

PATTERNS OF VEGETATION CHANGE IN GRASSLANDS, SHRUBLANDS, AND WOODLANDS OF SOUTHWEST OREGON

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ABSTRACT

Little information exists about vegetation change over time in the grasslands, shrublands, and woodlands of southwest Oregon. Multi-aged oak stands, encroachment of shade-tolerant conifers into non-conifer vegetation, reduced reproduction by pine, and the loss of meadows support the generally accepted belief that fire suppression has negatively impacted historically open vegetation types. However, a collation of historic anecdotes, General Land Office (GLO) survey records, homestead patent applications, original and repeat photographs, and other historic information on the general dynamics among oak, chaparral, grassland, and conifer vegetation in this area indicate a more diverse pattern of vegetation change only partially explained by fire exclusion. The historic and continued persistence of some meadows and savanna without recent fire are counter to general assumptions about the loss of open (i.e. herbaceous dominated) plant community structures as a result of fire-suppression. Naturally open areas (shallow soils underlain by fractured bedrock, and vertisol clay dominated soils) and ecotones between edaphically mediated grasslands and woody dominated sites continue to support large oaks with an open herbaceous understory despite effective fire suppression since the 2nd World War. Coarse vegetation reconstructions derived from General Land Office Surveys indicate that oak woodlands were far more common than oak savanna at the time of Euro-American settlement. Early descriptions of chaparral and high-elevation oak thickets

¹ Hosten, P.E., G. Hickman, and F. Lang. 2007. Patterns of vegetation change in grasslands, shrublands, and woodlands of southwest Oregon. U.S. Department of the Interior, Bureau of Land Management, Medford District.
<http://soda.sou.edu/bioregion.html>

indicate the existence of stand structures facilitated by stand replacement fire at the time of Euro-American colonization. The range of historic data indicates that woody canopy cover dominated much of the southwest Oregon landscape. Where forest structure was open, the understory was often dominated by shrubs rather than herbaceous species. Structural/compositional changes within woody dominated communities include: shrub to conifer, conifer to shrub, hardwood to conifer, hardwood to mixed hardwood and shrub, and conifer to hardwood. A more comprehensive understanding of vegetation change in response to both ecological and anthropogenic factors (pre and post European colonization) is necessary to help land managers achieve the mutual attainment of fuel-reduction and the maintenance of ecological processes in the grasslands, shrublands, and woodlands of southwestern Oregon.

INTRODUCTION

It is commonly assumed that under historic conditions, the woodlands and shrublands of southwest Oregon exhibited a more open understory than is often seen today (Franklin and Dyrness 1988). Public agency documents commonly cite encroachment by shrubs and younger cohorts of hardwoods as an ecologically-based rationale for fuel-reduction projects. While contemporary stand structures provide evidence of increasing densities (Agee 1996), there is also evidence of naturally dense vegetation compositions and structures favored by fire-intervals that support the domination of woody trees and shrubs (Franklin and Dyrness 1988).

Early explorers and European settlers frequently noted in their diaries the nature of the vegetation through which they traveled. Early photographers recorded images of the landscape, providing an invaluable source of information about vegetation change by way of photo-retakes. Fledging agencies dutifully kept records pertaining to land surveys, homesteading, and other land management activities. These records provide a basis for examining assumptions about how landscape-level vegetation type and structure have or have not changed since European colonization.

Local authors describe current non-conifer communities for southwest Oregon (Azet et al. 1996; Hickman 1997; Riegel, Smith, and Franklin 1992; Hickman in USDA 1993; and Smith 1985) that include high canopy or dense vegetation types. Other authors identify southwest Oregon as the northernmost extension of chaparral (Detling 1961, 1968 Franklin and Dyrness 1988). Government documents identify chaparral, rosaceous shrubs (rosaceous chaparral), and oak thickets as worthy of local conservation effort (USDI 2000, the White House 2000) despite the general assumption that the historic landscape was “more open.” This paper examines historic sources of information (predominantly within Jackson County and surrounding areas to determine whether all plant communities were “more open” at the time of European colonization than under present conditions, predominantly for non-conifer plant communities of Jackson County, Oregon (Figure 1).

