

Indians, Fire, and the Land

in the Pacific Northwest

Robert Boyd, Editor



Oregon State University Press
Corvallis, Oregon

91. M. Jacobs, "Kalapuya Texts."
92. Elizabeth Jacobs, "Tillamook Ethnography" (unpublished manuscript).
93. June Collins, *Valley of the Spirits: the Upper Skagit Indians of western Washington* (Seattle, 1974), 57; Thelma Adamson, "Unarranged Sources of Chehalis Ethnology" (Melville Jacobs Collection, Box 77, University of Washington Archives, 1926–1927); French, "Aboriginal Control of Huckleberry Yield."
94. See in particular Richard White, "Indian land use and environmental change: Island County," 1975 and this volume; Wayne Suttles, "The Economic Life of the Coast Salish of Haro and Rosario Straits" (Ph.D. dissertation, University of Washington, 1951); Helen H. Norton, "Evidence for Bracken Fern as a Food for Aboriginal Peoples of Western Washington" (*Economic Botany* 33(4): 384–96, 1979); Nancy Turner and Marcus Bell, "The Ethnobotany of the Coast Salish Indians of Vancouver Island" (*Economic Botany* 25(1): 63–104, 1971); and Turner and Harriet Kuhnlein, "Camas (*Camassia* spp.) and Riceroot (*Fritillaria* spp.): Two Liliaceous 'Root' Foods of the Northwest Coast Indians" (*Ecology of Food and Nutrition* 13(4): 199–219, 1983).
95. John Minto, "From youth to age as an American" (*Oregon Historical Quarterly* 9(2): 127–72, 1908), 152.
96. Zenk, "Contributions to Tualatin ethnography," 40–41 (calendar); 140 (winter houses).
97. John White, "A proposed typology of Willamette Valley sites," pp. 17–140 in C. Melvin Aikens, ed., "Archaeological Studies in the Willamette Valley, Oregon" (*University of Oregon Anthropological Paper* No. 8, 1975).
98. It might be noted that most early White contact with unacculturated Kalapuya took place during the spring and summer months, when trapping expeditions were undertaken and when the natives were dispersed over the land.
99. James Clyman, *Frontiersman* . . . , 122.
100. USDA Forest Service, *Range Plant Handbook* (Washington, 1937), var. pp.
101. The first quotation is from Joel Palmer's *Journal*, 170; the second from George Riddle's *History of Early Days in Oregon*, 37.
102. Joseph Linduska, ed., *Waterfowl Tomorrow* (USDI Fish and Wildlife Service, 1964), 238.
103. See, for example, Estella Leopold and Nina Bradley, "Fire and productivity," pp. 27–37 in Martin Alexander, ed., *Let the Forests Burn?* (Fort Collins, CO, 1974).
104. Minto, "From youth to age as an American," 152.
105. James Clyman, *Frontiersman* . . . , 136.
106. *Ibid.*, 138–39.
107. John Ball, letter of February 22, 1833 (Oregon Historical Society Ms. 195; published and unpublished versions).
108. James Clyman, *Frontiersman* . . . , 143 Wilkes, *Narrative*, vol. 4, 358.
109. James Clyman, *Frontiersman* . . . , 152; the Tualatin calendar is in Henry Zenk, "Contributions to Tualatin ethnography," 40–42.
110. James Clyman, *Frontiersman* . . . , 154 and 157.
111. On wild seeds gathered by California Indians, see especially Schenck and Gifford, "Karok Ethnobotany," 379–80; and Victor Chesnut, "Plants Used by the Indians of Mendocino County, California" (*Contributions from the U.S. National Herbarium* 7(3), 1902).
112. Work, "Journey from Fort Vancouver to the Umpqua River," 264; *The Brackenridge Journal*, 57; Taylor, *The Deer of North America*, 75 and 82.

An Ecological History of Old Prairie Areas in Southwestern Washington

Estella B. Leopold and Robert Boyd

Mud layers read like pages in a book to students of fossil pollen, and every proper lake is a local library of information on past vegetation. In southwestern Washington, fossil pollen tells the story of vegetation development and climate change since the time when continental glaciers stood 3,000 feet thick near Olympia. The romance of a lost biome dominated by ice-age mastodons, and a warmer time when prairie Indian cultures were in their heyday, can be inferred from fossil evidence, and can be read between the lines of the pollen story. The sediment record of plant pollen and macrofossils tells a tale about past vegetation that cannot be obtained in any other way. Such a fossil record has particular relevance when it is combined with historical data.

Using the palynological record, this chapter reconstructs the vegetation history and post-glacial environments of southwestern Washington and relates these to historical accounts from Cowlitz and other Salishan Indian cultures that occupied the area. We seek evidence for possible interactions between Native Americans and their prairie landscapes. Salishan peoples appear to have shaped the environment to suit their own needs just as Whites have reshaped theirs. In their own different ways, each influenced the general character of the dominant forest and prairie vegetation of southwestern Washington.

The prairies of southwestern Washington and in the rain shadow of the Olympic Range resulted in part from a xeric summer-dry climate. They occurred in a mosaic of prairie patches; those between Chehalis and Seattle were chiefly on flat, gravelly terraces of glacial outwash, while farther south toward the Columbia River the prairie soils were fine-grained and the topography was more undulating. They were known for the great diversity of their herbaceous species, and stood in marked contrast to the less diverse flora of the surrounding coniferous forests.

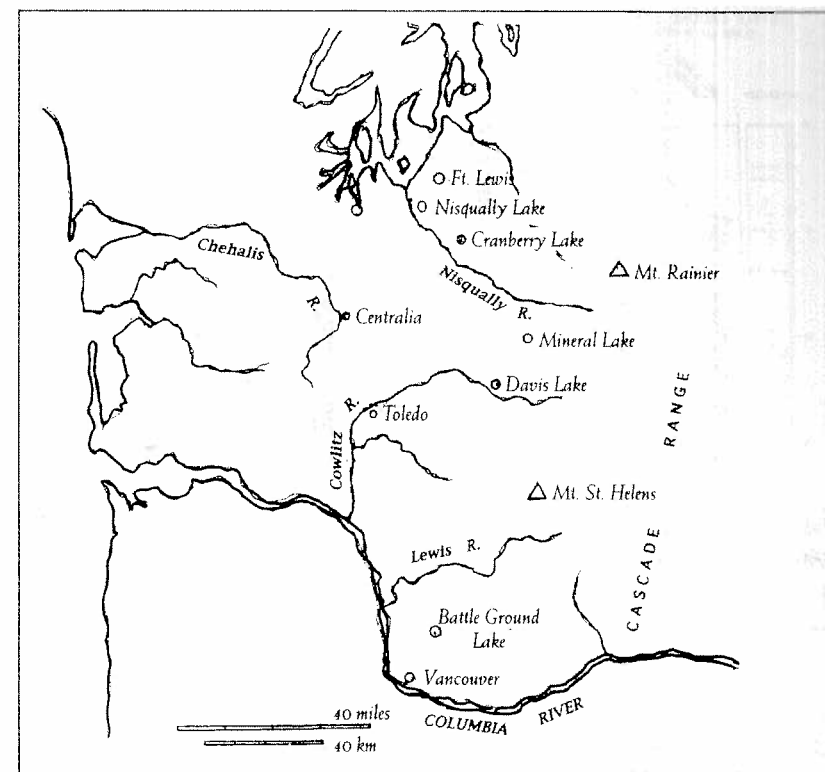
Reading the Pollen Record

In the Pacific Northwest, botanist Henry Hansen at Oregon State University was the first to explore the composition of post-glacial pollen preserved in bog and marsh sediments. Armed with his peat corer, he found a forest sequence faithfully repeated in coastal lowland sites: the earliest post-glacial pollen seemed to be dominated by lodgepole pine (*Pinus contorta*), followed by Douglas-fir (*Pseudotsuga menziesii*) and more recently by western hemlock (*Tsuga heterophylla*). The work of Calvin and Linda Heusser (New York University) and Cathy Barnosky (now Whitlock) and others at the University of Washington extended this record and provided new details. By penetrating old explosion craters north of Vancouver, Washington, these researchers have described long pollen sequences of prairie development. A particularly detailed record comes from a 15-meter sediment core at Battleground Lake (Lewis River drainage) where Barnosky identified fossil bracts and needles to complement the pollen data. Three sites to the north provide additional information: Mineral Lake south of the Nisqually River (Lewis County), Nisqually Lake (Pierce County) in the gravelly prairies, and Cranberry Lake (also Pierce County) along the prairie fringe.¹

Battleground Lake: The Chronology of Vegetation Change

In western Washington, when ice of the last glaciation draped the landscape north of Olympia (about 18–15,000 years ago), an odd mixture of herbs, shrubs, and conifers comprised an open type of vegetation near Vancouver: abundant grasses with snakeweed (*Polygonum bistortoides*), corn-salad (*Valerianella*), and Sitka berry (*Sanguisorba*) suggest mountain tundra-like habitats. But sagebrush (*Artemisia*), which was fairly abundant, implies summer-dry, perhaps steppe-like conditions. Lodgepole pine, that cosmopolitan tree which invades disturbed areas, was associated with spruces, probably including Engelmann and Sitka spruce (*Picea engelmannii* and *P. sitchensis*), and firs (Pacific silver fir and/or grand fir; *Abies amabilis* and *A. grandis*). The dominance of diverse herbs and shrubs suggest a steppic parkland tundra with spruce as a major tree species. Initial vegetation might have resembled modern high-altitude communities east of the Cascade crest, according to Barnosky's interpretation.

