

THE VEGETATION OF THE WILLAMETTE VALLEY¹

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ABSTRACT. The vegetation of the Willamette Valley, Oregon, has been modified by man for centuries. The earliest white men described the vegetation as extensive prairies maintained by annual fires set by Indians. The cessation of burning in the 1850s allowed expansion of forest lands on the margins of the former prairies. Today some of these forest lands have completed a cycle of growth, logging, and regrowth. Much of the former prairie is now in large-scale grain and grass seed production and is still burned annually. The pasture lands of the Valley are still maintained as open lands with widely scattered oaks. **KEY WORDS:** *Historical vegetation, Indian burning, Prairies, Vegetation change, Willamette Valley.*

THE vegetation of the Willamette Valley, Oregon, has changed significantly under human influence. The Indians of this area, at the time of contact with white settlers, set prairie fires annually, which created a prairie-open woodlands complex. The new settlers, who increased rapidly in the mid-nineteenth century, forced the Indians to leave. Their practice of annual burning was temporarily discontinued.

White settlers brought modifications of the habitat with their livestock and cropping, and more recently, forestry systems. The prairies were occupied early by livestock farmers and then converted to other agricultural practices, mostly grain production. Some burning continued, but only to remove the year's grain stubble or unused pasture trash. After the wheat market crash of 1898 some of the formerly plowed lands reverted to grass and

woods. The fire-tolerant, widely-spaced oak, fir, or pine seeded the so-called openings to form thickets that have grown to dense woodlands and forest. Firs now dominate these woodlands, because the firs are able to continue vertical growth and reach light more effectively than the broadleaf trees. A complete cycle has occurred in some locations. Mature 70 to 100-year-old fir trees have been harvested from formerly open prairie and parkland, and now new crops of seedlings have invaded the logged-over areas. A brief review of the literature on the vegetation of the Willamette Valley is in order (Fig. 1).

PREVIOUS REPORTS OF THE VEGETATION

John Smith missed the point when he charged that Shantz and Zon, on their map of the native vegetation of the United States, mapped the area of the Willamette Valley as covered by Douglas fir when, Smith thought, it was largely prairie.² Shantz and Zon were mapping a hypothetical climax vegetation.³

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¹ We are indebted to numerous students in biogeography classes, who contributed to the analysis of many of the individual townships used in this study, and to the Graphic Arts Service of the University of Oregon Library for final drafting of some of the maps. We appreciate the financial assistance provided by the Graduate School and the School of Continuing Education of the University of Oregon.

² J. E. Smith, "Natural Vegetation in the Willamette Valley, Oregon," *Science*, Vol. 109 (January 14, 1949), pp. 41-42. Smith failed to note that the vegetation at the time of white settlers' contact was not the "native vegetation," which may well have been some conifer other than Douglas fir, such as western hemlock; grass probably was not dominant in the Valley before human arrival. For evidence we need pollen analysis of conditions 250,000 years ago, which is not available. At present we only need look at the abundant trees on any woodlot not burned in the flat of the Valley. Everywhere some tree grows luxuriantly if given a chance.

³ H. L. Shantz and R. Zon, "Natural Vegetation," Part I, Sect. E, *Atlas of American Agriculture* (Washington: U. S. Government Printing Office 1924-36).

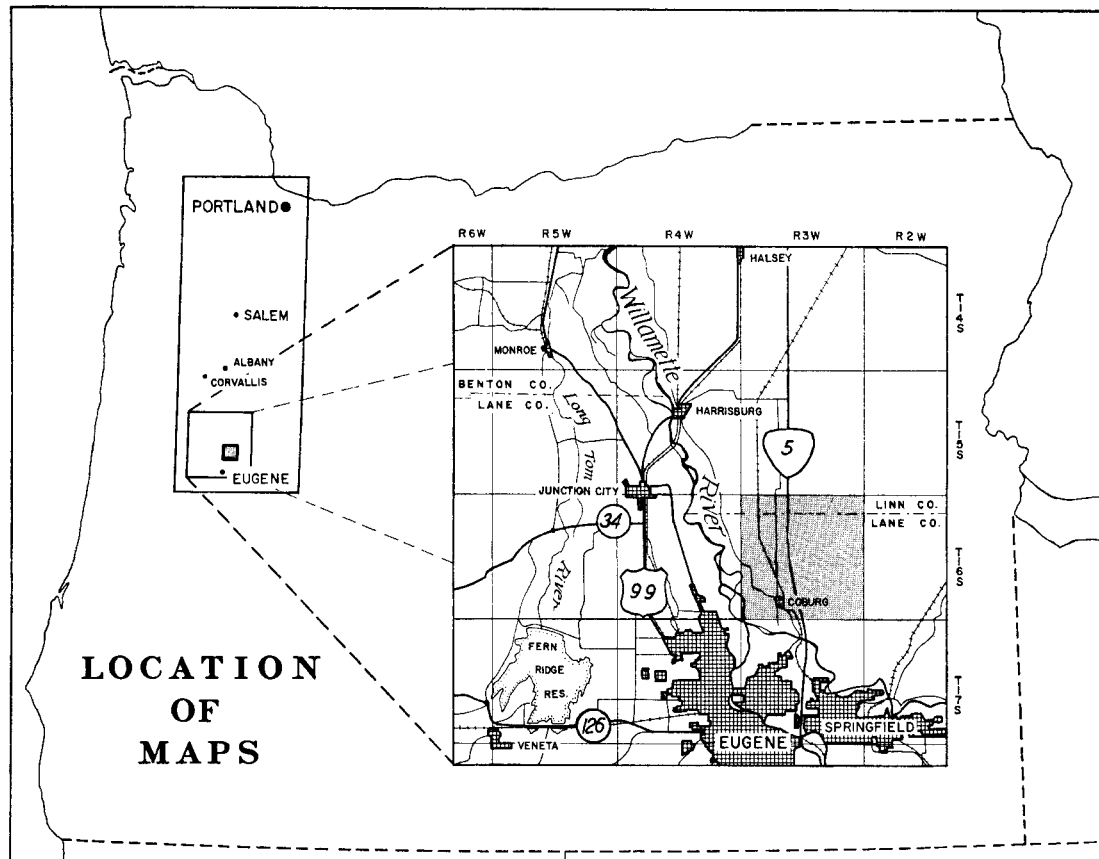


FIG. 1. The large rectangle shows the area covered by Figure 2. The enlarged rectangle is covered by Figures 3, 7, and 9. The shaded township is covered by Figures 4 and 8.

Their map is too small for our purposes even if it were appropriate. Smith's contention does, of course, support our conclusion that prairies covered the Valley.

In a township transect across the mid-Willamette Valley taken from 1853 survey maps, Habeck listed the vegetation types when the Valley was originally surveyed in the early 1850s.⁴ The types of vegetation Habeck found are the same ones that we use. The term oak openings was widely used in early surveys. The oaks were usually described as being large and solitary, though occasionally they were in

clumps. The most complete discussion of the Oregon white oak (*Quercus garryana*) association has been Thilenius' rather detailed ecological study of the species.⁵ Habeck used a distance of fifty feet (15 m) to witness trees as the critical length to indicate a differentiation between oak openings and oak forest. The boundary between oak opening and prairie was apparently fairly easy for the surveyors to demarcate for, with few exceptions, they drew this boundary on all their maps.