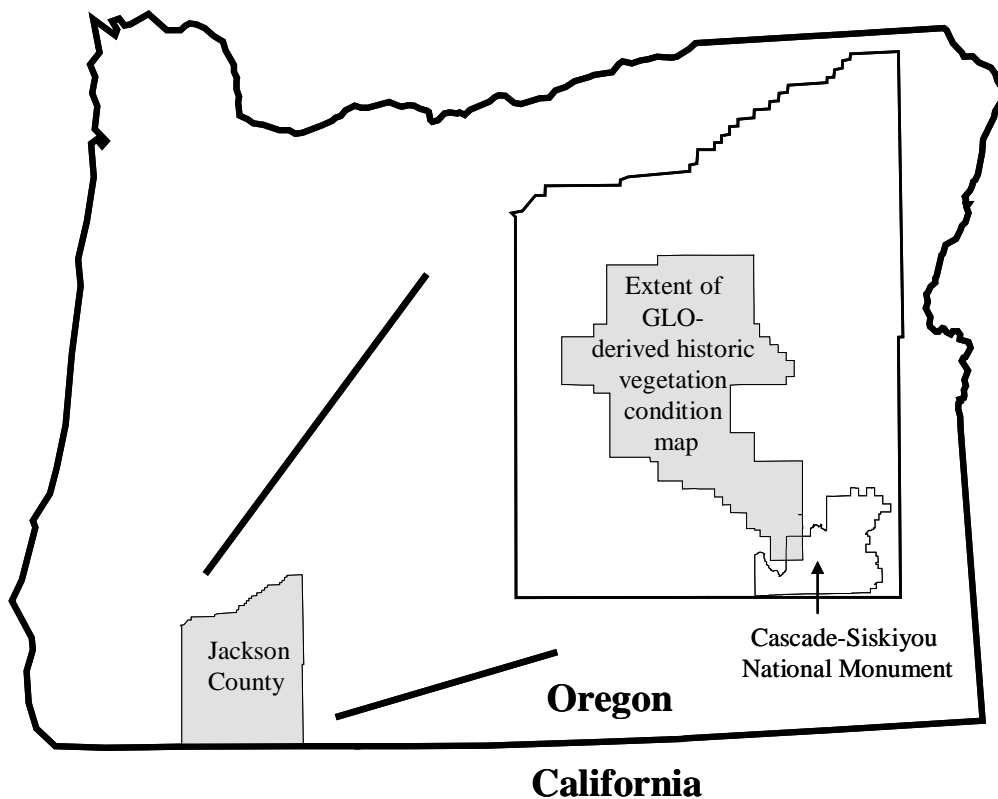


Figure 1. Study area including the Cascade-Siskiyou National Monument ,the extent of the General Land Office survey derived historic vegetation condition map.

METHODS

Historic data on vegetation are derived from a range of sources. The Southern Oregon Historical Society, Oregon Historical Society, Oregon Department of Transportation, and the archives of local offices of federal agencies (Bureau of Land Management and Forest Service) provided photographs. Pullen (1996) provided historic anecdotes originally from diaries by early travelers and residents of southwest Oregon. Keyword descriptions of vegetation within homestead patent applications under the Second Forest Homestead Act are from DiPaolo and Hosten (in prep). Historic plant community maps by Hickman (2005, 2006) based on the General Land Office Surveys for the Rogue Valley obtained from the Oregon Natural Heritage Database. Further area based analysis and cross-tabulation used more recently acquired classified imagery (Western Oregon Digital Imagery Project 1993). ARCMAP 9 (ESRI 2004) determined coarse patterns of structural and compositional change in vegetation.

RESULTS AND DISCUSSION

Anecdotes from Diaries of Early Explorers and European Settlers

Historic vegetation anecdotes from early explorers and European settlers are as varied as the landscape they describe. Anecdotes refer to grassland ('grass', 'prairie', and 'meadow'), shrubland ('brush', 'shrubbery', 'underbrush', 'undergrowth', 'chaparral'), woodland, and conifer-dominated 'timber' plant communities reflecting the complex landscape with its diverse ecological sites. Descriptions of some locations provide evidence of the great variety of vegetation types present on the landscape. Vegetation around the town of Ruch is thus described as 'pine timber and thick underbrush' as well as 'oak trees'. The descriptors 'oak and pine', 'wood', and 'prairie' are all associated with Ashland, and a similar range of descriptors are linked to the slopes of the distinctive Table Rock mesas near Medford. Almost one-third of the descriptions analyzed (11 out of 36) run counter to the notion of a historically more open landscape and make reference instead to dense shrub-dominated vegetation (Table 1).