As continental ice began to melt in the lowlands (15–11,200 years ago), some temperate plants appeared and tundra types were gone. Mountain hemlock (*Tsuga mertensiana*), Sitka alder (*Alnus sinuata*), lodgepole, and perhaps ponderosa pine (*Pinus ponderosa*) appeared and increased; vegetation became more luxuriant (based on increased pollen abundance), and diverse

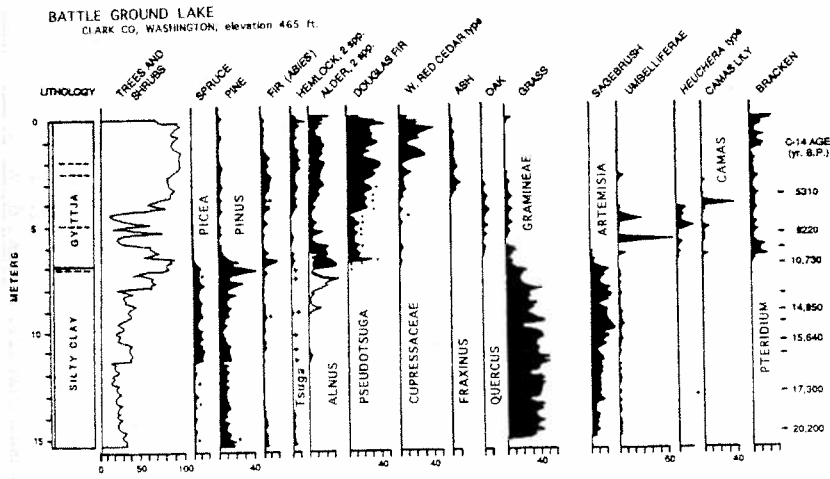


Map 1. Location of Pollen Sites of Southwestern Washington cited in the text: Battleground, Cranberry, and Davis Lakes.

herbs and sagebrush still were present. Barnosky interprets this as parkland with little evidence of tundra plants. The vegetation cover suggests cool and more humid conditions south of the retreating ice sheet.

Early humans saw this landscape; a broken spear point (made of bone) embedded in the rib of a mastodon bears witness to humans' probable hunting activities near Sequim, Washington, some 12,000 years ago. There the pollen mix was similar to that at Battleground Lake. Other extinct megafauna are recorded at Sequim (bison, caribou) and in the coastal region, i.e., at Beacon Hill, Seattle (mastodon), and Hillsboro/Portland, Oregon (tapir, mastodon).²

Western hemlock and red alder arrived in the Vancouver area by 11,000 years ago, and according to Barnosky's data were followed within 500 years by many temperate types including Douglas-fir. The earlier absence of Douglas-fir in southern Washington has led to discussions of where this tree was during the full glaciation. Barnosky feels it probably was eliminated from the area north of the Columbia River, but the tree came back about 16,000 years ago just after the full glacial period. Then there is no record of it until

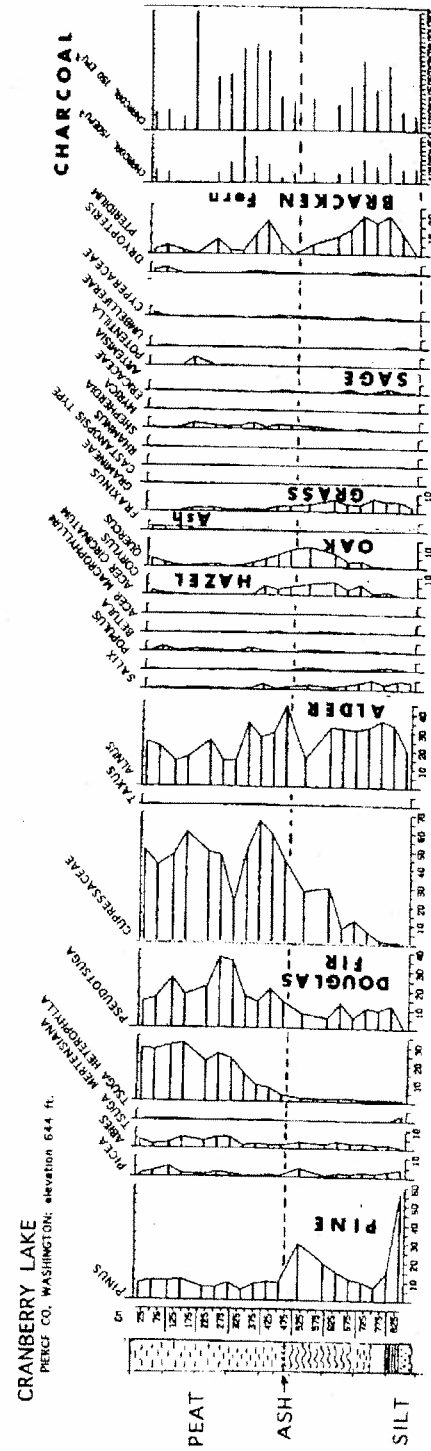


Pollen percentage diagram, Battleground Lake State Park, Clark County WA, selected taxa (after Barnosky, 1985). + indicates mountain hemlock pollen. Dots show position of macrofossils identified. Not all C-14 dates are shown. Several volcanic ash layers are found in this section (horizontal dotted lines in core).

ca. 11,000 years before present (B.P.). Within 1,000 years it spread virtually all the way to the Canadian border.³

Douglas-fir quickly became the dominant tree in the western Washington lowlands, where it was associated with an abundance of two successional species, red alder (*Alnus rubra*) and bracken fern (*Pteridium aquilinum*). These forests also contained western hemlock, probably grand fir, poplar (*Populus*), and white pine (*Pinus monticola*). The successional plants connote frequent fires and suggest open forests or forest in a mosaic with prairie patches.⁴

In southwestern Washington at Battleground Lake, however, the vegetation was more savanna-like, particularly between 9500–4500 years B.P.; Douglas-fir and oak (*Quercus garryana*) were the main trees associated with prairie and meadow grasses, camas lily (*Camassia quamash*), *Polygonum*, and various Compositae. Sporadic pollen peaks of camas lily, Umbelliferae, and alumroot (*Heuchera*) type suggest prairie plants flourishing periodically, perhaps after local fires. Bracken was widespread and abundant. During this warm, dry interval chinkapin (*Chrysopsis* or *Castanopsis*), which has sclerophyll leaves adapted to drought, expanded its range as far north as Seattle, and it became abundant in the southwestern part of the state. (At present, chinkapin is endemic along the Columbia Gorge and has only one outlying relict stand on the eastern side of the Olympics.) Between 9500–4500 B.P. the rich black prairie soils of southwestern Washington began to form. Associated with the prairie biome were the developing Indian cultures of southwestern Washington.



Pollen percentage diagram, Cranberry Lake, Pierce County WA, selected taxa. The volcanic ash layer (dashed line) is considered to be that of the Mazama Ash fall, dated at ~6800 yrs B.P. Based on this and the pollen zones, the sediment record starts at about 11,200 yrs B.P. Pollen diagram by Debbie Newman.

Between 4500 years B.P. and the present, a climatic cooling brought an increase in pollen of many conifers near Vancouver—Cupressaceae (probably western red cedar), Douglas-fir, western hemlock, ash, and others—while oak and prairie herbs and grasses declined. These data show that conifer forest expanded at the expense of grasslands in southwestern Washington; in the northern Puget Lowlands, forest composition shifted toward an increase in moisture-loving trees; especially notable was the rising importance of western red cedar (*Thuja plicata*).

Historical records come from the upper 16 cm of sediment at Battleground Lake; here pollen suggests at least two intervals of disturbance following settlement by Europeans. The first may have reflected logging outside the crater; weeds such as dock (*Rumex*), ragweed (*Ambrosia*), and also bracken fern increase to about 17% of the pollen/spore count. A second episode at 12 cm below the top of the profile records a drop in total tree pollen, particularly of Douglas-fir, while grass, bracken fern, and plantain increase. This change may reflect logging or deforestation that took place on the crater rim in the first part of the 1900s.

Cranberry Lake: Development of the Prairie Community

Pollen records can tell us not only the sequence of vegetational change but how and when the chief taxa of various plant communities came together. After the vegetation switched from cool late-glacial to warm Holocene plants, when chronologically did the prairie community appear in southwest Washington? Did the main types all appear together at once or did they “wander” into the area one at a time? Answers should reveal important details on the process of historic and modern prairie and savanna formation.

Cranberry Lake (Map 1) provides us with a broadly sampled pollen sequence from the margin of the prairie area along the Nisqually River east of Yelm in Pierce County. Though the core is not radiocarbon dated, it clearly shows the vegetation shifts at the chief zone boundaries recorded at Davis and Mineral Lake in the central Western Washington lowlands: from late glacial through early, middle, and late Holocene. Near the mid point in the core (depth 5.25 m) there is a layer of volcanic ash that undoubtedly records the explosion of Mount Mazama (circa 6800 years B.P.).

