Journal of Ethnobiology 23(1): 125–141 Spring/Summer 2003

THE USE OF DRIFTWOOD ON THE NORTH PACIFIC COAST: AN EXAMPLE FROM SOUTHEAST ALASKA

DANA LEPOFSKY,[a] NATASHA LYONS[a] and MADONNA L. MOSS[b]
[a] *Department of Archaeology, Simon Fraser University, Burnaby, B.C. V5A 1S6*
[b] *Department of Anthropology, University of Oregon, Eugene, OR 97403-1218*

ABSTRACT.—North Pacific Coast societies were dependent on several tree species to supply them with fuel and raw materials used in construction and in making implements with utilitarian, social, and/or ceremonial purposes. Although much of the North Pacific Coast is blanketed with forested ecosystems, usable and accessible wood was not always readily available. An archaeobotanical study of Cape Addington Rockshelter in southeast Alaska (49-CRG-188) revealed that the site occupants relied on driftwood to supplement the live trees and dead wood in the forest. Both accessible and renewable, driftwood also supplied preferred fuel wood taxa that otherwise would have been available only through trade with other groups. A review of the North Pacific Coast ethnographic literature reveals that driftwood was an important source of wood for fuel and technology for several First Nation groups.

Key words: Northwest Coast First Nations, paleoethnobotany, driftwood, Cape Addington, Alaska.

RESUMEN.—Las sociedades de la Costa del Pacífico Norte dependían de diversas especies arbóreas para la obtención de combustible y materias primas usadas en la construcción y en la elaboración de artículos con valor utilitario, social y/o ceremonial. Aunque gran parte de la costa del Pacífico Norte está cubierta por ecosistemas forestales, no siempre era facil obtener madera aprovechable y accesible. Un estudio arqueobotánico en el sureste de Alaska reveló que los habitantes del sitio usaban madera de deriva como suplemento a los árboles vivos y madera muerta obtenidos del bosque. La madera de deriva, accesible y renovable, también proveía de ciertos taxones preferidos como leña, que de otra manera sólo habrían estado disponibles a través del comercio con otros grupos. Una revisión de la literatura etnográfica de la Costa del Pacífico Norte revela que la madera de deriva era para varios grupos indígenas una fuente importante de combustible y material para manufacturas.

RÉSUMÉ.—Les sociétés de la côte du Pacifique Nord dépendaient de plusieurs espèces d'arbres pour subvenir à leurs besoins en combustible et en matières premières qu'elles utilisaient dans la construction et pour la fabrication d'ustensiles à des fins utilitaires, socials, et/ou cérémonielles. Bien qu'une grande partie de la côte du Pacifique Nord soit recouverte d'écosystèmes forestiers, les arbres utilisables et d'accès facile étaient parfois difficiles à trouver. Une étude archéobotanique de Cap Addington Rockshelter au Sud Est de l'Alaska (49-CRG-188) montre que les occupants du site comptaient sur le bois de grève pour complémenter les arbres et le bois mort de la forêt. À la fois accessible et renouvelable, le bois de grève procurait également des taxons de bois de feu fort prisés qui n'auraient été disponibles autrement que par des échanges commerciaux avec d'autres groupes. Un examen de la littérature ethnographique de la côte du Pacifique Nord révèle que le bois de grève était une importante ressource pour les besoins en combustible et en technologie de plusieurs groupes de Premières Nations.

INTRODUCTION

North Pacific Coast peoples relied on wood.[1] Ethnographically, large quantities of wood were used to construct and heat houses, to process foods, and as raw materials for manufacturing canoes, implements, and art and ceremonial objects (Turner 1998). In the archaeological record, evidence of this high demand for wood can be seen in the size and extensive remodelling of plank houses (Ames et al. 1992; Lepofsky et al. 2000), the abundance of charcoal in most sites (Stenholm 1992), the dominance of wooden artifacts and debris at wet sites (Bernick 1991), and the profusion of standing and dead culturally modified trees with evidence of bark and wood harvesting (Mobley and Eldridge 1992; Pegg 2000; Stryd 1997; Stryd and Eldridge 1993). In addition to sheer quantity, both the ethnographic and archaeological records indicate that North Pacific Coast peoples recognized different qualities of woods for fuel and technology, and sought particular species for specific tasks (Friedman 1975; Lepofsky in press; Turner 1998; Turner and Peacock in press).

Despite a well-developed system of ownership and management of trees (Stewart 1984:36–37; Turner and Peacock in press), the ethnographic record suggests that local forests could not always supply either the amount of wood or the particular species of wood needed by North Pacific Coast groups for fuel and technology. Heavy demands on firewood meant that some groups exerted considerable effort to collect fuel at some distance from their villages (Boas 1935 [1969]:7; Drucker 1951:107; Jewitt 1974:96). The effort involved in harvesting fuel and its overall value is further indicated by the fact that among the Coast Salish, the lower class were often required to supply firewood along with other essential supplies to dominant elite villages (Jenness 1955:86; Suttles 1987:5). In the more sparsely forested ecosystems of the northern portion of the coast, groups such as the Dena'ina had to re-locate their villages when local supplies of firewood were depleted (Kari 1987:15). Further, when specific woods for technology could not be obtained from forests within a group's territory, people traded for wood or the finished products (de Laguna 1972:35, 413; Drucker 1955:61; Singh 1966:27; Turner 1998:43–44; Wennerens 1985:59). The archaeological record of culturally modified trees indicates that North Pacific Coast peoples also travelled considerable distances from their settlements to harvest wood for technological purposes (e.g., Lepofsky and Pegg 1996).

In addition to the wood supply in the surrounding forests and that obtained through trade, many North Pacific Coast peoples could obtain wood as driftwood. This paper explores the importance of driftwood as an accessible and renewable source of wood for fuel and technology. Our paleoethnobotanical investigation of the Cape Addington Rockshelter in southeast Alaska revealed that a significant proportion of fuel wood used at the site did not grow locally, and likely came from driftwood. Further, the results suggest that the inhabitants of the rockshelter

