Aboriginal Control of Huckleberry Yield in the Northwest

David French

The use of fire by human beings, both in the intentional burning of grasslands and forests and as an agricultural and horticultural technique, has been a recent topic of research.[1] This paper adds new data on the use of fire as a plant control mechanism—specifically to increase yields of wild huckleberries—and explores the implications of this mechanism. The data are derived from field work with Chinookan and Sahaptin Indians living on the Warm Springs Reservation in Oregon and elsewhere in the Northwest.[2]

While the culture of the Chinookan-speaking Wascos and Wishrams sometimes has been classified as peripheral Northwest Coast, the economy differed only in emphasis, not in fundamental characteristics, from that of the adjacent Sahaptin-speakers along the Columbia River. The latter are easily classed with the Plateau. In both cases, the basic foods were roots, salmon, game, and berries. In the early 19th century the Wasco-Wishram spent more time near the Columbia River than did the Sahaptins and achieved greater exchangeable surpluses in salmon. Village as opposed to camp living patterns were correspondingly more important for the Chinookans.[3]

The move to the Warm Springs Reservation following the treaty of 1855 did not fundamentally change the annual cycle of resource exploitation. Salmon were caught from the spring through the fall, with a lull in mid-summer. Roots were dug during the spring and early summer. Although hunting occurred throughout the year, the most important season was the fall: in the Cascade Mountains it was undertaken concurrently with berry picking by the women.

More than a dozen species of berries and berry-like fruit were gathered by the Indians. Half of these belong to the genus *Vaccinium*, which includes huckleberries and blueberries. In northern Oregon and southern Washington the black mountain huckleberry (*Vaccinium membranaceum* Dougl. ex Hook.)[4] is by far the most important from the point of view of human exploitation, both in past times and today. The fruit is nearly black, sweet, and aromatic.

While *Vaccinium membranaceum* can survive in localities shaded by trees, the most favorable environment is an open one, including areas deforested by fires. Within a few years after a fire, these huckleberries are the dominant vegetation and are loaded with berries in favorable years. Subsequently, willows,

alders and other deciduous growth begin to replace the huckleberries in most localities. Coniferous trees, such as firs and pines, eventually become the dominant vegetation. Early in this century, wide areas near Mt. Hood and Mt. Jefferson were open as a result of forest fires; older Indians, remembering this, now discuss these areas as if they had deteriorated. From the Indian point of view, the huckleberry patches have been overrun with "weeds" in the form of coniferous trees.

There is abundant evidence that the Sahaptin and Chinookan Indians had a thorough understanding of the ecological relationships sketched above. Their solution to the problem of declining huckleberry yields was to start fires under controlled conditions. The aim was to re-establish berry patches of proven value without burning whole regions. The method of control was simple: fires were started at the end of the huckleberry season in the late fall. By this time, winter rains already had started and further rain as well as snow followed. Forest fires burning under such conditions do not spread beyond limited areas before they are extinguished by the moisture. A common technique for increasing the probability that a fire would indeed occur was to leave a log burning that had served as a reflector during the course of the heat drying of huckleberries.[5]

Lena Waters (Yakama) drying huckleberries, Sawtooth berry fields (Mt. Adams), 1936. USDA Forest Service photo by Ray Filloon. Courtesy of Rick McClure, Gifford Pinchot National Forest (Vancouver WA).

Time does not permit the discussion of other plant control techniques in the area. The burning of grasslands occurred in both eastern Oregon and the Willamette Valley. A non-fire form of control mechanism was the practice (still carried on today) of leaving some of the plants in a root patch to permit perpetuation of the crop.

The settled, regular way of life in fishing villages would lead one to expect that the adoption of agricultural crops from Whites would not be a difficult step for Chinookans and Sahaptins. This was indeed the case, with the Wasco beginning to cultivate garden patches near the Columbia by 1845, soon after the arrival of missionaries in the area. Following the treaty, they became diligent farmers on the reservation. Although the Sahaptins evidently found gardening and farming in partial conflict with their more mobile way of life, they did not resist agriculture as such, and they added certain forms of farming to their economy far sooner than did, say, Plains Indians. In short, the data support the hypothesis that the adoption of agricultural techniques is not difficult for a people who: 1) are familiar with the idea of controlling plant growth, and 2) have a way of life involving at least some degree of stability of residence during the growing season. The rapid adoption of potatoes among the Coast Salish provides a comparable case.[6]

Assuming that a plant species was available which was valued by these Indians and which provides a better yield under cultivation than growing wild, it would not be surprising to learn that this plant had been cultivated in aboriginal times. There is strong evidence, which sometimes has been overlooked, that this was exactly the case along the Columbia River. The reference is to tobacco. Several anthropologists have discussed the evidence for the aboriginal cultivation of tobacco along the north Pacific Coast, but it seems worthwhile here to call attention to the fact that the best early data on tobacco come not from the coast itself, but from the explorations of the botanist David Douglas along the Columbia River, specifically from the area we have been discussing. Douglas not only reported seeing a plant (by implication cultivated) in the hands of an Indian at Celilo Falls, which was Sahaptin territory, but he also chanced upon a tobacco patch and collected specimens that are neither the wild tobacco now growing in the area nor a species cultivated by Europeans (*Nicotiana attenuata*[7] or *N. bigelovii* var.). The patch was located above Willamette Falls, in the territory of Kalapuyan Indians, neighbors of Chinookan peoples. Turn-of-the-century ethnographers explicitly attribute tobacco growing to the Wishram.[8]

The connection between tobacco-growing and berry patch burning is somewhat more specific than merely the general one of being two forms of plant control. The above sources all state that the tobacco was planted in ashes provided by the burning of dead trees, stumps, or logs. The growing of tobacco seems to have ceased soon after Douglas's 1825 report. It was

supplanted by commercial tobacco, provided by White traders. Interestingly enough, however, modern Indians still retain the belief that a distinctly different wild species (that continues to be smoked in emergencies) grows best where there has been a fire.

