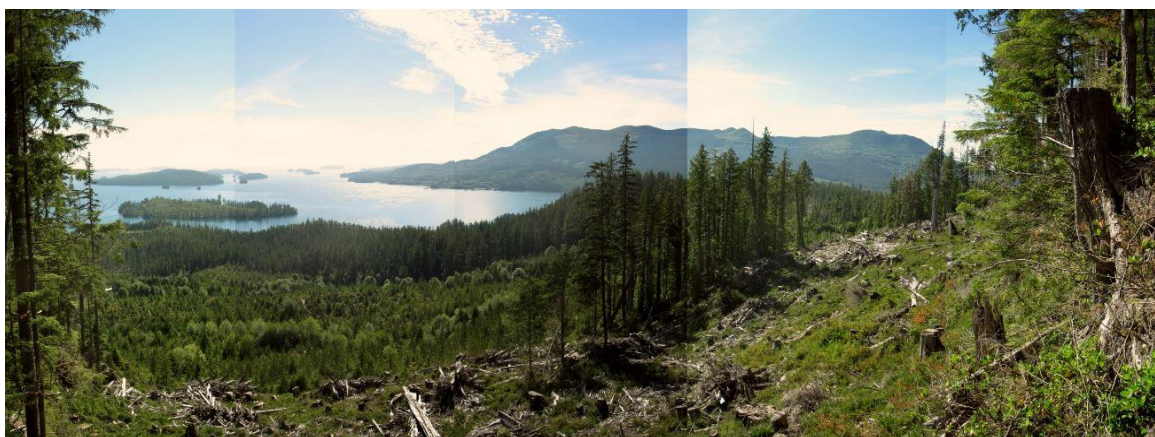


Figure 24: East half of TS1 survey area, view southwest to Toquaht Bay and Barkley Sound.

TS1 took place in the largest, southeastern-most old growth clearcut in a cluster of three along the LC04 access road (Figs.23-26). The first two visits required a half hour hike in past a locked gate. A key was acquired for subsequent visits. The site is perched across a saddle of land just above the access road, sloping either way down towards the



Figure 25: TS1 View towards western half of survey area, view west



Figure 26: Western half of survey area, view south to Broken Islands.

south, with a 180 degree view of Barkley Sound. The site has a short access road (LC04-2) into the middle of the site with a massive abandoned truck parked at its entrance. A single goliath western redcedar stands in the middle of the western portion of the site. The western side of the cut is crossed by a well-used bear trail that attaches to the access road. There is an abundance of berry bushes and tiny cedar and hemlock saplings not yet overgrown to any degree. The dimensions are about 500 x 200 m wide, with a 100 m pinch point in the middle, on a roughly 15-30 degree slope over the whole site.

In 2010 Baseline Archaeological Services performed an Archaeological Impact Assessment finding 18 CMTs at DgSh-62 and one at DgSh-63. All CMTs at DgSh-62 were recorded as impacted by logging. However, it appears that about four may have been left at the south end of the site in a

remaining stand of trees. Six stem rounds were collected for dating, five of which were dated (Table 1; Whalen 2012:3).

CMT	Type	Species	Modification Date	Comments
1	Taper	Cw	1829	Exact
3	Taper	Cw	1811	Exact
4	Taper	Cw	1829	Sample poor condition
4	Taper	Cw	Unknown	Bad sample x2 CMT#4
5	Taper	Cw	1794	Exact
17	Taper	Cw	1873	Exact

Table 1: Baseline CMT data for DgSh-62 (Whalen 2012:3)

Feature#	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
TS1-1	242	Sample	2011	5	1764- 1769	Confident	Open	Dated in lab
TS1-2	185	In field	2011	10	1816- 1826	Possible	Open	
TS1-4.1	588	Sample	2011	5	1418- 1423	Probable	Closed	Dated in lab
TS1-5	Unk	-	2011	-	-	Possible	Closed	
TS1-6.2	172	In field and photo	2011	Exact	1829	Confident	Open	same feature /date as Baseline #1
TS1-7	596	Sample	2011	5	1410- 1415	Confident	Closed	Dated in lab
TS1-9	358	Sample	2011	5	1648- 1653	Probable	Closed	Dated in lab
TS1-10	250	Sample	2011	>20	-1661	Possible	Closed	Dated in lab
TS1-12	367	Sample	2011	15	1629- 1644	Probable	Closed	Dated in lab
TS1-16	314	In field	2011	25	1672- 1697	Probable	Open	
TS1-17	1108	Sample	2011	5	898- 903	Confident	Closed	Dated in lab
TS1-20.1a	254	Photo	2011	20	1737- 1757	Probable	Closed	
TS1-20.1	196	In field	2011	10	1805- 1815	Confident	Closed	
TS1-20.2	199	Sample	2011	5	1807- 1812	Confident	Closed	Dated in lab
TS1-20.4	154	In field	2011	5	1852- 1857	Possible	Open	
TS1-21.1	195	In field	2011	10	1805- 1816	Probable	Open	
TS1-22	243	In field	2011	5	1763- 1768	Probable	Closed	
TS1-24	400	Sample	2011	20	1591- 1611	Possible	Closed	Dated in lab
TS1-25	201	In field	2011	10	1800- 1810	Probable	Closed	Same as Baseline (undated) #19
TS1-26	260	In field	2011	10	1741- 1751	Possible	Open	
TS1-27	Unk	-	2011	-	-	Insufficient data in notes	Closed	Same as Baseline (undated)#8?

Table 2: TS1 survey data

Site Discussion

This site was the first and largest to be visited, having the most site revisits as I refined how to count the negative data and collect dates in the site. As this was a known archaeological site the entire clearcut was surveyed over five site visits between



Figure 27: Extracting sample, TS1-17.



Figure 28: TS1-7

September 2014 and January 2015. Eighteen TBS CMTs and 19 dates were recorded (Table 2). Three of these CMTs were originally recorded by Baseline, along with one date. All were positioned where they were shown on Baseline's site map. While four appear to remain standing, I was unable to find the remaining 11 Baseline CMTs. This may have been due to the large number of slash piles throughout the site and the cutting of stumps too low to intercept with the scar features.

About 350 stumps over 40 cm in diameter were measured across the clearcut, not including the recorded CMTs. Of these around 65-70% were cedar. This would make roughly 8.6 % of trees and 13% of cedars at the site CMTs. Due to time constraints and the focus of the project on extracting dates and recording embedded scars I decided to abandon the data collection of all negative stumps. Up until this point we had measured and noted all non-cultural stumps.

The resulting data show that out of the scars found (excluding unclear features, and Baseline repeats) 67% of scars were closed and embedded within the tree while 33% were open or partially open. Interestingly seven out of the eight pre-1700 dates were entombed within closed scar lobes. The two oldest CMTs dating to about AD

903 (Fig.27) and AD 1415 (Fig.28) were found within 10 m of each other, both embedded and both almost entirely preserved to the core.

CMT TS2-17 (Fig.27) was clearly a very old sample when first discovered. Its cultural features were very exaggerated and appeared in the field to date well over 850 years. In January 2015 the Toquaht generously offered to help extract a large wedge sample from this tree for dating analysis. The sample was sanded with 400 grit sandpaper and its rings were counted microscopically at the University of Victoria. A minimum age of 1108 calendar years was counted (AD 903), as there is the possibility of some missing rings (image of sample in section 8.2). This sample is the longest living CMT ever recorded worldwide to my knowledge, which means it has lived the longest since modification. The next longest living CMT, recorded by Millennia Research was found at the nearby Julia Passage (Eldridge 1997a) and dates to AD 1137. The oldest modification ever found was of a subfossil pine tree in a Swedish peat bog dating to 2800 BP (Ostlund et al. 2004), making TS1-17 the second oldest modification ever found. These ancient CMTs are further discussed in section 8.2.

Another interesting sample was TS1-20 (Fig.29) which was bark stripped at least 4, possibly 5 times.



Figure 29: TS1-20, four or five bark stripping events. Dotted lines indicate bark peeled area, solid ends indicate scar crusts.

7.2.1.2. Toquaht Survey 2

Associated recorded archaeological Site: Yes, Nearby

DgSh-59: 100m SSE, 1 logging feature

DgSh-60: 200m SE, 3 bark strip trees

DgSh-61: 650m E, 3 logging features

Unrecorded CMTs: Yes, 7 CMTs, 7 Dates

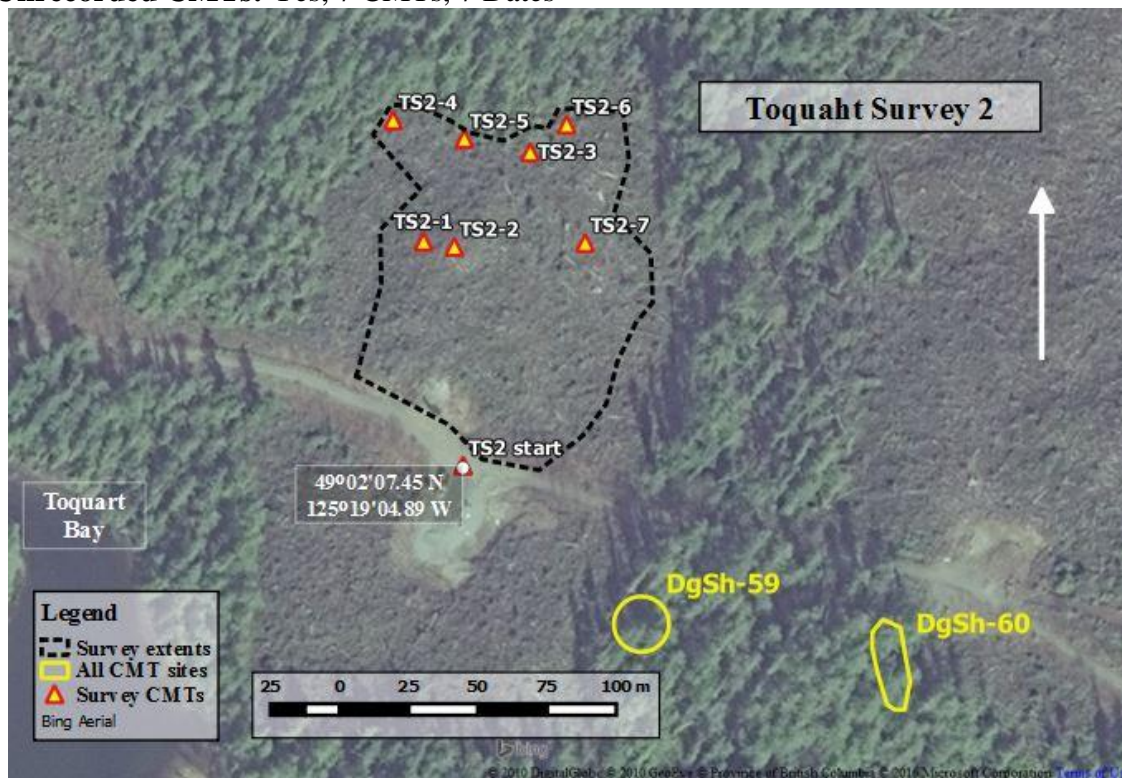


Figure 30: Toquaht Survey 2.



Figure 31: TS2, view southwest across south end of survey area.

TS2 is close to the shores of Toquaht Bay, further along the LC04 access road (Figs.30-32). It is surrounded by small isolated CMT sites containing bark strip and logging features. As TS2 is of a slightly older clearcut than TS1, there were more vegetation cover and



Figure 32: TS2, view south over TS2-4.

weathered stumps. The survey area is hemmed in on two sides by shoreline and river, and represents only a small portion of a much greater clearcut network. The site was visited one afternoon in the fall of 2014, during which 108 stumps were counted in a 120x100 m area, including seven CMTs. Due to time constraints, only eight

dates out of 11 total features were collected in the field (Table 3).

Feature#	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
TS2-1.1	477	In field	2006	20	1512- 1532	Confident	Open	
TS2-2.1	345	In field	2006	20	1644- 1664	Probable	Open	
TS2-2.2	-	-	2006	-	-	Probable	Open	
TS2-3.1	548	In field	2006	20	1441- 1461	Possible	Closed	
TS2-4.1	400	In field	2006	15	1594- 1609	Confident	Closed	
TS2-4.2	368	In field	2006	15	1626- 1641	Confident	Open	
TS2-5.1	-	-	2006	-	-	Possible	Open	
TS2-5.2	-	-	2006	-	-	Possible	Open	
TS2-5.3	-	-	2006	-	-	Possible	Open	
TS2-6	630	In field	2006	20	1359- 1379	Confident	Open	
TS2-7	441	In field	2006	20	1541- 1561	Probable	Open	

Table 3: TS2 survey data

Site Discussion

The time constraints were unfortunate as it turned out to be a very intriguing site, containing an archive of use dates between AD 1379 to AD 1641, with fairly even distribution in between. Despite their age several scars had not entombed themselves within their lobes, including the oldest. Four of the CMTs contained multiple stripping events. TS2-4 (Figs. 32-34) was an example of a young tree surviving four centuries after being stripped of 55% of its original bark, with over 80% of the remainder removed 32 years later.

The surrounding clearcut is far larger than TS2, of which my survey covered only a small area. If the area includes a similar density and age class of CMTs it could represent one of the oldest large indigenous forest management sites in the region.



Figure 33: TS2-4.



Figure 34: TS2-4, detail.

7.2.1.3. Toquaht Survey 3

Associated recorded archaeological site: No

Unrecorded CMTs: No

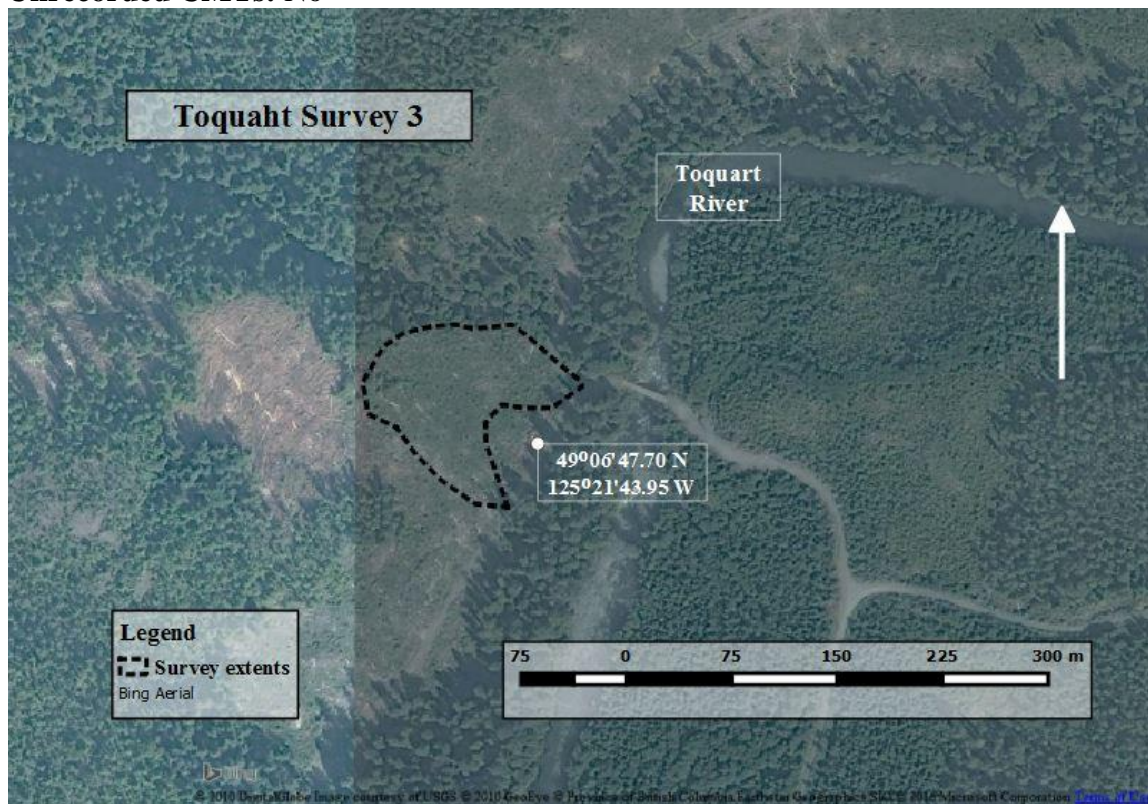


Figure 35: Toquaht Survey 3.

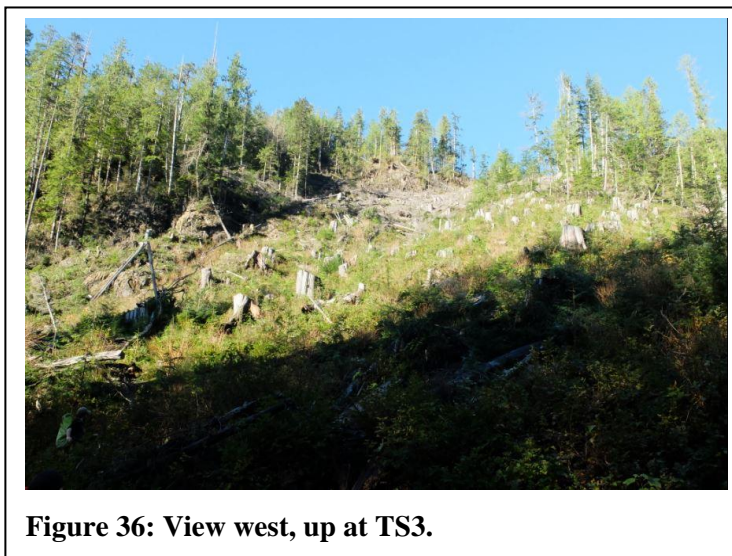


Figure 36: View west, up at TS3.

The site is just north of a wide, infilled delta dissected by the Toquaht River as it enters the northern end of Toquaht Lake (Fig.35-37). The chosen clearcut was one of the most recent in what had once been a large stand of trees in this delta area. This may have been a large area of

valley bottom old growth that was clearcut a few decades ago. There are no nearby archaeological sites.



Figure 37: View east, from top of TS3.

TS3 was surveyed one afternoon in November 2014. It is situated 2 km north of Toquart Lake on the western side of the Toquart River. The clearcut had many cedars, steep slope and was just 50m from the river. The survey area covered an arc of about 175x200m on the slope, or about a quarter of the entire clearcut. Only 87 cedars were counted as we finished the survey

when the slope became too dangerous to climb. A few interesting scarred stumps were found; however, no definitive features were located. It was initially thought that the slope was too steep for harvesting of cedar, until CMTs were found on the even steeper sloping PS8 site (Pacheedaht).

7.2.1.4. Toquaht Survey 4

Associated recorded archaeological site: No

Unrecorded CMTs: No

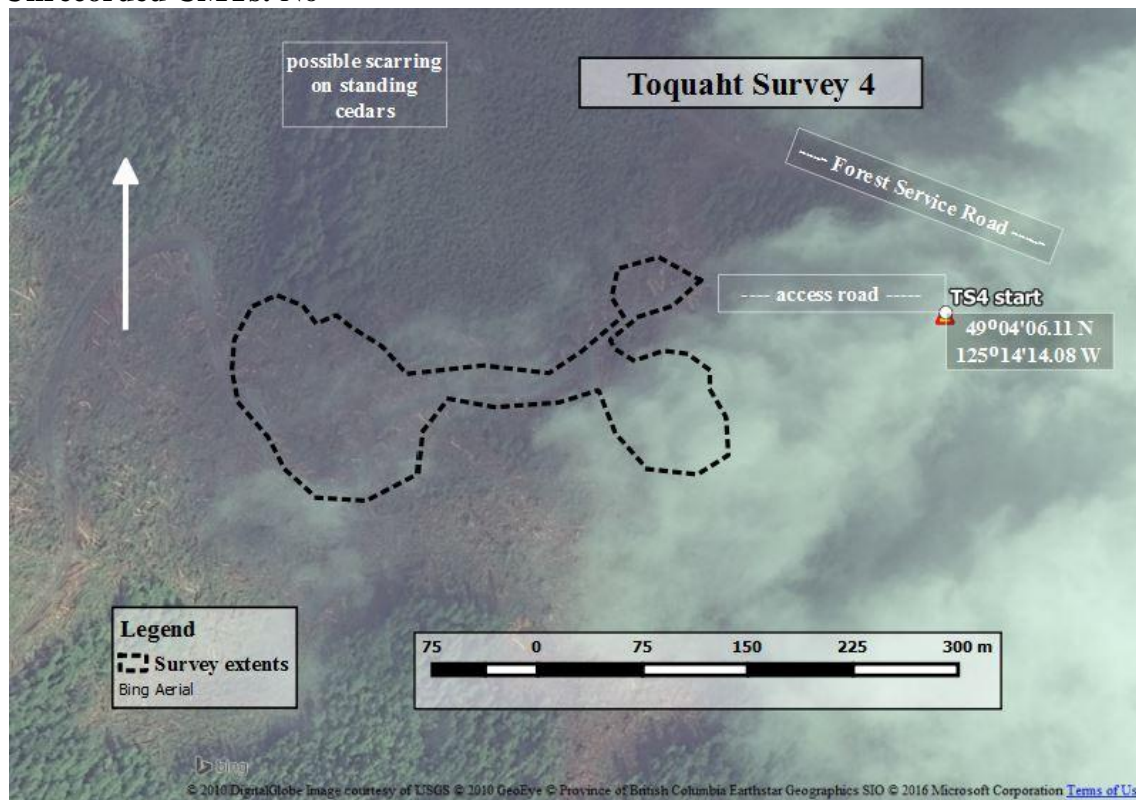


Figure 38: Toquaht Survey 4.



Figure 39: View southwest across survey area, and view east-southeast showing conditions of survey area.

This clearcut was accessed in one of the remote valleys between Pipestem and Effingham Inlets in January of 2015 (Figs.38, 39). The aim was to drive to a very remote area, with partial access to larger water bodies, in order to see if there had been active indigenous forest use. A few kilometres east up the Pipestem Main forest service road we found standing trees which had apparent cultural bark strip scars on their faces. We

backtracked to a clearcut just down slope from these trees. The survey was at both ends of a 500 x 250 m area, separated by disturbance from logging road building. The survey found no evidence of CMTs. However, most of the cedar stumps represented a very old age class of cedar and were rotted in the middle, while the younger stumps were largely hemlock. About 100 cedar stumps were counted in total.

7.2.2. Ditidaht Surveys

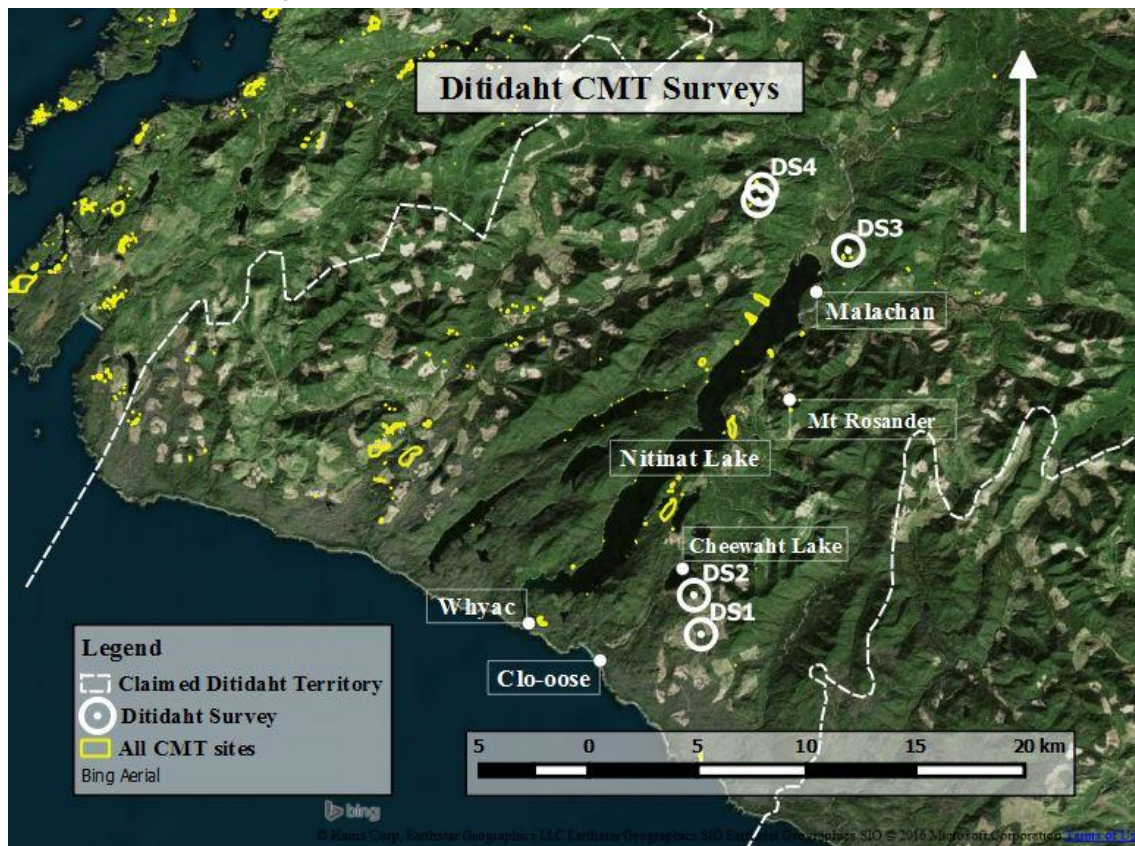


Figure 40: Ditidaht survey areas (CMT sites, RAAD 2015).

Ditidaht is a large territory southeast of Barkley Sound and northwest of Pacheedaht, centred around Nitinat Lake and stretching inland from the coast to Lake Cowichan (Fig.40). Its main village is now Malachan at the north end of the lake. At the south end sits the ancient villages of Whyac and Clo-oose, exposed to the open ocean. As in Toquaht, Ditidaht territory has been heavily impacted by industrial logging and is crisscrossed with active logging roads. A few large studies of the archaeological potential of Ditidaht territory (Bonner and Eldridge 2001, Ditidaht First Nation 2014) and several archaeological AIA's in Ditidaht territory have recorded many coastal and inland sites, including numerous CMTs. These dates were added to the CRM chronology. However, in such a vast territory many more dates are needed to infer much about regional forest usage. From the start it was very interesting to note the distance inland of many large CMT stands. Several sites are about 20 km from any large body of water. Such finds serve to hint at the true extent of indigenous forest use across Vancouver Island.

My first visit to Ditidaht was to present a proposal at the band office. There was general support for the work and the type of data to be collected. It was noted that a thesis based on data rather than theoretical interpretation would be more valued to the band. A number of sites, including the spiritually-significant Mt. Rosander were suggested as there has been considerable logging in the area.

Ditidaht was the last territory I worked in and all my fieldwork was completed in the four days of my second visit to Ditidaht territory, due to time constraints. Unfortunately most of the clearcuts I hoped to visit were not as recently cut as I had thought. Aerial images were poorly dated and many of the sites and roads were inaccessible. We made it most of the way to a clearcut at the southern base of Mt. Rosander. However, we never ended up starting the survey due to time constraints. As Rosander is topped by two small CMT sites, it is definitely an area worth revisiting. Surveys 1 and 2 were near Cheewaht Lake, while 3 and 4 were within known CMT sites at the north end of Nitinat Lake. All but one overlapped with known archaeological sites. Most clearcuts I had hoped to visit, that were far from recorded archaeological sites were hard to access or completely overgrown. During the whole survey we camped at the Nitinat Lake Forest Service campsite.

7.2.2.1. Ditidaht Survey 1

Associated recorded archaeological site: No

Unrecorded CMTs: No

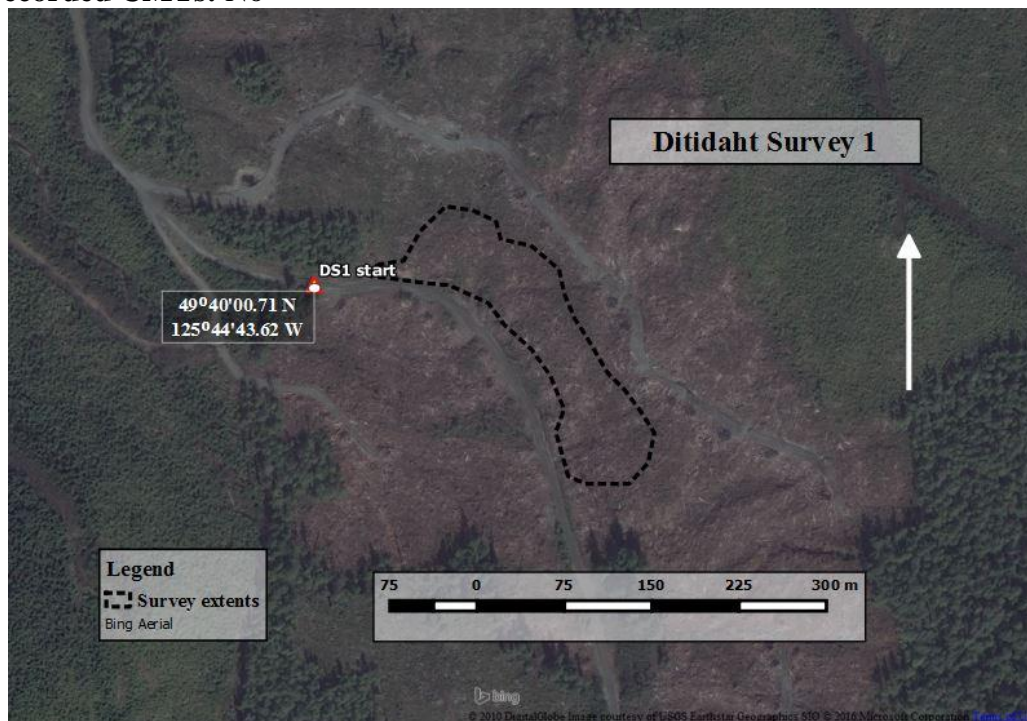


Figure 41: Ditidaht Survey 1.

DS1 (Fig.41) was chosen along the Rosander Main FSR after a number of previously planned survey areas along that road were found to have been overgrown with vegetation, thus preventing access. Outdated aerial imagery of the area required judgemental surveys. This site was adjacent to a small tributary stream and was on a slightly rolling landform. The site consisted of primarily old growth western redcedar stumps of varied size with some hemlock. About 100 stumps were counted in our survey. One large cedar stump appeared as if it may have had early scarring; however, rot and decay in its core made this impossible to confirm. No other CMT evidence was found. A site photo is missing from this survey area.

7.2.2.2. Ditidaht Survey 2

Associated recorded archaeological site: Yes, overlap

DeSe-53: 2 CMT stumps, 1 test hole, 1 TBS

Unrecorded CMTs: Yes, 2 CMTs, 1 date

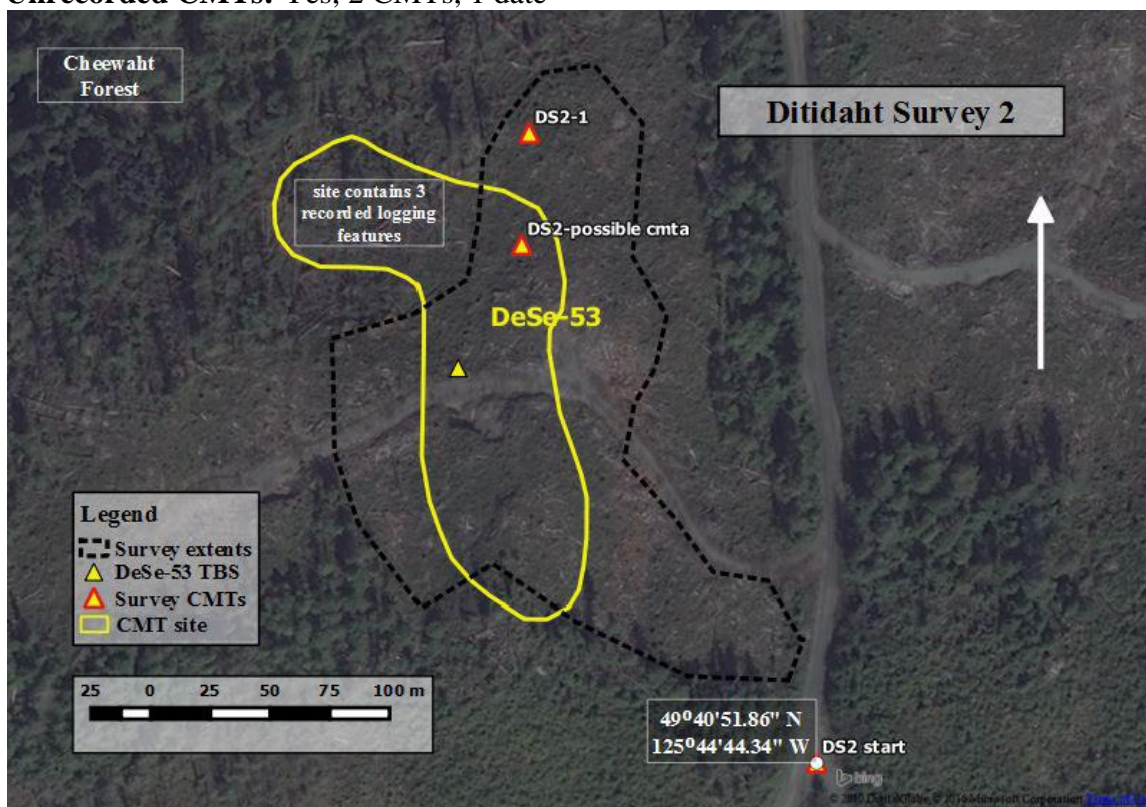


Figure 42: Ditidaht Survey 2 (Archaeology Branch, British Columbia 2000; RAAD 2015).

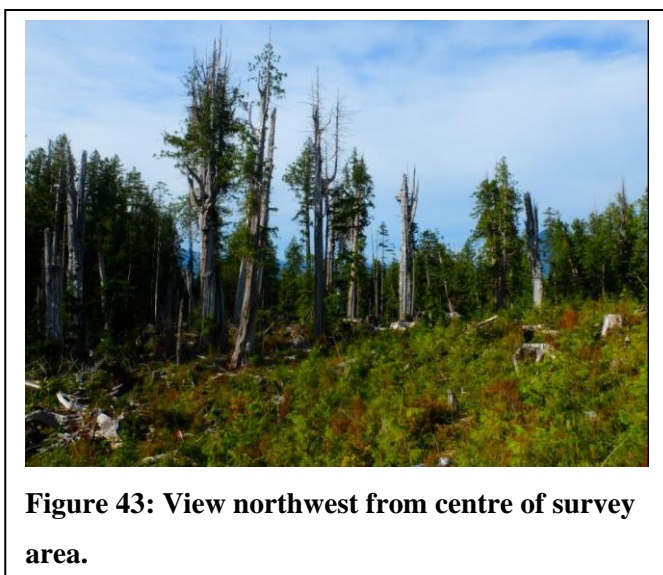


Figure 43: View northwest from centre of survey area.

In 2000 DeSe-53 was found off the Rosander Main FSR as part of an overview study conducted by Millennia Research and the Ditidaht First Nations (Figs.42, 43). Two CMT stumps, one test hole and a single Tapered Scar were found at the site, though nothing was dated (Table 4; Archaeology Branch of BC 2000). The site appears to have been almost entirely affected by the

2005 logging activity.

Feature#	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
DS2-1	230	Off photo	2005	50	1725-1775	Confident	Open	Age counted in field, lost in notes. Re-counted in photos
DS2-poss CMTa	-	-	2005	-	-	Possible	Close	Reconsidered later in photos. No date

Table 4: DS2 survey data.

The survey overlapped 60% of the known archaeological site. Two TBS scars were found in separate stumps at the north end of the site and do not appear to overlap with the single scar found by Millennia. The shape of the annual rings of DS2-1 suggests the scar was taken off an older healing lobe, hinting at a multiply scarred tree. The second feature appeared to be a small test strip taken off a cedar which had healed over itself. A few other suspicious scars appeared but with too few features for recording. The region around Cheewaht Lake is known to have been extensively managed by the Ditidaht for plants and cedar wood (Eldridge 1992:2, Turner et al. 1983:78). Despite the findings of this survey, there is likely more evidence here of forest use than represented in the archaeological literature.

7.2.2.3. Ditidaht Survey 3

Associated recorded archaeological site: Yes, adjacent and nearby
 -DeSd-4:7 TBS; DeSd-8:22 TBS; DeSd-9:2 TBS; DeSd-10:10 TBS
Unrecorded CMTs: Yes, 17 CMTs, 20 dates.

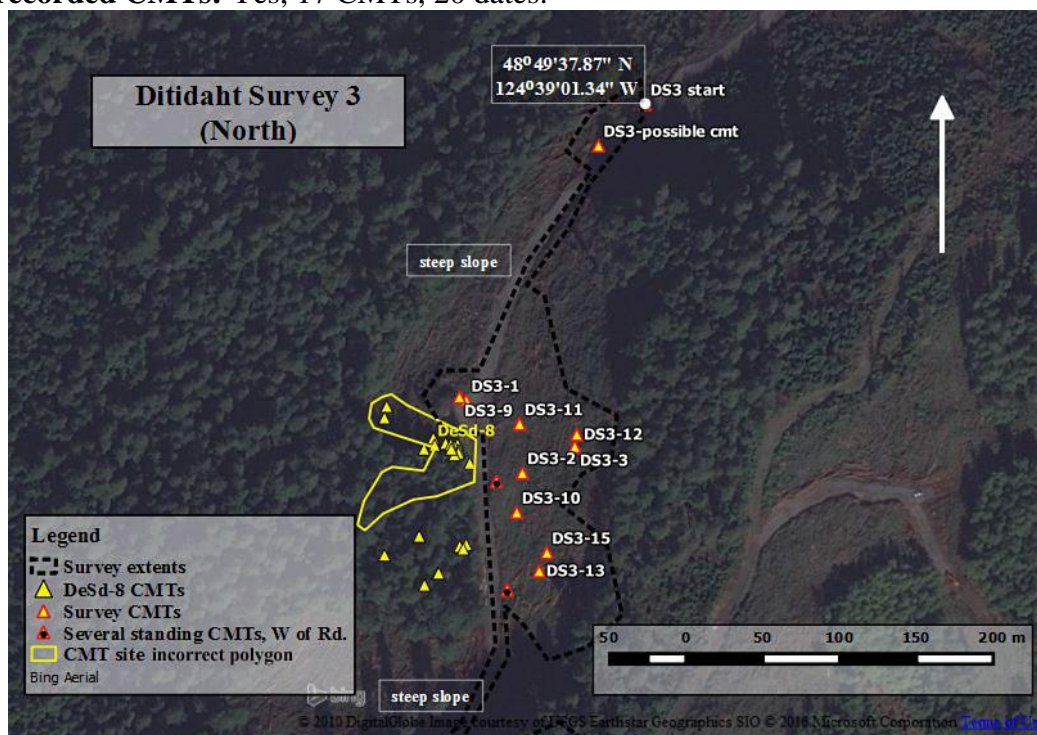


Figure 44: Ditidaht Survey 3, north (Archaeology Branch, BC 2011; RAAD 2015).

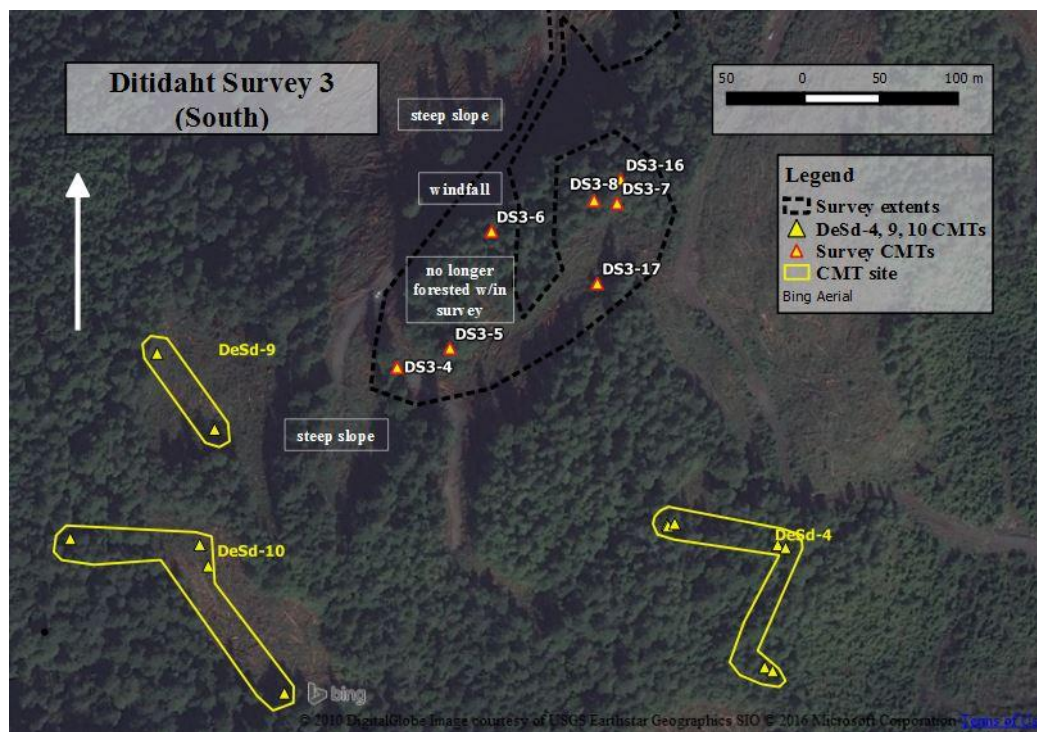


Figure 45: Ditidaht Survey 3, south (Archaeology Branch, BC 2011; RAAD 2015).



Figure 46: a) View north to north end of survey area and access road with stump. b) View north from south end of survey area, note windfall. c) View north-northwest looking down on north end of survey area. d) View from north survey area south to steep middle area.

The site is accessed by a short FSR just under 3 km south of the Nitinat Junction, east off the Carmanah Main (Fig. 44-46). The road rises very fast for about 1 km before reaching the CMT sites. Its entrance is guarded by a massive old growth rootball ripped from the precipitous cliff above the road (Fig.46a). The site is perched on a high ridge, with steep slopes and dramatic views across the Nitinat River delta and southwest over the length of Nitinat Lake (Fig.47). The Lake is known to directly channel Pacific winds for world class kite boarding. The day of our visit saw evidence of the extreme potential of the force of these winds. High winds and horizontal rain prevented much detailed recording. The majority of the ridge had been clearcut with thin, exposed stands of old growth dispersed throughout. These stands and the exposed timber on the margins are all

being lost as windfall. The remaining exposed old growth CMTs at DeSd-8 which we saw bending like grass in the wind appeared unlikely to survive long.



Figure 47: View southeast from south end of survey area, Nitinat Lake.

DeSd-4 was first discovered on this mountain slope in 2000 by Millennia Research during their overview study of Ditidaht Territory. Baseline revisited the site in 2011 as part of an Archaeological Impact Assessment, finding three more CMT sites. No features in this cluster of sites had been dated before our survey. DeSd-8 appeared on the ground to have avoided impact by logging, and aerial images suggest the other sites are also at least partially still intact. Site reports were unclear whether they had been impacted or not. The remaining sites all appear to be at high risk of destruction through exposure to strong weather.

The survey area was dissected in the middle by an extremely steep slope over which hung an outcropping of windfall trees. We counted beyond the 100 stump quota as the entire logged area appeared to be an extensive cedar bark utilization site. We were still finding CMTs in the last few minutes of our survey. Seventeen CMTs representing over 24 scar features were found throughout the site including a large number of multiple stripped trees (Table 5). Most had very distinctive features suggesting cultural bark stripping and their proximity to a number of standing CMT sites also increased our confidence. Due to poor weather conditions the data collection and description of the trees were not ideal. Many trees that had multiple features were not fully recorded. Many natural scars were also found in the survey area, no doubt due to the exposed position of the site and natural windfall scarring.

Feature#	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
DS3-1	260	In field	Nov 2011?	5	1746- 1751	Confident	Open	
DS3-2	236	In field	Nov 2011?	10	1765- 1775	Probable	Open	Peel taken off ancient phantom lobe
DS3-3	-	-	Nov 2011?	-	-	Possible	Closed	
DS3-4	160	In field	Nov 2011?	15	1836- 1851	Probable	Closed	At least 3 stripping events
DS3-5	-	-	Nov 2011?	-	-	Probable	Closed	Many lobes
DS3-6.1	206	In field	Nov 2011?	15	1790- 1805	Probable	Open	
DS3-6.2	-	-	Nov 2011?	-	-	Probable	Closed	
DS3-7	150	In field	Nov 2011?	30	1831- 1861	Probable	Closed	Core popper of phantom lobe
DS3-8.1	190	In field	Nov 2011?	35	1786- 1821	Confident	Open	
DS3-8.2	198	In field	Nov 2011?	25	1788- 1813	Confident	Open	
DS3-8.3	182	In field	Nov 2011?	40	1789- 1829	Confident	Open	
DS3-9.1	250	In field	Nov 2011?	10	1751- 1761	Confident	Open	
DS3-9.2	178	In field	Nov 2011?	20	1813- 1833	Confident	Open	
DS3-9.3	200	In field	Nov 2011?	10	1801- 1811	Probable	Open	
DS3-10	226	In field	Nov 2011?	10	1748- 1758	Confident	Open	
DS3-11	221	In field	Nov 2011?	20	1743- 1763	Confident	Open	
DS3-12.1	210	In field	Nov 2011?	10	1791- 1801	Confident	Open	Lots of lobes
DS3-12.2	110	In field	Nov 2011?	5	1896- 1901	Confident	Closed	Lots of lobes
DS3-12.3	183	In field	Nov 2011?	10	1818- 1828	Confident	Open	Lots of lobes
DS3-13	280	In field	Nov 2011?	30	1701- 1731	Confident	Closed	
DS3-15	103	In field	Nov 2011?	5	1903- 1908	Probable	Closed	
DS3-16	170	In field	Nov 2011?	30	1811- 1841	Probable	Closed	
DS3-17	195	In field	Nov 2011?	20	1769- 1816	Confident	Closed	
DS3-poss CMTa	-	In field	Nov 2011?	-		Probable	Open	

Table 5: DS3 survey data

In the organization of the GPS data collected during the surveys the waypoints of the CRM-recorded CMTs were georeferenced and overlaid with the provincial archaeological polygons and my waypoints. Unlikely several other sites, the waypoints of CMTs on the DeSd-8 site map did not overlap with its associated polygon. It is unclear whether the polygons or site maps should be trusted more, but in this case standing CMTs were observed at the site which corresponds with the site map. It is thought the CMT waypoints on the site map are correctly positioned while the polygon is offset.

7.2.2.4. Ditidaht Survey 4

Associated recorded archaeological site: Yes, nearby

DfSe: 23 TBS CMTs

Unrecorded CMTs: Yes, 11 CMTs, 10 dates

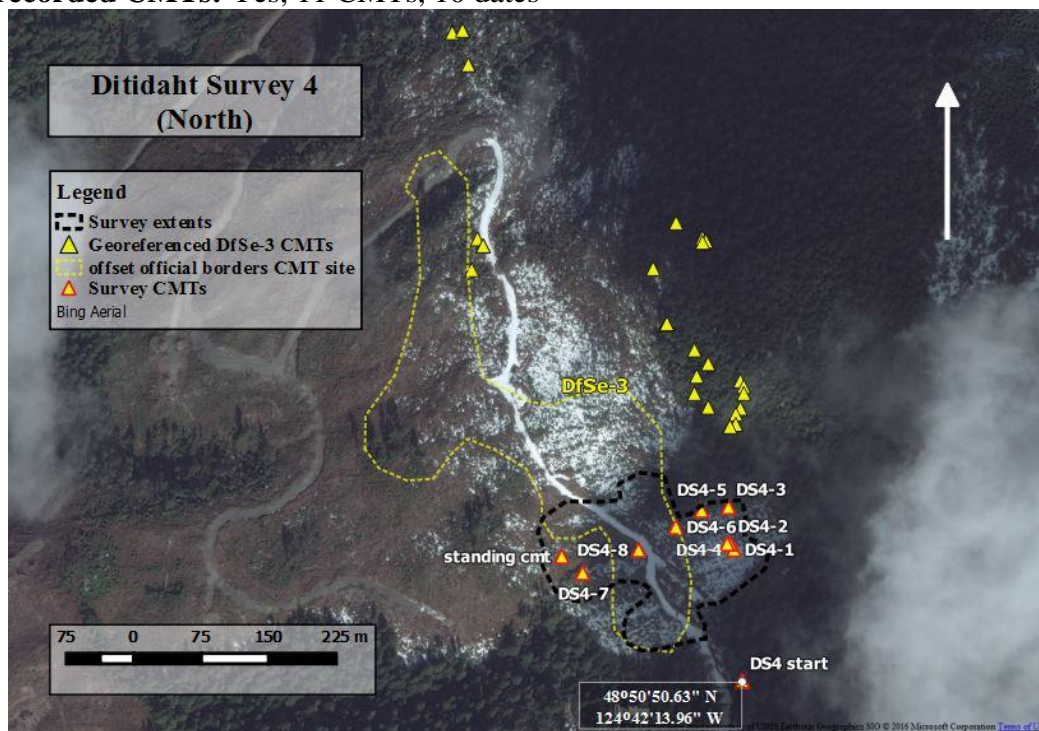


Figure 48: Ditidaht Survey 4, north (Archaeology Branch, BC 2001a; RAAD 2015)

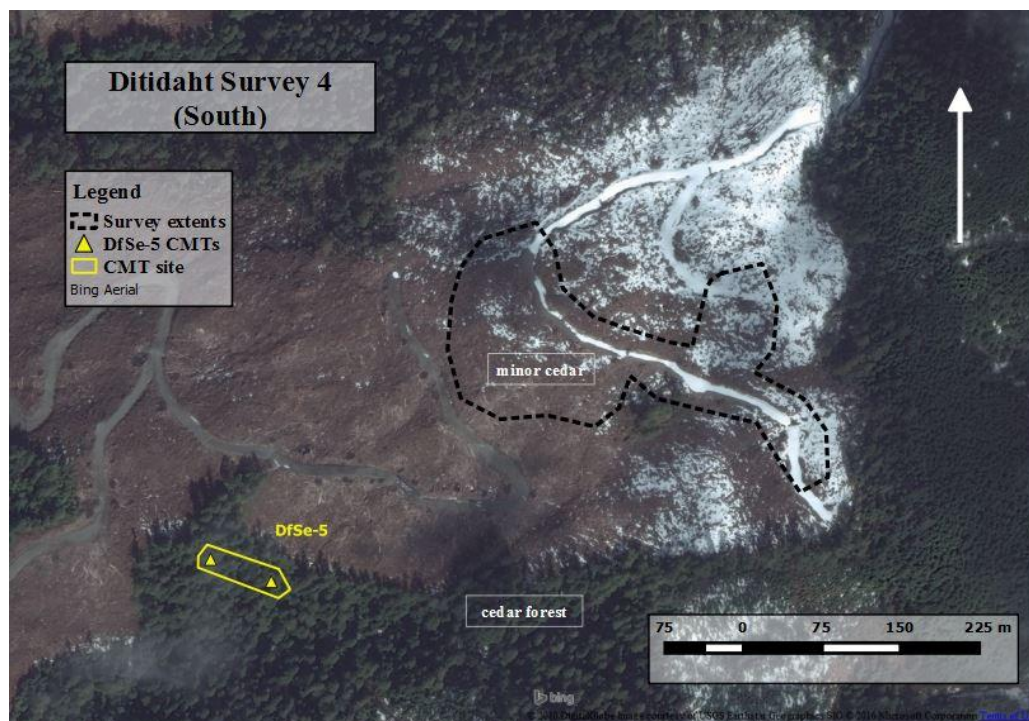


Figure 49: Ditidaht Survey 4, south, (Archaeology Branch, BC 2004; RAAD 2015).



Figure 50: a) View east from bottom of north survey area to top. b) View from northern survey area to south survey area. c) View west from bottom of north survey area.

DfSe-3 was found in 2000 during Millennia Research's overview survey of Ditidaht territory (Figs.48-50). Twenty-three TBS CMTs were found, half of which had between two and five bark strip features. The single sample taken by increment borer from the site was dated to circa AD 1830. The site was accessed by a new FSR off the Flora Lake Main less than 2 km northeast from Flora Lake, off the Carmanah Main.

The archaeological site polygon for DfSe-3 appears on RAAD (2015) to overlap the area we surveyed, in which case our survey might have revisited features. However the official site map in the report was geo-referenced on the QGIS map containing my GPS points. The RAAD polygon for the site boundaries appears to be about 350 m SSW of its true location on the ground. Standing CMTs were noted in the forest at the north end of my survey area suggesting that much of the recorded archaeological site might still be intact and simply offset in the Provincial records.

Our survey was completed in two parts in September 2015 (Figs.48,49). The southern section (a distance away from DfSe-3) was hiked into and surveyed first, but minimal cedar was found. We turned around after encountering a mother bear with two cubs. We returned to where we had parked the car at a fallen tree on the FSR. Some

nearby cedars had suspicious scars so we surveyed the adjacent clearcut on either side of the road. As many as 115 stumps were counted over a 250x300 m area. Eleven TBS CMTs were found containing a total of 13 bark strip features (Table 6). It was only after survey of the area had been completed that we realized the proximity to the known DfSe-3 CMT site. Though no features appeared to have been re-recorded.