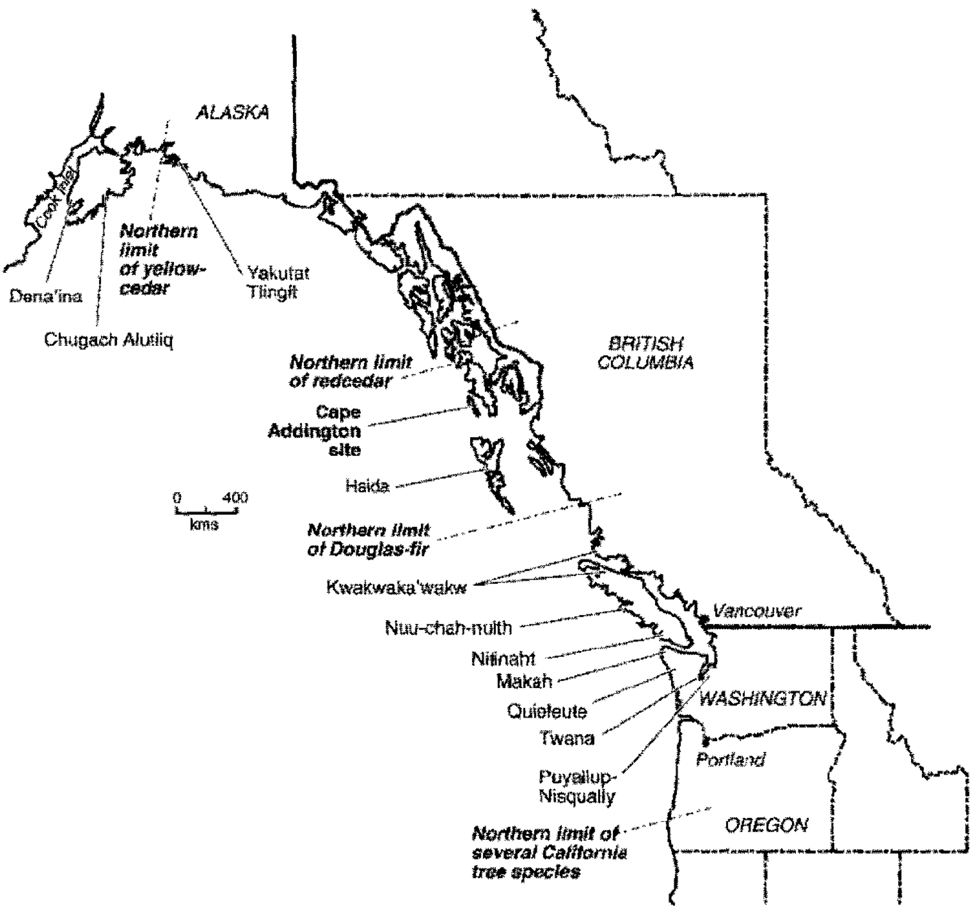

FIGURE 1.—The North Pacific Coast, showing location of Cape Addington Rockshelter, northernmost range limits of some major tree species, and cultural groups for whom there is an ethnographic record of driftwood use (see Table 3). Tree range limits come from Pojar and MacKinnon (1994).

selected preferred fuel wood taxa from among the drift. A review of the ethnographic literature for the region indicates that the Cape Addington Rockshelter inhabitants were not unique on the North Pacific Coast, and that driftwood was an important source of wood for fuel and technology for many groups.

CAPE ADDINGTON ROCKSHELTER

Cape Addington Rockshelter is located on Noyes Island, one of many small islands west of Prince of Wales Island in southeast Alaska (Figure 1). The site was excavated by Moss in 1997. The cultural deposits extend over a 20 × 10-m area on a slope that ranges between 5.5 to 9.0 m above mean high tide within an uplifted wave-cut rockshelter. The 279 cm deep shell midden at the site has produced 13 radiocarbon dates with calibrated midpoints ranging from A.D. 160 to 1420. The site deposits are composed of shell, fire-cracked rock, bone, antler, and charred and uncharred botanical remains. The artifact assemblage numbers about two dozen items, including five deer ulna awls or knives, bone and wood points, a deer scapula spoon, barbed bone harpoon point, mussel shell blade, and fragments of worked bone, wood, and shell.

From the rockshelter, 8918 vertebrate remains have been studied. Thirty-two species, nine additional genera, and another nine families of animals have been identified (Moss n.d.; Moss and Losey 2003). During the earliest period of site occupation (A.D. 70 to 270), the faunal remains are dominated by halibut (*Hippoglossus stenolepis* Schmidt) and deer (*Odocoileus hemionus sitkensis* Merriam). After A.D. 600, Pacific cod (*Gadus macrocephalus* Tilesius) is the most abundant taxon, indicating site occupation during March and April (see Bowers and Moss 2001 for a detailed discussion of Pacific cod). In later periods, harbor seals (*Phoca vitulina* L.) and salmon (*Oncorhynchus* spp.) become key resources, and offshore resources, such as northern fur seals (*Callorhinus ursinus* L.), Steller sea lions (*Eumetopias jubatus* Schreber), and a variety of seabirds attest to use of oceanic islands, possibly including the Forrester Islands. Both faunal and macrobotanical evidence suggest site use during spring and summer (Lepofsky et al. 2001; Moss and Losey 2003). Plants were collected in the site vicinity, and some plant processing and consumption took place on site.

The site occurs within the densely vegetated western hemlock–Sitka spruce (*Tsuga heterophylla–Picea sitchensis*) rainforest characteristic of the southern half of southeast Alaska (Viereck and Little 1972). Some small shore pine (*Pinus contorta*) are also found along the beach fringe today. Mountain hemlock (*Tsuga mertensiana* (Bong.) Carr.), western redcedar (*Thuja plicata*), and yellow-cedar (*Chamaecyparis nootkatensis*) occur within the larger region, but were not observed during reconnaissance of southwest Noyes Island. Shrubs and herbs growing in the immediate vicinity of the rockshelter include Sitka alder (*Alnus crispa*), cow parsnip (*Heracleum lanatum* Michx.), and devil's club (*Oplopanax horridus* Smith). A variety of ferns, grasses, and other low-lying plants are found outside the shelter. The shoreline in front of the site is open to the Gulf of Alaska, but nearby headlands and offshore rocks provide some protection from the full force of Pacific swells and storms. Nonetheless, driftwood is common on the beach in front of the site today.

The vegetation surrounding the site today likely differs little from that of the last 2000 years. The forest surrounding the site has not been altered significantly by modern human activity, and while the record of glacial advances and macrofossils do indicate climatic fluctuations on the Alaska coast in the last 2000 years (e.g., Calkin et al. 2001; Cwynar 1990; Hansen and Engstrom 1996; Mann et al. 1998), there was relatively little change in vegetation in the same period—at least at the coarse level that pollen records can detect (e.g., Gottesfeld et al. 1991; Hebda 1995; Hebda and Whitlock 1997).

METHODS

As part of a larger paleoethnobotanical analysis of 49-CRG-188, Lyons and Lepofsky identified 90 charred and 30 uncharred wood specimens from five bulk sediment samples and from material collected from the ¼-inch screen during the excavation of one deposit (Table 1; Lepofsky et al. 2001). The bulk and ¼-inch

TABLE 1.—Paleoethnobotanical samples analysed from Cape Addington Rockshelter.