At the base of the core, the late-glacial zone is represented by silty mineral sediments and a single pollen sample at a depth of 8.00 m. As is characteristic in a wide number of sections in Washington, the pollen is dominated by pine, in part by lodgepole pine.⁵ Associated with this is abundant pollen of alder (*Alnus*), some willow (*Salix*), spruce (*Picea*), and mountain hemlock. Above 8.00 m, the Holocene transition at Cranberry Lake is marked by a major change. Pine is replaced by a mix of alder, bracken fern, and Douglas-

fir. Mountain hemlock shifts to western hemlock. This is the typical pollen assemblage of the early Holocene in western Washington.

But at Cranberry Lake, unlike the more northerly sites, we also see a prairie signal: grass pollen rises to 5—8%, and sagebrush is present. By the middle Holocene phase, hazel (*Corylus*) appears, and then Garry oak rises to an important 10% of the pollen count. At this point we have most of the main pollen indicators of savanna and prairie present together. While these are the chief prairie signals using pollen, one savanna element, Oregon ash (*Fraxinus pennsylvanica*), so far is absent.

In the last phase above the Mazama ash, the late Holocene pollen assemblage records a cooling somewhat like that at Battleground. Cranberry Lake shows a surprising *increase* of Douglas-fir, concomitant with rises in fir (*Abies*) and birch (*Betula*). Cupressaceae (either juniper or cedar [*Thuja*]) remains dominant, while alder continues at a moderately high level (>20%). In the non-tree fraction, there are small rises of cinquefoil (*Potentilla*) and Dryopteris fern. Oregon ash is the last identifiable member of the prairie savanna to appear in the Cranberry Lake pollen sequence. At Battleground Lake a similar pollen sequence occurs, but there the herbs are more prominent and some make extraordinary peaks.

The pollen evidence clearly indicates that the peak abundance of the prairie elements (grass, hazel, and oak) occurred in the early Holocene, before the Mazama Ash (6800 B.P.). Bracken fern can be considered a member of that assemblage too, as some of the historical and ethnographic accounts speak of bracken prairies. But the pollen evidence from a wide number of sites also clearly indicates a moderate cooling and perhaps moister time after the Mazama explosion. One wonders how the prairies continued to flourish during this less-than-optimal climatic period.

To find out how the prairies persisted until the present, we must turn to the historic and ethnographic records. The earliest historical records provide snapshots of what the prairies looked like before they were altered by agriculture and invasive species; the ethnographic record describes the cultural practices of indigenous peoples that modified the local vegetation.

Indians and Prairies

Historical Evidence

The journals of the first Euro-American explorers who passed through southwest Washington are invaluable sources on indigenous prairies: they not only give locations and point out major topographic features, but invariably describe plant cover as well. Lewis and Clark, for instance, during March and April 1806, encountered several small alluvial prairies along the lower

Columbia: at Deer Island, Quathlapootle (mouth of Lewis River), on Image Canoe (Hayden) Island, and opposite the mouth of the Quicksand (Sandy) River. Astonishingly, some of these prairies were composed almost wholly of camas lily, while others were of nearly pure onion (*Allium* or *Brodiaea*), as if they were vegetable gardens. The implications are that the digging stick methods of harvest and use of fire were selectively capable of encouraging certain species to an abundance no one has seen since.

In February 1814, Nor'wester Alexander Henry described the plain on which, 10 years later, Fort Vancouver would be established:

February 6, Point Vancouver The Land adjoining the river is low and most overflown at high water; it is a meadow extending about 3 miles in length and at the widest part about $\frac{3}{4}$ mile in breadth to the foot of a beautiful range of high Prairie ground rising about 30 feet. On the top of this Hill is a most delightful situation for a Fort on a Prairie of about 2 Miles long, and 2 miles broad, good Soil and excellent Pine in abundance in the rear . . . Biche [black-tail deer] are apparently very numerous here and Chevreuil [white-tails] also. Their tracks, dung &c are to be seen in every direction. The fire seems to have passed through the lower Prairie last Fall, and the green grass is already sprouted up about four inches in height.⁶

At Fort Vancouver, in April 1825, in the "extensive natural meadows and plains of deep fertile alluvial deposit covered with a rich sward of grass and a profusion of flowering plants," Scottish botanist David Douglas collected specimens:

my labour in the neighbourhood of this place was well rewarded by *Ribes sanguineum* [currant], *Berberis aquilifolium* [tall Oregon Grape], *B. glumacea* [*B. nervosa*, Oregon Grape], *Acer macrophyllum* [bigleaf maple], *Scilla esculenta* [*Camassia quamash*, camas], *Pyrola apbylla* [leafless pyrola], *Caprifolium cilosium* [honeysuckle], and a multitude of other plants⁷

Douglas's co-traveler, Dr. John Scouler, commented on the changes that had occurred on the prairie since construction of the fort:

Ft. Vancouver . . . is situated in the middle of a beautifull prairie, containing about 300 acres of excellent land, on which potatoes & other vegetables are cultivated; while a large plain between the fort and river affords abundance of pasture to 120 horses besides other cattle. The forests around the fort consist chiefly of *Pinus balsamea* & *P. canadensis*.⁸

The visiting governor-general of the Hudson's Bay's Columbia District added:

the pasture is good and innumerable herds of Swine can fatten . . . on nutritious Roots that are found here in any quantity . . . the country [is] so open that from the Establishment there is good traveling on Horseback to any part of the interior⁹

Not mentioned in these early accounts, but described in later records, were the "dry prairies" of the interior of present-day Clark county.¹⁰

Further to the north, in the lands of Salishan Cowlitz-, Upper Chehalis- and southern Lushootseed- (Puget Salish) speaking peoples were, as one explorer described them, "a string of prairies which skirt the mountains from the Columbia at least as far as the Skywhamish [Skykomish]."¹¹ The largest of these were located along the regular route from the Columbia to Puget Sound (just to the east of the path of present-day I-5), and so were frequently described by early travelers. In 1811—12, a Northwest Company fur trader ascended the "Cow-lit-sick," where he found savannas: "beautiful high Prairies . . . occasionally interspersed with a few Oaks & pines &c and are the feeding ground of a great many Elk & deer."¹² Two years later, four Iroquois traders employed by the Company reported a

pleasant Country, open and frequently intersected by small Prairies and Deer very numerous, the natives are also numerous, and have a great many Horses which they use in hunting the Deer.¹³

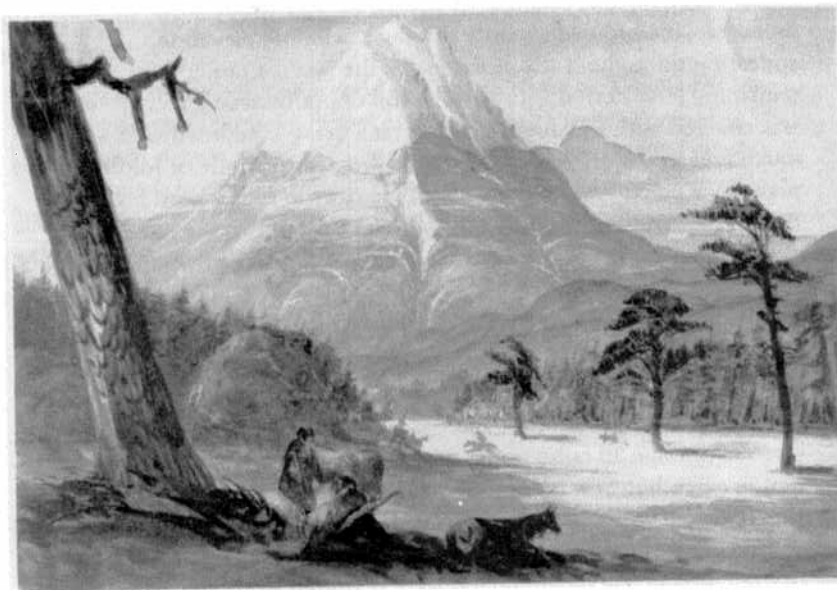
The most explicit description of the Chehalis and Cowlitz prairies comes from the pen of a Hudson's Bay Company doctor, trained in botany in his native Scotland, who passed through the "Cowlitz corridor" on his way from Fort Vancouver to Fort Nisqually in late May 1833:

5/25 arrived at a beautiful prairie extending NE & SW at least 4 miles—nearly a mile broad & very level, for two thirds of its breadth.—the brow of a gently sloping & winding elevation, appearing throughout whole extent, as the face, or rather flank of the remaining & western third . . . The soil of prairie seemed fertile, it was covered with a luxuriant but not rank grass, & adorned with a much greater variety of flowers than either Cattlepootle or Jolifie plains¹⁴, & much fewer trees, only single rows in some spots. Found ripe strawberries, on a sunny brae with an eastern exposure . . . The prairie now seemed encircled with trees which rose a bristling serrated wall around.