Feature#	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
DS4-1.1	250	In field	2004	1	1753- 1754	Probable	Closed	
DS4-1.2	235	In field	2004	2	1767- 1769	Probable	Closed	
DS4-1.3	195	In field	2004	5	1804- 1809	Probable	Open	
DS4-2	245	In field	2004	3	1756- 1759	Confident	Closed	
DS4-3	258	In field	2004	5	1741- 1746	Confident	Open	
DS4-4	228	In field	2004	10	1766- 1776	Probable	Open	
DS4-5	210	In field	2004	5	1789- 1794	Probable	Closed	
DS4-6	253	In field	2004	5	1746- 1751	Probable	Closed	
DS4-7	225	In field	2004	10	1769- 1779	Confident	Open	
DS4-8	225	In field	2004	10	1769- 1779	Probable	Open	
DS4-poss cmta	-	-	2004	-	-	Possible	Closed	Rotted, maybe 2 strip
DS4-poss cmtc	-	-	2004	-	-	Possible	Closed	
DS4-poss cmtd	-	-	2004	-	-	possible	open	

Table 6: DS4 survey data

7.2.3. Pacheedaht Surveys

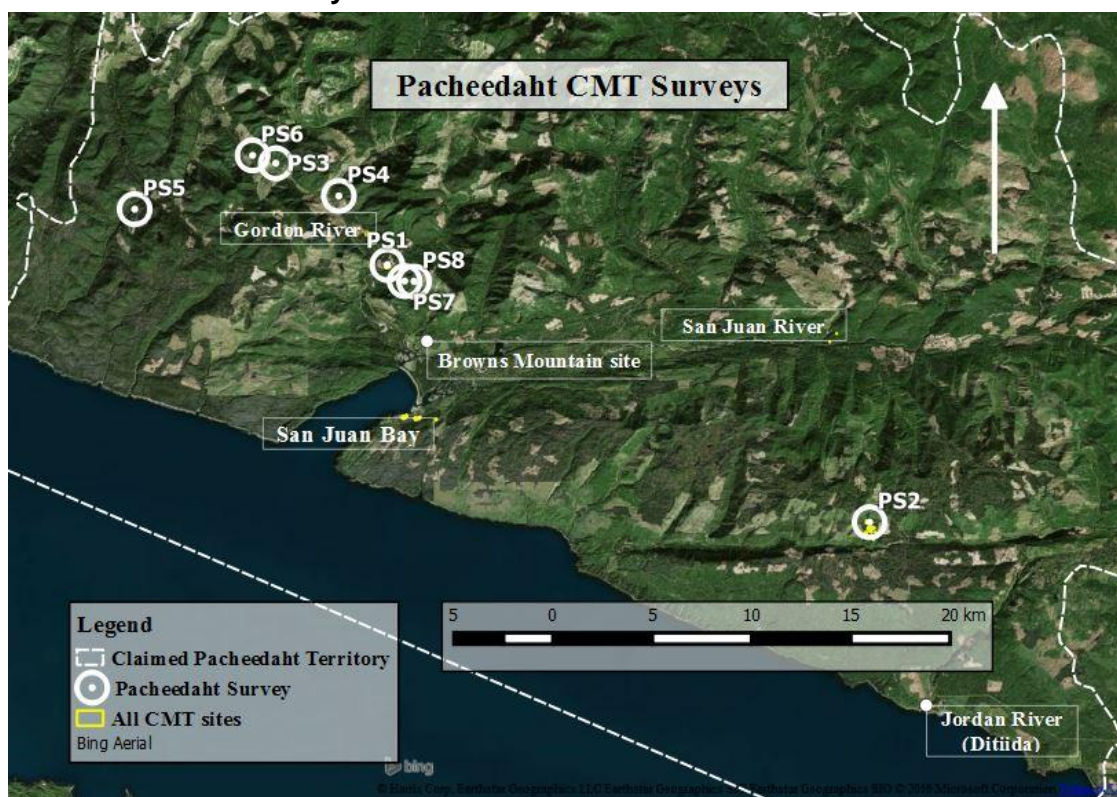


Figure 51: Pacheedaht survey areas (CMT sites, RAAD 2015).

Pacheedaht is another large territory, stretching deep within the Carmanah-Walbran wilderness to beyond Jordan River on the coast, and inland almost to Lake Cowichan (Fig.51). Like Ditidaht lands, Pacheedaht territory includes a network of logging roads and clearcuts of various ages. Much of the old growth forest in the region was clearcut earlier this century (Leversee 2015). Several smaller stands of old growth remain spread out across the landscape, hosting many record size trees that are of growing interest to environmental groups in Victoria and Vancouver. Many of these remnant old growth stands are of increasing importance to CMT studies, as they host increasingly rare evidence of indigenous use. Avatar Grove, well known to environmentalists in Victoria, has several examples of indigenous logging activity (Phoebe Ramsay 2015 personal communication).

My meeting at the Pacheedaht band office occurred a day prior to the Ditidaht meeting. There were discussions of my fieldwork and findings in Toquaht territory which I had largely completed at that point. I explained my purpose and interest in the work, and the Pacheedaht mentioned a few sites they were interested in my visiting first. Areas

nearby San Juan Bay and Gordon River were of interest to the band as they are ethnographically known to be resource harvesting areas and were very close to the ancient village of P'aachiida and their current village on the mouth of the Gordon River. The Pacheedaht also mentioned their shared interest in archaeological data from the Great Flood site of Mt. Rosander within Ditidaht lands. As noted above a survey of that site was not possible for this study. The first accessible site suggested was PS1 at the confluence of Braden Creek and Gordon River. The Pacheedaht offered the help of their tree fallers, who were knowledgeable about CMTs to accompany me on the first few surveys until their schedules no longer allowed it. From then on I used my own volunteers.

7.2.3.1. Pacheedaht Survey 1

Associated recorded archaeological site: Yes, adjacent,

DdSc-19: 31 TBS CMTs

Unrecorded CMTs: Yes, 13 CMTs, 18 dates

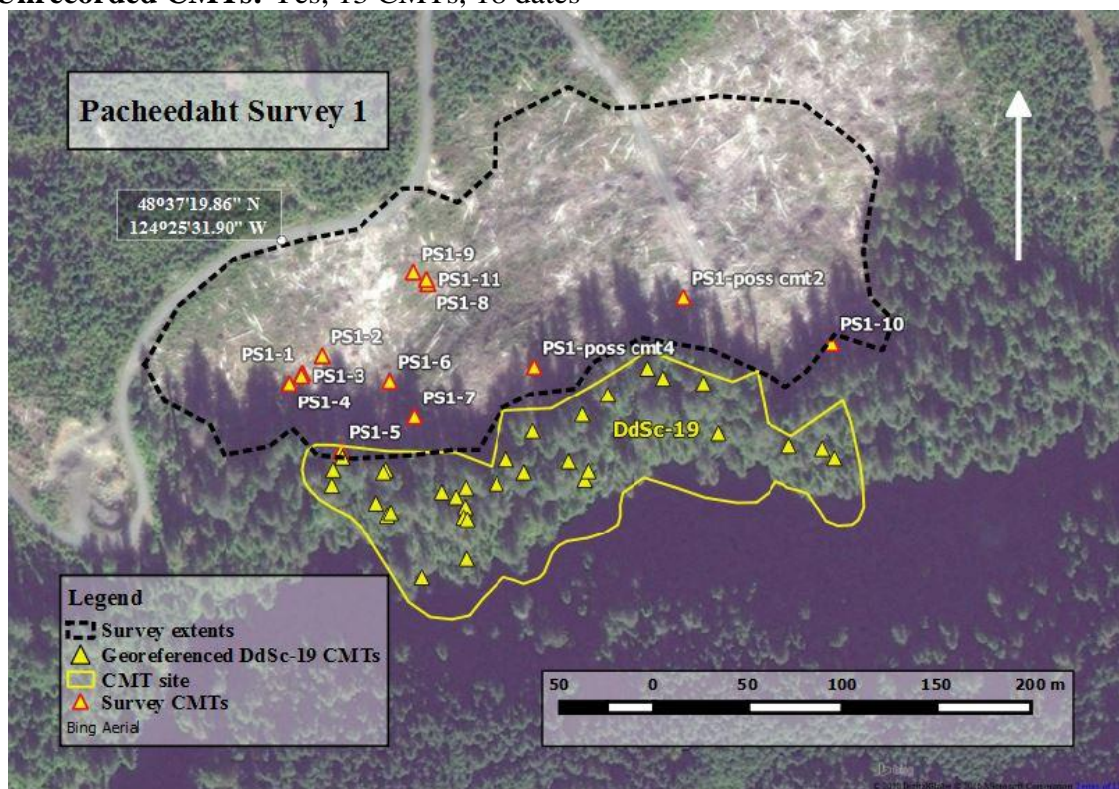


Figure 52: Pacheedaht Survey 1.



Figure 53: View east across site.



Figure 54: View west across site.

PS1 sits on a ridge above Braden Creek near its confluence with the Gordon River, near the end of the Edinburgh Main FSR (Figs. 52-54). The adjacent CMT site, DdSc-19, stands between the clearcut survey area and the creek below. A total of 31 recorded TBS trees were discovered by Millennia Research in 2010, during a non-permit site visit. Several of the CMTs are clearly visible along the site's border. The Pacheedaht requested that we visit this clearcut, due to its proximity to the protected stand and potential for unrecorded CMTs.

Two visits were made to PS1, the first in March and the second in June, during which we were able to survey an area about 600x200 m. The site is dissected by a small stream gully running down to the Braden Creek, along which some of the CMTs were associated. Some 13 CMTs were found throughout the survey area, representing 18 dated features ranging from AD 1679 to 1825 (Table 7). Almost half of the dated samples were from embedded scars. One CMT, PS1-4, hosted a total of five different bark strip scars.

Feature #	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
PS1- 1	250	In field	Jan-Mar 2010	50+	1760 min	Possible	Open	
PS1-2.1	-	-	Jan-Mar 2010	-	-	possible	open	
PS1-2.2	235	In field	Jan-Mar 2010	35	1740- 1775	Probable	Closed	
PS1-2.3	230	In field	Jan-Mar 2010	30	1750- 1780	Probable	Closed	
PS1-3.2	277	In field	Jan-Mar 2010	?	- 1733 ?	Probable	Open	Unclear if date is from 3.1 or 3.2
PS1-4.1	325	In field	Jan-Mar 2010	10	1675- 1685	Confident	Open	
PS1-4.2	238	In field	Jan-Mar 2010	5	1767- 1772	Probable	Open	
PS1-4.3	235	In field	Jan-Mar 2010	10	1765- 1775	Possible	Open	
PS1-4.4	190	In field	Jan-Mar 2010	5	1815- 1820	Probable	Closed	
PS1-4.5	185	In field	Jan-Mar 2010	5	1820- 1825	Probable	Closed	
PS1-5	316	In field	Jan-Mar 2010	20	1674- 1694	Confident	Closed	
PS1-6	208	In field	Jan-Mar 2010	2	1800- 1802	Probable	Closed	
PS1-7.1	215	In field	Jan-Mar 2010	15	1780- 1795	Confident	Open	Same year
PS1-7.2	215	In field	Jan-Mar 2010	15	1780- 1795	Confident	Closed	Same year
PS1-8	215	In field	Jan-Mar 2010	10	1785- 1795	Confident	Open	
PS1-9	326	In field	Jan-Mar 2010	5	1684- 1679	Possible	Closed	
PS1-10	234	In field	Jan-Mar 2010	15	1761- 1776	Confident	Open	
PS1-11	211	In field	Jan-Mar 2010	5	1794- 1799	Probable	Open	
PS1-uncl.2	-	-	Jan-Mar 2010	-	-	Possible	Open	
PS1-uncl.4.1	-	-	Jan-Mar 2010	-	-	Probable	Open	
PS1-uncl.4.2	-	-	Jan-Mar 2010	-	1740- 1800	probable	Open	

Table 7: PS1 survey data

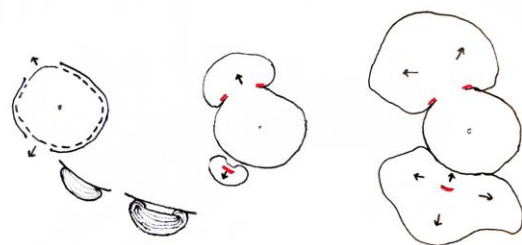
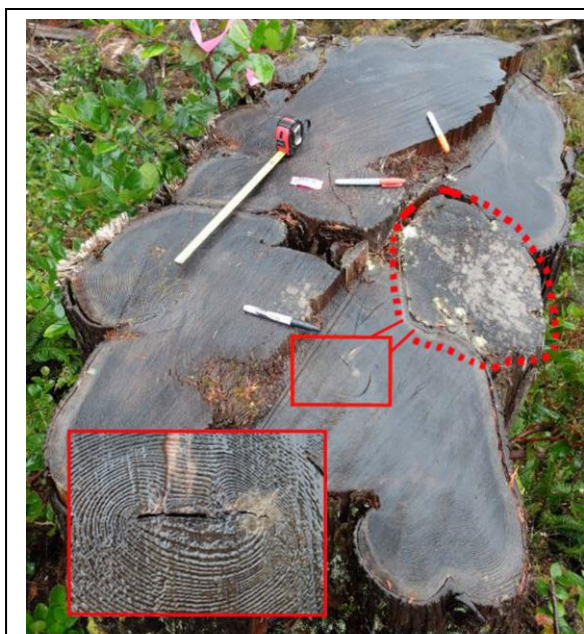


Figure 55: PS1-7 pattern of lobe growth, note inset detail of growth pattern off small strip of remaining bark.

The great resiliency of cedar to bark harvesting was well displayed in PS1-7 (Fig.55). In about AD 1795, this tree had over 80% of its bark removed at once (60% and 20%). The two strips of remaining bark between the peeled areas both regenerated. The larger strip became one large lobe, while the smaller peeled itself off the original tree after its annual rings regained their circular connection.



Figure 56: Mass of scars on PS1-4.

Another feature, PS1-4 appeared to have evidence of five different bark stripping events, all with very clear scar crusting (Fig.56).

7.2.3.2. Pacheedaht Survey 2

Associated recorded archaeological site: Yes, nearby

DcSa-4: 3 yellow cedar TBS; DcSa-5: 3 yellow cedar TBS; DdSa-3: 34 yellow cedar TBS; DdSa-4: 62 yellow cedar TBS; DdSa-5: 2 yellow cedar TBS; DdSa-6: 1 yellow cedar TBS; DdSa-7: 2 yellow cedar TBS; DdSa-8: 12 yellow cedar TBS

Unrecorded CMTs: Yes, not fully recorded.

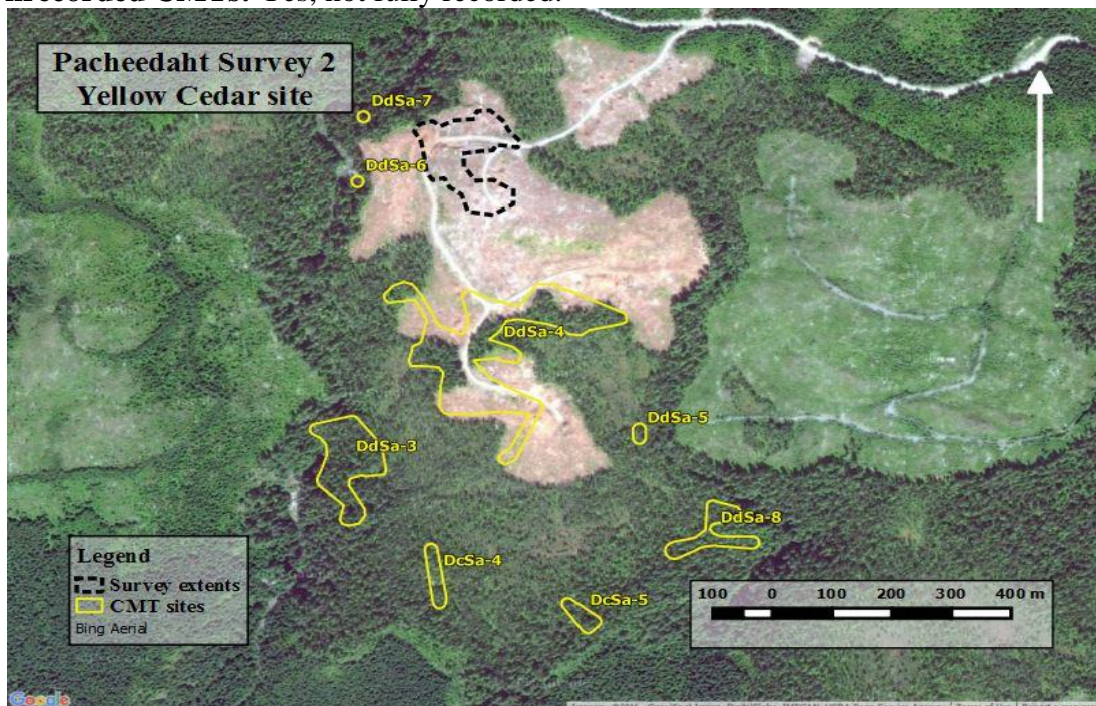


Figure 57: Pacheedaht Survey 2 (Google Maps 2016; RAAD 2015).

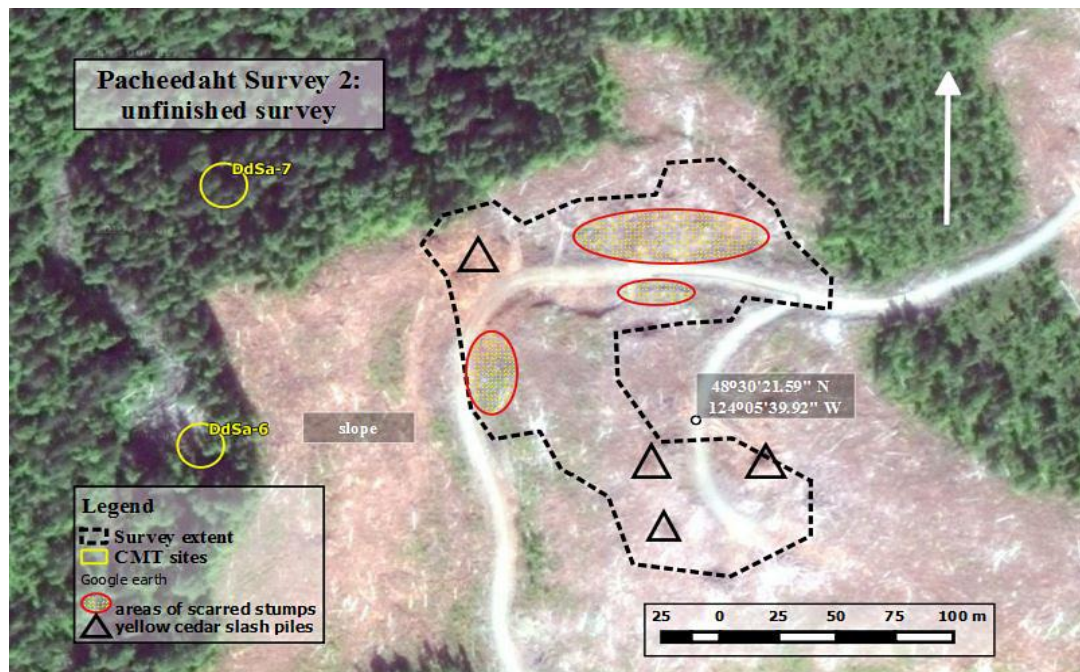


Figure 58: Pacheedaht Survey 2, unfinished survey (Google Maps 2016; RAAD 2015).



Figure 59: PS2 site and view east across north section of survey area, ribbons on suspected CMTs.

PS2 is at the north end of an unusually large and high elevation yellow cedar harvesting site found in 2006 by Coast Interior Archaeology under permit 2006-434 (Stafford 2008; Figs. 57-59). Large harvesting sites of yellow cedar this far inland are relatively rare on the Northwest Coast. It is especially interesting that this site exists in a large area exhibiting almost no other CMT sites. Stafford (2008:14) suggest these yellow cedar sites are starting to come to light as forestry activity moves higher up mountainsides. In Pacheedaht a large part of the remaining old growth exists as smaller and medium sized stands on these mountain slopes (Leversee 2015). The site is found on an FSR off the north end of the North Main FSR, which is accessed just two kilometres west from Jordan River.

DdSa-4 was impacted by logging in 2014 (Ramsay 2014: Table 8). Twenty-seven of the recorded yellow cedar CMTs were felled, 10 of which were taken as samples. Of those 10 samples, five were found to likely have natural scarring and the remainder contained six features that were dated.

CMT	Type	Species	Modification Date	Comments
A58.1	TBS	Yellow cedar	1503 +/- 25	Cultural
A58.2	TBS	Yellow cedar	1503 +/- 25	Cultural
M59	TBS	Yellow cedar	1684	Cultural, dead max estimated age
M39	TBS	Yellow cedar	1829	Cultural, dead max estimated age
MA40.1	TBS	Yellow cedar	1606 est	
MA40.2	TBS	Yellow cedar	1503	Possibly cultural, max estimated age
XX1	TBS	Yellow cedar	1527 +/-10	Label missing in field

Table 8: Millennia DdSa-4 CMT data (Ramsay 2014:8)

The morphology of the cultural scarring of yellow cedars has not yet been adequately studied. It is assumed to be very similar to that of western redcedar, however it is clear from samples that growth and healing patterns of scars are notably different. Millennia's analysis of the yellow cedar samples of this site (Ramsay, 2014) is one of the very few studies of cultural scarring on yellow cedar.

Site discussion



Figure 60: CMT blocks found in slash pile PS2 (left redcedar, right yellow cedar).

When we visited the site, a few western redcedar scars were found within the survey area (Fig.60, left). However the majority of the scarred trees were yellow cedar logs in large slash piles or scattered as cut wood across the site (Fig.60, right). It was hard to tell if scarred logs were originally from within the nearby DdSa-4 archaeological site. At the northwest end of the site we began to find many scarred yellow cedar stumps, several containing multiple stripping events. A combination of the inability to count the microscopic rings in the field, and the lack of confidence in proper identification of yellow cedar CMTs led me to decide not to collect detailed information for this study until a revisit was possible. That revisit was never possible due to the discovery of many more western redcedar sites. No dates from this site have been added to our survey chronology, due to the vague knowledge of details of the site. This area is well worth a revisit. Photos of possible CMTs are in Appendix II.

7.2.3.3. Pacheedaht Survey 3

Associated recorded archaeological site: No.

Unrecorded CMTs: Yes, 2 TBS CMTs, 2 dated

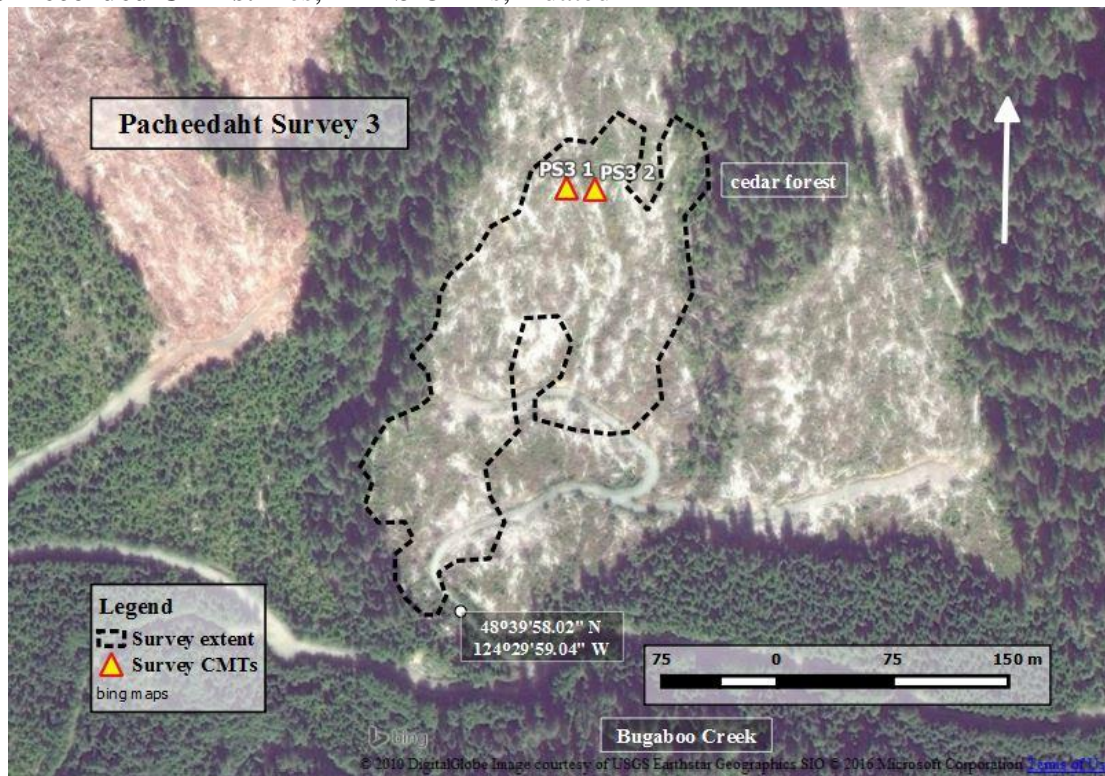


Figure 61: Pacheedaht Survey 3 (Bing Maps 2015).



Figure 62: view southeast from middle of clearcut.

Feature #	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
PS3-1	327	In field	2006-2008 (2 years added to buffer)	10	1667- 1679	Probable	Closed	Good scar, isolated stumps?
PS3-2	345	In field	2006-2008 (2 years added to buffer)	10	1649- 1661	Probable	Closed	Good features

Table 9: PS3 survey data

PS3 sits on a rise of land facing south over Bugaboo Creek, well into the heart of Pacheedaht territory (Figs.61,62). The clearcut was logged at some point between 2006 and 2008. A fairly large number of hemlock were found across the survey area mixed in with cedar. Almost nothing was found for a few hours until we stumbled across a very deep cut creek bisecting the site. Two very convincing embedded TBS scars of a similar age range sat across from each other, on either side of the creek (Table 9). Though their features looked cultural, their isolation on the hillside seemed to be slightly suggestive of natural forces. However a deeper, larger, and intact creek valley immediately to the east appeared to harbour a denser, intact cedar forest, suggesting the possibility that these two TBS scars could be possible outliers of another site.

7.2.3.4. Pacheedaht Survey 4
 Associated recorded archaeological site: No.
 Unrecorded CMTs: No.

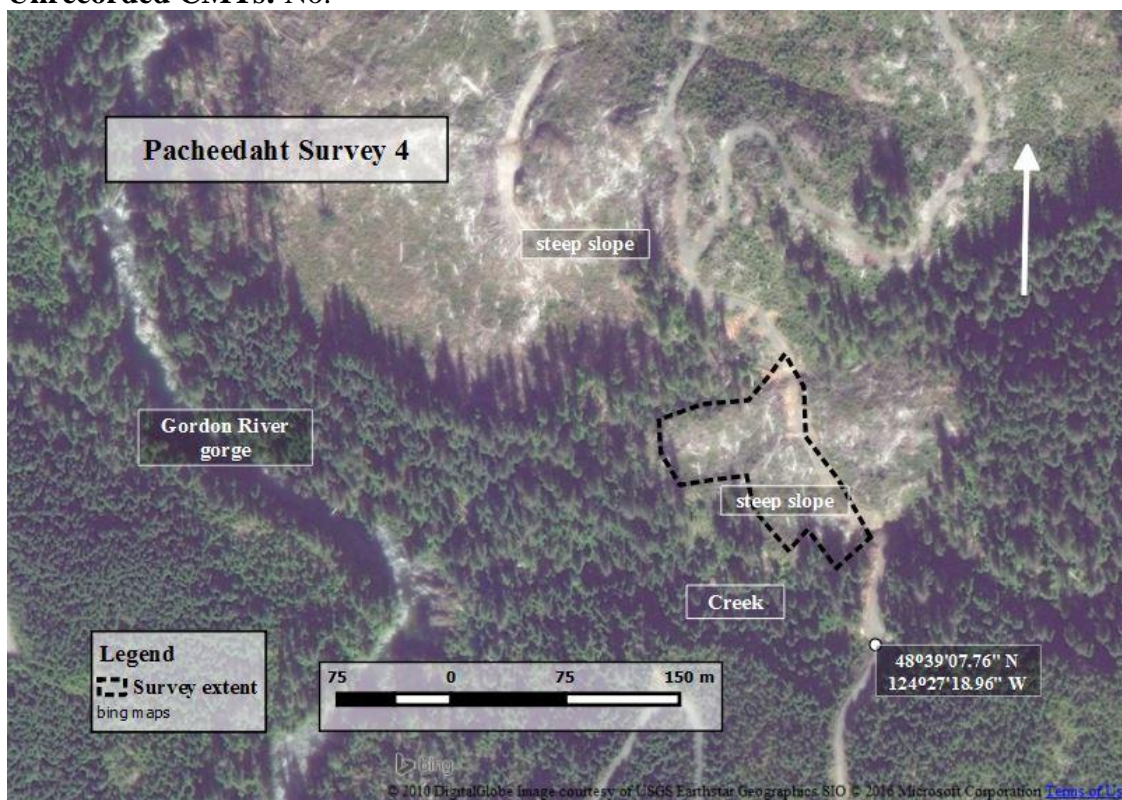


Figure 63: Pacheedaht Survey 4 (Bing Maps 2015).



Figure 64: View west from top of steep PS4 survey area.

This site (Figs. 63,64) was accessed on the same day as PS3. Due to rough roads on the west side of Edinburgh Mountain and a long hike in at the end of the day we had very limited time here. The survey was terminated after a count of less than 35 stumps. The survey area was fairly contained between a tributary

creek for the Gordon River and a much larger clearcut further down the mountainside. There was a high proportion of cedars, but almost no evidence of bark scarring. There

was a large amount of large fallen timber across the 175x100 m site, whose very steep slope made survey difficult.

7.2.3.5. Pacheedaht Survey 5

Associated recorded archaeological site: No.

Unrecorded CMTs: No.

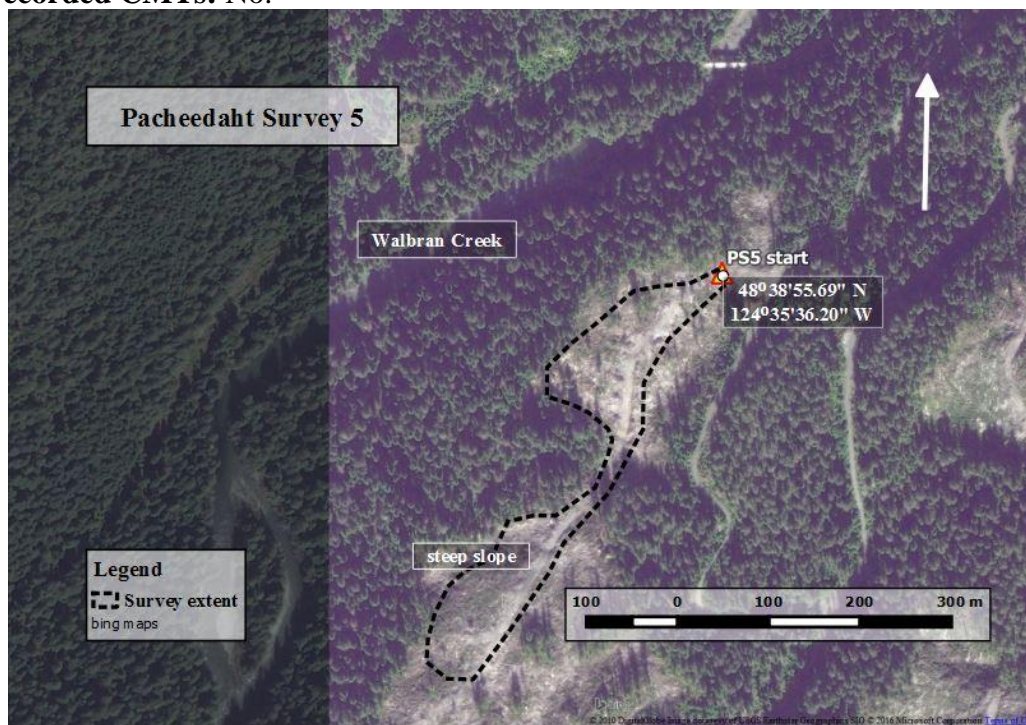


Figure 66: Pacheedaht Survey 5 (Bing Maps 2015).



Figure 65: View north-northeast from middle of survey area.

PS4 is in a very remote region within the Carmanah-Walbran wilderness (Figs.65,66). The Walbran Main Rd stretches south from Lake Cowichan and dead ends in an active logging area almost surrounded by the Carmanah-Walbran Provincial Park.

While the area is known ethnographically for hunting, trapping and fishing (Bouchard and Kennedy 1991) no inland archaeological sites have been found in the region (RAAD 2015). The Ditidaht name for the nearby Walbran Creek is ‘kaxiiks’. Two ethnographic accounts of kaxiiks speak of ‘wild people’ or Sasquatch inquiring about the taste of sea cucumbers at the outflow of this creek (Bouchard and Kennedy 1991:18).

The survey area itself sits just uphill from Walbran Creek in one of several recent cut stands of oldgrowth. We surveyed a 125 x 800 m overgrown ridge. It was very difficult to cross and some stumps were only visible from a distance; however, no cultural scars were found during the survey.

7.2.3.6. Pacheedaht Survey 6

Associated recorded archaeological site: No.

Unrecorded CMTs: Yes. 5 TBS CMTs, 3 dated.

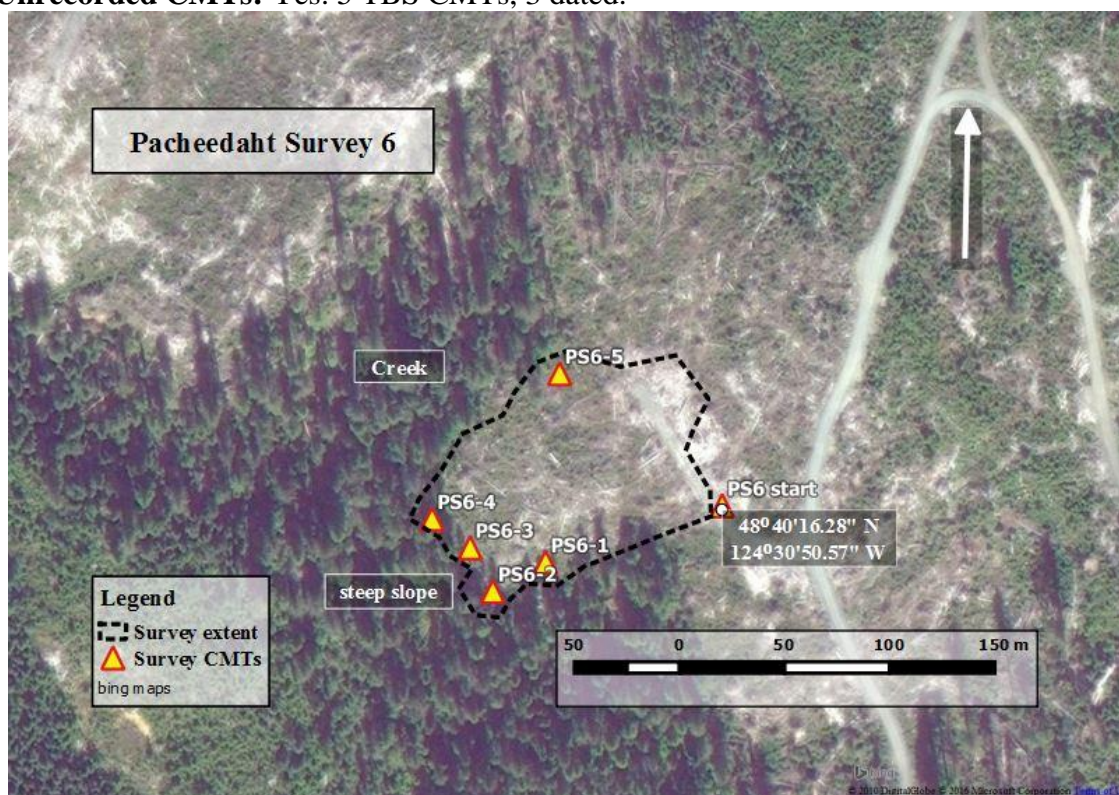


Figure 67: Pacheedaht Survey 6 (Bing Maps 2015).

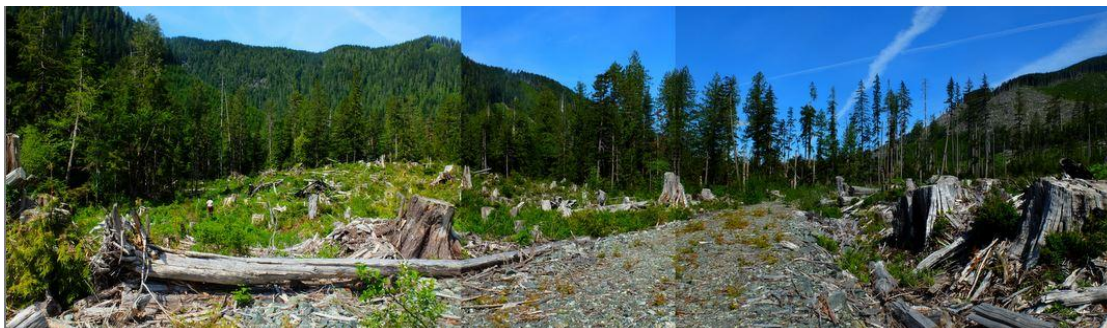


Figure 68: View west across whole site.

Feature #	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
PS6-1	-	-	Mar-July 2007?	-		Possible	Open	Very likely but needs revisit
PS6-2.1	-	-	Mar-July 2007	-		Probable	Closed	Good features, datable
PS6-2.2	-	-	Mar-July 2007	-		Probable	Closed	Good features, datable
PS6-3	249	In field	Mar-July 2007	>50	1708- 1758	Probable	Open	Unclear scars, but 75% peeled
PS6-4	227	In field	Mar-July 2007	20	1760- 1780	Possible	Open	
PS6-5.2	233	In field	Mar-July 2007	40	1754- 1774	possible	open	

Table 10: PS6 survey data

PS6 is in a recent clearcut that is the middle point between the Walbran Main forestry region and the Gordon River area (Figs.67,68). It is located in the corner of this more expansive clearcut that stretches across the entire hillside. Our survey area was perched on a ridge adjacent to an intact, old growth creek valley, and beside a thin stand of remnant mature trees. There was considerable evidence of elk browsing in the cut, and a lot of bark scarring that was likely natural. Close to the edges of the cut were some cultural scars that appeared to have been either cut prior to the recent logging activity, or were dead at the time of logging.

The survey area was about 150x210 m, and 103 cedars stumps were counted. Five of these, representing six features were recorded as likely CMTs (Table 10). The three dates counted in the field ranged from AD 1758 to 1780.

7.2.3.7. Pacheedaht Survey 7

Associated recorded archaeological site: Yes, DdSc-21 is about 475 m to the east.

DdSc-21: 3 TBS CMTs

Unrecorded CMTs: Yes, 4 CMTs, 1 dated

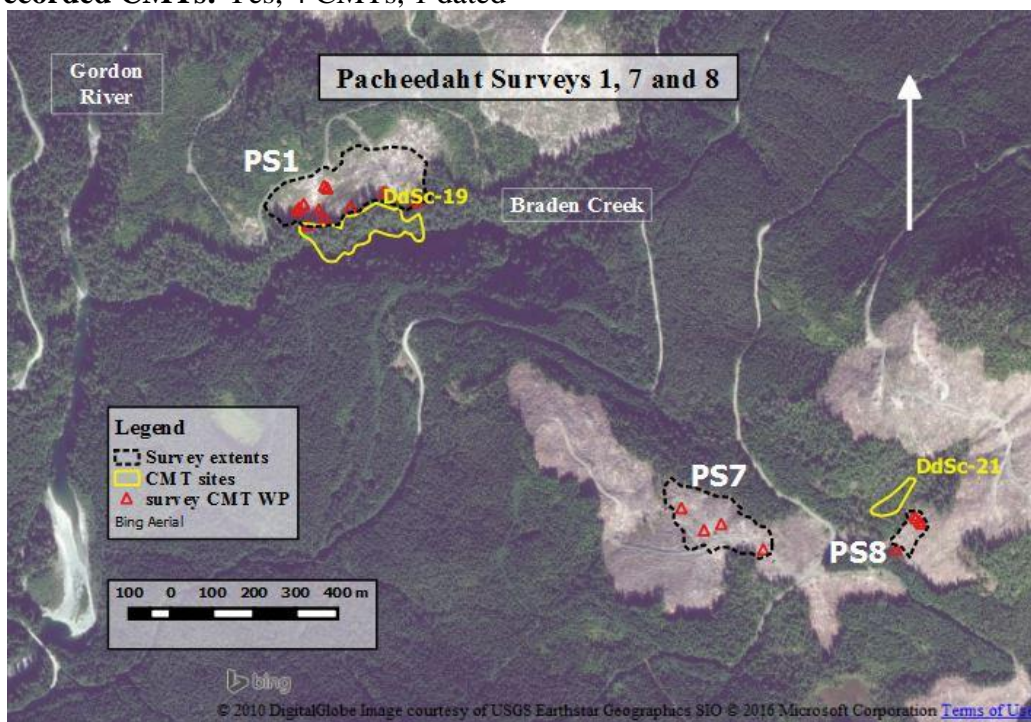


Figure 69: Pacheedaht Survey7 in relation to 1 and 8 (RAAD 2015).

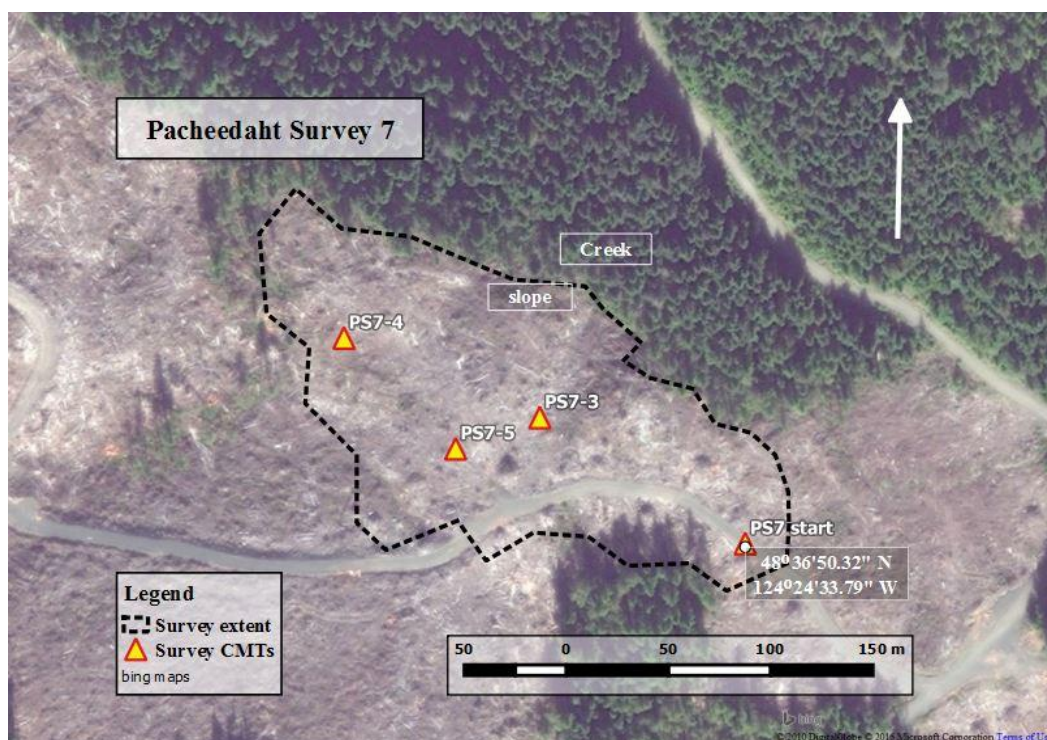


Figure 70: Pacheedaht Survey 7 (Bing Maps 2015).



Figure 71: View east from middle of survey area towards DdSc-21 and PS8, and view west from middle of survey area, PS7-5 in centre.

Feature #	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
PS7-3.1	-	-	May-July 2010	-	-	Possible	Closed	
PS7-3.2	-	-	May-July 2010	-	-	Possible	Closed	
PS7-4.1	-	-	May-July 2010	-	-	Possible	Closed	
PS7-5	275	In field	May-July 2010	>50	1685-1735	confident	open	All features. Unclear if dead at time of logging

Table 11: PS7 survey data

PS7 (Figs.69-71) is within the middle of a larger mixed old growth/second growth clearcut logged in 2010. We surveyed what appeared to be the main old growth section on a rise above a small forested creek valley to its north. On the hillside a kilometre to the east is the recorded CMT site, DdSc-21. Over the 425x200 m survey area, 123 cedar stumps were counted with a relatively high percentage of hemlock stumps throughout. The TBS scars found in redcedar stumps at this site were largely on very old stumps and mostly rotted away (Table 11). A few I considered to be likely CMTs but they were difficult to discern, and nearly impossible to date accurately. The final stump counted may have been dead when it was cut in 2010, however it stood high above the rest and had all the characteristics of a CMT.

7.2.3.8. Pacheedaht Survey 8

Associated recorded archaeological site: Yes, adjacent. DdSc-21 is about 25m NW of survey area.

DdSc-21: 3 TBS CMTs

Unrecorded CMTs: Yes, 4 CMTs, 5 dates.

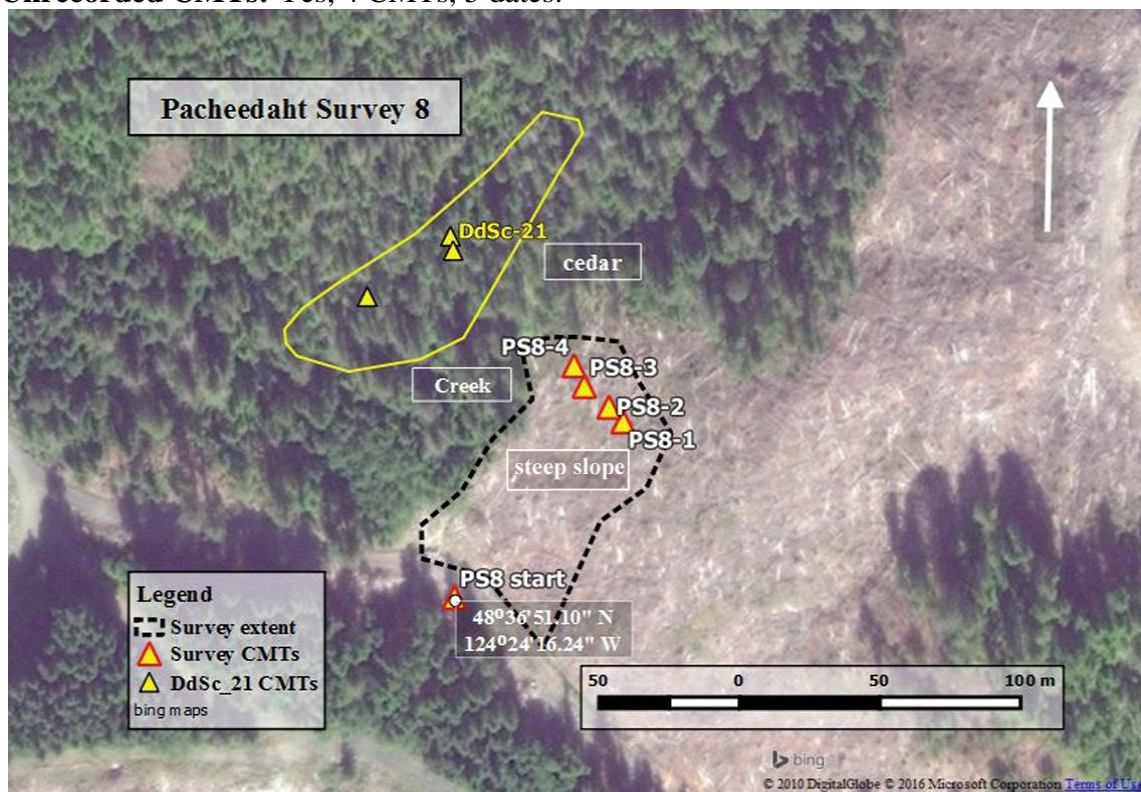


Figure 72: Pacheedaht Survey 8 (Bing Maps 2015; RAAD 2015)



Figure 73: view SW from top of survey area, and view southeast from middle of survey area.



Figure 74: View northwest from centre of survey to PS8-4.

Feature #	Age bef. logging	Method dating	Logged	Age buffer	Calendar Year	Confidence	Open/closed	Notes
PS8-1	220	In field	Apr-Nov 2010	20	1770-1790	Probable	Closed	
PS8-2	226	In field	Apr-Nov 2010	10	1774-1784	Confident	Closed	
PS8-3	249	In field	Apr-Nov 2010	15	1746-1761	Confident	Open	
PS8-4.1	313	In field	Apr-Nov 2010	10	1687-1697	Possible	Closed	Very rotted
PS8-4.2	193	In field	Apr-Nov 2010	5	1812-1817	confident	Closed	

Table 12: PS8 survey data

Though PS8 (figs. 72-74) was near PS7, we decided to investigate the area after spending a few hours unsuccessfully looking for other accessible old growth forests in the vicinity. The slope of the site was precipitous and looked difficult to access, however it was adjacent to the existing archaeological site and a large stand of old growth cedar trees. The stand was surveyed by Millennia in 2010. They found three TBS CMTs and wrote that there were a number of CMTs in the general area. “There is a very high potential of additional CMTs in the area surrounding the recorded site. The full extent of the site has not been determined. Boundaries reflect only the CMTs that were recorded. At least 11 other possible CMTs were observed in and around the current site boundaries” (Archaeology Branch, British Columbia 2010). Despite this the adjacent area that we surveyed was logged anyway.

After climbing up beside the archaeological site we found a cluster of TBS CMTs that had been logged (Table 12). Their position was quite dramatic, well elevated from the surrounding valley, on a steep slope and far removed from most navigable rivers or creeks. The scars were of a fairly old age class and all but one were embedded.

Due to time constraints, and the steep slope we cut the survey short to less than 40 stumps. A number of possible standing CMTs were seen just outside the borders of the recorded site when we exited the survey area via the standing forest. This site would be of considerable interest to revisit since the clearcut continues to the southeast of our survey area and further uphill from the CMT site.

7.2.3.9. Browns Mountain site: DdSc-25

Associated recorded archaeological site: No

Unrecorded CMTs: Yes, 10 TBS CMTs, no dates, indicative of many more.

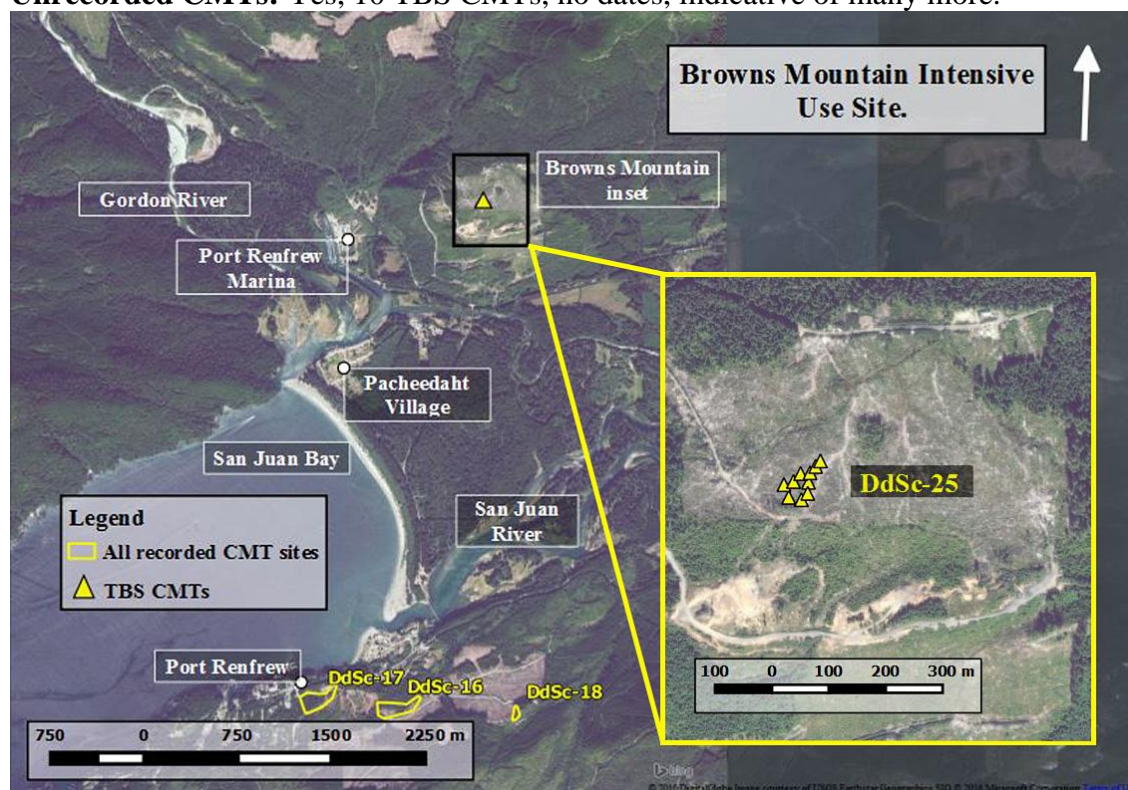


Figure 75: Browns Mountain intensive use site DdSc-25 (Bing Maps 2016; RAAD 2015).