Table 1. A collation of early anecdotes about the vegetation of the Applegate and Rogue River valleys from diaries of explorers and European.

Location	Description	Source
Valley Floor		
Ruch	Pine timber and thick underbrush	Giles 1853-1855 (1946)
Forest Creek	Pretty open, woods	Giles 1853-1855 (1946)
Ruch	Oak Trees	Giles 1853-1855 (1946)
Upper Table Rocks	Thick shrubbery	Walling previous to (1884)
Table Rock	Thickly covered with majestic old pines & rugged oaks	Walling previous to (1884)
Table Rock	Brush	Walling previous to (1884)
Lower Table Rock - Ashland	Great meadows, interspersed with the groves of oaks which appear like vast orchards	Applegate 1846 (1921)
Near Ashland	Oak & pine	Ogden 1827
Grave Creek	Prairie	Peal 1841 (Wilkes 1845)
Below Grants Pass	Small patches of prairie	Peal 1841 (Wilkes 1845)
Valley of the Rogue	Woods here consist of () and a long, broad prairie between 2 species of oaks, 1 Lambert pine	Peal 1841 (Wilkes 1845)
Near Ashland	Oak & pine	Ogden 1827
Lower Table Rock	Brush	Peale 1841 (Wilkes 1845)
General Rogue Valley	Grassy plains	Walling previous to 1885
Bear Creek	Rolling prairie resembling scenery of the Willamette Valley	Wilkes 1841 (1845)
General Rogue Valley	Level part of the valley adjoining river is generally prairie land, with occasional scattered black pine and black and white oak of stunted growth	Annual report, Chief Engineers
Edge of Agate Desert	Inaccessible to us on account of undergrowth	Miles Alcorn 1855
Near Ashland	Passing through wood	Eld 1841 (Wilkes 1845)
Near Ashland	Prairie	Peale 1841 (Wilkes 1845)
Valley Foothills		
Gold Hill	Mountain covered with wood	Edwards 1837 (1932)
Gold Hill	Country on opposite side is also less woody and hilly and grass more abundant	Ogden 1827
Merlin	Wood of different kinds and the white pine of extraordinary size	Ogden 1827
Near Grave Creek	Mountains dry, parched & covered with scrubby pine and several kinds of evergreen shrubbery	J. Clyman 1846
Grave Creek - Grants Pass	Hills covered with grass	J. Clyman 1846
General Rogue Valley	Wooded slopes	Walling, previous to 1884
General Rogue Valley	Mountains covered with timber & and underbrush so dense they can conceal themselves	Culver 1855
Near Graves Creek	Wood not as thick, Pinus Lambertiana more common	Wilkes 1841 (1845)
Bear Creek confluence with Rogue	Country around is hilly with numerous oaks & Pinus lambertiana growing on them	Brackenridge 1841 (1931)
Gold Hill	Thinly covered with pine trees	Brackenridge 1841 (1931)
Grants Pass-Grave Creek	Country similar to [Gold Hill] with perhaps larger quantity of oaks.	Brackenridge 1841 (1931)
Bear Creek - Southern Rogue Valley	Chaparral, the crookedest, ugliest, & most obstinate brush you ever saw, forms the upland undergrowth	S. H. Taylor 1853 (1921)
Bear Creek Valley	On the southern slopes, grass, much of it clover, takes the place of timber, while northern slopes are covered with pine, mostly, pitch pine, fir and yellow cedar	S. H. Taylor 1853 (1921)
Mid-Elevation Forest		
Yale Creek	Brushy and steep canyon, of heavy timber	Wm. Martin 1856
Murphy Creek	Brush	Oregon Sentinel
Murphy Creek	Timber	Beeson 1858
Mts NW of Evans Creek	Brushy, enemy encamped in thick wood filled with underbrush	Walling, previous to 1884