The formal question of when horticulture was adopted and practiced is not of importance in this context. Whether or not tobacco was still being grown around 1840, when missionaries introduced garden crops, is of less significance than the fact that the Indians continued to appreciate the principle of plant control, e.g. berry patch burning, and that there was persistence of functional relationships in the economy which would facilitate the adoption of gardening.

To summarize: a method for the control of huckleberry crops has been described, and this has been interpreted in terms of 1) general understanding and control of plants; and 2) a specific technique of control, namely burning, which also was employed with tobacco (coupled with the idea of planting). The relatively rapid adoption of White crops and techniques was explained not only in terms of familiarity with ideas of plant control but also in terms of the relatively stable village life that had been associated with a fishing economy. The stability is necessary but not sufficient for agriculture to be invented or adopted.

Paper read at the American Anthropological Association meeting, Chicago, December 1957; not previously published

Notes

1. See Charles Cooper, "The Ecology of Fire" (*Scientific American* 204(4): 150–60, 1961); on fire in grasslands and forests see Omer Stewart, "The Forgotten Side of Ethnogeography," pp. 221–40 in Robert Spencer (ed.), *Method and Perspective in Anthropology* (Minneapolis, 1954) and "Fire as the First Great Force Employed by Man," pp. 115–33 in William Thomas (ed.), *Man's Role in Changing the Face of the Earth* (Chicago, 1956); for horticultural and agricultural fire see Harold Conklin, "An Ethnoecological Approach to Shifting Agriculture" (*Transactions of the New York Academy of Science* Series 2, 17: 133–42, 1954) and H. H. Bartlett, "Fire, Primitive Agriculture, and Grazing in the Tropics," pp. 692–720 in Thomas (ed.), *Man's Role in Changing the Face of the Earth.*

2. The research was supported by grants from the Wenner-Gren Foundation, the American Philosophical Society, Carl Reynolds, and the Social Science Research Council.

3. On classification in the Northwest Coast culture area see Alfred Kroeber, "Cultural and Natural Areas of Native North America" (*University of California Publications in Archaeology and Ethnology* vol. 38, 1939), 30 and Map 6; Philip

Drucker, *Indians of the Northwest Coast* (New York, 1955), 7; on the Plateau culture area see Verne Ray, *Cultural Relations in the Plateau of Northwestern America* (Los Angeles, 1939).

4. "Black mountain huckleberry" is the most common term, and will be used throughout this volume; *V. membranaceum* is called by several other names: "twin-leaved huckleberry," "mountain bilberry," and "blue huckleberry" among botanists alone.

5. Later research provides more detail on the post-harvest burn: "certain men were responsible for watching and maintaining the condition of the berry-picking areas"; ". . . one or two men were chosen specifically for the task of staying behind to burn the fields. These men were chosen for their knowledge, because not only did they have to burn the fields, they had to call on the rain and thunder to put the fire out." "The mountains provided signs of the coming weather which the old people could read, thus, for example, predicting rain, and individuals were available who could produce rain, if it became necessary." The first and last sentences are from Kathrine French *et al.*, "An Ethnographic Overview of the Mt. Hood National Forest, Oregon" (*Archaeological Investigations Northwest Report* No. 86, 1995); the middle two are from Cheryl Mack, "Past Human Uses—Watershed Analysis of the Eastern Portion of the Upper White Salmon River Drainage" (ms., 1994).

6. For a discussion of Coast Salish potato cultivation see Wayne Suttles, "The Early Diffusion of the Potato among the Coast Salish" (*Southwestern Journal of Anthropology* 7(3): 272–88, 1951).

7. *N. multivalvis* in the original. *Multivalvis* is an old name for *Nicotiana quadrivalvis*, one of two native tobaccos found in the Pacific Northwest. See James Hickman, ed., *The Jepson Maual of Higher Plants of California* (Berkeley, 1993), 1072. *Nicotiana attenuata*, however, is the only species reported to be used by the Indians of the Plateau culture area, of which the Wascos and Wishrams were marginal members. See Eugene Hunn, Nancy Turner, and David French, "Ethnobiology and Subsistence," pp. 525–45 in Deward Walker, ed., *Plateau*, vol. 12 of the *Handbook of North American Indians* (Washington, 1998), 535.

8. On West Coast tobacco cultivation, see John Harrington, "Tobacco Among the Karuk Indians of California" (*Bureau of American Ethnology Bulletin* 94, 1932), and Robert Heizer, "The Botanical Identification of Northwest Coast Tobacco" (*American Anthropologist* 42(4): 704–6, 1940). David Douglas's citations on tobacco may be found in his "Sketch of a Journey to the Northwest Part of the Continent of North America during the years 1824–25–26–27" (*Oregon Historical Quarterly* 5: 230–71, 325–69; 6: 76–97, 206–27, 1904–05), 249 and 269. A second version of Douglas's tobacco account from his *Journal of Travels in North America, 1823–1827* (New York, 1953) is cited in Boyd (this volume). Edward Curtis in "The Wishram," pp. 172–82 in *The North American Indian*, vol. 8 (Norwood, MA, 1911), 173; and Leslie Spier and Edward Sapir in "Wishram Ethnography" (*University of Washington Publicatons in Anthropology* 3(3), 1930), 269, note Wishram tobacco cultivation.

Indian Land Use and Environmental Change
Island County, Washington: A Case Study

Richard White[1]