Figure 76: View east-southeast from centre of DdSc-25 towards festival campsite, and view looking roughly south from centre of DdSc-25.

The Browns Mountain site (fig.75.76) was found in a scenario outside the structure of my fieldwork. In the early discussions with the Pacheedaht it was requested that we visit clearcuts near Browns Mountain which rises up behind San Juan Bay, in an area that has been home to the Pacheedaht for generations and is of great traditional importance to the band. The largest of the old growth clearcut on the mountain however is private property and not accessible without the property owner's permission. As my project was intended to only survey Crown lands we did not pursue access. In June 2015 however I visited the expansive clearcut on Browns Mountain while camping during the annual Tall Tree Music Festival that occurred on the property. Our group camped along a dead end logging road in the south/central area of the old-growth clearcut. It was very clear that there was a vast number of old growth cedar stumps in the area, several of which lined the venues trails with visible bark scars. On the final morning of the festival I explored for 45 minutes in the area adjacent to our campsite. The clearcut was likely about five to 10 years old, with minimal saplings and bushes growing on the large stumps. It appeared that almost one third of the stumps I examined were bark-stripped, most of them multiple times (Figs.77, 78). One of these stumps hosted a total of at least 19 scar crusts counted at the site, indicating a minimum of 10 bark stripping events, and likely more (Fig.78).

After the festival several requests were made to re-access the property and record more of what is likely a large and intensively used bark harvesting site. The site however is under consideration for development and access was not granted. It appeared that no AIA had been completed for the clearcut of this 600x1000 m old growth cedar forest

standing little more than 2 km from the Pacheedaht village. In the interest of protecting a



Figure 77: example of multiple harvesting at DdSc-25, scar crusts in red.



Figure 78: Stump at DdSc-25 with 19 visible scar crusts in red.

site that might host one of the most intensively harvested trees on the island I contacted the Provincial Archaeology Branch with the photographs and information I had from the festival. The permit for the site was fast tracked for protection and by early fall DdSc-15 was an official site and the property owner was notified of his responsibilities in regard to the Heritage Conservation Act. The recorded site however consists of what amounts to about a 100x50 m area, likely representing a small portion of the overall CMT site.

Chapter 8: Discussion

Over the course of the fieldwork portion of this study, 16 surveys were performed, 11 of which found previously unrecorded TBS CMTs. Of the eight clearcuts that were in some way associated with other CMT sites, all were found to contain previously unrecorded CMTs. Of the eight clearcuts that were far removed and disassociated from other CMT sites, three were found to have previously unrecorded CMTs. If the Browns Mountain site is included in this number, the ratio of previously unrecorded CMT sites to disassociated clearcuts is 4:9.

All of the 11 positive sites included some number of embedded scar features, suggesting that they are at least partly the reason for incomplete coverage during AIAs. It is unclear what percentage of these sites previously had AIAs, as data regarding AIAs with negative survey results were not readily available at the Archaeology Branch.

Eighty-five dates of varying estimation were collected from 79 CMTs (not including 3 re-recorded scars in TS1) found in the positive sites. It is regrettable that greater effort was not placed into extracting more accurate dates during the fieldwork. Complications with the circular saw and difficult working conditions contributed to some of the larger age estimates. Overly conservative estimates likely made up for much of the rest. Detailed interpretations of the compiled and extracted CMT from the region are discussed below. The total count of CMTs from surveys should be considered conservative due to issues in sampling detailed in section 7.1.3.2 above.

8.1. Date comparisons

“The reality still today is that living individuals and populations on the Northwest Coast can and do connect directly with these ancient places, events and ecosystems through tradition, oral history and continued use. Our understanding of the time depth and quality of data available in cultural modifications on trees is improving. At present, the main issue must be the identification and dating of older modifications in the existing old growth forests.” (Stafford and Maxwell 2006:4)

One of the primary questions of this thesis regards whether post-impact assessments in clearcuts can give a more representative sample of existing TBS CMT dates than the current procedure that largely only surveys standing forests. Is the

distribution of features and dates different than that revealed by traditional AIAs and on average are those dates considerably older? Also, do the embedded scars found in post-impact assessments represent scars older than open ones? To answer these questions I compare the AIA and post-impact assessment dates, as well as the open and closed scar dates.

8.1.1. Post-impact assessments

The comparison between the CRM dates and those of my survey is essentially between data collected during AIAs of forested areas prior to the impacts of logging versus the post-impact assessments undertaken within clearcuts. For that reason I include other known post-impact assessments that occurred within the study region (Fig.79). Though there may have been more, I was only able to confirm two CRM assessments within southern Nuu-chah-nulth territories in which archaeologists returned to sites to collect data after the logging event occurred (Morley Eldridge 2016 personal communication). These were both performed by Millennia Research.

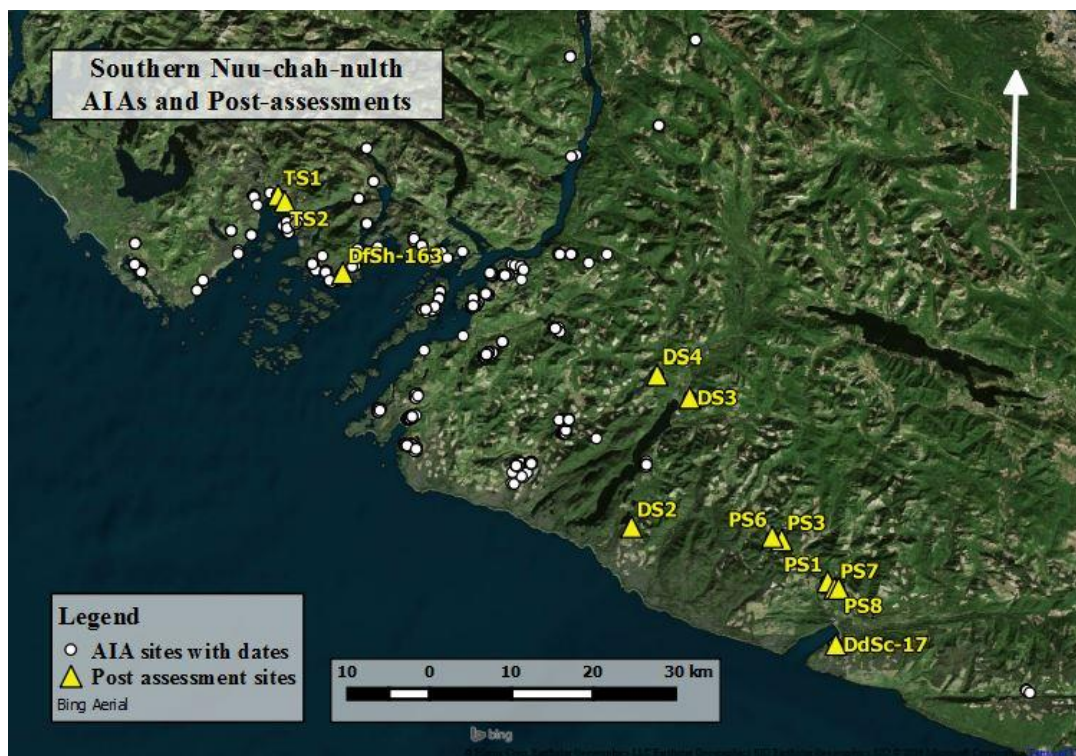


Figure 79: Map of all post-impact assessments and AIAs (Bing Maps 2016; RAAD 2015).

The first site at Julia Passage (DfSh-163; Eldridge 1997a) within Barkley Sound was initially recorded in 1994 during an AIA for a Forest Service Road construction.

Samples collected during harvesting in 1996 were incorrectly labelled leading to a revisit of the site. The majority of the dates collected were found on stumps in the post-impact assessment of the site. This site also returned the oldest recorded living CMT at that time, within an embedded scar on an old-growth western redcedar. The second site, DdSc-17, was first discovered in 2007 as part of an AIA for a proposed marina, residential and resort development in Port Renfrew (Owens 2007). In 2012 the site was revisited to relocate particular CMTs within the site boundary, but it was found that sections of the site had been altered by logging and the construction of access roads without the appropriate Heritage Conservation Act permit (Ramsay 2013: iii). This visit led to the discovery of a number of early dates on the site that had previous gone unnoticed.

I added the 33 TBS dates extracted from Millennia's two post-impact assessments to the 85 exact and minimum TBS dates collected in the 10 field surveys that produced dates. The graph in figure 80 shows the rough distribution of all CMT dates within all 12 post-impact assessments. While not representative of much useful regional information due to the thin distribution of sites, the chronology does hint at the potential reach of CMT dates into the past.

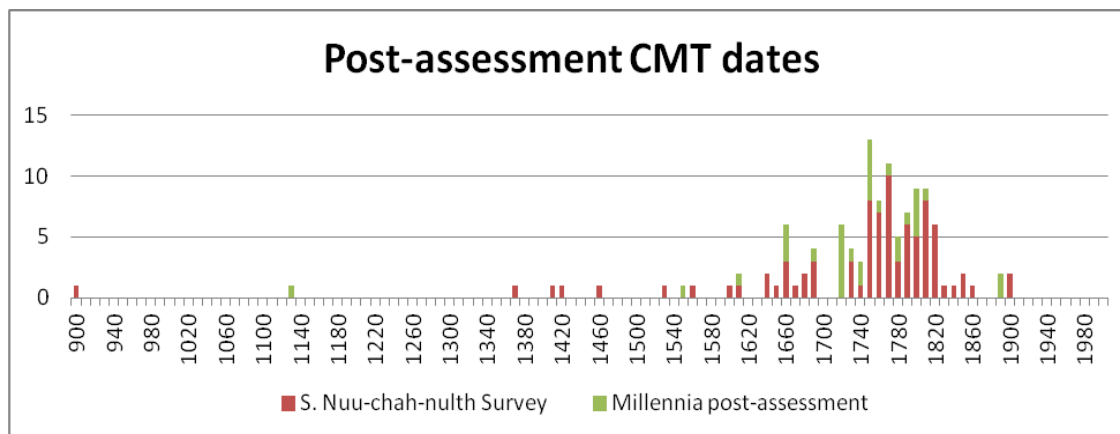


Figure 80: All southern Nuu-chah-nulth post-impact assessment dates (survey dates; Eldridge 1997a; Ramsay 2013).

More interesting perhaps is the comparison with regional AIAs (Fig.81), in which the post-impact assessment distribution is clearly centred across the 1700s rather than 1800s.

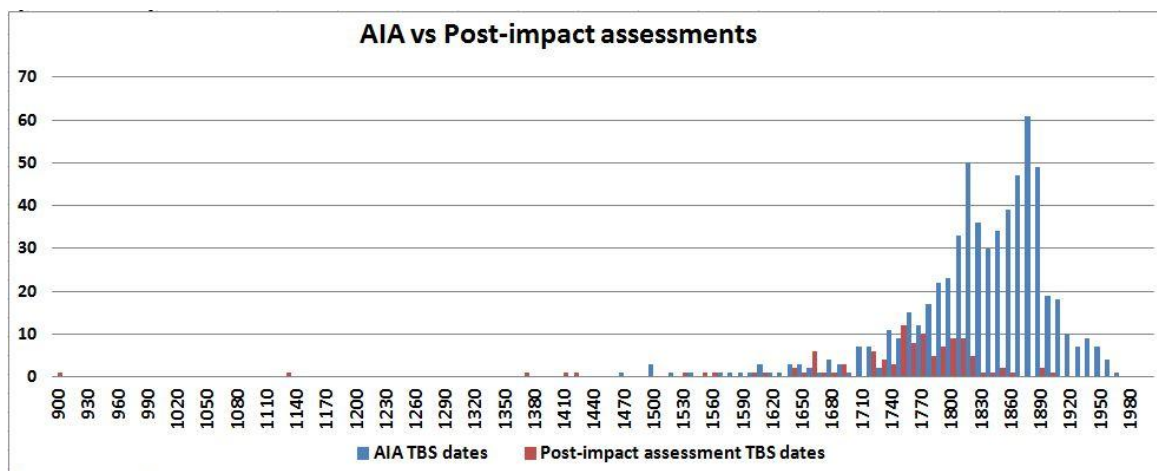


Figure 81: Combined AIA and post-impact assessment dates (RAAD 2015).

It is curious that the major bimodal peaks in the AIA chronologies are not present in the post-impact assessment surveys. One would think that all AIA dates and trends should appear in post-impact assessment surveys causing wider but not necessarily purely earlier distribution, unless somehow younger trees are selected against. This is difficult to understand or explain as more recent CMT features would be the most visible during any CMT survey, before or after logging activity. In our surveys, stumps wider than 40 cm were examined. Could a portion of younger CMTs have been overlooked due to their size? Possibly, but one has to consider that many trees scarred in the mid to late 1800s would have likely grown larger than 40cms. Finally one must note that the 12 post-impact assessments represent only a fraction of the data collected by AIAs. If more dates are found in post-impact assessments it is probable that 19th century trends seen in AIAs may begin to appear.

To gain a better visual of the chronological distribution of both post-impact assessment and AIAs I divided all the decadal totals against the respective totals of each sampling type (Post-assessments and AIAs; Fig.82). This shows the significance of the weight of older dates within the post-assessment sample, which is considerably different that of the AIAs. It reveals the potential reach for post-assessments to record CMTs back to the 1300s. One can imagine that trends may become visible three to four centuries prior to European contact if revisits of assessed sites become common. This fits well with the fact that cedars are known to live well over 1000 years in the landscape (Stoltmann

1993), and modifications on such ancient trees should be at least slightly more common than are currently recorded.

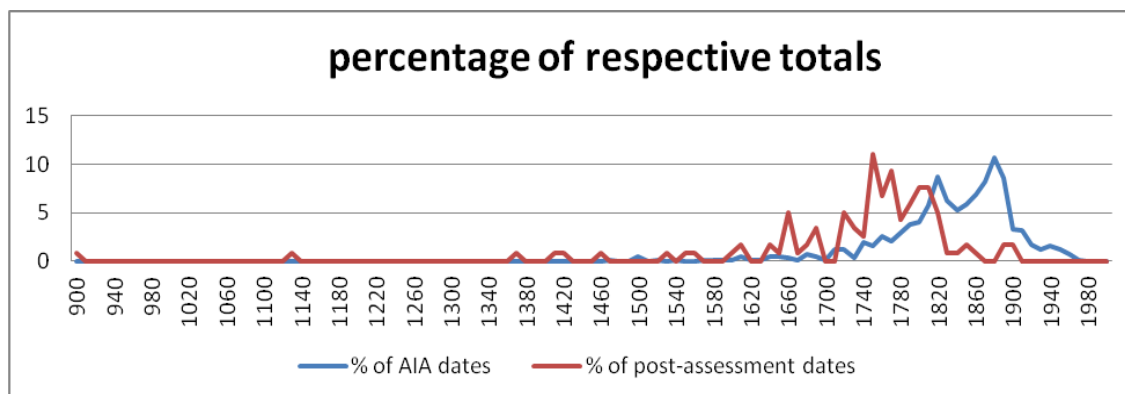


Figure 82: AIA and post-impact assessment dates as percentage of respective totals (RAAD 2015).

In comparing the two samples, I excluded the two oldest and two youngest outliers from both groups to ensure the AD 903 and AD 1137 did not affect the distributions. The average calendar year for all 610 TBS dates collected from AIAs in the region was AD 1837. The average year for all 118 post-impact assessment TBS dates was 1749, almost a century earlier. Taking the median of both samples, AIAs are centred on 1849 while post assessments are 1769, a difference of 80 years. The bulk of the bark stripping dates revealed in post-assessments, represent modifications created by First Nations people a generation prior to European contact; one that may have been up to ten times larger than what was found in the area in the mid to late 1800s (detailed in section 2.1 above). In other words, the high frequency of harvesting in this pre-contact period, within a relatively unbiased sample, is consistent with high pre-contact populations.

Excluding the two oldest and youngest outliers, the post-impact assessments also appear to show a greater range in dates than those of AIAs. The standard deviation of AIAs is 69.79 years while that of post assessments is higher at 88.48 years.

Figure 83 shows a combination of the two types of assessment dates. Again, one can see the differing distribution of dates in the regional chronology. The trend in post-impact assessment dates is suggestive of a more representative sample, one that could reflect forest use by a larger population.

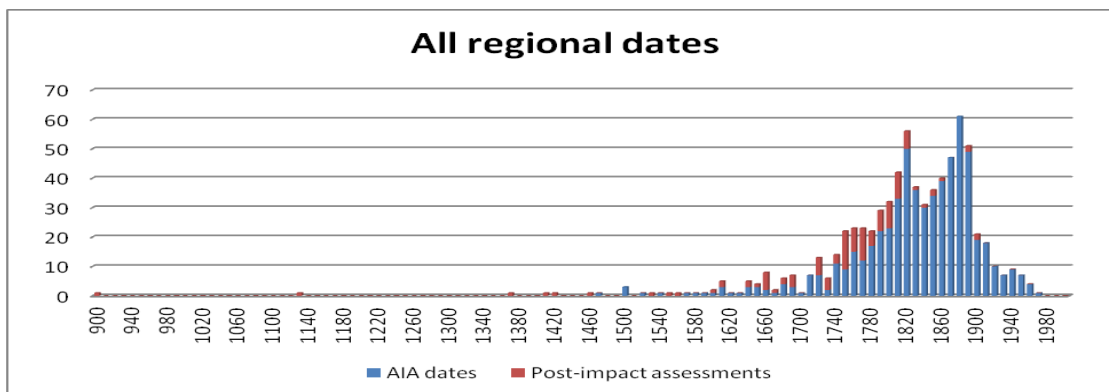


Figure 83: All regional CMT dates (RAAD 2015).

8.1.2. Embedded scars

An analysis of embedded vs open TBS scars in survey stumps was made to determine what percentage of CMTs were open versus closed. To better understand the difference in AIA and post-impact assessment chronologies it must be determined how many CMTs are regularly overlooked and whether there is substantial age difference between embedded scars (often missed in AIAs) and open scars.

Out of a total of 109 TBS features found during surveys in this study (including non-dated features) 34% had an open ‘window’ between its scar lobes, while 49% were closed. 17% of features were within an intermediate category, either so nearly closed that they would have prevented access for AIA identification, or so deteriorated/obstructed that identification would have been very difficult or impossible without a cross-section

(Fig.84).

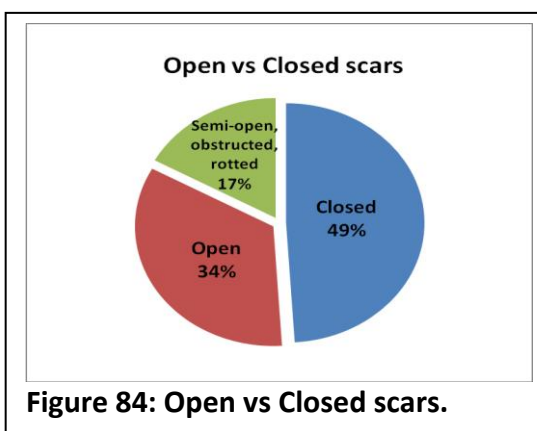


Figure 84: Open vs Closed scars.

Though there was considerable variation between sites, embedded scars were present at every positive site during my surveys. This suggests that around half of all TBS features in the overall region may be undetectable by archaeologists performing AIAs prior to logging activities. This

percentage of overlooked features is heightened when one considers that 17% of lobes are within an intermediate category unlikely to be confidently recorded as cultural. The percentage of consistently missed TBS scars in the landscape could be as high as 66%.

This of course does not take into account the forested areas that are not surveyed due to ‘low potential’, sites that are surveyed but overlook visible scars through lack of complete coverage, or the inadequate sampling of destroyed sites discussed in section 6.4.

Regarding the number of overlooked CMTs found in this study’s surveys, and the percentage of TBS scars that are invisible or obstructed during AIAs, I can confidently say that well over 50% of existing TBS features in old growth forests, the majority of which predate 1846 (95% of post-impact dates) and thus should be protected under Section 13 of the Heritage Conservation Act, are consistently overlooked and often destroyed during logging and development operations. There is currently no regulation in place ensuring that post-impact assessment audits record the exposed archaeological material left on CMT sites (Angelbeck 2008).

8.1.2.1. Age of embedded scars

“The drop in numbers prior to 1800 AD is considered the result of feature preservation and relative inability to identifying older features. With more care taken to identify older features and obtain good dating samples from the better-preserved parts of a bark-stripped cedar CMT stem, combined with efforts to cross date dead and, when necessary, living CMTs, we will gather the sort of data and the number of dates we need to answer historical demographic questions.” (Stafford and Maxwell 2006:4, 6)

It was hypothesized that embedded scars should represent an older age class of TBS. On average the oldest TBS CMTs are most likely to have had their lobes completely heal over, encasing the scar. This would also explain why the post assessment surveys, which all include embedded scars, have generally resulted in older dates.

All dates from the surveys were collected (including two that were previously recorded during an AIA by Baseline archaeologists at site DgSh-62/TS1) and divided by open, closed, or semi-open/rotted. The dates include all exact, estimated and minimum counts. The average calendar date for open scars is AD 1774, for semi-open/rotted scars AD 1726, and for closed scars AD 1717. The difference in age between open and closed scars is a significant 57 years. Excluding the oldest and youngest outlier of the closed sample however brings this average up to 1733. Again, excluding outliers, the median of open scars is 1778 while the median for closed is 1769, a difference of only 9 years. There is however, a full century difference between AIAs and post-impact assessments. The difference between open and closed scars may only be part of the explanation as to

why there is a full century difference between both survey types. The most easily identifiable CMTs in a standing forest are inevitably the younger, open faced CMTs. Preservation of tool marks on the younger CMTs usually confirms for archaeologists that a feature of any type is cultural. Additionally, many of the scars classified as ‘open’ on my survey had healing lobes pressed so tightly against the dead scar face that no archaeologist would have been able to feel or view the scar crusts. These would have been very difficult to identify in a standing forest.

It should also be noted that all CMTs vary drastically in percentage of bark stripped off the original tree, which affects the variability of open or closed scar ages. This study did not measure the rate of the growth of lobes in relation to the percentage of bark originally stripped from the tree. Narrow peels will quickly become closed scars while trees that were nearly girdled will take centuries for their healing lobes to meet. The rate of annual growth is also highly variable even between cedars at a particular site. So, this estimation of closed versus open scar age remains a broad approximation (Fig.85). As a case in point, several open scarred TBSs found in the field were very old, while other closed lobes were quite recent. CMT TS2-6 (Fig.86a) was dated to at least AD 1379 with a semi open scar, while CMT DS3-16 (Fig.86b) dating to AD 1841 was within a closed scar. This is in line with the embedded scars found during the Meares Island study which found that even recent scars can be entombed by their lobes (Arcas 1986b: 98).

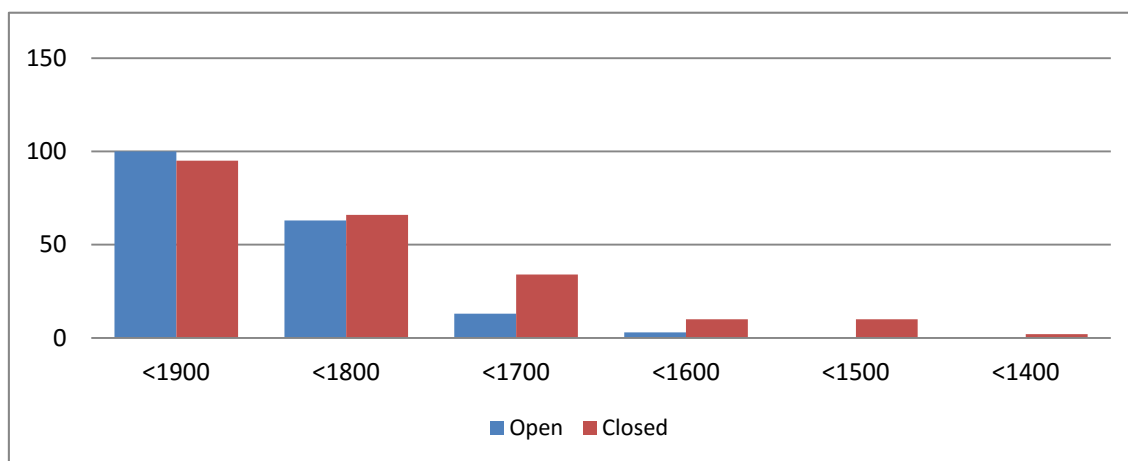


Figure 85: General trend of open to closed scars progressively deeper in time.



Figure 86: a) TS2-6, AD 1379. b) DS3-16, AD 1841.

An important point is found in the standard deviation between the two collections. Open bark strip scars appear to have a much narrower range of ages than that of embedded scars. While on average they are over 50 years younger, open scars have standard deviation of 60 while closed scars have a deviation of 116 (without the TS1-17 outlier of AD 903).

8.1.3. AIA and Post-Impact reflection

Could these numbers suggest that CMT chronologies in Northwest coastal landscapes might parallel a substantial portion of the lifespan of a cedar's life, and reflect the true frequency of cedar harvesting in the region over a greater time period? By including closed and rotted CMT scars can one view centuries of harvesting and forest use prior to European contact? Sixty percent of post-assessment dates for this region are from before 1778, the date of Cook's first visit to the area. Only 14% of AIA dates are before this date (10% of Meares Island features predated 1774 [Arcas 1986:91]).

Could it be that the 'peaks' seen in existing coastal CMT chronologies (Pegg 2000) that show intense harvesting during the collapse of First Nation population on the coast, actually represent minor peaks during the collapse of cedar harvesting frequencies? The frequency of harvesting shown in AIA chronologies may be an artifice of its sampling method, while true 'peaks' in harvest align themselves with periods of high population for the region. It appears that post-impact assessments may hold the key to a truer representation of cedar harvesting that may roughly match population levels on the coast.

The vast bulk of the cedar archive, documenting indigenous forestry practices for the last half millennia or more likely lies invisible or overlooked within standing old growth

forests, or of course, are exposed and rotting in clearcuts and second growth plantation forests following modern logging activity.

8.2. CMT Antiquity

As noted earlier, the oldest modified tree specimen was a subfossil pine tree found preserved in a Swedish peat Bog (Ostlund et al. 2004). It had been stripped for its cambium by Sami peoples of northern Scandinavia about 2800 years ago, in 800 BCE. The same study found a number of other samples of bark harvesting using ^{14}C dating and dendrochronology from the last 870 years. Elsewhere in Sweden living trail marker trees have been dated back to the 1520s (Ericsson et al. 2003:294). These early dates show the potential reach of CMT chronologies and studies into the deep past; not just the industrial revolution period in Europe or the contact period of the Northwest Coast.

Few areas of the world, however, have the vast (though threatened) areas of surviving old growth forest as those present on the Northwest Coast, and the concomitant potential for CMT study. Any inspection of RAAD for the province of British Columbia will show that CMT sites are not a rarity in the landscape but characteristic fixtures of many assessed old growth forests. As discussed above, if embedded TBS CMTs are consistently overlooked in old-growth cedar forests and represent an older age class of modified tree then no doubt many extremely ancient features still exist throughout the coast.

Daniels et al. (1997) found that natural cedar logs and snags in southwestern coastal rainforests can date many centuries from their death, with some well over 300 years in age. Cedar snags, standing within forest environments stood for centuries after death. Though deterioration might prevent accurate identification of some long-dead logging features, it is interesting to consider the time depth that these degraded or 'phantom' (no longer existing) logging features can be dated. In southern Nuu-chah-nulth areas, five nurse trees sit atop ancient logging features dated to the 1500s, with one dating prior to AD 1424 (DgSg-83). Despite the fact that Northwest Coast logging features often consist of dead, decaying wood, many exceedingly old nurse trees are found growing on top of identifiable features.

Bark strip scars are generally more likely to continue to exist in the landscape. The tree is often stripped when young, allowing for the full lifespan of the tree to pass,

including several centuries as a dead snag or log in the forest. Considering that yellow cedars may live beyond 1600 years (McKinnon 2003) and that cedar logs and snags may exist in the forest for centuries after death (Daniel 1997), the potential for these features to endure in the land for a long time is clear.

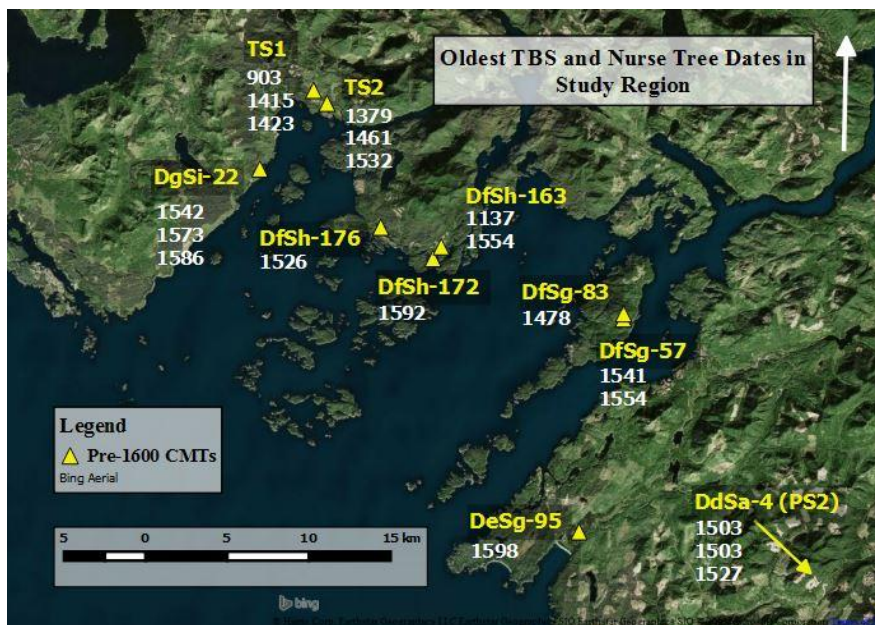


Figure 87: Oldest TBS and minimum date logging features in southern Nuuchahnulth.



Figure 88: Newcastle embedded scar, AD 1467 (Eldridge and Eldridge 1988: plate 9, p64; reproduction courtesy of Millennia Research).

As CMT studies progressed on the Northwest Coast, the age of discovered features has steadily reached deeper into the past (Fig. 87). The TBS scars found during the Meares Island Study were dated by cutting wedge samples from healing lobes, the oldest of which was stripped in AD 1642 (Arcas 1986b). Looking at stump cross sections during the Newcastle Island CMT study Eldridge and Eldridge (1988:36) found an embedded scar dating to AD 1467 (Fig.

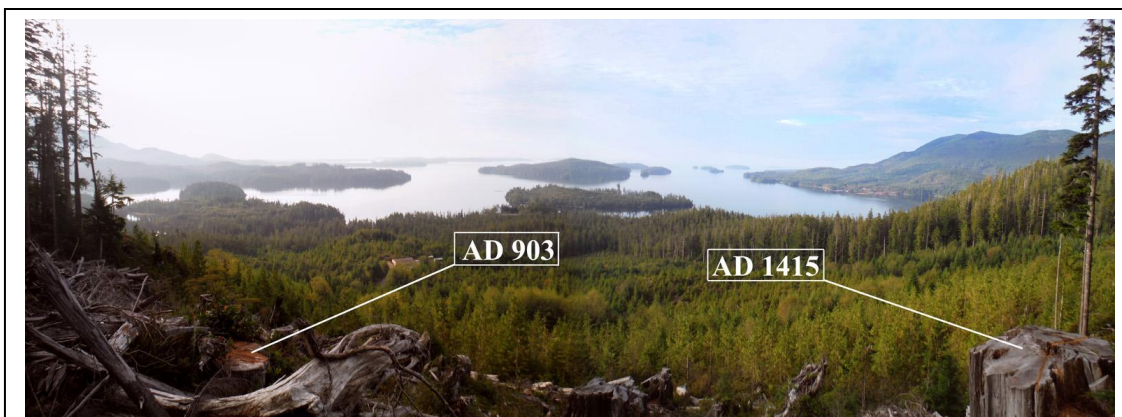


Figure 89: Oldest features at TS1, Barkley Sound in background.

88). Garrick (1998:51), during his cedar study on Hanson Island at the north end of Vancouver Island, provided estimations of a number of scar features dating back to the 1200s. As mentioned earlier, during the post-assessment revisit of the Julia Passage site,

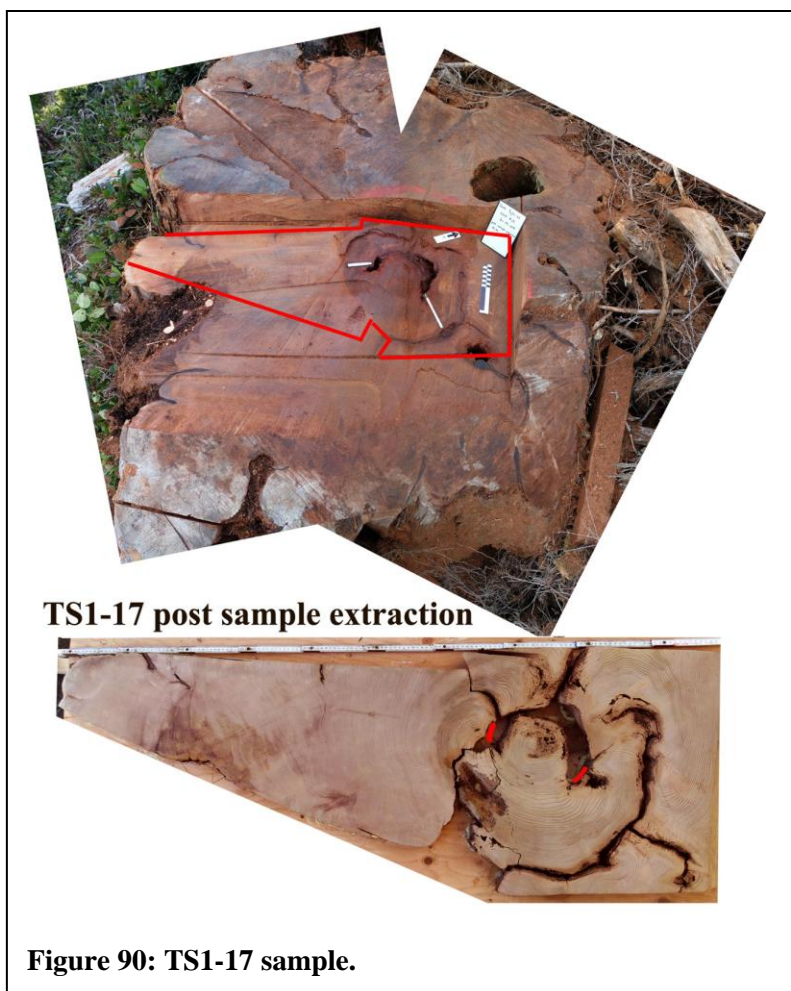


Figure 90: TS1-17 sample.

Eldridge (1997) found the oldest living CMT at the time, dating to AD 1137. Similarly during a post assessment study at TS1 another TBS dating to approximately AD 903 (Figs. 89,90; Section 7.2.1.1) was found.

Considering that post-impact assessments appear to result in an older sample of TBS scars throughout the last millennia, it may be possible for regional trends in harvesting to appear deeper in time.

Natural decay and mortality, wildfires, windstorms and logging have all slowly erased many of the earliest potential dates, however many still remain, waiting to fill the gaps of the record. Thanks to continued old growth logging on Vancouver Island a large amount of this data today are exposed in clearcuts and readily available for collection. Very large cedar stumps in accessible coastal areas have been recorded by various environmental organizations, and seen throughout this survey (Fig. 91). There is great potential that many of these slopes, exposed from their veil of canopy and wood, hold valuable archives of indigenous forestry.



Figure 91: Old stumps in Pacheedaht Survey 1

8.3. Chronologies

Many of the Northwest Coast CMT studies have utilized chronologies of dates to map the frequency of use and timeline for their sites (Mack 1996; Marshall 1998; Mobley and Lewis 2009; Nicolai 2013; Pegg 2000; Stryd and Eldridge 1993). They have largely focused on site specific chronologies, with the exception of Pegg's (2000) in depth exploration of the interpretive value of CMT date distributions across a larger regional scale. There are a number of questions however, about the appropriate use of CMT chronologies across time and space, and what sort of insights that can be gained from them on a more regional basis.

8.3.1. Chronological sampling obstacles

Inherent bias in the existing chronologies has been mentioned earlier. Natural die-off and deterioration of CMTs is often pointed to as a reason for the "limited visibility" of CMTs in the early period (Pegg 2000:82). While this is obviously true, hopefully this study has suggested that this dearth of early dates is also largely due to the existence of embedded TBS scars, overlooked features that are deteriorated, and the general lack of

post assessments. The inclusion of these missed features in CMT stands should resolve much of the sample bias that is within our control.

Natural changes to landscape

Change in a forest's dominant species or destruction of a stand are other important factors to take into account when considering the existing sample of CMTs. Even with a full representation of all existing scars, various natural processes may have been at work over the last few centuries affecting the preservation rates of some trees. Marshall (1998; 2014 personal communication) found in her CMT study that natural biological changes in the forest had a great effect on the dates that were represented. Many cedar stands visited during fieldwork for this study appeared to be remnants of an ancient climax stand that was slowly being replaced by a new forest type (Daniels et al. 2003). Additionally, while cedars are well adapted to insect infestations and pathogens (Minore 1983:24-29), the act of scarring does create new access points for infection and thus instability for the tree. Fire is another factor to likely affect many sites over the course of centuries. Gavin et al.'s (2003) study on Vancouver Island's west coast found that all south facing slopes within their study area had burned to some degree. Fire scarring on local trees is identifiable and datable however, allowing for such events to be factored into certain regional chronologies.

Artificial boundaries

Due to the nature of the work, surveys are usually limited to cut-block boundaries determined by forestry companies. The archaeological sites that are found are inevitably constrained by how large the proposed logging site will be. Depending on the size of cedar harvesting sites, such sampling will only date a portion of a site. Also, past logging events greatly skew what data can be collected from cultural forests. The fact that so much productive old growth has already been logged and was never surveyed, suggests that the majority of forests in particular geographic areas have been almost entirely erased of their cultural features. Highly productive, old-growth forests in valley bottoms for example have been logged by about 91% on Vancouver Island and the south coast of BC (Ancient Forest Alliance 2012).

Small sites and incomplete sampling

The failure to find many CMTs in the landscape also contributes to the general lack of dates from CRM reports in most areas. Roughly half of all recorded CMT sites and half of all dated sites within southern Nuu-chah-nulth territories have between one and two features within them. Many more sites, containing larger number of CMTs have had only small numbers of samples dated. This creates a thin, random collection of isolated modification dates across the landscape that is of little use to chronologies interpreting local indigenous use of sites. More dates will aid in the useful interpretation of trends that occur in more localized areas.

8.3.2. Chronologies for southern Nuu-chah-nulth

“[CMTs] represent a biological archive providing exact time- and place-specific historical information” (Andersson 2005:9).

Regarding southern Nuu-chah-nulth territories, it is unlikely that there are enough CMT dates contained within the region to provide confident interpretations about forestry use and associated socio-political trends. One of the aims of my fieldwork was to supplement the CRM data collected in previous studies. The 85 dates that I collected from the field were a minor addition to the 859 dates found in CRM reports. A total of 944 dates is a large collection, no doubt yielding interesting trends, yet it falls short of what is likely needed to reveal trends in cedar harvesting across an area almost 150 km in length. With this factor in mind, I examine the collected dates for possible trends in this region. Figures 92-98 illustrate trends in the CMT features found within the current extent of Toquaht, Ditidaht and Pacheedaht territories.

8.3.2.1. Toquaht Chronology

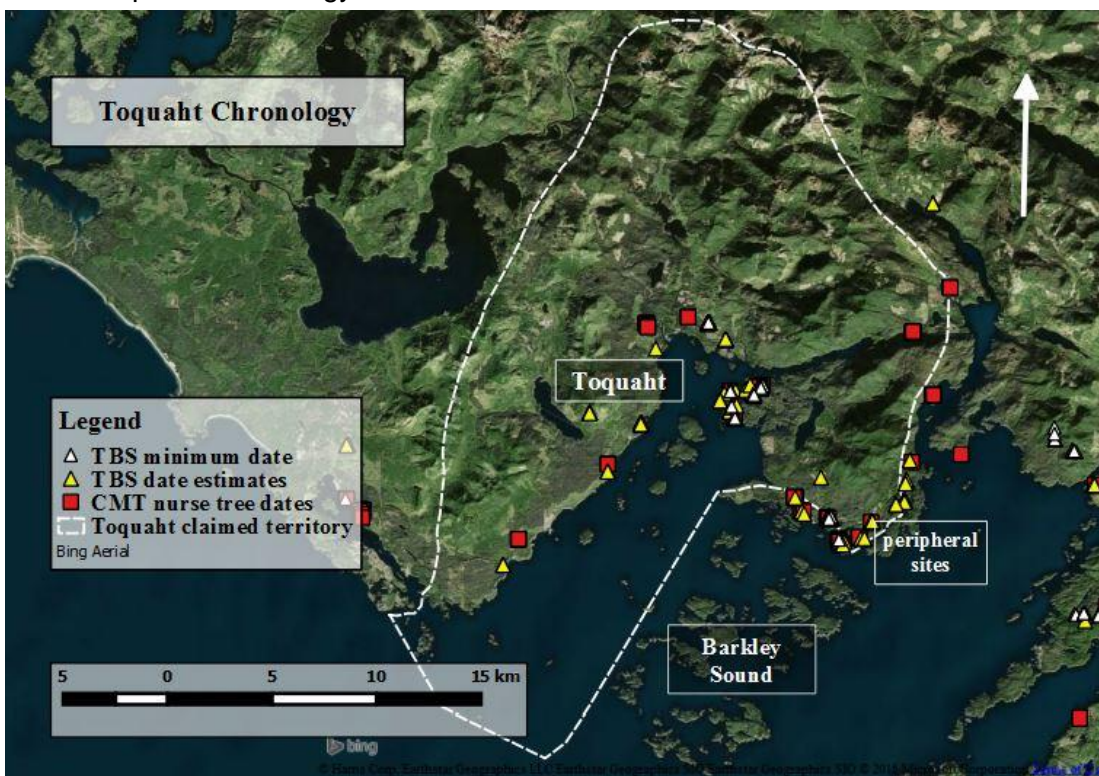


Figure 92: Map, Toquaht chronology (RAAD 2015).

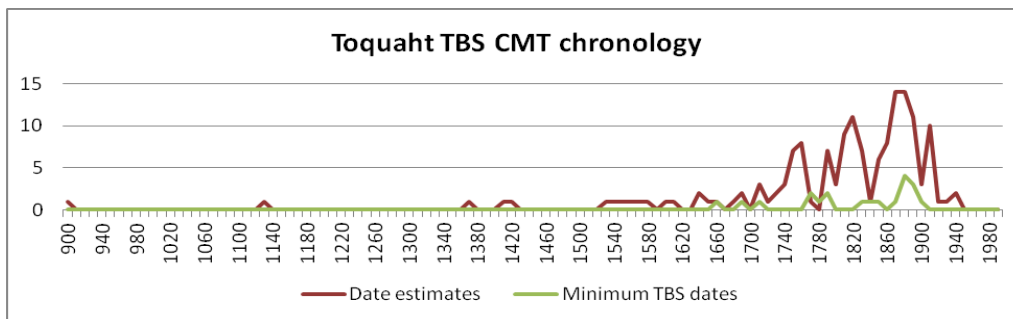


Figure 93: Toquaht TBS CMT chronology (RAAD 2015).

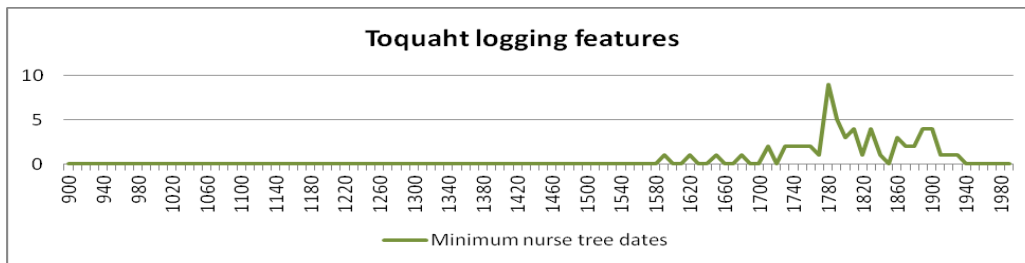


Figure 94: Toquaht logging features (RAAD 2015).

8.3.2.2. Ditidaht Chronology

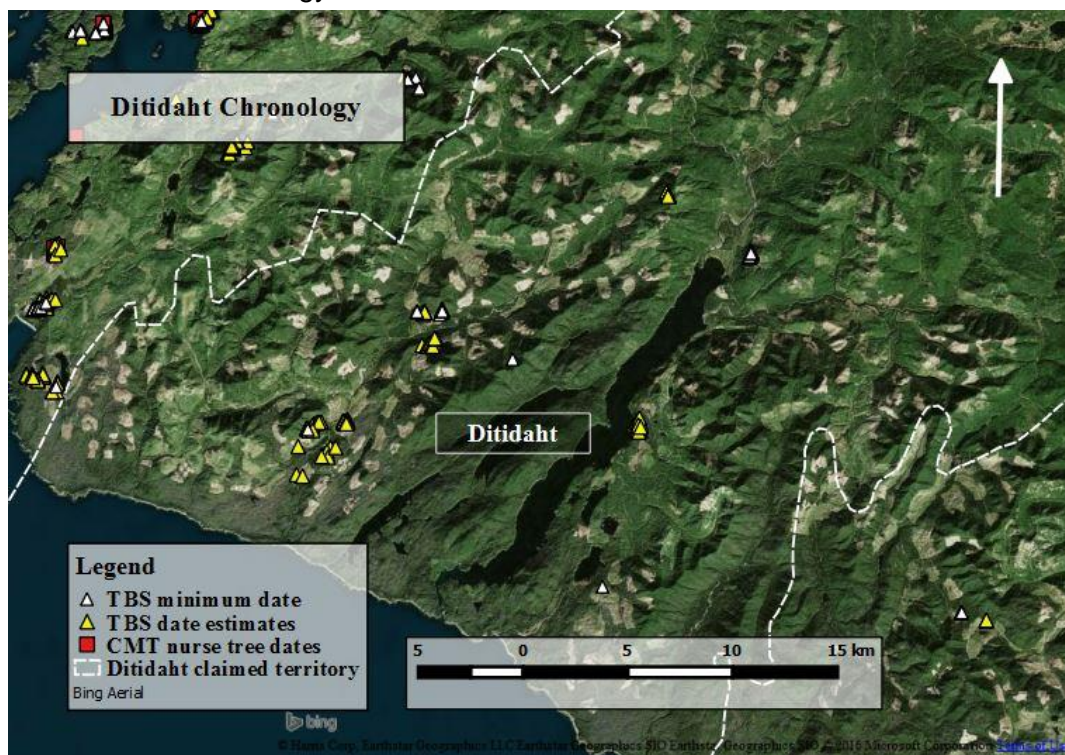


Figure 95: Map, Ditidaht chronology (RAAD 2015).

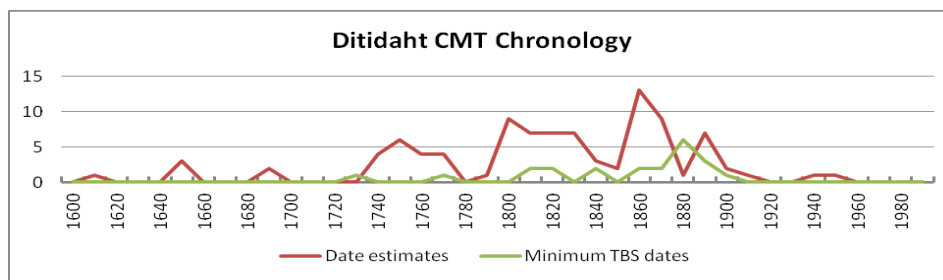


Figure 96: Ditidaht CMT chronology (RAAD 2015).

8.3.2.3. Pacheedaht Chronology

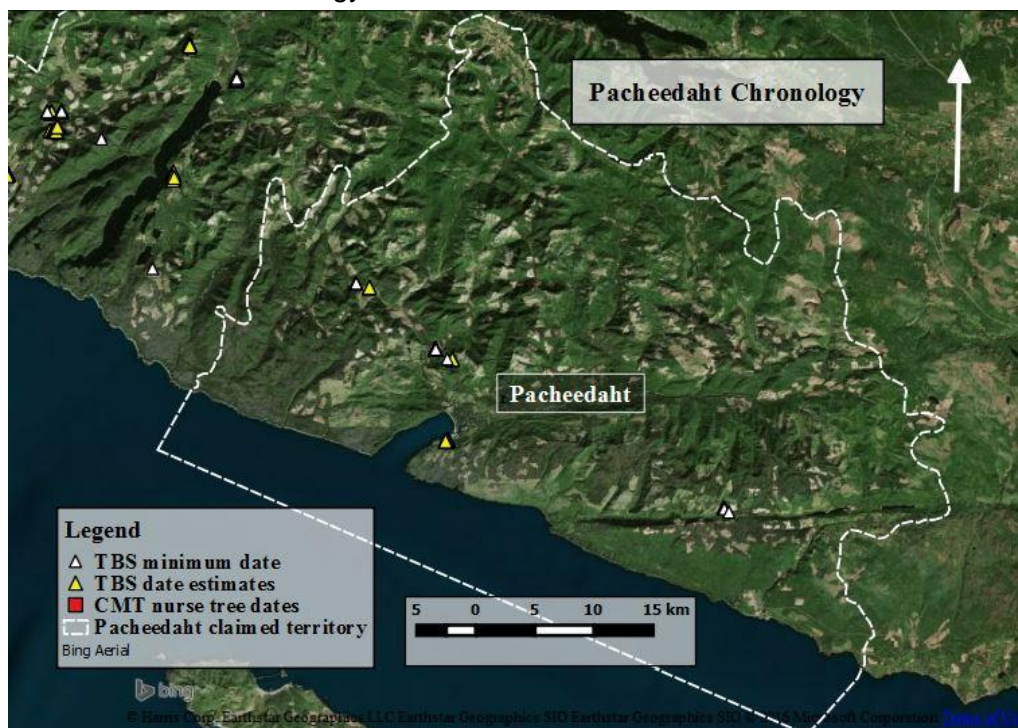


Figure 97: Map, Pacheedaht chronology (RAAD 2015).

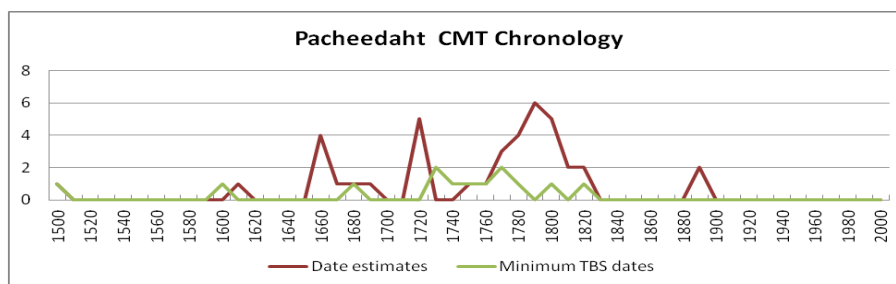


Figure 98: Pacheedaht CMT chronology (RAAD 2015).

8.3.2.4 Southern Nuu-chah-nulth Chronological histories

The illustrated chronologies are from three claimed territories which I was permitted to study. Below, I attempted to connect these harvesting trends with local recorded histories from the ethnographic and historic record (details of events were presented in Chapter 2). I examined early contact period events within southern Nuu-chah-nulth territories that were near dated CMT sites, and which had specified dates and locations. I have chosen events from the ethnographies and ethnohistories that appear to have been particularly disruptive for local populations. It should be noted, however, that they represent just a few events in an otherwise deep and complex history in which many

other interactions would have played into frequencies of resource use (events are further detailed in section 2.1 above).

1.1780s: **Early arrival of Smallpox within Ditidaht's Nitinat Narrows.**

2. 1790s?: **The Effingham Inlet territorial dispute**, is one which occurred “before the end of the 18th century” (McMillan 1999:194), and potentially during the late 1790s (Denis St. Claire 2016 personal communication). It resulted in major attacks in Toquaht territory and the eventual destruction of the Effingham Inlet groups by the Ucluelet and the Tla-o-qui-aht.

3. 1840s: **The Long War** was an extremely turbulent time for the Ucluelet and Toquaht along with several of their neighbours.

4.1850s: **Makah Smallpox** arrived among Pacheedaht and Ditidaht groups.

5. AD 1868: **Huu-ay-aht Smallpox event.**

6. AD 1875: **Smallpox arrival in Barkley Sound.**

Using QGIS I selected CMT dates which I had attached to CMT site polygons associated with affected territories. I then compared them against the CMT chronologies of their neighbours to distinguish obvious differences in harvesting frequencies. Each map shows selected areas, mostly determined by the current First Nation's claimed boundary.

Barkley Sound/ Pacheedaht and Ditidaht

In this chronology I compare just the exact dates and date estimates for Barkley Sound against Ditidaht and Pacheedaht Territories to the south of the Sound (Fig.99). The difference in the number of samples collected for each region is clear, as are the differing chronological patterns (Fig.100). However, correlations between historical events and

harvesting chronology are not very pronounced. This could be due to localized events affecting some groups more than others. The inclusion of all groups blurs any trends that might be present in more localized areas.