Unit	Stratum	Feature	Date (approx.)	Sample volume (liters)	Notes
Unit 1	Layer IIa	18	A.D. 1420	1.4	18 is a hearth with ash lens, burned rock, charcoal. II is a dark, fine silty black matrix with considerable amounts of bone and some shell.
Unit 2	Layer IIIc	22	A.D. 660	1.6	22 is a mussel shell-burned rock concentration. III is light-colored due to large quantities of shell. Large particles of shell, rock; considerable bone.
Unit 2	Layer IVd	N/A	A.D. 500	1.9	IV is a dark matrix with less shell than III. Moist compared to upper strata. Bone occurs.
Unit 7	Stratum B	N/A	A.D. 1250	1.8	B is a dark matrix with some shell and lots of charred wood.
Unit 7	Stratum H	N/A	A.D. 800	1.1	H is a dark matrix with bits of shell.
Unit 3	Layer IIIa	N/A	A.D. 750	N/A	botanical remains collected from 1/4-inch screen. III is light-colored due to large quantities of shell. Large particles of shell, rock; considerable bone.

samples were selected to represent the different areas of the excavation as well as the major deposits within the site. Two of the bulk samples were from features and the other three were from charcoal-rich layers within the shell midden. The material from the ¼-inch screen was from a shell-rich deposit where unique depositional conditions resulted in the preservation of an abundance of both uncharred and charred botanical remains (Lepofsky et al. 2001). Material collected from the ¼-inch screen should be representative of larger-sized botanical remains, but not smaller remains.

We processed the sediment and ¼-inch samples in slightly different ways. The sediment samples were floated using a modified bucket flotation system which collected plant remains >0.425 mm in diameter. These remains were sorted into their constituent parts (charcoal, "seeds," needles, non-woody tissues) with the aid of a dissecting microscope (maximum magnification 40×). We limited our analysis of the ¼-inch screen material to remains >2.0 mm in size, since an unknown amount of smaller material had passed through the screen. We sorted this material directly into three gross categories: charcoal, uncharred wood, and uncharred herbaceous plant. We further subdivided the uncharred wood into two categories based on gross morphology: stem/root and wood. The "wood" category consists of fragments which, based on the curvature of the growth rings, originate from large branches, large roots, or stemwood. The "branch/root" category consists of specimens whose original diameter (based on ring curvature and presence of bark) was <0.5 cm in diameter, and therefore likely originated from either smaller tree roots or small branches.

We randomly selected for identification 15 charcoal specimens from each of the five flotation samples and 15 specimens from the charcoal, uncharred wood, and branch/root from the ¼-inch screen. Based on previous experience with wood analysis on the North Pacific Coast, 15 specimens is the minimum sample size to represent the abundance of the common taxa. All specimens were >2 mm in size. Charred wood was identified using a reflected light microscope (maximum magnification 400×) and uncharred wood was identified with a transmitted light microscope (maximum magnification 400×). All identifications were made by comparing against specimens in the wood reference collection housed in Lepofsky's paleoethnobotany laboratory at the Department of Archaeology, Simon Fraser University.

RESULTS

The Cape Addington Rockshelter flotation and screen samples yielded seeds, needles, buds, wood, and non-woody tissues representing 24 plant taxa (Lepofsky et al. 2001). Of these, uncharred and charred wood taxa dominate the assemblage both in diversity and abundance. The woods are comprised of ten tree species, the majority of which are conifers (Table 2).

Despite the relatively small sample size, there is patterning in the distribution of charred and uncharred wood taxa. Of the charred woods, three species, spruce (*Picea sitchensis*), redcedar (*Thuja plicata*), and Douglas-fir (*Psuedotsuga menziesii*) were collected most often and in greatest quantity (Figure 2). The remaining charcoal species were collected either infrequently, and/or were not harvested in abundance. Our sample of uncharred woods is too limited to discern definitive patterns, but the percent abundances of some taxa do indicate distinct formation processes for the uncharred wood and charred wood taxa (e.g., yellow-cedar charcoal versus uncharred branch/root; hemlock charcoal versus uncharred wood; Table 2).

This non-random distribution reflects the deliberate collection of particular wood species for specific tasks. We assume that the charred wood recovered was collected for fuel, and/or was scrap generated from other tasks, which was later burned. The preference at the site was clearly for spruce, redcedar, and Douglas-fir fuel; each of these taxa is widely recognized among Northwest Coast peoples as an excellent, all-purpose fuel wood (Turner 1998). The uncharred wood from the ¼-inch screen sample may have been brought into the site to manufacture artifacts, or may have also been stockpiled for future fuel consumption (e.g., Reger and Campbell 1986).

The taxonomic abundance of the different woody taxa reflects both local abundance and cultural preference. In charred and uncharred archaeological samples as well as in the local environment today, conifers are more common than hardwoods. However, while both spruce and western hemlock (*Tsuga heterophylla*) are common in local forests today, and were likely so in the past as well, only spruce is ubiquitous and abundant in the archaeobotanical assemblage (Table 2;

TABLE 2.—Wood taxa recovered from Cape Addington Rockshelter.

Scientific name (common name)	N (% Abundance)[1] C	UC W	UC B/R	Distribution
Coniferous Trees				
Abies spp. (true fir)	4 (4)	—	—	could be either *A. amabilis* or *A. lasiocarpa*; both grow in rare, local stands in southeast Alaska; not observed on Noyes Island, but may be present.
Chamaecyparis nootkatensis D. Don (yellow-cedar)	4 (4)	1 (3)	5 (17)	present in southeast Alaska in mixed coniferous forests from sea level to timberline, including muskeg; not in immediate vicinity of site today, but may be present at higher elevations.
Picea cf. *sitchensis* (Bong.) Carr.[2] (Sitka spruce)	27 (30)	6 (20)	3 (10)	abundant in the forests of southeast Alaska from low to mid elevations; abundant in site vicinity today.
Pinus cf. *contorta* Dougl.[2] (shore pine)	3 (3)	—	—	common in shoreline forests, present in site vicinity today.
Pinus/Picea	2 (2)	—	—	—
Psuedotsuga menziesii (Mirbel) Franco (Douglas-fir)	9 (10)	—	—	common component of central and southern B.C. coastal forests; northernmost population is 380 km south of Noyes Island.
Thuja plicata Donn (western redcedar)	11 (12)	1 (3)	—	present in southeast Alaska from low to mid elevations south of Frederick Sound; not in immediate site vicinity today; may occur in more protected habitats on the island.
Tsuga cf. *heterophylla* (Raf.) Sarg.[2] (western hemlock)	3 (3)	5 (17)	2 (7)	common tree of coastal forests; common in site vicinity today.
Tsuga/Chamaecyparis	14 (16)	2 (7)	3 (10)	—
Unidentified conifer	7 (8)	—	2 (7)	—
Deciduous Trees				
Alnus cf. *crispa*[2] (Regel) Rydb. (Sitka alder)	3 (3)	—	—	common along shorelines of southeast Alaska and near site today.
Pyrus fusca Raf. (Pacific crabapple)	1 (1)	—	—	grows in mixed and pure thickets or as a slow-growing small tree in low to mid elevations of southeast Alaska. None observed in the site vicinity today.
Salix spp. (willow)	1 (1)	—	—	several species of willow grow on the outer islands of southeast Alaska; in site vicinity today.
Unidentified deciduous	1 (1)	—	—	—

[1] C = charred, UC W = uncharred stemwood; UC B/R = uncharred branch/root. For charcoal, N = 90 (15 identified specimens from each of the five flotation samples and the one ¼-inch screen sample). For uncharred wood, N = 30 (15 specimens from each of the stemwood and branch/root specimens recovered from ¼-inch screen sample).