After his general transect across the Valley at the latitude of Corvallis, Habeck gathered

⁴ J. R. Habeck, "The Original Vegetation of the Mid-Willamette Valley, Oregon," *Northwest Science*, Vol. 35 (1916), pp. 65-77. Common and scientific names for all species referred to in the surveyor's records are listed on page 71 and are not repeated here. We follow the nomenclature in Peck's *A Manual of the Higher Plants of Oregon*.

⁵ J. F. Thilenius, "The *Quercus Garryana* Forests of the Willamette Valley, Oregon," *Ecology*, Vol. 49 (1968), pp. 1124-33. The early surveyors made it clear that they were referring to both white and black oak in their use of the term oak opening by noting species at each section corner. Habeck, op. cit., footnote 4, p. 72.

detailed quantitative data about forest regeneration on a single township.⁶ Our field observations further south in the Valley corroborate his findings that:⁷

with settlement, the fires were controlled, and large portions of the oak openings have developed into oak forests. There is indication that these oak forests, in the absence of further disturbance, will be replaced by Douglas fir and/or big-leaf maple.

He pointed out the validity of using tree habit, open-grown oaks, fir, and maple, as indicators of a former park landscape, and tall spindly habit as an indicator of closely spaced forest regeneration.

Sprague and Hansen reported that fire scars on tree rings and age classes of trees indicate that the vegetation of the western side of the Valley was frequently burned prior to the arrival of pioneer settlers, but burning decreased sharply after 1848.⁸ A monumental work that gives insight into the problem of fires in western Oregon in historical times was written by William Morris.⁹ We have used this as a key to discover additional evidence for burning the vegetation in the Valley. A broader, geographical perspective is given by Franklin and Dyrness' volume on the forests of Oregon and Washington.¹⁰

Observations Before 1853

Several explorers and settlers visited the Valley before it was originally surveyed. Their records assist in the description of the vegetation of the area and indicate the processes operative in its development. The most extensive accounts providing evidence for early fires are those made by David Douglas in 1826 when he travelled up the Willamette Valley toward the Umpqua River. On Septem-

ber 27, 1826, at a point "58 miles up" the Willamette River, Douglas wrote:¹¹

Country undulating; soil rich, light, with beautiful solitary oaks and pines interspersed through it, and must have a fine effect, but being all burned and not a single blade of grass except on the margins of rivulets to be seen. This obliged us to camp earlier than we would have otherwise done.

It is perhaps unwise to accept Douglas' mileage calculations too strictly, for it is assumed that this comment refers to the first plain that would offer an agreeable view, such as above the falls of the Willamette, out of the forests of the lower part of the Valley. Apparently a grass fire had recently been widespread and had thoroughly burned the prairie in this area.

Douglas' following notation found him camped "on the south side of the Yamhill River" where he wrote:¹²

On the 28th and the two following days we travelled in a southwest direction over a fertile woody country abounding with small streams, plains, and belts of large oaks: deer being scarce in consequence of the plains being burned by the Indians to compel these animals to seek food in certain parts more convenient for hunting.

In a continuation of the account of the twenty-eighth of September, Douglas wrote:¹³

Country much the same as yesterday. Friday, 29th. . . . Country not different from yesterday. Travelled about thirteen miles. Nothing new came under my notice.

These comments indicate that Douglas, in travelling on the west bank of the Willamette River, met burned areas so extensive that game had departed the area. He unhesitatingly attributes the cause of the burns to Indian activity, and subsequently offers an explanation for their action.

Another day Douglas still continued to comment on the burned prairies:¹⁴

Sunday, Oct. 1st. . . . I had not gone more than half a mile from the camp when I observed a very large wasp nest, which had been attached to a tree, lying on the plain where the ground was perfectly bare and the herbage burned, taken there by the bears.

The bare ground was indicative of the thor-

⁶ J. R. Habeck, "Forest Succession in Monmouth Township, Polk County, Oregon since 1850," *Montana Academy of Science*, Vol. 21 (1962), pp. 7-17.

⁷ Habeck, op. cit., footnote 6, p. 16.

⁸ L. F. Sprague and H. P. Hansen, "Forest Succession in the McDonald Forest, Willamette Valley, Oregon," *Northwest Science*, Vol. 20 (1946), pp. 89-98.

⁹ W. G. Morris, "Forest Fires in Western Oregon and Western Washington," *Oregon Historical Quarterly*, Vol. 35 (1934), pp. 313-39.

¹⁰ J. F. Franklin and C. T. Dyrness, *Vegetation of Oregon and Washington*, Forest Service Research Paper PNW-80 (Portland, Ore.: Pacific Northwest Forest Experiment Station, 1969).

¹¹ D. Douglas, *Journal Kept by David Douglas During His Travels in North America 1823-1827* (New York: Antiquarian Press Ltd., 1959), p. 123.

¹² Douglas, op. cit., footnote 11, p. 66.

¹³ Douglas, op. cit., footnote 11, p. 214.

¹⁴ Douglas, op. cit., footnote 11, p. 215.

oughness of the fire in clearing the surface of all litter. It is plausible to assume that such a "cleansing by fire" also removed almost all the brush and young tree seedlings along with the grasses. On the following day Douglas stated:¹⁵

Monday, 2nd. . . . Course due south, inclining to the west. Country the same as yesterday, rich but not yet a vestage of green herbage; all burned except in the deep ravines. . . . As no place could be found suitable for fodder for the horses, we had to travel till four o'clock, we camped at a low point of land near a woody rivulet. Marched twenty-one miles. My feet tonight are very painful and my toes cut with the burned stumps of a strong species of *Arundo* and *Spires tomentosa*.

At this point Douglas was perhaps roughly west of present-day Salem. It is remarkable that he should have travelled approximately twenty-five miles (40 km) from the Yamhill River to west of Salem and found the land so thoroughly burned that his horse lacked fodder. In two more days and approximately fifteen miles (24 km) farther south in the area of present-day Albany, directly opposite Mt. Jefferson, Douglas wrote:¹⁶

Thursday, 5th. . . . Camped on the side of a low woody stream in the centre of a small plain—which, like the whole of the country I have passed through, is burned.

During the following seven days the accounts continue the same theme.

The significance of his having travelled fifteen days through the Willamette Valley from near the Oregon City falls to its southern extremity without finding enough food for his horses or game for himself further establishes the extent and completeness of burning. Certainly such extensive burning had a great influence on the Valley's vegetation. In 1826, there were practically no white settlers in the Valley to protest Indian burning. The conscious setting of fires by Indians can be seen clearly by the pattern of burning, with its interfingering of streams and galeria forest in the bottomlands (Fig. 2).