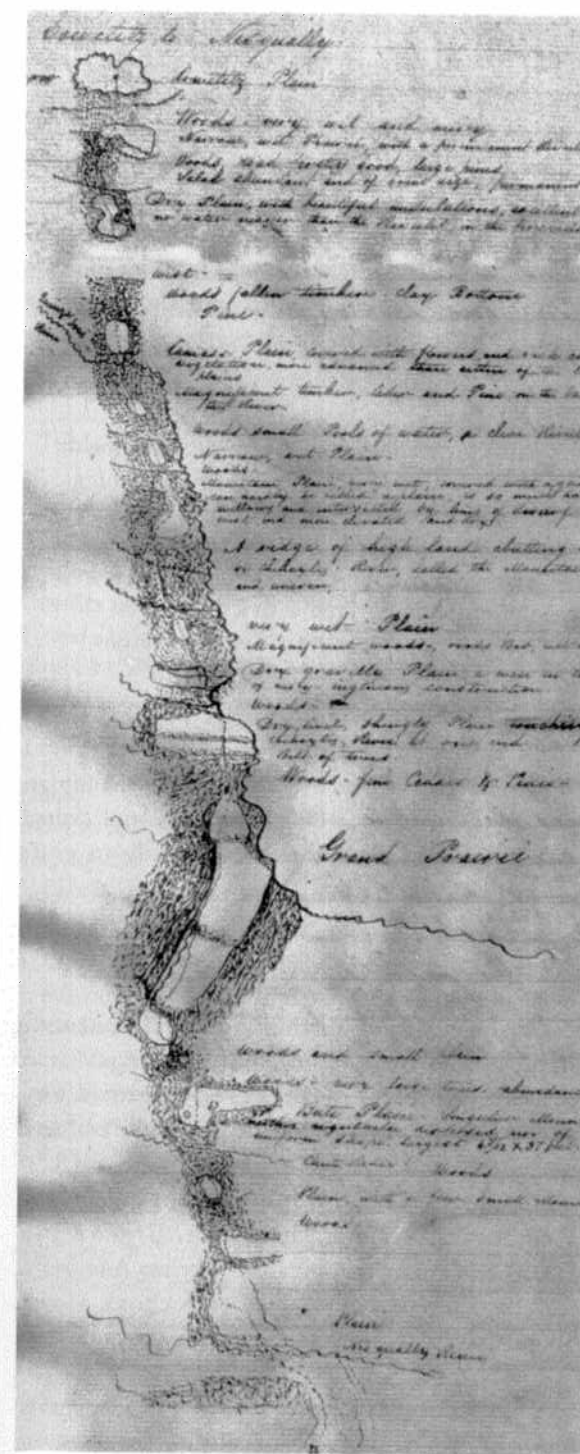
5/27 Disturbed two deer as we ascended the gentle slope forming the eastern boundary of upper prairie of Cowlitz. Our course lay through rich & level prairies & prairions or smaller plains, separated from each other by belts of wood from 100 paces to $\frac{1}{2}$ a mile broad . . . at first stage of portage 20 miles from Cowlitz & encamped in a long narrow prairie extending S. & N. of different elevations marked by winding slopes dotted with many wooden knools & its surface enamelled with a profusion of blue flowered kamass & yellow ranunchilus [buttercup]—a few Indian hovels were scattered along the margins of a lazy stream & in the hollow formed between two long winding woody elevations about 12 horses were feeding.

5/28 Encampment on Grand Prairie . . . from the brow of a hill flanking prairie to N. had an extensive view—the broad flat plain of green & yellow hues spread out beneath, encircled with wood . . . Passed several beautiful prairies, the two latter of which have been of a more sandy soil . . . a round eminence, a fairy knoll at NW side, which perhaps was formerly an island in the lake which from the sandy soil & profusion of rounded stones of boulders on the surface—I suppose to have occupied plain.”¹⁵

Dr. William Tolmie (who wrote the above passages) made several significant observations: on the topography of the prairies—described as generally flat or rolling with “few trees,” in “single rows” or “woody knolls,” bounded by ridges or trees (in one case a “serrated wall”) or separated by “belts of wood”; on the diversity of plant cover—“luxuriant but not rank grass,” with a “great variety of flowers” and edible plants including areas “enamelled with a profusion of blue-flowered kamass” and strawberries; and on edaphic prairie types: in the Cowlitz/Chehalis area “fertile soil”; and the “sandy soil & profusions of rounded stones” of the gravelly prairies of the southern Sound. In a later letter from Fort Nisqually, Tolmie said the Cowlitz and Chehalis prairies “In beauty . . . far surpass any thing of the sort I have ever beheld.”¹⁶ Like Lewis & Clark, he has described an astonishing density of blue camas lily, a feature no longer seen on any western Washington prairies!



Mount Rainier from “La Grande Prairie,” watercolor by Henry Warre, September 21, 1845. Note the flat prairie surface and rows of conifers along the margins. Courtesy of the National Archives of Canada, Inventory No. I-62; Negative No. C-26341.



Map 2. Hudson's Bay Company route between the Cowlitz Plain and Nisqually River, showing outlines of plains and prairies. From James Douglas's manuscript "Diary" for April 22–October 2, 1840. Courtesy of Information Management Services (BC Archives), Victoria. Call # A B40 D75.2A.

In spring 1840, James Douglas, later the founder of Victoria and first governor of British Columbia, passed through the "Cowlitz corridor" and mapped the prairies he encountered along the way. His manuscript map, never before published, is reprinted here (Map 2).¹⁷ Douglas also was struck by the edaphic difference between the south and north: the first "a rich clay" where "woods and Prairie predominate almost equally"; the second "poor rocky shingle," "three-fourths" of which was "level or undulating Prairies." The northern gravelly prairies are those on glacial outwash terraces; some of these occur at distinctly different levels, as on "Upper" and "Lower" Weir Prairie at Fort Lewis. Douglas contrasts these to the clay-rich soils in a more undulating terrain to the south of the glacial outwash train.

The plant cover was different too:

There is a very marked distinction, in the indigenous product of the Prairies; those of the Cowlitz section are covered with an astonishing abundance of Camas, other bulbous roots, with a few humble flowers, while grass of a coarse quality appears more sparingly; the Prairies of the other section, on the contrary, exhibit less fecundity, having few or no Camas bulbs, but is rather thinly covered with a few short tender grass [sic], greatly relished by every variety of gramnivorous quadruped, and whose nutritive qualities are in high repute.¹⁸

Douglas said the northern prairies "offer superior pasturage"; a year later an American explorer said of the Cowlitz and Chehalis prairies "here the ground is ready for the plough and nature seems as it were to invite the husbandman to his labour."¹⁹ And so it was to be: in the 1850s, donation land claims blanketed both areas, and the prairies were converted rapidly to non-indigenous uses.

Ethnographic Evidence

But what of the indigenous inhabitants? How did they utilize and "husband" the southwest Washington prairies before being removed to reservations in the 1850s? Palynology helps reconstruct how the prairies originated; history tells us what they must have looked like throughout the pre-White era, and ethnography tells us how they were used.

No in-depth monograph on the Cowlitz or Upper Chehalis Indians has ever been published. But there is a wealth of information gathered from native informants in the late 1920s and 1930s by ethnographer Thelma Adamson, preserved in her fieldnotes in the University of Washington Archives, as well as an important collection of myth texts, also collected by Adamson, published in 1934.²⁰

The Cowlitz Indians, despite their occupation of an area best known for its tree cover, have been termed a "prairie people."²¹ Their lives centered on

the open prairies depicted in Douglas's map: here their most important food plants were found; here was pasturage for their horses; their winter villages and summer camps were near or on the prairies; much of the action in their myths took place on prairies.

One of Adamson's informants, Mrs. Youckton, born at Cowlitz Prairie about 1865, said, "there used to be prairie all the way from Olympia to Tenino and Centralia." The Indians had names for every prairie along the way. Many of these names are preserved in Adamson's notes or in the myth texts. Provided with more up-to-date and precise transcriptions (and sometimes translations) by linguist M. Dale Kinkade, who interviewed some of the last Upper Chehalis and Cowlitz speakers, the names appear in Table I.