[2] Species identifications of these genera are based on phytogeography rather than minute anatomy.

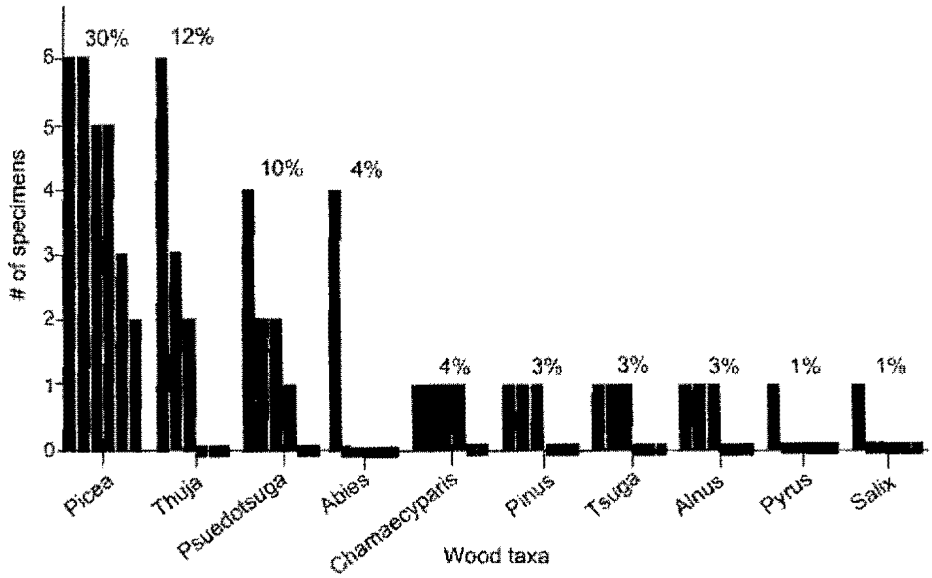

FIGURE 2.—The number of times different charcoal taxa were identified in each of six samples (15 identifications per sample). For each taxon, each bar represents one sample. The numbers on top of the bars represent the average percent abundance for that taxon. Only secure identifications are illustrated, but unidentifiable specimens are included in the calculations of percent abundance.

Figure 2). This may be because unlike spruce, hemlock was not a preferred fuel wood among many Northwest Coast groups (Turner 1998).

In contrast, Douglas-fir does not grow locally, yet is common in the archaeobotanical record. The northern limit of Douglas-fir habitat occurs at about 53° north latitude in central British Columbia, almost 380 km to the south of Noyes Island (Figure 1; Pojar and MacKinnon 1994:17). Distributions of Douglas-fir varied in the past, but never extended north of British Columbia's central coast (Mathewes and Rouse 1975; Hebda 1995; Hebda and Whitlock 1997).

The Douglas-fir wood in the 49-CRG-188 assemblage was undoubtedly collected as drift from Noyes Island beaches. Although it is possible that the Cape Addington Rockshelter occupants travelled south to harvest Douglas-fir or that they received it through trade, both these scenarios seem unlikely, especially given that the archaeological site was not occupied year-round. The Davidson Current, which regularly transports drift from southern California northward along the Alaska coast during the winter (Thomson 1981:231) likely transported the Douglas-fir wood to beaches in the site vicinity.[2]

Other taxa within the archaeobotanical assemblage also may have been collected as driftwood, but this is more difficult to demonstrate based on plant geography. In particular, the abundance of redcedar in the archaeobotanical assemblage is greater than its apparent abundance in the local forest (Table 2). Although we cannot rule out the possibility that site inhabitants went to some effort to transport redcedar back to the rockshelter from elsewhere on the island, or from another island, a more plausible scenario is that they harvested the wood as drift from the beach in front of the rockshelter.

While we cannot quantify how much of the total wood used at the rockshelter was collected as driftwood, it appears to be significant. Conservatively, based on Douglas-fir alone, driftwood accounts for 8% of the charred and uncharred wood recovered at Cape Addington (n = 120). If redcedar is included in the total, at least 18% of the total assemblage may have originated from drift (Table 2). The actual contribution of driftwood could be much higher.

The relative abundance of Douglas-fir and redcedar in the archaeobotanical assemblage suggests that the site inhabitants deliberately selected these woods from among the drift. Although we cannot quantify how common Douglas-fir and redcedar were in the ancient driftwood population, we expect that hemlock was at least as available as the other two species. Yet, whereas hemlock was not collected in abundance as a fuel wood, Douglas-fir and redcedar were clearly sought after. In the case of Douglas-fir, it was only found charred in the deposits (Table 2), suggesting it was selected only for fuel, and not for other purposes.

DRIFTWOOD USE ON THE NORTH PACIFIC COAST

Even though few North Pacific ethnographers discuss the use of woods much at all, our literature review indicates that groups throughout the region relied on driftwood for fuel and technology (Table 3; Figure 1). For the Makah and Kwakwa'ka'wakw, for example, driftwood was the most common source of fuel, while only occasional use is mentioned for other groups. For some groups, access to driftwood meant a supply of valued woods that were not locally available or sufficiently abundant, and could otherwise be acquired only through trade. Such was the case of redcedar among the Alutiiq (Wennerens 1985:59) and Makah (Singh 1966:27), and redcedar and yellow-cedar among the Yakutat Tlingit (de Laguna 1972:43; Drucker 1955:61). Several sources mention preferred uses for particular taxa of drift, indicating that driftwood, like wood found in the forest, was selectively harvested for specific uses.

The ethnographic sources are relatively silent as to specifically who collected driftwood. Slaves and other lower class people were often employed to gather firewood in general (Boas 1935 [1969]:7; Jewitt 1974:96; Oberg 1973:79; Ruyle 1973:611; Singh 1966:54; Suttles 1987:5), which likely included driftwood as well as wood from the forest. Only Drucker (1951:107) had more specific observations about the harvesting of driftwood. He noted, "[b]oth [Nuu-chah-nulth] men and women got wood, although women's wood gathering consisted chiefly of picking up small driftwood along the beaches. Men got 'big wood'—big lengths of driftwood. . . ."