Table derived from Pullen R. 1996

At the turn of the century, botanist John Leiberg made a detailed description about the semi-arid often shrub-dominated areas in Jackson County with precipitation of less than 15 inches and elevation ranging from 1600 to 4000 feet under the heading of “Western Slope: Semiarid region”. The semi-arid tracts are described as: “... having a small amount of arboreal vegetation, mostly confined to the banks of the water courses. They carry scattered copses of black oak (*Quercus californica* [renamed *Q. kelloggii*]) and white oak (*Q. garryana*), interspersed here and there by stands of frutescent or, rarely, arborescent (*Arbutus menziesii*), and with dense thickets of brush largely composed of chaparral (*Ceanothus cuneatus*).” The origin of the semi-arid areas is considered in part natural and “through the agency of man”, a contention echoed by others (Gratowski 1961; Franklin and Dyrness 1988). An unpublished memoir by local buckaroo George Wright provides numerous anecdotes about the role of historic grazing in converting bunchgrass dominated grasslands to “weeds” in the vicinity of the Cascade-Siskiyou National Monument (Hosten et al.2007). Wright’s comments reflect knowledge passed down from his father and grandfather who started to work with livestock in the CSNM area in the late 1860s. George Wright and Ingram (1922, 1923) make reference to the invasion of woody species in some bunchgrass depleted areas (Table 2), providing further evidence that heavy historic livestock-mediated depletion of bunchgrasses may have precipitated woody shrub invasion of former grassland ecological sites.

Notes from Land Surveys

Another source of recorded landscape descriptions are found in the General Land Office Survey notes (Table 2) from the 1880’s to the early 1900’s. Less than 50 years after the Applegate Trail began encouraging the settlement of southwestern Oregon, livestock use began to noticeably influence the character of the landscape. General Land Office Survey notes from 1871 identify a landscape with the “appearance of having been extensively used for grazing for many years” (TOWNSHIP 41 SOUTH, RANGE 3 EAST).

Notes taken by early surveyors and members of the Forest Service refer frequently to evidence of stand-replacement fire that resulted in the destruction of timber and subsequent conversion to shrub domination (Table 2). Leiberg identifies Townships of

land exposed to fire at more frequent intervals than believed to have occurred prior to settlement. The commonplace occurrence of stand-replacement fire and replacement of timber by shrubs (Leiberg 1900) challenges the notion that contemporary stand-replacement fires are an anomaly when compared to historic conditions. Walling's (1884) description of the loss of meadows along ridge tops and lore about Native American targeting of specific locations of the landscape with fire (Lalande 1995) help explain the juxtaposition of fire-mediated grasslands and high canopy stand-replacement conditions defined by chaparral.

Table 2. Text from historic documents providing inference about fire and livestock as processes influencing non-conifer communities of southwest Oregon.

Text from historic documents	Reference
If we may believe those pioneers, the country was one of primitive wildness, yet of obvious fertility and productiveness. The wild grasses grew in profusion, covering everywhere the land as with a garment of the softest and most luxuriant verdure . . . The hill tops, now mostly covered by dense thickets of manzanita, madrone, and evergreen brush, were then devoid of bushes and trees because of the Indian habit of burning over the surface in order to remove obstructions to their seed and acorn gathering	Walling 1884, also in Zybach 2007
This type [the chamise type] shows frequent conifer reproduction unless it has been previously depleted of young conifer growth by fires occurring at shorter intervals than the time required for new conifers to produce seed and start a new crop	Peterson 1916
The stockmen say that the entire Applegate area was free from brush areas in the early days and that where topographic features did not interfere anyone could travel over any part of the country on horseback. . . . The trained forester sees another explanation of the case. He believes that most of the Applegate division was at one time in the early days covered with a good forest growth and that it was removed by repeated forest fires.	Peterson 1916
Without much doubt the present agricultural areas, once grass covered and carrying scattered stands of oak, were burned over quite as extensively as the timbered tracts; at least there are few oaks that do not show fire marks.	Leiberg 1900
The aspect of the forest, its composition, the absence of any large tracts of solid old growth of the species less capable of resisting fire, and the occurrence of veteran trees of red fir, noble fir, white pine, alpine hemlock, etc., singly or in small groups scattered through stands of very different species, indicate without any doubt the prevalence of widespread fires throughout this region long before the coming of the white man. But, on the other hand, the great diversity in the age of such stands as show clearly their origin as reforestations after fires, proves that the fires during the Indian occupancy were not of such frequent occurrence nor of such magnitude as they have been since the advent of the white man.	Leiberg 1900
CASCADE RANGE AND ASHLAND RESERVES. 293 The oaks in the region resist fire well, notwithstanding the fact that more than 50 per cent have a rotten and hollow interior. Their ability to withstand fire is, however, more largely due to environment than to inherent qualities. Their growth is always open and scattered and their habitat is along the lowest elevations, where there is a minimum of combustible material on the ground to support a hot and lasting fire.	Leiberg 1900
On timber mountain ... p48 ... in the area of timber spring ... " The sheep killed about all of the good grass that used to grow around that part of Timber Mountain. The area was over grazed year after year by both sheep and cattle and it became more dust than anything else. After the grass was gone weeds had a chance to get a foothold and now the woods have taken the place of the grass that used to grow so abundantly."	Wright unpubl
General Township/Range descriptions	
TOWNSHIP 39 SOUTH, RANGE 2 WEST. This township is largely made up of areas semiarid in character, supporting extensive brush growths, but little timber. The once forested tracts have been badly burned, and in place of the forest have come oak copses, madrona, and thickets of " chaparral." The forest has been pretty well culled of its dimension stuff long ago, and what remains is mostly small growth and of little commercial value.	Leiberg 1900
TOWNSHIP 39 SOUTH, RANGE 1 WEST. This township comprises steep rocky slopes, draining partly into Applegate Creek, partly into Bear Creek. Originally of good proportion, the forest has been culled during many years and stripped of its best timber, only a trace remaining. Fires have wrought great havoc and have transformed many of the slopes into great brush heaps with thin lines of half-dead trees in their midst.	Leiberg 1900
TOWNSHIP 39 SOUTH, RANGE 2 EAST. This township consists mostly of steep rocky breaks rising abruptly from Bear Creek Valley toward the Siskiyou-Cascades junction in the east. A large proportion of the region is naturally non-forested. The forested areas bear thin stands of scattered yellow pine and red fir mixed with copses of	Leiberg 1900