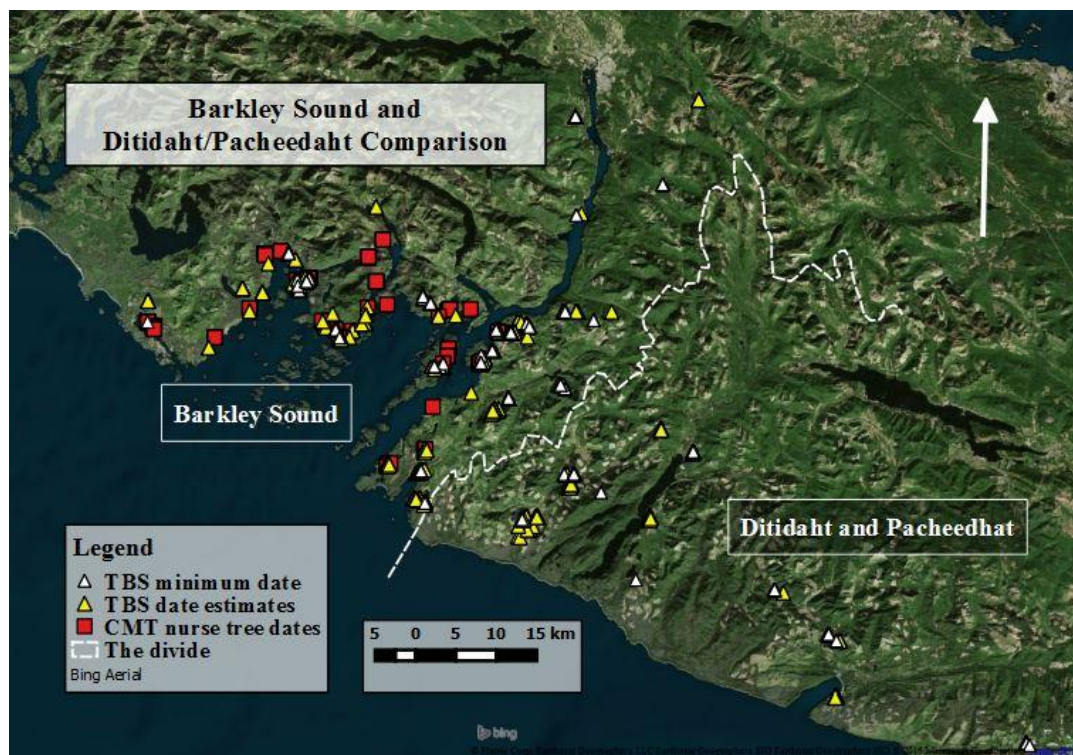


Figure 99: Map, Barkley Sound and Ditidaht/Pacheedaht comparison (RAAD 2015).

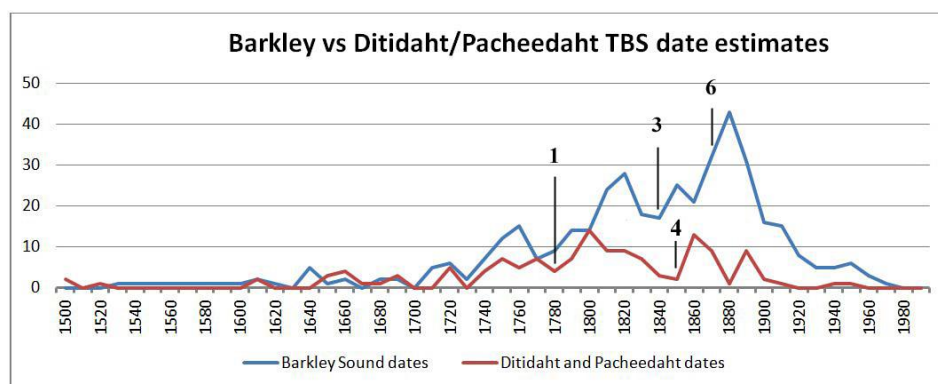


Figure 100: Barkley Sound vs Ditidaht/Pacheedaht TBS dates (RAAD 2015).

Ditidaht

It is clear how few TBS dates there are for the relatively large Ditidaht Territory (Fig.101). However, two historically devastating events line up clearly as slumps in the chronology: (1) the *Columbia's* AD 1791 meeting with the Ditidaht Chief Cassacan, who

mentioned the earlier arrival of Smallpox among his people (likely early 1780s; Howay 1941:196), and (4) the arrival of Smallpox from the Makah in the early 1850s (Boyd 1999:167-168).

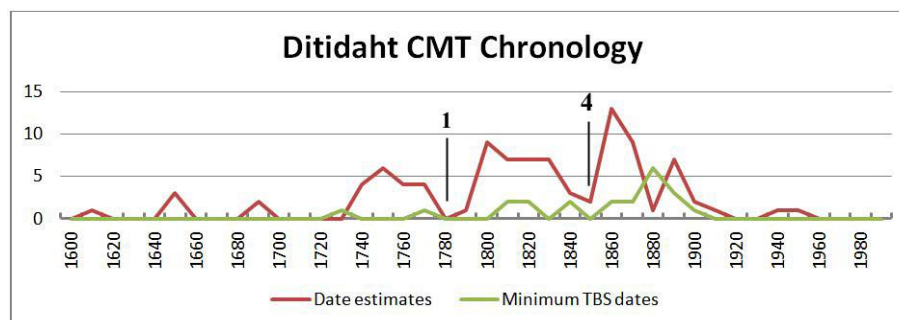


Figure 101: Ditidaht CMT chronology (RAAD 2015).

Pacheedaht

The Pacheedaht region has such poor coverage of CMT dates due to commercial old growth logging of the last century that any inferences based on trends for such a large region would be erroneous (Fig.102). It should be noted however that there are still many remnant old growth stands in Pacheedaht territory with evidence of CMTs. There are also many recently clear-cut old growth stands near archaeological sites and around ethnographically important areas that are likely to contain many more TBS dates to add to this chronology.

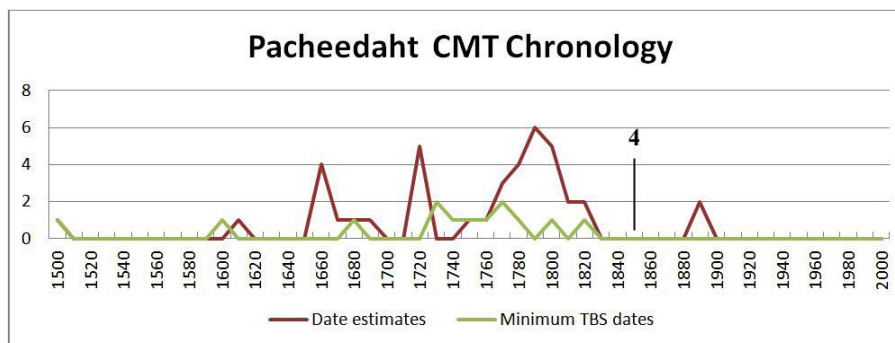


Figure 102: Pacheedaht CMT chronology (RAAD 2015).

Barkley Sound East and West

Figures 103 and 104 illustrate the CMT chronologies for all of Barkley Sound. Figure 103 includes all exact TBS dates and date estimates, as well as minimum TBS for the region back to 1500 (though there are many scattered dates earlier than this). Figure 104 includes all nurse tree dates on logging features over the same period.

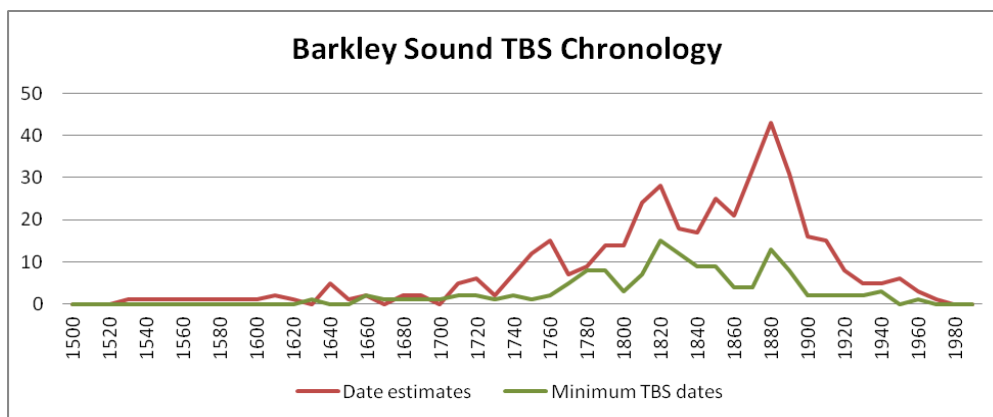


Figure 103: Barkley Sound TBS chronology (RAAD 2015).

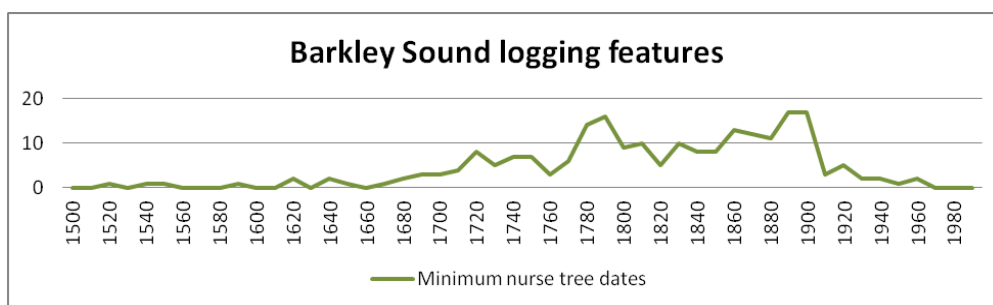


Figure 104: Barkley Sound logging features (RAAD 2015).

Two of the historical events chosen to line up with CMT chronologies in Barkley Sound (2, 3) are deeply tied to the history of the Toquaht and their neighbours. The conflicts involving the Effingham groups (2) and the Long War in Barkley Sound (3) were both largely centred in the west of the Sound, though they did involve more distant neighbours (section 2.2). The AD 1868 Smallpox outbreak among the Huu-ay-aht in the east of the Sound (5) and the AD 1875 Smallpox outbreak across all of Barkley Sound are shown as well. In order to discern the chronological trends of Toquaht history I divided all exact and estimated TBS CMT dates into east and west Barkley Sound (Figs 105,106)

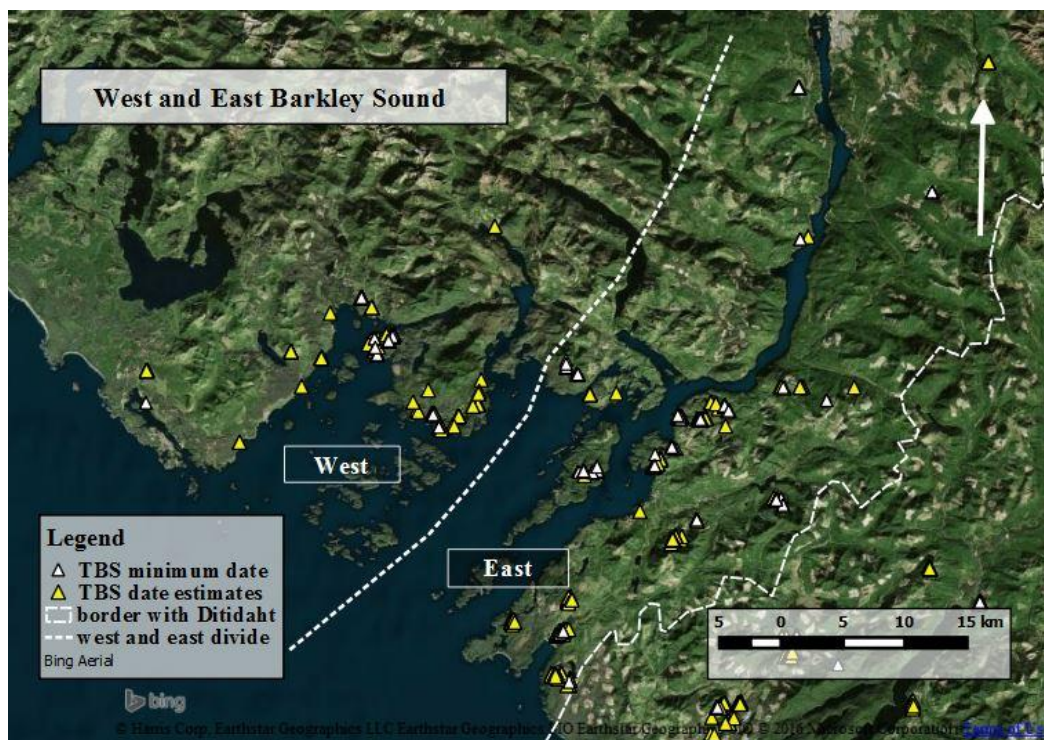


Figure 105: Map, west vs east Barkley Sound (RAAD 2015).

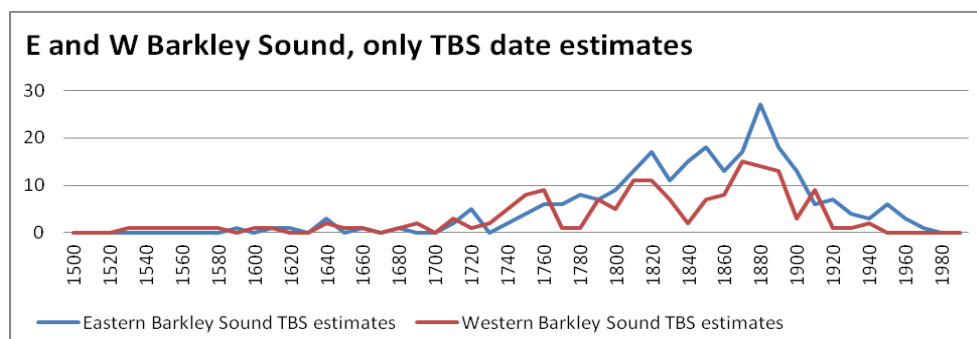


Figure 106: East vs West Barkley Sound, only TBS dates (RAAD 2015).

A comparison of the chronologies may illustrate the differing effects of variously located events (Figs. 107-108). Figure 107 appears to show some consistent slump in bark harvesting during the Long War of the 1840s for western Barkley Sound (3), with a lesser effect in the east. The conflict with the Effingham groups (2), however, does not show clearly. This is most likely due to the inadequate number of bark scars, and the possibility that conflicts such as these, which aren't clearly dated, may have been protracted over long periods of time in which their effects on resource collection may be diluted. A slight slump in the east (Fig.108) however reveals a possible connection with

the Smallpox outbreak in Huu-ay-aht territory in AD 1868 (5). However this event occurred late in decade so it is unclear if there is a relation.

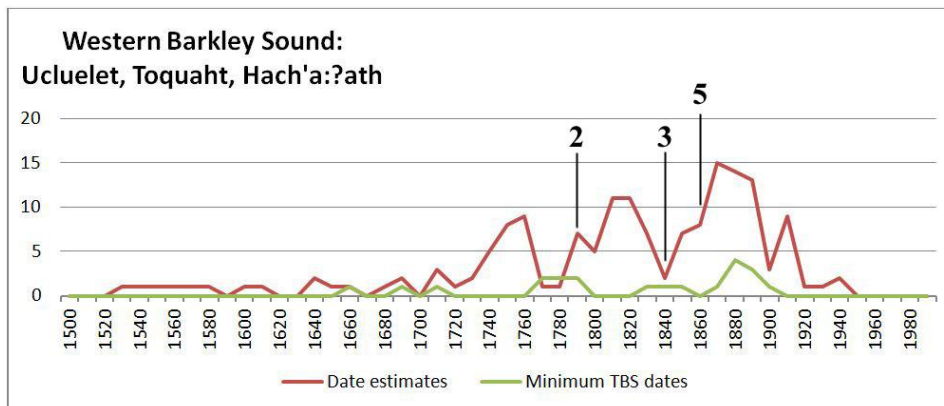


Figure 107: Western Barkley Sound, Ucluelet, Toquaht, Hach'a:ʔath (RAAD 2015).

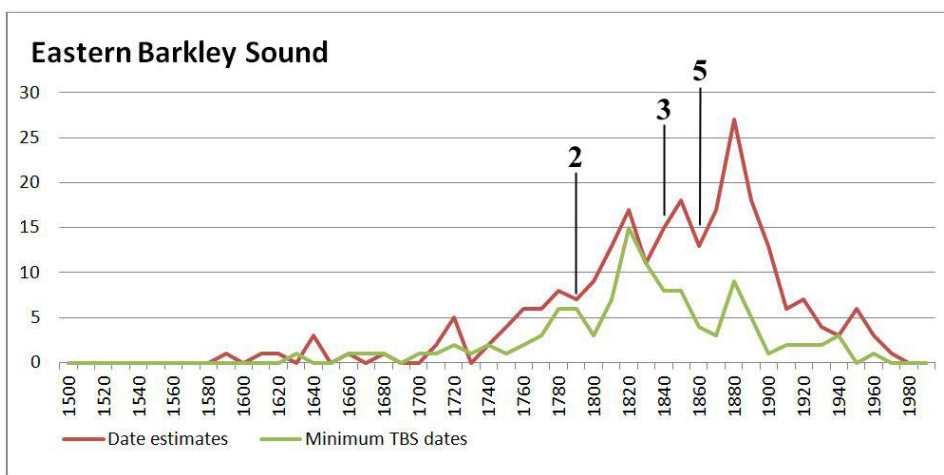


Figure 108: Eastern Barkley Sound (RAAD 2015).

A close up of harvesting dates in the west of the Sound, taken from Hach'a:ʔath territory and the centre of Toquaht territory suggest a similar story (Fig.109). In the first chronology (Fig. 110) there are unclear trends for the Effingham conflict (2) and a solid slump during the Long War (3). In the Hach'a:ʔath chronology (Fig.111), they and their other Effingham neighbours ceased to be independent groups following the conflict with the Ucluelet and Tla-o-qui-aht, most likely dispersing to relatives in other groups (Arima and St. Claire 1991:32). Thus, the chronology of Hach'a:ʔath TBS dates after about AD 1800 may well be representative of a different group. The border of the Toquaht and the historical Hach'a:ʔath overlap in an area of many dated CMTs making the separation of such dates difficult.

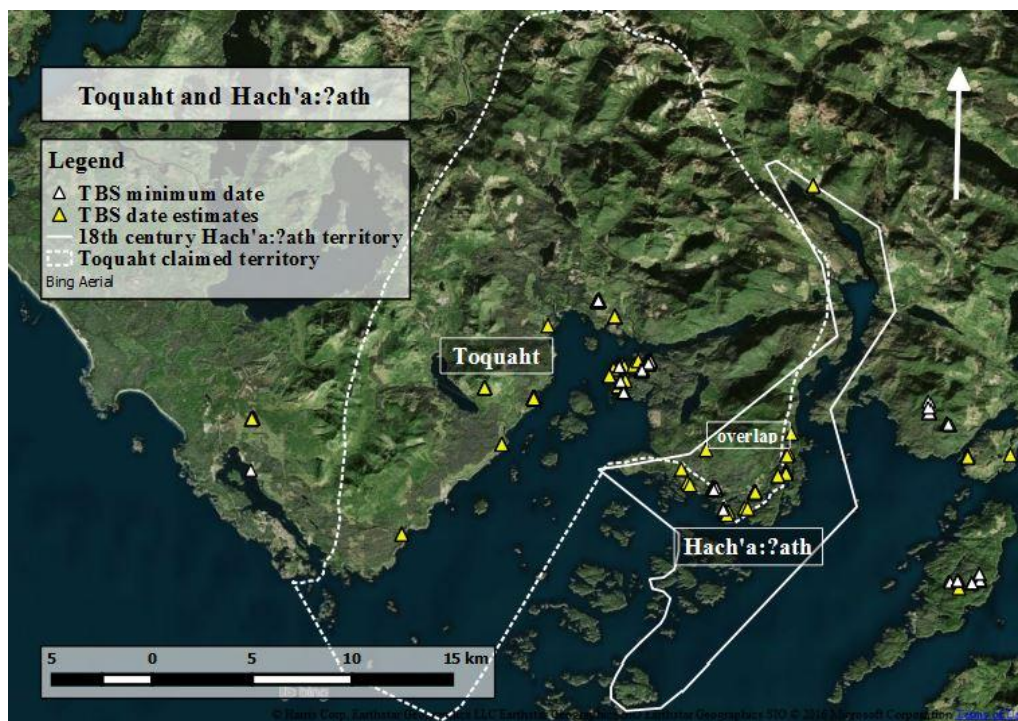


Figure 109: Map Toquaht and Hach'a:ʔath (RAAD 2015).

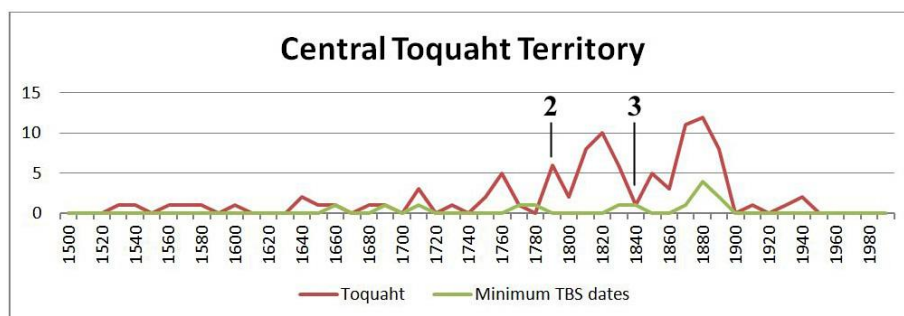


Figure 110: Central Toquaht territory (RAAD 2015).

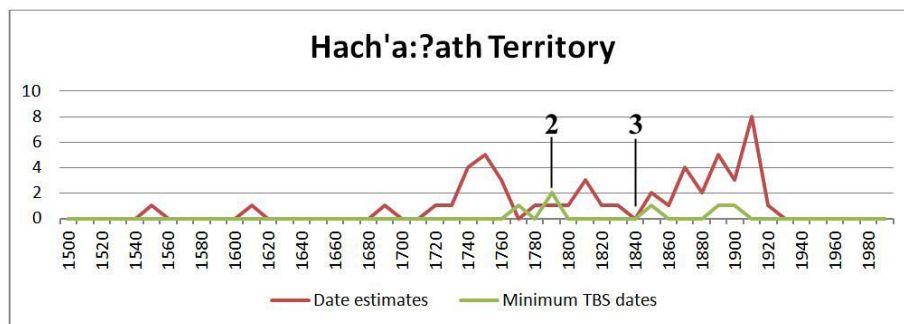


Figure 111: Hach'a:ʔath territory (RAAD 2015).

In these chronologies I have naturally assumed that war and disease would result in declines of bark harvesting and forest management. Conflicts would put a strain on the routine of ordinary resource collection, and would potentially discourage individuals

from roaming far from home. Disease incapacitates numerous individuals, and eliminates the workforce. To some degree one would think that these forces have a negative impact on harvesting ability. Pegg's (2000) study, however, came to the conclusion that at least generally many of these conflicts and demographic collapses caused an increase in ceremonial activity associated with new political exchanges, funerals and name-taking ceremonies, thus requiring more cedar resources. This increase in ritual activity may have concealed some of the effects of a diminishing overall harvest of cedar.

One might, however, consider that while these opposing patterns create difficulties in interpreting frequencies of harvesting, increased ritual activity may be more associated with the growth of confederacies and powerful influential chiefs during the fur trade. In the early period southern Nuu-chah-nulth groups existed outside of the direct influence of the northern confederacies (Drucker 1951:110), and instead sat as many autonomous groups with smaller home territories. What was the size and frequency of these early potlatches, and was there a different effect on the collection of resources in the early period when tumultuous events hit? The wealth generated by the fur trade and early input of the seasonal wage economy created very large potlatch events (Lutz 1992; Sellers 2013) within larger confederation style networks that demanded increased harvesting for cedar. It may be that prior to this external input of wealth (pre-early 19th century), ordinary seasonal activity among the southern Nuu-chah-nulth might have been negatively affected by disease and war. Additionally, the periods of new wealth for First Nations groups were relatively contained periods that may only overshadow certain sections of the historical record.

8.3.3. Questions of Scale

The information gleaned from CMT chronologies is largely dependent on the scale in which a locality or region is being viewed. A few acres of forest may document cedar harvests of generations of individuals supplying the needs of family groups and households. The larger the landscape under study the more people and diversity of intentions, needs and practices grow. The following is an exploration of the problem of scale when looking at CMT harvesting frequencies and historical events.

Too small?

A single CMT site chronology might represent localized harvesting patterns of a family or individually owned and controlled stand (Deur and Turner 2005). The frequency of harvests would represent fragmented aspects of several connected generations over time. Cedar bark removal for randomized purposes, can tell little more than human use and knowledge of a cedar harvesting site, and aspects of harvesting patterns from one site.

Anomalies in patterns of use can be interesting on a local scale, but troublesome on a larger scale. An example of such an issue occurred at the Newcastle Block CMT study (Fig. 112; Eldridge and Eldridge 1988:32) in which 25 bark harvesting scars, or one quarter of the total, occurred from a single year, 1798. It is thought that this may have been a one-off harvest of a massive load of cedar bark for a potlatching event. While very interesting in the small scale, when transferred to a slightly larger, semi-regional scale, this one-off spike in harvesting may suggest some non-existent trend in the region. However, if there are enough dates collected across the land, these inconsistencies should diminish.

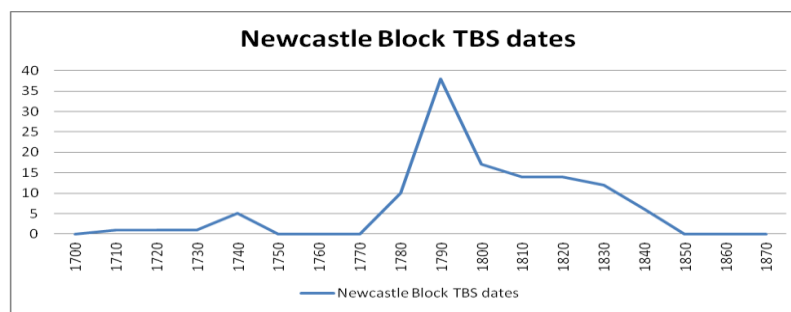


Figure 112: Newcastle Block TBS dates (Eldridge and Eldridge 1988).

Figure 113 shows all dates from southern Nuuchahnulth territories alongside the same chronology that has had all the repeated dates within single sites removed. This could suggest that at a larger scale repeated events would not affect the general trends in frequency very much. It should be noted that on a larger scale some repeated harvests may represent an increasing demand on resources that is tied in with regional trends.

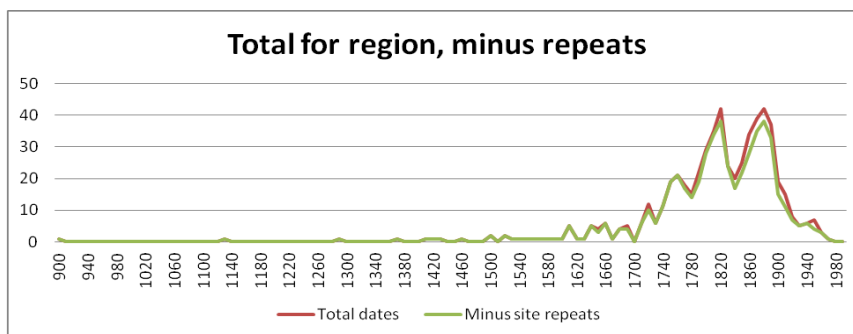


Figure 113: All dates from southern Nuu-chah-nulth, minus repeated dates (RAAD 2015).

Too large?

If a CMT chronology is too large then it is likely that the unique factors affecting harvesting patterns of particular groups, regions, or even culture groups might be lost. Actual trends in one region may not exist in another and become lost or diminished when chronologies are overlapped. Likewise non-existent trends may be found when involving the chronologies of a nearby area.

Just right?

Other issues with CMT chronologies in particular regions or territories of known historical events are important. The territorial borders in the prehistoric period and early contact times are often unknown. They were changing before and throughout the contact period and their present boundaries are the result of a very long and complicated history. Many groups known to have been political forces in early times no longer exist due to war and/or epidemics. The borders that exist today are the result of peaceful amalgamation, annexation, transfer of rights or just filling vacant areas (Arima and St. Claire 1991). This makes the choosing of boundaries of resource use to overlap with CMT maps very difficult without relatively detailed ethnographic material and oral histories. However, these historical resources combined with ample CMT dates should combine to tell very interesting stories of the trends of bark use in certain areas, when taking a multi-scalar approach that is appropriate to the region.

8.3.4. Questions around minimum dates and bad samples

Nurse trees: The chronology of nurse tree dates on logging features is limited in the sense that it can only record minimum dates. As noted earlier though, a rough estimation suggests that nurse trees on average may begin to grow on stumps after about 10 years

(Mobley and Eldridge 1992:101). If enough dates are collected in a region, one may be able to create a rough chronology of indigenous logging by creating a normal chronology of dates, then shifting all the dates by a decade earlier. The variation in the age of establishments of saplings on stumps should be evened out with the large number of samples (Fig.114).

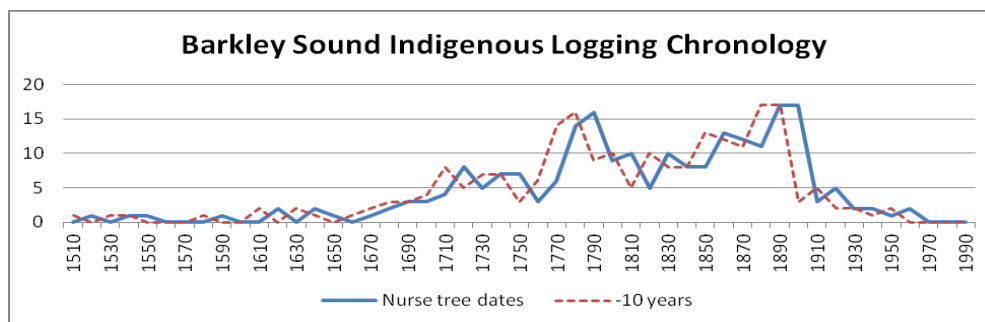


Figure 114: Decadal Shifting of Barkley Sound indigenous logging chronology (RAAD 2015).

TBS poor samples

Many of the existing CMT dates for the Northwest Coast are minimum TBS dates. These are usually taken from poor samples in which a minimum count of the age of the injury was taken. Often increment bores will return this sort of rough date, or a rotted disk sample. In my own fieldwork, a number of tree ring counts were such broad estimates that they could only be considered minimum age ranges. These broad estimations were either due to microscopic rings or stump rot.

When all these dates are assembled and overlapping the chronology for the larger region, it appears that the minimum dates mirror those exact dates and estimates (Fig.115). It is difficult to find an appropriate way to combine these dates to determine broad trends of bark harvesting frequency in the region. Does one subtract a number of years from the minimum dates, as in the nurse tree chronology, or should it be added to the more accurate chronology, thus adding quantity but lessening quality (Fig.116)?

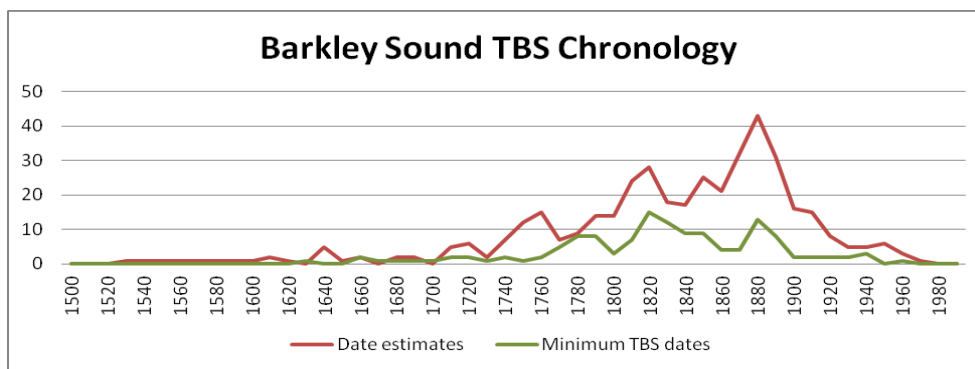


Figure 115: Barkley Sound TBS chronology (RAAD 2015).

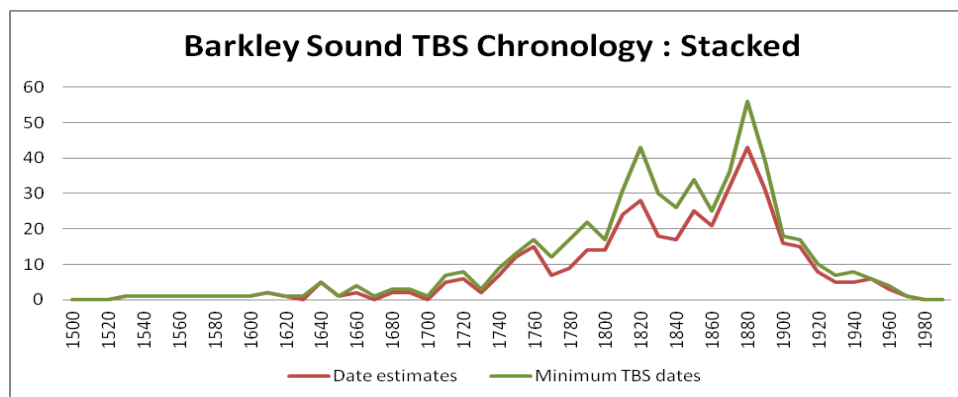


Figure 116: Barkley Sound TBS chronology, stacked (RAAD 2015).

The combination of all three chronologies (nurse tree, TBS, and poor TBS samples) show some agreement amongst the more basic trends for the entire region (Figs.117, 118). The bimodal pattern seen in other CMT chronologies (Pegg 2000) is noticeable for both TBS chronologies, but less so for that of nurse trees. This however, should not be surprising. While frequency of indigenous logging and bark collection may both be reflective of certain general patterns, logging is a comparatively infrequent activity. Most logging activity (dated by nurse tree growth) is related to house construction or canoe building, whereas bark collection is tied to all aspects of cultural life. Logging frequency may be more closely aligned with movement or rebuilding of settlements than bark harvesting.

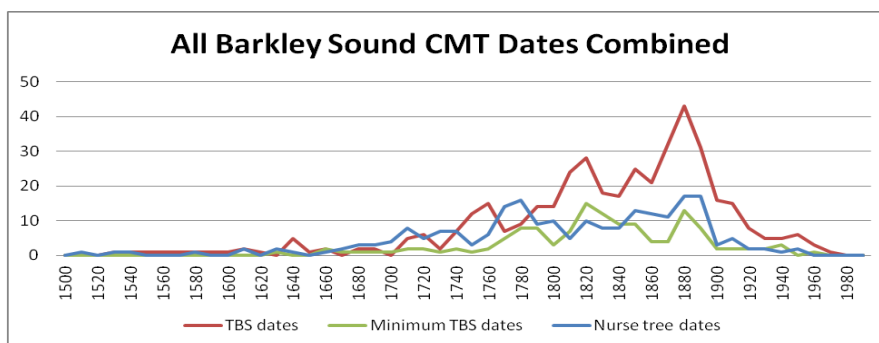


Figure 117: All Barkley Sound CMT dates combined (RAAD 2015).

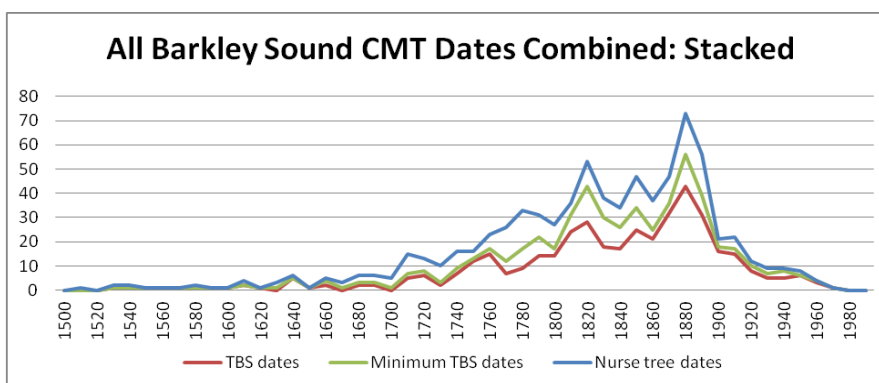


Figure 118: All Barkley Sound CMT dates combined, stacked (RAAD 2015).

8.3.5. Visualization of Chronology:

A finer-grained view of many of the inferred trends in the graph may help determine whether they are significant or not. The dates seen in the chronology are exact dates, or exact minimums, assigned to an arbitrary list of decades (Figs 119-121). Such a chronology inevitably skews the interpretation of data to some degree; several 1889 dates will give no weight to the 1890s, in the same way that a dozen 1891 minimum dates will give no weight to the 1880s or 1870s. Details on the accuracy of individual dates can be tracked down via Borden numbers to determine how broad a range they cover and whether their estimated time buffer bleeds into nearby decades.

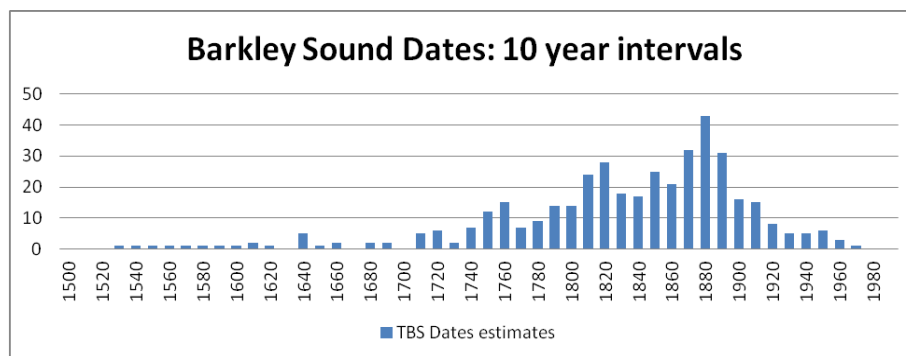


Figure 119: Barkley Sound dates, 10 year intervals (RAAD 2015).

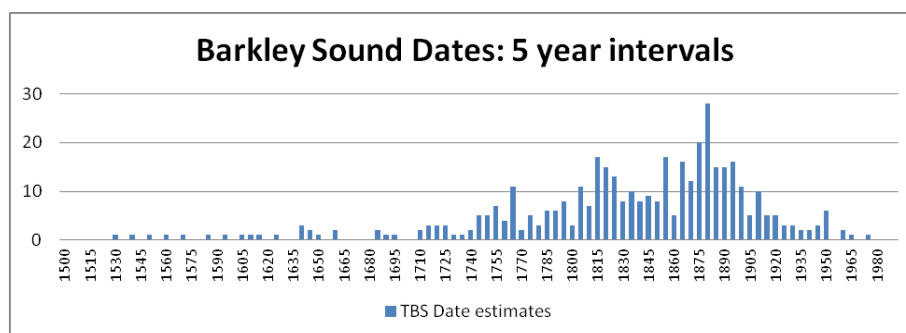


Figure 120: Barkley Sound dates, 5 year intervals (RAAD 2015).

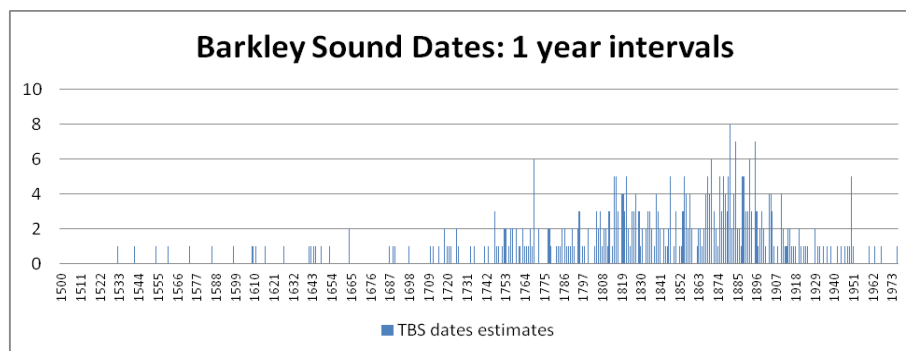


Figure 121: Barkley Sound dates, 1 year intervals (RAAD 2015).

8.3.6. Other potential directions

Many questions about First Nations' landscape use can be answered utilizing the spatial and temporal data provided by enough CMT dates taken across the landscape.

- There is potential to see routes of movement across the land. Inland trails can be dated to their frequency of use and providing insight into trade networks or connections between groups (Eldridge 2013; Mack 1996:12).

- Spatial use of cedar forests over time might be used to determine the transition from year-round villages to seasonal village camps through frequency of use, distances from historic villages and harvest levels at particular sites.
- Areas of intense harvest can be compared to nearby village centres to suggest periods of occupancy and abandonment.
- Regions with minor archaeological research but intense cedar usage might suggest the presence of undiscovered population centres.
- Do dates from multiple harvested trees line up with periods of high populations, and greater intensity of use? Does a larger percentage of bark removal line up with greater populations?
- Are abandoned village sites more likely to be visited for bark stripping than similar coastlines?

The comparison of resource extraction patterns across the land before and after the contact period is a particularly interesting question. Using QGIS I completed a distance analysis of bark harvesting across all southern Nuu-chah-nulth regions. I calculated distances between all dated TBS features in the land and all coastline and large stream/river systems to determine if there appeared to be a more extensive use of deep forest areas in earlier periods, prior to influences of Europeans. The results (Fig.122) suggest that there was little change in the use of remote forest areas before or after contact. Despite diminished populations and change to many aspects of indigenous life, far flung harvest sites were still used extensively by successive generations of First Nations people. This may reflect the maintenance of resource use rights passed between individuals and groups and the continued memory of important resource collection sites.

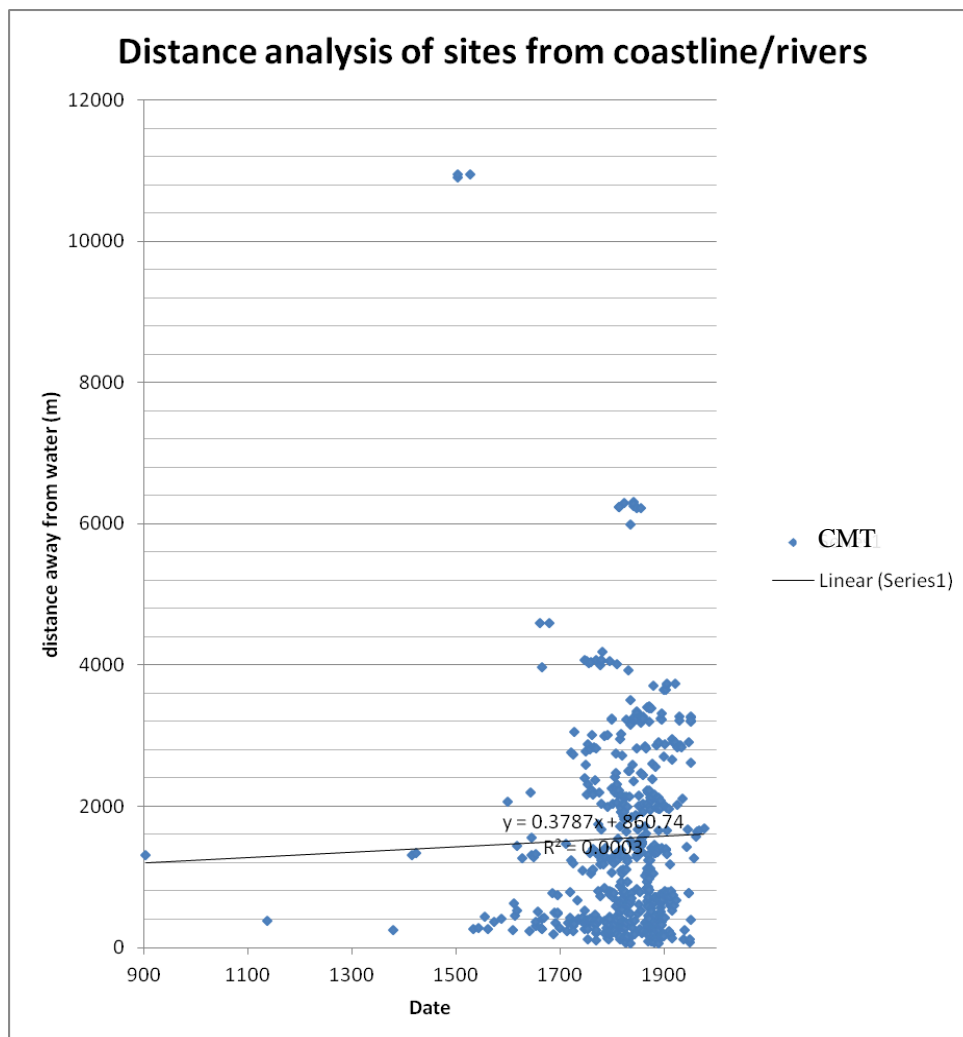


Figure 122: Distance analysis, CMTs from large rivers and shoreline ($R^2=0.0003$).

8.3.7. Discussion of CMT Chronologies

While there are clearly many issues to address in the study of CMT chronologies, it does appear that they have great potential for future analysis on a more regional scale. The field of CMT studies has largely suffered from a lack of research over the last few decades, and has been overlooked by many Northwest Coast archaeologists. Very little in the way of large scale CMT studies has been done on the coast (Arcas 1986; Eldridge and Eldridge 1988; Eldridge 2013; Garrick 1998; Stafford and Maxwell 2006). Stafford and Maxwell (2006:20) point out that “Although many thousands of modified trees have been recorded in BC, little has been done to analyse the data on regional or sub-regional levels in order to answer questions about the recent prehistoric period.” Many of the issues mentioned in this section may appear as stumbling blocks to the practical research of

CMTs but they are not. Rather, they are the result of the limited research on the subject. If current regional chronologies throughout the NWC continue to grow with better representation in collected samples, there will be larger archives will be available to determine different patterns of human use of the landscape.

8.4. Cedar tending and multiple harvesting

“Oh, the cedar tree! If mankind in his infancy had prayed for the perfect substance for all material and aesthetic needs, an indulgent god could have provided nothing better.” (Bill Reid quoted in Stewart 1984:8)

In Eldridge’s unpublished paper “Was Cedar a Finite Resource in the Late Prehistoric of the Pacific Northwest?” (2013) he reflects on his decades of experience in CMT research, and explores the idea that many high population areas of the Northwest Coast lacking adequate cedar resources may have experienced real shortages of cedar wood and bark. His primary examples are within a number of proposed forestry cut blocks spread over 110 km of the Skeena River, an area used historically by thousands of people during the bark harvesting months of late spring. The surveys found evidence for intensive bark harvesting on whole cedar forests in the area, with thousands of recorded features on standing trees. Trees exhibiting multiple (external) scars in several areas were seen to cluster across the areas surveyed, possibly marking old trail networks. His findings suggest that the high demand for cedar in areas where it was plentiful would have led large populations to kill off the resource had not sustainable practices been developed. In areas where cedar was scarce conservation practices would have been even more necessary (Eldridge 2013:10). Today there are ample ethnographic accounts describing techniques that encourage the bark stripper to not remove all the cedar bark. These are said to be borne out of a concern that the tree is a living being and a tree completely peeled (girdled) of its bark would die, causing nearby trees to curse the bark peeler (Boas 1921:616-617; Mauze 1998:239; Turner and Peacock 2005:133-134). Eldridge (2013) suggests that the very real threat of extinguishing the cedar resource by intense over harvesting may have led to this established conservation ethic.

Following this train of thought, I have wondered to what degree some cedars may have been under long term regimes of arboriculture in which the bark resource was managed. A large portion of CMT features have been found in surveys to have multiple

bark strip features. My study found 20% of the TBS trees in the survey hosted multiple cultural scarring events. Some areas exhibited more scarring than others, but it appeared that when there was higher density of TBS CMTs there were many more trees with multiple scars. In the Meares Island study (1986: 91, 97) over 15% of standing TBS CMTs had two or more visible scars, while in the post-assessment at the Newcastle block (Eldridge 1988) 36% of TBS CMTs had multiple scars. An AIA of Bawden Bay by Eldridge et al (1989) found 34% of TBS CMTs with multiple visible scars. The largest forest utilization site ever recorded at DkSp-11 on the east coast of Nootka Island found that 43% of the CMTs had multiple scarring events on a total of 2104 visible TBS trees (the whole site was estimated to contain about 10,000 CMTs; Arcas 1999).

The act of scarring a cedar for bark in a culturally utilized forest renders much of

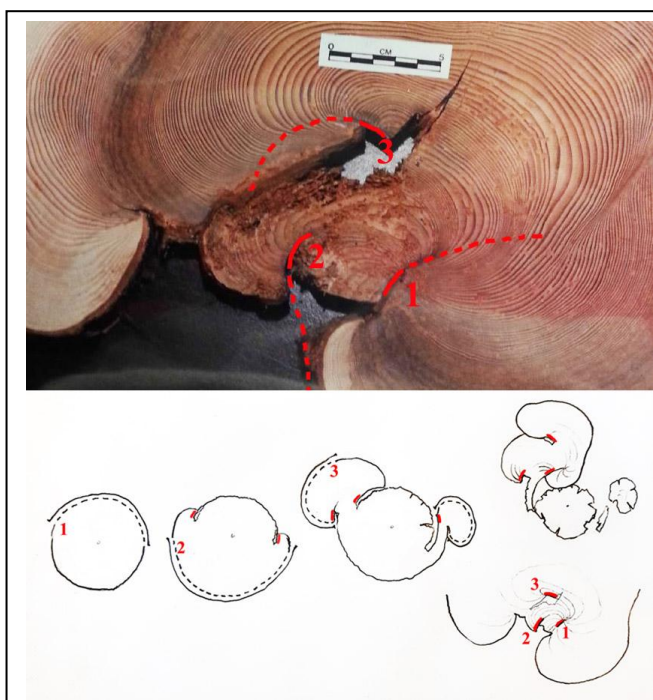
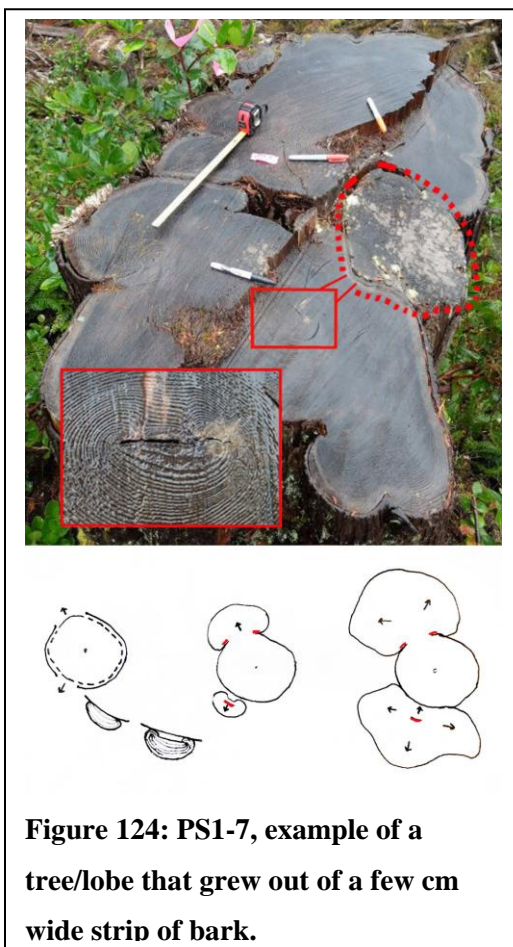


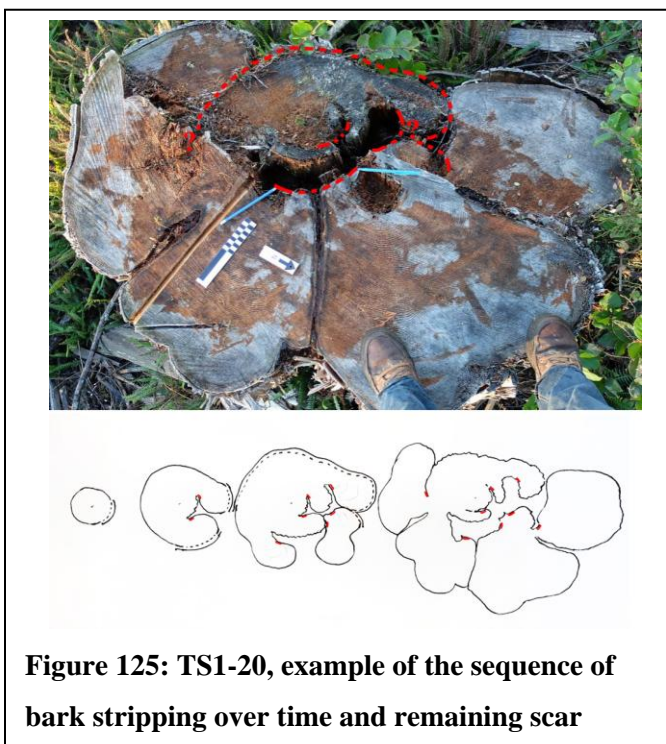
Figure 123: Newcastle Block example of multiple stripping events off lobes (Eldridge and Eldridge 1988: plate 15, p71; reproduction courtesy of Millennia Research), the first off a 'phantom' lobe. Sketch shows inferential phantom tree and stripping sequence .

its wood useless as a pole, canoe or even a plank (Eldridge 2013:10). The peel causes the death of inner cambium and surrounding wood, causing rot as the new annual rings curve into lobes. It does not however render the tree useless for continued bark harvesting. In fact the opposite may be true. Eldridge and Eldridge (1988) found in their Newcastle Block Study that 23 of 29 re-stripping events on TBS CMTs were done on the healing lobes of the previous scars (Fig. 123). An additional six trees were not stripped on the lobe, but rather on the back of the tree, and within a few years of the first scarring event.