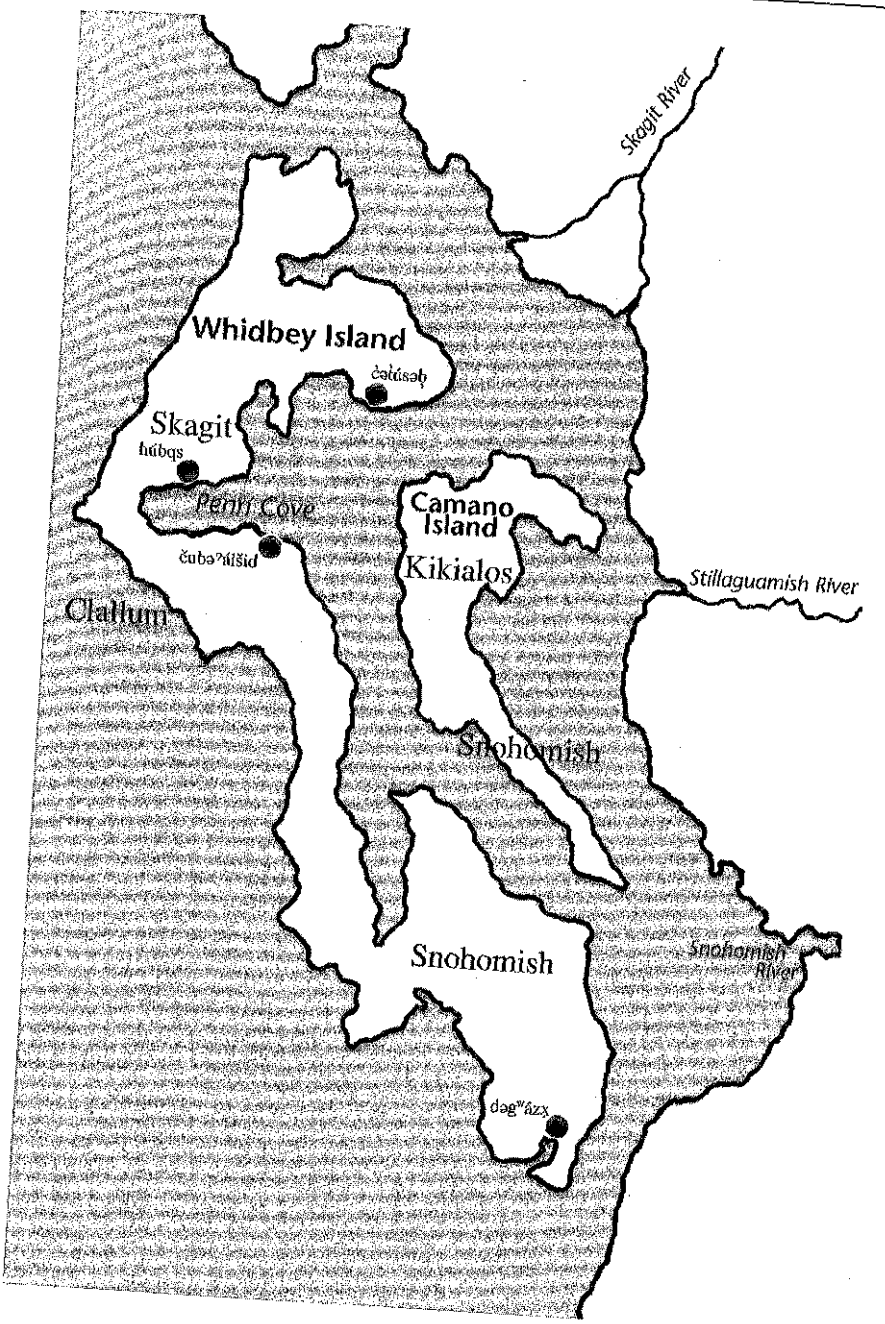
The first Americans to settle in Island County, Washington Territory, in the late 1850s regarded the region as a virgin wilderness. Heavy coniferous forests and small prairies covered the several islands in Puget Sound that composed the county.

On these islands, Salish tribes followed age-old practices of fishing, hunting, and gathering, and Whites presumed that these people had adapted to the land, enjoying its abundance and suffering its scarcities. The prairies and forests seemed obviously the creation of unrestrained nature. Few observers were aware that the Indians inhabiting the area actually had played an active role in shaping their environments, not indirectly, as any population shapes the ecology of a region merely by occupying it, but consciously and purposefully to fit their own needs. Through the use of fire and a simple technology, the Indians over many generations had encouraged the growth of three dominant plants on the islands—bracken, camas, and nettles—to supplement their regular diet of fish and small game, and also had created the conditions that fostered immense forests of Douglas-fir. A study of the early Salish experience in Island County demonstrates salient features in the process by which hunting and gathering peoples profoundly altered their natural environment.[2]

At the arrival of White settlers, the Indian population in Island County, an area of approximately 206 square miles, lived wholly on two large islands, Whidbey and Camano. In size, Whidbey ranks second only to Long Island in the continental United States; Camano is about one-fifth the size of Whidbey. Small fertile prairies, located largely on the northern part of Whidbey Island, comprised about 5% of the county. The remaining terrain was hilly, forested, and infertile.[3]

Four Salish tribes—the Skagit, Kikialos, Snohomish, and (later) the Clallam—had lived on parts of these islands since about 1000 A.D. Each tribe was a loose aggregation of villages united by language and blood, rather than by a centralized political system. Anthropologists have classified all these tribes as saltwater or canoe Indians, who, despite differences in language and kinship, shared basically similar culture traits.[4]

The Salish viewed the land as being occupied not only by humans, plants, and animals, but also by a vast array of spirits associated with specific animals or natural phenomena. This added dimension gave nature an ambience and



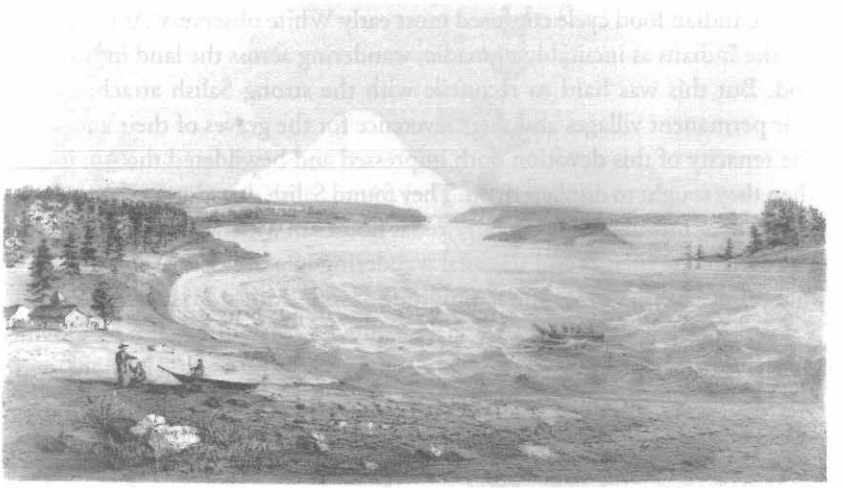
Whidbey and Camano Islands: ethnographically attested winter villages. Map by David Myhrum. Source: Wayne Suttles and Barbara Lane, "Southern Coast Salish," pp. 485-502 in Suttles, ed., Northwest Coast, vol. 7 of the Handbook of North American Indians (Washington, 1990), 486.