Table I: Prairies along or near the Hudson's Bay Company's track between Cowlitz (Toledo) and Fort Nisqually
(listed from south to north)

Indian names from M. Dale Kinkade²²

Cowlitz names²³

1. *ʔwí-lkə'nʔ* ("red-ochre place"): the prairie at Cowlitz Landing
Now-ok ("Big Prairie"): Cowlitz prairie, Hudson's Bay Co. farms on Cowlitz River; Cowlitz Mission
məxkanʔ ("horn, antlers?"): (lower) Lacamas and/or Mill Creek and prairie
2. *nixk wə-nəxt'an* ("stretching a hide"): prairie with lots of camas; Lacamas Prairie
ləkəməs'ili'i: prairie and creek close to Cowlitz [Chinook Jargon ("camas land") for above?]
3. *kuluʔn* (*k'u-lu-tən'*, UpChe): Jackson Prairie

Upper Chehalis names²⁴

4. *la tc't*: a prairie just NW of Napavine
5. *nəwəq'm* ("big prairie"): Newaukum River & Prairie [carrots and camas gathered here]
6. *suq'əh*: prairie across the river from Chehalis
7. *nsə'əmš* ("weeping prairie"): prairie north of Chehalis
8. *laik ! ut*: prairie south of Centralia
9. *Pawak' mstaleon*: little prairie on RR south of Centralia
10. *tá-tn'c šn'* ("resting place"): Ford's Prairie
11. *náč'alt*: Lincoln Creek; little prairie near Lincoln Creek
12. *máq'maq'm* ("prairies"): Galvin on Lincoln Creek
13. *wəxé-uws*: prairie where community of Grand Mound is situated
14. *ʔitál's*: northern part of preceding prairie; Little Rochester Prairie
15. *λ'aqá-yqł* ("little long prairie"): Mound Prairie, west part
16. *λ'aqáyqł* ("long prairie"): Mound Prairie, east part; Rochester
17. *nisáy'əqł*: prairie SW of Tenino (Rock Prairie?)
18. *nspístl's*: "Scatter Creek Prairie" (Violet Prairie?)
19. *taw somix*: prairie between Tenino and Olympia (Rocky Prairie?)

The Cowlitz and Upper Chehalis prairies were managed by fire. Explicit statements in Adamson's notes say so:

Prairies were burned in early spring, when dry, so that a new growth would come in. The grass was bunch grass. This would be used for pasture ground." (Peter Heck, p. 297)

Chiefs make Inds. burn prairies in Aug.; to make grass, strawberries, & black berries grow. (Jonas Secena, p. 348)

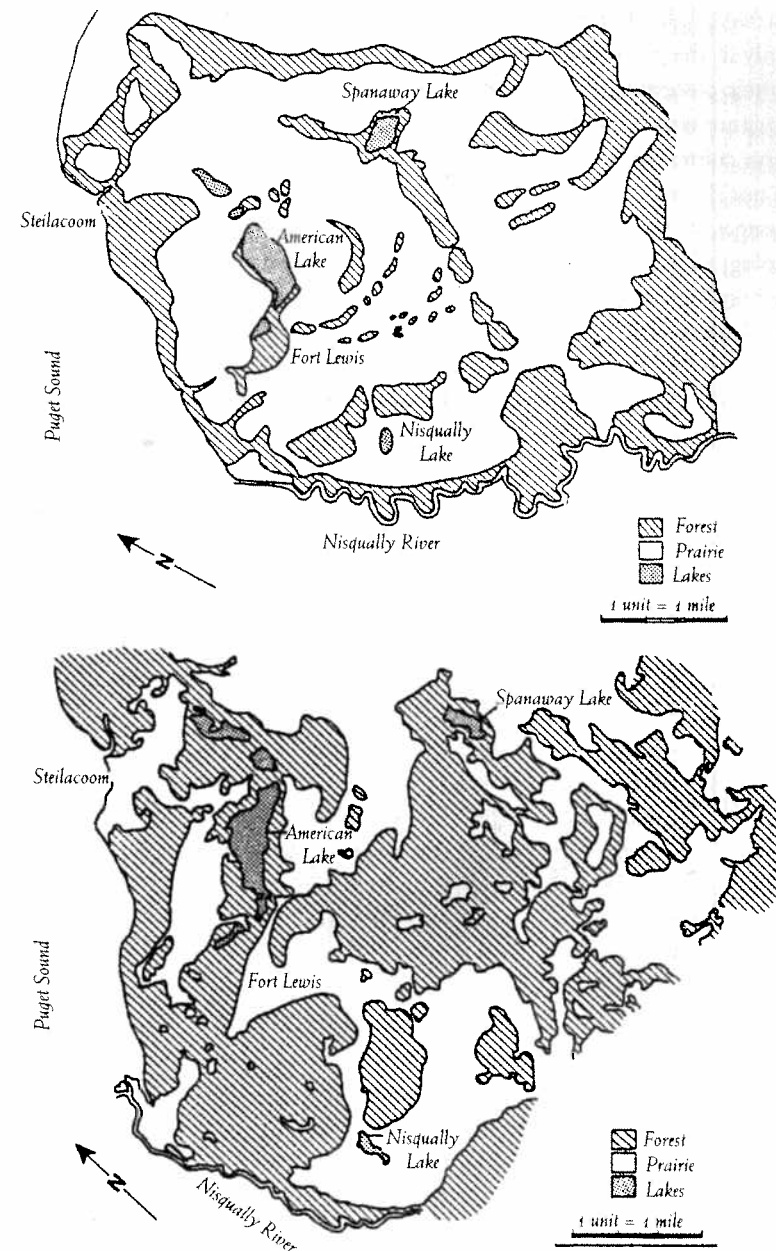
Burn a spot and black berries would grow. Berry patches good for two or three years, and then weeds and no good. burn it, camp there, stay there, until berries all gone. (Pike Ben & wife)

The citations note prairie burning either in very early spring or fall, probably for different reasons. Burning in the fall may have been chiefly for pasture, though annuals and forbs such as strawberries and camas would benefit as well. The August burning would allow autumn regrowth of grass, which would last into winter, as in the Willamette Valley. A less frequent burning schedule (circa three years) is best for berry production, and may have been either in spring or fall.

Cowlitz "had to travel far in the hills for blackberries" (*Rubus ursinus*), huckleberries (*Vaccinium membranaceum*), and blueberries (*V. caespitosum*), where they also hunted deer, bear, and other game. The texts name other early succession berry species that "grow on Cowlitz Prairie": black-caps (*Rubus leucodermis*), salmonberries (*R. spectabilis*), red huckleberry (*Vaccinium parvifolium*), gooseberries (*Ribes divaricatum*), and "June" (service) berries (*Amelanchier alnifolia*).²⁵

As elsewhere in western Washington, the prairies were foci of economically important plants.²⁶ Among greens, dock (wild rhubarb; *Rumex occidentalis*), cow parsnip (*Heracleum lanatum*), and *yalp*, an unidentified 2½-foot-tall plant with white flowers, grew at the prairie's edge; the stalks of all were eaten.²⁷ Roots, including two species of camas (*Camassia quamash* and *C. leichtlinii*) and "wild carrot" (*Perideridia gairdneri*), were collected with digging sticks in late spring and baked. Some camas bulbs were huge—and up to two feet deep! Small tiger lily (*Lilium columbianum*) of the prairie has nutritious bulbs that were gathered in fall and boiled in water. Wild yellow sunflower roots (*Balsamorhiza deltoidea*) were eaten in summer and fall. From under the white oak trees at the prairie edge, the Indians gathered acorns in fall; they cooked these all night on hot rocks in a pit. The texts also note strawberries (*Fragaria vesca*) and state that grasshoppers were gathered by burning grassy areas.²⁸ The Cowlitz economy depended on this diverse productivity of prairies, and they enhanced the abundance of prairie plants by the use of fire.²⁹

In the late 1700s, horses were introduced across the Cascades by eastern Washington Indians, and the Cowlitz, Upper Chehalis, and Nisqually became



Maps 3 and 4. Change in areal extent of the Nisqually prairies over the past 150 years. Top: prairies in the 1850s, reconstructed from land use and other historical records. Bottom: shrinking of prairie area by the late twentieth century. From Arthur Kruckeberg, *Natural History of Puget Sound*, 287. Reproduced by permission, University of Washington Press.

equestrians.³⁰ These peoples were exceptional among Coast Salish Indians not only in the possession of horses but in the enhanced mobility associated with their possession. The presence of extensive prairies, modified by fire so that pasture was available year-round, may have served as a "preadaptation" to horse culture that other peoples west of the Cascades did not have and could not share.

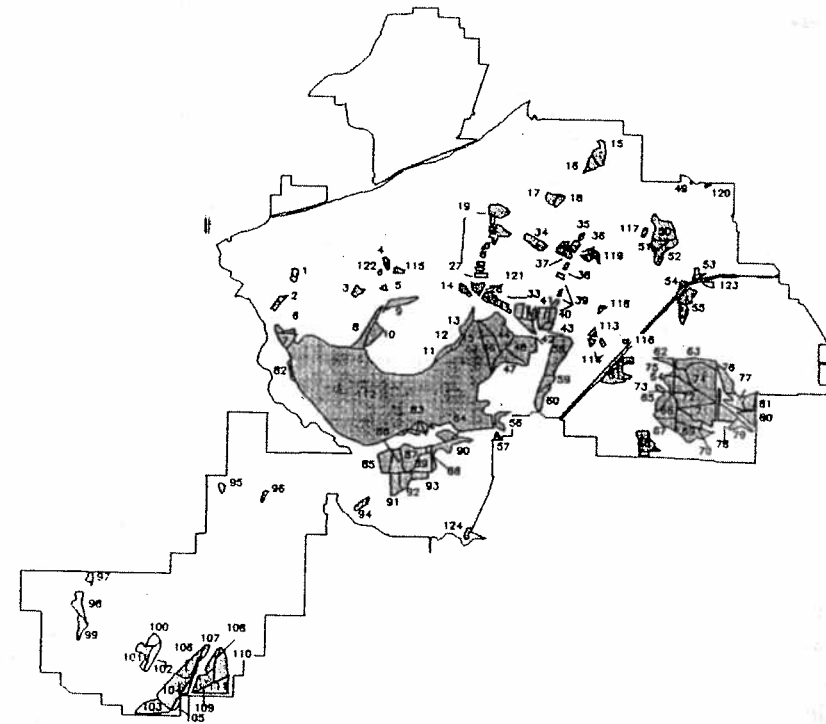
Passages in the historical and ethnographic texts provide hints on the technology of burning. Jonas Secena stated that "chiefs" directed at least some of the burning. "Red (Douglas) fir" bark was "used for making fire." Sharp prairie borders with forests and boundaries on ridge tops suggest control; one myth ("The Boy and the Fire") implies that trails might serve as fire breaks. In this myth, a boy, fleeing fire, sought safety with Tree, Rock, Creek, Prairie, Rotten Log, and Trail. Tree and Rotten Log burned, Rock got "very hot," Creek boiled, and the grass on Prairie burned, but "Trail said 'Sometimes I burn, but only along the sides. Lie down on me.' He lay down on Trail and the fire passed over him."³¹