oak. The timber is all of poor quality.	
With reference to the S. Umpqua cattle range: The original type throughout this lower section was very open yellow pine-oak type common to this region with an understory of grasses and weeds with occasional patches of browse ...Repeated burning has done much to destroy the original stand of timber and combined with premature grazing have heavily increased the browse species and practically eliminated the perennial grasses.	Ingram 1922
With reference to the Illahee unit of the North Umpqua cattle range: "Indications are conclusive that many of the areas examined now supporting heavy stands of brush at one time were open grass-weed some with scattering mature white and black oaks, still others with a mixture of yellow pine and Douglas fir with an understory of perennial forage grasses and weeds."	Ingram 1923
FRACTIONAL TOWNSHIP 41 SOUTH, RANGE 1 EAST. This fractional township consists of spurs and canyons projecting southward from the Siskiyou Range. The forest along the lower slopes is of excellent quality and proportion, and is remarkable for the large percentage of incense cedar of large growth which it contains. The upper slopes have been badly overrun by fires in recent times, and are thinly covered with forest in the midst of dense brush growths.	Leiberg 1900
FRACTIONAL TOWNSHIP 41 SOUTH, RANGE 2 EAST. The central and southern portions of this township are situated on the summit and southern slopes of the Siskiyou Range. The township is very thinly forested, consisting largely of grassy or brushy semiarid slopes. The northern portion of the township contains scattered stands of timber much damaged by fires and of little commercial value	Leiberg 1900
FRACTIONAL TOWNSHIP 41 SOUTH, RANGE 3 EAST. This township consists of steep hills very sparsely forested, but covered with dense brush growths as the result of fires. Most of the timber was burned in recent times. There is no reforestation. The mill timber, scattered among the brush heaps, is of poor quality and practically inaccessible.	Leiberg 1900
TOWNSHIP 40 SOUTH, RANGE 2 EAST. This township is situated on the northern slopes of the Siskiyou Mountains and consists of rocky, broken hills rising in the east and south to join the main range. Fires have run through the forest in recent times, burning 30 percent of the timber and badly searing the remainder. The stands are light and scattered among bare, rocky flats and glades and dense brush growths. The larger portion of the timber consists of small-growth red fir of little commercial value.	Leiberg 1900
TOWNSHIP 40 SOUTH, RANGE 4 EAST. The eastern areas of this township consist of portions of the large lava plateau which flanks the main summit of the Cascade Range north of the Klamath River. The western portions of the township comprise broken, unevenly forested ridges draining into Jenny Creek. The mill timber in the eastern sections forms heavy stands, is excellent in quality, and easy of access. Fires have marked the entire forest stand in the township, and have mostly suppressed the young growth; hence the forest is of an open character, with but little undergrowth.	Leiberg 1900
TOWNSHIP 39 SOUTH, RANGE 1 EAST. The extreme western portions of this township consist of low, sparsely timbered slopes, with heavier stands in the ravines; the central portions comprise agricultural and grazing lands while the eastern mainly include semiarid, rocky, nonforested slopes. The forest is of poor quality throughout. Since the first settlement of the region it has been culled and burned repeatedly. Private holdings have conserved some of the better portions. In general the timber is of little commercial value.	Leiberg 1900
TOWNSHIP 39 SOUTH, RANGE 3 EAST. This township covers the areas at the junction of the Siskiyou and the Cascade ranges, and consists of rocky flats and ridges forming the upper drainage basin of Jenny Creek. The forest contains a large quantity of red fir, small in growth and badly damaged by the numerous fires which have overrun the township in recent times. The yellow pine is short bodied, as is the usual condition on the rocky areas of this region. Where fires have burned all the timber, brush growths are the rule.	Leiberg 1900
TOWNSHIP 39 SOUTH, RANGE 4 EAST. This township comprises most of the eastern areas of the Jenny Creek watershed and consists, in its eastern portion, of a level or gently rolling plateau region; in its western sections of hilly and broken ground. Its central areas contain Johnson Prairie, a large glade with many small ramifications. Fires have run throughout the entire extent of the township. The northern areas are very badly burned, extensive tracts being completely covered with brush growth as a result. The central and southern portions carry a heavy forest of yellow pine, excellent in quality and easy of access. The red fir is inferior in growth and quality, due to the many fires in the region.	Leiberg 1900
TOWNSHIP 41 SOUTH, RANGE 3 EAST" The eastern half of this township is mostly smooth bald hills covered with bunch grass and very well watered with springs and small streams. Along the streams are found many small flats suitable for agriculture have good soil. Timber is not plenty but enough is found for all purposes of settlement. It has the appearance of having been extensively used for grazing for many years. The west half is on the Siskiyou Mountains is generally barren and rocky and being unfit for agriculture or grazing purposes is unsurveyed."	General Land Office (various)