Penn Cove (above) and Cultus Bay (facing page) on Whidbey Island (Washington Territory) in the 1850s. Drawings from the Pacific Railroad Surveys, vol. 12, Book 1, opposite pp. 306, 288. OrHi #s 98636, 98637.

additional meaning. Plants and animals took on not only economic but also religious significance. Although the settlers dismissed these ideas as superstitions, the Salish possessed an acute knowledge of the natural world. Their understanding of plant life, for instance, was both thorough and refined. They named and classified plants, observing subtle differences in taxonomy and habitat. This knowledge was not solely utilitarian; the Indians observed and studied plants whether they were useful or not.[5]

The Salish quest for salmon (*Oncorhynchus* spp.)—the principal food staple for all Puget Sound Indians—largely determined the location of their villages on the islands. Salmon fishing oriented the tribes toward the rivers, and tribal boundaries in the county were the logical continuations of mainland river systems that lay opposite the islands. As a result, the people of the Snohomish River settled on southern parts of Whidbey and Camano islands, while the tribes on the Skagit River built villages on North Whidbey. The Kikialos were strictly an island tribe, living on North Camano, but their territory faced the Stillaguamish River and they crossed to the mainland each fall to fish its banks.[6]

At the peak of Salish population (before 1770), the Salish villages contained between 1,500 and 2,500 people, living in more than ninety-three places. Most of the sites were summer camping grounds inhabited seasonally for fishing, hunting, and berry or root gathering, but the Salish occupied as many



as fifteen permanent villages on the islands. Since the Indians sought safe and protected coves for canoe anchorages and a local supply of fish and shellfish, the selected village locations were principally on northeast Whidbey and Camano. Three large Skagit villages on Penn Cove, on North Whidbey, formed the population center of the islands. The Snohomish had villages on South Whidbey, while the Kikialos occupied permanent sites along the western and northern beaches of Camano. Most of the land on southern Whidbey and southern Camano had no permanent population.[7]

The large concentration of nonagricultural people on the islands called for a sensitive adjustment to the environment, and a willingness to use every available source of food. This adjustment was reflected in the Salish food cycle of hunting, gathering, and fishing. Although the cycle varied from tribe to tribe, the Salish moved periodically through their territories in Puget Sound following the annual pattern of abundance. From May to October, hundreds of mainland Indians joined permanent residents on the islands for root gathering and hunting. For all the Indians in the county, gathering vegetable products comprised a crucial element of their food cycle. At least fifty plants, exclusive of trees, were used by the Skagit alone.[8]

The Salish search for food plants ended in September, when the first salmon of the great fall runs started up the rivers, and the Indians moved off the islands and gathered on the riverbanks to take them. For two months, incredible numbers of fish crowded the streams. The large groups of Indians who fished and the immense quantities of fish caught led early settlers to regard salmon as their major food. Salmon were indeed of fundamental importance, but the Salish had other sources of sustenance and were prepared to survive the occasional failure of the salmon to appear.[9]

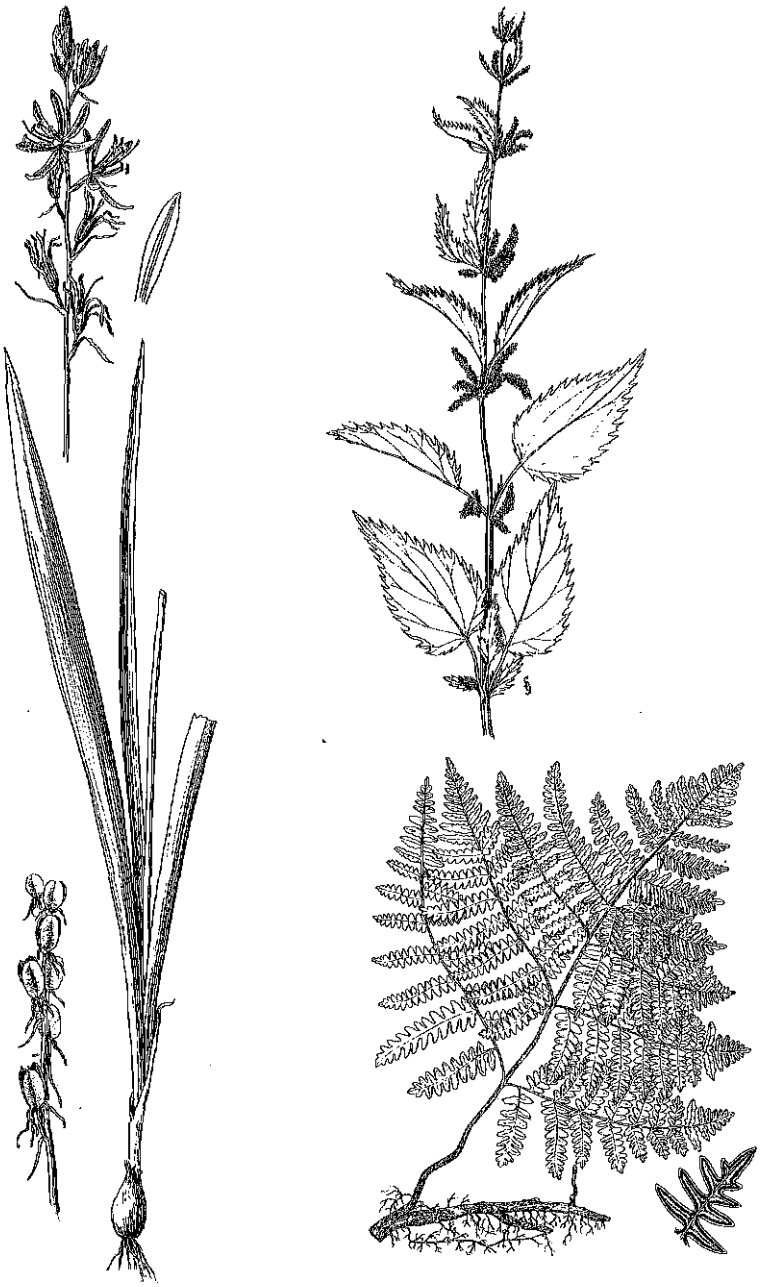
The Indian food cycle confused most early White observers. At times they saw the Indians as incurably nomadic, wandering across the land in search of food. But this was hard to reconcile with the strong Salish attachment to their permanent villages and their reverence for the graves of their ancestors. The tenacity of this devotion both impressed and bewildered the Americans when they sought to displace them. They found Salish devotion to their villages and lands as formidable as the huge cedar houses in which they lived. Actually the permanent villages and seasonal wandering in search of food formed the poles of the Salish's physical relation to the land. Both were basic.[10]