There is some indication that driftwood was a resource that could be claimed and owned. This is clearly illustrated in the case of a large spruce log that drifted ashore in Nitinaht territory in 1930s that was immediately claimed, and then cut up for firewood (Turner et al. 1983:fig. 16). Since slaves belonged to titleholders or to the households of titleholders (Donald 1997), and slaves often collected firewood, we surmise that driftwood collected for fuel was considered the private property of an individual or the common property of a household. Some southern

TABLE 3.—Aboriginal use of driftwood on the North Pacific Coast.[1]

Group	Use of driftwood	Reference
Puyallup-Nisqually	Driftwood piled to make screen to direct heat from cooking fires on beach	Smith 1940:286
Twana	"Bark was a favored winter fuel, but any kind of wood, including beach drift, was so used"	Elmendorf and Kroeber 1992:220
Makah	Drift logs were split into boards or made into canoes	Swan 1868:4
Quileute and Makah	Driftwood was the principal source of firewood; redcedar drift logs were used for canoes, especially by the Makah	Singh 1966:23
Nitinaht	Drift logs were owned and cut up for firewood; *P. sitchensis* drift for fuel	Turner et al. 1983:fig. 16
Nuu-chah-nulth	Drift was collected for fuel	Drucker 1951:107; Arima 1983:62
Nuu-chah-nulth	Bamboo sometimes drifted ashore	N.J. Turner[2]
Kwakwaka'wakw	Drift logs for firewood	Wolcott 1967:23; Rohner and Rohner 1970:19
Kwakwaka'wakw	Drift logs were most common source of fuel; soft driftwood used as hearth with fire drill	Boas 1909:407
Kwakwaka'wakw	Driftwood was used to process elderberries and to singe the hair off harbor seals	Boas 1921:256, 451.
Haida	*P. menziesii, Acer, Betula,* and other woods sometimes collected as drift	N.J. Turner[2]
Northern and Kaigani Haida	Drift logs were lashed together to make rafts to migrate to Alaska	Blackman 1981:75
Haida	Drift logs used for pyre to cremate dead	Swan 1876:9
Haida	Driftwood used for fire on beach to process spruce roots	Blackman 1980:85
Yakutat Tlingit	*Thuja* and *Chamaecyparis* found as drift	de Laguna 1972:413
Chugach Alutiiq	*Thuja* available at Nuchek only as drift; it was available year round on the beaches of Prince William Sound, used for paddles, quivers; yellow-cedar sought after on Lower Kenai Peninsula	Wennerens 1985:59, 78
Chugach Alutiiq	Driftwood, small trees, and broken pieces of wood were preferred over standing trees *Thuja* available only as drift; when found, people cut, packed, and shared the wood; *Tsuga* spp. harvested only as drift, though locally available. Paddles and dugout canoes made from *Tsuga* and *Thuja* drift. *Populus trichocarpa* driftwood used to heat homes and steambaths; preferred for smoking fish	Russell 1991b: 6, 19, 20, 21

TABLE 3.—Continued.

Group	Use of driftwood	Reference
Dena'ina	Driftwood and windfalls were sought after for firewood; *Thuja* collected as driftwood	Kari 1987:15, 39
Dena'ina	Fire drills made of *Thuja* drift	Osgood 1966:108
Dena'ina, Aleut	*Populus trichocarpa* drift preferred for smoking fish because is "clean", without sap, contains salt, and slow-burning; for steambath switches, whittling *Thuja* and *Chamaecyparis* used as building material due to resistance to rot; dugout boats for children. Driftwood used as poles for fish drying racks	Russell 1991a: 9, 12, 13

[1] The aboriginal groups are ordered from south to north along the coast. See Figure 1 for locations of groups.

[2] Dr. Nancy J. Turner, ethnobotanist, University of Victoria, email correspondence with D. Lepofsky, 1999.

Northwest Coast peoples divided beaches into family-owned territories to claim ownership of beached whales (e.g., Hajda 1990), and it is possible that driftwood was also incorporated into this system of ownership.

At the north end of the Pacific Coast, where forest wood is a much scarcer commodity, several groups developed systems of ownership of driftwood. For instance, among the Alutiiq, when redcedar drift was found it was cut up and shared (Russell 1991b:19), and among the Koniag of Kodiak Island, ownership of driftwood was often claimed while the logs were still out at sea (Adams 1998). Among the Aleuts of the Aleutian Islands, wars were started when driftwood was taken from another village's territory (Veniaminov 1984, cited in Hoffman 1999:159), and an excavation of an Aleut village suggests that driftwood was shared within a household group (Hoffman 1999:159). The people of Nunivak Island marked ownership of piled driftwood by placing a large log in an upright position in the pile (Fienup-Riordan 2000:62).

DISCUSSION

From the time of initial colonization of the North Pacific Coast, driftwood probably has been an important source of wood for people of the region (Ames and Maschner 1999:61). Not only was driftwood a readily accessible and renewable source of wood, but it also provided preferred taxa that would not otherwise have been available except through trade. Both the Cape Addington Rockshelter case study and our review of the ethnographic record indicate that North Pacific Coast peoples selectively harvested driftwood for particular purposes. Like living trees or dead wood found in a resource territory, driftwood was integrated into a system of ownership and management typical of other valued resources, by at least some groups.

Although we cannot determine the amount of driftwood available on Pacific Coast beaches prior to industrial logging, early accounts indicate that driftwood was plentiful. For instance, in 1777, when Captain Cook arrived to Nootka Sound on the west coast of Vancouver Island, he was pleased that many drift logs of all shapes and sizes were available to repair various parts of the *Resolution* (Gough 1978:10). Similarly, Dorsey (1898:5), travelling in Dixon Entrance in the late 1800s, commented that many beaches were "piled high with drift, often to a height of sixty feet or more." Likewise, early photographs of the coast (e.g., Curtis's 1912 photograph of "[t]he mouth of the Quinault River") also show abundant driftwood on the beaches (Curtis 1913).

Despite the overall availability of driftwood on the coast, not all people would have had equal access to this valuable resource. Because of the subtleties of local ocean currents, only certain beaches accumulate drift.[3] Undoubtedly, North Pacific Coast peoples had knowledge of beaches where drift tended to accumulate and these were valuable locations for collecting wood. Even though we cannot reconstruct the relative abundance of species that were available as driftwood prior to industrial logging, current patterns of deposition of drift on beaches should reflect the overall spatial availability of driftwood in the past.