The Chehalis myth "Bluejay and his sister Yo'i"³² shows that burning prairies had a role in native cosmology as well. Bluejay's sister Yo'i (perhaps magpie) married Fog, who turned out to be a ghost and who took Yo'i to the Land of the Dead. Bluejay wanted to visit his sister but had to pass through "five prairies, always burning" to get there. Yo'i told him he must carry five buckets of water to douse the fires in each prairie. On the way to the Land of the Dead, Bluejay first passed through five prairies "so full of beautiful flowers that [they] seemed to be on fire."³³ Then Bluejay entered the five blazing prairies ("Stats, stats, Fire Prairie"), each hotter than the last. He visited his sister in the Land of the Dead, where he had more adventures, but then had to return to the land of the living. Now, however, the order of the prairies was reversed. The flower prairies came first, and Bluejay, improvident or just plain foolish, used up a bucket and a half of precious water on them. Entering the fire prairies, he managed to stretch three buckets over the first four, but had only half a bucket to get through the last and largest. Bluejay ran through the flames, but near the end he ran out of water. He used his five bearskin robes to stifle the fire; he spat on it. "He had only a few steps left to go, when he began to shrivel up and roast. Suddenly he died, his claws drawn up together." Being a spirit-person, Bluejay did not really die, of course, but his foolish behavior made it impossible for the living to visit the dead any longer. The dead (as ghosts) can still visit us, but like Bluejay, they fall just before they get here and forget how to speak.

The Fort Lewis Prairies: Modern Remnants

The floral composition of native prairie communities has been studied systematically by several botanists.³⁴ On the Thurston County prairies, common species include bunch grasses (*Agrostis tenuis*, *Festuca idahoensis*, *Poa pratensis*), violet (*Viola adunca*), camas, *Brodiaea coronaria*, shooting star (*Dodecatheon hendersonii*), sedge (*Carex pennsylvanica*), kinnikinnick (*Arctostaphylos uva-ursi*), and mosses (*Polytrichum*) and lichens (*Rhacomitrium cladonia*). Bracken fern and salal (*Gaultheria shallon*) occur in dense stands in small areas.

The prairie flora and vegetation are best preserved in the military base at Fort Lewis, where frequent burning occurs as a result of military practices. These modern prairie remnants appear on Map 5. Typically in the Fort Lewis region, the prairies are surrounded by patches of oak savanna along the forest/



Map 5. Contemporary prairie units within the boundary of the US Army's Fort Lewis, Pierce County, WA. The largest prairie (6 miles long) is Ninety Six Division Prairie, along the north side of Nisqually River. Prairies shown are under active prescribed burn management by the Army, which maintains them well, though there are (non-native) weed infestations in some areas.

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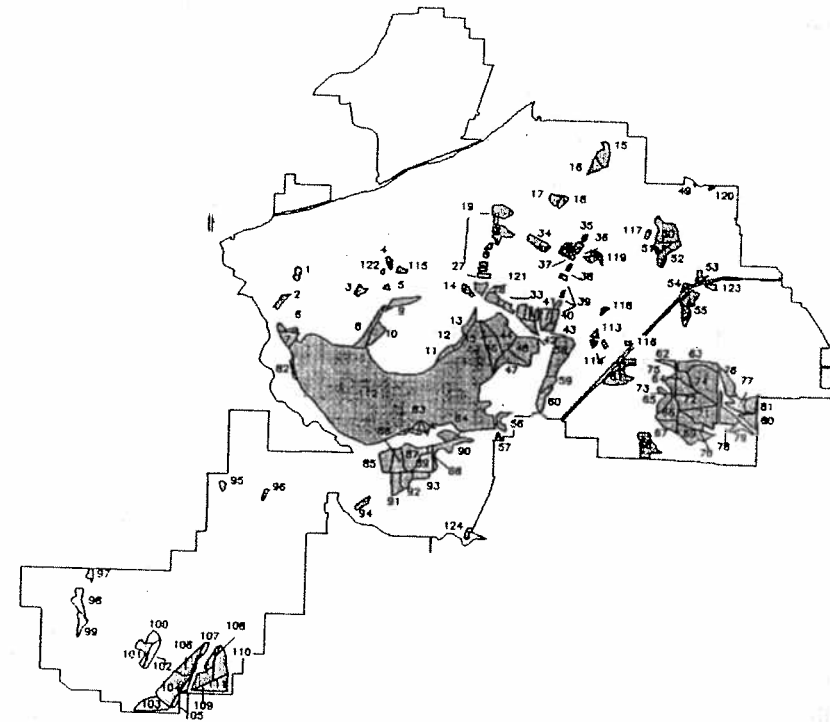
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prairie ecotone. Members of the oak savanna are service berry, hazel, and Oregon Ash (which also typifies the moist creek sides). Spring ephemerals and bunch grasses characteristic of the prairie also occur under the open-structured oak savanna: shooting star, chocolate lily (*Fritillaria lanceolata*), and wheat grass (*Agropyron idahoense*).

The original forest in the Fort Lewis area was dominated by Douglas-fir, with western red cedar occurring in wet areas.³⁵ Historical stand data indicate that lowland Douglas-fir woods burned with low-intensity ground fires with a fire return interval measured at around fifty years.³⁶ Forests in the lowlands of King County observed and measured in 1907 show that Douglas-fir represented around 80–85% of the forest biomass (measured in board feet), with old-growth trees (called “red fir” for mature specimens and “yellow fir” for giant trees that were scaley barked). Their diameters commonly were eight feet dbh (diameter at breast height), and their stumps show that they were typically placed fairly far apart (10–25 meters). Testimony from old loggers living on Tiger Mountain, King County, said that the Douglas-fir old-growth forest was very easy to walk through, and that it was fairly fire-proof.³⁷ It is likely that this open structure was maintained by ground fires that regularly cleaned out the small trees and underbrush.

Forest has invaded much of the prairie area. In the Douglas-fir forest along the margins of Weir and Johnson prairies, the trees are all even aged, and none of them exceeds 12 inches dbh. Prairie-type soils are found in these peripheral forests.³⁸ Forest encroachment can be seen today in the scattered Douglas-firs on the 91st Division Prairie at Fort Lewis.

While the prairie at Nisqually survives in modified form, the present landscape of the Battleground Lake area is agricultural; a Douglas-fir forest grows on the rim of the crater, but it is nearly all young timber. Conifer forests have expanded into many former prairies, probably because burning by Indians was brought to an end in the late 1800s. The Upper Chehalis Indians are confined to a small reservation at Oakville; the Cowlitz are landless.

Europeans have written a new message across this landscape, and have reshaped the biota to suit their changing needs; it is unfortunate that so many species have been extirpated in this process. Prairie communities now are so rare that they badly need protection as well as prescribed burning. The Upper Chehalis and Cowlitz Indians and the new Washingtonians are a part of a linear history in which each has consciously restructured their landscape.