Even modern anthropologists have tended to view the Salish as moving easily over the land, adapting to natural abundance and leaving no trace, with the settlers inheriting the land much as the first Indians had found it. They described the Indians as living off the "spontaneous product of nature" for generations until they eventually were displaced. Both the settlers and scholars have presumed that the components of the Salish food cycle were gifts of virgin nature. But in the plant communities that existed at the time of early settlement, there was evidence of substantial Salish influence on the environment. Three plants in particular—bracken, camas, and nettles—found in abundance by surveyors and settlers, were closely tied to Salish cultural practices.[11]

Prolonged human occupation of a site usually led to a local enrichment of the soil. Succeeding generations of Indians living at the same village inevitably produced considerable amounts of waste. Shells and bones, plant refuse, ashes from fires, and excrement of humans and animals all gradually rotted and provided the soil with significant amounts of potash, phosphorous, and nitrogen. These accumulations of waste also provided seedbeds for many of the ancestors of human food crops.[12]

The nettle (*Urtica dioica*), for example, preferred rich soils and historically has been associated with human occupation. The nettle probably spread from the prairies, where it was a native plant, into the vicinity of the Salish villages. As with corn, constant proximity brought familiarity and, eventually, the discovery of uses for the plant. The Indians of Puget Sound made extensive use of the nettle. They extracted a medicine and a dye from it, and peeled, dried, and rolled the bark into a two-ply string for fishing and duck nets. Moreover, as a wild nettle patch generally indicated rich ground, the Indians later used the plant as a guide in starting potato patches. According to their own testimony, the Skagit Indians tended the nettles in a manner closely resembling cultivation. They kept the nettle patches free of weeds and burned the plant refuse in the fall after harvesting. The Salish clearly encouraged the nettle over other plant species of the prairies.[13]

The Salish not only burned nettle patches but also regularly burned entire prairies in mid-summer or early fall when the rains had stopped and grass was



Bracken fern (lower right), camas (left), and nettle (upper right) were economically important plants for generations of Western Washington Salish Indians. Drawings of fern and nettle are from Helen Gilkey (comp.), Weeds of the Pacific Northwest, pp. 14 and 67. Camas appears in C. Leo Hitchcock, Vascular Plants of the Pacific Northwest, vol. 1, p. 783.

tall and tinder dry. The first settlers on Whidbey found these fires alarming, for they threatened their crops and houses. Because Whites refused to tolerate the occasional destruction of their property, the beginning of American settlement saw the cessation of Indian burning on the prairies.[14]

Few settlers gave much thought to the reasons behind these fires. One of the few who did was James G. Cooper, a botanist with the railroad expedition that reached western Washington in 1853. Cooper recognized that the Salish had definite and sensible reasons for burning, and concluded that if they ceased the practice the forest soon would encroach on the open lands. The Indians, he wrote, "burned to preserve their open grounds for game, and for the production of their important root, the camas." The introduction of the horse, according to Cooper, had provided a further inducement for firing the grasslands. Fresh pastures sprang up in burned-over country. Cooper's comments on Indian land use were insightful, but were largely ignored. Actually, they fit the inland Indians of southern Puget Sound better than they did the saltwater Salish of Whidbey.[15]

The Salish of Island County had no reason to burn to increase grazing areas, for they had no horses, nor were they dependent on large game animals for food. Even deer, a relatively minor source of food, were browsers that did not require extensive grasslands for feed. Undoubtedly, Indian burning encouraged game animals by enlarging their feeding areas, but this was not necessarily the rationale for burning. More likely, the initial impetus for fires was to increase vegetable production.[16]

The desire to encourage the growth of bracken (*Pteridium aquilinium*), a fern which reached heights of seven feet on the prairies, and camas (*Camassia quamash*)—which Cooper noticed dominating large expanses of open land—were the main reasons for setting fires. Both plants were staples of the Indian diet. The Salish ground dried bracken roots into flour, which they baked for bread. They boiled the fresh camas, eating them like potatoes, or dried and preserved the bulbs. The abundance of these plants on the prairies was not fortuitous. Rather than being major Indian food sources because they dominated the prairies, bracken and camas more likely dominated the prairies because they were major Indian food sources. According to Carl Sauer, the noted geographer, the very existence of people like the Salish depended on "acting intelligently within the range of their experience." Observing the changes that fire brought in its wake and using the altered landscape to their own advantage were "advantageous behavior" that enabled the Salish to survive.[17]