In addition to the availability of drift on local beaches, the role of driftwood to any individual group was undoubtedly influenced by regional variation in forest species composition and overall forest productivity. Importantly, the number of tree species declines northward along the coast (Alaback 1996), and the distribution of highly valued species such as Douglas-fir, redcedar, and yellow-cedar becomes increasingly restricted towards the northern ends of their geographic ranges (Figure 1; Pojar and MacKinnon 1994). Where redcedar and yellow-cedar do grow in Alaska, they often are small and stunted (Pojar and MacKinnon 1994:17), and thus are unsuitable for canoes or large structures. In the northernmost part of the region (north of 58° north latitude), forests not only contain fewer tree species in general, but less of the landscape is forested, and those forests are less productive overall (Alaback and Pojar 1997). Based on these vegetation patterns, it seems quite clear that driftwood was more important to people on the extreme northern part of the North Pacific Coast. However, the ethnographic data suggest that geographical variation alone does not account for the relative role of driftwood among North Pacific Coast groups (Table 3).

A final factor in determining the importance of driftwood was settlement type. Large, long-term, permanent settlements would have placed especially high demands on local forests, both for fuel and technological needs. This is clearly illustrated for the Makah, Nuu-chah-nulth, and Kwakwaka'wakw, who are located in some of the most productive coastal forests, yet according to the ethnographic record, driftwood was their principal source of fuel (Table 3). Driftwood may also have played a relatively more important role in some small and/or low-status settlements since these communities are less likely to be associated with the well-developed regional trade systems that supplied non-local woods.

The North Pacific Coast is not unique in northwestern North America with respect to the value of driftwood. Further north in the Western Arctic, where the landscape is sparsely treed or treeless, and the cold winters result in especially heavy demands on fuel, the importance of driftwood permeates the religious, social, and economic systems of most groups (Adams 1998; Barker 1993; Fienup-Riordan 1996, 2000; Oswalt 1957:26). To the east, Plateau groups located their villages and camps along floodplains that accumulated drift, and used the wood both for fuel and for special technological purposes (Miller 1998:258; Rhode 1986; Smith 2000:7.8; Stenholm 1985; Teit 1930:223).

Recognizing the value of driftwood has important implications for our understanding of how people of the North Pacific Coast negotiated resource diversity across the landscape. Even in a heavily forested region, an archaeologist cannot assume that charcoal represented in an archaeobotanical assemblage represents locally growing tree species. North Pacific Coast peoples clearly identified and understood the different properties of various wood taxa, even in the form of drift. Identifying charred remains to genus or species should become a routine archaeological practice, especially for wood samples from coastal sites submitted for radiocarbon dating. Samples of driftwood may be particularly susceptible to the "old wood," or inbuilt age problem, and the magnitude of this effect can be species specific (Gavin 2001; Schiffer 1986).

NOTES

[1] For the purpose of this paper, we define the North Pacific Coast as the region extending from Cook Inlet to the Oregon–California border.

[2] Dr. Curt Ebbesmeyer, Oceanographer, Evans-Hamilton; email correspondence with D. Lepofsky, 1999.

[3] Dr. Curt Ebbesmeyer, Oceanographer, Evans-Hamilton; email correspondence with D. Lepofsky, 1999.

ACKNOWLEDGMENTS

Excavations at 49-CRG-188 were supported by grants to Moss from the National Science Foundation, Tongass National Forest, Craig Ranger District, University of Oregon, and the National Marine Fisheries Service, Auke Bay Laboratory. Moss would like to thank the field team: Jon Erlandson, Rob Losey, Mark Tveskov, Betty Johnston, and Erik Moss Erlandson, all of whom enjoyed driftwood campfires at night. Many thanks to Curt Ebbesmeyer for sharing his extensive knowledge of drift, to Nancy Turner for information on the use of drift by First Nations of the Northwest Coast, and to Karen Adams for sharing her unpublished work on driftwood use in Alaska. We also thank Jesse Morin for his help with the search through ethnographic sources for information on wood use by Northwest Coast peoples. Many thanks to Kathia Guay and Remi Brisson for the translation of the abstract into French and to Andres Valle-Domenech and Marcela Olguin-Algarez (once again) for the translation into Spanish.

REFERENCES CITED

Adams, Karen R. 1998. The spirit of driftwood: Alaskan driftwood use and archaeological implications. Paper presented at the 63rd Annual Meeting of the Society for American Archaeology, Seattle, Washington.

Alaback, Paul B. 1996. Biodiversity patterns in relation to climate: the coastal temperate rainforests of North America. In *High-Latitude Rainforests and Associated Ecosystems of the West Coast of the Americas*, eds. Richard B. Lawford, Paul B. Alaback, Eduardo Fuentes, pp. 105–133. Springer-Verlag, New York.

Alaback, Paul and Jim Pojar. 1997. Vegetation from ridgetop to seashore. In *The Rainforests of Home*, eds. Peter K. Schoonmaker, Bettina von Hagen, and

Edward C. Wolf, pp. 69–87. Island Press, Washington, D.C.

Ames, Kenneth M., Doria F. Raetz, Stephen C. Hamilton, and Christine McAfee. 1992. Household archaeology of a southern Northwest Coast plank house. *Journal of Field Archaeology* 19:275–290.

Ames, Kenneth M. and Herbert D.G. Maschner. 1999. *Peoples of the Northwest Coast.* Thames and Hudson Ltd., London.

Arima, E.Y. 1983. *The West Coast People. The Nootka of Vancouver Island and Cape Flattery.* British Columbia Provincial Museum, Special Publication, no. 6, Victoria.

Barker, James H. 1993. *Always Getting Ready, Upterrlainarluta. Yup'ik Eskimo Subsistence in Southwest Alaska.* University of Washington Press, Seattle.

Bernick, Kathryn. 1991. Wet Site Archaeology in the Lower Mainland Region of British Columbia. Report on file, British Columbia Heritage Trust, Victoria.

Blackman, Margaret B. 1980. *During My Time. Florence Edenshaw Davidson. A Haida Woman.* University of Washington Press, Seattle.

———. 1981. *Window on the Past: The Photographic Ethnohistory of the Northern and Kaigani Haida.* National Museum of Man Mercury Series, Canadian Ethnology Service, Paper no. 74. National Museums of Canada, Ottawa.

Boas, Franz. 1921. Ethnology of the Kwakiutl, Based on Data Collected by George Hunt. Bureau of American Ethnology, Annual Report 35, pts 1–2. In *35th Annual Report of the Bureau of American Ethnology for the Years 1913–1914,* pp. 43–1481. Washington, D.C.

———. 1909 [1975]. The Kwakiutl of Vancouver Island. Publications of the Jesup North Pacific Expedition 5 (2):301–522. *Memoirs of the American Museum of Natural History* 8 (2). Reprinted, AMS Press, New York.