A few years later (1834) John Work, an employee of the Hudson's Bay Company, observed Indians setting fires during the early summer.¹⁷

July 2. Fine. Continued our course 6½ hours across

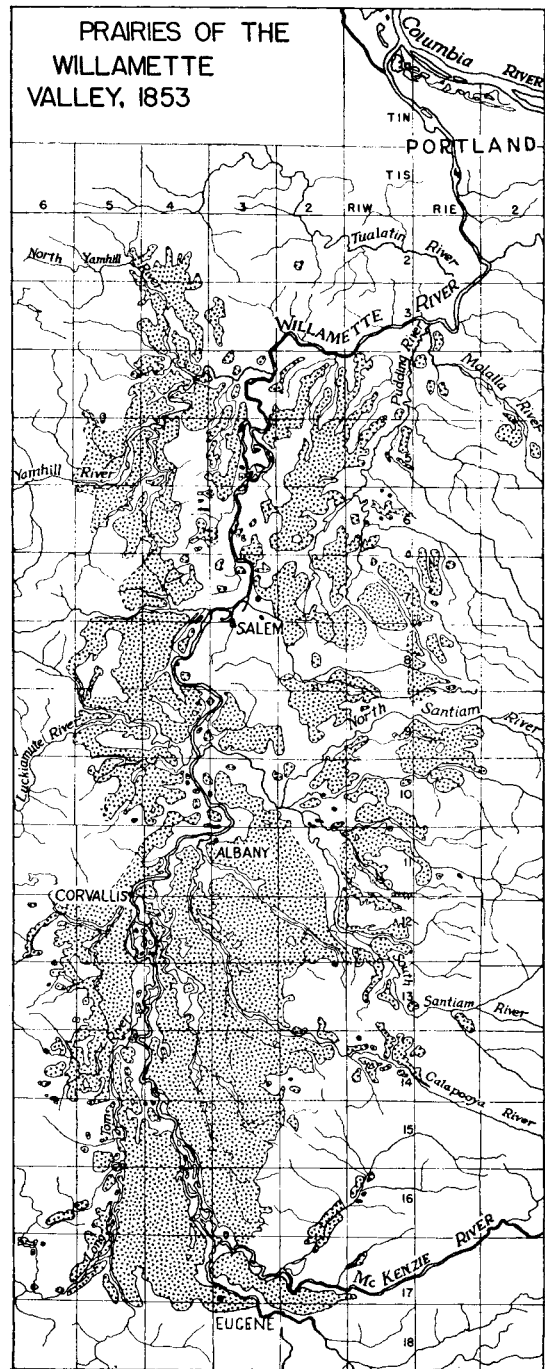


FIGURE 2.

Vancouver to Umpqua River, and Return, in 1834," *Oregon Historical Quarterly*, Vol. 24 (1924), pp. 236-68, esp. p. 264; and F. J. Young, ed., "John Work's Journey to Umpqua River, 1834, comments by Leslie M. Scott, ed.," *Oregon Historical Quarterly*, Vol. 24 (1924), pp. 238-68.

¹⁵ Douglas, op. cit., footnote 11, p. 215.

¹⁶ Douglas, op. cit., footnote 11, p. 216.

¹⁷ L. M. Scott, ed., "John Work's Journey from Fort

the plain to River Lauries Mary's River . . . where we camped. The Indians set fires to the dry grass on the neighboring hill, but none of them came near us. The plain is also on fire on the opposite side of the Willamet.

This comment refers to the general area south of Corvallis.

On August 18, 1840, approximately thirty miles (48 km) south of the Santiam River on the east side of the Willamette Valley, a missionary complained of a similar problem experienced by David Douglas, a lack of food for his horses due to recent fires. Gustavus Hines wrote:¹⁸

The prairie had been all overrun with fire a short time previous, and it was with difficulty that we could find sufficient feed for our horses. However, around the pool, the grass was so green that the fire had passed it.

In September, 1841, Charles Wilkes, U. S. Navy Lieutenant, was exploring southwards along the west bank of the Willamette River and described this situation on the ninth:¹⁹

In the course of the day they passed Creole creek, and encamped on the Ignas. The atmosphere during the day had become quite thick, owing to the smoke arising from the burning of the prairies.

Farther south on the following day Wilkes commented:²⁰

On the 10th, the country was somewhat more hilly than the day previous, but still fine grazing land. . . . The country had an uninviting look, from the fact that it had overrun by fire, which had destroyed all the vegetation except the oak trees, which appeared not to be injured.

It is possible that if fires were set frequently, perhaps each year, the amount of litter accumulated annually would have been insufficient to produce a fire of high enough intensity to destroy established oak trees. The random failure of fire to kill young oak trees accounts for widely spaced oaks on the margins of the Valley. In the middle of the prairies frequently no trees were found by the surveyors between 1853 and 1855. This may relate to the greater frequency of fires at the center of the prairies than on their margins,

but also may relate to the virtual lack of any surface declivities that might provide some protection to the seedling. The oaks are on slightly higher ground.

W. D. Brackenridge, the botanist who accompanied Wilkes, commented on the circumstances of the next day:²¹

11th. Struck into what our hunter [guide] called the long prairie, at the entrance to which is Marshes Creek, a still small pond of water. The N. East side of this prairie is bounded for a considerable distance by the Lamale River i.e. now the Long Tom River, which is about twenty yards broad and very still. On the banks grew Dogwoods, Spires, Willows, Alder, and close by clumps of large *Pinus*, near to *P. ponderosa*, procured Seed of *Madia elegans* [tarweed], but the rascally Indians by setting fire to the prairies had deprived us of many fine plants, land still good. (Course S. by East, distance 24 miles.)

By the middle of September the Wilkes party had reached the extreme southern end of the Willamette Valley and were about to cross the divide into the basin of the Umpqua River. At this point Brackenridge wrote:²²

15th day. . . . day very fine but dense with smoke from the prairie fires in the vicinity. On top was a small grassy plain . . . The woods had been lately on fire here.

Brackenridge thus indicated that fires burned the prairies to the extreme upper end of the Willamette Valley, perhaps as far as present-day Cottage Grove. David Douglas suggested the same idea when he commented upon the lack of fodder for his horses as he neared the Umpqua River drainage.

In November, 1844, James Clyman described evidence of grass fires in the vicinity of the Yamhill River:²³

5. Crossed a range of high rounded hills covered with excellent grass and where it had been burned 16 or 18 days it was now green and fair pasturage that which had not been burned off was likewise green and good grazing crossed the Yamhill River . . .

6. . . . had no success in hunting—the deer appear to be plenty But confine themselves to the thickets which are almost impassable through this whole region of country.

¹⁸ G. Hines, *Wild Life in Oregon*, second edition of *Life on the Plains of the Pacific* (New York: Hurst and Co., 1881).

¹⁹ C. Wilkes, *Narrative of the U. S. Exploring Expedition During the Years 1838, 1839, 1840, 1841, 1842* (Philadelphia: Lea and Blanchard, 1845), Vol. IV, p. 222.

²⁰ Wilkes, op. cit., footnote 19, p. 222.

²¹ O. B. Sperlin, ed., *The Brackenridge Journal for the Oregon Country* (Seattle: University of Washington Press, 1931), p. 57.

²² Sperlin, op. cit., footnote 21, p. 58.

²³ C. L. Camp, ed., *James Clyman, Frontiersman* (Portland, Oregon: Champoeg Press, 1960), pp. 120–21.

Clyman again referred to this particular region on the tenth and eleventh of November:²⁴

A beautiful extensive view of the Yam Hill stretching away to the N. W. until it mingled with the Brown rolling oak hills rising into the dark green Fir mountains beyond the valley itself covered in a young growth of green grass the old having been burned off not exceeding thirty days (ago) . . . great quantities of wild geese seen flying and feeding on the young grass of the lately Burned Prairies.

Apparently the late fall was not the only time of year when fires could burn in the Willamette, for Clyman recorded on March 15, 1845, "no change except the valley is somewhat enveloped in smoke."²⁵

David Douglas was one of the first to suggest that the Indians in Oregon practiced a form of game management through clearing land by fire. They left small unburned patches where deer could be hunted more easily. Wild honey and grasshoppers were also obtained more readily after a fire.²⁶ Circle hunts using a decreasing ring of fire also increased hunting efficiency. Fine descriptions of these are given by S. A. Clarke and by John Minto.²⁷

After the annual burning in September the Indians procured the seed of the sunflower with such ease that Charles Wilkes said it was a staple.²⁸ *Lamoro sappolil* or tarweed, as it was called by Jesse Applegate, provided a "wild wheat" that was harvested after fires in late autumn by the Indians of Polk County, Oregon.²⁹ Clarke indicated yet a fourth reason for burning by Indians, so "no hostile war party could approach unseen." He considered this to be the "chief object" of the use of fire. Certainly if this were to be an effective means of defense, the Indians would have had to burn off any woody vegetation and grass at every opportunity.