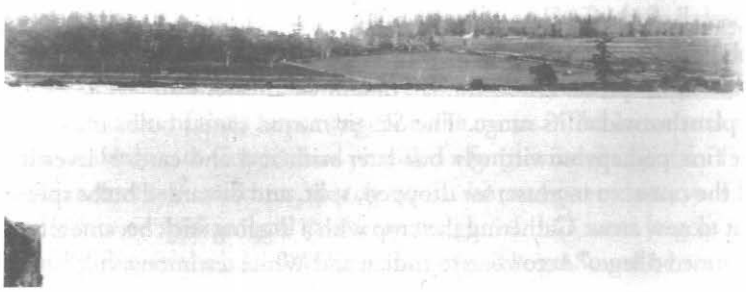
In the Puget Sound region, bracken was a pioneer invader of disturbed or burned-over lands. Burning facilitated the plant's spread over the prairies where the dense growth of native grasses often blocked its progress. Once established, the extensive root system of the fern, and the death of its topgrowth in the

fall, protected it from fatal damage by fire and gave it an advantage over less resilient rivals. The encouragement of bracken would not have benefited a pastoral people seeking to enlarge their grazing lands. In fact, bracken was a poor feed after its first growth, and pastoral peoples lamented its increase. But the Salish were not herdsmen. They valued the fern as an important source of food, and sought to promote its growth.[18]

The camas plant benefited more indirectly from burning. Like bracken, its topgrowth died off in late summer, and fall prairie fires did it little harm. Unlike bracken, however, the mere destruction of competing plants did not contribute to its spread. Direct human or animal intervention was necessary for the plant to widen its range. The Skagit moved camas bulbs into fresh areas, at first perhaps unwittingly but later with zeal and care. Harvesting enabled the camas to increase; for dropped, split, and discarded bulbs spread the plant to new areas. Gathering the crop with a digging stick became a type of "unplanned tillage." According to Indian and White testimony, cultivation to ensure a better harvest eventually supplemented the digging and transplanting of mature bulbs. Such a technique approached true farming—as did other Salish practices. For example, they also worked in plant refuse around another food plant, the tiger lily (*Lilium columbianum*). The Indians of the upper Skagit, and probably the Whidbey Skagit, practiced a primitive cultivation of both the lily and the wild carrot (*Perideridia gairdneri*). When the potato was introduced into Puget Sound, the Salish quickly became adept at the cultivation of that crop without any direct instruction by the settlers.[19]

Indian modification of the vegetational community of the prairies was significant and purposeful. Salish practices involved a rational manipulation of the environment, and this manipulation had profound ecological effects. Burning destroyed conifer seedlings and shrubs that encroached on the prairies, while at the same time it encouraged bracken to become the dominant vegetation of the open lands. Other Salish practices helped spread camas and nettle plants. Unwanted trees or shrubs surviving the fires were pulled out by hand. When the Whites arrived, they regarded the prairies as wild. They damned bracken for making plowing difficult, cursed the painful sting of the nettle, and praised camas as pig food. In fulfilling the Biblical injunction of sinking plowshares into earth, they imagined that they were putting the stamp of man upon the land. But the stamp of man was already firmly present.[20]

Salish influence on the landscape extended beyond the limits of the prairies into the surrounding forests. Indians used wood extensively, especially red cedar (*Thuja plicata*), but also Douglas-fir (*Pseudotsuga menziesii*), hemlock (*Tsuga heterophylla*), and alder (*Alnus rubra*). Yet considering the abundance of the forests and the massive size of the towering trees, direct Salish use probably had little impact on forest ecology. The conifers of western Washington were so huge that it took the neighboring Makah Indians two



(above) Penn Cove circa 1900, showing prairies and forest. (facing page) House frames from the Skagit village at Snatelum Point. negs. no. UW 18307 & NA 696. Special Collections Division, University of Washington Libraries.

weeks to fell a Sitka spruce (*Picea sitchensis*) by fire and axe. To cut the fir and cedar of Island County would have demanded similar labor. The occasional felling of one of these giants would have made only a minuscule difference in the forest as a whole.[21]

For the Salish, the forest yielded other products besides wood. They searched among the trees for berries, fireweed (*Epilobium angustifolium*), and game, none of which favored deep forest but thrived in the clearings and young successional forests that followed fires. The upper river Indians, fearing the immediate destruction of existing game animals, were wary of fire, but the saltwater peoples of the lowlands apparently burned over berry fields without much hesitation. They particularly sought to promote the growth of fireweed and berries that formed part of the normal successional pattern on such lands. Berries were an important food, while fireweed, along with other materials, was used in the weaving of blankets. The very name "fireweed," given it by the settlers, showed the close connection between this plant and burning.[22]

The first United States surveyors to examine Whidbey and Camano islands in the late 1850s made significant comments on the condition of the forests at the time. There had not yet been a decade of settlement, and most of the islands were unoccupied and practically unexplored. The surveyors made two critical observations: 1) that Douglas-fir was the dominant forest species of the islands, closely followed by hemlock and Sitka spruce and cedar; and 2) that large areas in the forests had been burned.[23]

In the hemlock-cedar climax forests in Island County, Douglas-fir relied for propagation on the destruction not only of other trees but also of the mature fir itself. Fir not only thrived on catastrophe, it depended on it. Fir seedlings died in the dense shade of mature forests, while hemlock and cedar seedlings survived, spread, and eventually displaced the mature fir as they fell from age and disease. Without interference, the climax forest of the region would have been primarily cedar and hemlock. As Douglas-fir of all ages and sizes abounded on the islands, mature forests obviously had been destroyed. This destruction clearly did not result from harvesting, nor was there evidence of extensive kills by disease or insects. The surveyors blamed the destruction on fire.[24]

Normally, the fires that had destroyed the virgin forests of Island County could have been ascribed to lightning. However, few thunderstorms occurred in western Washington. Thunderstorms swept the mountains on the mainland, but they would have had to be of staggering proportions to reach Puget Sound. Furthermore, such fires never could have reached Island County, simply because Whidbey and Camano were islands. Yet fires were so extensive and common on the islands that, of the sixteen townships surveyed in the 1850s, six contained burned-over forests. In five of these, the damage was substantial. This burning gave the Douglas-fir its advantage and enabled the tree to dominate the forests of the islands.