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Notes

1. See Henry Hansen, “Postglacial forest succession, climate and chronology in the Pacific Northwest” (*Transactions of the American Philosophical Society* 37, 1947); Calvin and Linda Heusser, “Sequence of pumaceous tephra layers and late Quaternary environmental record near Mt. St. Helens” (*Science* 210: 1007–9, 1980); and Estella B. Leopold *et al.*, “Pollen and lignin records of late Quaternary vegetation, Lake Washington” (*Science* 218: 1305–7, 1982). Southwest Washington pollen sites are discussed in Dennis Hibbert, “Pollen analysis of late-Quaternary sediments from two lakes in the southern Puget lowland, Washington” (M.S. thesis, University of Washington, 1979); Matsuo Tsukada, “*Pseudotsuga menziesii*: its pollen dispersal and late Quaternary history in the Pacific Northwest” (*Japanese Journal of Ecology* 32: 159–87, 1982); Cathy Barnosky, “Late Quaternary vegetation near Battle Ground Lake, Southern Puget trough, Washington” (*Geological Society of America Bulletin* 96(2): 263–71, 1985); and M. Tsukada, S. Sugita, and D. Hibbert, “Paleoecology in the Pacific Northwest I. Late Quaternary vegetation and climate” (*Verhand Internationale Vereinigung für Theoretische und Angewandte Limnologie* 21: 730–37, 1981).
2. See K. Peterson, P. Mehringer, and C. Gustafson, “Late Quaternary vegetation and climate at the Manis Mastodon Site, Olympic Peninsula, Washington” (*Quaternary Research* 20(2): 215–31, 1983). On the Sequim megafauna, Carl Gustafson and Claire Manis, *The Manis Mastodon Site: An Adventure in Prehistory* (Sequim, 1984); the Beacon Hill and Hillsboro fauna are unpublished (D. Mullineaux; A. Barnosky).
3. Barnosky, “Late Quaternary vegetation near Battle Ground Lake”; M. Tsukada, “*Pseudotsuga menziesii*: its pollen dispersal and late Quaternary history in the Pacific Northwest” (*Japanese Journal of Ecology* 32: 159–87, 1982).
4. See Les Cwynar, “Fire and the forest history of the north Cascade Range” (*Ecology* 68(4): 791–802, 1987).
5. Hansen, “Postglacial forest succession . . .”; Cwynar, “Fire and the forest history of the North Cascade Range”; and Barnosky, “A record of late-Quaternary vegetation from Davis Lake, southern Puget Lowland, Washington” (*Quaternary Research* 16(1): 221–39, 1981).
6. Alexander Henry, *The journal of Alexander Henry the younger*, vol. 2, *The Saskatchewan and Columbia*, Barry Gough, ed. (Toronto, 1992), 675.
7. *Journal Kept by David Douglas During His Travels in North America, 1823–1827* (New York, 1959), 56. Honeysuckle is now *Lonicera ciliosa*.
8. “Dr. John Scouler’s Journal of a Voyage to N.W. America,” F. G. Young, ed. (*Oregon Historical Quarterly* 6, var. pp., 1905), 174. The two tree species probably are Douglas-fir and lodgepole pine; Scouler’s names are not in current use.
9. *Fur Trade and Empire: George Simpson’s Journal . . . 1824–1825* [etc.], Frederick Merk, ed. (Cambridge MASS, 1931), 87.
10. See Helen H. Norton, Robert Boyd, and Eugene Hunn, “The Klikitat Trail of south-central Washington: A reconstruction of seasonally used resource sites,” this volume.
11. George McClellan, “Journal,” 5/20–12/11, 1853. Microforms Collection A228, University of Washington Libraries.
12. *The Discovery of the Oregon Trail: Robert Stuart’s narratives of his overland trip eastward from Astoria in 1812–13*, Philip Rollins, ed. (New York, 1935), 30.

13. *The journal of Alexander Henry the younger*, 684.
14. At the mouth of the Lewis River and site of Fort Vancouver, respectively.
15. *The Journals of William Fraser Tolmie, physician and fur trader* (Vancouver, 1963), 191–93.
16. Letter of 9/20/33, William Tolmie Letter Book, Kew Garden Herbarium Library, Kew, England.
17. A copy of the map, made by Sir George Simpson a year later, has been published, in *London Correspondence Inward from Sir George Simpson*, Publications of the Hudson's Bay Record Society 29 (London, 1973), between pp. 76 and 77.
18. James Douglas, "Douglas Expeditions, 1840–41," Herman Leader, ed. (*Oregon Historical Quarterly* 32: var. pp., 1931), 11.
19. Charles Wilkes, "Diary of Wilkes in the Northwest," Edmund Meany, ed. (*Washington Historical Quarterly* 16 and 17 var. pp., 1925–26), 145.
20. Thelma Adamson, "Unarranged Sources of Chehalis Ethnology," Parts I and II, Melville Jacobs Collection, Box 77 (University of Washington Archives, 1926–27); "Folk-tales of the coast Salish" (*Memoirs of the American folk-lore society*, vol. 27, 1934).
21. Verne Ray, *Handbook of Cowlitz Indians* (Seattle, 1966).
22. Personal communication to authors, June 10, 1997. M. Dale Kinkade is professor of linguistics at the University of British Columbia. Most of the prairie names were reheard and retyped by Kinkade before the passing of the last speakers; names not reheard retain earlier (and less reliable) transcriptions.
23. M. Dale Kinkade, *Cowlitz (Salish) Dictionary*. Ms. in Kinkade's possession.
24. Kinkade, "Upper Chehalis Dictionary" (*University of Montana Occasional Papers in Linguistics* No. 7, 1991).
25. From "Xwə'ni Travels," p. 258.
26. Helen H. Norton, "The association between anthropogenic prairies and important food plants in western Washington" (*Northwest Anthropological Research Notes* 13(2): 175–200, 1979).
27. The Chehalis myth, "Moon" (pp. 158–72), describes the mythological origin of these prairie plants.
28. "Nəxə'ntci Boy," 231.
29. See also Erna Gunther, *Ethnobotany of western Washington: the knowledge and use of indigenous plants by native Americans* (orig. 1945; rev. ed. Seattle 1973).
30. Daniel Boxberger, "The Introduction of Horses to the Southern Puget Sound Salish," pp. 103–19 in *Western Washington Indian Socio-Economics: Papers in Honor of Angelo S. Anastasio* (Bellingham, 1984).
31. "The Boy and the Fire," p. 223.
32. Adamson, "Folk-tales," pp. 293–303. This is the Humptulips version; there is an Upper Chehalis equivalent on pp. 21–23.
33. The flowers may have been the red spear-flowers mentioned in "Moon"; here they are said to "produce an effect like the glow from phosphorous wood."
34. See Frank Lang, "A study of vegetation change on the gravelly prairies of Pierce and Thurston Counties, Western Washington" (M.A. thesis, botany, University of Washington, 1961); Reid Schuller, "Native Flora and Vegetation of Glacial Outwash Prairies in the Puget Trough Lowland (6 pp. unpublished report, Washington Natural Heritage Program, 1983); and Roger DelMoral and David Deardorff, "Vegetation of the Mima Mounds, Washington State" (*Ecology* 57(3): 520–30, 1976). Several papers in the volume *Ecology and Conservation of the South*

- Puget Sound Prairie Landscape* (Patrick Dunn and Kern Ewing, eds., The Nature Conservancy of Washington, 1997) discuss native species, species composition, and preservation/restoration efforts of native prairies in central Western Washington.
35. County Tax Records.
36. Leopold and class 1985 historical stand data; Peter Morrison and Frederick Swanson, "Fire history and pattern in a Cascade Range landscape" (USFS PNW General Technical Report 254, 1990).
37. Leopold, personal interview, 1980.
38. Frank Ugolini and A. K. Schlichte, "The Effect of Holocene Environmental Changes on Selected Western Washington Soils. (*Soil Science* 116(3): 218–27, 1973)

Appendix

In "The Association Between Anthropogenic Prairies and Important Food Plants in Western Washington" (1979),¹ Helen H. Norton made the important discovery that a large proportion of the plants native to the fire-managed prairies of western Washington were useful in the economy of the local Native Americans, either as food, in the technology, or as medicines. This insight came from her analysis of the prairie plants in James G. Cooper's list of "Plants collected West of the Cascade Mountains during 1854–55."² Following Norton's precedent, we here analyze a more recently compiled native species list, Reid Schuller's and James Barrett's 1983 "Native Flora of Glacial Outwash Prairies in the Vicinity of Pierce and Thurston Counties, Washington—A Hypothetical Reconstruction." Only plants with documented economic uses are listed below; they comprise something over 30% of Schuller's and Barrett's 180 total.

Economically Useful Plants of the Native Prairies of Pierce and Thurston Counties³

	Cooper ⁴	Chappell ⁵	Native Use ⁶
Trees			
<i>Alnus rubra</i> , red alder			T, F
<i>Picea sitchensis</i> , Sitka spruce			T
<i>Pinus monticola</i> , white pine			t, m
<i>P. ponderosa</i> , Ponderosa pine	x		F
<i>Pseudotsuga menziesii</i> , Douglas-fir			T, f
<i>Pyrus fusca</i> , western crabapple	x		F, t
<i>Quercus garryana</i> , Oregon oak	x		F