The results of the cessation of burning were

²⁴ Camp, op. cit., footnote 23, p. 121.

²⁵ Camp, op. cit., footnote 23, p. 121.

²⁶ Douglas, op. cit., footnote 11, p. 214.

²⁷ S. A. Clarke, *Pioneer Days of Oregon History* (Portland: J. K. Gill Company, 1905), Vol. I, pp. 89-90; and J. Minto, "The Number and Condition of the Native Race in Oregon when First Seen By White Men," *Oregon Historical Quarterly*, Vol. I (1900), pp. 296-315.

²⁸ Wilkes, op. cit., footnote 19, p. 358.

²⁹ J. Schafer, ed., *A Day With the Cow Column in 1843 by Jesse A. Applegate. Recollections of My Boyhood by Jesse A. Applegate* (Chicago: The Caxton Club, 1943), p. 137.

noted near Champoe on "French Prairie," by H. W. Scott:³⁰

The prairie contained perhaps one hundred and fifty square miles of irregular dimensions, and was free of timber. . . . The prairie had been an Indian grazing ground, and was evidently kept clear of trees by fires set by the Indians for that purpose. At present it contains groves of trees in many places, obscuring the view and changing the old time condition.

There is further proof, through direct observation, that fires in the Valley were regularly set each year by the Indians. In telling of his pioneer life in Polk County, Jesse Applegate commented upon the frequency of Indian-set fires and gave a vivid description of one in 1844:³¹

It is probable we did not yet know that the Indians were wont to baptise the whole country with fire at the close of every summer; but very soon we were to learn our first lesson. This season the fire was started somewhere on the south Yamhill, and came sweeping up through the Salt Creek gap. The sea breeze being quite strong that evening, the flames leaped over the creek and came down upon us like an army with banners. All our skill and perseverance were required to save our camp. The flames swept by on both sides of the grove; then quickly closing ranks, made a clean sweep of all the country south and east of us. As the shades of night deepened, long lines of flames and smoke could be seen retreating before the breeze across the hills and valleys. The Indians continued to burn the grass every season, until the country was somewhat settled up and the whites prevented them; but every fall, for a number of years, we were treated to the same grand display of fireworks. On dark nights the sheets of flame and tongues of fire and lurid clouds of smoke made a picture both awful and sublime.

This comment, in agreement with Charles Wilkes, clearly states that the burning was annual. No attempt was made by man to stop the flames. Only when the whites, whose property would be endangered, arrived in sufficient numbers were the Indians restrained from firing the Valley. The attitude of familiarity and acceptance with which Applegate looked upon these holocausts is indicated by another comment:³²

One evening after dark we heard loud screaming or yelling a mile and a half away across the prairie,

³⁰ H. W. Scott, *History of the Oregon Country* (Cambridge, Massachusetts: Riverside Press, 1924), Vol. 2, p. 221.

³¹ Schafer, op. cit., footnote 29, pp. 137-38.

³² Schafer, op. cit., footnote 29, p. 139.

and presently a fire was seen to start up like a flash. Someone said it must be a band of Indians on the warpath, whooping, and firing the grass, for it was autumn and the grass was dry. The facts were, as we learned next day, that Uncle Charlie's truck [Wooden wagon] heavily loaded and drawn by three yoke of oxen, was enroute across the valley and one of the spindles took fire.

The Applegate pioneers were apparently quite ready to attribute any grass fire to the activity of the local Indians.

This list of benefits indicates that fires in the Valley were a common occurrence long before the white man arrived. Fires probably had been influencing the development of the prairie and open-woods type of vegetation in the Valley for millenia. By the time of contact by the white man, the recurring fires had allowed only grasses and certain resistant oaks to exist in many parts of the Valley, especially on the flats. Many of the prairies have been maintained to the present by cultivating, grazing, or burning the lands. In most cases where these activities have not been practiced the woodlands have expanded and taken over the former prairies.

CHANGES IN THE VEGETATION

Method

Documentation of vegetation for 1853 and 1969 is assembled from early written accounts, maps, current observations, and aerial photographs that permit the tall woody vegetation to be mapped at several scales. The vegetation associations have been mapped in an ideographic manner to illustrate conditions of the two time periods. The accuracy level is approximately equal to the early survey records. The first surveyors recorded vegetation along section lines and corners and recorded on maps of each township the boundaries between the prairie and oak opening or woodland. As a result of good recent base maps and aerial photographs, supplemented with field observations, our data are probably more complete than the 1853 surveys.

The vegetation types identified by the earliest government surveyors were those commonly in use by earlier explorers and settlers, such as Lewis and Clark, David Douglas, Jesse Applegate, James Clyman, and others.³³

³³ R. G. Thwaites, ed., *Original Journals of the Lewis and Clark Expedition, 1804-1806* (New York: Dodd, Mead & Company, 1904-1905); Douglas, op.

They used such terms as prairie, low wet prairie, and marsh for habitats that we generalize in the prairie symbol. For the wooded habitat they used scattered oak or pine or fir, oak openings, ash swale, and bottomland timber. (Bottomland timber included the bigleaf maple, black cottonwood, Oregon white ash, Douglas fir, and red cedar.) Dense forest to the early surveyors was by comparison to the present a very open stand of trees. The forests were composed of Douglas fir, western hemlock, western red cedar, and bigleaf maples on moist sites. On the drier habitats were an open stand of Douglas fir, ponderosa pine, incense cedar, oaks, and madrone.

The original survey at a scale of 1:31,680 was by individual townships.³⁴ Each township map showed the location of roads, trails, houses, other buildings, and plowed land, as well as the boundaries of the prairies and wooded lands and the type of soil and relief. Several maps, including those produced by the United States Forest Service, were considered for use in compiling maps of the modern vegetation, but all had significant shortcomings.³⁵ Our maps had to be compiled from United States Geologic Survey topographic maps, aerial photographs taken in 1960 and 1968, and field observation.³⁶ The size of the area and the types of information desired for comparison with earlier records led us to use a qualitative ideographic methodology in establishing the boundaries of the dominant or significant types of plant cover (Figs. 2, 3, 4, 7, 8, and 9).

Copies of the original maps and the field notes from the period between 1852 and 1855

cit., footnote 11; Schafer, op. cit., footnote 29; and Camp, op. cit., footnote 23.

³⁴ Township maps and field notes, Willamette Meridian, Oregon. Surveyor General's office, Oregon City, Oregon, 1852 and 1853. The original maps and field notes are now held by the Bureau of Land Management, Portland, Oregon.

³⁵ H. J. Andrews and R. W. Collin, *Forest Type Map of the State of Oregon* (Portland, Oregon: Pacific Northwest Forest Experiment Station, 1936); *Forest Type Map of Lane County, Oregon, 1:63,360* (Portland, Oregon: Pacific Northwest Forest Experiment Station, 1956); and *Forest Type Map of Benton County, Oregon, 1:63,360* (Portland, Oregon: Pacific Northwest Forest Experiment Station, 1940).

³⁶ We used the Halsey, Monroe, Brownsville, Elmira, Eugene, and Marcola topographic maps at a scale of 1:62,500, Agricultural Stabilization and Conservation Service aerial photographs taken in 1960 at a scale of 1:20,000, and a 1:63,360 mosaic of their 1:20,000 photographs taken in 1968.