This, they suggest is due to the thin-wall cambial cells which grow following injury (Shigo 1985:99-101 cited in Eldridge and Eldridge 1988:44), which might make the fibre in the bark desirable. They also note that lobes may have been chosen due to the “young” (Eldridge and Eldridge 1988:44) bark of the lobe. Many samples have been found of cedar trees on the Northwest Coast that have been harvested multiple times over the years (Fig.123).

What has been considered an act of conservation for the continued life of the tree in effect extends the harvestable life of the tree for many generations. Garrick (1998: 71) noted in his Hanson Island CMT study that “on multiple peel CMTs, because of shaping sequencing



techniques, live bark remaining after three or four peels have been removed is often greater than the live bark on a cedar of the same circumference from which no bark has been harvested”. He suggested that cedars were being shaped to “maximize bark productivity and the deliberate ‘setting up’ of peeled trees” so that more bark would be available for the next generation (Garrick 1998:70; Figs.124, 125).

The act of scarring often causes an explosion in ring growth

(Arcas 1986b:199) on either side of the scar which creates a sort of ballooning of the healing lobes. The added burst of surface area on the healing lobe as it encroaches over the scar face becomes a surface of new and flexible bark that is very unlike the older bark of the rest of the trunk (Fig.126). Additionally, as healing lobes encircle scar crusts on scar faces they often do not host the branches that might prevent harvesting elsewhere on the tree. It is unclear if this young bark will continue to have the same properties as that of a young tree the same age as the scar crust within the lobe. Eldridge (2013), in his examination of cedars at one of the CMT sites on the Skeena River found un-stripped cedars around multiple harvested CMTs. He thought that stripped trees might have been “intentionally targeted, perhaps for a characteristic of their inner bark (Eldridge 2013:20).



Figure 126: Examples of young TBS CMTs in Prince Rupert Harbour 2015.

Many combinations of bark stripping patterns over decades, or even centuries, create a host of different shapes for possible future bark stripping, maximizing the cedar harvest for future visitors. A single tree with multiple strip scars often has provided several times more bark over its lifetime than could have been harvested had all the bark been peeled off in the first event. One bark stripping pattern (Fig.127) appears in all corners of the Northwest Coast and allows for the extraction of bark from one tree over a few decades that equates to over 100% of the bark that would be strippable at any one time. It also creates mirrored lobes allowing future harvest.

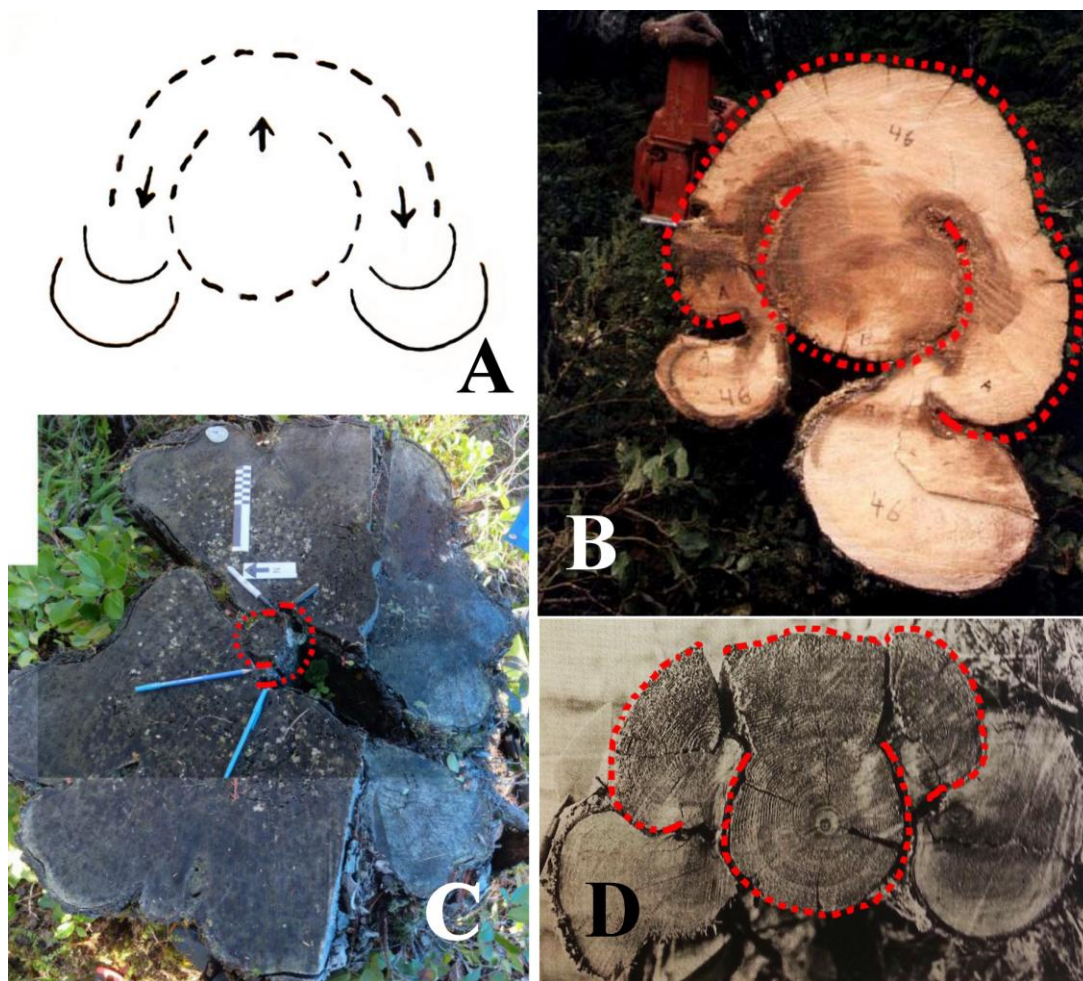


Figure 127: a) two sided bark stripping pattern with directions of lobe growth; b) Mobley and Lewis 2009, reproduction courtesy of Chuck Mobley; c) TS2-4; d) USDA USFS 1984 in Mack 1996, reproduction courtesy of the USDA, USFS).

Cedars that have had several bark peels removed often cease to have the concentric circle of annual tree rings, but rather the live wood grows around scar crusts into large ballooning lobes as the deadwood of the scar face succumbs to rot and disintegration (Fig.128). The trees that have had three or more bark strips taken from them are left with nothing but lobes left to strip. Provided some length of bark is left after peeling, there is a good chance that lobe growth will continue (Figs. 129, 130).



Figure 128: Stump of lobes DS3.



Figure 129: PS1 standing multiple stripped CMT and hypothetical bark stripping sequence.



Figure 130: Goldstream, CMT. Re-peeling of healing lobes, original scar face between inner set of lobes.



Figure 131: Large cedar stumps with scar crusts on semi-outer lobes.

This brings me to the question of harvesting cedars in an old growth forest. As trees grow larger, bark becomes coarser and less desirable to use (Boas 1921:122), except for the large slabs of roofing. The general instruction for archaeologists doing CMT survey is to avoid larger trees, as those that were over 60cm at the time of scarring would have had poor quality bark (British Columbia, Archaeology Branch 2001:28; Arcas 1986b:189).

Many of the larger stumps found over the course of this project had partially rotted out centres, surrounded by masses of tight lobes (Fig.131). Many scar crusts on these trees were ignored due to the age and size of the tree at the time of scarring.

Such an ancient tree would not have been bark stripped due to the poor quality bark. However, if the act of bark stripping instigates increased 'young' ring and bark growth on healing lobes, could it be possible that many of these trees continued to be stripped as the tree aged? If trees were revisited over generations, continuous young

bark could be produced through the act of successive bark peeling. Even if a tree were peeled for the first time at an old age, that act of scarring might produce lobe bark of a quality sufficient for harvest. The process of repeated scarring adds surface area to the face of the tree and through the forces of compartmentalization (Shigo 1985) encourages the walling off of peeled and rotted wood for the growth of healing lobes. This may explain the presence of a number of very good quality scar crusts and lobes on the outer

portions of very large stumps or trees (Fig.132). It could also resolve the possible issue of



Figure 133: A large Goldstream, BC CMT within cultural stand that appears to have multiple scar lobes.

intensive use sites that age and do not immediately make way for young desirable tree growth. If all cedars were only viable for a few peels before old age set in, it is likely that the resource demands on cedar would either force the quick exhaustion of a cedar stand's use, or would pressure individuals to remove all of a tree's bark (girdling) which would lead to the death of entire stands.

Repeatedly visited CMT use sites must have been tended with conscious arboricultural practices that took into account the growth of healing lobes. Cedar has a high ability to continue to grow following intensive harvests of bark, and that which was left was likely known to have the potential to grow into a harvestable lobe years or generations into the future. Millennia's post-impact assessment at DdSc-17 (Ramsay 2013) found 20 features on just eight exposed stumps. One sample was stripped about 8 different times (Fig. 133b).

A short distance from this location stands Browns Mountain and the intensively harvested CMTs (DdSc-25) that I found during the Tall Tree Music festival (section 7.2.3.9 above).

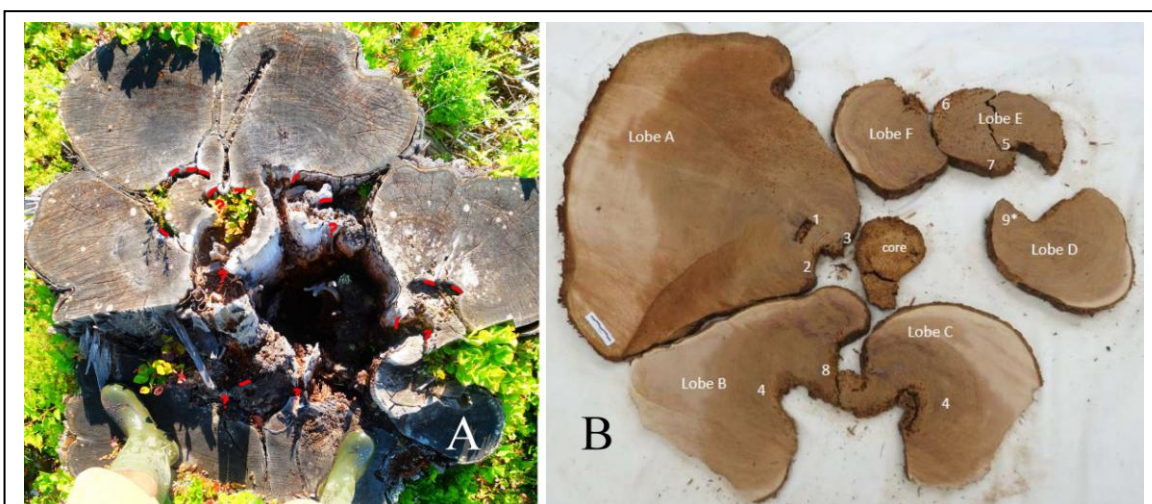


Figure 132: a) Browns Mountain multiply-scarred cedar 2015, red marking scar crusts, b) DdSc-17 multiply scarred cedar (Ramsay 2013, reproduction courtesy of Millennia Research).

Almost all the trees found in a small fraction of that site contained multiple harvesting events. Here too was found a cedar that was stripped a minimum of 10 times (Fig. 133a). There has been a focus on the conservational practices of indigenous bark peels and their practice of minimal impact. While true, and thoroughly documented, the long held ethic likely is rooted in the discovery at some early period that partial harvesting encourages long term, continued productivity of bark on the tree. A cedar tree that is able to be bark stripped three or 10 times and still produces harvestable ‘young’ bark may take on a character of mystical significance, truly living up to its reputation as the ‘life-giver’, one that gives more of itself than any other. The importance of a cedar which stands as a testament to the harvesting actions of several generations is hard to fathom.

8.5. Extent of CMT archaeological sites

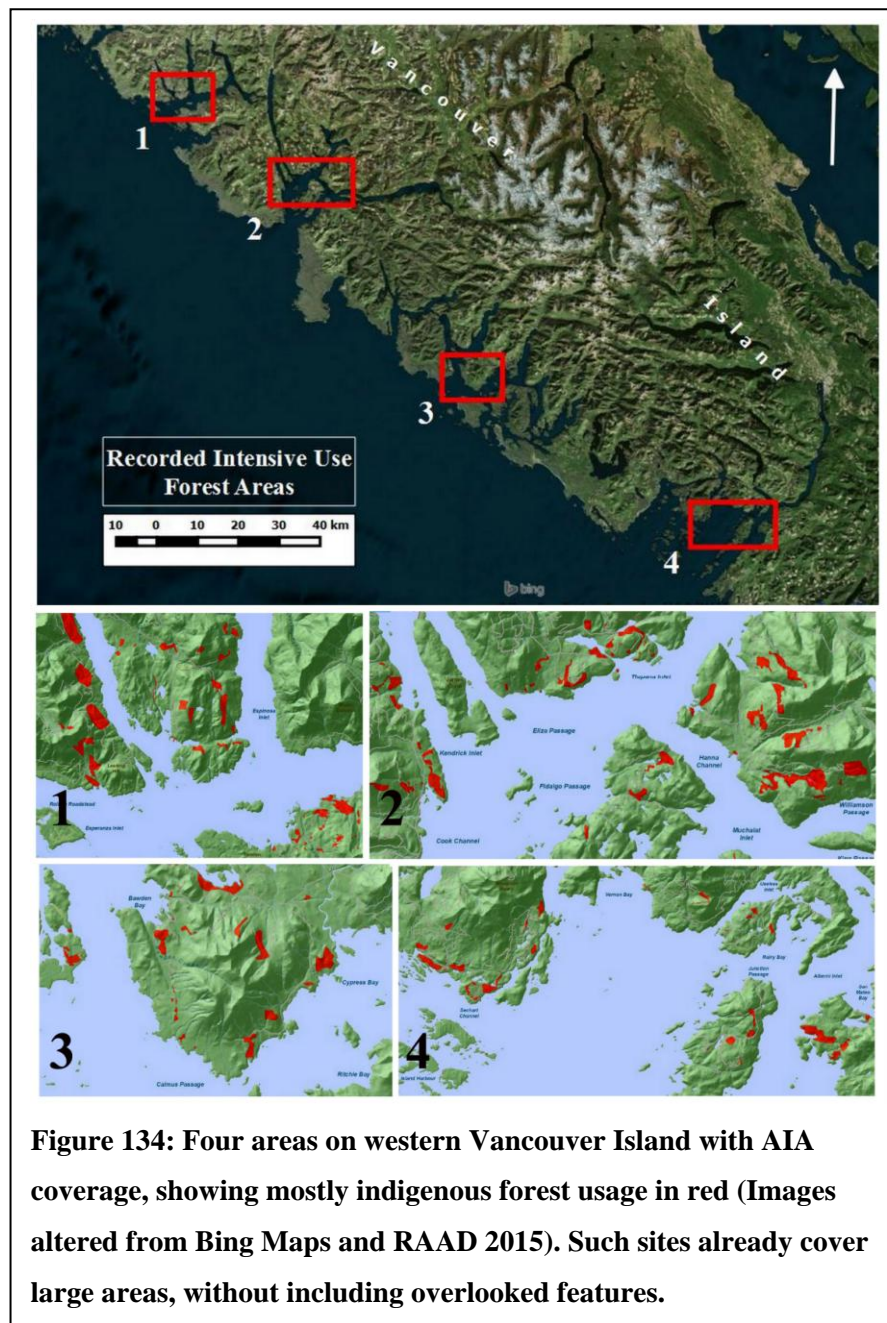
I believe that the current focus on CMT features should transition towards a focus on culturally modified forests. CMTs themselves are only features within more expansive archaeological sites, larger owned areas, bigger forest archives and deeper conceptualizations of place. Forests hosting such features should be recognized in their entirety for two reasons: the likelihood and invisibility of their expanded extent (in light of embedded scars), and, the fact that they were not just intermittently harvested areas but rather bark cultivating and tending sites of deep cultural importance.

Distribution

“small and large clusters of CMTs may be found any distance from a major water body in old growth environments.” (Stafford and Maxwell 2006:9)

Today CMTs are one of the most common archaeological sites in coastal regions of BC (RAAD 2015). This vast distribution of sites is the culmination of only about three decades of surveys, usually limited to old growth areas of medium or high CMT potential. The expanse of recorded CMT sites does not include the ancient coastal forests that have effectively been wiped clean of their cultural heritage over the last century and a half of industrial logging. Nor does it include the embedded scars and other features that have been overlooked during the last three decades. It is striking to consider the

extent to which culturally modified cedars must have existed across the Northwest Coast prior to industrial logging.



Though the distribution of CMT sites today is expansive across the province, it is one of clear, tight boundaries (Fig. 134). These protected zones really only represent current and historic industrial logging activity, arbitrary protection buffers, and visible scarring on cedars. How confidently can we consider these boundaries as true outlines of indigenous forest

usage? In areas where cedar was prominent, and stands accessible, is it possible that many harvesting sites had no distinguishable boundaries? Could the only true boundaries of sites be along the blurred lines of forest type, accessibility and the temporal boundaries of ownership and memory, related to the visitation periods of harvesters? Many areas on

the coast would suggest this to be the case. If all recorded sites are larger than they appear today, it may be that entire regions should be considered anthropogenic landscapes.

Anthropogenic landscapes

The extent to which many of these CMT stands have had multiple harvesting events is an argument for their inclusion into the realm of intensively managed physiomorphic ecosystems. As described earlier, recent ecological and archaeological studies have found many of the traditional resource collection sites on the Northwest Coast were often modified to maximize harvest over the long term (Anderson and Wohlgemuth 2012; Beckwith 2004; Deur 1999; 2002; Deur and Turner 2005; Groesbeck et al. 2013; Lepofsky 2004; Mobley and Eldridge 1992; Stryd and Eldridge 1992; Turner et al 2013). Clams were dug in most natural beaches, however due to local resource pressures some coastal groups created monumental clam gardens for greater harvests of particular shellfish species. Camas was dug and cooked in natural prairies throughout southeastern Vancouver Island and the southern coast; however, fire management allowed for more expansive harvests for root crops. The demand for cedar was consistent across the northwest to such an extent that the Northwest Coast culture area is almost completely bound within its range (Pojar and Mackinnon 1994:42). However, due to high population or trade patterns, the demand for cedar increased in some areas. Almost all medium to large CMT stands seem to show evidence of multiple harvesting. Many examples of CMT stands (e.g., Arcas 1999; Eldridge 1988;1989) have conservatively recorded a quarter to half of all cedars exhibiting multiple harvesting (few of these have had post-assessments). Many of these forests, harvested intensively by untold numbers of generations, exist largely within the realm of human modification and intent. A cedar stand that exists for most of its life within the human conceptual map and has always been shaped human hands can only be considered an anthropogenic forest, or what Ingold would describe as a “built” landscape (1993).

Chapter 9: Concluding Remarks

9.1. Aboriginal Rights

“This is an important issue since almost no treaties had been established with BC First Nations. They still claim an unbroken ownership and use of their traditional territory and few claims regarding land use have been settled. In fact, virtually all forests under government tenure are subject to ongoing native claims.” (Nathan 1993 cited in Angelbeck 2008:124)

The issue of Aboriginal right to the land is central to these discussions as the harvesting of cedar and other forest resources is deeply connected to contemporary issues of occupation, ownership and land rights. As an introduction to this brief discussion I quote some opening passages and thoughts of Gilbert Sproat in his *Scenes and Studies of Savage Life* set in Alberni and Barkley Sound in the 1860s. While his thoughts crystallize the logic of dispossession taken by colonial governments and settlers, they also reveal something of the long-standing indigenous assertions of the inalienable nature of their ties to the land,

"Chiefs of the Seshahts," said I on entering, "are you well; are your women in health; are your children hearty; do your people get plenty of fish and fruits?"

"Yes," answered an old man, "our families are well, our people have plenty of food; but how long this will last we know not. We see your ships, and hear things that make our hearts grow faint. They say that more King-George-men will soon be here, and will take our land, our firewood, our fishing grounds; that we shall be placed on a little spot, and shall have to do everything according to the fancies of the King-George-men."

"Do you believe all this?" I asked.

"We want your information," said the speaker.

"Then," answered I, "it is true that more King-George-men (as they call the English) are coming: they will soon be here; but your land will be bought at a fair price."

"We do not wish to sell our land nor our water; let your friends stay in their own country."

To which I rejoined: "My great chief, the high chief of the King-George-men, seeing that you do not work your land, orders that you shall sell it. It is of no use to you. The trees you do not need; you will fish and hunt as you do now,

and collect firewood, planks for your houses, and cedar for your canoes. The white man will give you work, and buy your fish and oil."

"Ah, but we don't care to do as the white men wish."

"Whether or not," said I, "the white men will come. All your people know that they are your superiors; they make the things which you value. You cannot make muskets, blankets, or bread. The white men will teach your children to read printing, and to be like themselves."

"We do not want the white man. He steals what we have. We wish to live as we are...."

"The Right of Savages to the Soil

I spent some months very pleasantly directing the first work at the settlement. The vessels discharged their cargoes, and the carpenters worked on shore preparing timber for the houses and buildings.... The place the Indians had moved to was about a mile distant, and our conversation naturally was very much about them.... We often talked about our right as strangers to take possession of the district. The right of *bonâ fide* purchase we had, for I had bought the land from the Government, and had purchased it a second time from the natives. Nevertheless, as the Indians disclaimed all knowledge of the colonial authorities at Victoria, and had sold the country to us, perhaps, under the fear of loaded cannon pointed towards the village, it was evident that we had taken forcible possession of the district. The American woodmen.... **considered that any right in the soil which these natives had as occupiers was partial and imperfect, as, with the exception of hunting animals in the forests, plucking wild fruits, and cutting a few trees to make canoes and houses, the natives did not, in any civilized sense, occupy the land.** It would be unreasonable to suppose, the Americans said, that a body of civilized men, under the sanction of their Government, could not rightfully settle in a **country needing their labours, and peopled only by a fringe of savages on the coast.** My own notion is that the particular circumstances which make the deliberate intrusion of a superior people into another country lawful or expedient are **connected to some extent with the use which the dispossessed or conquered people have made of the soil,** and with their general behaviour as a nation. For instance, **we might justify our occupation of Vancouver Island by the fact of all the land lying waste without prospect of improvement.**.... Any extreme act, such as a general confiscation of cultivated land, or systematic personal ill-treatment of the dispossessed people, would be quite unjustifiable." (Sproat 1868:7-9, emphasis added)

Sproat's message gives heavy weight to the 'fact' that local First Nations did not 'occupy' or 'improve' the land, but that it was 'lying waste' without improvement. The

sum of Sproat's knowledge of forest use was that local people were "hunting animals in the forests, plucking wild fruits, and cutting a few trees to make canoes and houses," but they did not, "in any civilized sense, occupy the land"(1868:9). His perspective is one based on a perception of European landscapes, agriculture, clearcut forests and fences. The cognitive models First Nations had of the land and regionally developed physiomorphic land management practices such as clam gardens, prescribed burning, and estuarine gardens were not comprehensible from Sproat's perspective.

I suggest that few scientists, anthropologists or First Nations themselves could downplay the importance of cedar material for Northwest Coast cultures. Its centrality and importance to Northwest Coast culture trumps any comparison to a single agricultural resource tied to other cultures. Hopefully the last three decades of CMT research and the results of this study have shown to some degree that the proliferation of this resource's use is reflected in the scars, so-called 'collapsed acts' (Mead 1977[1938]:97 quoted in Ingold 1993:162), or 'photo-negatives' (Rautio et al. 2014:138) found throughout Northwest Coast forests. CMTs exist as evidence of Aboriginal Right to the land. Cedar management and harvesting forcefully demonstrate that the land was not "lying waste without improvement" (Sproat 1868:8), but was part of a system of ownership, stewardship, and sustainable resource management that literally 'improved' the land. Along with many other intensively used environments on the Northwest Coast, forest landscapes were carefully managed to maximize resource harvest for large populations potentially faced with the threat of over harvesting. This use of the land is significant proof of ownership.

The recent *Tsilhqot'in* case in the Supreme Court of Canada gave a rather clear declaration of what constitutes aboriginal claim to the land, one that is important to underscore in light of CMT research across the Northwest Coast.

"In my view, the concepts of sufficiency, continuity and exclusivity provide useful lenses through which to view the question of Aboriginal title. This said, the court must be careful not to lose or distort the Aboriginal perspective by forcing ancestral practices into the square boxes of common law concepts, thus frustrating the goal of faithfully translating pre-sovereignty Aboriginal interests into equivalent modern legal rights. Sufficiency, continuity and exclusivity are not ends in themselves, but inquiries that shed light on

whether Aboriginal title is established” (Tsilhqot’in Nation v. British Columbia 2014:para 32).

The following sections are summaries of the inquiries related to sufficiency, continuity and exclusivity. After that I briefly analyse CMTs in light of this Tsilhqot’in decision.

1. Sufficiency of occupation

Occupation must be seen as sufficient to grant Aboriginal title; the traversing or passing use of grounds is not seen as sufficient. “The common law perspective imports the idea of possession and control of the lands. At common law, possession extends beyond sites that are physically occupied, like a house, to surrounding lands that are used and over which effective control is exercised” (Tsilhqot’in Nation v. British Columbia 2014:para 36). Sufficiency of occupation is context specific, and the frequency and intensity of use may vary with the characteristics of the Aboriginal group (Tsilhqot’in Nation v. British Columbia 2014:para 37). In order to occupy the land sufficiently to gain title, the group must have historically acted in a way that it would communicate to a third party that it held the land for its own purposes (Tsilhqot’in Nation v. British Columbia 2014:para 38). There must be signs of appropriation that indicate an intent to use and control the land for one’s own purposes. “Apart from the obvious, such as enclosing, cultivating, mining, building upon, maintaining, and warning trespassers off land, any number of other acts, including cutting trees or grass, fishing in tracts of water, and even perambulation, may be relied upon. The weight given to such acts depends partly on the nature of the land, and the purposes for which it can reasonably be used” (McNeil 1989:198-200 quoted in Tsilhqot’in Nation v. British Columbia 2014:para 39).

2. Continuity of occupation

There must be evidence of continuity between present and pre-sovereignty occupation (Tsilhqot’in Nation v. British Columbia 2014:para 45). This doesn’t necessarily mean unbroken continuity, but rather evidence that the present occupation must have a pre-sovereignty antecedent (Tsilhqot’in Nation v. British Columbia 2014:para 46)

3. Exclusivity of occupation

The group must have had both intent and capacity to exclusively occupy the land. This may be proved by evidence that others were excluded from the land, or that access was granted only by permission by occupiers (Tsilhqot'in Nation v. British Columbia 2014:para 48).

The use and management of cedar forest on the Northwest Coast is closely aligned with all the stated pre-requisites for aboriginal title. CMTs are physical evidence of 'collapsed acts' of use within forest environments; they show clear 'sufficiency' of use, and not just mere traversing of the land. Regional CMT chronologies provide spatially specific frequencies of use from early periods through to the contact period, and in some cases even into modern times, thus establishing continuity of use over centuries. Ethnographies and oral histories tie together areas as traditional territories of present and extinct bands.

As for exclusivity to the land there is ample evidence of Nuuchahnulth concepts of ownership, transfer of rights, and conflict over infringements of rights in resource areas. The ownership of resource extraction sites has been well established through studies in the region (Deur and Turner 2005; Drucker 1951). Historical accounts make specific records of this. When Captain Cook and his crew began cutting trees on Bligh Island in Nootka Sound he was confronted by locals who demanded he obtain permission first (Angelbeck 2008:125). He spoke of the Nuuchahnulth's entrenched conceptions of ownership stating, "Here I must observe that I have no where met with Indians who had such highly developed notions of every thing the Country produced being their exclusive property as these" (Beaglehole 1967:306 quoted in Deur and Turner 2005:161). Drucker (1951:247) reiterates a similar commentary, "The Nootkans [Nuuchahnulth] carried the concept of ownership to an incredible extreme. Not only river and fishing stations close at hand, but the waters of the sea for miles offshore, the land, houses, carvings on a house post... names, songs, dances, medicines, and rituals, all were privately owned." Drucker describes the ownership in terms of economic and ceremonial rights and privileges that can be acquired or transferred through inheritance or as reward (Deur and Turner 2005:161). These rights of exclusive ownership are conceived in a very different conceptual framework than that known at the time by outsiders. Ahousaht Elder Roy

Haiyupis is quoted as describing this concept, *Hahuulhi*, at the Scientific Panel for Sustainable Forest Practices in Clayoquot Sound in 1995 (Deur and Turner 2005:163) by explaining that “the hereditary chiefs have the responsibility to take care of the forests, the land, and the sea within his ha hoolthe, and a responsibility to look after his *mus chum* or tribal members” (described elsewhere as rights of *tupaatis*). Ethnographies and outsider accounts of the pre-contact and early contact period suggest most conflicts were specifically instigated through high population pressures on resource areas and disagreements over land and resource ownership (McMillan 1996:60). Eldridge and Eldridge (1988:55) found that forest utilization patterns at the Newcastle block suggested patterns of ownership in which hard to access inland areas experienced intensive use while nearby shorelines were untouched.

In situations where land title may be established, the Tsilhqot’in Case also inquires about the ensuing rights granted to the Nation. These rights include: “the right of employment and occupancy of the land; the right to possess the land; the right to the economic benefits of the land; and the rights to pro-actively use and manage the land” (Tsilhqot’in Nation v. British Columbia 2014: para 73). The restriction placed on this title is that as it is collective title, it must be held for all future generations. As such, ownership cannot be transferred away from the group to anyone other than the Crown or changed to the degree that it would be unusable to succeeding generations (Tsilhqot’in Nation v. British Columbia 2014:para 74.). One would think the establishment of Aboriginal Title to CMT forests should lead to restoration of First Nations management of forest resources and the economic advantages and control that come with such ownership. The stipulation that lands must be used in such a way that does not “substantially deprive future generations of the benefit of the land” (Tsilhqot’in Nation v. British Columbia 2014:para 74.) would suggest the adoption of more efficient forestry practices than extant land use, ones that are in line with long term forest management strategies that have been practiced by First Nations for millennia.

9.2. Current Protections

Provincial legislation in British Columbia under the Heritage Conservation Act protects all archaeological resources pre-dating 1846 (Archaeology Branch, British

Columbia 1996: 13,2,d). Damage to or alteration of a protected Provincial heritage site or damage to or removal of a Provincial heritage object from that site constitutes an infringement of the Act (Archaeology Branch, British Columbia 1996: 13,2,a). Whether these sites are recorded or still unknown on Crown or private land, they are automatically protected (Klimko et al. 1998:35). CMTs only began to be recorded in the late 1980s after a number of studies investigated their characteristics and developed proper sampling procedures (discussed earlier; Arcas 1986; Eldridge and Eldridge 1988; etc). CMT surveys became commonplace following the establishment of the Forest Practices Code in 1995 which obligates forest companies holding tenure agreements to submit operational plans to the Ministry of Forests that include values such as cultural heritage resources (Klimko et al. 1998:33). The license must describe actions that will manage and conserve archaeological sites. In their inventories they must also exhibit how they will mitigate any disturbance to these cultural resources (Klimko et al 1998:34). Klassen et al. (2009) outlines how up until the 1997 Delgamuukw Case First Nations had little input or involvement in archaeological management. Following this there was a political response in the recognition of Aboriginal rights and title. Any development made on Crown lands would first have to determine if Aboriginal right existed on the land and whether the planned changes to the land obstructed those rights (Klassen et al. 2009: 208). This decision and successive court cases that followed allowed for better First Nations involvement and consultation in resource management decisions (Klassen et al. 2009: 209).

Currently individual CMT features identified in the landscape may be protected within a site surrounded by a 10 m buffered boundary (Archaeology Branch, MFLNRO 2015). If CMTs exist in a cluster within 10 m of each other the boundary is often drawn to connect them. If they are beyond 50 m from each other the sites are considered as separate. Those clusters that are between 10 and 50 m apart may be connected or not, depending on the opinion of the recording archaeologist. Often an 'arm' of the protected site may reach outwards to include these outliers.

The 10 m buffer is largely an arbitrary number enacted to surround archaeological sites. For CMTs, within forest stands, it is unsupported by current forestry literature on windthrow buffers and boundaries. Measurements of wind exposure, forest boundary

orientation, stand structure and soil type (Mitchell et al 2001; Ruel 1995; Ruel et al. 2001) are the most important factors affecting retention of stands when attempting to retain them on edges of forest cut blocks. In an old-growth forest there is little forest material offering protection in a 10 m buffer for CMTs, especially when much of the material in that boundary might become a windfall hazard. CMTs are particularly at risk because scarred and snag trees with dead or hollow centres are likely more susceptible than other trees to fall due to exposure from forestry activity.

Whenever part of the protected site is going to be impacted and mitigation is needed, a sampling strategy suggested by Muir and Moon (2000: 20) is often used to retrieve an “accurate characterization of a site population in terms of: feature age, type, number and spatial distribution”. The number of suggested samples taken is based on the variability of these different attributes. Smaller samples are taken in narrower ranges; larger samples are taken where greater variability is encountered. Though different traits of a site can be considered in their statistical calculations, a chart for sampling is offered. If a CMT group (of a certain type) consists of fewer than 30 features, 100% of recording is efficient. If a group consists of about 150 features, 50% of features should be recorded. For 400 features 25% should be recorded, and so on (Muir and Moon 2000). It appears from analysis of CRM dates taken within southern Nuuchahnulth regions that sampling is rarely this extensive. Additionally, none of these sampling strategies assumes that over 50% of features (embedded scars) are consistently overlooked in recorded sites. The current sampling strategy would return a biased sample of dates, and struggle to include the oldest of the sample. Such a strategy can only effectively work in the conditions of a post-assessment in which close to 100% of available data is exposed.

Most important is the question of the overlooked TBS features found during this study. In the current survey process CMT site boundaries and sampling processes are flawed in their consistent under-recording of CMT features in landscapes. During this survey embedded and difficult to identify open scars were found to account for over half of all TBS CMTs recorded. Every CMT site visited was noted to have missed TBS features, as was every clearcut within a half km of CMT sites. AIAs that are completed with due diligence are still unable to detect a large portion of protected heritage features within the land. For disassociated sites with known CMTs randomly distributed in old

growth cedar forests (without potential models) there is around a 40% chance for the discovery of unrecorded TBS CMTs. Despite prior knowledge of the existence of embedded TBS scars from among the earliest CMT studies (Arcas 1986b, Eldridge and Eldridge 1988) there has been no system in place for surveys to occur after logging events either for investigating overlooked scars or to verify the continued existence of the ‘protected’ site (Angelbeck 2008:138). As 100% of post-impact assessed CMT sites were shown to have inadequately protected heritage features, this lack of review or oversight can no longer be seen as acceptable.

9.3. Recommendations.

“Our forests and mountainsides tell us the histories of our ancestors. If you destroy these modified trees, these histories will be destroyed. It’s as if we went into a library and ripped up the one and only existing copy of a history book.” (Sam 1997:92 quoted in Turner et al. 2009:238)

“The erasure removes a clear reminder of indigenous presence in the landscape, markers that these are traditional territories. The destruction of these trees is essentially the destruction of records. The logging of these heritage trees can readily be seen as a rewriting of history—the removal of the evidence of Aboriginal forestry in the wake of a corporate one. Given the context of unsettled land claims, this erasure takes on greater importance.” (Angelbeck 2008:139)

Limited widespread research into embedded and overlooked CMT features in BC forests has led to a lack of oversight in the removal of countless archaeological features of unknown scientific and cultural value since the first collections of CMT data in the late 1980s and protections in 1995 (Klimko et al 1998). It is clear that while current AIAs are completed with due diligence under Section 12 of the Heritage Conservation Act they are not able to uncover all existing CMT features within surveyed areas. The post-impact assessment surveys detailed in this study suggest most, if not all, recorded sites are larger than they appear. Current logging practices are systematically infringing on Heritage Conservation Act protections in most cut blocks around protected CMT sites, and many unassociated old growth cedar cut blocks

The BC Archaeology Branch has a responsibility to protect all cultural resources pre-dating 1846; however there is an inherent bias against an older age class of CMT features. This group of features not only provides important cultural and historical

information, but also should hold great sway in the issue of aboriginal title within coastal forests. I suggest a number of recommendations that will ensure adequate protection for sites, and appropriate measures for the salvage of data from recently destroyed CMT archives.

1. Heritage Protections for whole stands of CMTs rather than individual features.

The results of this study suggest that CMT sites found during AIAs are very strong positive indicators of many overlooked and embedded TBS scars, and possibly other evidence of forest usage. The fact that unrecorded CMTs were always found within 500 m of recorded CMTs suggests the need for substantial increase of buffers around CMT features, or possibly even the creation of blanket protections for old growth stands within areas of known forest usage.

Inadequate borders

The existing borders around archaeological sites, specifically CMT sites are not appropriate from a site protection standpoint. Current 10 m buffers do not provide adequate protection against windfall for existing CMT features exposed on the edge of cutblocks. Current forestry literature clearly points to the need for a thorough analysis of site specific climactic, topographic, and pedologic studies, as well as an analysis of stand structure to appropriately guard against windfall (Mitchell et al 2001; Ruel 1995; Ruel et al. 2001). The creation of larger forest utilization CMT sites rather than individual feature sites would add to their physical protection. The creation of appropriate buffers around these sites should also take into account site specific conditions affecting windthrow.

Not isolated features

From a cultural use perspective, the protection of CMTs on a feature by feature basis negates the fact that the majority of CMT stands are multiple use sites revisited countless times throughout generations, often over the course of many centuries. They were sites often used in their entirety and represent more than just single, detached events. There is sufficient literature detailing inherited rights of ownership and use over such resource extraction areas (Angelbeck 2008:125; Deur and Turner 2005:161; Drucker 1951:247) as well as CMT studies that prove the tending of cedar was prolific and continuous over time and space in most areas. Again, the results of this study prove that

the physical evidence of such expanded use does still exist in the landscape. The presence of such evidence for tending and management of cedar bark harvesting should be considered of utmost value to the question of aboriginal title over such areas of woodland. By the standard of what constitutes land ownership set out during the *Tsilhqot'in* case (*Tsilhqot'in Nation v. British Columbia* 2014) these modified cedar forest stands are of primary concern to the descendant communities still living within their ancestral territories. For these reasons, whole CMT stands must have adequate protection from destruction by non-aboriginal interests.

Identification

Visible CMT features of any number appearing in the landscape, especially in areas of CMT potential, should be considered as indicators of larger use sites. Presently in archaeological surveys, positive shovel tests often indicate site use. Protective borders are extended around these sites up to the nearest negative tests. The site boundary extends beyond the edge of all positive shovel tests. The inside is often minimally surveyed in order to confirm extension of the site. At the very least recorded standing CMT features should be considered in the same way that positive shovel tests suggest unseen archaeological features in the area. The embedded scars between and surrounding the CMT should be assumed to be present in the vicinity. The creation of regional scale CMT inventories and detailed potential models prior to any logging activities would increase the efficiency of finding more hidden CMT stands.

As several sites were found without the aid of previously recorded CMT features one must address the issue of embedded scars in the land that might be completely undetectable within a standing forest. In some of these cases a closed seam may be detectable on the outside of the tree, but many will not. The review of CMT potential models and the survey of clearcuts in the region of proposed cutblocks may give insight into the potential for embedded scars.

The proliferation of these overlooked features, combined with the undersampling of recorded features over the last three decades should highlight how much evidence of forest use has been lost, and how endangered these sites have become in the face of logging. This research should enhance the urgent need for greater protections.

2. The elimination or extreme reduction of clearcutting within old growth environments.

I suggest the elimination or extreme reduction in clearcutting within old growth cedar forests. The protections of more CMT forest sites, and the transition to smaller cutblocks and selective logging would be a step towards the ecosystem based forest management that has obviously been maintained in Northwest Coast forests for thousands of years. Many First Nations have advocated for more efficient logging practices that leave less of a footprint on the land: selective logging, heli-logging, and even reuse of abandoned logging roads instead of creating new ones (Angelbeck 2008:124). The training of fallers to identify embedded scars would be a simple task and would allow CMT sites to be detected and marked during projects. With such a protocol entire forest utilization sites would not be erased from history in single logging operations.

Appropriate fines, in line with Heritage Conservation Act stipulations, should be in place for the destruction of any CMT, including embedded scars. The destruction of one embedded scar during a logging operation can often not be avoided. However the exposure of one embedded scar in a cutblock should be considered ample suggestion that more exist, and operations should stop. This is similar to the cessation of continued construction under threat of prosecution in areas where buried midden is located. The continued logging of a stand of old growth following the exposure of a protected feature should be treated as willful ignorance, and thus prosecutable under the Heritage Act. The Forest Practices Code includes references to protections of cultural heritage resources. It states that if a person carrying out forestry activity finds a cultural heritage site that was not previously recorded or noted the person must either, “(a) modify or stop any forest practice that is in the immediate vicinity of the previously unidentified resource feature to the extent necessary to refrain from threatening it, and(b) promptly advise the district manager of the existence and location of the resource feature.” (British Columbia MFLNRO 1995: Part 4, Section 51). The existence of embedded scars in old growth cedar forests should be widely known by foresters and should be searched for during all logging operations in and around ancient forests.

3. Post-impact assessments of old-growth cedar stands

The lack of regular audits for CMT sites after logging operations ensures the continued invisibility of CMTs throughout Northwest Coast forests. It arrests any expanded historical and cultural knowledge about indigenous forest use, and willfully collaborates in the erasure of evidence of Aboriginal forest use on what are unceded territories.

Future:

Going forward I believe that both AIA and post-impact assessments are necessary for the representation and thorough recording of CMT data within cedar forests in association with any form of old growth logging. Due to the invisibility of embedded scars both pre- and post-assessments should be required in all old growth forests that are proposed for logging and have CMT potential.

AIA of standing forests are necessary for the identification of open TBSs and indigenous logging features that are only visible in a standing forest. Features seen only in the profile of TBSs, such as tool marks, length and shape of scars, and bark on scar faces, provide additional proof of cultural modification. The results of this study suggest that revisits to all AIA survey areas in old-growth cedar forests following logging activity should be considered a minimal requirement for both the discovery of overlooked CMT forests and the recovery of data on embedded features. This would ensure that all embedded scars and overlooked scars are recorded. Collecting samples only during post assessments might also increase efficiency, reduce problems of miss-labelling or losing CMT disk samples, and recording the of natural samples.

Most clearcuts accessed during my surveys had relatively high cuts taken at the base of old growth cedars. I had expected that most would miss the cross-section with the scar crusts. I believe that any continued old-growth cedar clearcutting should maintain this high cutting of all cedar trees. It would be useful for First Nations foresters working in home territories to be able to recognize the features of cultural scarring on such trees. That way stumps can be cut on site, at the time of discovery to allow for immediate or follow up recording of features seen in cross-section.

Retroactive audits:

It is imperative that retroactive surveys of clearcuts in areas of CMT potential be undertaken to confirm and record lost data that likely exist in exposed in logged areas. These audits would also contribute to better understanding of more efficient ways to protect such features in the future.

Despite the diminishing amount of remaining old growth forests, the last few decades have seen extensive logging of remnant stands across southern Vancouver Island (Fig. 135; Leversee 2014). The relatively even distribution of these clearcuts suggest the potential for audits of overlooked CMTs that were illegally logged due to lack of appropriate surveys and sampling measures. Data collected by such surveys would be of great value to the archaeological history of BC and to local First Nations. Over the course of this survey identifiable cultural scars have been seen in stumps cut over the past 20 year, and suggestive features in stumps well over 50 years old.

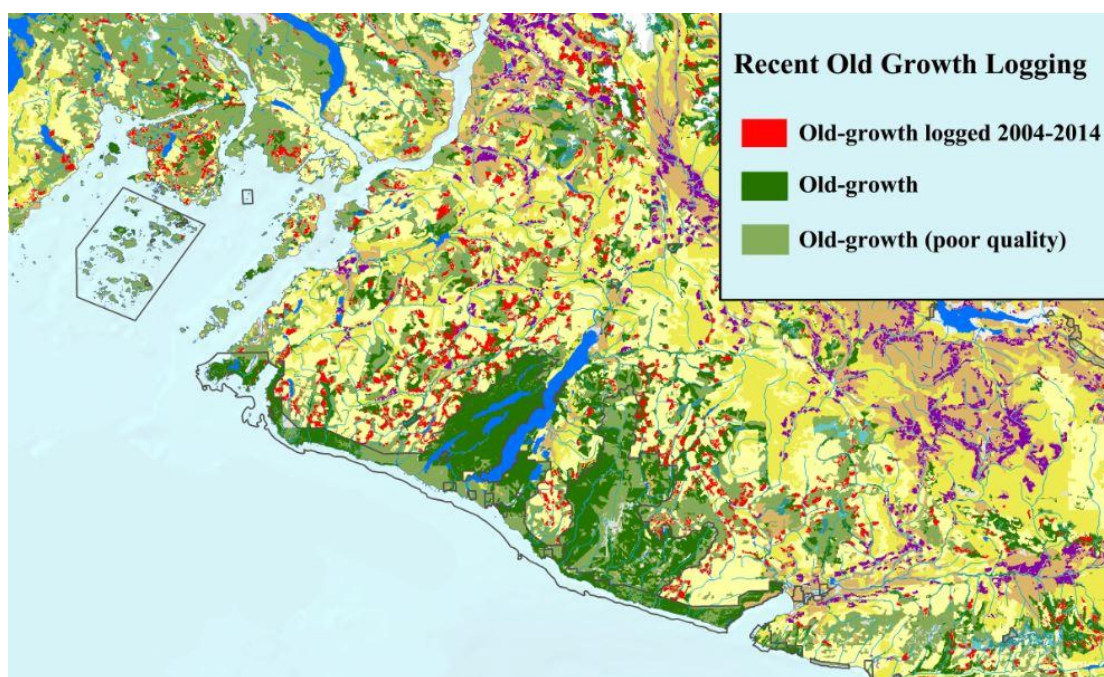


Figure 135: Recent old growth logging within study region (reproduction courtesy of Leversee 2014).

9.4. Conclusion

“In early times, native people felt that even the stump left after felling a cedar contained life and a spirit. A Tlingit legend tells of Raven, who was roasting some salmon and having an argument with Stump. Eventually, angry Stump deprived Raven of his meal by throwing himself over the fire and the roasting salmon. An old Tlingit pole depicts the orange-shafted flicker (a special family crest) perched on a tree stump—the latter personified as a human with its knees drawn up in front.” (Stewart 1984:179).

CMT features in the landscape stand as not only a verification of First Nation’s use, management and ownership of vast tracks of coastal forest, but as a consistent ‘pulse’ of those connections through time and space. As Stafford and Maxwell (2006:6) write, “[t]hey are history written on the landscape.” No other feature, archaeological site, plant, ethnographic record or historical document so consistently places human beings throughout the landscape in particular places, at particular times, for the purposes of interacting with an object as culturally important as cedar. Despite consistent reiterations of the importance of CMTs to First Nations history (British Columbia, Archaeology Branch 2001; Eldridge and Eldridge 1988; Mobley and Eldridge 1992; Pegg 2000; Stafford and Maxwell 2006; Stryd and Eldridge 1993) the lack of recent, large scale studies into CMT morphology and regional distribution has led to the continued destruction of these features.

Within southern Nuu-chah-nulth areas there appears to be inadequate recording and sampling of all CMT features in the process of mitigating negative affects to these archaeology sites during logging and other development. Inadequate recording of sites, blacklogs of sites waiting for protection, and dispersal of such records are major impediments in the way of tracking down CMT data from recorded sites. More importantly, however, it seems that many altered sites are substantially under-sampled. Reports often suggest this to be the result either of mislabelling and misplacing samples, or the extraction of poor samples after the AIA during logging activity.

In addition to poor sampling, we are overlooking a substantial number of CMTs in the field. One hundred percent of clearcut surveys within half a kilometre of known CMT sites turned up overlooked TBS CMTs, both embedded and open features. Forty

percent of clearcut surveys that were far removed from CMT sites encountered overlooked TBS CMTs (almost half if we include Browns Mountain). About half of all TBS scars—the most common CMT feature—are embedded and undetectable by AIAs. Another 17 % are obscured and unlikely to be identified. Judging from these surveys, an additional percentage of open faced, identifiable CMTs are also overlooked simply by the nature of archaeological assessments in overgrown, standing forests. I am confident in saying that AIAs are missing well over half of CMT features, and under-sampling the features that are found.

Post-impact assessments have been shown to recover a substantially more representative distribution of features and dates than current AIAs undertaken prior to logging activity. The date range for TBS CMTs found in post assessments is in line with the true lifespan of cedar trees than represented in existing chronologies. It also reflects considerable First Nations populations harvesting cedar prior to the tumultuous episodes of depopulation brought on by the contact period. Representative sampling of post-impact assessments may not only provide insights into pre- and post-contact period demographics, but a host of other land use questions otherwise lost to history or in need of corroboration. There is also a need for the deeper study into cedar tending, and multiple bark harvesting events in intensively used CMT sites. Patterns of bark peeling to induce lobe growth should provide greater insight into the sustainable anthropogenic management of cedar forests.

The lack of appropriate study into CMTs is contributing to the erasure of evidence of aboriginal use and title to forest lands within existing First Nations territories. The possibility of salvage archaeology within clearcut old growth areas, and the future potential for post-impact assessments around any logging areas can do much to remedy destruction of this evidence. Post-impact assessments should be considered a requirement for any future old growth logging activity within cedar stands. Finally, the phasing out of old growth clearcutting in cedar forests paired with the expansion of protected cultural forest boundaries is suggested due to the nature of embedded scarring, and the expanse of cultural forests on the west coast of Vancouver Island.

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Appendix I

Appendix 1 consists of all basic CMT data collected by CRM companies and archived within the Archaeology Branch of British Columbia. Dates were found either within Detailed Site Forms, Archaeological Impact Assessment reports or Site Alteration Permit Reports. Dates are broken down by accuracy of the extracted date, as best determined by the report.