Second Forest Homestead Act

The keyword vegetation descriptions of lands sought under the Second Forest Homestead Act are remarkable for the preponderance of descriptors indicating dense non-conifer vegetation (Table 3). Twenty-seven out of thirty-seven homestead applications identify

the presence of brush or chaparral, with frequent reference to the high density of the vegetation. Most of the homestead patent applications are away from the main stem of the Applegate and Little Applegate Rivers, indicating that more desirable lands along water were already long occupied by early pioneers. The occupation of homesteads along the toe-slopes leading to the Siskiyou Mountains places these plant communities at lower to mid elevations on southerly facing slopes. Many of the anecdotes identify open forest, but with a brushy understory rather than herbaceous species.

Table 3. Keyword vegetation descriptions of patent applications under the 2nd Forest Homestead Act of 1906

Township and Range	Keyword vegetation descriptions
T. 38S, R.3W, Section 20	Chaparral and manzanita brush; Open Yellow pine and Douglas Fir reproduction; Scattered Yellow pine 1200 ft per acre; Barren rocky
T. 38S, R. 3W, Section 20	Scattering white oak. Good reproduction of yellow pine and Douglas fir; Scattered Yellow pine 10,000 ft B.M.; Dense growth of oak grubs, manzanita, and chaparral.
	Cultivated; Cleared; Chaparral
T. 38S, R. 3W, Section 20	Chaparral and manzanita brush; Burn - 1915 - not restocking; Scattering Oaks Grubs; Scattering Timber and Reproduction (Yellow Pine and Douglas fir)
	Brush; Grass; Timber-less than 2000 BF
T. 38S, R. 2W, Section 26	Cleared and cultivated; Fir; yellow pine, madrone
T. 38S, R. 3W, Section 10	1500 feet per acre of Yellow pine and Douglas fir; 2000 feet per acre of Yellow pine and Douglas fir; Yellow pine reproduction; Chaparral and Manzanita
T. 38S, R. 3W, Section 13	Cleared; Chaparral; Conifer Forest
T. 38S, R. 3W, Section 16	Cultivated; Cleared; Less than 200 B.F.; Brush
T. 38S, R. 3W, Section 8	Heavy Timber; Scattering timber heavy black oak and madrone; Tillable land with scattering timber
T. 38S, R. 3W, Section 22	Chaparral and Manzanita; Open and scattering brush; Under Cultivation; Yellow Pine and Douglas Fir Reproduction
T. 38S, R. 3W, Section 16	Dense growth reproduction yellow pine; Dense growth of manzanita and chaparral
T. 38S, R. 3W, Section 22	Brush; Grass; Timber-less than 2000 BF
T.38S, R. 3W, Section 20	Cultivated; Chaparral; Cleared
T. 38S, R. 3W, Section 26	Farm; Open Land; Underbrush; Brushy side hill; High brushy ridge; Timber
T. 39S, R.2W, Sections 13, 14, 24	Chaparral and scrub oak; Maple, W. oak, B. oak, Birch, Ash; Under cultivation; Grassland
T. 40S, R.2W, Section 4	200,000 B.M. 60% fir, 30% pine, 10% cedar; Cultivated
T. 39S, R. 3W Section 1	Chaparral, Scrub oak, Manzanita; Cultivated; Grasslands - Parks
T. 39S, R. 2W Section 20	Grassland - glade; Chaparral - scattered pines
T. 39S, R. 2W Section 22	Brush; Timber - Less than 2000 B.F.; Cultivated
T. 39S, R. 2W, Section 24	Brush; Grassland; Old cuttings; Timber; Cultivated
T. 39S, R. 3W Section 12	Dense Chaparral; Brush; Open
T. 39S, R. 3W Section 4	One acre slashed; 10 acres cleared; One acre in orchard; 120 acres of timber