———. 1935 [1969]. *Kwakiutl Culture as Reflected in Mythology.* Kraus Reprint, New York.

Bowers, Peter M. and Madonna L. Moss. 2001. The North Point Wet Site and the subsistence importance of Pacific cod on the northern Northwest Coast. In *People and Wildlife in Northern North America: Essays in Honor of R. Dale Guthrie,* pp. 159–177. British Archaeological Report International Series 944. Archaeopress, Oxford.

Calkin, Parker E., Gregory C. Wiles, and David J. Barclay. 2001. Holocene coastal glaciation of Alaska. *Quaternary Science Reviews* 20:449–461.

Curtis, Edward S. 1913 [1970]. *The North American Indian: Being a Series of Volumes Picturing and Describing the Indians of the United States, the Dominion of Canada, and Alaska,* vol. 19, ed. Frederick W. Hodge. Plimpton Press, Norwood, Massachusetts. Johnson Reprint, New York.

Cwynar, L.C. 1990. A late Quaternary vegetation history from Lily Lake, Chilkat Peninsula, southeast Alaska. *Canadian Journal of Botany* 68:1106–1112.

de Laguna, Frederica. 1972. Under Mount Saint Elias: The History and Culture of the Yakutat Tlingit, Pt. 1. *Smithsonian Contributions to Anthropology,* Vol. 7. Smithsonian Institute Press, Washington, D.C.

Donald, Leland. 1997. *Aboriginal Slavery on the Northwest Coast of North America.* University of California Press, Berkeley.

Dorsey, George A. 1898. A cruise among Haida and Tlingit villages about Dixon's Entrance. Reprinted in Appleton's Popular Science Monthly from a lecture delivered in the Field Columbian Museum, Nov. 6, 1897.

Drucker, Philip. 1951. *The Northern and Central Nootkan Tribes.* Smithsonian Institution Bureau of American Ethnology, Bulletin 144. Smithsonian Institution, Washington, D.C.

———. 1955. *Indians of the Northwest Coast.* The Natural History Press, Garden City, New York.

Elmendorf, William W. and A.L. Kroeber. 1992. *The Structure of Twana Culture. With Comparative Notes on the Structure of Yurok Culture.* Washington State University Press, Pullman, Washington.

Fienup-Riordan, Ann. 1996. *The Living Tradition of Yup'ik Masks.* University of Washington Press, Seattle.

———. (editor) 2000. *Where the Echo Began and other Oral Traditions from Southwestern Alaska recorded by Hans Himmelheber.* University of Alaska Press, Fairbanks.

Friedman, Janet. 1975. The Prehistoric Uses of Wood at the Ozette Archaeological Site. Ph.D. dissertation, Department of

Anthropology, Washington State University, Pullman.

Gavin, Daniel G. 2001. Estimation of inbuilt age in radiocarbon ages of soil charcoal for fire history studies. *Radiocarbon* 43: 27–44.

Gottesfeld, Alan S., Rolf W. Mathewes, and Leslie M.J. Gottesfeld. 1991. Holocene debris flows and environmental history, Hazelton area, British Columbia. *Canadian Journal of Earth Sciences* 28:1583–1593.

Gough, Barry M. 1978. Nootka Sound in James Cook's Pacific world. In *Nu-tka—Captain Cook and the Spanish Explorers on the Coast*, eds. Barbara S. Efrat and W.J. Langlois, pp. 1–32. Sound Heritage vol. VII, no. 1. Province of British Columbia, Victoria, B.C.

Hajda, Yvonne. 1990. Southwestern Coast Salish. In *The Handbook of North American Indians*, vol. 7, *The Northwest Coast*, ed. Wayne Suttles, pp. 503–517. Smithsonian Institution Press, Washington, D.C.

Hansen, B.C.S. and D.R. Engstrom 1996. Vegetation history of Pleasant Island, southeastern Alaska, since 13,000 yr BP. *Quaternary Research* 46:161–175.

Hebda, Richard J. 1995. British Columbia vegetation and climate history with focus on 6KA BP. *Géographie Physique et Quaternaire* 49:55–79.

Hebda, Richard J. and Cathy Whitlock. 1997. Environmental history. In *The Rain Forests of Home: Profile of a North American Bioregion*, eds. Peter K. Schoonmaker, Bettina von Hagen and Edward C. Wolf, pp. 227–254. Island Press, Washington, D.C.

Hoffman, Brian W. 1999. Agayadan Village: household archaeology on Unimak Island, Alaska. *Journal of Field Archaeology* 26:147–161.

Jenness, Diamond. 1955. The Faith of a Coast Salish Indian. *Anthropology in British Columbia*. Memoir No. 3. British Columbia Provincial Museum, Victoria.

Jewitt, John R. 1974. *The Adventures and Sufferings of John J. Jewitt, Captive Among the Nootka 1803–1805*. ed. Derek G. Smith. McClelland and Stewart Ltd, Toronto.

Kari, Priscilla Russell 1987. *Tanaina Plantlore. Dena'ina K'et'una*. National Park Service, Anchorage, Alaska.

Lepofsky, Dana. In press. The Northwest. In *Plants and People in Ancient North America*, vol. 2, ed. Paul Minnis. Smithsonian Institution Press, Washington, D.C.

Lepofsky, Dana, Michael Blake, Douglas Brown, Sandra Morrison, Nicole Oakes, and Natasha Lyons. 2000. The archaeology of the Scowlitz site, southwestern British Columbia. *Journal of Field Archaeology* 27(4):391–416.

Lepofsky, Dana, Madonna L. Moss, and Natasha Lyons. 2001. The unrealized potential of paleoethnobotany in the archaeology of northwestern North America: Perspectives from Cape Addington, Alaska. *Arctic Anthropology* 38(1):48–59.

Lepofsky, Dana and Brian Pegg. 1996. Archaeological and ethnographic assessment. In The Kowesa Watershed Assessment: Summary Report, pp. 38–44. Interrain Pacific, Portland, Oregon.

Mann, Daniel H., Aron L. Crowell, Thomas D. Hamilton, and Bruce P. Finney. 1998. Holocene geologic and climatic history around the Gulf of Alaska. *Arctic Anthropology* 35:112–131.

Mathewes, Rolf W. andd Glen E. Rouse. 1975. Palynology and palaeoecology of postglacial sediments form the lower Fraser River Canyon of British Columbia. *Canadian Journal of Earth Sciences* 12: 745–756.

Miller, Jay. 1998. Middle Columbia River Salishan. In *The Handbook of North American Indians*, vol. 12, *The Plateau*, ed. Wayne Suttles, pp. 253–270. Smithsonian Institution Press, Washington, D.C.

Mobley, Charles M. and Morley Eldridge 1992. Culturally modified trees in the Pacific Northwest. *Arctic Anthropology* 29:91–110.

Moss, Madonna L. n.d. Archaeological Investigation of Cape Addington Rockshelter: Human Occupation of the Rugged Seacoast on the Outer Prince of Wales Archipelago, Alaska. University of Oregon Anthropological Papers. (in preparation)

Moss, Madonna L. and Robert J. Losey. 2003. Resource Use on the Northwest Coast: Case Studies from Southeast Alaska and Oregon. *The Proceedings of the 17th International Abashiri Symposium*, Abashiri, Japan. (in press).

Oberg, Kalvero. 1973. *The Social Economy of* *the Tlingit Indians*. University of Washington Press, Seattle.

Osgood, Cornelius. 1966. *The Ethnography of the Tanaina*. Yale University Publications in Anthropology 16. Yale University, New Haven, Connecticut.

Oswalt, Wendell H. 1957. A Western Eskimo ethnobotany. *Anthropological Papers of the University of Alaska* 6:16–36.

Pegg, Brian. 2000. Dendrochronology, CMTs, and Nuu-chah-nulth history on the west coast of Vancouver Island. *Canadian Journal of Archaeology* 24:77–88.

Pojar, Jim and Andy Mackinnon. 1994. *Plants of Coastal British Columbia*. Lone Pine Press, Vancouver.

Reger, Douglas R. and Chris R. Campbell. 1986. *Early Historic Use of Sakie Bay Cave, CRG-230*. Alaska Archaeological Surveys, State of Alaska, Department of Natural Resources, Anchorage.

Rhode, David. 1986. Archaeobotanical investigations in the Wells Reservoir Archaeological Project, Eastern Washington. In *The Wells Reservoir Project, vol. 1: Summary of Findings*, ed. James Chatters. Appendix A-3. Central Washington Archaeological Survey, Archaeology Report 86-6, Ellensburg, Washington.

Rohner, Ronald P. and Evelyn C. Rohner. 1970. *The Kwakiutl Indians of British Columbia*. Holt, Rinehart and Winston, New York.

Russell, Priscilla N. 1991a. Ninilchik Plantlore. An Ethnobotany of the Ninilchik Dena'ina, Aleut, and Russian Peoples. Ms. on file with author and Pratt Museum, Homer, Alaska.

———. 1991b. *English Bay and Port Graham Alutiiq Plantlore*. Homer Society for Natural History, Chugach Heritage Foundation, and Alaska Native Plant Society, Anchorage.

Ruyle, Eugene E. 1973. Slavery, surplus, and stratification on the Northwest Coast: the ethnoenergetics of an incipient stratification system. *Current Anthropology* 14:603–631.

Schiffer, Michael B. 1986. Radiocarbon dating and the "old wood" problem: the case of the Hohokam chronology. *Journal of Archaeological Science* 13:13–30.

Singh, Ram Raj Prasad. 1966. *Aboriginal Economic System of the Olympic Peninsula Indians, Western Washington*. The Sacramento Anthropological Society, Sacramento State College, Sacramento, California.

Smith, Alan H. 2000. Kalispel ethnography and ethnohistory. In *The Calispell Valley Archaeology Final Report, vol. 2. History and Ethnographic Background*, eds. W. Andrefsky, G.C. Burtchard, K.M. Presler, S.R. Samuels, P.H. Sanders, and A. Thoms, pp. 7.1–7.151. Center for Northwest Anthropology, Department of Anthropology, Washington State University, Pullman.

Smith, Marion W. 1940. *The Puyallup-Nisqually*. Columbia University Press, New York.

Stenholm, Nancy A. 1985. Botanical assemblage. In *Summary of Results, Chief Joseph Dam Cultural Resources Project, Washington*, ed. Sarah K. Campbell, pp. 421–453. Office of Public Archaeology, University of Washington, Seattle.

———. 1992. Fort Rock Basin botanical analysis. Paper presented at the Northwest Anthropological Conference, Burnaby, B.C.

Stewart, Hilary. 1984. *Cedar*. Douglas and McIntyre, Vancouver.

Stryd, Arnoud. 1997. *Culturally Modified Trees of British Columbia*. British Columbia Ministry of Forests, Nanaimo, B.C.

Stryd, Arnoud and Morley Eldridge 1993. CMT archaeology in British Columbia: the Meares Island studies. *B.C. Studies* 99:184–234.

Suttles, Wayne. 1987. Private knowledge, morality, and social class among the Coast Salish. In *Coast Salish Essays*, ed. Wayne Suttles, pp. 3-14. Talonbooks, Vancouver and University of Washington Press, Seattle.

Swan, James G. 1868. Indians of Cape Flattery at the Entrance of the Strait of Fuca, Washington Territory. *Smithsonian Contribution to Knowledge* 16(8):1–106. Washington, D.C.

———. 1876. The Haidah Indians of Queen Charlottes Islands, British Columbia. With a brief description of their carvings, tattoo designs, etc. *Smithsonian Contributions to Knowledge* 21(4):1–18. Washington, D.C.

Teit, James A. 1930. The Salishan Tribes of the Western Plateaus. In *45th Annual Report of the Bureau of American Ethnology for the Years 1927–1928*, ed. Franz Boas, pp. 23–396. Washington, D.C.

Thomson, Richard. 1981. Oceanography of the British Columbia Coast. *Canadian Special Publication of Fisheries and Aquatic Sciences* 56. Department of Fisheries and Oceans, Ottawa.

Turner, Nancy J. 1998. *Plant Technology of First Peoples in British Columbia. Royal British Columbia Museum Handbook.* University of British Columbia Press in collaboration with the Royal British Columbia Museum, Vancouver.

Turner, Nancy J. and Sandra L. Peacock. In press. Solving the perennial paradox: the ethnobotanical evidence for plant resource management on the Northwest Coast. In *Keeping It Living: Indigenous Plant Management on the Northwest Coast*, eds. Douglas Deur and Nancy J. Turner. University of Washington Press, Seattle.

Turner, Nancy J., John Thomas, Barry F. Carlson, and Robert T. Ogilvie. 1983. *Ethnobotany of the Nitinaht Indians of Vancouver Island.* Occasional Papers of the British Columbia Provincial Museum, no. 24, British Columbia Provincial Museum, Victoria.

Viereck, Leslie A. and Elbert L. Little, Jr. 1972. *Alaska Trees and Shrubs.* Agricultural Handbook No. 410. Forest Service, United States Department of Agriculture, Washington, D.C.

Wennerens, Alex J. 1985. Traditional Plant Usage by Chugach Natives Around Prince William Sound and on the Lower Kenai Peninsula, Alaska. M.A. Thesis, University of Alaska, Anchorage.

Wolcott, Harry F. 1967. *A Kwakiutl Village and School.* Holt, Rinehart and Winston, New York.