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DdSa-4		62	yellow cedars	tapered scar	several	0		0	1527	1503, 1503	3	bef 1684, bef 1829, abt 1606, bef abt 1503	iverson forest eng., coast interior arch. (later Millenia Research 2013)	bef 1684 (M59, cookie sample off dead tree=considerably older?), bef 1829 (M39, cookie sample off dead tree=considerably older), abt 1606 (MA40, cookie sample estimated date), bef abt 1503 (MA40, cookie sample estimate date), abt 1527 (XX1, cookie sample +/-10 years, yellow), abt 1503 (A58, cookie sample +/- 25 years, yellow), abt 1503 (A58, cookie sample +/-25 years, yellow, two scars)	2013-0117 report, Millenia	all yellow cedars stripped, very likely cultural but very little literature on cultural vs natural scarring of yellow cedar trees. Clean 'cultural' scars on either side of A58, the same year, is definitive to me to be cultural.	
DdSa-8		12	yellow cedar	tapered scar		0		0			1	1749		bef 1749 (CMT increment core, core not long enough? min 257 bef 2006)	Coast Interior Archaeology		(detailed site report-ref 2006-434)

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DdSc-17		9?	cedar	logged: stump (2), tested(1), planked(1). Tapered scar(5)		15	1795, 1802, 1808, (mm7-1788),1775, 1896, 1809, 1750, 1725, 1805, 1725, 1815, 1725, 1612, 1894.	(mm7-1727, 1788, 1725, 1668) (cmt24-1663, 1665)			6			abt 1727 (CMT MM7, dendro cookie), abt 1788 (CMT MM7, dendro cookie), abt 1725 (CMT MM7, dendro cookie), abt 1668 (CMT MM7, dendro cookie), [abt 1663 (CMT24, dendro cookie), abt 1665 (CMT24, dendro cookie) could be same scar], 1795 (CMT MM1, dendro cookie exact), 1802 (CMT MM1, dendro cookie exact), 1808 (CMT MM1, dendro cookie exact), 1788 (CMT MM7, dendro cookie exact), 1775 (CMT MM18, dendro cookie exact), 1896 (CMT D04, dendro cookie exact), 1809 (CMT23, dendro cookie exact), 1750 (CMT24, dendro cookie exact), 1725 (CMT24, dendro cookie exact), 1805 (CMT24, dendro cookie exact), 1725 (CMT24, dendro cookie exact), 1725 (CMT24, dendro cookie exact), 1815 (CMT24, dendro cookie exact), 1725 (CMT24, dendro cookie exact), 1612 (CMT25, dendro cookie exact), 1894 (CMT28, dendro cookie exact).	millenia	some may pre-date 1846.	recently dated 2012-0345

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSe-47		59?	red cedar	tapered scar	59 harvested	0		1825, 1892, 1835, 1892, 1893, 1893, 1695, 1827, 1892, 1695,	1795-1815, 1823-33		12			abt 1825 (CMT A8, TBS likely cookie), abt 1892 (CMT D4, TBS, likely cookie), abt 1893 (CMTD3-3, TBS, likely cookie), abt 1834 (CMT A54-2, TBS, likely cookie), abt 1892 (CMT A41-3, TBS, likely cookie), abt 1893 (CMT D3-2, TBS likely cookie), 1693-97 (CMT A41-1, TBS, likely cookie), abt 1827 (CMT D3-1, TBS, likely cookie), abt 1892 (CMT A29, TBS, likely cookie), 1693-97 (CMT A41-2, TBS, likely cookie), 1795-1815 (CMT A45-1, TBS, likely cookie), 1823-33 (CMT A15, TBS, likely cookie)	arcas	still need to find 1999-120 for more details on site/dates	(detailed site report-ref 1999-120?)
DeSe-54		1		bark stripped		0		0			1	1846		bef 1846 (CMT 1, dendro cookie-min date due to rot)	baseline	cookie sample taken	(detailed site form- ref 2002-162?)
DeSf-37		2?	cedar	tapered scar		2		1828, 1828			0			1828 (CMT 02, increment core taken, TBS), 1828 (CMT 02, increment core taken, TBS)	Huuauaht, Arcas, (dates M.L. Parker Company Inc.)	two TBS taken from one CMT, report says 1928 in one section, 1828 in two diff sections. Also, although it says "exact dates" moved them to "abt exact" as they are both taken via increment borer.	(detailed site form)

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSf-38		28	red cedar	tested, bark stripped		6	1869, 1869, 1869	1870,1866-67, 1813-14, 1867-68			1			1869 (CMT 5, dendro cookie exact), 1869 (CMT 22, dendro cookie exact), 1869 (CMT 12, dendro cookie exact), 1866-67 (CMT 1, dendro analysis), 1813-14 (CMT 4, dendro analysis), 1867-68 (CMT 20, dendro analysis), abt 1870 (CMT 9, dendro cookie 'circa')	Arcas, (dates M.L. Parker Company Inc.)	all four cmt dates seem to be from same barking episode... (additional dating CMT 1,4,20 in nov 95). Also, unclear if dates are from extracted cookies, or increment borer.)	(detailed site form)
DeSf-39		35	red cedar	bark stripped		1	1815				0			1815 (CMT 8, likely dendro cookie)	Arcas, (dates M.L. Parker Company Inc.)	likely dated from cookie samples, as harvesting happened a month earlier	(detailed site form)
DeSf-43		12	red cedar	bark stripped	12 harvested	0		1801,1820, 1837, 1802, 1828, 1846			6			abt 1801 (dendro cookie, maybe exact), abt 1820 (dendro cookie, maybe exact), abt 1837 (dendro cookie, maybe exact), abt 1802 (dendro cookie, maybe exact), abt 1828 (dendro cookie, maybe exact), abt 1846 (dendro cookie, maybe exact)	Arcas, Huuayaht	listed in spreadsheet as "abt exact" as they were taken from disk samples.	
DeSf-50		2	red cedar	bark stripped	2 harvested	0					1	1872		bef 1872 (CMT2, frag round, min count, cultural)	baseline	1 other CMT dated to 1864, but 'uncertain' cult origins.	2013-0298, obtained from chelsea gogal, baseline. April 2015.
DeSf-62		1	red cedar	bark stripped		1	1868				0			1868 (CMT 9, TBS cookie, exact)	baseline	lobe thickness= likely pre-1846.	2009-0011

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSf-63		8	red cedar	bark stripped	7 impacted	5	1818, 1878, 1875, 1868, 1873				0			1818 (CMT 1, TBS cookie, exact), 1878 (CMT 5, TBS cookie, exact), 1875 (CMT 6, TBS cookie, exact), 1868 (CMT 14, TBS cookie exact), 1873 (CMT 15, TBS cookie, exact)	baseline	lobe thickness= likely pre-1846.	2009-0011
DeSf-64		6	red cedar	bark stripped	7 impacted	3	1863, 1910, 1868				0			1863 (CMT 2, TBS cookie, exact), 1910 (CMT 3, TBS cookie, exact), 1868 (CMT 17, TBS cookie, exact)	baseline	lobe thickness= likely pre-1846.	2009-0011
DeSf-65		2	red cedar	bark stripped	2 impacted	1	1956				0			1956 (CMT 11, TBS cookie, exact)	baseline	lobe thickness= likely pre-1846.	2009-0011
DeSf-66		1	red cedar	bark stripped	1 impacted	1	1872				0			1872 (CMT 12, TBS cookie, exact)	baseline	lobe thickness= likely pre-1846.	2009-0011
DeSf-68,69			red cedar	TBS		3	1805, 1768, 1751				0			1805 (CMT UNK, TBS cookie, exact), 1768 (CMT UNK, TBS cookie, exact), 1751 (CMT UNK, TBS cookie, exact)	baseline	collected from block but missing CMT #s	2010-0039
DeSf-68		8	red cedar	windfallen planked (2), bark stripped(6)	8 impacted	4	1653, 1746, 1653, 1740				0			1653 (CMT 3, TBS cookie, exact), 1746 (CMT 6, TBS cookie, exact), 1653 (CMT 21, TBS cookie, exact), 1740 (CMT 25, TBS cookie, exact)	baseline		2010-0039
DeSf-69		16	red cedar	bark stripped		6	1806, 1616, 1657, 1832, 1808, 1806				0			1806 (CMT 9, TBS cookie, exact), 1616 (CMT 10, TBS cookie, exact), 1657 (CMT 12, TBS cookie, exact), 1832 (CMT 13, TBS cookie, exact), 1808 (CMT 14, TBS cookie, exact), 1806 (CMT 17, TBS cookie, exact)	baseline		2010-0039

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSf-70		2	red cedar	bark stripped	2 impacted	1	1849				1	1811		1849 (CMT 1, TBS cookie exact count), bef 1811 (CMT 2, TBS cookie min date, rot)	baseline	healing lobe thickness= likely pre-1846.	2010-0372
DeSf-72		8	red cedar	bark stripped	4 impacted	4	1810, 1834, 1841, 1851				1	1903		1810 (CMT 2, TBS cookie, exact), 1834 (CMT 2, TBS cookie, exact), 1841 (CMT 3, TBS cookie, exact), 1851 (CMT 4, TBS cookie, exact), bef 1903 (CMT 1, TBS cookie, uncertain due to rot)	baseline	proximity to other sites= likely pre-1846.	2011-0152
DeSf-73		3	red cedar	bark stripped	2 impacted	1	1743				0			1743 (CMT 20, TBS cookie, exact)	baseline	proximity to other sites= likely pre-1846.	
DeSf-74		10	red cedar	bark stripped	9 impacted	6	1871, 1946, 1870, 1868, 1867, 1867		1866, 1874		2			1871 (CMT 3, TBS cookie, exact), 1946 (CMT 5, TBS cookie, exact), 1870 (CMT 7, TBS cookie, exact), 1868 (CMT 11, TBS cookie, exact), 1867 (CMT 15, TBS cookie, exact), 1867 (CMT 16, TBS cookie, exact), abt 1866 (CMT 14, TBS cookie, heavily rotted), abt 1874 (CMT 17, TBS cookie, cut too low, uncertain age)	baseline	cmt 14 and 17 put into date buffer of +/- 10 years, as comments in report suggest uncertainty with age.	2011-0206

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSf-76		83	red cedar	bark stripped	25 impacted	4	1893, 1870, 1891, 1889				11	bef 1883, bef 1886, bef 1882, bef 1880, bef 1892, bef 1876, bef 1868, bef 1888, bef 1892, bef 1883, bef 1892		1893 (CMT5, BS cookie, 1 intact scar crust, cultural), 1870 (CMT 86, BS cookie, 1 intact crust, cultural), 1891 (CMT 98, BS cookie, 1 intact crust, exact count, cultural), 1889 (CMT U-1, BS cookie, 1 intact scar crust, exact count, cultural), bef 1883 (CMT35, min count, cultural), bef 1886 (CMT68, most of crust missing, Y missing rings, cultural), bef 1882 (CMT69, incomplete round, Y missing rings, cultural), bef 1880 (CMT70, min count, cultural), bef 1892 (CMT80, centre rot, min count, cultural), bef 1876 (CMT83, min count, cultural), bef 1868 (CMT85, min count, cultural), bef 1888 (CMT 89, paired crusts, frag due to rot, min count, cultural), bef 1892 (CMT95, frag scar crust, Y missing rings, cultural), bef 1883 (CMT98a, rotted crust, min count, cultural), bef 1892 (CMT99, rotted, min count, cultural)	baseline		2013-0298, obtained from chelsea gogal, baseline. April 2015.
DeSg- 91, 92, 93, 95, 96, 97, 98, 99, 100				TBS		5	1866, 1866, 1817, 1827, 1798				3	1822, 1829, 1940		1866 (UNK, cookie exact, def cult), 1866 (UNK- stripped at same time as other 1866, cookie exact, def cult), 1817 (UNK, cookie exact, def cult), 1827 (UNK, cookie exact, def cult), 1798 (UNK, cookie exact, def cult), bef 1822 (UNK, cookie, min date, miss rings rot), bef 1829 (UNK, cookie, min date, miss rings rot), bef 1940 (UNK, cookie, min date, miss rings rot)		improper labeling made samples unusable for reporting purposes	2005-399

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSg-101		7	cedar	barkstripped	4 harvested	2	1858, 1858, 1856				1			1858(CMT 10, dendro cookie, exact), 1858 (CMT 11, dendro cookie exact), bef 1856 (CMT 3, TBS cookie, exact)	Baseline	likely pre-1846	RAAD and 2006-0141, [2007-131 (states all are exact)]
DeSg-102		1	cedar	barkstripped	1 harvested	0		0			1	1769		bef 1769 (CMT 4, dendro cookie rotten sample)	Baseline	likely pre-1846	RAAD and 2006-0141, 2007-131
DeSg-103		1	cedar	barkstripped	1 harvested	1	1915				0			1915 (CMT 5, dendro cookie exact)	Baseline	likely pre-1846	RAAD and 2006-0141, 2007-131
DeSg-104		1	cedar	barkstripped	1 harvested	1	1915				0			1915 (CMT 6, dendro cookie exact)	Baseline	likely pre-1846	RAAD and 2006-0141, 2007-131
DeSg-107		9	red cedar	barkstripped	9 harvested	7	1859, 1889, 1872, 1881, 1870, 1869, 1884				0			1859(CMT 13-1, dendro cookie exact), 1889 (CMT 19, dendro cookie exact), 1872 ("na", dendro cookie exact), 1881 (CMT 16, dendro cookie exact), 1870 (CMT 8, dendro cookie exact), 1869 (CMT 13-1, dendro cookie exact), 1884 (CMT 7, dendro cookie exact)	Baseline		RAAD and 2007-131
DeSg-108		4	red cedar	barkstripped	4 harvested	5	1873, 1889, 1893, 1892, 1891				0			1873 (CMT 27-1, dendro cookie exact), 1889 (CMT 9, dendro cookie exact), 1893 (CMT 29, dendro cookie exact), 1892 (CMT 26, dendro cookie exact), 1891 (CMT 27-2, dendro cookie exact)	Baseline	likely pre-1846 lobe thickness.	RAAD and 2007-131
DeSg-109		4	red cedar	barkstripped	4 harvested	4	1759, 1763, 1782, 1761				0			1759 (CMT 2, dendro cookie exact), 1763 (CMT 5, dendro cookie exact), 1782 (CMT 4, dendro cookie exact), 1761 (CMT 3, dendro cookie exact).	Baseline		RAAD and 2007-131

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSg-51		121??		Logged: flat stump, barberchair stump, planked, stumps (91 various), tested(3), canoe, undercut, sectioned, step stump, notched. Bark stripped, kindling collection		0		0	1950, 1918, 1820, 1816, 1880, 1914		12		1841+, 1764+, 1900+, 1949+, 1855+, 1755+, 1883, 1718, 1745	abt 1950 (CMT 71, increment tbs 'circa'), bef 1841 (CMT 54, increment nurse *incomplete-no pith), bef 1764 (CMT 79, increment nurse tree**incomplete-no pith), bef 1900 (CMT 76, increment nurse tree **incomplete-no pith), abt 1918 (CMT 97, increment bark strip *positive ring expansion), bef 1949 (CMT 60, increment nurse tree**incomplete-no pith), abt/bef 1820 (CMT 63, increment "sample"?), before 1855 (CMT 54, increment nurse tree**incomplete-no pith), bef1755 (CMT 79, increment nurse tree**incomplete-no pith), abt/before 1816 (CMT 85, increment "sample"), abt 1880 (CMT 51, increment bark strip**possible ring expansion), abt 1914 (CMT 69, increment tbs**positive ring expansion), bef 1883 (CMT 75, dendro cookie nurse), bef 1718 (CMT 93, dendro cookie nurse- 1801, 1847= age of other nurse trees on same CMT), bef 1745 (CMT 94, dendro cookie nurse-1749= age of other nurse tree on same CMT)	gov't and reserve		detailed site form and SAP 2004-269
DeSg-72		13	red cedar	bark stripped		2	1763, 1881		1850	1960	2		1763 ("1", dendro cookie, "exact"), 1881 ("20", dendro cookie, "exact"), abt 1960 (CMT 2, on basis of external appearance), abt 1850 (CMT 1, increment bore 'circa')	Baseline	RAAD, [2007-131 (only records exact dates)]		

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSg-78		72	cedars	logged: canoe, sectioned, notched, planked, stump. Bark stripped	41 harvested	14	1783, 1777, 1721, 1806, 1710, 1627, 1648, 1807, 1817, 1878, 1616, 1805, 1868, 1645				3		1898, 1736, 1887	1783 (CMT 17, dendro cookie exact, TBS), 1777 (CMT 19, dendro cookie exact, TBS), 1721 (CMT 19, dendro cookie exact, TBS), 1806 (CMT 21, dendro cookie exact, TBS), 1710 (CMT 26, dendro cookie exact, TBS), 1627 (CMT 40, dendro cookie exact, TBS), 1648 (CMT 40, dendro cookie exact, TBS), 1807 (CMT 40, dendro cookie exact, TBS), 1817 (CMT 50, dendro cookie exact, TBS), 1878 (CMT 56, dendro cookie exact, TBS), 1616 (CMT 63, dendro cookie exact, TBS), 1805 (CMT 68, dendro cookie exact, TBS), 1868 (CMT 69, dendro cookie exact, TBS), 1645 (CMT 70, dendro cookie exact, TBS), bef 1898 (CMT 42, dendro cookie, nurse hemlock), bef 1736 (CMT 51, dendro cookie nurse heml), bef 1887 (CMT 51, dendro cookie nurse heml)	Baseline	MISSING-FOUND april 2, 2014 from arch branch	detailed site form and 2007-239
DeSg-79		1	cedar	barkstripped	1	1	1863				0			1863 (CMT 2, dendro cookie 'exact')	Baseline, western forest products	2007-239	detailed site form and 2007-239

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSg-92		12	cedar	barkstripped	12 impacted	4	1839, 1821, 1846, 1846				5	1824, 1837, 1928, 1931, 1829		1839 (CMT 19, cookie exact, def cult), 1821 (CMT 20, cookie exact, def cult), 1846 (CMT 20, cookie exact, def cult), 1846 (CMT 20, cookie exact, def cult, stripped same time as scar 2), 1824 (CMT 6, cookie, min date, miss rings rot), 1837 (CMT 6, cookie, min date, miss rings rot), 1928 (CMT 8, cookie, min date, miss rings rot), 1931 (CMT 10, cookie, min date, miss rings rot), 1829 (CMT 18, cookie, min date, miss rings rot)	Baseline	likely pre-1846	2005-399
DeSg-93		1	cedar	barkstripped	1 impacted	0		0			1	1896		bef 1896 (CMT 1, cookie, min date, miss rings rot)	Baseline	likely pre-1846	2005-399
DeSg-95		63	cedar	barkstripped	57 impacted	14	1925, 1825, 1816, 1845, 1642, 1815, 1850, 1822, 1820, 1823, 1822, 1812, 1799, 1598				3	1721, 1966, 1839		1925 (CMT 35, cookie exact def cult), 1825 (CMT 40, cookie exact def cult), 1816 (CMT 40, cookie exact def cult), 1845 (CMT 40, cookie exact def cult), 1642 (CMT 57, cookie exact def cult), 1815 (CMT 57, cookie exact def cult), 1850 (CMT 68, cookie exact def cult), 1822 (CMT 69, cookie exact def cult), 1820 (CMT 78, cookie exact def cult), 1823 (CMT 79, cookie exact def cult), 1822 (CMT 97, cookie exact def cult), 1812 (CMT 100, cookie exact def cult), 1799 (CMT 104, cookie exact def cult), 1598 (CMT 109, cookie exact def cult), bef 1721 (CMT 80, cookie, min date, miss rings rot), bef 1966 (CMT 97, cookie, min date, miss rings rot *typo? 1866?), bef 1839 (CMT 97B, cookie, min date, miss rings rot)	Baseline	likely pre-1846	2005-399

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DeSg-96		2	cedar	barkstripped	2 impacted	1	1859				0			1859 (CMT 96, cookie, exact, def cult)	Baseline	likely pre-1846	2005-399
DeSg-98		1	cedar	barkstripped	1 impacted	1	1839				0			1839 (CMT 94, cookie, exact, def cult)	Baseline	likely pre-1846	2005-399
DfSe-1		10?		burnt tree, bark stripped		1					0			1748 (CMT 1, dendro cookie? Exact** "Uncertain cultural origin")	Millenia, arcas	detailed site report.	
DfSe-10		1	cypress trees	barkstripped	1 impacted	0	0				2	1830, 1819		bef 1830 (CMT 1, TBS cookie, cypress, min count), bef 1819 (CMT 1, TBS cookie, cypress, min count)	baseline	healing lobe= likely pre-1846.	2011-0011
DfSe-16		5	red cedar	barkstripped	5 impacted	1	1777				0			1777 (CMT 10, TBS cookie, exact)	baseline	healing lobe= likely pre-1846.	2008-0356
DfSe-3		23	red cedar(18), cypress(5)	bark stripped		0	0		1827-30		1			1827-30 (CMT 4, "circa", increment core sample)	Millenia	likely pre-1846.	
DfSf-11		1	red cedar	burnt bark stripped (probable)		1			1834		0			1834 (CMT burnt, probably burnt cmt)	traditions consultant	unclear dating method... Thus date range	detailed site report and 1999,76
DfSf-12		4		barkstripped		2			1834, 1854		0			1834 (CMT 11, unclear), 1854 (CMT, unclear)	traditions consultant	unclear how dates were taken	detailed site report and 1999,76
DfSf-14		32		bark stripped		6	1898, 1904, 1878, 1903, 1920, 1904				0			1898 (CMT 31, dendro exact), 1904 (CMT 28, dendro exact), 1878 (CMT 23, dendro exact), 1903 (CMT 40, dendro exact), 1920 (CMT 26, dendro exact), 1904 (CMT 37, dendro exact)	archipelego	unclear about how what kind of samples taken	
DfSf-16		16		bark stripped		1					0	1847		1847 (CMT A17, TBS cypress[or cedar RAAD], no comments[bef])	archipelego, baseline	date ignored, likely through observation (pre "1847")	2001-018 (found with 2006-0141)

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSf-17		31?		bark stripped		17	1839, 1895, 1929, 1929, 1841, 1855, 1892, 1895, 1855	1826, 1844, 1847, 1847, 1901, 1916, 1862, 1889, 1931, 1920, 1924, 1946, 1799	1950, 1870, 1950, 1950, 1847, 1799, 1950		8			1839 (CMT H6b, dendro cookie), 1826 (CMT 15, "exact" increment core), 1895 (CMT 2c?, dendro cookie), 1929 (CMT H6e, dendro cookie), 1929 (CMT H6f, dendro cookie), 1841 (CMT H8, dendro cookie), 1901 (CMT 9, dendro increment core), 1916 (CMT 18, dendro increment core), 1862 (CMT 16, dendro increment core), 1889 (CMT 22, dendro increment core), 1931 (CMT 6, dendro increment core), 1855 (CMT H6c, dendro cookie), 1892 (CMT 2, dendro cookie), 1895 (CMT 2b, dendro cookie), 1920 (CMT 20, dendro increment core), 1924 (CMT 1, dendro increment core), 1946 (CMT 19, dendro increment core), 1855 (CMT H6d, dendro cookie), abt 1844 (CMT H7, dendro cookie 'circa'), abt 1950 (CMT 3, dendro increment core 'circa'), abt 1847 (CMT 2a? Dendro cookie, 'circa'), abt 1870 (CMT 5, dendro increment core), abt 1950 (CMT 4, dendro increment core, 'circa'), abt 1847 (CMT 1? Dendro cookie, 'circa'), abt 1799 (CMT H6a, dendro cookie, 'circa'), abt 1950 (CMT 7, dendro increment core, 'circa')	Weyerhaeuser, archipelego	both stem round and increment cores collected in 2000, and 2002. unclear why some cookies are 'circa', notes suggest this area had extremely heavy use. Cmts stripped multiple times	detailed site report and 2001-204
DfSf-18		1		bark stripped		1		1905			0			1905 (CMT 24, dendro cookie, exact)	archipelego	no sample description-thus +/- 1 year	
DfSf-2		21	cedar	tapered scar		0		0	1835		1			1835 (CMT 12, dendro cookie, 'poor sample?', internal scar)	Arcas, baseline	original site incorrectly to the west of actual location. 1 cmt in this location. 1 cmt dated, unclear if natural scar or not.	2010-0233, (obtained from diana-prov archy branch)- (although it says 2010-152 in site report)
DfSf-21		14	yellow cedar	bark stripped	4?	1	1812				1	1905		1812 (CMT 6, dendro cookie? Exact), 1905 (CMT 1, dendro cookie? Exact), abt/bef 1905 (CMT 1, dendro cookie? 'circa' 'date is 1905+')	archiepelego, baseline	sample collection method not described	

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSf-22		25	red cedar	bark stripped		9		1864, 1827, 1888, 1849, 1905, 1967, 1963, 1778, 1976			0	1940		1864 (CMT 20, dendro cookie? Exact), 1827 (CMT 1, dendro cookie? Exact), 1888 (CMT 17, dendro cookie? Exact), 1849 (CMT 25, dendro cookie? Exact), 1905 (CMT 24, dendro cookie? Exact), 1967 (CMT 19, dendro cookie? Exact), 1963 (CMT 23, dendro cookie? exact), 1778 (CMT 3, dendro cookie? exact), 1976 (CMT 21, dendro cookie? exact.)	archiepelego	exact dates moved to +/- 1, due to lack of collection method description	
DfSf-23		3		bark stripped		0		0 1778, 1827			3	1734		bef 1734 (CMT 1-2, dendro cookie, deteriorated wood), abt 1778 (CMT 3, dendro cookie 'circa'), abt 1827 (CMT 1-1, dendro cookie, 'circa')	archiepelego, baseline		
DfSf-35		8	cedars	bark stripped	7 impacted	2	1725, 1779				0			1725 (CMT1, TBS cookie), 1779 (CMT2, TBS cookie)	baseline		2004-057
DfSf-36		2	cedars	bark stripped	2 impacted	1	1787				0			1787 (CMT 11, dendro TBS cookie, exact)	baseline		RAAD and 2004-057
DfSf-37		1	red cedar	bark stripped	1 impacted	1	1664				0			1664 (CMT 1, dendro cookie, exact)	archiepelego		2003-169

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSf-39		236	cedars	logged: stump, felled and planked(5), felled and notched(3), sectioned(18). Tapered scar(129)	many impacted, stem rounds of 87 dated)	32	1872, 1877, 1819, 1715, 1788, 1867, 1794, 1834, 1805, 1843, 1879, 1879, 1753, 1888, 1689, 1809, 1912, 1820, 1795, 1938, 1819, 1785, 1875	1863			61	1823, 1795, 1879, 1898, 1740, 1834, 1683, 1717, 1828, 1825, 1879, 1631, 1799, 1863, 1925, 1812, 1850, 1911, 1890, 1839, 1887, 1797, 1788, 1937, 1869, 1845, 1774, 1842, 1889, 1844, 1835, 1897	1782, 1916, 1759, 1626, 1925, 1905, 1901, 1791, 1892, 1725, 1741, 1840, 1727, 1922, 1845, 1726, 1729, 1773, 1771, 1819, 1822, 1740, 1849, 1799, 1729, 1899, 1824, 1900, 1786, 1721, 1797, 1873	1872 (CMT 5, cookie, exact, def cult), 1877 (CMT 41, cookie, exact, def cult), 1819 (CMT 50, cookie, exact, def cult), 1715 (CMT 59, cookie, exact, def cult), 1788 (CMT 65, cookie, exact, def cult), 1867 (CMT 66, cookie, exact, def cult), 1794 (CMT 68, cookie, exact, def cult), 1834 (CMT 76, cookie, exact, def cult), 1805 (CMT 102, cookie, exact, def cult), 1843 (CMT A6, cookie, exact, def cult), 1879 (CMT A17, cookie, exact, def cult), 1879 (CMT A19, cookie, exact, def cult), 1753 (CMT A23, cookie, exact, def cult), 1888 (CMT A35, cookie, exact, def cult), 1689 (CMT A43, cookie, exact, def cult), 1809 (CMT A66, cookie, exact, def cult-poss second scar but too frag), 1912 (CMT B5, cookie, exact, def cult), 1820 (CMT B8, cookie, exact, def cult), 1863 (CMT B13, cookie, exact, def cult), 1795 (CMT B14, cookie, exact, def cult), 1938 (CMT B17, cookie, exact, def cult), 1819 (CMT B19, cookie, exact, def cult), 1785 (CMT C7, cookie, exact, def cult), 1815 (CMT UNK, cookie, exact, def cult), 1695 (CMT UNK, cookie, exact, def cult), 1868 (CMT UNK, cookie, exact, def cult), 1791 (CMT UNK, cookie, exact, def cult), 1843 (CMT UNK, cookie, exact, def cult), 1855 (CMT UNK, cookie, exact, def cult), 1827 (CMT UNK, cookie, exact, def cult), 1840 (CMT UNK, cookie, exact, def cult), 1875 (CMT UNK, cookie, exact, def cult), bef 1782 (CMT 1, nurse tree cookie, min date), bef 1916 (CMT 2, nurse tree cookie, min date), bef 1823 (CMT 14, TBS cookie, min date, miss rings rot), bef 1759 (CMT 20, nurse tree cookie, min date), bef 1626 (CMT 22, nurse tree cookie, min date), bef 1925 (CMT 23, nurse tree cookie, min date), bef 1905 (CMT 34, nurse tree cookie, min date), bef 1901 (CMT 35, nurse tree cookie, min date)	baseline	chisel marks suggest pre-1846.	2005-472
DfSf-4		103	cedar	tapered scar	9 harvested	6	1720, 1725, 1749, 1748, 1726				1	1726	1720 (CMT 8, dendro cookie exact, TBS), 1725 (CMT 16, dendro cookie exact, TBS), 1748 (CMT 6, dendro cookie exact, 'possible cmt'), 1749 (CMT 18, dendro cookie exact, definite TBS), 1748 (CMT 5, dendro cookie, exact), 1726 (CMT 9, dendro cookie exact), after 1726 (CMT 9, dendro cookie-unclear 'after'...maybe 'bef'?)	Arcas, baseline			

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSf-55		8		logged stump(6), bark stripped(2)	5 of 8	0		0			1	1833		bef 1833 (CMT3, cookie TBS, missing rings -rot)	baseline	healing lobe= likely pre-1846.	2004-363
DfSf-57		1	red cedar	barberchair stump, w/ butt, missing and crown sections		0		0			1	1677		bef 1677 (CMT21, cookie heml nurse tree)	baseline		2004-363
DfSf-58		40		logged: planked, notched, stump, kindling collection. Tapered scar	17/40 impacted	0		0			4	1706, 1878, 1851, 1919		bef 1706 (CMT9, cookie min date, heml nurse tree), bef 1878 (CMT27, cookie TBS missing rings-rot), bef 1851 (CMT 32, cookie TBS missing rings-rot), bef 1919 (CMT25, cookie TBS missing rings-rot)	baseline		2004-363
DfSf-6		14	cedar, yew, hemlock	tapered scar (11), blazed yew (1), blazed hemlock(2)		0	1855	1856, 1856, 1857,			5	1862		abt 1855 (CMT, dendro cookie, 'status exact' 'circa'), abt 1856 (CMT, dendro cookie, 'status estimated' 'circa'), abt 1856 (CMT, dendro cookie, 'status estimated'), abt 1857 (CMT, dendro cookie 'status estimated'), bef 1862 (CMT, dendro cookie, min age)	Weyerhaeuser, Arcas	site update exists for CMTs post 1946 (maybe 1846?)	

source found outside of RAAD map, site forms.	Comments	recorder(s)	comments on dating	Min date-(nurse trees)	Min date- Increment core, rotted disk	# dated est. nursing/dendro	buffer 10-20	buffer +/- 10	abt exact +/- 1-2 years	Exact cookie dates	# dated exactly COOKIE/dendro	removed/lost	# type/species	CMT species	# of CMT	associated features	Site #
Site alteration permit No. 2003-323	mislabelled cookies from block 9664	baseline	1816 (unk- def. Cult cookie), 1884 (unk-def. Cult cookie), 1869 (unk- def. Cult cookie), 1808 (unk-def. Cult cookie), 1854 (unk- def. Cult cookie), 1809 (unk- def cult cookie), 1898 (unk-def cult cookie), 1877 (unk-def cult cookie), 1934 (unk-def cult cookie), 1883 (unk-def cult cookie), 1951 (unk-def cult cookie), bef 1824 (unk- cookie missings rings, rot), bef 1881 (unk-cookie fragmented missing rings), bef 1808 (unk-cookie missings rings, rot), bef 1812 (unk-cookie fragmented and missing rings), bef 1826 (unk-cookie missings rings rot), bef 1862 (unk-cookie missing rings rot)		1824, 1881, 1808, 1812, 1826, 1862	6				1816, 1884, 1869, 1808, 1854, 1809, 1898, 1877, 1934, 1883, 1951	11		bark stripped				Dfsf-7,26,27,28

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSf-7		51		tapered scar	51 harvested	13	1836, 1822, 1817, 1820, 1791, 1806, 1858, 1867, 1876, 1885, 1815, 1807, 1864				9	1838, 1892, 1817, 1815, 1814, 1828, 1827, 1784, 1821		1836 (CMT A1, dendro cookie TBS), 1822 (CMT A1, dendro cookie TBS), 1817 (CMT A2, dendro cookie, TBS), 1820 (CMT A8, dendro cookie, TBS), 1791 (CMT A9, dendro cookie, TBS), 1806 (CMT A11, dendro cookie, TBS), 1858 (CMT A20, dendro cookie, TBS), 1867 (CMT A31, dendro cookie, TBS), 1876 (CMT A33, dendro cookie, TBS), 1885 (CMT A35, dendro cookie, TBS), 1815 (CMT A37, dendro cookie, TBS), 1807 (CMT A38, dendro cookie, TBS), 1864 (HFN9 dendro cookie, TBS), bef 1838 (CMT A3, dendro cookie, TBS min date due to rot), bef 1892 (CMT A7, dendro cookie, TBS min date due to rot), bef 1817 (CMT A10, dendro cookie, TBS min date due to rot), bef 1815 (CMT A13, dendro cookie, TBS min date due to rot), bef 1814 (CMT A17, dendro cookie, TBS min date due to rot), bef 1828 (CMT A31, dendro cookie, TBS min date due to rot), bef 1827 (CMT A7, dendro cookie, TBS min date due to rot), bef 1784 (CMT A7, dendro cookie, TBS min date due to rot), bef 1821 (HFN6, dendro cookie, TBS min date due to rot)	baseline, arcas	missing but found in Site Alteration Permit No. 2003-323	Site alteration permit No. 2003-323
DfSf-70		7		bark stripped	2 harvested	1	1819				0			1819 (CMT 4, dendro cookie, exact)	baseline		detailed site permit and 2009-380
DfSf-71		11		bark stripped	11 harvested	6	1932, 1765, 1769, 1756, 1847, 1753				0			1932 (CMT 23, dendro cookie, exact), 1765 (CMT 26, dendro cookie, exact), 1769 (CMT 17, dendro cookie, exact), 1756 (CMT 19, dendro cookie, exact), 1847 (CMT 14, dendro cookie, exact), 1753 (CMT 9, dendro cookie, exact)	baseline		detailed site report

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSf-83		11	red cedar	bark stripped		5	1847, 1855, 1840, 1840, 1822		1841		2	1848, 1789		1847 (CMT 1, dendro cookie exact), 1855 (CMT 1, dendro cookie exact), 1840 (CMT 6, dendro cookie exact), 1840 (CMT 7, dendro cookie exact), 1822 (CMT 10, dendro cookie exact), bef 1848 (CMT 3, 'minimum date' dendro cookie), bef 1789 (CMT 9, 'minimum date' dendro cookie), abt 1841 (CMT 6, incomplete sample)	baseline	healing lobe= likely pre-1846.	2010-0233
DfSg-103		32	red cedar	tapered scar	32 harvested	15	1884, 1886, 1878, 1903, 1903, 1881, 1888, 1942, 1883, 1883, 1895, 1903, 1884, 1887, 1904.				0			1884 (CMT 33-1, dendro cookie exact), 1886 (CMT 14, dendro cookie exact), 1878 (CMT 13, dendro cookie exact), 1903 (CMT 12, dendro cookie exact), 1903 (CMT 28-3 dendro cookie exact), 1881 (CMT 22, dendro cookie exact), 1888 (CMT 40, dendro cookie exact), 1942 (CMT 27, dendro cookie exact), 1883 (CMT 3, dendro cookie exact), 1883 (CMT 19, dendro cookie exact), 1895 (CMT 33-2, dendro cookie exact), 1903 (CMT 28-1, dendro cookie exact), 1884 (CMT 4, dendro cookie exact), 1887 (CMT 17, dendro cookie exact), 1904 (CMT 30, dendro cookie exact).	baseline	dated from cookies, likely exact	detailed site report and 2007-035
DfSg-106		1	red cedar	tapered scar	1 harvested	0		0			1	1883		bef 1883 (CMT 2, dendro cookie 'before'-missing rings)	baseline	association with other sites = pre-1846.	

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSg-123		228+		logged: tested(1), fallen planked(7), stump(44), sectioned(46) . Tapered scar (130)	223 impacted	8	1889, 1884, 1885, 1884, 1882, 1875, 1867, 1904				47	1799, 1857, 1941, 1794	1885, 1799, 1905, 1884, 1881, 1873, 1908, 1841, 1791, 1915, 1889, 1792, 1875, 1878, 1866, 1686, 1856, 1867, 1896, 1964, 1890, 1877, 1861, 1893, 1903, 1903, 1866, 1864, 1819, 1801, 1899, 1884, 1831, 1954, 1838, 1943, 1866, 1746, 1900, 1870, 1889, 1864, 1877, 1908, 1794, 1874, 1902,1868	1889 (CMT 2, TBS cookie, exact), 1884 (CMT 3a, TBS cookie exact), 1885 (CMT 3b, TBS cookie exact), 1884 (CMT 5, TBS cookie, exact), 1882 (CMT 18, TBS cookie, exact), 1875 (CMT 34, TBS cookie, exact), 1867 (CMT 52, TBS cookie, exact), 1904 (CMT 135, TBS cookie, exact) bef 1885 (CMT 6, cookie heml nurse tree), bef 1799 (CMT 7a, cookie cedar nurse tree), bef 1905 (CMT 7b, cookie heml nurse tree), bef 1884 (CMT 19a, cookie heml nurse tree), bef 1881 (CMT 19b, cookie heml nurse tree), bef 1873 (CMT 20, cookie heml nurse tree), bef 1908 (CMT 23, cookie heml nurse tree), bef 1841 (CMT 39, cookie heml nurse tree, min count), bef 1791 (CMT 41, cookie heml nurse tree), bef 1915 (CMT 50a, cookie heml nurse tree), bef 1889 (CMT 50a, cookie heml nurse tree), bef 1792 (CMT 51, cookie heml nurse tree), bef 1875 (CMT 52, cookie heml nurse tree), bef 1878 (CMT 54, cookie heml nurse tree), bef 1866 (CMT 83, cookie heml nurse tree), bef 1686 (CMT 86, cookie heml nurse tree), bef 1856 (CMT 92, cookie heml nurse tree), bef 1867 (CMT 95a, cookie heml nurse tree), bef 1896 (CMT 95b, cookie cedar nurse tree), bef 1964 (CMT 96, cookie heml nurse tree), bef 1890 (CMT 99a, cookie heml nurse tree), bef 1877 (CMT 99b, cookie cedar nurse tree), bef 1799 (CMT 103, TBS cookie, min dat, miss rings rot), bef 1861 (CMT 104, cookie heml nurse tree), bef 1893 (CMT 105a, cookie heml nurse tree), bef 1903 (CMT 105b, cookie heml nurse tree), bef 1903 (CMT 109, cookie heml nurse tree), bef 1866 (CMT 110, cookie heml nurse tree), bef 1864 (CMT 112, cookie heml nurse tree), bef 1819 (CMT 114, cookie heml nurse tree, min date), bef 1801 (CMT 116, cookie heml nurse tree), bef 1899 (CMT 120, cookie heml nurse tree) bef	baseline	likely pre-1846.	2009-0037
DfSg-44		4?		logged: flat topped, indeterminant stump		0		0			1		1817	bef 1817 (CMT M4, nurse tree dendro cookie 183yrs)	coast forest mgmt, millenia, arcas	says "year of injury" mistake as it is nurse tree. Min year.	detailed site report
DfSg-46		76		logged and barkstripped		1		1769			0			1769 (CMT R16,dendro cookie, "circa"-but full explanation)	Millenia		detailed site report and 1998-118

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSg-50		8	cedars	logged: undercut, felled, sectioned, planked, logged		0		0			4	1892, 1965, 1891, 1895	bef 1892 (CMT A10, dendro cookie nurse tree, 108 yrs), bef 1965 (CMT A12, dendro cookie on nurse tree of ancient stump, 35 yrs), bef 1891 (CMT A9-a, dendro cookie nurse tree, 109 yrs), bef 1895 (CMT A9-b, dendro cookie nurse tree, 105 yrs)	Millenia	thorough descriptions	detailed site report (and 2000-014?)	
DfSg-51		9		logged: undercut, felled, notched,		0		0			4	1925, 1754, 1855, 1837	bef 1925 (CMT J4, dendro cookie nurse tree, 75 yrs), bef 1754 (CMT J7, dendro cookie nurse tree, 246 yrs), bef 1855 (CMT J5, dendro cookie nurse tree, 145 yrs), bef 1837 (CMT J8, dendro cookie nurse tree 163 yrs)	Millenia	thorough descriptions		
DfSg-57		29		logged:log(3), planked(3), step stump(1), stump(1), tested(2), flat stump, sectioned(7), notched(4). Tapered scar(13)	26 effecte d	2	1784, 1900				12	1805, 1818, 1885, 1750, 1775	1835, 1858, 1922, 1554, 1541, 1908	1784 (HFN 32, dendro cookie exact, TBS), 1900 (CMT C3, dendro cookie 'exact' TBS), bef 1818 (HFN 9, dendro cookie TBS. miss rings rot), bef 1805 (CMT H3, dendro cookie, miss rings rot), bef 1775 (HFN 33, dendro cookie, TBS miss rings rot and fragmented), bef 1835 (HFN 21, dendro cookie cedar nurse tree, miss rings rot), bef 1885 (HFN 10, dendro cookie bark strip. miss rings rot), bef 1858 (HFN 27, dendro cookie min date,heml nurse tree), bef 1922 (HFN 22, dendro cookie min date, heml nurse tree), bef 1554 (HFN 23, dendro cookie min date, heml nurse tree), bef 1750 (HFN 8, dendro cookie min date, heml nurse tree), bef 1541 (HFN 7, dendro cookie min date, heml nurse tree), bef 1908 (HFN 19, dendro cookie min date, heml nurse tree)	Baseline	discrepancies with site form and archy report on exact dates. ("exact" likely refer to exact ages of nurse trees...)	2004-403

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSg-59		6	red cedar	logged: flat stump(1), step stump(1). Tapered scar(4)	3 harvested	1	1895				0			1895 (CMT D1, dendro cookie, no missing rings, definite, 105 yrs)	Millenia, coast forest mgmt		
DfSg-60		5	red cedar	logged flat stump(3), religious marker tree(2, basally burnt)		0	0				1		1802	bef abt 1802-09 (CMT C5-6, on two nursing trees, comparison with tree rings of chainsawed tree nearby using 'loupe')	I.R. Wilson		
DfSg-65		17		logged (16), lg rectangular scar(1)		0	0				2		1708, 1828	bef 1708 (CMT A, dendro cookie nurse tree), bef 1828 (CMT 11, dendro cookie nurse tree)	baseline, coast forest mgmt	likely pre-1846, unclear about whether these are nurse trees, can't find original source.	detailed site report
DfSg-66		16		logged	14 removed	0	0				5		1774, 1884, 1906, 1771, 1797	bef 1774 (CMT G, dendro cookie nurse tree), bef 1844 (CMT 22, dendro cookie nurse tree), bef 1906 (CMT 9, dendro cookie nurse tree), bef 1771 (CMT 6, dendro cookie nurse tree), bef 1797 (CMT 21, dendro cookie nurse tree)	baseline, coast forest mgmt		detailed site report
DfSg-67		27		logged (4), bark stripped (23)	26 removed	5	1890, 1827, 1891, 1895, 1900				1		1894	1890 (CMT 11, dendro cookie), 1827 (CMT 12, dendro cookie), 1891 (CMT 25, dendro cookie), 1895 (CMT 19, dendro cookie), 1900 (CMT 3, dendro cookie), bef 1894 (CMT 27, dendro cookie TBS cmt...nurse?)	baseline, coast forest mgmt	unclear if 1894 is a rotted TBS cookie or a nurse tree. Assumed nurse tree as there is an aboriginally logged feature on site.	detailed site report and 2001,407

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSg-73		27+4		logged:stepped stump(1), flat topped stump(1), barberchair (1). Tapered scar(10)		0	0				1		1802	bef 1802 (CMT 54, dendro cookie nurse tree)	Baseline		detailed site report
DfSg-81		3	cedar	logged(1): planked, flat stump. Tapered scar (2)		1	1875				1	1880		1875 (HFN1, dendro cookie bark stripped), bef 1880 (HFN1, dendro nurse cookie)	baseline	site report suggests the second HFN1 is a nurse tree, 2004-403 says it is HFN2 as a TBS missing rings due to rot.	2004-403
DfSg-83		6	cedar	logged: step stump, barberchair stump, planked, flat stump, sectioned	6 removed	1	1877				5	1478	1426, 1649, 1802,	1877 (UNK CMT, incorrectly labeled, cookie exact), bef 1426 (HFN15, dendro cookie heml nurse), bef 1649 (HFN30, dendro cookie heml nurse), bef 1802 (HFN17 dendro cookie heml nurse), bef 1478 (UNK CMT, incorrectly labeled, TBS cookie missing rings, min date)	baseline	likely pre-1846	2004-403,
DfSg-84		3		tapered scar	3 removed	0	0				2	1797, 1887		bef 1797 (CMT 9, dendro cookie TBS, miss rings rot), bef 1887 (CMT 8, dendro cookie TBS miss rings rot)	baseline		2004-403
DfSg-85		1	red cedar	tapered scar	1 removed	0	0				1	1773		bef 1773 (CMT 10, dendro cookie TBS miss rings rot)			2004-403

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSg-86		3	cedar	tapered scar	3 removed	1	1772				4	1786, 1882, 1786, 1764		1772 (CMT 7, dendro cookie exact), [bef 1786 (CMT 2, dendro cookie TBS miss rings rot), bef 1882 (CMT 2, dendro cookie TBS missing a few rings), bef 1786 (CMT 2, dendro cookie TBS miss rings heavy rot)--all same CMT], bef 1764 (CMT 6, dendro cookie TBS miss rings rot)	baseline		2004-403
DfSg-87		2		tapered scar		1	1944				0			1944 (CMT 5, dendro cookie)	baseline	likely pre-1846	2004-403
DfSg-88		1		tapered scar	1 removed	1	1787				0			1787 (CMT 3, dendro cookie)	baseline	likely pre-1846	2004-403
DfSg-93		44	red cedar	tapered scar		2	1833, 1830				4	1845, 1832, 1831, 1828		1833 (CMT R156, dendro cookie bark stripped), 1830 (CMT 203, dendro cookie bark stripped), bef 1845 (CMT 202, dendro cookie 'before'), bef 1832 (CMT 118, dendro cookie 'before'), bef 1831 (CMT R123, dendro cookie 'before'), bef 1828 (CMT 203, dendro cookie 'before').	baseline, Arcas	likely pre-1846	
DfSg-94		10	red cedar	tapered scar		0	0				1	1745		bef 1745 (CMT 66, dendro cookie 'before', missing rings due to rot)	baseline, arcas	likely pre-1846	2005-482
DfSg-95		10	red cedar	taperes scars		0	0				1	1808		bef 1808 (CMT 55, dendro cookie 'before')	baseline, arcas	likely pre-1846	2005-482

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSg-98		105	red cedar	tapered scars (all)	30 impacted	1	1854				4	1853, 1853, 1844, 1857		1854 (CMT34, dendro cookie bark stripped), bef 1853 (CMT 32, dendro cookie 'before'), bef 1853 (CMT 36, dendro cookie 'before'), bef 1844 (CMT 35, dendro cookie 'before'), bef 1857 (CMT 33, dendro cookie, 'before')	baseline, arcas	likely pre-1846	
DfSh-162		119	red cedar	barberchair stump, flat stump, tapered scar, planked, sectioned	23 harvested	15	1905, 1831, 1923, 1810, 1913, 1917, 1800, 1906, 1910, 1910, 1910, 1911, 1910, 1911, 1880				8	1798, 1795, 1908, 1779, 1857	1766, 1821, 1790	1905 (CMT 25, dendro cookie exact TBS), 1831 (CMT 33, dendro cookie, exact TBS), 1923 (CMT 37, dendro cookie exact TBS), 1810 (CMT 38, dendro cookie exact TBS), 1913 (CMT 42, dendro cookie, exact TBS), 1917 (CMT 48, dendro cookie exact TBS), 1800 (CMT A27, dendro cookie exact TBS), 1906 (CMT A32, dendro cookie exact TBS), 1910 (CMT A48, dendro cookie exact TBS), 1910 (CMT A49, dendro cookie exact TBS), 1911 (CMT A51, dendro cookie exact TBS), 1910 (CMT A52, dendro cookie exact TBS), 1911 (CMT unk, dendro cookie exact TBS), 1880 (CMT unk, dendro cookie exact TBS), bef 1798 (CMT 33, dendro cookie, min date due to rot), bef 1766 (CMT 36, dendro cookie cedar nurse tree), bef 1795 (CMT A39, dendro cookie, min date due to rot), bef 1821 (CMT unk, dendro cookie heml nurse tree), bef 1908 (CMT unk, dendro cookie, min date due to rot), bef 1790 (CMT unk, dendro cookie heml nurse tree), bef 1779 (CMT unk, dendro cookie min date due to rot), bef 1857 (CMT unk, dendro cookie, min date due to rot).	Baseline	MISSING(FOUND)-recovered at Archaeology branch april 02, 2014	2007-169,

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSh-163		7?	red cedar	felled, tapered scar.		12	1766, 1554, 1743, 1137, 1735, 1755, 1759, 1741, 1756, 1722, 1690, 1751				2		1810	1766 (exact, cookie? Bark stripped cedar), 1554 (exact, cookie? Bark stripped cedar), 1743 (exact, cookie? Bark stripped cedar), 1137 (**oldest known CMT on NWC. exact, cookie? Bark stripped cedar), 1735 (exact, cookie? Bark stripped cedar), 1755 (exact, cookie? Bark stripped cedar), 1759 (exact, cookie? Bark stripped cedar), 1741 (exact, cookie? Bark stripped cedar), 1756 (exact, cookie? Bark stripped cedar), 1722 (exact, cookie? Bark stripped cedar), 1690 (exact, cookie? Bark stripped cedar), 1751 (exact, cookie? Bark stripped cedar), bef 1810 (nursing tree of barberchair stump), abt 1710-1847 (cross dating, comparisons with similar CMTs in area[extremely broad, date is not included])	Millenia	unclear as to why so many CMTs dated with only 7 cmts stated as being on the site...	1996-109
DfSh-171		29	cedars	logged(8), tapered scar(21)		2	1816, 1896				4		1934, 1810, 1890, 1836	1816 (CMT 27, dendro cookie), 1896 (CMT 17, dendro cookie), bef 1934 (CMT 17, cookie of CMT), bef 1810 (CMT 17, cookie of CMT), bef 1890 (CMT 17, cookie of CMT), bef 1836 (CMT 17, cookie of CMT)	coast forest mgmt, Millenia	unclear how dates for 'estimate' trees came about.. No obv mention of nurse trees. Only cookies taken for #17 and #27	1999-135- need to figure out what kind of samples are for "bef" dates [assumed to be nurse trees]

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSh-172		26		flat stump, logged(15), tapered scar		0		0 1764, 1797			6		1783, 1799, 1792, 1592	bef 1783 (CMT 1, nurse tree, cookie 218yrs"cross dating"?), bef 1799 (CMT 18, nurse tree, cookie 202, missing rings), abt 1764 (CMT 19, cross dating, 237 yrs, no missing rings, bark scar), abt 1797 (CMT 12, cookie? 204 yrs, some missing rings, bark scar), before 1792 (CMT 12, nurse tree, cookie, 209, no missing rings), bef 1592 (CMT 14, nurse tree cookie, 409 yrs, no missing rings)	Baseline, Arcas, (millenia earlier)		detailed site report and 2002-248
DfSh-173		5	cedar	tapered scar	some..	1	1876				0			1876 (CMT 2, definite, cookie, no missing rings)	Millenia		
DfSh-174		45	red cedar	logged(35), tapered scar(10)		0		0 1789			2		1718	bef 1718 (CMT M37, heml nurse cookie, 281 yrs, no missing rings), abt 1789 (CMT M23, red cedar, cookie, "circa"- unclear dating method "sample taken")	coastal forest mgmt, Millenia	was a third tree dated, but was also nurse heml from M37 CMT with a younger age.	detailed site report

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSh-176		84	cedar	logged (72), notched, chopped, sectioned, planked, bark stripped (12)		1	1892				9		1734, 1879, 1847, 1729, 1526, 1857, 1644, 1673, 1827	bef 1734 (CMT 31, cookie heml nurse, 268 yrs), bef 1879 (CMT 3, cookie heml nurse tree, 123 yrs), bef 1847 (CMT 78m, cookie cedar nursing tree, 155 yrs), bef 1729 (CMT 7, cooke heml nurse tree, 273 yrs), bef 1526 (CMT 67, cookie heml nurse tree 476 yrs), bef 1857 (CMT 32, cookie heml nurse tree, 145 yrs), bef 1644 (CMT 33, cookie heml nurse tree, 358 yrs), bef 1673 (CMT 6, cookie heml nurse tree, 329 yrs), bef 1827 (CMT 14, cookie cedar nurse tree, 275 yrs).	coast forest mgmt, baseline		detailed site report and 2001-135

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSh-178		87?	cedar	logged stump, tested, planked, tapered scar		7	1868, 1868, 1853, 1908		1747, 1879, 1890, 1868,		2			1868 (CMT 58, cookie bark strip, 134 yrs, 'definite'), 1868 (CMT 38, cookie bark strip, 134 yrs, 'definite'), 1853 (CMT 42, cookie bark strip, 129 yrs -'definite'), 1908 (CMT 44, cookie bark strip, 94 yrs, 'definite'), 1747 (CMT 60-1 cookie bark strip, 254 yrs, 'definite' missing '<5 rings',sample did not bisect scar), 1868 (CMT 60-2, cookie bark strip, 133yrs, 'definite' sample did not bisect scar),1879 (CMT 82, cookie bark strip, 123 yrs, 'definite'-sample did not bisect scar),1890 (CMT 61, cookie bark strip, 112 yrs, 'definite' sample did not bisect scar),	Arcas, Baseline	none of the states said 'exact', but instead said 'circa' despite using cookies.... Some of the comments said 'definite' which led me to make them exact dates, leaving two as estimates...	detailed site report and 2001-135
DfSh-179		3	cedar	bark stripped		2	1611, 1821				0			1611 (CMT 79, cookie bark strip, 391 yrs, 'definite'), 1821 (CMT 80, cookie bark strip, 181 yrs, 'definite')	Baseline	none of the states said 'exact', but instead said 'circa' despite using cookies.... Some of the comments said 'definite' which led me to make them exact dates, leaving two as estimates...	detailed site report and 2001-135
DfSh-196		1	red cedar	felled, barkstripped		1	1878							1878 (cookie no missing rings, 124 yrs, definite)	Baseline		RAAD and 2002-196 (2002-329)
DfSh-197		1	red cedar	felled, barkstripped		0		0	1747		1			bef 1747 (CMT 6, cookie bark strip, missing rings 255+yrs)	Baseline		RAAD and 2002-196