VEGETATION OF THE UPPER WILLAMETTE VALLEY 1853-'54

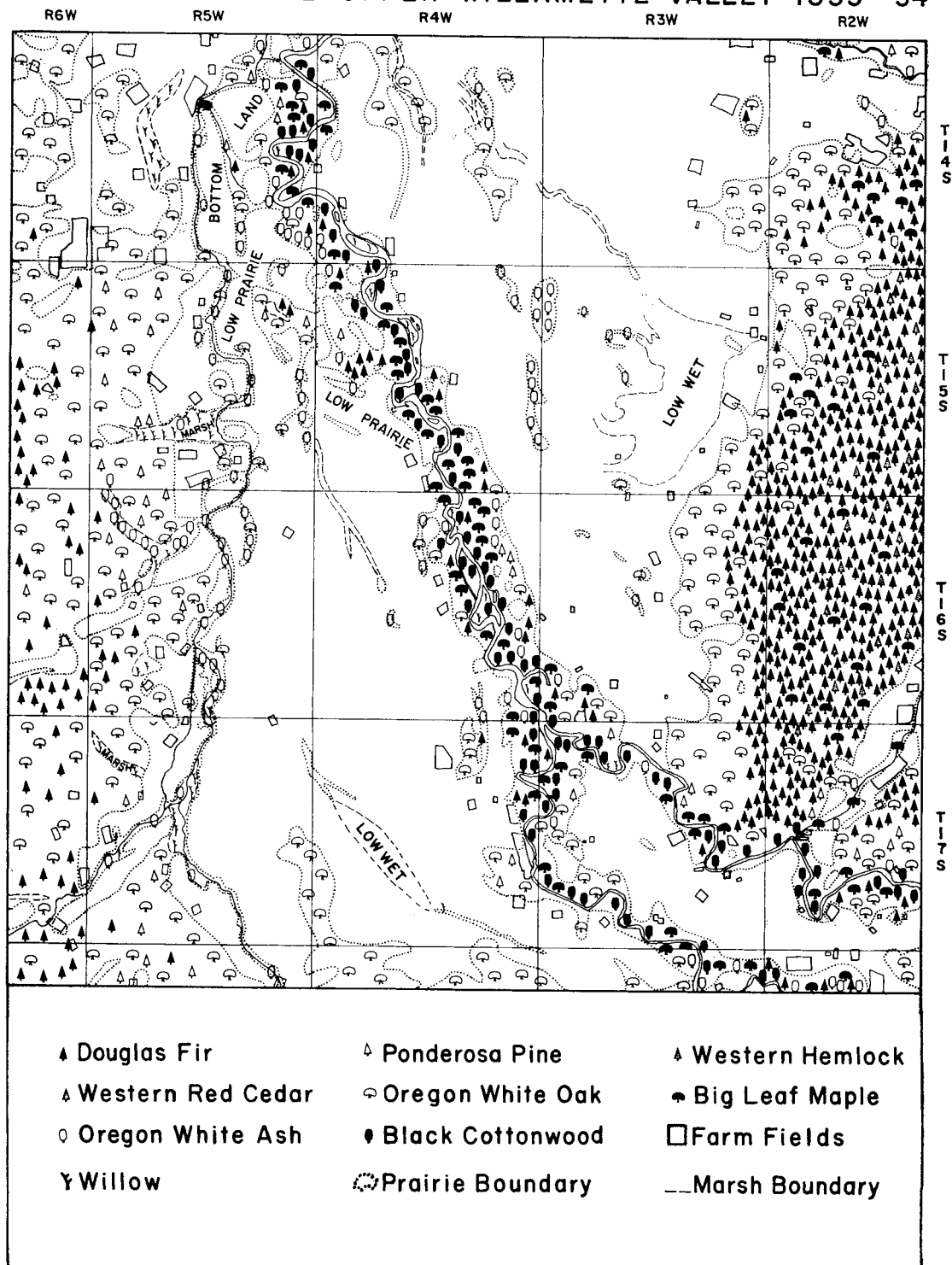


FIGURE 3.

VEGETATION ON T16S, R3W IN 1854

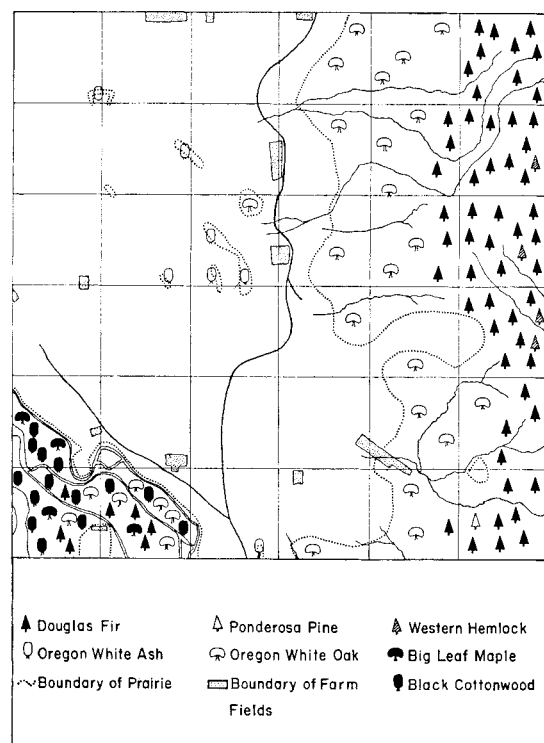


FIGURE 4.

were used to compile a map showing the distribution of prairies in the entire Valley (Fig. 2). Greater detail is shown with decreasing scale when the best estimates of the distribution of the dominant vegetation are plotted for the southern, or upper, part of the Willamette Valley (Fig. 3), and for a single township, on the basis of the original survey map, with additional vegetation information gained from the original surveyors' notes (Fig. 4).

The Vegetation at the Time of the First Survey

Prairies dominated the Valley landscape at the end of Indian control. Trees grew in gallery forests along the streams, and in woodlands on the steeper slopes. Isolated oaks, pines, and firs in the prairie were related to special conditions such as former dwelling places of Indians, thin soil, rock outcrops, slight rises (oak) or depressions (ash), trails, and the infrequent accident of being missed by annual fires when young.

For example, the surveyors frequently found no trees at all in the flat of the Valley, and had to utilize marking systems other than the

TABLE 1.—SURVEYOR'S NOTES WRITTEN IN 1854

To the West Between Section 20 & 29 Township 16S, Range 3W, Willamette Meridian	
Chs & Lks	
S 89° 36'	W on True Line Betwn Sections 20 & 29* Var. 19° 30' E
30.70	Dr David HouseBears, North about 250 Links
39.85	Set Qr Section Post Deposited one Pint Charcoal and Raisid Mound with Trench as per Instructions
79.70	To Section Corner Land Level Prairie, Soil good 1st Rate Clay Loam

* Spelling and punctuation is as it appears in the field notes.
Source: General Land Office, Surveyor's field notes, 1854, Book 28, p. 144. Original notes held by Bureau of Land Management, Portland, Oregon.

traditional witness trees. They buried a pint of charcoal, drove charred stakes, piled rocks, dug trenches, and made mounds in the absence of trees. A quotation from the surveyor's field notes between sections 20 and 29 of T16S, R3W, is typical of conditions on the open prairie (Table 1, Fig. 4). The survey lines were always eighty chains, or one mile (1.6 km), in length and bounded a section. The field notes of the surveyors provide a grid of vegetation types that leaves little doubt of the existence of prairie. By combining this grid with their sketches of the boundary between prairie and wooded lands we have been able to reconstruct a reasonable map.