Extensive forest burning in the county resulted either from prairie fires that accidentally spread to the woods, or from fires deliberately set to extend berry grounds. With the brisk winds that blew across the islands, a small fire

could spread rapidly. As Indian fires were the main source of forest burning in Island County, and probably in the entire Puget Sound region, they played a critical role in determining the species composition of the forests. The result was a large stand of Douglas-fir in the lowland forests of Puget Sound, and a successional growth of groundsel (*Senecio sylvaticus*), fireweed, berries, and bracken; and fir, alder, and hemlock seedlings.[25]

In the northern coniferous forests, burning had shaped woodland ecology for centuries. Fire formed a crucial part of the forest environment. It not only liberated mineral nutrients accumulated in the litter, humus, wood, and foliage of the old forest, but it simultaneously prepared seedbeds and triggered the release of some seed supplies. The periodic destruction of old forests kept a significant proportion of each region in young trees and thus reduced the susceptibility of the forest to insects and disease. In a sense, fires were so common and critical that the species composition that would have developed without fire would have been unnatural. The only unusual aspect of the situation on Puget Sound was that such a large percentage of fires were of human origin.[26]

Fire not only shaped the forests but also the animal population that inhabited the woodlands. Both deer (*Odocoileus hemionus*) and elk (*Cervus canadensis*) were abundant in Island County when settlers first arrived, and according to Miron Heinselman, a forester who had studied forest fires, these animals were "best adapted to recent burns and early succession forests—not climax forests." Thus by setting fires, the Salish provided these animals with their habitat and increased their numbers—as well as the number of their predators, the wolves.[27]

The Salish accomplishment in creating and maintaining their ecosystem was impressive. Because of this, the Indian population of 1770 was larger than any human population on the islands before 1910. They populated their islands with spirits and powers, but did not restrict their manipulation to magic. Their technology was limited, but they used it effectively. Unlike the Indians of the upper rivers, the Salish rarely suffered seasonal scarcities or periodic famines. Indeed, in terms of camas, berries, bracken, deer, and elk, the islands were a food-exporting region. This had been brought about by Indians learning, through observation and tradition, to alter natural communities to fit their needs, without destroying in the process the ability of these communities to sustain the cultures that had created them. Far from being creatures of their environment, the Indians had shaped their world and made it what it was when the Whites arrived.[28]

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Notes

1. The original version of this paper was read at the Pacific Northwest History Conference at Tacoma, Washington, in April of 1975. A second version of this article appeared as chapter 1, "Shaping the Face of the Land," in *Land Use, Environment and Social Change: The Shaping of Island County, Washington* (Seattle, 1980).
2. Aboriginally, the Salish had been a hunting, gathering, and fishing people. By the 1850s, they were raising potatoes and beans. The adoption of agriculture had not significantly altered older patterns of land use when Whites first settled. See Wayne Suttles, "The Early Diffusion of the Potato Among the Coast Salish" (*Southwestern Journal of Anthropology* 7(3): 272–88, 1951; reprinted in *Coast Salish Essays* [Seattle, 1987], 137–51).
3. *U.S. Soil Survey of Island County, Washington* (Washington, D.C.: USDA Soil Conservation Service, Series 1949, No. 6, 1958), 3, 5–6.
4. Marian Smith, "The Puyallup-Nisqually" (*Columbia University Contributions to Anthropology* 32, 1940), 28–32. See also George Gibbs, "Tribes of Western Washington and Northwestern Oregon" (*Contributions to North American Ethnology* 1(2): 157–361, 1877), 178. Indeed, tribal divisions did not differentiate the villages of the Puget Sound region as well as the cultural divisions of inland, river, and saltwater—divisions first mentioned by American settlers and later adopted by anthropologists.
5. *Ibid.*, 58–59. June Collins, *Valley of the Spirits: The Upper Skagit Indians of western Washington* (Seattle, 1974). Herman Haeberlin, "The Mythology of Puget Sound," *Journal of American Folklore,* 37:371-438, 1924, 378–79, 383–84, 391. Ella C. Clark, *Indian Legends of the Pacific Northwest* (Berkeley, 1969), 199–201. James Swan, *The Northwest Coast, or Three Years Residence in Washington Territory* (New edition, Berkeley, 1972), 316. Claude Levi-Strauss, *The Savage Mind* (Chicago, 1966), 3–10, makes the point of the exact knowledge of plant life possessed by hunting and gathering peoples in general.
6. The Clallam do not fit this pattern. They arrived in Island County after the introduction of the potato and seized a small area of fertile prairie land to grow that crop. *Pioneer and Democrat* (Olympia, Washington), April 9, 1853. Victor J. Farrar (ed.), "The Diary of Colonel and Mrs. I. N. Ebey," *Washington Historical Quarterly [WHQ],* 8(2):124-52, 1917, 139. Paul Kane, *Wanderings of an Artist among the Indians of North America . . .* (Toronto, 1925), 157–58.
7. The basic data on population and village sites is from Herbert C. Taylor, "Aboriginal Populations of the Lower Northwest Coast," *Pacific Northwest Quarterly,* 59(4):158-65, 1963, 160–63, and Alan Bryan, "Archaeological Survey of Northern Puget Sound" (*Idaho State University Museum Occasional Paper No. 11,* 1963), 12–13. See also Thomas T. Waterman, [Puget Sound Geography] (ms. No. 1864 in the National Anthropological Archives, Smithsonian Institution, 1920). I have modified the population estimates.
8. Erna Gunther, *Ethnobotany of Western Washington* (Seattle, 1973), *passim.* For information on the food cycle, see Herman Haeberlin and Erna Gunther, "The Indians of Puget Sound" (*University of Washington Publications in Anthropology* 4(1), 1930), 20–21, 26; June Collins, "John Fornsby: The Personal Document of a Coast Salish Indian," pp. 285-341 in Marian Smith (ed.), "Indians of the Urban Northwest" (*Columbia University Contributions to Anthropology* 36, 1949), 294–95,

302. *Duwamish et al. vs. United States of America*, United States Court of Claims, Seattle, 1932, docket F-275, collection of tribal briefs, two volumes, I, 314–15, Pacific Northwest Collection, University of Washington [UWash], Seattle. Bryan, *Survey*, appendix, 1–11.
9. Collins, "John Fornsby," in Smith (ed.), *Indians of the Urban Northwest*, 302–3.
10. E. A. Starling to Isaac I. Stevens, December 10, 1853, "Letters from agents assigned to Puget Sound District, Washington Superintendency, Bureau of Indian Affairs, Record Group 75," National Archives. Stevens to George W. Manypenny, December 26, 1853, "Indian Appropriations," *House Miscellaneous Document 38*, 33 Congress, 1 Session (Serial 741), 11.
11. Haeberlin and Gunther, *Indians of Puget Sound*, 20. For a more recent assertion of the same opinion by an ecologist, see Loye Miller, "Some Indian Midden Birds from the Puget Sound Region," *Wilson Bulletin* [Wilson Ornithological Society], 72(4): 392-97, 1960), 397.
12. Bruce Proudfoot, "Man's Occupance of the Soil," pp. 8–33 in Ronald Buchanan, Emrys Jones and Desmond McCourt (eds.), *Man and His Habitat: Essays presented to Emyr Estyn Evans* (London, 1971), 12.
13. *Ibid.*; Gunther, *Ethnobotany*, 28; *Duwamish et al.*, 1, 314–15. Swan, *Northwest Coast*, 77. Swan described the abundance of nettles around old village sites on Shoalwater Bay.
14. James G. Cooper, "Report upon the Botany of the Route," *Explorations and Surveys . . . for a Railroad . . . to the Pacific Ocean* (12 vols., Washington, 1855), 12, Book 2, 23. Farrar (ed.), "Ebey Diary," *WHQ*, 7(4): 307-21, 1916, 309, 321.
15. Cooper, "Botany," *Railroad Reports*, 12, Book 2, 22–23.
16. Bryan, *Survey*, appendix, 4.
17. Cooper, "Botany," *Railroad Reports*, XII, Book 2, 22–23. Winfield S. Ebey, Diary, July 1, 5, 1858, Ebey Collection, UWash. Walter Crockett to Harvey Black, October 15, 1853, Manuscript Collection, UWash. Francis Kautz (ed.), "Extracts from the Diary of A. V. Kautz," *Washington Historian*, 1(4):181-86, 1900, 184; *Land and Life: A selection from the writings of Carl Ortwin Sauer* (Berkeley, 1963), 178–79.
18. Gunther, *Ethnobotany*, 14–15; F. Fraser Darling, *West Highland Survey: An Essay in Human Ecology* (Oxford, 1955), 172; George Neville Jones, "A Botanical Survey of the Olympic Peninsula, Washington" (*University of Washington Publications in Biology* 5, 1936), 36–37. Jerry Franklin and C. T. Dyrness, *The Natural Vegetation of Oregon and Washington* (Portland: USDA Forest Service, General Technical Report PNW-8, 1973; reprinted Corvallis: Oregon State University Press, 1988), 89. Ecologists and shepherds in areas with climates similar to that of Island County have noted that continued burning and heavy grazing of open lands lead to immense increases in the amount of bracken.
19. Camas was widespread on the prairies, and Whidbey was especially noted for its huge yields. Farrar (ed.), "Ebey Diary," *WHQ*, 8(2), 134; "Message of the President," *Senate Executive Document I*, 33 Cong., 2 Sess., (Serial 746), 455. George Gibbs, "The Indian Tribes of Washington Territory," *Railroad Reports*, I, 432–33; Sauer, *Land and Life*, 180; *Duwamish et al.*, I, 314–15, 319–20; Gunther, *Ethnobotany*, 25; Collins, *Valley of the Spirits*, 55.
20. *Duwamish et al.*, I 319. Crockett to Black, October 15, 1853, Manuscripts Collection, UWash. Farrar (ed.), "Ebey Diary," *WHQ*, 8(2), 134.

21. James G. Swan, Diary, November 21, 1863, Swan Collection, UWash. For more information on Salish use of timber, see Gunther, *Ethnobotany, passim*; Haeberlin and Gunther, *Puget Sound,* 15, 32, 34; John Osmundson, "Man and His Natural Environment on Camano Island, Washington," (M.A. thesis, Washington State University, 1971), 41; and Joan Vastokas, Architecture of the Northwest Coast Indians of America (Ph.D. dissertation, Columbia University, 1966) and "Architecture and Environment: The Importance of the Forest to the Northwest Coast Indian," *Forest History,* 13(3):12-21, 1969.
22. Gunther, *Ethnobotany,* 41. Gunther here apparently rules out the possibility that the Salish procured fireweed by burning.
23. Book 1: 312, 333, 576, 585, 596, 603; Book 10: 486, 523, 534, 540, 562, 582; Book 11: 686; Book 12: 422, 426, 445, 488, 525, 526, 542, "Field Notes of the United States Surveyor," Bureau of Land Management, Portland, Oregon.
24. The ecology and successional patterns of the forests of the Pacific Northwest are in Thornton Munger, "The Cycle from Douglas Fir to Hemlock," *Ecology,* 21(4):451-59, 1940, 451–59; J. V. Hoffman, "The Establishment of a Douglas Fir Forest," *ibid.*, I(1):49-54, 1920, 49–54; Jones, *Botanical Survey,*32; and Franklin and Dyrness, *Natural Vegetation,* 82–84.
25. For natural succession and plant growth following burns, see Franklin and Dyrness, *Natural Vegetation,* 64–67.
26. Miron L. Heinselman, "The Natural Role of Fire in Northern Conifer Forests," in Charles W. Slaughter, Richard J. Barney, and George M. Hansen (eds.), *Fire in the Northern Environment—A Symposium* (Portland: Pacific Northwest Forest and Range Experiment Station, 1971), 64–67.
27. *Ibid.;* George Vancouver, *A Voyage of Discovery to the North Pacific* (six vols., London, 1801), II, 167. Crockett to Black, October 15, 1853, Manuscript Collection, UWash. Bryan, *Survey,* 47, and appendix, 7–11. Joseph Perry Sanford, Journal, June 15, 16, 1842, Records of the U.S. Exploring Expedition...Charles Wilkes, 1838–1842, Records of the Hydrographic Office, Office of Naval Records, RG 76, NA. *Duwamish et al,* I, 319.
28. The population of Island County in 1910 was 4,704; in 1900 it was 1,807. *Thirteenth Census of the United States, Population,* I, 977. Collins, "John Fornsby," in Smith (ed.), *Indians of the Urban Northwest,* 294–95, 302.