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSh-201		132	cedar	logged(81), bark stripped (51)	50% harvested	12	1875, 1757, 1865, 1869, 1891, 1881, 1767, 1893				6	1896	1785, 1759, 1809, 1785, 1835, 1836, 1868, 1814, 1789	1875 (CMT 16, dendro cookie, TBS, definite), bef 1896 (CMT 127, dendro cookie- rotted TBS cedar cookie), 1757 (CMT 51, dendro cookie, TBS, definite), 1865 (CMT 49, dendro cookie, TBS, definite), 1869 (CMT 6, dendro cookie TBS, definite), 1891 (CMT 112, dendro cookie, TBS, definite), 1785 (CMT 53, dendro cookie, nurse hemlock, definite), 1881 (CMT 51, dendro cookie, TBS, definite), bef 1759 (CMT 14, dendro cookie, nurse hemlock), 1767 (CMT 75, dendro cookie, TBS, definite), 1893 (CMT 75, dendro cookie, TBS, definite), bef 1809 (CMT 12, dendro cookie, nurse cedar, definite), bef 1785 (CMT 45, dendro Cookie, nurse cedar, definite), bef 1835 (CMT 92, dendro Cookie, nurse hemlock, definite), bef 1836 (CMT 32, dendro Cookie, nurse hemlock definite), bef 1868 (CMT 52, dendro Cookie, nurse hemlock, definite), bef 1814 (CMT 51, dendro Cookie nurse hemlock, definite), bef 1789 (CMT 93, dendro Cookie, nurse hemlock, definite).	Baseline		detailed site form and 2002-344
DfSi-77	hist bldg/logging	103	103/red cedar	logged log, notched, stump, burned, tested, bark stripped, planked	3(natural?), 2 cut/dated	2	1872, 1769				0			1872 (cookie, exact, bark stripped red cedar), 1769 (cookie, exact, notched red cedar)-[(104 + R83-jan 96)]	Arcas (dated, observed), MacMillan Bloedel		detailed site report and 1996-160
DfSi-78		70		logged log, planked(2), lg rectangular scar, stump(9)	0	0		0			4		1893, 1763, 1787	abt 1892(CMT 1,dendro, nurse tree +/-1yr), abt 1748 (CMT 8, dendro, nurse tree+/- 15yr), abt 1783 (CMT 9-3, dendro, nurse tree +/-4 yr)	Arcas 03		detailed site report

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSi-84		95		barberchair stump(6), canoe(1), logged log(11associate, 5 unassociated), undercut(1), flat stump(69), planked(7)	0	0		0			2	1815, 1835	1805-15 (CMT 167, dendro, nurse tree), 1829-35 (CMT 169, dendro, nurse tree),	Arcas		detailed site report and 2005-38	
DfSi-85		5	5 cedars	bark stripped, planked	2?	2		1805	1800		0		1798-1802 (CMT 2, dendro, cookie), 1804-06 (CMT 3, dendro, cookie) [they could be either TBS or planked scars]	Arcas		detailed site report and ,2005-38	
DfSj-53		many		logged:sectioned(7 missing), flat stump(52), step stump(5), planked(11), undercut(5), barberchair stump(22), notched(1), stump(23), tested(1). Bark stripped(269)		0		0			14	1785 (100 year range?), 1854, 1690, 1789, 1797, 1811, 1734, 1867, 1780, 1805, 1858, 1781, 1867	bef 1850-54 (CMT D23, dendro cookie heml nurse tree), bef 1680-1690 (CMT D28, dendro cookie heml nurse tree), bef 1787-89 (CMT D31, dendro cookie cedar nurse tree), bef 1793-97 (CMT D32, dendro cookie heml nurse tree), bef 1807-11 (CMT D33, dendro cookie heml nurse tree), bef 1710-34 (CMT 34, dendro cookie heml nurse tree), bef 1859-67 (CMT D35, dendro cookie heml nurse tree), bef 1776-80 (CMT D36, dendro cookie heml nurse tree), bef 1801-05 (CMT D39, dendro cookie heml nurse tree), bef 1675-1785 (CMT D45-2A, cedar bark strip cookie), bef 1575-1675 (CMT D45-2B, cedar nursing tree cookie), bef 1854-58 (CMT D46, dendro cookie heml nurse tree), bef 1777-81 (CMT D49A, cedar nursing tree cookie), bef 1863-67 (CMT D63, cedar nursing tree cookie)	arcas	missing dates found. From arch branch april 8	detailed site report and 2006-392	

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DfSj-83		many		logged(144 total):felled, stump(23), planked(11), step stump, barberchair stump(22), flat stump(52). Bark stripped(269)		0		0			11		1758, 1700, 1747, 1692, 1706, 1893, 1791, 1816, 1756, 1856, 1772	bef 1754-58 (CMT D2, cedar nurse tree cookie), bef 1691-1700 (CMT D3, cedar nurse tree cookie), bef 1740-47 (CMT D4, cedar nurse tree cookie), bef 1676-92 (CMT D5, heml nurse tree cookie), bef 1686-1706 (CMT D7, cedar nurse tree cookie), bef 1885-93 (CMT D12, heml nurse tree cookie), bef 1787-91 (CMT D15, heml nurse tree cookie), bef 1808-16 (CMT D16, heml nurse tree cookie), bef 1753-56 (CMT D17, heml nurse tree cookie), bef 1852-56 (CMT D18, heml nurse tree cookie), bef 1768-72 (CMT D19, heml nurse tree cookie)	arcas	missing but found in arch branch april 8	detailed site form and 2006-392
DfSj-86		7	red cedar	bark stripped		0		0	1767, 1804, 1807, 1747	1742-52, 1832-1840,	7		1710	abt 1695-1725 (felled tree in 1960, increment core taken), 1742-52 (CMT 2, TBS cookie), 1832-1840 (CMT 3, TBS cookie), 1765-1769 (CMT A2, TBS cookie), 1802-06 (CMT 1-1, TBS cookie), 1805-09 (CMT 1-2, TBS cookie), 1746-49 (CMT A1, TBS cookie)	arcas, int. Forest products		detailed site report and 1999-350

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSe-5		44	red cedar	tapered scar		0		0			4	1828, 1827, 1831, 1664		bef 1828 (CMT 15, TBS 'sampled with chainsaw, previously logged'), bef 1827 (CMT 16-a, TBS 'sampled with chainsaw, previously logged'), bef 1831 (CMT 16-b, TBS 'sampled with chainsaw, previously logged'), bef 1664 (CMT 19, TBS 'sampled with chainsaw, previously logged')	, millenia	38 of which harvested in the last few year, 4 older stripped trees were commerically harvested in 1935. dates extracted with chainsaw	detailed site report and 2000-358
DgSf-10				logged: stump(2)bark stripped(5?)		0		0	1785		1			bef 1785 (CMT B1, dendro cookie?-originally from dgsf-2)	Millenia, Arcas	some cmts originally part of dgsf-2	detailed site report
DgSf-9		4?		tapered scar	1?	0		0			3	1853, 1855, 1843		bef 1853(CMT A-2, dendro cookie 'before'), bef 1855 (CMT A-2, dendro cookie, 'before), bef 1843 (CMT A-2, dendro cookie 'before')	Millenia, Arcas	these dates are off "deteriorated stumps" unclear if 'before' or 'circa' are better options. Will go with 'before' suggested on form	detailed site report and 2002-199

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSh-11	telegraph wire	32		bark stripped, notched, planked, felled		0		0			11		1919, 1788, 1863, 1883, 1887, 1866, 1903, 1934, 1898, 1803.	bef 1916-19 (nurse cookie), bef 1780-88(nurse cookie), bef 1843-63(CMT A5, fir nurse cookie), bef 1867-83 (heml nurse cookie), bef 1884-87 (heml nurse cookie), bef, 1831-81 (spruce nurse cookie), bef 1862-66 (heml nurse cookie), bef 1900-03 (spruce nurse cookie), bef 1931-34 (spruce nurse cookie), bef 1898 (increment bore of healing lobe of CMT 15), bef 1803 (increment bore of heml nurse tree)	Arcas 97-96		detailed site report and 1997-56
DgSh-12		17		felled, notched, planked, logged		0		0			3		1900, 1900, 1920	bef 1900 (CMT A3, heml nurse cookie exact), bef 1900 (CMT A16, heml nurse cookie exact), bef 1920 (CMT A19, heml nurse cookie exact)	Arcas, MacMillan, 97		detailed site report and 1997-242.
DgSh-15		1 (2 scars)	red cedar	tapered scar		1	unk ("samples taken")				0				Millenia	likely cmt, samples taken-no date shown.	1997-284
DgSh-16		12		tapered scar, stripped		0		0		1855, 1815	2			abt 1855 (CMT S1, increment core on scar),abt 1815 (CMT S2, increment core on scar), abt 1697 (increment core, "tree is still uncertain" = not included)	Millenia	3rd dated tree possibly not cmt.	

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSh-23		46	cedars	logged, bark stripped, notched, planked, stumps, planks.		0		0			6		1832, 1878, 1695, 1797, 1808, 1848.	bef 1832 (CMT 41, heml nurse, 171yrs, exact), bef 1878 (CMT 17, heml nurse, 125, exact), bef 1695 (CMT 30, heml cookie nurse, 308 yrs exact), bef 1797 (CMT 41, heml nurse cookie, 206 yrs, exact), bef 1808 (CMT 49, heml nurse cookie, 195 yrs exact), bef 1848 (CMT 38, heml nurse cookie, 155 yrs exact)	Baseline	associated with above?	
DgSh-28		17	cedars	stump, tapered scar, sectioned log,		4		1752			5	1899, 1888, 1871	1838, 1816,	1886 (CMT C01, dendro cookie), 1949 (CMT B08, TBS cookie), 1769 (CMT B19, dendro cookie), 1752 (CMT B16, TBS cookie exact), bef 1838 (CMT C02 dendro nurse cookie), abt 1816 (CMT C02, cookie, cedar nurse tree), bef 1871 (CMT B07, TBS cookie, min date, rot), bef 1888 (CMT A07, TBS cookie, min date, approx-missing 5-10 rings), bef 1899 (CMT A06, TBS cookie, min date, approx)	Baseline		2004-0181
DgSh-29		17 (?)	cedar	stump, planked, sectioned, tapered scar	8 (harvesting)	2		1880, 1888			1		1834	1880 (CMT A03, dendro cookie TBS), 1888 (CMT A01, dendro cookie TBS), bef 1834 (CMT A08, dendro nurse cookie, missing some rings)	Baseline	dates not exact as no comment on missing rings	2004-0181

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSh-31		1	red cedar	tapered scar, bark stripped	1 (harvested)	1		1877			0			1877 (CMT B09, TBS cookie)	Baseline		
DgSh-34		15	cedars	stump, tapered scar		6	1890, 1899, 1829, 1893	1687, 1892			2	1891, 1876, 1770, 1730		1892 (CMT B14, TBS cookie), 1890 (CMT A10, TBS "species BS?" cookie), 1899 (CMT A09, TBS cookie), 1687 (CMT A12, TBS cookie), 1829 (CMT B12, TBS cookie), 1893 (CMT B16, TBS cookie), bef 1891 (CMT A15, dendro cedar nurse cookie), bef 1730 (CMTA31, cedar nurse cookie), bef 1770 (CMT A30, cookie cedar nurse tree, no details on miss rings, or comments), bef 1876 (CMT A15, cookie cedar nurse tree, no miss rings)			2004-0181
DgSh-36		4		planked, stump, tapered scar		2		1769, 1698			1	1841, 1889		1769 (CMT A19, TBS cookie), 1698 (CMT A19, TBS cookie), bef 1841 (CMT A18, TBS nurse cookie missing rings, "rot, outer rot"), bef 1889 (CMT A18, TBS cookie missing rings, "rot, outer rot")	Baseline		RAAD and 2004-0181
DgSh-38		21	cedars	tapered scar, stump, planked	2 harvested	1		1868, 1822			1			1868 (CMT A32, TBS cookie), bef 1822 (CMT B04, TBS cookie)	Baseline		RAAD and 2004-0181
DgSh-39		2	cedar	stump, tapered scar		1					0	1569		1569 (CMT A23, cedar nurse cookie)	Baseline		2004-0181

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSh-42		11		tapered scar	8 harvested	2	1819, 1839, 1881				3	1885		1819 (CMT C05, TBS cookie), 1839 (CMT C08, TBS cookie), bef 1881 (CMT C02, TBS cookie), bef 1885 (CMT C04, TBS cookie) , bef 1851 (CMT C02, TBS cookie["some pinching"- maybe natural?--cut out])		deterioration of some of cmts, possibly why some dates = estimates	2004-0181
DgSh-43		2?		stump, scar	1, none left	1		1850			0			1850 (CMT C12, TBS cookie)	Baseline		2004-0181
DgSh-44		14?		stump, planked, tapered scar	13 harvested	5	1881	1815, 1876, 1895, 1856			5	1777	1892, 1793,	1876 (CMT A77, TBS cookie), 1881 (CMT A92, TBS cookie exact), 1895 (CMT A87, TBS cookie), 1815 (CMT A42, TBS cookie), 1856 (CMT A90, TBS cookie), bef 1793 (CMT A81, heml nurse cookie), bef 1878 (CMT A76, TBS cookie ["uncertain" = cut out]), bef 1892 (CMT A86, nurse heml cookie), bef 1777 (CMT A93, TBS cookie, missing rings)	Baseline	no mention of nurse trees, most 'bef' dates from stripped trees.	2004-0181

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSh-45		71?		stump, planked, sectioned, undercut, tapered scar	29 harvested	16	1884, 1869, 1791, 1826, 1795, 1914, 1824,	1792, 1814, 1838, 1877, 1790, 1892, 1874, 1843, 1881, 1936, 1948, 1826, 1795, 1712,			5	1832, 1885	1809, 1840, 1733, 1743, 1799, 1785, 1774	1843 (CMT A38, TBS cookie), 1869 (CMT A39, exact TBS cookie), 1948 (CMT A43, TBS cookie), 1791 (CMT A48, exact TBS cookie), 1826 (CMT A52, TBS cookie), 1795 (CMT A54, TBS cookie), 1914 (CMT A68 exact TBS cookie-cedar [attached is 1774-A68, heml nurse tree]), 1712 (CMT A69, TBS cookie), 1824 (CMT A73, exact TBS cookie), 1792 (CMT B48, TBS cookie), 1814 (CMT B52, TBS cookie), 1877 (CMT A34, TBS cookie, no comments on miss rings), 1795 (CMT A54, TBS cookie, no mention of miss rings), 1826 (CMT A52, TBS cookie, no mention of miss rings), 1881 (CMT A41, TBS cookie, no missing rings), 1936 (CMT A41, TBS no missing rings), bef 1840 (CMT A41, dendro cedar nurse cookie), bef 1733 (CMT A47, dendro heml nurse cookie), bef 1799 (CMT A51, dendro heml nurse cookie), bef 1785 (CMT A51, dendro cedar nurse cookie), bef 1809 (CMT B33, dendro heml nurse cookie), bef 1658 (CMT A32, TBS cookie, "uncertain" rotten), bef 1743 (CMT A47 min date, heml nurse cookie), bef 1832 (CMT B53, TBS cedar, missing some rings), bef 1885 (CMT B47, TBS cookie, missing some rings).	Baseline	originally missing but found.	2004-0181

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- Increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSh-46		40?		stump, tapered scar, planked, sectioned	39 harvested	13	1880, 1882, 1733, 1899.	1836, 1831, 1835, 1718, 1825, 1883, 1852, 1881, 1892,			1	1894, 1718, 1789,		1836 (CMT A02, TBS cookie), 1831 (CMT A03, TBS cookie), 1835 (CMT A24, TBS cookie), 1718 (CMT B02, TBS cookie), 1825 (CMT B27, TBS cookie), 1883 (CMT B32, TBS cookie), 1880 (CMT B34, exact TBS cookie), 1852 (CMT B35, TBS cookie), 1882 (CMT B36, exact TBS cookie), 1733 (CMT B37, exact cedar TBS cookie), 1881 (CMT B42, TBS cookie), 1892 (CMT B44, TBS cookie), 1899 (CMT B45, TBS cookie), bef 1836 (CMT B26, cookie TBS, cultural but centre rotted), bef abt 1894 (CMT B01, inner rot TBS cookie), bef 1789 (CMT B41, cookie TBS, missing some rings)	Baseline	FIND REPORT	2004-0181
DgSh-47		2	cedars	tapered scar	1 harvested	1		1858			0			1858 (CMT B06, TBS cookie)	Baseline		
DgSh-48		1	cedar	tapered scar		1		1880			0			1880 (CMT B08, TBS cookie)	Baseline		
DgSh-49		4	cedar	tapered scar	3 harvested	1	1835				0			1835 (CMT B09, TBS cookie)	Baseline		
DgSh-62		18	cedars	bark stripped	18 impacted	4	1829, 1811, 1794, 1873		1829		1			1829 (CMT 1, TBS cookie, exact), 1811 (CMT 3, TBS cookie, exact), 1794 (CMT 5, TBS cookie, exact), 1873 (CMT 17, TBS cookie, exact), abt 1829 (CMT 4, TBS in poor condition. Second strip on tree UNK)	Baseline	likely predates 1846	2010-360

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSi-12		54		logged sectioned, bark stripped, tested, felled, planked	1(dating)	1	1823				0			1823(CMT 9,dendro, TBS red cedar, cookie)	Arcas		
DgSi-14		47	red cedar	logged, stumps, logged logs, chop marks,		0	0				9		1626, 1718, 1656, 1686, 1744, 1784, 1712, 1756, 1789	bef 1626(CMT 25, heml.nurse 374), bef 1718(CMT 27, heml. Nurse 282yrs), bef 1656(CMT 32 cedar nurse 344yrs), bef 1686(CMT 24, cedar nurse 314 yrs), bef 1744(CMT 29, cedar nurse 256 yrs), bef 1784(CMT 35 cedar nurse 216 yrs-rotted outside round), bef 1712 (CMT 17, cedar nurse 288 yrs), bef 1756 (CMT 13, cedar nurse 244 yrs), bef 1789 (CMT 12, cedar nurse 211 yrs)		most cmts in poor condition and appear very old, none alive? Other than nurse trees.	
DgSi-15		2	red cedar	logged, stumps	0	0	0				1		1785	bef 1785(CMT 2, heml.nurse 215 yrs)	Arcas	stem rounds collected by coast forest mgmt (for nurse trees??)	
DgSi-16		2	red cedar	logged, testhole, chisel marks, stump		0	0				1		1804	bef 1804(CMT 4, nurse 196 yrs)	Arcas		
DgSi-17		6	red cedar	flat stump, barberchair stump		0	0				2		1875, 1901	bef 1875(CMT 2, dendro-cookie on dead snag nurse?), bef 1901(CMT 5, dendro cookie on nurse)			detailed site report

Site #	associated features	# of CMT	CMT species	# type/species	removed/lost	# dated exactly COOKIE/dendro	Exact cookie dates	abt exact +/- 1-2 years	buffer +/- 10	buffer 10-20	# dated est. nursing/dendro	Min date- increment core, rotted disk	Min date-(nurse trees)	comments on dating	recorder(s)	Comments	source found outside of RAAD map, site forms.
DgSi-19		10		tapered scars		6	1870,	1875, 1870, 1870, 1870	1867		0			1874-76(CMT 4, TBS cookie), 1870 (CMT 7, TBS cookie), 1869-71 (CMT 6, TBS cookie), 1863-72 (CMT 8, TBS cookie), 1869-71 (CMT ?, TBS cookie), 1869-71 (CMT 10, TBS cookie)	Arcas	dated post 03	detailed site report
DgSi-22		53	cedars?	logged log, tapered scar, sectioned log, step stump(2), stump(18-unclassified), barberchair stump(2), flat stump(16)	3?	3		1772	1586, 1542, 1573, 1718, 1825		4		1823	1823-28(CMT 6 cookie-unclear type), 1715-22(CMT 8 cookie, 2 on 1 tree, TBS?), 1771-74 (CMT 8 cookie, 2 on 1 tree. TBS?), 1821-25(CMT 9, dendro heml.nurse tree), 1583-90(CMT 19, dendro core on scar 3), 1540-45(CMT 19, dendro core on scar 1), 1570-76 (CMT 19, dendro core on scar 2)	Arcas 05-08		detailed site report
DhSd-2		43	cedar	bark stripped -tapered and reg	10 harvested	0		0	1899, 1895, 1921, 1896		4			abt 1899 (CMT .., dendro cookie), abt 1895 (CMT..., dendro cookie), abt 1921 (CMT... , dendro cookie), abt 1896 (CMT..., dendro cookie)	, millenia	11 very recent bark strips, 31 older.	detailed site report and 1999-223

source found outside of RAAD map, site forms.	RAAD and 2006-395
Comments	
recorder(s)	baseline
comments on dating	1897(CMT A1, dendro cookie, exact), 1821(CMT A16, dendro cookie, exact), 1833 (CMT A14, dendro cookie, exact), 1888 (CMT A16, dendro cookie, exact), 1896 (CMT A10, dendro cookie exact--recorded in form as 1996, assumed typo... 1896???), 1889 (CMT A15, dendro cookie exact), bef 1887 (CMT A1, dendro cookie 'before')
Min date-(nurse trees)	
Min date- Increment core, rotted disk	1887
# dated est. nursing/dendro	1
buffer 10-20	
buffer +/- 10	
abt exact +/- 1-2 years	
Exact cookie dates	1897, 1821, 1833, 1888, 1896, 1889
# dated exactly COOKIE/dendro	6
removed/lost	10 affected
# type/species	tapered scars
CMT species	cedars
# of CMT	12
associated features	
Site #	DhSf-46

Appendix II

Appendix II contains basic data, images and confident levels of all CMTs and suspected CMTs found in Toquaht, Ditidaht and Pacheedaht Territories. Included is basic information about clearcut blocks, access, and survey crew.

Toquaht Surveys

Toquaht Survey 1

Cut block ID:	LC04 (IMapBC 2015)
Cut block description:	CP57 – LC04, 86C, Coulson Forest Products Limited (IMapBC 2015)
Date of logging	November 1 st , 2010- January 31 st , 2011 (IMapBC 2015)
Access:	LC04 road (gated) off Toquart FSR
Position	1.3 km as the crow flies from Toquart Bay. 175-225m ASL
Associated Archaeological Site:	Yes, surrounds DgSh-62 and DgSh-63 CMT sites. Permit #2010-360, Baseline Archaeological Services Ltd.
Date of access, conditions	July, August, October, November 2014; January 2015. Conditions usually cool and sunny. August visit very hot and dry.
Recorders	Jacob Earnshaw, Andrew Sheriff, Keith Holmes, Jenny Cohen, Kyle Armstrong, Noah Plonka, Denis Hutu.



CMT#	TS1-1	CMT#	TS1-2
DBH/height	.65 x .9m / ~1 m	DBH/height	.74 x 1.09m / 3m (NA uprooted)
Open/closed	Open (15cm window)	Open/closed	Semi open (2cm window)
Direction	East, side slope (gentle slope)	Direction	North, upslope
Scar crust (lobes, condition)	L (1.5cm) + R (1.5cm) both fragmented. Flat, black.	Scar crust	L (1cm) + R (~1cm, damaged). Narrow but smooth and black.
Expanded post injury ring	Yes, extreme	Expanded post injury ring	Unclear. Not in notes, and not shown in photos. Ring width in lobes relatively wide though.
Right angle intercept	Semi rotted, though appears yes.	Right angle intercept	Yes, clear.

Phenol staining	Appears rectangular, unclear	Phenol staining	Unclear, crushed.
Original tree size/ % stripped	30cm / 50%	Original tree size/ % stripped	~30cm, unclear / <30%
Confidence	85%	Confidence	65%
Estimated Age	Min. 242, AD 1769. (buffer 5 years, wedge sample- minor rot at scar crust and some microscopic rings)	Estimated Age	Min. 195, AD 1816. (buffer 10 years, counted roughly in field)
Comments	Some suggestion in notes it may have been recorded by Baseline, but is not close to Baseline's waypoints	Comments	Poor recording. Structurally looks cultural, tiny crusts and poor condition lower confidence.



CMT#	TS1-3 (multiple scars)	CMT#	TS1-4.1 (multiple scarred stump)
DBH/height	1.35 m (other half covered in earth)/ 4.5 m (fallen)	DBH/height	1.15 m / ~4.5 (fallen)
Open/closed	All closed	Open/closed	Closed
Direction	NA (fallen)	Direction	NA (fallen)
Scar crust	None	Scar crust	R (3.5 cm), flat, intact, wide. L appears more natural, pinched.
Expanded post injury ring	?	Expanded post injury ring	Yes
Right angle intercept	?	Right angle intercept	R, yes. L, no.
Phenol staining	?	Phenol staining	Irregular phenol staining (could be from rot, very old feature)
Original tree size/ % stripped	?	Original tree size/ % stripped	28 cm / 30%
Confidence	Downgraded, insufficient data of unknown scarring events.	Confidence	70%
Estimated Age	-	Estimated Age	Min. 588 years, AD 1423 (buffer 5 years, wedge core sample, some microscopic rings)
Comments	Tree is ringed with lobes however all possible scar crusts and scar faces are rotted away.	Comments	Confident other than poor R scar crust and rotted face. Scar is high on tree, may have been rougher peel.



CMT#	TS1-4.2 (multiple scarred stump)	CMT#	TS1-5
DBH/height	1.15 m / ~4.5 (fallen)	DBH/height	1.77 x 1.8 m / >3 m (uprooted, standing)
Open/closed	Semi open (stuffed with salal)	Open/closed	Closed
Direction	NA (fallen)	Direction	NA (uprooted)
Scar crust	Only L lobe, natural looking crust	Scar crust	R (2.5 cm), flat. L, not found.
Expanded post injury ring	No	Expanded post injury ring	Unclear, possibly.
Right angle intercept	No	Right angle intercept	Unclear.
Phenol staining	Irregular	Phenol staining	-
Original tree size/ % stripped	unclear	Original tree size/ % stripped	<.6m / unclear
Confidence	Downgraded, natural scar	Confidence	60%
Estimated Age	-	Estimated Age	Unclear
Comments	Recorded early in project, very likely natural scar.	Comments	Poor recording, needs revisit. Unclear feature.



CMT#	TS1-6	CMT#	TS1-7
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DBH/height	1 x .75m / 1.5m	DBH/height	1.32 x 1.65m / .95m
Open/closed	Open (17 cm window)	Open/closed	Closed, very deep
Direction	South, side slope (gentle/medium slope)	Direction	Northeast, upslope
Scar crust	R (2.5cm) + L (3cm). Flat smooth scar crusts.	Scar crust	R (2.5cm) + L (2.5cm), very good, flat scars.
Expanded post injury ring	Yes clear.	Expanded post injury ring	Yes clear.
Right angle intercept	L, yes clear. R, mostly.	Right angle intercept	Yes
Phenol staining	Rectangular phenol staining.	Phenol staining	Rectangular phenol staining.
Original tree size/ % stripped	<60cm, off older healing lobe / ~25%	Original tree size/ % stripped	18cm / 20%?
Confidence	80%	Confidence	85-90%
Estimated Age	Min. 172, AD 1839 (15 year buffer, wedge core sample). Dated exactly by Baseline to AD 1829.	Estimated Age	Min 596, AD 1415 (5 year buffer, wedge core sample, few microscopic rings, one or two years possibly missing from scar crust)
Comments	Feature already recorded and dated by Baseline. Photos appear to suggest 3 scarring features on this tree. Two of which were overlooked by me in the field. Baseline only took a wedge sample of lobe and missed the other two features as well.	Comments	All features appear cultural. Only contrary feature is the minimum amount scarred.



CMT#	TS1-8	CMT#	TS1-9
DBH/height	1.5 x 2m / 2.1m	DBH/height	2 x 1.66m / 1.2m
Open/closed	Closed	Open/closed	Closed
Direction	Northeast, upslope (medium, steep)	Direction	North, upslope
Scar crust	R (2.5cm) + L (2.75cm). Good, flat,	Scar crust	R (2cm) + L (2cm), good, flat but

	not very black, slight wobble.		thin.
Expanded post injury ring	No, not clear	Expanded post injury ring	Yes
Right angle intercept	Yes, but thin rings.	Right angle intercept	Yes, mostly
Phenol staining	Rectangular phenol staining.	Phenol staining	Rectangular phenol staining is clear on the R side
Original tree size/ % stripped	>80cm / <5%	Original tree size/ % stripped	Unclear / unclear
Confidence	55%	Confidence	75%
Estimated Age	Min. 292, AD 1719 (5 year buffer, wedge core sample, microscopic rings)	Estimated Age	Min 358, AD 1653 (5 year buffer, wedge core sample, possibly missing some rings from crust area and outer side of tree)
Comments	Missing several features, tiny % peeled, and large original tree. Unclear feature.	Comments	Looks like the scar is taken off an older scar lobe. Possibly a fragment of original scar's scar crust seen in photos but unclear.



CMT#	TS1-10	CMT#	TS1-11
DBH/height	.79 x .85m / 3.75m (NA fallen)	DBH/height	1.33 x 1.6m / 1.3m
Open/closed	Closed	Open/closed	Closed
Direction	NA (fallen)	Direction	North, upslope (medium slope).
Scar crust	R (~1cm), very narrow, though relatively flat. (May be result of high cut in tree, rougher area of peel.)	Scar crust	R (2cm), flat but very poor condition, partially disconnected from intersecting rings. L, not found.
Expanded post injury ring	Unclear	Expanded post injury ring	Unclear
Right angle intercept	Yes, mostly	Right angle intercept	Unclear, possibly pinch?
Phenol staining	Rotted centre	Phenol staining	Too rotted
Original tree size/ % stripped	<40cm / ?	Original tree size/ % stripped	<60cm
Confidence	60%	Confidence	>50%
Estimated Age	Min 350, AD 1661 (10 year buffer, wedge core sample, microscopic rings, rings missing at crust and outer	Estimated Age	Min 400-500 years.

	face.)		
Comments	Cross section is far up the tree, like other high cuts it's showing a rougher scar crust. Lower end of confidence, though still convincing shape...	Comments	Very unclear sample. Very rotted stump, with lots of debris. Poor recording and unclear photos. Needs revisit to confirm any cultural features.



CMT#	TS1-12 (multiple scar features)	CMT#	TS1-13
DBH/height	1.7 x 1.6m / 1m	DBH/height	2.10 x 1.5m / 2m
Open/closed	Closed	Open/closed	Semi closed
Direction	North, upslope (very steep!)	Direction	Northwest, upslope (gentle)
Scar crust	R (2cm) + L (2.5cm), both partial, but good, smooth, black. Another scar crust seen in photos beside the R scar crust.	Scar crust	R (2cm) + L (2.5cm), both good, flat, partial scar crusts. Healing lobe has wrapped around them.
Expanded post injury ring	Unclear, rotted.	Expanded post injury ring	Minor
Right angle intercept	Yes, clear	Right angle intercept	Yes, clear
Phenol staining	Completely rotted out.	Phenol staining	All degraded.
Original tree size/ % stripped	Likely <60 cm / <30 cm?	Original tree size/ % stripped	~70 cm / 55%
Confidence	65-70%	Confidence	55%
Estimated Age	Min 367, AD 1644 (15 year buffer, wedge core sample, microscopic rings, estimates of years at rot near scar crust).	Estimated Age	Min 489, AD 1522 (10 year buffer, wedge core sample, no microscopic rings, but estimates at crust and outer face of stump).
Comments	Appears that recorded scar crust may be only older healing lobe. Needs revisit, better cleaning and recording.	Comments	Mainly all good features, just the large size of original tree. Possible rectangular scar?



CMT#	TS1-14	CMT#	TS1-15
DBH/height	-	DBH/height	.88m x 1.12m
Open/closed	Closed	Open/closed	Closed
Direction	-	Direction	side slope
Scar crust	R (2.5cm), good flat scar, lobe wrapped around. L not found.	Scar crust	L (2cm) + R (1cm), slightly curved, mostly obstructed by lobe growth.
Expanded post injury ring	Unclear	Expanded post injury ring	No.
Right angle intercept	Yes	Right angle intercept	R, yes. L, unclear.
Phenol staining	Rotted out	Phenol staining	Rotted out.
Original tree size/ % stripped	>60cm / unclear	Original tree size/ % stripped	10cm / ~13%
Confidence	Downgraded	Confidence	55%
Estimated Age	-	Estimated Age	-
Comments	Single good scar crust, but on too large a tree, very poor condition of massive stump. Insufficient recorded data.	Comments	Unclear scar crusts, lack of expanded ring growth, and small area peeled suggestive of natural origins. A cleaner cut of stump might suggest differently.



CMT#	TS1-16	CMT#	TS1-17
DBH/height	1.14 x 1.12m / ?	DBH/height	3 x 1.79m / 1m
Open/closed	Open	Open/closed	Closed
Direction	upslope	Direction	North, uphill
Scar crust	R + L (partial), unclear condition, looks rough in image.	Scar crust	R (2cm) + L (2.5cm), smooth, black, good condition.
Expanded post injury ring	Images suggest yes.	Expanded post injury ring	Yes, clear.
Right angle intercept	Unclear	Right angle intercept	Yes, clear.
Phenol staining	Probably rectangular phenol staining	Phenol staining	Rectangular phenol staining.
Original tree size/ % stripped	27cm/ ~75%	Original tree size/ % stripped	18.5 cm / 50%
Confidence	75-80%	Confidence	85-90%
Estimated Age	Min 314, AD 1697 (25 year buffer, counted in field)	Estimated Age	Min 1108, AD 903 (5 year buffer, disk sample take of feature, counted under microscope, high confidence in count within 5 years).
Comments	Shape strongly suggests cultural bark strip, high % peel, needed better recording.	Comments	Very good feature, all textbook features, high confidence. Oldest recorded living CMT.



CMT#	TS1-18	CMT#	TS1-19
DBH/height	1.12 x .96m / NA fallen cedar	DBH/height	1.09 x 1.51m / ?
Open/closed	Closed	Open/closed	Closed
Direction	NA (fallen)	Direction	North, side slope

Scar crust	L, good but a little wavy. R not found.	Scar crust	R + L, both smooth but thin and narrow, lobe has grown around both.
Expanded post injury ring	Yes, mostly apparent on R side.	Expanded post injury ring	Yes, clear.
Right angle intercept	unclear	Right angle intercept	No.
Phenol staining	Rotted out.	Phenol staining	Semi-rectangular phenol staining
Original tree size/ % stripped	Unclear, likely <60cm / unclear if old 'core-popper' or small tree.	Original tree size/ % stripped	22 cm / 20%
Confidence	55-60%	Confidence	55%
Estimated Age	Min 378, AD 1633 (25 year buffer, counted in field, poor conditions).	Estimated Age	Min 150, AD 1891 (5 year age buffer, counted in field)
Comments	Insufficient data, needs better cut.	Comments	Unclear scar, generally looks good but for lack of right angle ring intercepts with scar crust, flat advance of lobes.



CMT#	TS1-20.1a (multiple scarred stump)	CMT#	TS1-20.1 (off lobe, multiple scarred stump)
DBH/height		DBH/height	
Open/closed	Closed	Open/closed	Closed
Direction	East	Direction	Northeast, side slope
Scar crust	R + L, both smooth, flat, black, good condition.	Scar crust	L (4cm) + R (4cm), perfect scar crusts
Expanded post injury ring	Yes	Expanded post injury ring	Yes, clear
Right angle intercept	Yes	Right angle intercept	Yes.
Phenol staining	Likely rectangular, but unclear due to decay.	Phenol staining	Appears rectangular, but degraded.
Original tree size/ % stripped	~18cm / ~20%	Original tree size/ % stripped	~40cm / 10-15%?
Confidence	80%	Confidence	85%
Estimated Age	Min. 254, AD 1757 (20 year buffer, counted from images.)	Estimated Age	Min 196, AD 1815 (10 year buffer, counted in field)
Comments	This scar was notice in photos after	Comments	Lobe peel, high confidence of

	fieldwork. Very likely cultural, has appropriate features, good scar crusts.		cultural origins.
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CMT#	TS1-20.2 (multiple scarred stump)	CMT#	TS1-20.4 (multiple scarred stump)
DBH/height		DBH/height	
Open/closed	Closed	Open/closed	Open
Direction	South, side slope (gentle)	Direction	North
Scar crust	R (3cm) + L (4cm, partial), perfect scar crusts.	Scar crust	L side intercepted with earlier scar crust (=no growth) and R is crushed.
Expanded post injury ring	unclear	Expanded post injury ring	unclear
Right angle intercept	Yes	Right angle intercept	unclear
Phenol staining	Appears rectangular but degraded	Phenol staining	Yes? Unclear.
Original tree size/ % stripped	~40cm / 15-20%?	Original tree size/ % stripped	~60? / 40-50%
Confidence	85%	Confidence	65%
Estimated Age	Min 199, AD 1812 (5 year buffer, counted in field)	Estimated Age	Min 154, AD 1857 (5 year buffer, counted in field, date associated with minor scar found after analysis on adjacent lobe.)
Comments	Lobe peel, high confidence of cultural origins.	Comments	By association this feature has likely cultural origins, and is believed to be one of two later strips. The second having partially peeled the L lobe of 20.1.



CMT#	TS1-21.1 (multiple scarred tree)	CMT#	TS1-22 (multiple scarred tree)
DBH/height	.77m x .62m / >1m	DBH/height	2.69m x 2.75m / ?
Open/closed	Open (5cm)	Open/closed	closed
Direction	South, flat.	Direction	?, flat ground.
Scar crust	R + L, both perfect and good condition, but unclear if both scar crusts are from same event.	Scar crust	L (3cm) + R (2cm), perfect scar crusts, a little degraded but still smooth, and flat.
Expanded post	possibly	Expanded post	Yes

injury ring		injury ring	
Right angle intercept	Yes, clear	Right angle intercept	Yes, clear
Phenol staining	Too rotted out.	Phenol staining	Possibly rectangular, but rotted out original
Original tree size/ % stripped	Unclear, 20-30cm? / >60%	Original tree size/ % stripped	Unclear, likely around 60cm or larger/ ?
Confidence	75%	Confidence	70%
Estimated Age	Min 195, AD 1816 (10 year buffer, counted in the field, unclear in notes which scar crust counted)	Estimated Age	Min 243, AD 1768 (5 year buffer, counted in the field)
Comments	Shape of tree appears to be from multiple scarring events and lobe growths, only one scarring event was recorded in field, but that may actually represent two scarring events.	Comments	Peel taken off larger tree, but it appears that bark was taken off an older healing lobe.



CMT#	TS1-23	CMT#	TS1-24
DBH/height	2.98m x (half covered) / ~1m	DBH/height	1.16 x 1m / >4 metres
Open/closed	Semi-open (window 3cm)	Open/closed	Closed
Direction	Side slope/downhill (gentle slope)	Direction	NA (fallen tree)
Scar crust	L (2cm), perfect, smooth scar crust. R, pulverized.	Scar crust	L + R, both good condition, but similar to other trees with high cuts, a little wobbly.
Expanded post injury ring	Yes, clear	Expanded post injury ring	No, ...or minimal
Right angle intercept	Yes, clear	Right angle intercept	Yes
Phenol staining	Unclear	Phenol staining	Rectangular phenol staining
Original tree size/ % stripped	>1m / ?	Original tree size/ % stripped	41 cm / ~20%
Confidence	55%	Confidence	65%
Estimated Age	-	Estimated Age	Min 400, AD 1611 (20 year buffer, wedge core sample taken). Tree fallen years previous, a sapling growing on the log was cut and dated, adding 57 years to the age

			of the log (included in above date).
Comments	One great scar crust, but is far out on tree and generally natural looking.	Comments	Very convincing features, however not a huge portion peeled, and wobbly scar crusts.



CMT#	TS1-25	CMT#	TS1-26
DBH/height	.67 x .62m / ?	DBH/height	1.6 x 1.45m / ?
Open/closed	Closed	Open/closed	Semi open (20 cm, but stuffed with salal and rotted wood).
Direction	East, uphill	Direction	Downhill/side slope
Scar crust	R (1cm) + L (2cm), both are partial, but very good condition, though lobes have wrapped around crusts, making them look wavy. Still looks fairly cultural.	Scar crust	L (6cm?), perfect scar crust, black, smooth. R is rotted out.
Expanded post injury ring	Possibly, obscured.	Expanded post injury ring	Unclear
Right angle intercept	Yes	Right angle intercept	Yes
Phenol staining	Rotted out	Phenol staining	Rotted out
Original tree size/ % stripped	~18cm / ~50%	Original tree size/ % stripped	~55cm / 30%?
Confidence	75%	Confidence	60%
Estimated Age	Min 201, AD 1810 (10 year buffer, counted in the field)	Estimated Age	Min 260, AD 1751 (10 year buffer, counted in the field)
Comments	Likely same as Baseline's CMT #19. Most features good, good general shape. Typical single peeled CMT	Comments	Appears that the right lobe might be off earlier scar lobe, very unclear from photo. Possible multiple scarring? (reflection: needed higher confidence level)



CMT#	TS1-27
DBH/height	.83 x .8m / 3m (fallen)
Open/closed	Closed
Direction	NA (fallen tree)
Scar crust	L, little wobbly, high cut tree. R, rotted out.
Expanded post injury ring	Minor
Right angle intercept	Angled, not pinched
Phenol staining	Rotted out
Original tree size/ % stripped	20-25 cm / unclear
Confidence	60%
Estimated Age	-
Comments	Slight possibility it is the same tree at Baseline's CMT #8. Otherwise, suggestive but not conclusive features.

Others photographed, not recorded:



Toquaht Survey 2

Cut block ID:	LC3 (IMapBC 2015)
Cut block description:	LC3, ?, Coulson Forest Products Limited (IMapBC 2015)
Date of logging	August 1 st , 2006 – September 1 st , 2006 (IMapBC 2015)
Access:	LC04 road (gated) off Toquaht FSR
Position	250m as the crow flies from Toquaht Bay. 20-30m ASL
Associated Archaeological Site:	Nearby. DgSh-59: 100m SSE, 1 logging feature DgSh-60: 200m SE, 3 bark strip features DgSh-61: 650m E, 3 logging features
Date of access, conditions	November 2014. Sunny cool conditions
Recorders	Jacob Earnshaw, Keith Holmes, Andrew Sheriff



CMT#	TS2-1	CMT#	TS2-2.1
DBH/height	1.05 x .55m / 1.3m	DBH/height	.94 x .73m / ?
Open/closed	Open, but obscured	Open/closed	Open (11cm)
Direction	West, side slope	Direction	Northeast, side slope
Scar crust	R, is more visible than left. Both present, and flat.	Scar crust	R, slightly hidden scar crust
Expanded post injury ring	Yes	Expanded post injury ring	Yes
Right angle intercept	Yes, mainly	Right angle intercept	Unclear, degraded
Phenol staining	Rectangular phenol staining	Phenol staining	Unclear
Original tree size/ % stripped	17cm/ 55-60%	Original tree size/ % stripped	30-40cm / 20%
Confidence	75-80%	Confidence	70%
Estimated Age	Min 477, AD 1532 (20 year buffer, counted in the field. Unclear estimate)	Estimated Age	Min 345, AD 1664 (20 year buffer, counted in field)
Comments	All features present, surrounded by other likely cultural features.	Comments	Great scars, in cultural area, most of traits, just poor condition of stump



CMT#	TS2-2.2	CMT#	TS2-3
DBH/height	.94 x .73m / ?	DBH/height	1.15 x .7m / 1.25m
Open/closed	Open (9cm)	Open/closed	Closed
Direction	Southwest, side slope.	Direction	Northwest, uphill/side slope
Scar crust	R, good. L, good.	Scar crust	R, yes. L, yes.
Expanded post injury ring	Unclear	Expanded post injury ring	Unclear
Right angle intercept	Yes	Right angle intercept	L, Yes. R, unclear?
Phenol staining	Unclear	Phenol staining	Unclear
Original tree size/ % stripped	30-40cm / 20%	Original tree size/ % stripped	Unclear, <35cm
Confidence	70%	Confidence	55-60%
Estimated Age	-	Estimated Age	Min 548, AD 1461 (20 year buffer, counted in the field, estimate)
Comments	Great scars, in cultural area, most of traits, just poor condition of stump	Comments	Poor recording, and potentially too large a tree?



CMT#	TS2-4.1	CMT#	TS2-4.2
DBH/height	1.13 x 1.16m / ?	DBH/height	1.13 x 1.16m / ?
Open/closed	Closed	Open/closed	Effectively closed, window 2cm
Direction	North, flat	Direction	South, flat
Scar crust	L, great. R, great.	Scar crust	R, great. L, great.
Expanded post injury ring	Yes, clear	Expanded post injury ring	Yes, clear
Right angle	Yes	Right angle	Yes

intercept		intercept	
Phenol staining	Clear rectangular phenol staining	Phenol staining	Clear rectangular phenol stain
Original tree size/ % stripped	10.5cm / 60%	Original tree size/ % stripped	13.5 cm / 45% (about 80% of live remaining bark)
Confidence	95-100%	Confidence	95-100%
Estimated Age	Min 368, AD 1641 (15 year buffer, counted in field, sample lost)	Estimated Age	Min 400, AD 1609 (15 year buffer, counted in the field, lost sample)
Comments	Everything points towards cultural multiple peeled tree.	Comments	Everything points towards cultural multiple peeled tree.



CMT#	TS2-5.1	CMT#	TS2-5.2
DBH/height	.82 x .47m / 1.1m	DBH/height	.82 x .47m / 1.1m
Open/closed	Effectively close, completely full of wood and salal.	Open/closed	Open, ~30cm
Direction	South, flat	Direction	North, flat
Scar crust	L, good. R, no, rotted	Scar crust	R, good. L, no, rotted.
Expanded post injury ring	Unclear	Expanded post injury ring	Rotted
Right angle intercept	Unclear, rotted	Right angle intercept	Rotted
Phenol staining	Rotted	Phenol staining	Rotted
Original tree size/ % stripped	Yes, 20-25 cm / ~30cm	Original tree size/ % stripped	20-25cm / ~50%
Confidence	65%	Confidence	65%
Estimated Age	-	Estimated Age	-
Comments	Multiple scarring events, looks convincing but very degraded stump.	Comments	Multiple scarring events, looks convincing but very degraded stump.



CMT#	TS2-5.3	CMT#	TS2-6
DBH/height	.82 x .47m / 1.1m	DBH/height	1.03 x 1.33m / ?
Open/closed	Open, ~25cm	Open/closed	Open, very deep though.
Direction	Northwest, flat	Direction	North/northwest, gentle uphill
Scar crust	R, no, rotted. L, good.	Scar crust	R, good. L, good
Expanded post injury ring	Rotted	Expanded post injury ring	Yes, clear
Right angle intercept	Rotted	Right angle intercept	Yes
Phenol staining	Rotted	Phenol staining	Clear rectangular phenol stain
Original tree size/ % stripped	20-25cm / 5-10%	Original tree size/ % stripped	19cm / 55%
Confidence	60%	Confidence	85%
Estimated Age	-	Estimated Age	Min 630, AD 1379 (20 year buffer, counted in field, estimate)
Comments	Multiple scarring events, looks convincing but very degraded stump.	Comments	Everything looks good, cultural scars in area. Strong confidence



CMT#	TS2-7
DBH/height	.99 x .54m / ?
Open/closed	Open
Direction	?
Scar crust	L, yes 2.5cm. R, missing, curl notable.
Expanded post injury ring	Yes, but unclear start
Right angle intercept	Yes.
Phenol staining	Possibly, partial stump.
Original tree	25-40cm / 65%

size/ % stripped	
Confidence	75%
Estimated Age	Min 441, AD 1561 (20 year end buffer, counted in the field)
Comments	Great scar, expanded ring, >50% cleanly peeled, cultural area. Good.

Others photographed, not recorded:



Toquaht Survey 3

Cut block ID:	86A (IMapBC 2015)
Cut block forest file ID:	A19234, Coulson Forest Products (IMapBC 2015)
Date of logging	October 1 st , 2006 – January 1 st , 2007 (IMapBC 2015)
Access:	road running north along Toquaht Lake, then Toquaht River. Take left onto road immediately after bridge. Clearcut is adjacent to road here.
Position	50m from river, 2 km as the crow flies from Toquaht Lake, 8.25 km from Toquaht Bay. 120-160m ASL
Associated Archaeological Site:	No
Date of access, conditions	November 2014. Sunny cool conditions
Recorders	Jacob Earnshaw, Keith Holmes, Andrew Sheriff

Stumps photographed, likely natural:



Toquaht Survey 4

Cut block ID:	0422 (IMapBC 2015)
Cut block forest file ID:	A87716, Errington Cedar Products LTD (IMapBC 2015)
Date of logging	April 25 th , 2013 – November 7 th , 2014 (IMapBC 2015)
Access:	FSR runs East from Toquaht Bay Rd, area surveyed is 5 kilometres passed Ellswick and Kite Lake.
Position	4 km as the crow flies N of Pipestem Inlet, 4.5 km as the crow flies W of Effingham Inlet. 275-300m ASL
Associated Archaeological Site:	No.
Date of access, conditions	January 2015. Conditions foggy with some rain.
Recorders	Jacob Earnshaw, Andrew Sheriff

Ditidaht Surveys

Ditidaht Survey 1

Cut block ID:	673223 (IMapBC 2015)
Cut block forest file ID:	TFL44, Western Forest Products Inc (IMapBC 2015)
Date of logging	July 1 st , 2010 – August 30 th , 2010
Access:	Rosander Main Rd runs the length of the E side of Nitinat Lake, site is about 3.5 km passed Cheewaht Lake on the E side of the road.
Position	2.25km SSW as the crow flies from Cheewaht Lake 4.75km NE of Clo-oose and the coast 210-225m ASL
Associated Archaeological Site:	No
Date of access, conditions	September 2015, hot overcast conditions
Recorders	Jacob Earnshaw, Lara Baltutis, Maude

Photographed, not recorded (insufficient data):



Ditidaht Survey 2

Cut block ID:	6763 (IMapBC 2015)
Cut block forest file ID:	TFL44, Western Forest Products Inc (IMapBC 2015)
Date of logging	February 1 st , 2005 – May 1 st , 2005 (IMapBC 2015)
Access:	Rosander Main Rd runs the length of the E side of Nitinat Lake, site is between the road and the S end of Cheewaht Lake.
Position	500m ESE from S Cheewaht Lake. 110-140m ASL
Associated Archaeological Site:	Yes, overlaps DeSe-53 DeSe-53 CMT site, 2 CMT stumps, 1 test hole, 1 TBS
Date of access, conditions	September 2015. Warm, overcast weather.
Recorders	Jacob Earnshaw, Lara Baltutis, Maude



CMT#	DS2-1	CMT#	DS2-poss cmta
DBH/height	? / 1.6m	DBH/height	-/-
Open/closed	Open	Open/closed	Closed
Direction	West, no slope	Direction	?
Scar crust	L, no, rotted out. R, good, smooth, 6.5cm	Scar crust	Not too smooth, but flat.
Expanded post injury ring	Yes	Expanded post injury ring	No
Right angle intercept	Yes. Clear on right lobe.	Right angle intercept	Yes
Phenol staining	Rectangular phenol staining	Phenol staining	Yes, clear
Original tree size/ % stripped	>40, taken off lobe / unclear	Original tree size/ % stripped	~60cm / <5%
Confidence	85%	Confidence	60%
Estimated Age	Min 230, AD 1775 (50 year buffer, unclear if tree alive or dead at time of falling. Estimate.)	Estimated Age	-
Comments	Peel taken off older healing lobe, tree might be dead? Unclear age, looks like very old and degraded multiple peeled tree.	Comments	Possible test peel off a large tree. Good compartmentalization, but could be natural? Unclear.

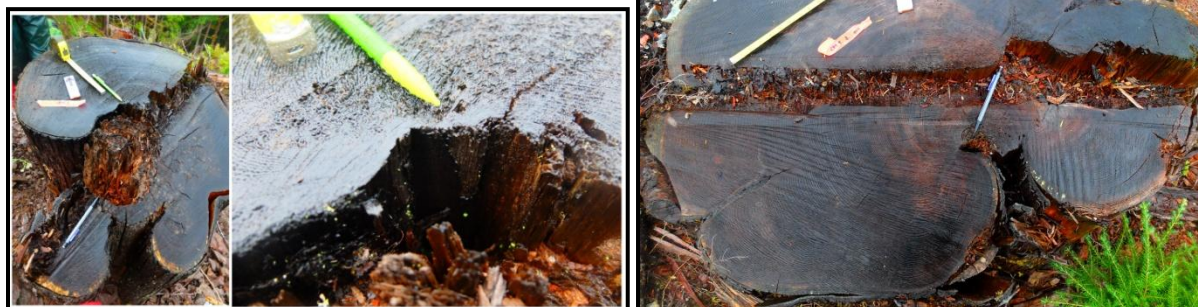
Other photographed, not recorded:



Ditidaht Survey 3

Cut block ID:	872213 (IMapBC 2015)
Cut block forest file ID:	TFL44, Western Forest Products (IMapBC 2015)
Date of logging	“planned harvest date” November 23 rd , 2011 (IMapBC 2015)
Access:	From Nitinat Junction (Carmanah Mainline and Nitinat Mainline) take Br 74 south for about 5.3km until at the CW730. Follow CW730 for 2.3 km. Walk about 100m from there.
Position	1.25km WNW from N end of Nitinat Lake. 130-210m ASL

Associated Archaeological Site:	Yes. Adjacent to DeSd-8, within 250m of DeSd-4, 9, 10. -DeSd-4 , CMT site, TBS cedars, modified Yew Trees. Millennia Research 2000 overview survey, Permit #2000-321. -DeSd-4 revisited, CMT site, 7 total TBS cedars -DeSd-8 CMT site, 22 TBS CMTs -DeSd-9 CMT site, 2 TBS CMTs -DeSd-10 CMT site, 10 TBS CMTs Baseline Archaeological Services, 2011 AIA, Permit #2010-152.
Date of access, conditions	September 2015. Heavy rain and extreme wind, very poor recording conditions.
Recorders	Jacob Earnshaw, Lara Baltutis, Maude, Adam Love, Phoebe Ramsay



CMT#	DS3-1	CMT#	DS3-2
DBH/height	.9m x .9m / 1.1m	DBH/height	1.05m x .95 / ?
Open/closed	Open, 11cm window	Open/closed	~Open, 5 cm window
Direction	?, uphill	Direction	South facing
Scar crust	L, good intact	Scar crust	L, good. R, missing (only one lobe present)
Expanded post injury ring	Yes	Expanded post injury ring	Yes, minor
Right angle intercept	Yes, both	Right angle intercept	Yes
Phenol staining	Too rotted	Phenol staining	NA, inside gone
Original tree size/ % stripped	33cm / 50%	Original tree size/ % stripped	?, strip off phantom lobe
Confidence	85%	Confidence	75%
Estimated Age	Min 260, AD 1751 (5 year buffer, counted in field)	Estimated Age	Min 236, AD 1775 (10 year buffer, counted in field)
Comments	All good features, little rotted.	Comments	Peel off an ancient phantom lobe, several good features. Nothing definite.