Upon leaving the prairies and entering the ash swales, the vegetation must have seemed dense, because the early surveyors referred to the swales as thickets. When they entered the bottomland timber they said it was difficult to traverse and commented about the thick underbrush and large size of the cottonwoods. On hills surrounding the margins of the Valley they recorded that their lines continually intersected trees, but they were able to survey in the oak and fir openings. In the forests near the crest of the hills they did not survey completely but recorded that they were in heavy timber.

On the prairies, witness trees became progressively less abundant with increased distance from the hill slopes and the bottomland timber along the rivers. Frequently, the surveyors, when working on the prairie, made the statement that there were no trees in sight,

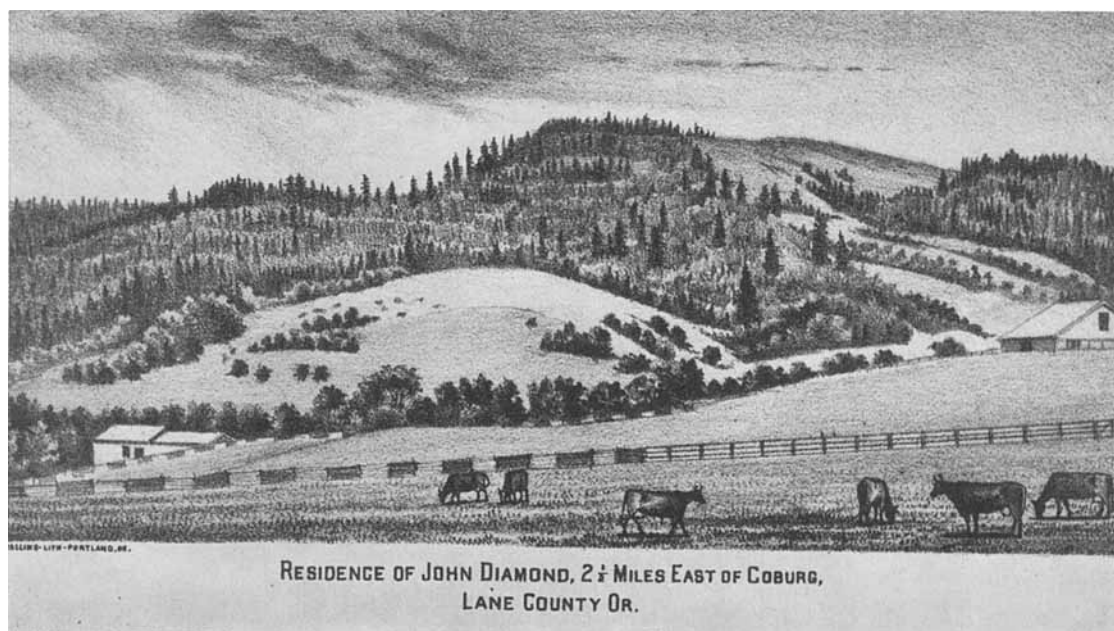


FIG. 5. Looking east toward the Coburg Hills in approximately 1880. Large prairies on hills were overgrown with Douglas fir and then logged, as seen in Figure 12.

especially when they were surveying the low wet and marshy prairies.

For comparison, the line between sections 25 and 26 of T16S, R3W (Table 1, Fig. 4) transects the prairie salient near the crest of the Coburg Hills on the steepest part of the slope. The section line at the top of the hill passed through prairie for almost half a mile.

We find additional evidence of the nature of the vegetation from sketches of the Coburg Hills apparently drawn in the early 1880s (Fig. 5) in this same area east of Coburg, and south of Skinner's Butte near Eugene (Fig. 6).³⁷ These further substantiate the evidence obtained from the 1853 maps and surveyors' records. The sketches show different views of the salient of prairie that extended from the flat of the Valley to the crest of the hills (Figs. 3 and 4, Table 2). The encroachment of woody growth can be observed between the scattered tall conifers. This indicates that the oak openings with scattered firs had already become established, forming a dense stand of young regrowth. The firs in the picture would have grown approximately thirty

feet (9 m) above the lower vegetation in the thirty plus years since the 1853 survey was made. The view of Spencer's Butte from Skinner's Butte in downtown Eugene illustrates the

TABLE 2.—SURVEYOR'S NOTES WRITTEN IN 1854

To the North Between Section 23 & 24 Township 16S, Range 3W, Willamette Meridian	
North Between Sections 23 & 24	Var 21° 25' E
9.50	Leave oak openings and Enter Prairie N.E.
22.35	Began to ascend Hill
40.00	Set Qr Section Post From Which*
	a Maple 10 in Dia Bears. S 44° E 92 Links
	a W. Oak, 10 in do do N 7° W 450 do
56.50	Top of Hill and Enter Fir Timber S.E
70 00	Began to descend Hill
78.50	ascend Hill
80.00	Set Post corner of Sections 13, 14, 23, & 24
	Which
	a Fir 18 in Dia Bears. N 48° W 18 Links
	a do 30 in do do N60° E 20 do
	a do 26 in do do S 88° E 57 do
	a do 28 in do do S 63 W 124 do
	Land Broken 2nd Rate Hills to steep for
	cultivation Timber 2nd Rate
	Fir oak Pine & C (cedar) undergrowth
	Hazle and oak.

³⁷ A. G. Walling, *Illustrated History of Lane County, Oregon, Compiled from the Most Authentic Sources* (Portland, Oregon: the author, 1884).

* Spelling and punctuation is as it appears in the field notes. Source: General Land Office, Surveyor's field notes, 1854, Book 28, pp. 95-96. Original notes held by Bureau of Land Management, Portland, Oregon.

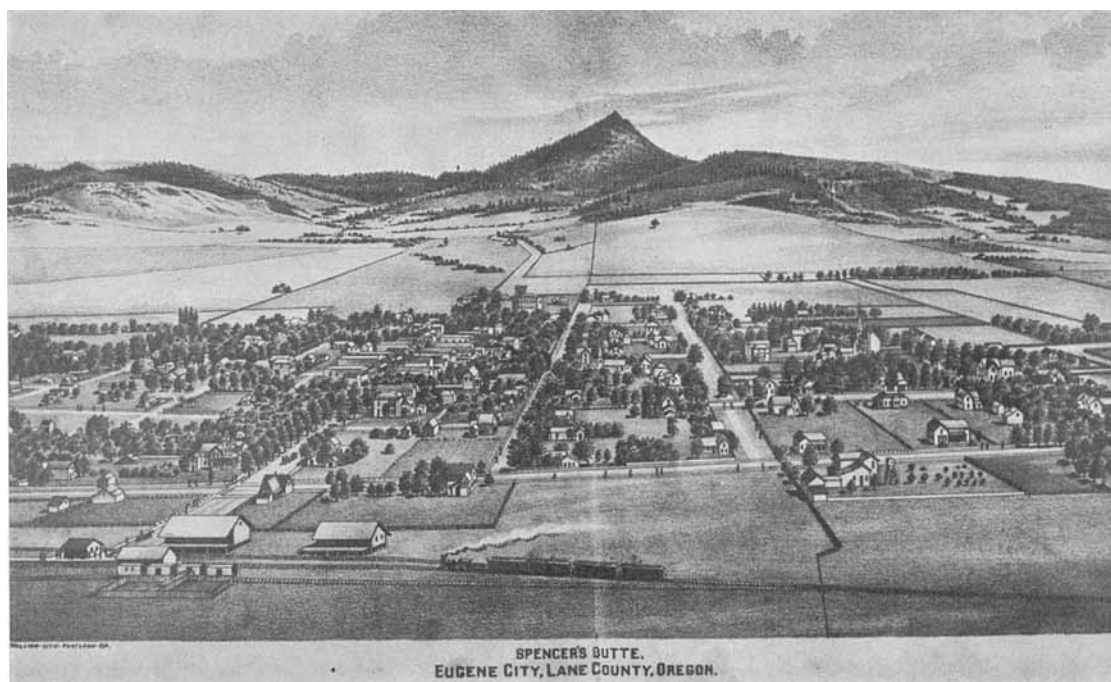


FIG. 6. The bare foothills of Eugene, Oregon, during the late 1880s. These foothills are currently covered with oak and fir forests and make favored building sites.

paucity of tall timber on the southern hills, and its virtual absence on the lower hills in the foreground (Fig. 6).