	Cooper ⁴	Chappell ⁵	Native Use ⁶
Shrubs			
<i>Amelanchier alnifolia</i> , Saskatoon	x		T, F
<i>Berberis aquifolium</i> , tall Oregon grape	x		F, T
<i>Corylus nuttallii</i> , Pacific dogwood			T
<i>Cornus cornuta</i> , California hazel			F, T
<i>Holodiscus discolor</i> , creambush oceanspray			T
<i>Lonicera ciliosa</i> , orange honeysuckle	sp.		t
<i>Prunus virginiana</i> , chokecherry	sp.		F, t
<i>Rhamnus purshiana</i> , cascara			M
<i>Ribes sanguineum</i> , red currant			f
<i>Rosa pisocarpa</i> , clustered wildrose	sp.		f
<i>Rubus ursinus</i> , trailing blackberry			F, C
<i>Salix scouleriana</i> , Scouler's willow			t
<i>Symphoricarpus albus</i> , common snowberry			t, M
Herbs			
<i>Achillea millefolium</i> , yarrow	x	x	M
<i>Agrostis</i> spp. (four), bentgrasses			C
<i>Allium amplexans</i> , slim-leafed onion			F
<i>Apocynum androsaemifolium</i> , spreading dogbane			T
<i>Arctostaphylos uva-ursi</i> , kinnikinnick	x		F
<i>Balsamorhiza deltoidea</i> , Puget balsamroot	x	x	F
<i>Brodiaea coronaria</i> , harvest brodiaea	x		F
<i>B. hyacinthina</i> , hyacinth brodiaea	x		F
<i>Bromus carinatus</i> , California brome	x		C
<i>B. sitchensis</i> , Alaska brome			T, C
<i>Camassia leichtlinii</i> , Leichtlin's camas			F
<i>C. quamash</i> , common camas (some spp.)	x	x	F
<i>Carex</i> spp. (nine), sedges		x	C, T
<i>Danthonia californica</i> , California danthonia		x	C
<i>Delphinium menziesii</i> , Menzies' larkspur	x		t, m
<i>D. nuttallii</i> , Nuttall's larkspur	sp.		t, m
<i>Deschampsia caespitosa</i> , tufted hairgrass			t
<i>Dodecatheon hendersonii</i> Henderson's shooting-star	sp.	x	t
<i>Elymus glaucus</i> , blue wildrye		x	t
<i>Epilobium angustifolium</i> , fireweed	x		F
<i>Festuca idahoensis</i> , Idaho fescue		x	C
<i>Festuca occidentalis</i> , rubra western, red fescue	sp.		c

	Cooper ⁴	Chappell ⁵	Native Use ⁶
<i>Fragaria virginiana</i> broad-petalled strawberry	x	x	F
<i>Fritillaria lanceolata</i> , chocolate lily	x	x	F
<i>Goodyera oblongifolia</i> , rattlesnake plantain			M
<i>Heuchera chlorantha</i> , meadow alumroot			M
<i>Hieracium cynoglossoides</i> houndstongue hawkweed	sp.	x	f
<i>Juncus effusus</i> , common rush			t
<i>Koeleria cristata</i> , prairie junegrass	x	x	C
<i>Lilium columbianum</i> , tiger lily	x		F
<i>Lomatium triternatum</i> , nine-leaf lomatium	x		F
<i>L. utriculatum</i> , pomo-celery lomatium	x	x	f?
<i>Madia exigua</i> , <i>minima</i> , tarweeds	sp.		f?
<i>Mentha arvensis</i> , field mint	x		f
<i>Perideridia gairdneri</i> , Gairdner's yampah	x		F
<i>Poa pratensis</i> (2 more spp.), bluegrasses	sp.	x	C
<i>Polypodium glycyrrhiza</i> , licorise fern			m
<i>Polystichum munitum</i> , sword fern			T, f, m
<i>Potentilla glandulosa</i> , gland cinquefoil	sp.		f
<i>Prunella vulgaris</i> , self-heal	x	x	f
<i>Pteridium aquilinum</i> , bracken fern	x	x	F, t
<i>Satureja douglasii</i> , ⁷ yerba buena			f
<i>Trifolium</i> (four spp.), clovers	x		C
<i>Trillium ovatum</i> , white trillium			m
<i>Viola adunca</i> , early blue violet	x	x	m

Native use: C = forage foods of Cervids (deer and elk); F = food; M = medicine; T = technology. More important use given first; lower-case letters indicate that the species was relatively unimportant.

Additional Economically Useful Prairie Plants listed by James G. Cooper (1860)⁴

	Use	Environment
Trees		
<i>Pinus contorta</i> , lodgepole pine	T, F, m	DP
<i>Taxus brevifolia</i> , Pacific yew	T, M	B
Shrubs		
<i>Ceanothus sanguineus</i> , redstem ceanothus	C	B (Vancouver)
<i>Lonicera involucrata</i> , bearberry	t, C	WP
<i>Philadelphus lewisii</i> , mockorange	T, m	DP
<i>Prunus emarginata</i> , bittercherry	T, F	B

	Use	Environment
<i>Ribes divaricatum</i> , straggly gooseberry	F, M, t	B
<i>Rosa gymnocarpa</i> , dwarf wild rose	f	B
<i>R. nutkana</i> , common wild rose	F, M, t	DW
<i>Rubus leucodermis</i> , blackcap	F, t, c	DP, W
<i>Sambucus cerulea</i> , blue elderberry	F, t, m, c	DP
<i>Spiraea douglasii</i> , hardhack	t	WP
<i>Vaccinium caespitosum</i> , dwarf blueberry	F	P
Herbs		
<i>Agoseris glauca</i> , mountain carrot	f	DP
<i>Aquilegia formosa</i> , columbine	f, m	DP
<i>Chimaphila umbellata</i> , common pipsissewa	m	DW
<i>Cirsium undulatum</i> , wavy-leaved thistle	F	DG (Columbia)
<i>Conioselinum pacificum</i>	f	WP
Pacific hemlock-parsley		
<i>Disporum hookerii</i> , Hooker's fairybell	f	P
<i>Erythronium grandiflorum</i> , avalanche lily	F	P
<i>Fragaria vesca</i> , woods strawberry	F	P
<i>Galium triflorum</i> , bedstraw	p	B
<i>Geum triflorum</i> , prairie smoke-avens	m	Whidbey Island
<i>Heracleum lanatum</i> , cow parsnip	F	WP (coast)
<i>Hieracium scouleri</i> , wooly-weed	f	BW
<i>Osmorhiza occidentalis</i> , western sweet-cicely	f	P
<i>Plantago</i> (two spp.), plantain	C, m	P (Chehalis)
<i>Psoralea physodes</i> , California tea	m	P
<i>Stachys cooleyae</i> , hedge nettle	f	"wet grounds"
<i>Trifolium wormskejoldii</i> , springbank clover	F	P
<i>Vicia gigantea</i> , giant vetch	f	"sand" (Steilacoom)

Use: C = forage foods of Cervids (deer and elk); F = food; M = medicine; P = perfume; T = technology. More important use given first; lower-case letters indicate that the species was relatively unimportant. Environment: B = borders; BW = burnt woods; DG = dry ground; DP = dry prairies; DW = dry woods; P = prairies; W = woods; WP = wet prairies.

Notes to Appendix

1. *Northwest Anthropological Research Notes* 13(2): 175–200.
2. Pp. 55–70 in "Report of the Botany of the Route," pp. 13–70 in vol. 12 of *Reports of Explorations and Surveys to Ascertain the Most Practicable and Economical Route for a Railroad from the Mississippi River to the Pacific Ocean . . .* (36th Cong. 1st Sess., House Executive Document 56) (Serial Set no. 1055).
3. The base list is from Reid Schuller and James Barrett's "Native Flora of Glacial Outwash Prairies in the Vicinity of Pierce and Thurston Counties, Washington: A Hypothetical Reconstruction" (The Washington Natural Heritage Program, 1983). Schuller and Barrett compiled their list from several sources, both published and unpublished, dating between 1961 and 1982. Common names are from C. Leo Hitchcock's *Flora of the Pacific Northwest: an illustrated manual* (Seattle, 1973).
4. From James G. Cooper's "Plants Collected West of the Cascade Mountains during 1854–'55," pp. 55–70 in his "Report on the Botany of the Route." Only those plants listed as found on "prairie," "dry prairie," "wet prairie," "dry woods," and in a few cases geographically (Whidbey Island or Steilacoom; places outside Puget Sound if known locally as well) are included. Cooper's binomials are not always identifiable with modern scientific names. In some cases his originals have been identified successfully by Norton (1979), and are used here. "sp." in the Cooper column indicates that either unidentifiable species, or species other than those listed by Schuller and Barrett, are given on his list.
5. From Christopher Chappell and Rex Crawford, "Native Vegetation of the South Puget Sound Prairie Landscape," pp. 107–22 in Patrick Dunn and Kern Ewing, eds., *Ecology and Conservation of the South Puget Sound Prairie Landscape*, Seattle: the Nature Conservancy of Washington, 1997. Chappell and Crawford's list includes eighty species, both native and introduced, found in "contemporary prairie and oak woodland communities." Only those species occurring in the "Idaho fescue/White-top aster," "Oregon white oak/Long-stolon sedge-Camas," and "Oregon white oak/Snowberry/ Long-stolon sedge" communities are listed.
6. Standard ethnobotanical sources are used here. They include Erna Gunther's *Ethnobotany of Western Washington* (Seattle, 1973); Nancy Turner's *Plants in British Columbia Indian technology* (Victoria, 1979), *Food Plants of Coastal First Peoples* (Vancouver, 1995), and *Food Plants of Interior First Peoples* (Vancouver, 1997); and the "Environment" and "Ethnobiology and Subsistence" chapters of the *Northwest Coast* and *Plateau* volumes of the *Handbook of North American Indians* (1990, 1998). A notation indicates that the specific species was used by some, but not necessarily all, of the peoples of the two culture areas.
7. Listed as a prairie component only by Chappell and Crawford; not listed by Schuller and Barrett or Cooper.