CMT#	DS3-3	CMT#	DS3-4 (multiple scars on tree)
DBH/height	~a metre across	DBH/height	1.35m x 1.2m / ?
Open/closed	Closed	Open/closed	Closed
Direction	Uphill slope, very steep	Direction	North, side slope- unclear in notes
Scar crust	L, good crust	Scar crust	Yes
Expanded post injury ring	Unclear	Expanded post injury ring	Unclear
Right angle intercept	Yes	Right angle intercept	Yes, clear
Phenol staining	Unclear	Phenol staining	?
Original tree size/ % stripped	Unclear	Original tree size/ % stripped	Unclear
Confidence	65%	Confidence	80%
Estimated Age	-	Estimated Age	Min 160, AD 1851 (15 year buffer, unclear which scar is dated, counted in field)
Comments	Too much rotting, possible remnant of a large multiple peeled tree. Lobey.	Comments	Three scars on this tree. Poor working conditions during wind storm. One looked more cultural than the rest, but all had potential. Confident at least one is cultural. Maybe all.



CMT#	DS3-5 (multiple scars on tree)	CMT#	DS3-6.1
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DBH/height	>1 metre	DBH/height	.7m x .85m / ?
Open/closed	Closed for all lobes	Open/closed	Open, crushed, maybe originally 2 cm open?
Direction	-	Direction	East
Scar crust	Yes	Scar crust	R, good, fragmented
Expanded post injury ring	-	Expanded post injury ring	Unclear
Right angle intercept	-	Right angle intercept	Unclear
Phenol staining	-	Phenol staining	-
Original tree size/ % stripped	-	Original tree size/ % stripped	Unclear
Confidence	80%	Confidence	70%
Estimated Age	-	Estimated Age	Min 206, AD 1805 (15 year buffer, counted in field)
Comments	Absolute mess of rings, poor photography and working conditions. Few great scar crusts, and lobes off phantom lobes, high cultural likelihood.	Comments	Very rotted two scarred tree



CMT#	DS3-6.2	CMT#	DS3-7
DBH/height	.7m x .85m / ?	DBH/height	1.4m x 1.07m / ?
Open/closed	Closed	Open/closed	Closed
Direction	South	Direction	Upslope
Scar crust	L, good, fragmented	Scar crust	L, good. R, rotted out
Expanded post injury ring	Unclear	Expanded post injury ring	Yes
Right angle intercept	Unclear	Right angle intercept	Unclear
Phenol staining	Too rotted	Phenol staining	Unclear
Original tree size/ % stripped	Unclear	Original tree size/ % stripped	75-80%?
Confidence	70%	Confidence	70%
Estimated Age	-	Estimated Age	Min 150, AD 1861 (30 year buffer, counted in field)
Comments	Very rotted two scarred tree	Comments	Has scar crust, and high % peeled



CMT#	DS3-8.1 (multiple scars on tree)	CMT#	DS3-8.2 (multiple scars on tree)
DBH/height	.9m x .8m / ?	DBH/height	.9m x .8m / ?
Open/closed	All open	Open/closed	All open
Direction	All around	Direction	All around
Scar crust	All very good and smooth	Scar crust	All very good and smooth
Expanded post injury ring	Many yes	Expanded post injury ring	Many yes
Right angle intercept	Many yes	Right angle intercept	Many yes
Phenol staining	Unclear	Phenol staining	Unclear
Original tree size/ % stripped	Unclear/unclear	Original tree size/ % stripped	Unclear/unclear
Confidence	100%	Confidence	100%
Estimated Age	Min 190, AD 1821 (35 year buffer, rot and counting off photo)	Estimated Age	Min 198, AD 1813 (25 year buffer, rot and counting off photo)
Comments	Repetitive scarring, clean good crusts	Comments	Repetitive scarring, clean good crusts



CMT#	DS3-8.3 (multiple scars on tree)	CMT#	DS3-9.1
DBH/height	.9m x .8m / ?	DBH/height	1m x 1m ?
Open/closed	All open	Open/closed	Open
Direction	All around	Direction	East, uphill steep slope
Scar crust	All very good and smooth	Scar crust	L, good. R, good.
Expanded post injury ring	Many yes	Expanded post injury ring	deteriorated
Right angle intercept	Many yes	Right angle intercept	Yes
Phenol staining	Unclear	Phenol staining	Unclear
Original tree size/ % stripped	Unclear/unclear	Original tree size/ % stripped	Unclear/ unclear
Confidence	100%	Confidence	90%
Estimated Age	Min 182, AD 1829 (40 year buffer, dead lobe? Unclear age)	Estimated Age	Min 250, AD 1761 (10 year buffer, counted in field)
Comments	Repetitive scarring, clean good crusts	Comments	Good traits

CMT#	DS3-9.2	CMT#	DS3-9.3
DBH/height	1m x 1m ?	DBH/height	1m x 1m ?
Open/closed	Open	Open/closed	Open
Direction	South southwest, side slope steep	Direction	Northwest, side slope steep
Scar crust	L, good. R, good.	Scar crust	L, good. R, good.
Expanded post injury ring	Yes, clear	Expanded post injury ring	Yes, clear
Right angle intercept	Yes	Right angle intercept	Yes
Phenol staining	Unclear	Phenol staining	Rectangular phenol staining
Original tree size/ % stripped	Unclear/ unclear	Original tree size/ % stripped	Unclear/ unclear
Confidence	90%	Confidence	80%
Estimated Age	Min 178, AD 1833 (20 year buffer, counted in field)	Estimated Age	Min 200, AD 1811 (10 year buffer, counted in field)

Comments	Good traits	Comments	Good traits
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CMT#	DS3-10	CMT#	DS3-11
DBH/height	~1 metre / "quite high"	DBH/height	1m x .8m / unclear
Open/closed	Open, 3cm clogged with debris	Open/closed	Open, 3 cm window
Direction	North northeast, upslope/side slope	Direction	West, southwest. Unclear slope
Scar crust	L, yes, partially crushed. R, Yes perfect	Scar crust	L, yes intact. R, rotted out.
Expanded post injury ring	Yes, clear	Expanded post injury ring	Probably, unclear
Right angle intercept	Yes, clear	Right angle intercept	Yes
Phenol staining	Rectangular, possibly on L side	Phenol staining	Rotted out centre
Original tree size/ % stripped	~45cm / 25%?	Original tree size/ % stripped	? / >75%
Confidence	90%	Confidence	95%
Estimated Age	Min 226, AD 1758 (10 year buffer, counted in field)	Estimated Age	Min 221, AD 1763 (20 year buffer, counted in field)
Comments	A number of scars, only one clearly cultural	Comments	All good features of this scar, possibly other scars on tree.



CMT#	DS3-12.1	CMT#	DS3-12.2
DBH/height	1.2m x 1.05m / ?	DBH/height	1.2m x 1.05m / ?
Open/closed	Open, 4 cm	Open/closed	Closed
Direction	South, upslope	Direction	North, down slope

Scar crust	L, great. R, great	Scar crust	L, great. R, small but good
Expanded post injury ring	Yes	Expanded post injury ring	Yes
Right angle intercept	Yes	Right angle intercept	Yes
Phenol staining	NA	Phenol staining	NA
Original tree size/ % stripped	Unclear	Original tree size/ % stripped	Unclear
Confidence	80%	Confidence	80%
Estimated Age	Min 210, AD 1801 (10 year buffer, counted in field)	Estimated Age	Min 110, AD 1901 (5 year buffer, counted in field)
Comments	All perfect scar crusts, multiple peels	Comments	All perfect scar crusts, multiple peels



CMT#	DS3-12.3	CMT#	DS3-13
DBH/height	1.2m x 1.05m / ?	DBH/height	~metre across? Partially crushed
Open/closed	Open, rotted out centre	Open/closed	Partly open, but totally obstructed
Direction	West, side slope?	Direction	Side slope
Scar crust	L, unclear. R, Yes	Scar crust	L, good. R, good
Expanded post injury ring	Yes	Expanded post injury ring	Unclear from photos
Right angle intercept	Yes	Right angle intercept	L, unclear. R, yes
Phenol staining	NA, rotted centre	Phenol staining	Too crushed
Original tree size/ % stripped	Unclear	Original tree size/ % stripped	<60, unclear
Confidence	80%	Confidence	85%
Estimated Age	Min 183, AD 1828 (10 year buffer, counted in field)	Estimated Age	Min 280, AD 1731 (30 year buffer, counted in field with very tight rings)
Comments	All perfect scar crusts, multiple peels	Comments	Noted as definite cultural, good traits.

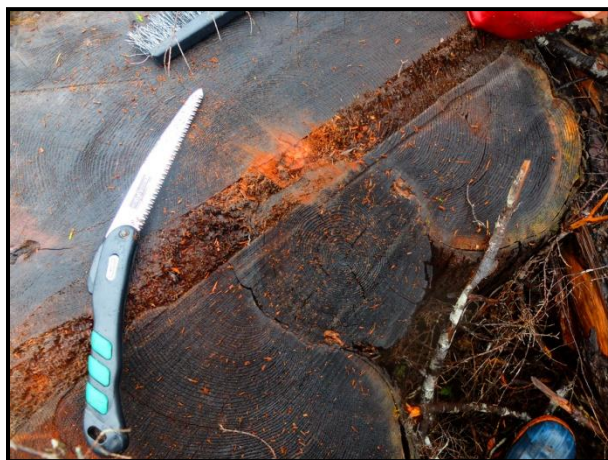


CMT#	DS3-14	CMT#	DS3-15 (multiple scarred tree)
DBH/height	~1m across?	DBH/height	?
Open/closed	Closed	Open/closed	Closed
Direction	Side slope	Direction	Upslope
Scar crust	L, semi intact. R, semi intact	Scar crust	L, good. R, missing lobe.
Expanded post injury ring	Yes	Expanded post injury ring	Unclear
Right angle intercept	No	Right angle intercept	Yes, clear
Phenol staining	Semi rectangular	Phenol staining	NA, gone
Original tree size/ % stripped	<25%	Original tree size/ % stripped	<75cm?
Confidence	55%	Confidence	75%
Estimated Age	Min 108, AD 1903 (5 year buffer, counted in field)	Estimated Age	Min 103, AD 1908 (5 year buffer, counted in field)
Comments	Few features, unclear	Comments	Other recorder confident, I am more cautious. Looks very cultural but large tree. Maybe one of many scars on this tree?



CMT#	DS3-16	CMT#	DS3-17 (multiple scarred tree)
DBH/height	~1metre across	DBH/height	>1m
Open/closed	Closed	Open/closed	Closed
Direction	West southwest, upslope	Direction	Downhill, but is facing artificially cut slope for road. So unclear.
Scar crust	L, good, but fragmented. R, good, but fragmented	Scar crust	L, good. R, good

Expanded post injury ring	Yes, clear	Expanded post injury ring	Minor
Right angle intercept	Unclear, rot	Right angle intercept	Yes, clear
Phenol staining	Rotted out	Phenol staining	Perfect rectangular phenol staining.
Original tree size/ % stripped	Unclear	Original tree size/ % stripped	Unclear, likely >60cm
Confidence	70%	Confidence	80%
Estimated Age	Min 170, AD 1841 (30 year buffer, counted in field)	Estimated Age	Min 195, AD 1816 (20 year buffer, counted in the field, maybe logged when dead??)
Comments	Probable cultural scar, good features. Missing some.	Comments	Large tree, but great features. Peeled off an older lobe! If cleaned off, likely many more cultural scars.



CMT#	DS3- poss. cmta
DBH/height	<1 metre
Open/closed	Open
Direction	?
Scar crust	L, yes.
Expanded post injury ring	Yes
Right angle intercept	Yes, not perfect though
Phenol staining	No decay?
Original tree size/ % stripped	~25cm? / 65%
Confidence	70%
Estimated Age	-
Comments	Textbook shape, though unclear features due to uncertainty in field. Unclear, looks good in photos.

Ditidaht Survey 4

Cut block ID:	8714 (IMapBC 2015)
Cut block forest file ID:	T0785 (W side), TFL44 (E side), Western Forest Products (IMapBC 2015)
Date of logging	April 16 th , 2004 – October 29 th , 2004 (IMapBC 2015)
Access:	
Position	1.25km WNW from N end of Nitinat Lake. 130-210m ASL
Associated Archaeological Site:	Yes, DfSe-3 DfSe-3 CMT site, 23 TBS, including 5 yellow cedars. Millennia Research 2000 overview survey. Permit #2000-313
Date of access, conditions	September 2015. Overcast with minor rain, cool conditions.
Recorders	Jacob Earnshaw, Lara Baltutis, Maude



CMT#	DS4-1.1	CMT#	DS4-1.2
DBH/height	1.5m x 1.6m / ?	DBH/height	1.5m x 1.6m / ?
Open/closed	Closed	Open/closed	Closed
Direction	South, side slope/uphill	Direction	Southeast, uphill
Scar crust	L, small piece. R, crush-no	Scar crust	L, broken but good. R, crushed-no
Expanded post injury ring	Yes, clear	Expanded post injury ring	Minor
Right angle intercept	Unclear	Right angle intercept	Unclear
Phenol staining	Too much rot	Phenol staining	Too much rot
Original tree size/ % stripped	30-35cm	Original tree size/ % stripped	30-35 cm
Confidence	75%	Confidence	75%
Estimated Age	Min 250, AD 1754 (1 year buffer, counted in field several times)	Estimated Age	Min 235, AD 1769 (2 year buffer, counted in field several times)
Comments	Great features, looks fairly cultural	Comments	Great features, looks fairly cultural



CMT#	DS4-1.3	CMT#	DS4-2
DBH/height	1.5m x 1.6m / ?	DBH/height	1.1m x .85
Open/closed	~open, rotted out centre	Open/closed	Closed
Direction	East southeast, uphill	Direction	Northeast, side slope/flat
Scar crust	L, perfect. R, perfect	Scar crust	L, mostly intact. R, fragmented but good.
Expanded post injury ring	Minor	Expanded post injury ring	Yes clear
Right angle intercept	Yes clear	Right angle intercept	L, yes. R, unclear
Phenol staining	Too much rot	Phenol staining	Too rotted
Original tree size/ % stripped	30-35cm	Original tree size/ % stripped	18cm / 50%
Confidence	80%	Confidence	85%
Estimated Age	Min 195, AD 1809 (5 year buffer, counted in field several times)	Estimated Age	Min 245, AD 1759 (3 year age buffer, counted twice in field)
Comments	Great features, looks cultural.	Comments	Good features, one possible test strip on stump as well...but unclear.



CMT#	DS4-3	CMT#	DS4-4
DBH/height	1.45m x 1.15m / .65	DBH/height	1mx .75m / .64
Open/closed	~open, 2.5 cm	Open/closed	Open
Direction	East, uphill	Direction	South (core popper)
Scar crust	L, good, mostly intact. R, good, mostly intact	Scar crust	L, unclear. R, good but partially rotted.
Expanded post injury ring	Yes, big	Expanded post injury ring	Yes. L, exaggerated. R, minor
Right angle intercept	L, yes. R, mostly	Right angle intercept	L yes
Phenol staining	Too rotted	Phenol staining	Unclear
Original tree size/ % stripped	~25cm / 40%	Original tree size/ % stripped	30-35cm / 70%
Confidence	85%	Confidence	80%
Estimated Age	Min 258, AD 1746 (5 year buffer, counted twice in the field)	Estimated Age	Min 228 (10 year buffer, counted in the field)
Comments	Good features	Comments	Another date came up with 160 on other lobe. This may have been a dead lobe though.



CMT#	DS4-5	CMT#	DS4-6
DBH/height	1.08m x .96m / 1.6m	DBH/height	1.5m x 1.45m / .8m
Open/closed	Closed	Open/closed	Closed
Direction	Northeast, uphill	Direction	Northeast, upslope
Scar crust	L, very good, 4.5cm. R, very good, 3cm	Scar crust	L & R semi intact scar crusts
Expanded post injury ring	Yes, clear	Expanded post injury ring	Yes
Right angle intercept	Partially, not pinched	Right angle intercept	Too rotted
Phenol staining	Possibly	Phenol staining	Too rotted
Original tree size/ % stripped	25cm / 35-40%	Original tree size/ % stripped	27cm / ~50%
Confidence	80%	Confidence	70%
Estimated Age	Min 210, AD 1794 (5 year buffer, counted in field)	Estimated Age	Min 253, AD 1751 (5 year buffer, counted in field)
Comments	Good features	Comments	Good features



CMT#	DS4-7	CMT#	DS4-8
DBH/height	1.5m x 1.1m / ?	DBH/height	.65m x .57m / ?
Open/closed	~open, 2 cm window	Open/closed	~open, 2 cm window
Direction	North, upslope along cliff	Direction	North, uphill
Scar crust	L, good 2.5cm. R, mostly rotted, crust found down in hole.	Scar crust	L, good fragmented crust. R, rotted out
Expanded post injury ring	Yes, clear	Expanded post injury ring	Yes, probable
Right angle intercept	Yes	Right angle intercept	L, yes. R, rotted

Phenol staining	Too rotted	Phenol staining	Rotted
Original tree size/ % stripped	19cm / 55%	Original tree size/ % stripped	~20cm, too degraded
Confidence	90%	Confidence	70%
Estimated Age	Min 225, AD 1779 (10 year buffer)	Estimated Age	Min 225, AD 1779 (10 year buffer)
Comments		Comments	Fairly poor condition



CMT#	DS4-poss cmta (multiple scars)	CMT#	DS4-poss cmtb
DBH/height	-	DBH/height	-
Open/closed	Closed	Open/closed	Closed
Direction	-	Direction	-
Scar crust	-	Scar crust	-
Expanded post injury ring	-	Expanded post injury ring	-
Right angle intercept	-	Right angle intercept	-
Phenol staining	-	Phenol staining	-
Original tree size/ % stripped	-	Original tree size/ % stripped	-
Confidence	50-65%??	Confidence	<60%
Estimated Age	-	Estimated Age	-
Comments	Looks like double stripped on opposite sides. Could very well be a CMT but needs a crush cut to view features.	Comments	Fairly typical shape for single scar, but crusts rotted out, strange intersections of lobes. Very unclear



CMT#	DS4-poss cmtc	CMT#	DS4-poss cmtd
DBH/height	-	DBH/height	-
Open/closed	Closed	Open/closed	-
Direction	-	Direction	-
Scar crust	-	Scar crust	-
Expanded post injury ring	Very clear	Expanded post injury ring	-
Right angle intercept	-	Right angle intercept	-
Phenol staining	-	Phenol staining	-
Original tree size/ % stripped	-	Original tree size/ % stripped	-
Confidence	60%	Confidence	60%
Estimated Age	-	Estimated Age	-
Comments	Far too rotted out to tell, but clear expanded rings in right area.	Comments	One lobe remaining on crushed stump, potential scar crust is largely rotted out. Unclear increase in ring width. Would need fresh cut.

Standing CMTs waypointed:



Pacheedaht Surveys

Pacheedaht Survey 1

Cut block ID:	7185 (IMapBC 2015)
Cut block forest file ID:	T0155 (North), T0129 (South), Teal Cedar Products Ltd (IMapBC 2015)
Date of logging	January 4 th , 2010 – March 26 th , 2010 (IMapBC 2015)
Access:	Pacific Marine Rd is taken north from the Port Renfrew Marina about 6.4km to the Braden Rd Gordon River Rd intersection. Continue over the bridge on Gordon River Rd for about 6km. Turn east onto the Edinburgh Main FSR, cross bridge and continue south for about 5.4km until you are at the site.
Position	5km as the crow flies from San Juan Bay, 100m from Braden Creek. 60-75m ASL
Associated Archaeological Site:	Yes, adjacent to DdSc-19 DdSc-19: 31 TBS CMTs. Millennia Research 2010, non-Permit site visit.
Date of access, conditions	March (overcast, rain), June (hot, sunny) 2015.
Recorders	Jacob Earnshaw, Bob Matkin, Jenn Elliot, Adam Love, Sara White, Jenny Cohen, Cal Abbott.



CMT#	PS1-1	CMT#	PS1-2.1
DBH/height	1.55m x 1.5m / 1.2m	DBH/height	1.3m x 1.63m / ?
Open/closed	Open, filled with salal, 11cm	Open/closed	Open, 4cm window, filled with salal
Direction	Roughly north	Direction	Southwest, uphill
Scar crust	No, rotten	Scar crust	No clear scars, unclear
Expanded post injury ring	Unclear	Expanded post injury ring	Unclear
Right angle intercept	?	Right angle intercept	Unclear
Phenol staining	Too rotted	Phenol staining	Unclear
Original tree size/ % stripped	35cm / 60%	Original tree size/ % stripped	45-60cm / 35%
Confidence	60%	Confidence	60%
Estimated Age	Min 250, AD 1760 (50 year buffer, counted in field-varied recorded date counts)	Estimated Age	Unknown, older than PS1-2.2
Comments	Would have been less confidence, but for its proximity spatially and temporally to PS1-2	Comments	Possible due to association of other scars

CMT#	PS1-2.2	CMT#	PS1-2.3
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DBH/height	1.3m x 1.63m / ?	DBH/height	1.3m x 1.63m / ?
Open/closed	Closed, rotted	Open/closed	Closed
Direction	West, side slope	Direction	East southeast, gentle side slope
Scar crust	R, good. L (possible in photos, too rotted)	Scar crust	L, perfect. R, unclear, rotted?
Expanded post injury ring	Yes, clear	Expanded post injury ring	Yes, clear
Right angle intercept	Yes	Right angle intercept	Yes
Phenol staining	Too rotted	Phenol staining	Too rotted
Original tree size/ % stripped	45-60cm / 20%	Original tree size/ % stripped	45-60cm / 20%
Confidence	80%	Confidence	80%
Estimated Age	Min 235, AD 1775 (35 year age buffer)	Estimated Age	Min 230, AD 1780 (30 year end buffer)
Comments	Confident	Comments	Confident



CMT#	PS1-3.1	CMT#	PS1-3.2
DBH/height	1.7m x 1.8m / ?	DBH/height	1.7m x 1.8m / ?
Open/closed	Closed	Open/closed	Open, 12cm, partially hidden around lobe
Direction	Northwest	Direction	East northeast
Scar crust	L, yes clear. R, unclear rotted	Scar crust	L, yes clear. R, rotted out.
Expanded post	No	Expanded post	Yes clear

injury ring		injury ring	
Right angle intercept	Clear	Right angle intercept	Clear on left scarcrust
Phenol staining	Irregular, maybe from rot and degradation	Phenol staining	Mainly rotted, possibly rectangular
Original tree size/ % stripped	60cm / 15%	Original tree size/ % stripped	40cm / 30%
Confidence	<50%	Confidence	70%
Estimated Age	-	Estimated Age	Min 277, AD 1733 (10 year buffer, counted in the field-unclear which scar though).
Comments	Not enough traits, downgraded	Comments	Looks fairly cultural.



CMT#	PS1-4.1	CMT#	PS1-4.2
DBH/height	1.94m x 1.68m / ?	DBH/height	1.94m x 1.68m / ?
Open/closed	Open, 4cm window	Open/closed	Open, 20m window
Direction	North, upslope-gentle	Direction	West, flat
Scar crust	L, loose but intact scarcrust	Scar crust	R, good 3cm. L, good 2.5cm
Expanded post injury ring	Yes clear	Expanded post injury ring	Likely, but unclear in photos, not in notes
Right angle intercept	Yes on left lobe	Right angle intercept	Yes
Phenol staining	Unclear, rotted out	Phenol staining	Unclear, rotted out
Original tree size/ % stripped	45cm / 50%	Original tree size/ % stripped	50-55cm / 25-30%
Confidence	85%	Confidence	75%
Estimated Age	Min 325, AD 1685 (10 year buffer, counted in field)	Estimated Age	Min 238, AD 1772 (5 year buffer, counted in the field)
Comments	Peel taken off original tree, good features	Comments	Good features

CMT#	PS1-4.3	CMT#	PS1-4.4
DBH/height	1.94m x 1.68m / ?	DBH/height	1.94m x 1.68m / ?
Open/closed	Open, 18cm window	Open/closed	Closed
Direction	East, gentle down slope	Direction	Northeast, side slope
Scar crust	R, good. L, good	Scar crust	Both, partial crusts
Expanded post injury ring	Yes, clear	Expanded post injury ring	Unclear
Right angle intercept	Yes	Right angle intercept	?
Phenol staining	Unclear	Phenol staining	Yes, semi rotted though
Original tree size/ % stripped	75-80cm / 25%	Original tree size/ % stripped	-far out on younger lobe
Confidence	65%	Confidence	75%
Estimated Age	Min 235, AD 1775 (10 year buffer, counted in field)	Estimated Age	Min 190, AD 1820 (5 year buffer, counted in field)
Comments	Taken off 4.1 left lobe, very large area stripped	Comments	Taken off 4.3 right lobe



CMT#	PS1-4.5	CMT#	PS1-5
DBH/height	1.94m x 1.68m / ?	DBH/height	1.74m x 1.87m / ?
Open/closed	Closed	Open/closed	Closed
Direction	Southeast, minor down slope	Direction	North northwest
Scar crust	L, only small fragment. R, flat but slightly uneven, minor pinching?	Scar crust	L, fragments found, very rotted. R, great smooth, 4cm.
Expanded post injury ring	Minor increase on right lobe	Expanded post injury ring	Probable, all thick rings
Right angle intercept	?	Right angle intercept	Clear on right lobe, rest are rotted
Phenol staining	Too rotted out	Phenol staining	Rotted out
Original tree size/ % stripped	Far out on younger lobe, large tree	Original tree size/ % stripped	Unclear, 30cm? / 60%?
Confidence	75%	Confidence	90%
Estimated Age	Min 185, AD 1825 (5 year buffer, counted in the field)	Estimated Age	Min 316, AD 1694 (20 year buffer, counted in field)
Comments	Date same as 4.4?	Comments	Maybe core-popper, large percentage stripped, association with other cultural scars.



CMT#	PS1-6	CMT#	PS1-7.1 and 7.2
DBH/height	1.17m x 1.27m / ?	DBH/height	1.3m x .95m / >2m
Open/closed	Closed	Open/closed	Open and closed
Direction	West northwest, flat	Direction	Northwest and south
Scar crust	L, good	Scar crust	Attached lobe 7.1: both great scarcrusts detached lobe 7.2: mostly flat scarcrust
Expanded post injury ring	Yes	Expanded post injury ring	Yes for both
Right angle intercept	Unclear, possible pinch on right lobe but could be from damaged wood	Right angle intercept	7.1 yes
Phenol staining	Unclear	Phenol staining	No staining
Original tree size/ % stripped	27cm / 30%	Original tree size/ % stripped	30cm / 80% (60% and 20%)
Confidence	75%	Confidence	90-95%
Estimated Age	Min 208, AD 1802 (2 year buffer, counted in field, large rings)	Estimated Age	7.1: Min 215, AD 1795 7.2: Min 215, AD 1795 (both 15 year end buffer, counted in field)
Comments	Fairly good features, typical form.	Comments	Two scars taken off same tree at same time. One lobe becomes own tree



CMT#	PS1-8	CMT#	PS1-9
DBH/height	1.41m x 1.04m / ?	DBH/height	1.05m x 1.6m / ~1m

Open/closed	Open, window 23cm	Open/closed	Effectively closed, 1 cm window
Direction	West, upslope	Direction	North, side slope
Scar crust	L, rotted but visible and intact further down hole. R, no, shredded lobe	Scar crust	L, yes fragmented. R, no.
Expanded post injury ring	Yes clear	Expanded post injury ring	Yes, minor
Right angle intercept	Yes	Right angle intercept	Unclear
Phenol staining	Probable rectangular phenol staining	Phenol staining	All rotted
Original tree size/ % stripped	~30cm / 65%	Original tree size/ % stripped	18cm / ?
Confidence	85%	Confidence	60%
Estimated Age	Min 215, AD 1795 (10 year buffer, counted in field)	Estimated Age	Min 326, AD 1684 (5 year buffer)
Comments	Good features	Comments	Missing many features from rot, semi unclear



CMT#	PS1-10	CMT#	PS1-11
DBH/height	1.35m x .95m / ~2.5m	DBH/height	.7m x .73m / 1m
Open/closed	Open, 20cm window	Open/closed	Open, 13cm window
Direction	Southsouthwest, side slope	Direction	Southwest, side slope
Scar crust	R, good. L, obscured.	Scar crust	None, shredded off
Expanded post injury ring	Yes	Expanded post injury ring	Unclear, thick ring growth, but transition at year of injury is ripped off
Right angle intercept	?	Right angle intercept	NA
Phenol staining	Rotted out	Phenol staining	NA
Original tree size/ % stripped	~25-30cm? Unclear / ~60%	Original tree size/ % stripped	NA
Confidence	95%	Confidence	70%
Estimated Age	Min 234, AD 1776 (15 year buffer, counted in field)	Estimated Age	Min 211, AD 1799 (5 year buffer, counted in field)
Comments	Core popper, looks cultural	Comments	Maybe core popper, but missing

			important features due to condition of stump. Right beside CMT 8.
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CMT#	PS1-unclear 2 (multiple scars?)	CMT#	PS1-unclear 3 (multiple scars)
DBH/height	-	DBH/height	Over 1m x 1m
Open/closed	-	Open/closed	Both
Direction	-	Direction	-
Scar crust	L, looks good	Scar crust	Two good scar crusts from different scarring events
Expanded post injury ring	No	Expanded post injury ring	-
Right angle intercept	On left	Right angle intercept	-
Phenol staining	Possible rectangle phenol stain	Phenol staining	-
Original tree size/ % stripped	Large	Original tree size/ % stripped	Large, multiple lobes
Confidence	60%	Confidence	65%
Estimated Age	-	Estimated Age	-
Comments	Possible multiple scars, main scar is semi convincing due to scar crust	Comments	Possibly multiple scarred large tree, poor condition and insufficient notes



CMT#	PS1-unclear 4.1	CMT#	PS1-unclear 4.2
DBH/height	-	DBH/height	-
Open/closed	Open	Open/closed	Open
Direction	-	Direction	-
Scar crust	R, good.	Scar crust	L, good.
Expanded post injury ring	-	Expanded post injury ring	-
Right angle intercept	-	Right angle intercept	-
Phenol staining	Rotted out	Phenol staining	Rotted out
Original tree size/ % stripped	~25cm?	Original tree size/ % stripped	-
Confidence	60%	Confidence	65%
Estimated Age	-	Estimated Age	Min 210, AD 1800 (60 year buffer, very rough count)
Comments	Possible core popper, mostly peeled original tree. Very rough stump, needs new cut	Comments	Peel off lobe, poor recording, and stump not clean enough for inspection.



CMT#	PS1-unclear 5
DBH/height	2.65m x 2.5m / ~2m
Open/closed	Closed
Direction	-
Scar crust	-
Expanded post injury ring	-
Right angle intercept	-
Phenol staining	-
Original tree size/ % stripped	~15 cm?
Confidence	55%
Estimated Age	Min 712 years counted in field, AD 1298
Comments	Centre was too rotted, but a fresh cut might recover more features. Looked relatively promising, just not enough exposed features.

Other scarred features photographed but not recorded:



Pacheedaht Survey 2

Cut block ID:	570B (IMapBC 2015)
Cut block forest file ID:	A86800, Pacheedaht Forestry Limited (IMapBC 2015)
Date of logging	2013-2015, likely summer 2014. (IMapBC 2015)
Access:	Travelling west from Jordan River on Highway 14, N at Jordan River Mainline and then first left onto North Mainline. After crossing Loss Creek turn left on to Spur 150, through clearcut, cross creek, site is 550 meters at 260 degrees from the end of the road.
Position	7.5km as the crow flies from Pacific Ocean. 700-720m ASL.
Associated Archaeological Site:	Yes, all 100m – 1.2km away (large cluster). DcSa-4: 3 yellow cedar TBS DcSa-5: 3 yellow cedar TBS DdSa-3: 34 yellow cedar TBS DdSa-4: 62 yellow cedar TBS DdSa-5: 2 yellow cedar TBS DdSa-6: 1 yellow cedar TBS DdSa-7: 2 yellow cedar TBS DdSa-8: 12 yellow cedar TBS Sites recorded and investigated: 2006, Coast Interior Archaeology, Permit# 2006-434 (Stafford, 2008) Site alterations to DdSa-4: 2013, Millennia Research, Permit# 2013-0117 (Ramsay, 2014)
Date of access, conditions	March 2015. Foggy, light rain.
Recorders	Jacob Earnshaw, Jenn Elliot

Photos of unrecorded features at the site:



Pacheedaht Survey 3

Cut block ID:	7136 (IMapBC 2015)
Cut block forest file ID:	TFL46, Teal Cedar Products, Ltd (IMapBC 2015)
Date of logging	June 1 st , 2006 – December 5 th , 2008 (IMapBC 2015)
Access:	Pacific Marine Rd is taken north from the Port Renfrew Marina about 6.4km to the Braden Rd Gordon River Rd intersection. Continue over the bridge on Gordon River Rd for about 6.3 km before taking a sharp left west onto Bugaboo Main Rd. Continue 3.3 km until approaching clearcut on the right.
Position	Survey area starts about 120m from Bugaboo Creek, and 18km as the crow flies from San Juan Bay. 460-560m ASL
Associated Archaeological Site:	No
Date of access, conditions	April 2015. Sunny and cool weather.
Recorders	Jacob Earnshaw, Adam Love, Chelsea Gogal



CMT#	PS3-1	CMT#	PS3-2
DBH/height	1.4m x 1.25m / ?	DBH/height	1.63m x 2.3
Open/closed	Closed	Open/closed	~open, effectively closed due to spruce nurse tree
Direction	North, side slope/upslope	Direction	North, upslope
Scar crust	L, good. R, yes wide and smooth	Scar crust	L, good 3cm. R, damaged but good. –branch seen growing though?
Expanded post injury ring	Yes, clear	Expanded post injury ring	Yes, clear
Right angle intercept	Mostly right angle	Right angle intercept	Yes
Phenol staining	Crushed	Phenol staining	Rotted out centre
Original tree size/ % stripped	20-25cm / 30%	Original tree size/ % stripped	? / 55%
Confidence	75%	Confidence	80%
Estimated Age	Min 327, AD 1679 (10 year buffer, counted in the field)	Estimated Age	Min 345, AD 1661 (10 year buffer, counted in the field)
Comments	Unclear right angle, relative isolation only things against it.	Comments	Great other than the branch in scar crust



CMT#	PS3-possible cmta	CMT#	PS3-possible cmtb
DBH/height	-	DBH/height	-
Open/closed	Closed	Open/closed	Closed
Direction	-	Direction	-
Scar crust	Not clear	Scar crust	R, yes. L, ?
Expanded post injury ring	Partial on one side, reduced on other	Expanded post injury ring	Very minor
Right angle intercept	No	Right angle intercept	Yes on right
Phenol staining	-	Phenol staining	Possible rectangular?
Original tree size/ % stripped	-	Original tree size/ % stripped	~4cm
Confidence	<50%	Confidence	55%
Estimated Age	-	Estimated Age	-
Comments	Downgraded, natural	Comments	Unclear, possibly natural



CMT#	PS3-possible cmtc	CMT#	PS3-possible cmtd
DBH/height	~1m / ~1m	DBH/height	~1m
Open/closed	Closed	Open/closed	Closed
Direction	Unclear, uphill	Direction	?
Scar crust	? crushed	Scar crust	L, good. R, unclear, ripples
Expanded post	Minor increase	Expanded post	Probably but unclear

injury ring		injury ring	
Right angle intercept	?	Right angle intercept	Unclear, rotted
Phenol staining	-	Phenol staining	Rotted out
Original tree size/ % stripped	<25cm / ?	Original tree size/ % stripped	~1m?
Confidence	55-60%	Confidence	55% / <20%
Estimated Age	-	Estimated Age	-
Comments	Very unclear, crushed feature, 2 metres from PS3-2, interesting shape.	Comments	Very rotted and large original tree with a small % scar

Pacheedaht Survey 4

Cut block ID:	7141 (IMapBC 2015)
Cut block forest file ID:	TFL46, Teal Cedar Products Ltd (IMapBC 2015)
Date of logging	September 8 th , 2008 – September 15 th , 2009 (IMapBC 2015)
Access:	Pacific Marine Rd is taken north from the Port Renfrew Marina about 6.4km to the Braden Rd Gordon River Rd intersection. Continue over the bridge on Gordon River Rd for about 6km. Turn east onto the Edinburgh Main FSR, cross bridge and continue up hill. At the rise, make your first left and stop at the rockslide on the road. The site is just beyond the creek.
Position	300m from Gordon River, 13.8km from San Juan Bay. 60-75m ASL.
Associated Archaeological Site:	No
Date of access, conditions	April 2015. Sunny and warm conditions.
Recorders	Jacob Earnshaw, Adam Love, Chelsea Gogal

Pacheedaht Survey 5

Cut block ID:	4551 (IMapBC 2015)
Cut block forest file ID:	A71020, Ts'aa7ukw Forestry Ltd (IMapBC 2015)
Date of logging	January 15 th , 2010 – June 30 th , 2010 (IMapBC 2015)
Access:	Found within the unprotected region surrounded by Carmanah-Walbran National Park. The area was reached via the Walbran Main from Lake Cowichan. We were also able to leave via the small logging road networks between Walbran Main and the Bugaboo Main.
Position	200m from Walbran Creek, and 13.2km from the ocean. 125-140 ASL.
Associated Archaeological Site:	No.
Date of access, conditions	June, 2015. Very hot and sunny
Recorders	Jacob Earnshaw, Jenny Cohen

Pacheedaht Survey 6

Cut block ID:	683412 (IMapBC 2015)
Cut block forest file ID:	TFL44, Western Forest Products Inc (IMapBC 2015)
Date of logging	March 6 th , 2007 – July 27 th , 2007 (IMapBC 2015)
Access:	Pacific Marine Rd is taken north from the Port Renfrew Marina about 6.4km to

	the Braden Rd Gordon River Rd intersection. Continue over the bridge on Gordon River Rd for about 6.3 km before taking a sharp left west onto Bugaboo Main Rd. Finally make a right, onto the 150 Rd heading north. Survey area is about 3.75km in and on the left.
Position	675m from Bugaboo Creek, and 12.5km from San Juan Bay. 480m ASL.
Associated Archaeological Site:	No.
Date of access, conditions	June 2015. Sunny and hot.
Recorders	Jacob Earnshaw, Jenny Cohen



CMT#	PS6-1	CMT#	PS6-2.1
DBH/height	.58m x .54m / .75m-1m	DBH/height	.95m x .98m / 1.4m
Open/closed	Open, window 13cm	Open/closed	Effectively closed, wrapped around and clogged opening
Direction	North, flat	Direction	Northwest, flat
Scar crust	R, too grown over. L, yes 2cm (unclear in photos)	Scar crust	R, good, 2.5cm
Expanded post injury ring	Unclear	Expanded post injury ring	Yes
Right angle intercept	?	Right angle intercept	Yes
Phenol staining	Rotted out	Phenol staining	Possible rectangle, unclear. Rotted
Original tree size/ % stripped	Unclear, possible core popper	Original tree size/ % stripped	25-30cm / ~20% unclear
Confidence	65%	Confidence	70%
Estimated Age	Dead at logging event	Estimated Age	-
Comments	Looks like a core popper, fallen tree with long tapered scar beside it. Probably dead at time of logging. Maybe deserves a rating over 65%.	Comments	Good features, but unclear, rotted.



CMT#	PS6-2.2	CMT#	PS6-3
DBH/height	.95m x .98m / 1.4m	DBH/height	.62m x .58m / ?
Open/closed	Closed	Open/closed	Open, window 3cm
Direction	Southeast	Direction	South
Scar crust	R, good, 3.5cm	Scar crust	R, good. L, good. Both obscured by wrap-around lobes
Expanded post injury ring	Unclear	Expanded post injury ring	Yes
Right angle intercept	Yes	Right angle intercept	R, yes. L, semi pinched
Phenol staining	Yes	Phenol staining	Perfect rectangular phenol staining
Original tree size/ % stripped	12cm / 70%	Original tree size/ % stripped	13cm / ~65%
Confidence	80%	Confidence	75%
Estimated Age	-	Estimated Age	Min 249, AD 1758 (50 year end buffer, likely dead when cut. Counted in field, estimate!)
Comments	Likely cultural, good features, small tree, large % peeled.	Comments	Generally great form and looks cultural. Suggestive scar crusts though.



CMT#	PS6-4	CMT#	PS6-5.1
DBH/height	.71m x .62m / ?	DBH/height	~.55m? / 1.7m
Open/closed	Open, window 27cm	Open/closed	Obscured by fallen tree, maybe close to open?
Direction	North, flat	Direction	Northwest, side slope
Scar crust	L, good 2cm, degraded. R, about 1cm, unclear, semi natural looking.	Scar crust	Both very small and unimpressive
Expanded post	Yes, minor	Expanded post	Unclear

injury ring		injury ring	
Right angle intercept	Partial pinch	Right angle intercept	Unclear
Phenol staining	Yes, rectangular phenol staining	Phenol staining	Unclear
Original tree size/ % stripped	27cm / 70%	Original tree size/ % stripped	~25cm / ~30%?
Confidence	60%	Confidence	55%
Estimated Age	Min 227, AD 1780 (20 year buffer, counted in field)	Estimated Age	Min 223, AD 1784 (30 year buffer, counted very roughly in field, obscured by fallen tree)
Comments	Would say natural but for the core popper structure, and shape. Could be cultural.	Comments	Double scarring, possible cultural but poor condition and obscured by heavy fallen tree on feature.



CMT#	PS6-5.2	CMT#	PS6-possible cmta (multiple scarred tree)
DBH/height	~.55m? / 1.7m	DBH/height	~40m x 60m?
Open/closed	Open, window 3cm	Open/closed	Open and closed
Direction	South, uphill	Direction	-
Scar crust	Small and unimpressive	Scar crust	Unclear
Expanded post injury ring	Unclear	Expanded post injury ring	Unclear
Right angle intercept	Unclear	Right angle intercept	-
Phenol staining	Unclear	Phenol staining	-
Original tree size/ % stripped	~30cm / 30%?	Original tree size/ % stripped	-
Confidence	65%	Confidence	-
Estimated Age	Min 233, AD 1774 (30 year buffer, counted very roughly in field, obscured by fallen tree)	Estimated Age	-
Comments	Double scarring, possible cultural but poor condition and obscured by heavy fallen tree on feature.	Comments	Unclear why this tree was not properly recorded in field, from distance looks cultural. Might have

			been intended for revisit then looked over.
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CMT#	PS6-possible cmtb (multiple scars on tree)	CMT#	PS6-possible cmtc
DBH/height	-	DBH/height	-
Open/closed	Open	Open/closed	Open, window ~4cm
Direction	-	Direction	-
Scar crust	-	Scar crust	-
Expanded post injury ring	-	Expanded post injury ring	-
Right angle intercept	-	Right angle intercept	-
Phenol staining	-	Phenol staining	-
Original tree size/ % stripped	-	Original tree size/ % stripped	~35cm? / 25%
Confidence	-	Confidence	-
Estimated Age	-	Estimated Age	-
Comments	Another poorly recorded tree, possibly overlooked for revisit in field. Looks like a peel off an older lobe. Maybe not distinct scarcrusts.	Comments	Possible cmt, under recorded. Possible bottom of TBS scar, tree likely dead pre-logging event.



CMT#	PS6-possible cmtd
DBH/height	-
Open/closed	-
Direction	-
Scar crust	-
Expanded post injury ring	-
Right angle intercept	-
Phenol staining	-
Original tree size/ % stripped	-
Confidence	-
Estimated Age	-
Comments	Very crushed and overgrown stump. Impossible to tell without new cut on top of feature.

Pacheedaht Survey 7

Cut block ID:	7278 (IMapBC 2015)
Cut block forest file ID:	T0129, Teal Cedar Products Ltd (IMapBC 2015)
Date of logging	May 11 th , 2010 – July 29 th , 2010 (IMapBC 2015)
Access:	Pacific Marine Rd is taken north from the Port Renfrew Marina about 6.4km to the Braden Rd Gordon River Rd intersection. Continue about 6km on Braden Rd. Turn right, south onto Braden Rd. 8.3km will bring you between PS7 and PS8.
Position	1km SE of Braden Creek, 4.3km N from San Juan Bay. 310 ASL.
Associated Archaeological Site:	Yes, 420m E DdSc-21: 3 TBS CMTs
Date of access, conditions	June 2016. Very hot and sunny.
Recorders	Jacob Earnshaw, Jenny Cohen, Cal Abbott, Sara White, Adam Love



CMT#	PS7-1	CMT#	PS7-2
DBH/height	1.45m x 1.5m / 1.5m	DBH/height	2m x 2m / 1.75m
Open/closed	Open, though completely rotted out	Open/closed	Effectively close, clogged up and rotted window
Direction	South, uphill gentle slope	Direction	South, uphill
Scar crust	Rotted out	Scar crust	Rotted out
Expanded post injury ring	Unclear	Expanded post injury ring	Unclear
Right angle intercept	Unclear	Right angle intercept	Unclear, very rotted
Phenol staining	Unclear, rotted out	Phenol staining	Unclear
Original tree size/ % stripped	? unclear / >50%	Original tree size/ % stripped	~35cm / 50-60%
Confidence	59%	Confidence	<60%
Estimated Age	Min 575, AD 1435 (counted several times in field, very rotted so big estimate)	Estimated Age	-
Comments	All important features are rotted out, but looks like possible core popper shape that would have likely been cultural. Impossible to tell due to rot.	Comments	Massive lobes, huge tree. Inside too rotted to confirm anything.



CMT#	PS7-3.1	CMT#	PS7 3.2
DBH/height	2.9m x 2.25	DBH/height	2.9m x 2.25
Open/closed	Closed	Open/closed	Closed (now crushed and open due to logging)
Direction	North	Direction	South
Scar crust	Rotted out, gone	Scar crust	Rotted out, gone
Expanded post injury ring	Rotted out	Expanded post injury ring	Rotted out
Right angle intercept	Rotted out	Right angle intercept	Rotted out
Phenol staining	-	Phenol staining	-
Original tree size/ % stripped	Unclear	Original tree size/ % stripped	Unclear
Confidence	60%	Confidence	60%
Estimated Age	-	Estimated Age	-
Comments	Because of double scar, and form suggestive of cultural, but no distinguishing features.	Comments	Because of double scar, and form suggestive of cultural, but no distinguishing features.



CMT#	PS7-4.1	CMT#	PS7-4.2
DBH/height	2m x 1.6m	DBH/height	2m x 1.6m
Open/closed	Closed	Open/closed	Closed
Direction	East, gentle upslope	Direction	East, gentle upslope
Scar crust	Rotted out	Scar crust	Unclear from photos, probably not proper scarcrusts
Expanded post injury ring	Yes, clear on R lobe	Expanded post injury ring	Unclear
Right angle intercept	Unclear	Right angle intercept	Unclear
Phenol staining	Rotted out	Phenol staining	Rotted out
Original tree size/ % stripped	35-45cm? / 30%?	Original tree size/ % stripped	? / 10%?

Confidence	65%	Confidence	50%
Estimated Age	-	Estimated Age	-
Comments	Good but for lack of crusts which have rotted away.	Comments	Likely natural, downgraded



CMT#	PS7-5	CMT#	PS7-possible cmta
DBH/height	1.2m x 1.08m / >3m	DBH/height	>1m / ?
Open/closed	Open, 3cm window	Open/closed	Closed
Direction	NA, ripped off ground	Direction	-
Scar crust	L, ok. R, great and flat	Scar crust	Rotted out
Expanded post injury ring	Yes, clear	Expanded post injury ring	-
Right angle intercept	R, slight pinch. R, perfect	Right angle intercept	-
Phenol staining	Rectangular phenol staining	Phenol staining	-
Original tree size/ % stripped	35-40cm / 25%	Original tree size/ % stripped	Unclear
Confidence	85%	Confidence	50%
Estimated Age	Min 275, AD 1735 (50 year buffer, unclear if it was dead at time of logging?)	Estimated Age	-
Comments	High, ripped up stump with good looking scar on it.	Comments	Totally unclear due to rot.



CMT#	PS7-possible cmtb
DBH/height	<1m / .85m
Open/closed	Open, due to total rotting
Direction	-
Scar crust	Rotted out
Expanded post injury ring	-
Right angle intercept	-
Phenol staining	-
Original tree size/ % stripped	Unclear
Confidence	<50%
Estimated Age	-
Comments	Far too rotted, completely unclear. If not rotted would have a typical shape for a single peel?

Pacheedaht Survey 8

Cut block ID:	7279 (IMapBC 2015)
Cut block forest file ID:	TFL46, Teal Cedar Products Ltd (IMapBC 2015)
Date of logging	April 19 th , 2010 – November 25 th , 2010 (IMapBC 2015)
Access:	Pacific Marine Rd is taken north from the Port Renfrew Marina about 6.4km to the Braden Rd Gordon River Rd intersection. Continue about 6km on Braden Rd. Turn right, south onto Braden Rd. 8.3km will bring you between PS7 and PS8.
Position	1.1km SE of Braden Creek, 4.4km N from San Juan Bay. 320-355 ASL.
Associated Archaeological Site:	Yes, 420m E DdSc-21: 3 TBS CMTs (same as nearby PS7)

Date of access, conditions	June 2016. Very hot and sunny.
Recorders	Jacob Earnshaw, Jenny Cohen, Cal Abbott, Sara White, Adam Love.



CMT#	PS8-1	CMT#	PS8-2
DBH/height	.9m x 1.14m / ?	DBH/height	1.19m x 1.28m / .8m
Open/closed	Closed	Open/closed	Closed, though crushed and rotted. Unclear if originally open or not
Direction	Northeast, up steep slope	Direction	Northeast, up steep slope
Scar crust	Too crushed to see scar crusts	Scar crust	L, ?crushed. R, 2cm good crust
Expanded post injury ring	Yes	Expanded post injury ring	Yes. L, major. R, minor
Right angle intercept	Unclear	Right angle intercept	Yes on R
Phenol staining	Too crushed to see	Phenol staining	Rectangular phenol staining
Original tree size/ % stripped	~2-25cm? / ~30%	Original tree size/ % stripped	35cm / ~45%
Confidence	70%	Confidence	85%
Estimated Age	Min 220, AD 1790 (10 year buffer, counted from photos-rough but thick rings)	Estimated Age	Min 226, AD 1784 (10 year buffer, counted in field)
Comments	Close to other cmts, good form, uphill, though missing some features	Comments	Looks good, great features and beside arch site and other CMTs.



CMT#	PS8-3	CMT#	PS8-4.1
DBH/height	1.2m x .75m / 2.5m	DBH/height	1m x .65 / ?
Open/closed	Open, core popper	Open/closed	closed
Direction	Northeast, up steep hill	Direction	East up steep slope
Scar crust	L, great 5.5cm. R, hidden, unclear,	Scar crust	Completely rotted out for both

	crushed		
Expanded post injury ring	Yes, major	Expanded post injury ring	Yes, clear
Right angle intercept	L, yes. R, unclear	Right angle intercept	Rotted out
Phenol staining	Rotted out centre	Phenol staining	Rotted out
Original tree size/ % stripped	Unclear. >35cm / ~70%?	Original tree size/ % stripped	~15cm / ~25%?
Confidence	90%	Confidence	65%
Estimated Age	Min 249, AD 1761 (15 year buffer, counted in field)	Estimated Age	Min 313, AD 1697 (10 year buffer, counted in field)
Comments	Great features, and rare for a core-popper to be created naturally (so much peeled the dead original tree pops out).	Comments	Association with other cmts and clear change in ring width make for this level of confidence.

CMT#	PS8-4.2
DBH/height	1m x .65 / ?
Open/closed	Closed
Direction	East, up steep slope
Scar crust	Both perfect and flat
Expanded post injury ring	Yes, clear
Right angle intercept	Yes
Phenol staining	Partial rectangular phenol staining
Original tree size/ % stripped	38cm / ~20%
Confidence	90%
Estimated Age	Min 193, AD 1817 (5 year buffer, counted in the field)
Comments	Has great features, appears cultural. One the right lobe of original scar.

Browns Mountain Site, DdSc-25

Site access is on the gated, private Browns Rd across from entrance to Port Renfrew Marina on the Pacific Marine Rd. Up the private road, on the right are several roads that provide access to large clearcut area. These are the festival grounds for the Tall Tree Music Festival. CMT stand was once is spread throughout the northern half of this clearcut (recent old growth clearcut). Recorded archaeological site is now in the very centre: DdSc-25 (800m NNE of the intersection of Deering Rd and Pacific Marine Dr).

Photographs from a small sample of features at DdSc-25:

