Chapter 4

Solving the Perennial Paradox

Ethnobotanical Evidence for Plant Resource Management on the Northwest Coast

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It was all important. That *texwstus* [springbank clover], and the *tliksam* [silverweed], and the *q'weniy'* [Nootka lupine], and the . . . *xukwem* [northern rice-root]. See, when they go down the flats, they use little pegs. "This is my area." You got your own pegs, in the flats. And then you continue on that, digging the soft ground . . . so it will grow better every year. Well, I guess, fertilizing, cultivating, I guess that's . . . the word for it. Every family had pegs, owned their little plots in the flats.

—Kwaxistala, Chief Adam Dick, Kwakwaka'wakw, from Kingcome Inlet, 1996

People–Plant Interactions on the Northwest Coast

The indigenous cultures of the Northwest Coast are traditionally viewed as being one of the original affluent societies (Sahlins 1968)—hunter-gatherers, who, by exploiting the abundant "natural" resources of the Pacific Northwest, attained a high level of social complexity. Paradoxically, this complexity, it is often said, was achieved in the absence of plant food production and domestication. Consequently, as Ames and Maschner (1999: 13–14) observe,

> These societies confound ideas about the development of social complexity during human history and many of the traits expressed on the Northwest Coast are exactly those traits widely viewed as the basis for the development of civilization. It has always been assumed by historians, anthropologists, archaeologists, and others that farming is necessary for these traits to evolve. The non-farming hunter-gatherer societies of the Northwest Coast possessed all those traits, and did so for at least the last 2,500 years if not longer.

Efforts to explain this apparent anomaly (cultural complexity sans agriculture) have focused on the rich marine environments and the importance of anadromous fish to the economies of the region, suggesting that these plentiful resources served as the cornerstones of complexity. In contrast, few have explored the extensive ethnobotanical literature to evaluate the contributions of plant resources to Northwest Coast subsistence and to assess whether the dichotomy between foraging and farming is a useful distinction for the area (Deur and Turner, Introduction, this volume).

The purpose of this chapter, then, is to provide a broad overview of the nature of people–plant interactions on the Northwest Coast, as a prelude to the case-specific chapters that follow. In doing so, we hope to set the context for the following discussion of plant management traditions. We also hope to dispel the myth that social complexity arose here in the absence of food production by demonstrating that the "hunter-gatherers" of the region were not simple "affluent foragers," but active managers who have cultivated, sustained, overseen, and promoted culturally valued plant resources. The chapter proceeds as follows. We begin with a brief summary of the landscapes and peoples of the Northwest Coast, topics treated in greater detail in the Introduction to this volume, and, in terms of the peoples, in Chapter 5. Then we establish the theoretical basis for our research, drawn from the work of Peacock (1998), by outlining two models of people–plant interactions we have found particularly instructive. With this framework, we turn to the specifics of plant resource use on the Northwest Coast, identifying a continuum of management activities and discussing how these affected the composition and productivity of plant communities. Here, we draw from Turner's extensive ethnobotanical experience in the Pacific Northwest (Kuhnlein and Turner 1987, 1991; Turner 1995, 1997a–c, 1998, 1999, 2003a,b; Turner and Efrat 1982; Turner and Kuhnlein 1982, 1983; Turner et al. 1983, 1990) as well as from other recent recollections and accounts of elders from communities throughout the study area (see Beckwith 2004; Bouchard and Kennedy 1990; Compton 1993a,b; Davis et al. 1995; Deur 1999, 2000, 2002a,b) and corroborative materials from the Canadian Plateau (Peacock and Turner 2000; Turner et al. 2000). We also build upon the work of Suttles (1951a,b; see also this volume) who, several decades ago, drew the connection between precontact plant management practices of Coast Salish peoples and the ease with which they adopted potato cultivation. In our concluding remarks, we summarize the evidence presented and discuss the implications of these findings for our understandings of people–plant interactions on the Northwest Coast.

Plant Management Principles and Practices

The Northwest Coast of North America is well defined both geographically and culturally (Schoonmaker et al. 1997; Suttles 1990). Spatially, the Northwest Coast is identified as the strip of coastline extending from northern California to Yakutat Bay, Alaska, bounded on the inland side by mountain ranges and

characterized by a relatively mild climate, temperate rainforest, and rich marine life (see Deur and Turner, Introduction, this volume).

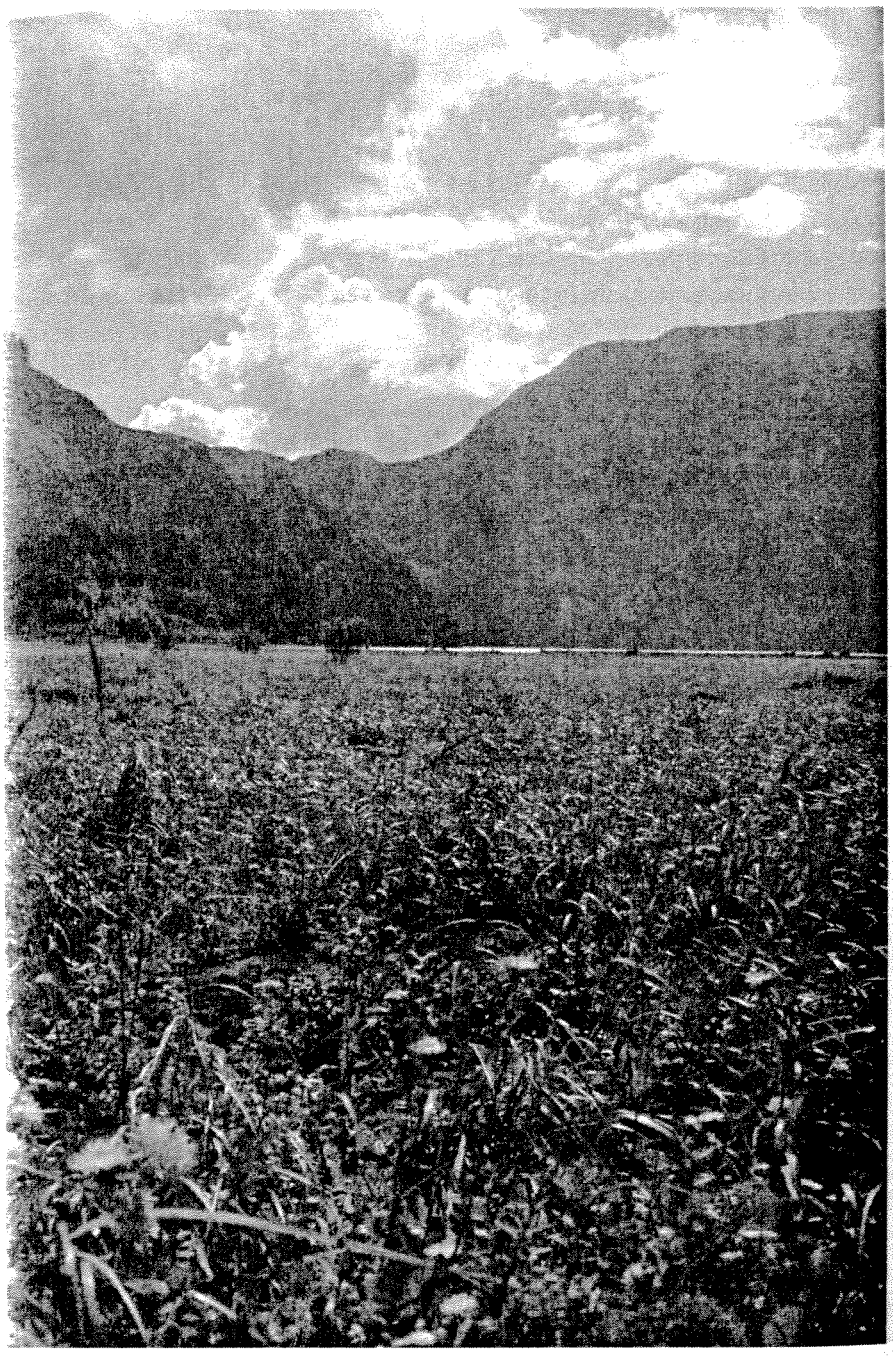
Within each of the four major ecological or "biogeoclimatic" zones of the Northwest Coast as described in the Introduction, are many specific habitats such as river estuaries, peat bogs, marshes, meadows, forests, parkland, and floodplains (Figure 4.1). These are occupied by specialized communities of plants and animals, many of them culturally important to Northwest Coast peoples. As noted previously, too, the various successional stages of the forest communities resulting from disturbance, as well as the climax communities, are important in providing a wide diversity of culturally important species. It is important to keep this geographical and ecological diversity in mind in discussions of traditional plant-resource management, because, although we can generalize management strategies to some extent, specific practices will vary according to environmental as well as cultural factors. It is also essential to acknowledge the cultural diversity of the region.

Despite sharing many cultural features, the peoples of the Northwest Coast are linguistically and culturally diverse. In British Columbia, at least fourteen to sixteen or more languages,[1] classed within five major language families, were spoken along the coast. It is important to recognize that the peoples of this coast were, and are, distinctive, and that there is a danger in too much generalization about peoples' cultures and lifestyles. We acknowledge that information known to one individual or community should not be applied to others without qualifications.

In this chapter we present admittedly relatively sporadic accounts of plant management. It is fair to assume that the practices we have documented are more widespread, but obviously more research is needed to confirm such an assumption and to extend the range of our knowledge and understanding about relationships between people and plant communities in the Northwest Coast region.

Over 300 plant species were utilized traditionally by Northwest Coast peoples as food, sources of material, medicines, and for spiritual purposes (Table 4.1). Our assessment of the traditional plant-management strategies associated with these resources indicates that they vary with species and geographic region, but range along a continuum from foraging activities with minimum or incidental impacts, to cultivation practices such as selective harvesting, tilling, weeding, pruning, and landscape burning, to intensive gardening—leading, apparently, to complete domestication, as in the case of the Northwest Coast tobacco (evidently a variety of *Nicotiana quadrivalvis*; Turner and Taylor 1972).

This range of activities is listed in Table 4.2, which represents our interpretation of models of human–plant interaction advanced by Ford (1985b) and Harris (1989). Like these models, it represents a continuum of increasing human effort and influence on the "natural" landscape. Unlike the others, it includes, as well as food plants, those species used for materials and medicines. We maintain that the same principles and practices guided the harvesting of all types of plant products (see M. K. Anderson [1996a] and



4.1. Kingcome River estuary (Photo by N. J. Turner)

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We turn now to a discussion of specific examples of management practices relevant to each of these categories, remembering, of course, that these categories represent arbitrary divisions across a continuum.

FORAGING STRATEGIES

Foraging activities, according to Ford (1985b), have minimal impacts on plant resources, although they may have incidental or unintentional effects. Included in this category are plants not harvested on a regular basis, or in large quantities. Foraging as such in the Northwest Coast area may have occurred with incidental picking of lesser-used fruits, famine foods, flavorings, materials for makeshift baskets, containers, and cordage, and some medicinal plants, as well as with opportunistic harvesting in a variety of circumstances. However, even in these cases, there were protocols for harvesting and use that would have resulted in non-random selection, which would be expected to produce some directed influence on the plant resources and their habitats.

CULTIVATION STRATEGIES

As depicted in Table 4.2, the range of activities included under cultivation varies from low-intensity techniques, such as tending and tilling, to those techniques requiring greater human input—such as transplanting, landscape burning, and the maintenance of garden plots. The activities had both incidental and intentional impacts on plant resources.

The majority of these plant-management strategies were directed at particular species, and therefore, these were the fundamental unit of resource management on the Northwest Coast. Populations of plants with cultural utility were encouraged through a number of strategies associated with aboriginal harvesting practices. These strategies were based both on biological and cultural considerations, and were employed to ensure the continued productivity of key resources. They include: the selective harvesting of plants based on well-defined criteria, a number of extractive techniques that increased rather than decreased overall population levels, and the creation and maintenance of "garden" habitats for certain key species.

HARVEST CRITERIA

The harvesting of plant resources was and is selective, being neither random nor all-encompassing. Selective harvesting was widely practiced in plant gathering, whether it was for greens, roots, berries, plant materials, or medicines. The criteria used to select plants for harvest varied considerably between species, and depended upon the type of plant resource and its intended use. Cultural preferences, the physiology of the plant, and environmental factors all influ-

(text continues on page 112)

TABLE 4.1. SUMMARY OF CULTURALLY IMPORTANT PLANTS OF THE NORTHWEST COAST WITH ASSOCIATED HARVESTING AND MANAGEMENT PRACTICES

Use category	*Examples*	*Notes on management*
FOOD: Berries (Total ± 50 species)	*Fragaria* spp. (wild strawberry); *Gaultheria shallon* (salal); *Ribes bracteosum* (gray currant); *Rubus spectabilis* (salmonberry); *Pyrus fusca* (Pacific crabapple); *Shepherdia canadensis* (soapberry); *Vaccinium membranaceum* (black huckleberry); *Vaccinium ovalifolium* (blueberry); *Vaccinium parvifolium* (red huckleberry); *Vaccinium oxycoccos* (bog cranberry); *Viburnum edule* (highbush cranberry)	All except wild strawberry are woody perennials; fruit picking generally non-impacting on plants; diversification and use of alternative species in poor crop years was practiced; seasonal rounds; some enhanced by periodic burning; some (e.g., gray currant, salmonberry, blueberry, red huckleberry, Pacific crabapple) were pruned periodically; salal pruned when stems picked; highbush cranberry and others known to have been transplanted; some berry patches fertilized; productive berry patches often owned by individuals or families
FOOD: Root vegetables (Total ± 25 species)	*Camassia* spp. (edible blue camas); *Conioselinum pacificum* ("wild carrot"); *Dryopteris expansa* (spiny wood fern); *Fritillaria camschatcensis* (rice-root); *Lupinus nootkatensis* (Nootka lupine); *Potentilla anserina* ssp. *pacifica* (Pacific silverweed); *Sagittaria latifolia* (wapato); *Trifolium wormskjoldii* (springbank clover)	All are herbaceous perennials with bulbs, corms, rhizomes, tubers, or taproots; all selectively harvested by season, age, size, life-cycle stage; part of seasonal round harvesting cycles; some (e.g., camas) enhanced by periodic landscape burning; propagules often incidentally or intentionally replanted; some weeded during harvest; specific sites harvested in annual or several-year cycles; patches often owned by individuals or families

Use category	*Examp*
FOOD: Green vegetables (Total ± 20 species)	*Epilobi* (firewe *mateia* *Heracle* parsnip bleberry shoots)
FOOD: Tree inner bark (Total ± 7 species	*Alnus ru* *Populus trichoca* *Tsuga he* hemlock (silver fi (Sitka sp
FOOD: Marine algae (Total ± 6 species)	*Egregia n* capturin *Porphyra* laver, no *integrifol* turing he
FOOD: Casual foods, flavorings and sweeteners, emergency foods, beverage plants (Total ± 50 species)	*Blechnum* fronds as sant); *Tsu* (western l tips as hu boughs fo ring spaw *landicum* beverage); (Sitka spr gum)
SMOKING: Tobaccos and tobacco flavorings (Total ± 2 species)	*Arctostaph* (kinnikinn smoked by *Nicotiana* tobacco; le

Use category	*Examples*	*Notes on management*
FOOD: Green vegetables (Total ± 20 species)	*Epilobium angustifolium* (fireweed); *Equisetum telmateia* (giant horsetail); *Heracleum lanatum* (cow-parsnip); *Rubus* spp. (thimbleberry, salmonberry, shoots)	All are herbaceous perennials or woody perennials (*Rubus* spp.); all selectively harvested as shoots or leaves by season, age, size, life-cycle stage; part of seasonal round harvesting cycles; some enhanced by picking
FOOD: Tree inner bark (Total ± 7 species	*Alnus rubra* (red alder); *Populus balsamifera* ssp. *trichocarpa* (cottonwood); *Tsuga heterophylla* (western hemlock); *Abies amabilis* (silver fir); *Picea sitchensis* (Sitka spruce)	All tree species; harvested by partial bark and cambium removal, but not girdling; selectively harvested by season and in some cases tidal phase; part of seasonal round harvesting cycles
FOOD: Marine algae (Total ± 6 species)	*Egregia menziesii* (boa kelp: capturing herring spawn); *Porphyra abbottiae* (red laver, nori); *Macrocystis integrifolia* (giant kelp: capturing herring spawn)	Selectively harvested by abundance, taste, season, location; fronds plugged, or plants pulled from rocks, allowing regeneration from remaining base of fronds
FOOD: Casual foods, flavorings and sweeteners, emergency foods, beverage plants (Total ± 30 species)	*Blechnum spicant* (deer fern; fronds as hunger supressant); *Tsuga heterophylla* (western hemlock; branch tips as hunger supressant; boughs for capturing herring spawn); *Ledum groenlandicum* (Labrador tea: beverage); *Picea sitchensis* (Sitka spruce: chewing gum)	Variously herbaceous or woody perennials; leaves, branches, gum, shoots, or other parts selectively harvested by season or at times of need; seldom harvested intensively in any locality
SMOKING: Tobaccos and tobacco flavorings (Total ± 2 species)	*Arctostaphylos uva-ursi* (kinnikinnick: leaves smoked by some groups); *Nicotiana* sp. (Haida tobacco; leaves chewed)	*Nicotiana* an annual, formerly grown in gardens from seed by Haida, Tlingit, Tsimshian, and others; kinnikinnick is perennial, leaves selectively harvested

TABLE 4.1 *(continued)*

Use category	*Examples*	*Notes on management*
MATERIALS: Pit-cooking, matting (Total ± 10 species)	*Alnus rubra* (red alder); *Gaultheria shallon* (salal branches); *Polystichum munitum*, *Pteridium aquilinum* (ferns); grass species	All herbaceous or woody perennials; materials harvested selectively from living plants as plucking or "pruning"
MATERIALS: Woods for construction and manufacture (Total: ± 25 species)	*Acer macrophyllum* (broadleaf maple); *Alnus rubra* (red alder); *Chamaecyparis nootkatensis* (yellow-cedar); *Picea sitchensis* (Sitka spruce); *Pseudotsuga menziesii* (Douglas-fir); *Salix* spp. (willow); *Taxus brevifolia* (Pacific yew); *Thuja plicata* (western red-cedar, intensively used)	All trees or shrubs; some harvested or coppiced as branches or stems from living plants; cedar planks cut from standing trees; trees selectively cut (e.g., cedar for dugout canoes; houseposts, etc.); stumps as habitat for berry bushes
MATERIALS: Woods and others for fuel, tinder (Total: ± 25 species)	*Alnus rubra* (red alder, for smoking fish); *Chamaecyparis nootkatensis* (yellow-cedar); *Juniperus scopulorum* (Rocky Mountain juniper, for smudging); *Populus balsamifera* (cottonwood); *Pseudotsuga menziesii* (Douglas-fir: wood, bark as fuel); *Thuja plicata* (western red-cedar, bark and wood)	Most are trees or woody perennials; materials often harvested from downed/dead trees, driftwood, or selectively as branches from living trees; burns sometimes used to create firewood
MATERIALS: Bark sheets for roofing, or other purposes (Total ± 5 species)	*Prunus emarginata* (bitter cherry, bark peeled off in strips as binding material); *Thuja plicata* (western red-cedar, bark sheets for roofing)	All trees; outer bark only removed, without killing tree; others removed in large sheets, which would kill trees if all bark taken; bark harvested selectively by size, season, tree characteristics
MATERIALS: Stem, leaf, root fibers/fibrous tissues (Total: ± 15 species)	*Carex obnupta* (basket sedge: leaves); *Chamaecyparis nootkatensis* (yellow-cedar: inner bark); *Nereocystis luetkeana* (bull kelp: stipes for fishingline);	All are woody or herbaceous perennials; materials cut (stems, leaves) or pulled in strips (barks) from living plants by pruning; herbaceous

Use category	*Examples*
MATERIALS: Stem, leaf, root fibers etc. *(continued)*	*Picea sitch* spruce: ro (willow: st *Schoenople* stems); *Th* ern red-ce roots, with *lia* (cattail: *dioica* (stin stems); *Xer* (bear-grass
MATERIALS: Dyes, stains (Total: ± 8 species)	*Alnus* spp. (*Echinodont* (Indian pai *Mahonia aq* (Oregon-gr
MATERIALS: Adhesives, caulking, waterproofing agents (Total: ± 10 species)	*Pinus contor* pine: pitch); *samifera* (co resin: adhesi *sitchensis* (Si pitch); *Pseud ziesii* (Dougl
MATERIALS: Scents, cleansing agents, spiritual protection, miscellaneous (Total: ± 50 species)	*Abies amabil* (silver fir, gr as scent); *Ale tosa* (old ma lichen: wipin *legia formosa* bine: roots as charm); *Asar* (wild ginger: zomes as scen *brevistylum* (t as good-luck *setum telmate* rush: abrasive *americanum* (cabbage: leave laying food on *stichum munit* fern: fronds to chon ripening *scouleriana* an (willow: leafy l

Use category	*Examples*	*Notes on management*
MATERIALS: Stem, leaf, root fibers etc. *(continued)*	*Picea sitchensis* (Sitka spruce: roots); *Salix* spp. (willow: stems, roots); *Schoenoplectus acutus* (tule: stems); *Thuja plicata* (western red-cedar: inner bark, roots, withes); *Typha latifolia* (cattail: leaves); *Urtica dioica* (stinging nettle: stems); *Xerophyllum tenax* (bear-grass: leaves)	materials harvested selectively by size, season, plant growth form, habitat; prime populations of kelp, nettles, cat-tails, etc., were recognized and selectively harvested
MATERIALS: Dyes, stains (Total: ± 8 species)	*Alnus* spp. (alders: bark); *Echinodontium tinctorium* (Indian paint fungus); *Mahonia aquifolium* (Oregon-grape: inner bark)	Various types of materials; harvested selectively and sporadically as required
MATERIALS: Adhesives, caulking, waterproofing agents (Total: ± 10 species)	*Pinus contorta* (lodgepole pine: pitch); *Populus balsamifera* (cottonwood bud resin: adhesive); *Picea sitchensis* (Sitka spruce: pitch); *Pseudotsuga menziesii* (Douglas-fir: pitch)	Harvested selectively from living trees
MATERIALS: Scents, cleansing agents, spiritual protection, miscellaneous (Total: ± 50 species)	*Abies amabilis, A. grandis* (silver fir, grand fir: boughs as scent); *Alectoria sarmentosa* (old man's beard lichen: wiping fish); *Aquilegia formosa* (red columbine: roots as good-luck charm); *Asarum caudatum* (wild ginger: leaves, rhizomes as scent); *Cirsium brevistylum* (thistle: roots as good-luck charm); *Equisetum telmateia* (scouring rush: abrasive); *Lysichiton americanum* (skunk-cabbage: leaves for drying/laying food on); *Polystichum munitum* (sword fern: fronds to line eulachon ripening pits); *Salix scouleriana* and other spp. (willow: leafy branches for	Variously herbaceous or woody perennials; most materials selectively harvested from living plants; usually harvested in limited quantities by season, life-cycle stage

TABLE 4.1 *(continued)*

Use category	*Examples*	*Notes on management*
MATERIALS: Scents, etc. *(continued)*	cleaning, separating fish; withes as fish stringers); *Sphagnum* spp. (sphagnum moss: infant diapering)	
MEDICINES: Whole plants or leafy branches (Total: ± 100 plant preparations)[1]	*Achillea millefolium* (yarrow: leaves, roots for colds, poultices); *Blechnum spicant* (deer fern: fronds as poultice for cuts); *Maianthemum dilatatum* (wild lily-of-the-valley: leaves as burn medicine); *Plantago major* (broad-leaved plantain: leaves as poultice for cuts)	Variously herbaceous or woody perennials; most materials selectively harvested from living plants; usually harvested by season, life-cycle stage
MEDICINES: Bark tissues (Total: ± 50–60)	*Abies grandis* (grand fir: coughs, tuberculosis, many ailments); *Alnus rubra* (red alder: coughs, tuberculosis, skin wash, many ailments); *Arbutus menziesii* (arbutus: bark for colds); *Oplopanax horridus* (devil's club: diabetes, stomach problems, arthritis); *Pyrus fusca* (Pacific crabapple: stomach problems, other ailments); *Rhamnus purshiana* (cascara: laxative); *Tsuga heterophylla* (western hemlock: internal bleeding, other ailments)	Barks usually removed from whole twigs or as portions from trunk; twigs sometimes rooted; some transplanting; trees not girdled; harvested selectively from a number of individual plants; usually sunrise side of tree; cultural constraints against girdling or overharvesting
MEDICINES: Pitch, resin, latex (Total ± 20)	*Picea sitchensis* (Sitka spruce: pitch as salve); *Pinus contorta* (lodgepole pine: salve, colds); *Populus balsamifera* ssp. *trichocarpa* (cottonwood: bud resin as salve); *Pseudotsuga menziesii* (Douglas-fir: salve, colds)	Pitch removed from injured or insect-damaged trees, or from bark blisters or buds; sometimes permanent "medicine" trees maintained over many decades

Use category	*Exa*
MEDICINES: "Roots" (Total: ± 50)	*Run* ern (*poly* lily: *dioic* arthı (fals and (TOX
MEDICINES: Leaves and/or shoots (Total: ± 30)	*Lysic* (skur burns *dilata* valley cuts, l (sting shoot
MEDICINES: Flowers, fruits (Total: ± 15)	*Holod* (ocear diarrh *canad* indige *Symph* (waxb warts)
MEDICINES: Miscellaneous, or unspecified, including fungi (Total: ± 20)	*Fomito* (brack tissue u

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Columbia, including the No

Use category	*Examples*	*Notes on management*
MEDICINES: "Roots" (Total: ± 50)	*Rumex occidentalis* (western dock: cuts); *Nuphar polysepalum* (yellow pond-lily: heart medicine); *Urtica dioica* (stinging nettle: arthritis); *Veratrum viride* (false hellebore: arthritis and other ailments: TOXIC)	Virtually all are herbaceous perennials; roots selectively harvested by size, life-cycle stage; fragments left behind often capable of regeneration
MEDICINES: Leaves and/or shoots (Total: ± 30)	*Lysichiton americanum* (skunk-cabbage: leaves for burns); *Maianthemum dilatatum* (wild lily-of-the-valley; leaves as poultice for cuts, burns); *Urtica dioica* (stinging nettle: leafy shoots for arthritis)	Herbaceous or woody perennials; leaves/shoots harvested selectively from living plants, which can then regenerate from rhizomes
MEDICINES: Flowers, fruits (Total: ± 15)	*Holodiscus discolor* (oceanspray: fruits for diarrhea); *Shepherdia canadensis* (soapberries: indigestion, ulcers); *Symphoricarpos albus* (waxberry: eye medicine, warts)	Herbaceous or woody perennials; flowers/fruits harvested from living plants, by season, life-cycle stage
MEDICINES: Miscellaneous, or unspecified, including fungi (Total: ± 20)	*Fomitopsis officinalis* (bracket fungus: fungus tissue used as purgative)	Gathered sporadically or incidentally

Note that these numbers are only approximations, based on the summaries calculated for Nlaka'pmx (Thompson) herbal medicines. They are based not on species per se, but on the numbers of particular medicinal preparations used in treating a specific illness or condition (see Turner et al. 1990: 43-54). Although each cultural group has its own traditional medicines, the Nlaka'pmx medicines seem generally representative of the species, plant parts, and applications used in other areas of British Columbia, including the Northwest Coast.

TABLE 4.2. ECOLOGICAL EFFECTS OF INDIGENOUS HORTICULTURAL METHODS ON SPECIES POPULATIONS

Horticultural Method	*Ecological Effects*
Selective harvesting and replanting	Reduces intraspecies competition; promotes intentional dispersal of propagules
Digging and tilling	Incidental dispersal of propagules; creates local soil disturbance; recycles nutrients, aerates soil; increases moisture-holding ability; possible reduction of allelopaths
Tending and weeding	Reduces interspecies competition; promotes soil modification
Sowing and transplanting	Replenishes population; promotes dispersion of propagules to new habitats
Pruning and coppicing	Removes dead material reducing plant vigor; stimulates vegetative reproduction and eventually flowering and fruiting
Landscape burning	Reduces competition; accelerates recycling of mineral nutrients; blackened ground encourages spring growth; promotes selection for annual or ephemeral habit, synchronization of fruiting; maintains successional stages; creates openings

(from Peacock 1998 and based on Anderson 1993a; Ford 1985; Harris 1989)

enced the selection process (e.g., Peacock and Turner 2000). However, in general, the most important criteria were the yearly growth cycle, reproductive status (e.g., flowering versus nonflowering), and maturity and size.

The yearly growth cycles of culturally important species were well known and carefully monitored, since the desired qualities of a particular resource varied throughout its development, either seasonally (spring versus summer) or yearly as the plant matured. On a seasonal basis, variations in growth cycles

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4.2. Cow-parsnip at harvesting stage (Photo by R. D. Turner)

meant certain resources could only be harvested during a short period of time at any given location even though the plant itself might be present throughout the year. The green shoots of cow-parsnip (*Heracleum lanatum*), for example, are harvested in early spring, before the plant flowers (Figure 4.2). After that, the stalks become unpalatable and undesirable (Kuhnlein and Turner 1987). On a yearly basis, variations in growth often meant a particular plant was left to mature for several years prior to harvesting.

The reproductive status of an individual plant, which is linked to growth cycles, was also an important criterion for selection. For example, a number of important root vegetables, such as camas (*Camassia leichtlinii* and *C. qua-*

mash), were frequently harvested only after the plant had started to die back and to go to seed (Arvid Charlie, personal communication to NT 1999; Elsie Claxton, personal communication to NT 1996; Christopher Paul, personal communication to M. Babcock 1967). Edible seaweed (*Porphyra abbottiae*) was harvested at its young, prereproductive life stage; the reproductive plants are considered too old, tough and "rotten" (Turner and Clifton 2002; Turner 2003a). Many medicinal roots were collected after flowering, at which point the roots were considered more potent. Similarly, the leaves of vegetative, non-fruiting cattail (*Typha latifolia*) and basket sedge (*Carex obnupta*) plants were selected for harvest over the fruiting ones. The reasons given are that the vegetative leaves are longer and of better texture (R. Y. Smith 1997; Turner and Efrat 1982), but the result is that the fruiting portions are left to produce seed and propagate. There were also cultural prohibitions against harvesting certain plants at certain reproductive stages.

Plants were also selectively harvested based on size preferences. Some would leave the largest plants to go to seed. For example, in the harvesting of root vegetables, only those of a certain size are taken; smaller individuals, be they bulbs, tubers or rhizomes, are left in place or sometimes replanted, to continue to grow for the next season. For example, Babcock (1967) reports about size selection of camas bulbs as discussed with Christopher Paul of Tsartlip:

> When gathering, the Indians would not collect the immature bulbs; Christopher Paul's mother's mother told him that these small, soft bulbs were "not worth cooking," and Mr. Paul has overheard his own parents discussing the matter. Mr. Paul thinks that these bulbs may have been gathered in another year, when they were mature, by the same family . . . The mature bulbs sometimes get as big as about 2½ inches [>6 cm] in diameter. After the bulbs become too old, however, they aren't any good to eat, either, Mr. Paul's maternal grandmother said. [p. 5]

Leaving the youngest and the very oldest bulbs in the ground would be an advantageous strategy for sustainable harvesting, because the younger bulbs would continue to grow for later harvest, and the oldest bulbs would be among the heaviest seed producers (Suttles, this volume). From our observations, there is a general correlation between the size of bulbs and the number of flowers and capsules it produces (see also Beckwith 2004). For root vegetables such as springbank clover (*Trifolium wormskjoldii*) rhizomes and northern rice-root (*Fritillaria camschatcensis*), leaving fragments behind to propagate and grow into new plants was a common practice (Deur, this volume).

Habitat preference was another criterion used in selective harvesting. Often, plants growing in a specific location were preferred to their counterparts in other regions. Certain places were known for their high-quality products: a stand of western yew trees (*Taxus brevifolia*) along the Cheewaht River was used intensively by Ditidaht implement makers (Turner, Thomas et al. 1983); an island in Clayoquot Sound was called "spruce roots island" after the

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EXTRACTIVE TECHNOLO

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spruce roots (*Picea sitchensis*) for basketry gathered there (Bouchard and Kennedy 1990). The western red-cedar (*Thuja plicata*) trees at Kanim Lake and a place called "wahiitlmitis" in Clayoquot Sound, and at another location along Tsusiat Lake in Ditidaht territory, were specifically sought by canoe makers because of the high quality of their wood; trees growing away from the ocean were preferred to those along the shore, whose wood would crack due to its exposure to salt (Bouchard and Kennedy 1990; R. Y. Smith 1997; Turner et al. 1983;). Similarly, basket-weavers have noted that red-cedar inner bark was preferred and considered of a finer grade when taken from inland trees than from those closer to saltwater (Compton 1993a; R. Y. Smith 1997). Medicinal plants, such as licorice fern (*Polypodium glycyrrhiza*, an epiphyte), were also preferentially harvested from particular places or from particular substrate species, such as Pacific crabapple (*Pyrus fusca*) or western hemlock (*Tsuga heterophylla*) trees (Compton 1993a; Turner and Efrat 1982). Some medicinal plants were said to be more potent if harvested from remote locations and upland sites. Berries, too, were selectively harvested from favorite places. In Clayoquot Sound, for example, a place called "*tl'uulhapi*" (Tonquin Beach) was a preferred place for Nuu-chah-nulth people to pick salal berries (*Gaultheria shallon*) because the berries are large and sweet here, according to Mary Hayes (Bouchard and Kennedy 1990: 513; R. Y. Smith 1997).

EXTRACTIVE TECHNOLOGIES

The specific tools and techniques used to harvest plant resources varied according to the species and the intended use of the plant. However, the net result of harvesting was to create an anthropogenic disturbance within a selected plant community. This was accomplished through digging, tilling, weeding, pruning, coppicing, and in some instances the selective burning of individual plants.

Digging or Tilling. Digging was the most common harvesting technique for roots and was used to collect a wide variety of edible and medicinal underground parts, as well as tree roots for basket materials. The digging stick (Figure 4.3), made of a hard wood such as western yew, Pacific crabapple, or ocean-spray, was the implement of choice for prying up root vegetables such as camas bulbs, silverweed roots, clover rhizomes, and rice-root (Compton 1993a; Turner 1997a, 1998; Turner et al. 1983). Specialized tools, such as the yew wood *k'ellákw*, used by the Kwakwa̱ka'wakw for root digging on estuarine tidal flats, allowed easy penetration of the soil and efficient extraction of the root product, with minimal damage to "root" segments (Deur, this volume; Adam Dick, personal communication to NT and DD, 1998). Generally, clumps of roots—together with any turf—were dug around, then overturned, the appropriate sized edible portions removed, and the other parts returned and covered up again (Turner et al. 1983). Digging activities tilled the ground, breaking the turf or sod, loosening and aerating the soil.

4.3. Yew wood digging stick (Haida; carved by Giitsxaa) (Photo by N. J. Turner)

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Replanting. Harvesting activities often had impacts on the redistribution of plant propagules. Propagules could be separated from the harvested portion and replanted, or seeds from mature plants could be knocked unintentionally or sprinkled intentionally into the loose soil. For example, as noted previously, many root-vegetables were harvested after flowering, when their seeds would be ripe. The digging and associated harvesting practices would be expected to assist in the dissemination of seeds. The question is whether this dissemination was incidental or intentional (see Suttles, this volume).

There is also evidence of intentional planting for other species. Chief Adam Dick and Daisy Sewid-Smith discussed the practice of removing the small propagule at the base of each rice-root[2] (*xukwem*) bulb and replanting it at the time the bulbs were harvested. Adam Dick recalled doing this when he was a young boy of about nine or ten years:

> You know, it's on the bottom, called the *gagemp* [literally "grandfather," the underportion of the main bulb] . . . we peeled it off and, throw it back there [to be replanted—Daisy Sewid-Smith].

Fragments and smaller individuals of silverweed (*Potentilla anserina* ssp. *pacifica*) roots, clover rhizomes, and "wild carrot" (*Conioselinum pacificum*) roots were also replanted at the time of digging, according to several sources (Adam Dick, Alice Paul, Daisy Sewid-Smith, Margaret Siwallace, Felicity Walkus, personal communications to NT, 1984, 1996; Bouchard and Kennedy 1990; Compton 1993a,b; Deur 2000, this volume; Edwards 1979; Turner and Efrat 1982). It is notable that similar practices were followed in the digging and replanting of propagules of interior root vegetables like chocolate lily (*Fritillaria lanceolata*) and, especially, yellow glacier lily (*Erythronium grandiflorum*), according to elders like Secwepemc plant specialist Mary Thomas (Loewen 1998; Peacock and Turner 2000; Turner et al. 2000).

Weeding, Clearing, and Fertilizing. Harvest locales were often weeded during harvesting to remove competing or unwanted species. Weeding was reportedly undertaken on occasion by camas-bulb diggers of Vancouver Island (Arvid Charlie, personal communication to NT, 1999; Babcock 1967; Suttles 1951a; Turner and Bell 1971), as it was by harvesters of yellow glacier lily and other root vegetables of the Interior Plateau of British Columbia (Peacock and Turner 2000; Turner et al. 2000). Weeds were also cut from around Pacific crabapple trees owned by Haisla people (see Compton 1993a; M^cDonald, this volume). Sometimes beds for root vegetables were cleared of loose rocks and other debris to make digging easier. In the Kwakwaka'wakw silverweed and clover plots of the tidal flats, weeding was commonplace (Deur, this volume).

In addition, plant populations were occasionally fertilized to enhance productivity. For example, seaweed was placed on camas patches and potato gardens as fertilizer to enhance production by some people, at least recently (M^cDonald, this volume; Moss, this volume; Suttles, unpublished notes with

Mary George and Agnes George 1952; Turner 1973; Turner and Efrat 1982). The traditional fertilizing of tobacco plots on the Northwest Coast with rotting wood has been well documented (Turner and Taylor 1972). Leslie M. Johnson (personal communication to NT and DD, 1999) encountered oral accounts of fertilizing nettles (*Urtica dioica*) with waste products from eulachon processing. A significant account of traditional tending of "berry gardens" was provided by Heiltsuk cultural specialists Cyril Carpenter and Pauline Waterfall (personal communication to NT, 2002). They were each told by their grandmothers, Bessie Brown and Beatrice Brown (who were sisters-in-law), about traditional berry gardens, in which people selected sites that were especially productive for (native) blueberries, huckleberries, and other berry species, and carefully maintained and enhanced these patches. One example of such a berry garden was pointed out to Cyril Carpenter when he was about ten years old, by Bessie Brown. It was a wide, bushy ledge beside a waterfall, at Rosco Inlet in Heiltsuk territory. This was above the peoples' houses. Bessie Brown described how the berry gardens were located beside waterfalls, above the communities, because there was a continuous mist there for a good part of the year. This kept the berry bushes moist, even in the summertime. The gardens were also generally situated in locations where they were protected against the prevailing extreme wind conditions. On these ledges, too, they were exposed to the sunlight at certain hours of the day, and this was important for the ripening berries. Long ago, Bessie Brown said, the hunters and fishers took all the remains from cleaning and dressing their salmon, as well as deer, mink, otter, wolf, and mountain goat. They dug large holes in the ground around the berry bushes and buried these remains, covering them over with soil. When herring eggs were harvested, the waste trimmings were washed and dug into these garden plots. This is what made the berries grow so well. Cyril Carpenter recalled that the berries from these bushes were healthier, bigger, more productive, and tastier than untended berries; you could harvest them from the branches in handfuls. These were salal (Figure 4.4), blueberries, and huckleberries. People also scattered ashes from the fireplaces of the long houses around the berry bushes, as well as adding clamshells. In addition, people used to transplant whole berry plants to these productive sites, and when they did they used crushed clamshells in the holes.

The Heiltsuk used similar practices in their home gardens as well, following introduction of potatoes and other domesticated plants. Cyril Carpenter remembered seeing his neighbor's father packing sacks and sacks of salmon bones and guts, digging holes, and burying them beside his plum trees and other fruit trees, a practice that was believed to be traditional. They also used to pack seaweed up to the garden. This fertilizing was done in the fall, just before winter set in, when they were processing the fall runs of salmon. As a young boy, Cyril recalled hammering many sacks of clamshells into small pieces, to spread on the garden. More recently, Cyril fertilized a domesticated cherry tree beside their house; he buried the remains of red snapper, ling cod, and salmon, as well as ash from the fire beside this tree, and it had grown rap-

4.4. Salal berries (Photo by R.

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1.4. Salal berries (Photo by R. D. Turner)

idly, in contrast to another cherry tree nearby that was just left alone and is still much smaller and less productive. Pauline's family spill the salmon blood and other liquids at the base of various plants in their parents' garden. Those plants which receive this seasonally grow tall and strong with rich green foliage.

Other documentation of soil enrichment or fertilizing has been elusive, except in the context of burning, where the ash from the firing of camas beds was said to provide nutrients to the soil and allow the bulbs to grow better the next year. This was also suggested for interior peoples' burning of root-digging and berry grounds (Turner 1999).

It is notable that weeding and clearing of land is often correlated with pro-

prietorship over a harvesting locality. This was commonplace, for example, in the case of camas harvest areas (Suttles, this volume). Straits Salish camas management practices were described to Marguerite Babcock (1967: 5) by Christopher Paul:

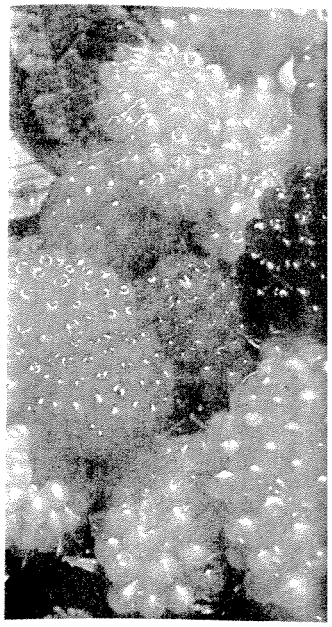
> The way that the family group . . . would establish claim to a plot of land [for camas harvesting] would be by clearing it. Once a family cleared a plot, it would "just naturally" become their plot to use, explained Christopher Paul. This clearing was done in the fall or spring before the gathering season, Mr. Paul thinks; in those seasons the soil was soft from the heavy rains, but not muddy (or frozen) as in the winter . . . The plot from which the bulbs were to be gathered would be cleared of stones, weeds, and brush, but not of trees. The stones would be piled up in a portion of the plot where there were no camas plants growing, and the brush would be piled to one side, left to rot or to be burned . . . ; this brush was actually uprooted, not just cut down. . . . The purpose of the clearing, said Mr. Paul, was to make the camas easy to clear [sic: dig?] when the camas was gathered intensively. The piles of stones on the plots are the remains or "markers" of the plots . . . however Mr. Paul doesn't know how or if the Indians set about marking off their plots other than clearing them. . . . He thinks that these plots may have been cleared every year before their use, in order to facilitate the gathering of the camas bulbs. . . .

Pruning or Coppicing. Pruning or coppicing (cutting shrubs down to their base to promote new growth) was another form of harvesting practiced on the shoots and stems of herbaceous and woody perennials used as food and for materials.

Green shoots of fireweed (*Epilobium angustifolium*), salmonberry (*Rubus spectabilis*), thimbleberry (*Rubus parviflorus*), cow-parsnip, and horsetail (*Equisetum telmateia*), all harvested for food in the early spring, were broken off from their rootstocks, and this stimulated the production of more shoots, as several elders have pointed out (Kuhnlein and Turner 1987; R. Y. Smith 1997; Turner 1995; Turner et al. 1983). Sometimes two or more "crops" could be taken from one patch during a single year, and then the plants were allowed to mature for a subsequent harvest, in a manner similar to the harvesting and cultivation of asparagus.

A range of berries were also "pruned" to enhance productivity. Daisy Sewid-Smith and Chief Adam Dick recalled that red huckleberries (*Vaccinium parvifolium*), salmonberries (Figure 4.5), and stink currants (*Ribes bracteosum*) were routinely "pruned" after the annual harvest by breaking the branches off.

> As soon as they clean that tree out [i.e., pick all the berries], we *tl'exw7id* [break off], we breaks them so . . . [the berries would grow plentifully later]. See, a lot of people think we never touched the wild . . . berries. But we did. We cultivated it. We pruned it . . . Especially that *gwadems* [red huckleberries], when they finished picking the *gwadems*, you know, they pruned them.



4.5. Salmonberries, different c

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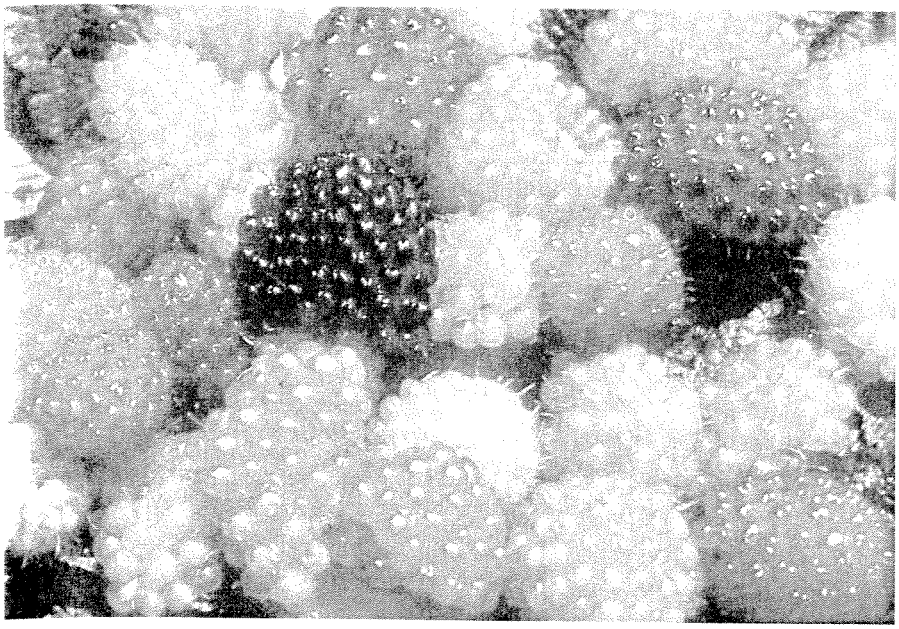
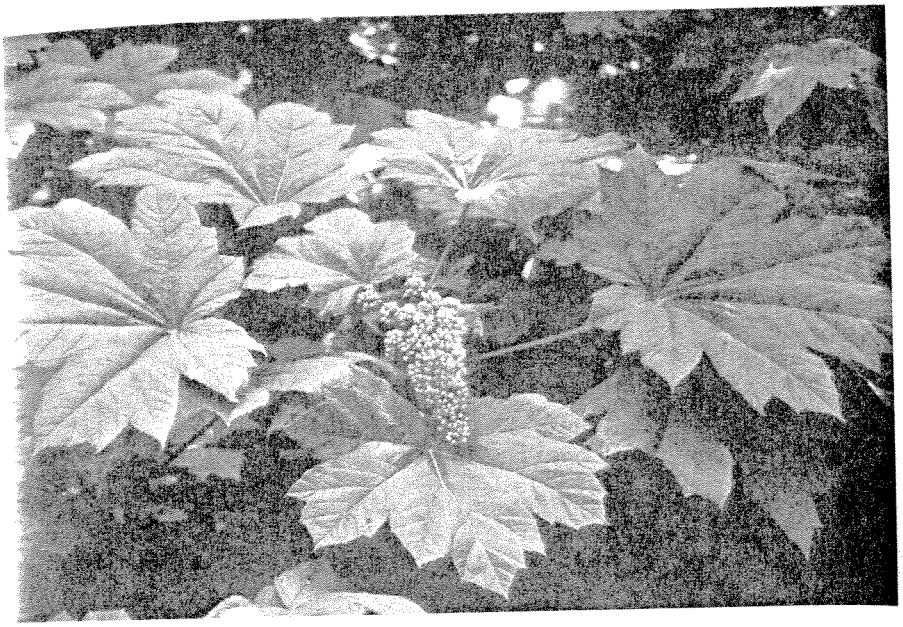


4.5. Salmonberries, different color forms (Photo by R. D. Turner)

> They break the tops off. Salmonberries too. So, when the *qw'alhem* [salmonberries], it's done, after you pick it, *tl'exwiiy* ["breaking the tops off"] they called that. My grandma tell me that if you let it grow this high [two meters or so], then it doesn't produce much berries. You know. But when you keep it down and, she says, the water, it's hard going up there, I guess, when it's too tall [Chief Adam Dick, personal communication to NT].

This pruning practice for red huckleberries was quite widely applied (Arvid Charlie, personal communication to NT, 1999; Percy and Dolores Louie, personal communication to NT 1998; R. Y. Smith 1997). Sometimes berries, such as soapberries (*Shepherdia canadensis*), were harvested by breaking off branches from the bush and shaking or picking off the berries (Elsie Claxton, personal communication to NT 1997; Compton 1993a). This was a form of pruning, which some people maintained made the berries more productive in the following years (Peacock and Turner 2000). Salal berries, too, were picked by their whole stems, a pruning process that some felt helped the plants to produce multiple stems of berries the following year (Gloria Frank, personal communication to NT, 1996; R. Y. Smith 1997). Crabapple trees were also pruned, according to Haisla elder Bea Wilson, who noted, "Old people would cut the branches from the top—this would ensure that there were lots next year—just cut the ones that had lots of fruits, not all of them" (Davis et al. 1995: 29). Pruning crabapple trees was also practiced in the territory of the neighboring Gitga'at (Coast Tsimshian) First Nation (Helen Clifton, personal communication to NT, 2002; McDonald, this volume).



4.6. Devil's club (Photo by R. D. Turner)

Devil's club (*Oplopanax horridum*) (Figure 4.6) and some of the other medicinal plants whose branches were harvested from the main plant could be considered to have been pruned as well (Captain Gold, personal communication to NT 1997; Marilyn Walker, personal communication to NT 1997, from her work with Tlingit people in Alaska). Not only might this stimulate growth in the plants, but one suggestion is that it may also stimulate the production of pharmacological compounds. Lantz (2001) has investigated the ecological characteristics of devil's club and demonstrated how traditional selective harvesting and other practices like replanting sections of the stem by harvesters can maintain the populations of this highly valued shrub.

Plants like basket sedge, bear-grass (*Xerophyllum tenax*), cattail, tule (*Schoenoplectus acutus*) and stinging nettle (*Urtica dioica*), sought for their leaves or stems as weaving and cordage materials, were cut in the late summer when the plants were at full maturity. Since these plants are perennials and their root systems were not impacted in harvesting, they would continue to grow the following year, and some people say they are even more prolific with cutting or pruning:

> Before I heard they didn't allow it [picking basket sedge in Pacific Rim Park Reserve], but I told him [the warden] that it's always better to get it cut, and prune it, it'll come out nice because the way it was, the grass it was brown from years back, dry [because people hadn't been gathering it] . . . it's like pruning it [Lena Jumbo, personal communication to Juliet Craig and Robin Smith, 1996; R. Y. Smith 1997: 149].

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Of course, trees needed fo

> It used to be known that if you pick them, a better crop would always be coming out. Just like my Aunty Lena was talking about the grass [basket sedge]. You have to pick them in order to have a better crop the following year . . . [Arlene Paul Jumbo, personal communication to Juliet Craig and Robin Smith, 1996; R. Y. Smith 1997: 149].

The bark, wood, and roots of a wide range of trees were also important to Northwest Coast peoples and in a sense these materials were "pruned" from the living trees in a manner that would ensure the survival of the tree. For example, in harvesting cedar bark, it was customary to remove bark from only one-third or so of the circumference of the tree. In this way, the tree would continue to grow. Boas (1921: 616–17) defines this practice clearly for the Kwakwaka'wakw:

> Even when the young cedar-tree is quite smooth, 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 cedar would die, and then another cedar-tree near by would curse the bark-peeler so that he would also die. Therefore, the bark-peelers never take all of the bark off a young tree [see also Schlick 1994].

The thousands of "culturally modified trees" still standing in the Pacific coastal temperate rainforests with peeled bark or removed planks from past decades are a testimony to the success of this partial harvesting as a strategy for "keeping it living" (see British Columbia Ministry of Forests 1997; Garrick 1998) (Figure 4.7). Bark of bitter cherry (*Prunus emarginata*), which was used for wrapping implements, was stripped away from the inner bark, leaving the growing cambium layer intact and protected. Spruce roots and cedar roots for baskets were dug selectively as well, since it was recognized that taking too many roots from an individual tree would be harmful to it (Nelson 1983; Turner 1996a).

Bark removed totally, either to access inner bark and cambium for food or for use as medicine (e.g., cascara, *Rhamnus purshiana*), was generally taken in small patches or strips, so that the tree was not girdled and would be able to heal after awhile. One Nuxalk elder, Edward Tallio, is quoted by Edwards (1980: 10), discussing cascara bark harvesting: "If you just peel the tree as it stands the whole tree dies. The roots must die too I guess. Nothing comes up. Therefore we have to chop the tree down in order to have young ones come out again, or they just peel one side . . . ." Many trees were used for their bark medicine and, almost always, the bark was cut in a narrow vertical strip from the sunrise or river side of the tree (see Turner and Hebda, 1990). This was to allow the tree to continue to grow, and the sunrise side was said to heal over most quickly (Tom Sampson, personal communication to NT, 1987; Daisy Sewid-Smith, personal communication to NT, 1994).

Of course, trees needed for the wood of their trunks, or those whose bark

4.7. Haida weaver Florence Davidson peeling red-cedar bark (1971)

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could not be removed in part, were cut or girdled, but this was evidently done selectively, and, by at least one account, people sometimes purposefully used windfalls and dead or dying trees to avoid killing living ones.

There are many other examples of particular parts, individuals, or populations of plants being pruned off, or selected in some other way, leaving the main portion of the perennial plant intact to continue to grow and reproduce. These practices are documented in many sources (Boas 1921; Compton 1993a,b; Scientific Panel for Sustainable Forest Practices in Clayoquot Sound 1995; R. Y. Smith 1997; Stewart 1984; Turner 1997b; Turner and Efrat 1982; Turner et al. 2000). Also, there is some ethnographic evidence of the pruning back of certain shrubs or trees to eliminate competition with culturally preferred species (McDonald, this volume). Deur (personal communication to NT, 2000) notes that there is evidence of similar pruning practices around the perimeter of small estuarine root grounds, where adjacent trees and shrubs would have shaded or overgrown patches of edible roots.

Transplanting. Transplanting, the removing of a growing plant, seedling, cutting, or other propagule from one place and replanting it in another, was also practiced on occasion, at least within the memories of contemporary elders. Adam Dick noted that highbush cranberry (*Viburnum edule*) could be transplanted and that patches that he had transplanted as a young man multiplied so that they became a prime picking area for his family in the years that followed. As recounted previously, Heiltsuk people also transplanted berry bushes (Cyril Carpenter, Pauline Waterfall, personal communication to NT, 2002). One Gitga'at woman suggested "borrowing a root" from a rare, yellow-berried variety of a red elderberry (*Sambucus racemosa*) bush growing away from their territory, in order to start one growing in Hartley Bay (Mildred Wilson, personal communication to NT, 2002).

Compton (1993a: 394) noted that springbank clover and Pacific hemlock-parsley, or "wild carrot," were reportedly "obtained from the Nuxalkmc who were said to have brought this plant to Hanaksiala territory. In return, the Nuxalkmc from Kimsquit and Bella Coola, as well as some Coast Tsimshian people from Metlakatla, were known to have returned home with stinging nettle plants from Hanaksiala territory following trading visits." Accounts of the transplanting of estuarine roots have been documented in several other contexts (Deur, this volume; Edwards 1979).

Hesquiaht elder Alice Paul (Turner and Efrat 1982) reported that camas from the Victoria area was once planted in the meadow behind Hesquiat Village. There are records of wapato (*Sagittaria latifolia*) being transplanted from one wetland area to another (see Darby, this volume). It does not grow naturally on Vancouver Island, for example, but was known to have been planted in small lakes on some of the Gulf Islands, and possibly also on Vancouver Island, by Cowichan peoples obtaining the tubers from their mainland relatives in the Fraser Valley (Arvid Charlie, personal communication to NT 1996, 1999).

Material plants, too, are sometimes transplanted. Alice Paul said that cat-

tails had been introduced to Village Lake behind Hesquiat in order to have a ready supply of mat-making material. Ditidaht elder and basket-maker Ida Jones made several attempts to transplant American bulrush, or "three-square" (*Schoenoplectus olneyi*; syn. *Scirpus americanus*) to wet places along the San Juan River to give her a ready source of this important foundation material for her wrap-twined trinket baskets, a practice that was apparently rooted in traditional Ditidaht practices (Turner et al. 1983). Gitga'at elder Tina Robinson (personal communication to NT, 2002) also noted that the Kitamaat (Haisla) were known to plant stinging nettle in their yards, for use in making string and medicine.

LANDSCAPE BURNING AND CLEARING

On a larger scale, people managed to create a particular habitat type or successional stage, rather than to increase the production of individual species per se. The use of controlled burning to promote the growth and productivity of culturally important plant communities has been increasingly recognized for the Northwest Coast region, as for western North America in general (Blackburn and Anderson 1993; Boyd 1986, 1999; Deur 1999, 2000; Deur and Turner 1999; French n.d.; Gottesfeld 1994a; Norton 1979a,b; Suttles 1951a,b; Turner 1999) and was perhaps the most common form of community-level resource management.

The camas prairies of western Washington, the Willamette Valley and southern Vancouver Island and Whidbey Island have been particularly noted for their anthropogenic influences (e.g., Boyd 1999; Norton 1979b; Suttles, this volume). One article on colonization of Vancouver Island reported in the mid-1800s, pertaining to the area around western Victoria, in Esquimalt:

> Miles of the ground were burnt and smoky, and miles were still burning. The Indians burn the country in order to [promote] . . . more especially, the roots which they eat. The fire runs along at a great pace, and it is the custom here if you are caught to gallop right through it; the grass being short, the flame is very little; and you are through in a second. . . . [Anonymous 1849: 18–19]

"The roots which they eat" would certainly have included camas bulbs, among others. The fires were evidently within, and contributed to, the perpetuation of a Garry oak (*Quercus garryana*) parkland type landscape, and were low and cool enough to remove understory species without killing tall, mature trees. If repeated in several-year intervals, such fires would have served to maintain the parkland communities so conducive to camas growth. The camas itself, and the other edible-"rooted" perennials, would not have been harmed by the fire since they would have been in their summertime dormant phase. Brenda Beckwith (2002, 2004) speculates that landscape burning was a necessary final procedure in a well-timed and instrumented camas harvest

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GARDENING STRATEGI

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season (see also McDougall et al. in press). The burning of the camas meadows on southern Vancouver Island could have provided valuable nutrients to both the bulbs and camas seeds, but the primary purpose of the use of fire was most likely for the continued maintenance of an open habitat free of encroaching woody plants (e.g., Douglas-fir, *Pseudotsuga menziesii*, and waxberry, *Symphoricarpos albus*). Hence, regular fire indirectly promoted the growth and productivity of camas by eliminating invasive and competitive species.

An early settler in Sooke, W. C. Grant, in a report to Governor James Douglas, complained of the practice of burning around his house by aboriginal people. He evidently understood the purposes of the burning, but did not attach significance or importance to it. He reported the fires were

> kindled promiscuously by the natives both in the wood and the prairie between the months of August and October. Their object is to clear away the thick fern and underwood in order that the roots and fruit on which they in a great measure subsist may grow more freely and be the more easily dug up. [Grant ca. 1848]

Less well known are the traditional burning practices of the Coast Tsimshian, Haida, Haisla, Nuxalk, Kwakwaka'wakw, Nuu-chah-nulth, and other peoples of the Coastal Western Hemlock Zone, where precipitation levels generally preclude natural fires. Although evidence is still limited, use of fire by these peoples is known (Turner 1999, 2004). It is generally restricted to production of small clearings, sometimes on islands, that enhance the growth of berries such as salal, huckleberry, blueberry, and strawberry, though camas sometimes appears to have been present in the anthropogenic clearings of the outer south coast (Deur 1999). Within this zone, for example, Kwakwaka'wakw apparently burned berry bushes, as reflected in the "prayer" to Berries, spoken by a woman before she picks the berries (translated by Boas into English; species not given; even in original Kwak'wala language version a general term for fruit is used):

> I have come, Supernatural Ones, you, Long-Life-Makers, that I may take you, for that is the reason why you have come, brought by your creator, that you may come and satisfy me; you Supernatural Ones; *and this, that you do not blame me for what I do to you when I set fire to you the way it is done by my root (ancestor) who set fire to you in his manner when you get old on the ground that you may bear much fruit* . . . [emphasis added; Boas 1930: 203]

GARDENING STRATEGIES

As noted throughout the above descriptions of plant management, several important root foods—particularly springbank clover, silverweed, rice-root,

and lupine—were intensively cultivated in "gardens" located in tidal marshes (Deur, this volume). Individual chiefs and families commonly owned silverweed and clover beds up and down the coast. Many intensively managed root-digging sites have been identified in this region (Arima et al. 1991; Boas 1934; Bouchard and Kennedy 1990; Compton 1993a,b; Sapir 1913–14; Turner and Efrat 1982; Turner et al. 1983). The patches of silverweed, clover and other root vegetables were certainly regarded as gardens. Plots were often marked out with posts, wooden pegs, or poles laid on the ground, or had boundaries determined by natural features such as large rocks on the tidal flats. Families traditionally attempted to expand their plots, incorporating more marsh area into them every year. In some places, this was accomplished through extensive modifications of the estuarine marsh. These gardens were carefully tended and looked after, with the plants being selectively harvested, replanted, weeded, and occasionally transplanted, as discussed above. The constant influx of nutrients from regular tidal inundation and alluvial deposits would preclude the necessity for using extra fertilizers to maintain productivity (Deur 2000, this volume).

TOBACCO CULTIVATION

As suggested in the Introduction of this volume, evidence suggests the Northwest Coast tobacco of the Haida, Tlingit, and probably the Tsimshian, was grown in garden settings and was propagated from "seed" each year (probably seed capsules, containing seed, judging from the explorers' descriptions of the size of the seed). The way the original seed was obtained, from supernatural circumstances, is described in several different Haida narratives (Turner and Taylor 1972). Not surprisingly, the tobacco gardens of the Haida were also weeded and fertilized in the fall by mixing rotten wood into the soil after the tobacco had been harvested (Turner and Taylor 1972).

The Social Context for Plant Management

Although not represented in Table 4.2 as management "techniques," peoples of the Northwest Coast also employed a number of resource management strategies on a larger scale, such as within a traditional territory, which, in turn, influenced species and community productivity and diversity. These included a planned and patterned seasonal round, the rotation of harvesting locales, controlling access to resource patches, and religious ceremonies and moral sanctions, which altered the time or intensity of plant harvests (e.g., Turner 1997a; Turner and Atleo 1998; Turner et al. 2000; Turner et al. Chapter 5, this volume). These principles provided the social context for plant management.

SCHEDULING

Decisions concerning where, when, and what to harvest were dictated by cultural preferences and necessity, but limited by the spatial and temporal avail-

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ability of plant resources. On one hand, the timing and frequency of collecting were determined by the life cycles of the plants themselves. These life cycles varied between species and according to the specific environment (e.g., aspect, precipitation, elevation) of a harvesting locale. Such natural scheduling constraints had to be balanced with cultural preferences for species at certain growth stages, as well as with scheduling conflicts that might arise when several species were available simultaneously for harvesting in different locales. Each group, and often each family, had its own routine patterns of travel and resource harvest within its traditional territory. Of course, the timing varied with latitude and specific climate and other patterns of productivity.

Starting in early spring, with the flowering of the salmonberry and elderberry bushes indicating the beginning of the growing season, people traveled to particular sites to harvest seaweed, collect herring spawn, gather seabird eggs, and harvest green shoots and early spring crops of wild root vegetables, as well as to hunt (for land and marine mammals and gamebirds) and fish (e.g., for eulachon, halibut, spring salmon). What followed was an ongoing procession of harvesting activities, with berries ripening in succession: salmonberries, strawberries, elderberries, huckleberries, blueberries, thimbleberries, salalberries, currants, and, later in summer and into fall, the mountain huckleberries and blueberries, crabapples, highbush cranberries, bog cranberries, and evergreen huckleberries, depending on the locality. Edible inner bark of hemlock and some other trees was harvested around June. Various root vegetables were harvested in summer or fall, usually at the time they were going to seed and their leaves were dying back. Red-cedar and yellow-cedar bark, and roots of red-cedar and Sitka spruce were usually harvested in early summer, whereas other basket materials like cattail, basket sedges, and tule were harvested in late summer or early fall. Nettle stems, for use in fishnets and lines, mat-making, and cordage were cut around the time the first snow hit the mountains. All during this period, animals were hunted and fish caught and processed. People generally harvested shellfish. such as clams, mussels, abalone, and rock chitons, from fall through to spring, but not usually in summer.

Exact determination of the time to harvest specific resources might be left to the control and judgement of a "chief" or clan/household leader, with samples and advice from family members and the use of seasonal indicators such as the blooming of certain plants, or the presence of a specific migratory bird (Lantz and Turner 2003). People usually went to particular camps that were the centers for many subsistence activities, from plant gathering to salmon or halibut fishing, rendering eulachon grease, hunting seals, or, for the Nuu-chah-nulth, whale hunting. An example is the Gitga'at seaweed camp on Prince Royal Island south of Hartley Bay, where Gitga'at families have gone for countless generations for three or four weeks or more around May to harvest and process their seaweed, halibut, spring salmon, rockfish, chitons, seal, seabird eggs, and other spring foods.

Scheduling of harvesting and peoples' presence in particular areas was itself a management strategy, one that would tend to limit overharvesting because

of time constraints and diversification of resource use. The necessity of moving on to other harvesting locales as salmon or other resources became available would itself confine the extent of harvesting a particular resource in any one location.

CONCEPTS OF OWNERSHIP OF PLANT RESOURCES

Considerable variation is found in concepts of ownership of land and resources along the coast, but virtually everywhere there were areas of recognized proprietary and territorial jurisdiction, as discussed by Suttles in this volume. Whether recognized at the community level or at the level of clan, family, or individual, the right to harvest and to control the harvest of other people at highly valued places and for high-value resources were widely established. Such proprietorship resulted in intensive monitoring, harvesting, and managing of sites and resources, and, we would argue, ultimately led to sustainable resource use.

Among the Kwakwaka'wakw, for example, the clans, or lineages from a single ancestor would own and have jurisdiction over an entire territory. This jurisdiction was held by a clan even if it moved to another village. Then, within the clan, individual families would have their own root-digging plots or crabapple trees. When asked if outside people would have to ask permission to use a clan's traditional territory, Daisy Sewid-Smith and Chief Adam Dick said that people very seldom crossed the boundaries, since the clan's territory was widely recognized and respected. Adam Dick added, "They don't do that, come across, 'cause they know they're owned. They will respect each other." Daisy Sewid-Smith pointed out that if people needed particular resources from another clan's territory, they would trade for them in exchange some product they had readily available to them.

Plant resources for which ownership was often claimed included root digging grounds, seaweed gathering sites, productive berry patches, and crabapple trees. Pacific crabapple trees in Haisla and Hanaksiala territory, for example, belonged to a number of different families from several different tribes (Compton 1993a; McIlwraith 1948, 1: 133), and the harvest from individual trees or "crabapple gardens" was controlled by families or chiefs. Olson (1940: 182) reported that "It is customary . . . at crabapple time for the ranking chief to test the berries and to give the word when they are ripe enough. No one may gather them before this." He also stated that controlled berry grounds never were "owned" by women. This was not the case on Haida Gwaii, however, where high-ranked women at Skidegate were said to own highbush cranberry patches behind the village (Emma Wilson, personal communication to NT, 1970). Highbush cranberry patches were also owned by Hanaksiala and Tsimshian chiefs (Compton 1993a). Gitga'at Eagle chief Ernie Hill Jr. described how his grandfather, Ambrose Robinson, who was in the Blackfish Clan, gained the rights to a highbush cranberry patch across from Hartley Bay. The rights were bequeathed to him by an elderly man of the Eagle clan in recognition of

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an act of kindness. Then, after his grandfather's death, the rights to this patch reverted to Ernie Hill Jr. as current Chief of the Eagle clan (Ernie Hill Jr., personal communication to NT, 2002).

Adam Dick and Daisy Sewid-Smith elaborated further on ownership of resources:

> Everybody had their own berry patches, just like everybody had their own clam beds. Things like [salal patches], Yeah, salmonberries and all that, all kinds of berries, wild crabapple, you just don't go [out and pick] . . . There's a certain places that a certain family goes, especially that wild crabapples. Our family used to go over here. And the other families go over here. They got markers too, for *celxw* [crabapples]. Oh, yes, they have pegs, you put pegs all around the tree. Especially the . . . wild crabapples. You just pick up those little sticks and you just peg, put it around the [tree]. Any kind of sticks. If you can get cedar, that would be good. Anything that's pegged, you know it's someone's [Chief Adam Dick, personal communication to NT, 1997].

Not all berry patches were under exclusive control, however. When asked about Kwakwaka'wakw ownership of the bog cranberry beds at Kingcome, Adam Dick said that they were so extensive, anyone could go there to pick.

As noted in Suttles (this volume), some camas beds, particularly those on small offshore islands around the Saanich Peninsula, were owned by certain Coast Salish families (Cheryl Bryce, personal communication to NT 2000; Elsie Claxton, personal communication to NT, 1996; Suttles 1951a, this volume). Nuu-chah-nulth and Ditidaht people sometimes traveled to Victoria to dig camas bulbs, and they would always ask permission from the Coast Salish people to do this (Turner et al. 1983).

Ownership brought with it responsibilities. These included the obligation to look after the resources in order to ensure their continuous production into the future, and to look after the needs of the tribe or community by sharing the proceeds with them. With his first harvest of berries, for example, a Nuu-chah-nulth chief gave a feast to his people (Drucker 1951: 252). The Nuu-chah-nulth system of chiefs' proprietorship over resources and their responsibilities to maintain them and to share them with their people is called *ḥaḥuulhi*. Chiefs' areas of *ḥaḥuulhi* are still recognized today, and may become once more an important element in management and decision-making along the west coast of Vancouver Island (Scientific Panel for Sustainable Forest Practices in Clayoquot Sound 1995; Foreword, this volume). Ernie Hill Jr. (personal communication to NT, 2002) explained the situation with his grandfather's high-bush cranberry patch: When the berries were ripe, his grandfather would take a whole group of Gitga'at people—anyone who wanted to go—over to pick them. They would spend the night there, and there was a dugout canoe kept there to help them access the berries along the shore of a lake. Each person who was picking gave the first bucket they picked to Ambrose Robinson, as the "owner" chief. After that, they were permitted to pick any quantity of berries

they wished for their own use. Ambrose Robinson, on his part, used the berries he received to host a feast for the village, as part of his obligations as a chief.

CEREMONIAL RECOGNITION OF RESOURCES

The ownership and rights to use certain areas and resources were validated at many opportunities, through public recognition at feasts and potlatches and other ceremonial occasions. Ceremonies, such as the "first salmon" ceremony of many groups and the sacred cedar-bark ceremonial of the Kwakwa̱ka̱'wakw (Sewid-Smith et al. 1998) were also a means of recognizing the importance of resource sustainability, and of formally showing respect for the other life-forms that people depend upon. These ceremonies, while perhaps not directly connected with anthropogenic plant communities, certainly influenced and constrained peoples' attitudes and behavior toward their resources, and they form part of the major context of resource use that determined how people related to their lands (Turner 1997a).

One example of how people's ceremonial practices determined specific harvesting is in the Chehalis "First-Fruits Ceremony," as described by Hill-Tout (1978: 116):

> Another of these ceremonies was kept in connection with the *satske*, or young succulent suckers of the wild raspberry ["*Rubus nutkanus*"; thimbleberry, *Rubus parviflorus*—Figure 4.8] which the Indians of this region eat in large quantities, both cooked and raw. When cooked, I am told they eat like asparagus. The time for gathering these was left to the judgment and determination of the chief. When ready to gather, he would direct his wife or daughter to pick a bunch and bring them to him; and then, the people all being assembled, a ceremony similar to that connected with the salmon ceremony would take place. After the ceremony anyone might pick as much as he liked. A similar ceremony took place later in the summer, when the berries of this plant were ripe.

Hill-Tout continues, expressing the opinion that such ceremonies were

> intended to placate the spirits of the fish, or the plant, or the fruit . . . in order that a plentiful supply of the same might be vouchsafed to them. The ceremony was not so much a thanksgiving as a performance to ensure a plentiful supply of the particular object desired; for if these ceremonies were not properly and reverently carried out there was danger of giving offense to the spirits of the objects and being deprived of them. . . . For it must be remembered that . . . the salmon, or the deer, or the berry, or the root, was not merely a fish or an animal or a fruit, in our sense of these things, but something more. The Indian's view of the universe was essentially an anthropopathic one. . . .

4.8. Thimbleberry (Ph

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4.8. Thimbleberry (Photo by N. J. Turner)

Another indication of peoples' deep respect for the plant resources they used is reflected in the words people used to address the spirit of the plants before they harvested them. Important examples are seen in Franz Boas's recorded Kwakwaka'wakw "prayers" (more accurately translated as "words of praise"). The first is an address to berries by a highbush cranberry picker, "Prayer of a Woman in Charge of Berry Picking in Knights Inlet":

> I come, One-Prayed-to, I try to come to you, means of mercy to me, that I may eat, that I may keep alive for a long time, you, Chief of the Upper World; you Life-Owner. Pray, let me come next year to stand again at the place where I am standing to pray to you. [Boas 1930: 203]

The second is offered to a young red-cedar:

> Look at me, friend! I come to ask 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 to beg you for this, Long-Life Maker. For I am going to make a basket for Lily-roots [*Erythronium revolutum*] 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! [recorded by Boas 1921: 619]

Peoples' reverent, yet pragmatic, attitudes toward the plants they used would encourage resource conservation and sustainability, both of which are pro-

moted in the concept of "keeping it living." Cultural constraints against taking too much or wasting resources, talked about by many elders as part of their early training (see Scientific Panel for Sustainable Forest Practices in Clayoquot Sound 1995; Turner et al. 2000), are closely related to this concept.

The Making of an Anthropogenic Landscape

The ethnobotanical evidence presented in the preceding discussion, when framed in terms of models of people–plant interactions, demonstrates that peoples of the Northwest Coast were active managers of their plant resources, employing a variety of strategies and practices, in a variety of habitats, to ensure a reliable, predictable supply of culturally important plant products. These practices, in turn, shaped the landscape of the Northwest, creating a series of anthropogenic landscapes. Table 4.3 serves to summarize and explain this point. It outlines the wild-plant management strategies of Indigenous peoples and the ecological effects of those strategies on the landscape at three spatial scales or levels of biological organization (Peacock 1998). It suggests the use of a wide range of cultivation methods, guided by management activities designed to regulate the timing, intensity, and frequency of harvest, that created anthropogenic disturbances within populations of culturally valued species in the habitats (communities) where they occurred. These disturbances have had both intentional and incidental impacts, and acted to increase the productivity, distribution, and predictability of key species, and to maintain habitats and conditions conducive to their growth. This had the effect of creating mosaics of productive communities on the landscape, increasing not only the diversity of species, but ultimately the productivity of the landscape.

Anthropogenic plant communities may be identified in at least eight environmental zones within coastal British Columbia, as summarized in Table 4.4:

low elevation meadows
rainshadow (Douglas-fir) forest
coastal rainforest (and associated clearings)
montane forests (and associated clearings)
freshwater marshes and swamps
freshwater bogs and fens
tidal wetlands
human occupation sites

Each of the habitat types identified in table 4.4 is discussed briefly below.

(text continues on page 140)

TABLE 4.3. INDIGENOU
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(from Peacock 1998)

TABLE 4.3. INDIGENOUS PLANT MANAGEMENT STRATEGIES AND THEIR IMPACTS ON THE PRODUCTIVITY AND AVAILABILITY OF PLANT RESOURCES

Use of Horticultural Methods

selective harvesting, digging, and replanting; tilling and weeding; sowing and transplanting; pruning and coppicing; burning

Guided by Management Activities

scheduling of seasonal rounds; rotation of harvesting locales; controlled access; religion/moral sanctions;

Regulates

the scale, frequency and intensity of anthropogenic disturbance

Scale of Application	*Results in:*
Species Level	*Increased productivity of selected species through:* Altered age structure, density, distribution, genetic structure, longevity, range, and yield of species with cultural utility
Community Level	*Increased habitat diversity through:* Altered community dynamics, size, and types; altered species associations, composition, diversity, richness, and vertical structure; creates openings or ecotones; halts successional sequences, creating productive seres
Landscape Level	*Increased heterogeniety of the landscape* Creates a mosaic of productive plant communities across landscape with both structural and compositional diversity

NET RESULT

Increased productivity and availability of culturally significant plant resources in an anthropogenic landscape

(from Peacock 1998)

TABLE 4.4 MAJOR HABITAT TYPES OF BRITISH COLUMBIA'S NORTHWEST COAST, WITH REPRESENTATIVE CULTURALLY IMPORTANT PLANT SPECIES AND ASSOCIATED MANAGEMENT PRACTICES

Habitat type	*Examples of culturally important plants*	*Associated management*
Meadow: low elevation	*Achillea millefolium* (yarrow); *Camassia* spp. (edible blue camas); *Fragaria* spp. (wild strawberry); *Fritillaria lanceolata* (chocolate lily); *Lilium columbianum* (tiger lily); *Pteridium aquilinum* (bracken fern); grass species	Burning; selective harvesting; tilling; weeding; ownership
Forest: rainshadow	*Abies grandis* (grand fir); *Acer macrophyllum* (broad leaf maple); *Allium cernuum* (nodding onion); *Alnus rubra* (red alder); *Arbutus menziesii* (arbutus); *Asarum caudatum* (wild ginger); *Fragaria* spp. (wild strawberry); *Heracleum lanatum* (cow-parsnip); *Holodiscus discolor* (oceanspray); *Lilium columbianum* (tiger lily); *Mahonia aquifolium* (Oregon-grape); *Perideridia gairdneri* (wild caraway); *Polystichum munitum* (sword fern); *Prunus emarginata* (bitter cherry); *Pseudotsuga menziesii* (Douglas-fir); *Pteridium aquilinum* (bracken fern); *Rhamnus purshiana* (cascara); *Rubus parviflorus* (thimbleberry); *Salix* spp. (willow); *Shepherdia canadensis* (soapberry); *Symphoricarpos albus* (waxberry); *Taxus brevifolia* (Pacific yew); *Thuja plicata* (western red-cedar); *Vaccinium parvifolium* (red huckleberry)	Burning; selective harvesting; pruning; ownership
Forest: rainforest (including small clearings within forest)	*Abies amabilis* (silver fir); *Alectoria sarmentosa* (old man's beard lichen); *Al*	Limited (patch) burning; selective

	fern); *Rhamnus purshiana* (cascara); *Rubus parviflorus* (thimbleberry); *Salix* spp. (willow); *Shepherdia canadensis* (soapberry); *Symphoricarpos albus* (waxberry); *Taxus brevifolia* (Pacific yew); *Thuja plicata* (western red-cedar); *Vaccinium parvifolium* (red huckleberry)	
Forest: rainforest (including small clearings within forest)	*Abies amabilis* (silver fir); *Alectoria sarmentosa* (old man's beard lichen); *Alnus rubra* (red alder); *Blechnum spicant* (deer fern); *Chamaecyparis nootkatensis* (yellow-cedar); *Dryopteris expansa* (spiny wood fern); *Echinodontium tinctorium* (Indian paint fungus); *Epilobium angustifolium* (fireweed); *Erythronium revolutum* (pink fawn lily); *Gaultheria shallon* (salal); *Heracleum lanatum* (cow-parsnip); *Maianthemum dilatatum* (wild lily-of-the-valley); *Oplopanax horridum* (devil's-club); *Picea sitchensis* (Sitka spruce); *Polystichum munitum* (sword fern); *Prunus emarginata* (bitter cherry); *Taxus brevifolia* (Pacific yew); *Tsuga heterophylla* (western hemlock); *Vaccinium alaskaense, Vaccinium ovalifolium* (blueberries); *Vaccinium parvifolium* (red huckleberry); *Thuja plicata* (western red-cedar)	Limited (patch) burning; selective harvesting; pruning; fertilizing; transplanting; ownership

TABLE 4.4. *(continued)*

Habitat type	*Examples of culturally important plants*	*Associated management*
Forest: montane (including small clearings)	*Chamaecyparis nootkatensis* (yellow-cedar); *Epilobium angustifolium* (fireweed); *Oplopanax horridum* (devil's club); *Shepherdia canadensis* (soapberry); *Vaccinium alaskaense* (Alaska blueberry); *Vaccinium deliciosum* (Cascade bilberry); *Vaccinium membranaceum* (black huckleberry); *Vaccinium ovalifolium* (blueberry); *Vaccinium parvifolium* (red huckleberry); *Veratrum viride* (false hellebore)	Burning; selective harvesting; pruning
Freshwater wetlands: marshes, swamps, alluvial floodplains	*Alnus rubra* (red alder); *Carex obnupta* (basket sedge); *Equisetum telmateia* (giant horsetail); *Lysichiton americanum* (skunk-cabbage); *Populus balsamifera* ssp. *trichocarpa* (cottonwood); *Pyrus fusca* (Pacific crabapple); *Ribes bracteosum* (gray currant); *Rubus spectabilis* (salmonberry); *Sagittaria latifolia* (wapato); *Salix* spp. (willow); *Schoenoplectus acutus* (tule); *Typha latifolia* (cattail); *Veratrum viride* (false hellebore); *Viburnum edule* (high-bush cranberry)	Selective harvesting; pruning; ownership
Freshwater wetlands: fens, bogs	*Chamaecyparis nootkatensis* (yellow-cedar); *Ledum groenlandicum* (Labrador tea: beverage); *Nuphar polysepalum* (yellow pond-lily); *Pinus contorta* (lodgepole pine); *Sphagnum* spp.; *Vaccinium oxycoccos* (bog cranberry); *Vaccinium uliginosum* (bog blueberry)	Selective harvesting; some ownership
Tidal wetlands: salt marshes,	*Conioselinum pacificum* ("wild carrot"); *Fritillaria*	Intensive tilling; selective

Freshwater wetlands: fens, bogs	*Chamaecyparis nootkatensis* (yellow-cedar); *Ledum groenlandicum* (Labrador tea: beverage); *Nuphar polysepalum* (yellow pond-lily); *Pinus contorta* (lodgepole pine); *Sphagnum* spp.; *Vaccinium oxycoccos* (bog cranberry); *Vaccinium uliginosum* (bog blueberry)	Selective harvesting; some ownership
Tidal wetlands: salt marshes, tidal floodplains	*Conioselinum pacificum* ("wild carrot"); *Fritillaria camschatcensis* (rice-root); *Lupinus nootkatensis* (Nootka lupine); *Potentilla anserina* ssp. *pacifica* (Pacific silverweed); *Pyrus fusca* (Pacific crabapple); *Rumex occidentalis* (western dock); *Schoenoplectus olneyi* ("three-square"); *Trifolium wormskjoldii* (springbank clover); *Triglochin maritimum* (arrow-grass); *Viburnum edule* (highbush cranberry)	Intensive tilling, selective harvesting, transplanting; replanting propagules, weeding, ownership
Human occupation sites	*Achillea millefolium* (yarrow); *Nicotiana* sp. (Haida tobacco; leaves chewed); *Rubus* spp. (thimbleberry, salmonberry); *Plantago major* (broad-leaved plantain); *Rumex occidentalis* (western dock); *Urtica dioica* (stinging nettle); *Pyrus fusca* (Pacific crabapple)	General use: fertilizing; pruning; clearing; selective harvesting; accidental/possibly intentional introduction

LOW ELEVATION MEADOWS

Perhaps the best-known anthropogenic plant communities of the Northwest Coast in British Columbia are the Garry oak parkland areas such as those occurring extensively around the Victoria region of southern Vancouver Island. The most intensively targeted plant resources in this community are the edible bulbs of blue camas, which were extremely important to the Straits Salish peoples of this region (Beckwith 2004; Lutz 1995; McDougall et al. in press; Suttles 1951a,b, this volume; Turner 1995, 1999; Turner and Bell 1971; Turner and Kuhnlein 1983). Camas beds were burned over, weeded, cleared, selectively harvested, and sometimes intentionally seeded, and were also sometimes owned by individuals or families. Other culturally important plants that would have benefited from cultivation practices for camas include chocolate lily, Hooker's onion, false onion, bracken fern, and tiger lily. Some camas meadows were also situated within the wetter forest ecosystems along the Northwest Coast, where burning or tidal inundation maintained an open landscape.

RAINSHADOW (DOUGLAS-FIR) FORESTS

As well as Garry oak parkland, clearings and small openings in the relatively dry conifer woods on the southeast coast of Vancouver Island and the Gulf Islands were also burned over, as discussed earlier, in order to maintain production of large patches of fruit-bearing shrubs (salal; thimbleberry—both sprouts and berries; red huckleberry; trailing blackberry—*Rubus ursinus*; and blackcap—*Rubus leucodermis*), as well as wild strawberries (*Fragaria* spp.) (Figure 4.9) and possibly hazelnut (*Corylus cornuta*), which was known to have been burned to enhance its productivity in other regions (Boyd 1986, 1999; Turner 1999). The burning extended along the west coast of Vancouver Island and into the transition region with the Coastal Western Hemlock zone. Burning may have enhanced the growth of Douglas-fir (*Pseudotsuga menziesii*), as a fire climax species, and its associated communities in areas where climax western hemlock forests would be expected in the absence of frequent fire.

COASTAL RAINFOREST

Intentional burning and other practices also modified habitats and enhanced resources within the moist western hemlock forests in various places along the coast. On the west coast of Vancouver Island, areas of Clayoquot Sound were reported to have been burned by Nuu-chah-nulth people to stimulate the growth of berries (George Louie, personal communication to Randy Bouchard, 1991). The burning of this area was confirmed by Stanley Sam (Ahousaht/Clayoquot), who noted that Alaska blueberries (*Vaccinium alaskaense*), red huckleberries, and salal berries grew particularly well after an area had been burned (Bouchard and Kennedy 1990).

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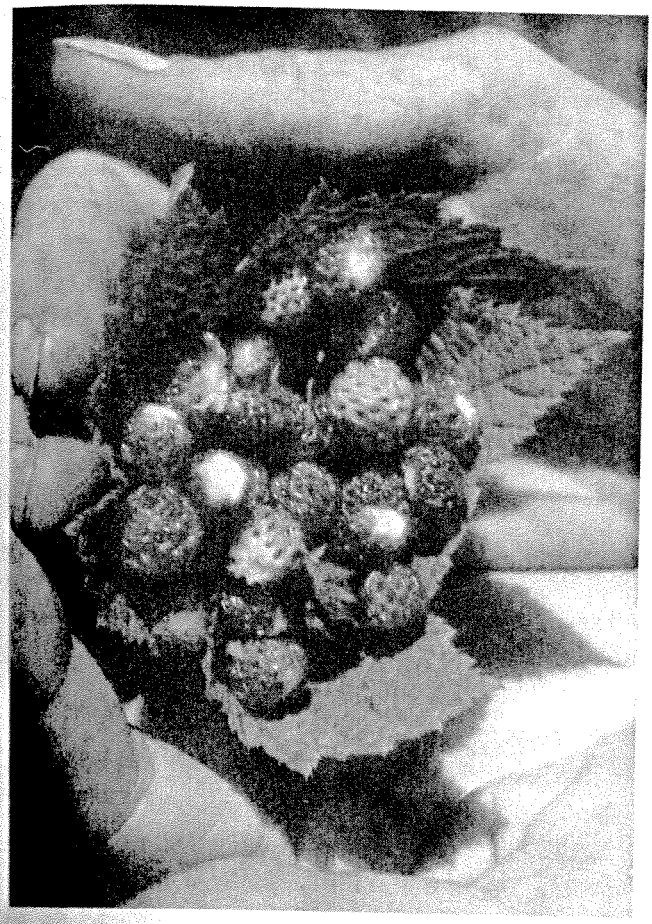

4.9. Wild strawberries (Photo by N. J. Turner)

1981), asked his father why there were so many burned trees around the Bella Coola valley, and was told that they burned to encourage the berries, especially raspberries (*Rubus idaeus*) and blackcaps. The late Felicity Walkus, who was originally from South Bentinck Arm, recalled that they "burned lots" around that area, and the late Dr. Margaret Siwallace, born at Kimsquit, said they also used to burn there to promote berry growth (both personal communications to NT, 1981). The Haisla and Haida also burned areas within their respective territories, around Kitimaat, and on Haida Gwaii, to encourage the growth of berries such as salal and red huckleberries (Lopatin 1945: 14; Turner 1999). Ernie Hill Jr. of the Gitga'at Nation reported (personal communication to NT, 2002) that there was an island in a long inlet near Kitkatla, where his father was raised, that people used to burn over completely to enhance the growth of blueberries (*Vaccinium ovalifolium*), and that the Tsimshian name for this island translated as "on-burned-down-for-blueberries." As previously discussed, the Kwakwaka'wakw people also burned berry bushes. Burning also allowed for the creation of prairies of bracken fern—the rhizome of which was roasted, ground into a flour, and baked into a bread—as well as the main-

tenance of small camas prairies far from the natural range of peak camas productivity. Once burning ceased, the coastal forest has reoccupied these prairies, and in some cases largely eliminated once abundant species of culturally preferred plants (Deur 1999).

Since considerable harvesting of trees and wood took place (especially red-cedar), with tree roots used for cordage and basketry, tree bark for construction, weaving, and medicine, branches for material and medicine, and a variety of other useful and culturally important plants, these forests, even those not burned over, can certainly be described as anthropogenic. Peoples' visible impacts on the forests were not as obvious as the impacts of logging and other activities of the incoming Europeans, but they were nonetheless present. They can be seen in the "culturally modified" trees, stumps, and logs throughout the coastal forests (British Columbia Ministry of Forests 1997; Garrick 1998). The gathering of cedar and spruce roots from the forest floor, and from rotten logs in the forest where the penetrating roots grow long and straight, was an activity that would have impacted the forest plant communities, but since it was done carefully and selectively, the impacts would be very subtle.

MONTANE FOREST

Contrary to common opinion, coastal peoples did venture into the mountains, and did use both plant and animal resources from montane forests (see Lepofsky et al., this volume). Yellow-cedar bark and many types of berries were particularly sought (R. Y. Smith 1997). For example, Duff (1952: 73) notes that for the Stó:lō (Halq'emelem) people of the Fraser Valley, "To obtain most of the berries they preserved for winter use, parties of women and a few men went into the mountains for several days during the late summer [for huckleberries and blueberries of various kinds (*Vaccinium* spp.)]. Then he adds, "Sometimes patches of these berries were burned to improve their future yield."

This indicates at least one management practice for this Coast Salish group (see also Lepofsky et al., this volume). Their northern neighbors, the Pemberton Stl'atl'imx, or Lil'wat are well known for their practice of burning mountainsides (Peacock and Turner 2000; Turner 1999). Such burning for berry enhancement has also been reported in montane areas at the far south end of the region, where such methods were employed to increase output of huckleberries and blueberries (*Vaccinium* spp.) (e.g., Deur 2002c; LaLande and Pullen 1999). The effect of such burning on the production of berries, as well as of certain root vegetables, by clearing out brush from under the trees, was said to be major; conversely, since these practices have been stopped because of forestry regulations, these food plants are widely considered to be less productive, or to even be disappearing altogether (Minore 1972; Peacock and Turner 2000; Turner 1999). Other details and impacts of human interactions with montane ecosystems will require further investigation.

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FRESHWATER MARSHES AND SWAMPS, RIVERBANKS, AND LAKESHORES

Many culturally important plants, mostly herbaceous perennials, were harvested from marshes, swamps, riverbanks, and lakeshores. Harvesting was often intensive. A relatively small tule mat, for example, of about 1 m square, might require 100 to 150 individual tule stalks. Considering the immense numbers and large size of such mats used traditionally by Nuu-chah-nulth and Coast Salish peoples especially, one would expect that thousands of tule stalks would have been gathered every year from designated harvesting areas. Some people maintained that thinning out the leaves or stems through harvesting actually allowed the plants to grow better the following year. Wapato, with its edible corms, was also harvested in considerable quantities within freshwater wetland environments, including tidally influenced freshwater wetlands (Darby, this volume; Spurgeon 2001). Other than this harvesting-related human influence, through which the habitats of these plants can be collectively identified as anthropogenic communities, there is little evidence of major human impacts, perhaps with the exception of wapato, which was harvested intensively, and Pacific crabapple, which was owned, pruned, and tended in specific places. Wapato swamps, once common and extensive in the Fraser Valley,[3] have been almost entirely eliminated from many sites by draining for agricultural purposes, and perhaps by a reduction in human management of wapato resources (see Darby, this volume; Carlson 2001). The pruning of Pacific crabapple trees has been noted, as has family ownership of these trees, and of highbush cranberries, which can often be found in the same wetland sites. Some people refer to sites with crabapple trees as "crabapple gardens," a significant appellation.

FRESHWATER BOGS AND FENS

These are specialized habitats that are wet but poorly drained and acidic, so that organic matter builds up without decomposing. Specific plants, adapted to these conditions, include sphagnum moss (used for diapering), Labrador-tea (*Ledum groenlandicum*), bog cranberry (*Vaccinium oxycoccos*), and bog blueberry (*Vaccinium uliginosum*). Often these habitats form extensive meadows from which people would harvest large quantities of plants, as well as using them for hunting the geese, swans, and ducks that light in these areas in large numbers to feed during their fall migrations.

One such meadow occurs at Kingcome Inlet, as recalled by Adam Dick:

> it's a *big* field. As far as you can see, it's just flat. With *qiqelis* [bog cranberries]. And . . . swans, were there . . . all the birds, ducks . . . they eat that. You pole up there [by canoe]. It's a long ways from the village. Then we tent, put a tent there, on the edge of that meadow. . . . Anybody could go . . . from the village. They can go and pick, all the . . . acres and acres of [cranberries]. . . .

Village Lake behind Hesquiat was a similarly important bog cranberry site for the Hesquiaht Nuu-chah-nulth. Bouchard and Kennedy (1990: 64–65) record a place called *tl'aaxaḵtis* ("cleared area") from Alice Paul, as "a narrow area between the northeast end of Village Lake and the beach at Hesquiat Harbour. In former times, this area was kept cleared in order to provide easy access to Village Lake for purposes of obtaining bog cranberries." Wiiknit is another meadow west of Hesquiat village where bog cranberries were also obtained. It was "a flat piece of land with no trees on it, of about 50 acres" in 1911 according to Father Charles Moser (Bouchard and Kennedy 1990). Similar muskeg areas occur near Fort Rupert, Bella Bella, in places of the Bella Coola and Kitlope valleys, Hartley Bay, in the vicinity of Prince Rupert, and on Haida Gwaii, especially the northeastern part, and all were known to and used by local peoples for harvesting plant resources. As well as harvesting large quantities of berries, people would have selectively harvested the leaves of Labrador-tea and various other plant products, including a range of medicinal plants. The ultimate effects of harvesting have not been determined, but they must have been significant.

TIDAL WETLANDS

Aside from the Garry oak meadow communities, there is perhaps the most extensive evidence of the cultivation and enhancement of the root-vegetable communities of the river estuaries and tidal flats all along the coast, producing intensively managed species such as springbank clover, Pacific silverweed, Nootka lupine, rice-root, and wild carrot (*Conioselinum pacificum*). These root vegetables were harvested in significant quantities, being served at major feasts and family gatherings, and also sometimes being dried and stored for winter (Boas 1921, 1930; Bouchard and Kennedy 1990; Compton 1993a,b; Edwards 1979; Turner 1995; Turner and Kuhnlein 1982, 1983; Turner et al. 1983). Notably, blue camas (specifically *Camassia quamash*) also grows prolifically in tidal marshes at the mouth of the Somass River in Port Alberni, where it was cultivated along with the other species, as well as a type of wild onion (apparently *Allium geyeri*, a rare species that is known to occur there—H. Roemer, personal communication to NT, 1999) (Arima et al. 1991). Bracken fern (*Pteridium aquilinum*), Pacific crabapple, and red elderberry (*Sambucus racemosa*) also occur in moist areas around the periphery of tidal marshes, as do tule, cattail, and various sedges.

The intensity of cultivation practices in this habitat is evident from many sources and on many parts of the coast (Deur, this volume). One tidal wetlands site in Clayoquot Sound is named after these practices. This site is called *shishp'iḵa* ("cultivated") because of the way people used to look after the beds of Pacific silverweed here (Hesquiaht Elder Alice Paul, cited by Bouchard and Kennedy 1990: 43, place name #11; see also Drucker n.d.: 1935–36, 23, 12).

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HUMAN HABITATION SITES

Village and camp sites and their immediate vicinities were intensively modified by humans. Stands of red alder (*Alnus rubra*) often signify the presence of an old village, according to Nuu-chah-nulth elder Roy Haiyupis (personal communication to NT, 1994).[4] This is because they come in after an area is cleared. Although alders were not specifically tended, they were, and are, culturally valued. They are trees that are successful cohabitors with humans. Other kinds of plants, too, are known for their ability to occupy heavily trampled and impacted sites, such as villages.[5] Stinging nettle (*Urtica dioica*) patches are almost always found in the rich moist soils around West Coast villages. Since this plant was required in large quantities as a cordage material everywhere, it was not only welcomed, but encouraged through transplanting or fertilizing in some instances (Leslie M. Johnson, personal communication 1999; Compton 1993a). It is possible that nettle, commonly found on village refuse areas many kilometers from its natural range, was introduced both intentionally and accidentally to places such as middens and village-associated clearings, where it became established on the long term (D. Deur, personal communication 1998). From personal experience, we know that stinging nettle is easily introduced into gardens, and will regenerate and spread copiously.

Drawings and photographs of coastal village sites from a century or more ago invariably show the houses set in rows within a clearing. Haida historian Captain Gold (personal communication to NT, 2000) explained that people cut the trees around the villages both for fuel and for house construction. However, clearing had another purpose as well: berry bushes, cow-parsnip, western dock (*Rumex occidentalis*), and other culturally important plants thrived in the more open environment of a village. As well, the stumps of the cut trees were especially valuable as growing substrates for berry species such as salal, red huckleberry, blueberry, and trailing currant.[6] Areas around some Haida and Nuu-chah-nulth villages were also formerly burned to enhance production of berries and other useful plants (Turner 1999, 2004).

Discussion

The culturally important plants of the Northwest Coast, with the exception of the former Northwest Coast tobacco, are all perennial species, either herbaceous perennials or woody perennials (trees and shrubs). This is the key to the management practices presented here—and to their lack of recognition in the past. These plants are not limited to seed production for propagation and maintenance of their populations. They have meristematic tissues in their rootstocks, rhizomes, roots, and buds that allow them to grow vegetatively, as well as from seed. The management practices are reliant on the broad capacity of these perennials for regrowth and regeneration. This, then, is the "Perennial Paradox" referred to in our title. In many of our past assessments of the lack of agriculture on the Northwest Coast, our attentions have

been focused on European-style agriculture: sowing the seeds of annual species—the lettuce, beans, cabbages, and carrots of the classic Mr. McGregor's garden—in neat rows. For perennials, different strategies are needed, and these are not necessarily easily identified as management or cultivation. We contend that Northwest Coast peoples *were* active managers of their plant resources, who did not simply "adapt to" the environment but actively modified it to ensure reliable, predictable and abundant supplies of key resources for food, materials and medicine.

At the species population level, plant management was practiced through harvesting strategies dictated by both cultural and biological factors. Harvesting had both intentional and incidental but frequently positive effects on the productivity of targeted species. By selecting individuals at certain life cycles, or according to age and size, indigenous peoples thinned the populations, decreasing intraspecies competition. Weeding also decreased competition between desired and undesired species, giving the culturally important plants a competitive advantage. Pruning and coppicing of herbaceous plants, trees, and shrubs encouraged the growth of new shoots, leaving the roots or rhizomes intact, as did the burning of selected individuals such as hazelnut bushes. The intentional replanting of "roots" and other propagules was also an important factor in maintaining population productivity.

Incidental impacts of harvesting practices included localized soil disturbances from digging and tilling. In addition, the accidental detachment of portions of taproots, tubers, corms, and bulbs would enable vegetative reproduction of the species (as well as intentional replanting). Further, harvesting of some species was done at a time when seeds were in production, and the activities associated with harvesting—digging, tilling, turning over the turf—would help to distribute seeds and propagules. Not only did people actually seem to have enhanced the growth and abundance of particular species through time, they may have, in some instances, extended the range of particular species through purposeful or accidental transport and replanting (Deur 1999; Turner and Loewen 1998).

The use of controlled fires to manage plant communities is well documented for Indigenous peoples throughout the world (e.g., Anderson 1993b; Boyd 1986, 1999; Day 1953; Deur 1999; Gottesfeld 1994a,b; Lewis 1973, 1977, 1978, 1982; Lewis and Ferguson 1988; Timbrook et al. 1982; White 1980). It is not surprising, then, that this was one of the more important management tools of the Northwest Coast peoples, who burned habitats at specified times of the year and at regular intervals to enhance the productivity of roots and berries. In some cases, the continued productivity of these habitats was ensured through alternating harvest locales.

Finally, while these plant management techniques had economic motives, they were embedded in a larger decision-making system structured by religious and moral ideologies and concepts of social reciprocity. These principles arguably guided people's interactions with the environment and ensured careful, considerate use of plant resources.

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These plant management principles and practices represent a continuum of people–plant interactions, with differing levels of intensity and differing impacts on landscape. At the foraging end of the scale, plant harvesting activities had little or no impact on the plant populations or the landscape. In contrast, activities associated with plant cultivation and domestication structured the species composition and diversity and thus had impacts at the population, community, and landscape levels, altering the natural (that is, successional) state, and creating anthropogenic landscapes.

It is important to stress that we believe that most of the plant management practices as described in this chapter are long-standing, and that they existed in some form prior to the coming of Europeans to the Northwest Coast. The intensive harvesting of springbank clover rhizomes, for example, was observed at Tahsis by Archibald Menzies (Newcombe 1923) at the time of Vancouver's circumnavigation of Vancouver Island. The fact that there are words in the aboriginal languages like the Kwak'wala *t'ekilakw* ("manufactured soil"), and the Nuu-chah-nulth *tlh'ayaqak*, is an indication of the antiquity of the gardening of tidal flat areas (see Deur, this volume). There are also terms corresponding with "weeding" and "pruning," as well as terms for the posts and pegs used to delineate harvesting areas owned by families or clans. Although much of this discussion has been based on the recollections of contemporary elders, there is no reason to doubt Adam Dick's contentions that the tidal flats at Kingcome Inlet, for example, were under intensive cultivation for countless previous generations. Hopefully, further research, including soil analysis, will be brought to bear on the question of the antiquity of plant management (Deur and Turner 1999).

Many questions still remain to be answered regarding plant cultivation and anthropogenic plant communities on the Northwest Coast. If Northwest Coast peoples' traditional plant production represents an intermediate stage between foraging and farming, what would the ultimate result of such activities have been, had the people been allowed to develop uninfluenced from the outside? Would they have intensified plant production to the point of dramatic genetic change from wild species? Already there was recognition of special types or variants of different foods and materials. For example, a special type of "sweet crabapple" from "a different kind of crabapple tree" is recognized by some Haisla people, one said to grow, among other places, at Kildala, in Haisla territory, and at the head of the Kitlope River. These are present in a ratio of perhaps 1 to 50 of the more common type (Compton 1993a: 269). The neighboring Gitga'at recognize and distinguish by name at least five different crabapple varieties (Marjorie Hill, Mildred Wilson, Annetta Robinson, personal communication to NT, 2002). Highly productive patches of good-tasting salal, highbush cranberry, red huckleberry, and other fruits are recognized and sought after in many areas. Special varieties of yellow-cedar (*Chamaecyparis nootkatensis*) and springbank clover are recognized and named in Ditidaht (Turner et al. 1983). Do these reflect the beginnings of human selection? Or has human use and influence already changed the genetic composition of coastal plants?

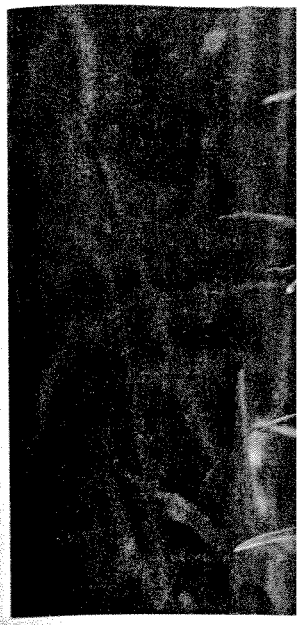
Many proto-domesticates could have been lost soon after Europeans arrived, just as the Northwest Coast tobacco was lost (see also Deur 1999, 2000).

Another major question needing intensive investigation is the relationship among plant and animal resources and human interactions. What role do animals play in anthropogenic plant communities? Here we have focused on plant resources, but in reality these are inextricably linked not only to the people who use them but to animals as well. Some plant–animal relationships known to aboriginal peoples are discussed elsewhere (Turner 1997b), but much is yet to be learned. For example, in traditional narratives on many parts of the coast, Canada goose in her human form was said to have revealed the value of silverweed, and other root vegetables to people (cf Bach 1992b: 97, cited in Compton 1993a; Edwards 1979). Mallard ducks are also associated with roots such as clover and silverweed. The phenomenon of bears pruning highbush cranberries, thereby increasing the berries' productivity, has already been mentioned. Also, burning meadows and forests is said to provide forage for deer, as well as enhancing food-plant production for people; thus hunting and plant gathering can be undertaken at the same sites. Bog cranberry meadows and other culturally important wetlands are frequented for hunting of swans, geese, and ducks in many areas, and what influence these birds may have on the cultural plant communities is not known.

Conclusions

By reviewing the nature of people–plant interactions on the Northwest Coast and situating these activities in the context of ecological-evolutionary models of plant-food production, we see that the "affluent foragers" of the region have much more in common with "farmers" than previously supposed. The ethnobotanical evidence presented in this chapter reveals not only that plants were significant contributors to *all* aspects of traditional economies, but that First Nations peoples actively managed those resources through strategies more commonly considered as "horticultural." By mimicking natural forms of intermediate disturbance regimes at differing spatial scales, these practices created and maintained a mosaic of productive and diverse habitats across the landscape. It was these anthropogenic landscapes that Europeans first encountered and mistook as "natural." Clearly, these data challenge the prevailing wisdom that Northwest Coast peoples achieved a high degree of cultural complexity *without* plant food production simply by gathering the abundant, natural resources of the landscape.

The final word in this story goes to Kwakwaka'wakw historian Daisy Sewid-Smith and Hereditary Chief and elder Adam Dick. When asked if the "grandfather" (*gagemp*) segment of the rice-root (Figure 4.10) that was removed and placed back in the ground was removed simply as a means of cleaning off the edible portion of the root, or if his ancestors recognized that it might actually grow into another plant, Adam Dick was adamant:



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We gratefully acknowledge th
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Recalma-Clutesi (*Ogwilog*
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Captain Gold, and Emma W
Edward Tallio, and Willie H
Richard Atleo (Chief *Umee*
Sambas, Arlene Paul, Stanley
Larry Paul, Alice Paul, Ruth
John Thomas, Ida Jones, and

4.10. Rice-root flowers (Photo by N. J. Turner)

ADAM DICK: That's what it does [re-grows]. That's why we were picking them off! That's why . . . [it was replanted]. That's going to grow. That's going to grow the next season.

NANCY TURNER: I see. So, it's just like gardening, really?

ADAM DICK: It *is* gardening!

DAISY SEWID-SMITH: But, see, people—this is what I'm saying—people didn't believe that we did this. They think that Nature just grows on its own. But our people felt to get more harvest, and bigger berries, they did these things. Same thing a farmer does.

Notes

We gratefully acknowledge the Elders and other knowledgeable people who have contributed information and insights in this work. We especially thank the following people: Chief Adam Dick (*Kwaxistala*), Dr. Daisy Sewid-Smith (*Mayanilth*), and Kim Recalma-Clutesi (*Ogwilogwa*) (Kwakwaka'wakw); Cyril Carpenter, Jennifer Carpenter, and Pauline Waterfall (Heiltsuk); Helen Clifton, Chief Johnny Clifton, Ernie Hill Jr., Marjorie Hill, Mildred Wilson, Annetta Robinson, Tina Robinson (Gitga'at–Tsimshian); Bea Wilson (Haisla); Florence Davidson, Barbara Wilson, Captain Gold, and Emma Wilson (Haida); Dr. Margaret Siwallace, Felicity Walkus, Edward Tallio, and Willie Hans (Nuxalk); Baptiste Ritchie (Stl'atl'imx–Lil'wat); Dr. Richard Atleo (Chief *Umeek*), Chief Earl Maquinna George, Gloria Frank, Lena Jambo, Arlene Paul, Stanley Sam, Roy Haiyupis, Brandy Lauder (Nuu-chah-nulth), Larry Paul, Alice Paul, Ruth Tom, and Rocky Amos (Nuu-chah-nulth–Hesquiaht); John Thomas, Ida Jones, and Chief Charlie Jones (*Queesto*) (Ditidaht); Tom Sampson,

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The botanical names for some of the plants mentioned in the epigraph are springbank clover (*Trifolium wormskjoldii*), Pacific silverweed (*Potentilla anserina* ssp. *pacifica*), Nootka lupine (*Lupinus nootkatensis*) and rice-root (*Fritillaria camschatcensis*). Deur (this volume) provides a detailed overview of traditional uses and management of these estuarine species.

Unless otherwise noted, all information in this paper from Chief Adam Dick and Dr. Daisy Sewid-Smith is from taped interviews with Nancy Turner in November 1996 and November 1997, and with Nancy Turner and Douglas Deur in August of 1998 and 1999. We acknowledge with gratitude their important contributions to the understanding of traditional plant cultivation.

1. The actual number of languages varies according to methods used to classify them; some are considered either as separate, or as dialects of a common language, depending upon different linguistic parameters.

2. This plant is sometimes also called "chocolate lily," a name usually applied to its relative, *F. lanceolata*.

3. For example, an entry in the Fort Langley Journal (p. 32) notes that on October 5, 1828, a large number of people had gathered at the "Forks" (where the Pitt and Fraser rivers join) to procure " . . . Wappatoes a root from under water in pools and marshes and held by them in great estimation as an article of food: The name they give it here is Scous or rather Skous. . . . " The journal also notes that (wild) onions were growing close to the river.

4. Alders are highly valued for their wood, as a source of fuel for smoking fish, for carving, for their bark (which is used as a red dye), and as a medicine (Turner 1998; Turner and Hebda 1990).

5. Broad-leaved plantain (*Plantago major*), an important medicine plant, is known as "village skunk-cabbage" in Haida, because it is always found around people's paths and yards (Turner 2004).

6. Today on Haida Gwaii, heavy browsing by introduced deer around villages such as Sgang Gwaay llnagaay has eliminated the productive berry bushes from all except the high stump locations (Turner 2004).

Chapter 5

"A Fine Line be

Ownership Patterns

among Northwest C

NANCY J. TURNE

AND JAMES T. JC

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