Changes Between 1853 and 1969

Changes on the Prairies

The greatest change, as measured by total surface area modified, is in the prairie land that has been plowed and planted to such crops as grain and grass seed. Smaller changes can be observed in groves of moisture-loving trees that previously had been restricted in area and have now expanded along the drainage channels of the Valley flats. In some locations near the fringes of the Valley, and especially on pastures and fallow farm lands, certain trees and shrubs, some considered weeds by the farmers, have invaded the former prairie lands (Fig. 9). The black hawthorne, poison oak, and wild rose are examples of species found in these fields and fence rows. They form a thick growth and frequently make the former locations of fences visible even though the posts and wires have long since disappeared. Pine, fir, madrone, and oak also invade some areas (Fig. 10). Other

changes include ornamental trees and plants decorating the expanding urban concentrations in parts of the former prairie.

The annual burning of stubble still darkens the sky with smoke much as the grass fires did in Indian days, and scattered oaks still resist and survive these annual fires (Fig. 11). Apart from such cultural features as fence rows, roads, buildings, orchards, and woodlots, this surface looks much like the old prairie in midsummer.

Changes in Areas of Former Openings

Wild species, formerly suppressed by Indian-set fires, have invaded large areas that were previously open and park-like. In many instances a crop of logs has been harvested from such invading forests (Fig. 12). Logging activities have been persistent in the area, and now tree farms have been established to harvest trees in perpetuity from much of the surrounding hill country.

The oak openings around the hilly margins of the Valley became dense oakwoods and the cities began to encroach on these same hills. Douglas fir has invaded the oak woodlands and overtopped the oaks. After ap-

VEGETATION OF THE UPPER WILLAMETTE VALLEY — 1969

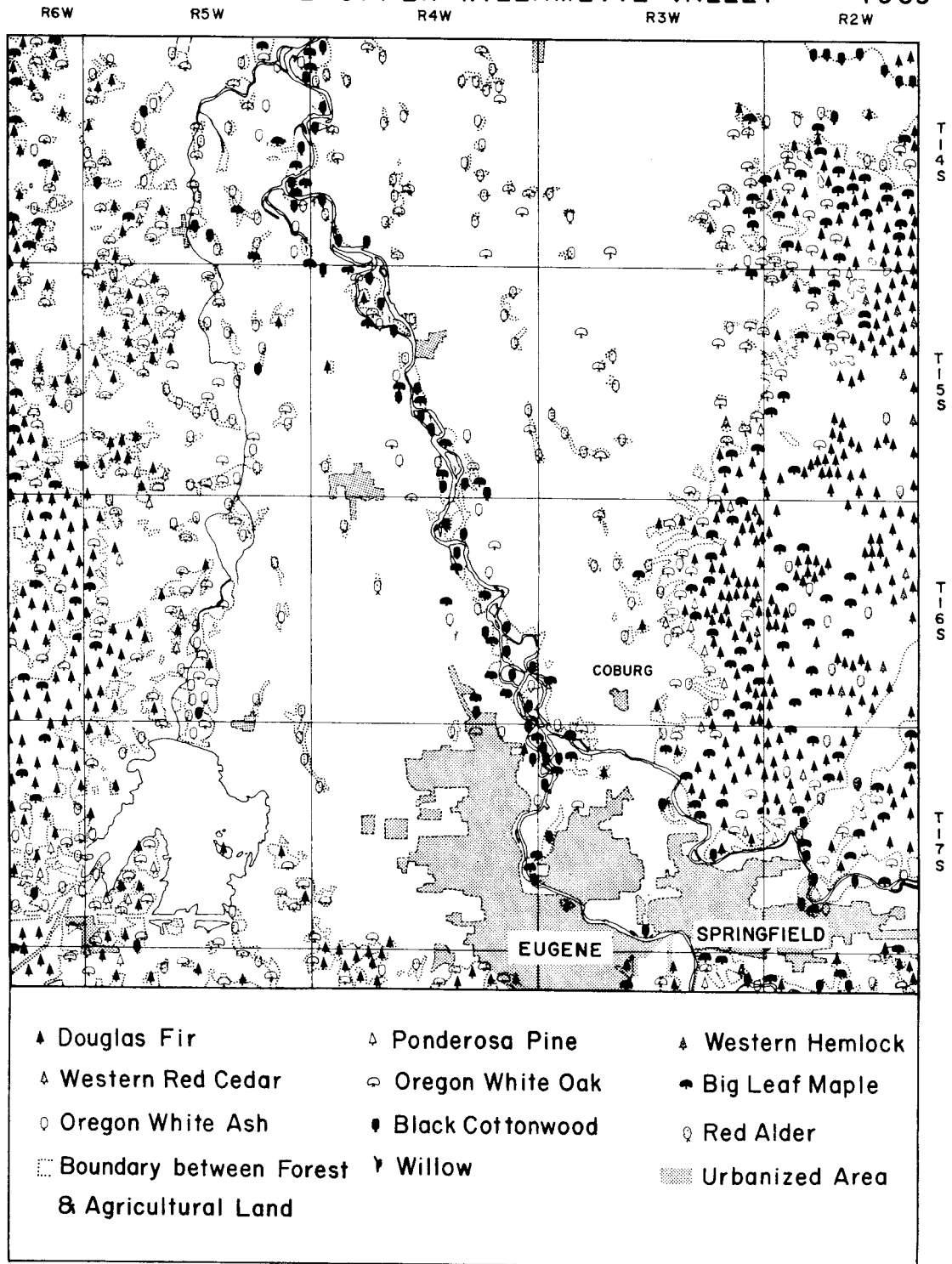


FIGURE 7.

VEGETATION CHANGE OF THE UPPER WILLAMETTE VALLEY 1854-1969

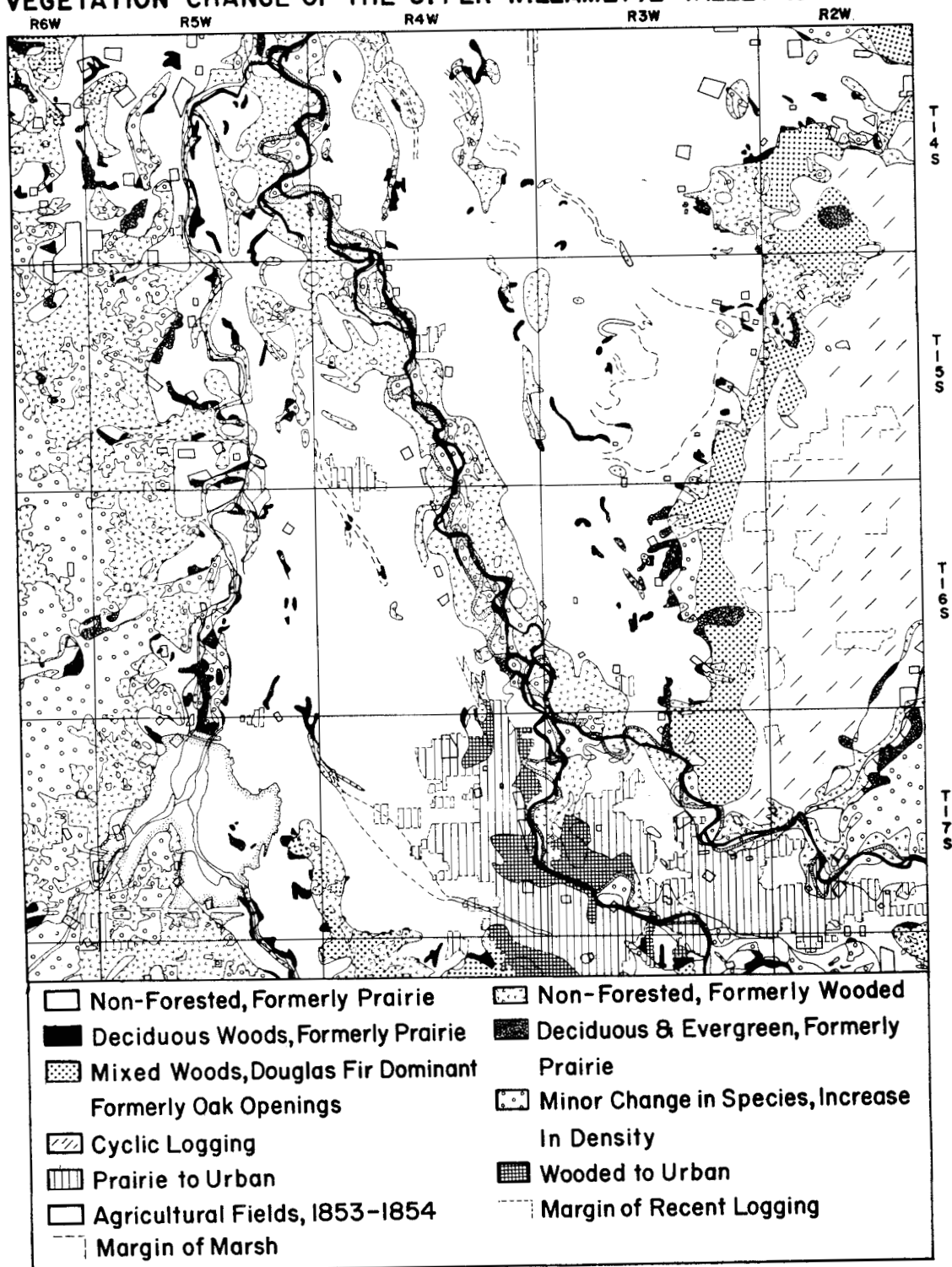


FIGURE 9.



FIG. 10. Young Douglas fir and Ponderosa pine take over former prairie near the eastern margin of the Valley.

proximately fifty years without fire the appearance of an oak woodland changes as the young Douglas fir grow above the older oak. Young adults who played as children in the oak woods south of Eugene now find Douglas fir forests on the same sites (Fig. 6).

Changes in Forested Lands

A frequent misinterpretation of the current forest resources of the area is that the surrounding forests were always as dense as they are now. In woods that have remained essentially unharvested over the last 100 years, in fact, crown densities are several times higher than was the case at contact by white settlers. The most striking difference in density is probably on the slopes of hills facing the open prairie, where firs now dominate the former oak woodlands and park landscape. The fir, hemlock, cedar, and pine woods on the east slopes of the Coburg Hills are probably less changed, as they were similarly forested under Indian influence. The Douglas fir trees, which now make up fifty percent or more of all

trees in most of the low elevation forests, have approximately eighty whorls, which means that these trees have had approximately eighty seasons of growth and are predominantly post-contact. Interspersed in this younger forest grow older [contact] trees with large lower limbs characteristic of open stands; the long lower limbs are dead in the shade of the more recent invaders.

Logging in these low elevation forests has changed both age distribution and species composition of almost every square mile of the areas mapped in the southern Willamette Valley. It remains (along with agriculture) a basic pillar of the local economy. So far the people of Oregon have not reserved nearby forest plots with a foresight that would seem appropriate for a people oriented to, and dependent on, the forest industry. Perhaps it will be necessary for the families that have benefited most from exploitation of the forest resources to lead the way in the establishment of suburban forest blocks. Appreciation must be generated for the benefits afforded by



FIG. 11. Oregon white oak stand scattered in a ryegrass field. Fields are still burned annually, and fire resistant oaks remain.

blocks of forest set aside for maintenance of clean air, restful environment, natural beauty, recreation, and a diverse habitat for animal life. The clearing of forest, especially on the rich bottom lands along the Willamette River and in the fir and pine areas on the western fringe of the Valley, have created a new, less crowded environment in these areas (Fig. 9).

SUMMARY

The broad, relatively flat terraces of the Willamette Valley were prairie lands at White contact. The Indians of the Valley burned these prairies and the adjacent woodlands in late summer and early fall, thereby producing plant associations in which woody plants were widely spaced. The closely spaced plants, presumably, had been burned when the ground was not moist enough to inhibit the passage of the fires. The dominant prairies of the early days have been occupied by agricultural, urban, and industrial activities, and the former association of prairie grasses has

generally disappeared or been highly modified by introduced species.

The bottomlands near the rivers have been cleared of most of their forest of black cottonwood, Oregon white ash, bigleaf maple, red alder, and Douglas firs. The loamy bottomland soils have provided rich agricultural harvests since severe flooding has been controlled by dams on the rivers. The poorly drained swales along the yazoo-type streams remain clogged with ash and bordered by oaks. Sedges, rushes, and occasionally willows indicate the waterlogged soils of the former wet prairies.

Dense oak woodlands developed from the park landscape of oak openings that bordered the Valley flats and extended nearly up to the crests of the surrounding hills. After the initial expansion of the Oregon white oak and black oak, Douglas fir was able to invade most of these hillslopes when they were dappled with shade by oak trees. Douglas fir also expanded



FIG. 12. Logged area on west side of Coburg Hills, near center of Figure 5.

onto previously grassy hillslopes when they were protected from fire by the colonists. The result was that, after fifty to seventy-five years, lumbering companies were able to harvest Douglas fir forests from the former grasslands and oak openings. With this harvesting of conifers (including much outright destruction of Ponderosa pine), the deciduous broadleaf components again expanded their domain, with oaks on the lower slopes and bigleaf maples on the higher wetter slopes or on shady sites on the north facing slopes.

Higher slopes with east and north facing aspects in the hills east of Coburg are regenerating coniferous forests of Douglas fir, western hemlock, and red cedar on logged-over

areas. A cyclic logging system was imposed on these coniferous forests that had increased in density since cessation of burning. This continues to the present. Some 200 to 300-year-old trees with dead lower branches still stand among the crop of tall but younger trees.

The vegetation existing today is analogous to what existed at the time of the original survey, although the species composition has significant differences of emphasis and extent. The invasion of prairie vegetation by trees and their persistence in the area, despite clearing and grazing, is one more argument that trees can grow on the Valley soils, and that the original prairies were artificially generated and maintained by fire.