Township and Range	Keyword vegetation descriptions
T. 39S, R. 3W Section 28	Alfalfa fields; Rocky gravel bars and rock bluffs; Steep rocky ridges and mostly covered with young growth.
	Timbered side hill 20,000 ft. B.M. per acre; Small Underbrush; Woodland; Cultivated, garden ground
T. 39S, R.4W Section 14	Brush; Cultivated; Poles, Woodland Grassland; Water
T. 39S, R.4W Section 18	30 acres 26,500 to acre 50% Y.P. 50% R.F.; Cultivated; Brushy; Hills; Poles, Cordwood Grassland
T. 39S, R.4W Section 30	Brush; 60% Fir, 40% Yellow pine; Clearing
T. 39S, R4W Section 30	Chaparral and Manzanita 60% F. 40% Y.P.
T. 39s, R. 3W Section 14	Brush; Open
T. 38S, R. 3W Section 10	Area under cultivation; Area cleared but not under cultivation; 2-15 Y.P. and D.F. 8"-24" DOB and Y.P. and D.F. 12" to 20" tall 20 to 300 per acre - 1000 B.M. in places; Manzanita and Madrone and Oak on most of area is dense.
T. 40S, R.2W, Section 4	Chaparral or Brush; Cultivated; Slashing; 250,000 ft B.M. 65% Y. Pine 35% Fir
T. 38S, R. 3W Section 14	Young growth fir 4 to 10 ft high; Dense Brush consisting principally of chaparral, grub oaks, and manzanita.
T. 38S, R. 3W Section 14	Oregon oak, Madrone, Manzanita, Scattering Pine and Fir
T. 39S, R. 4W Section 6	Manzanita and Chaparral; brush very dense also some white oak grubs; Cultivated

Vegetation Descriptions Derived from General Land Office Surveys (GLO)

GLO derived maps of the Rogue Valley validate many of the historic anecdotes from Table 1, particularly as they relate to the abundance of prairie (30.9%) on the valley floor (Table 4). Shrublands occupied a minor component (0.4%) of the mapped landscape. Oak Savanna occupied a relatively small portion of the landscape (1.2%), while woodland occupied 41.2% of the landscape. Just less than 25 percent of the map area is defined as closed forest upland, while 1.8% is defined as riparian closed forest. The percent occupation of the landscape must be related to the location and extent of the map, which covers the valley floor and the lower slopes of the valley only. In this context, the relative occupation of the landscape by riparian vegetation seems reasonable. The relative occupation of the landscape by woodland versus savanna is a deviation from the expected predominance of the more open form of oak-dominated community. While the scarcity of shrublands in the GLO map supports the contention that frequent fire may have kept the shrub life form at lower abundances, information from the Natural Resources Conservation Service (NRCS) surveys provides several alternative explanations for the open nature of the historic vegetation. High clay, seasonally wet, and shallow soils likely all played a role in maintaining the open character of portions of the study area. Note that

the GLO derived vegetation type maps include mostly valley bottom and foothills, relatively land few of the slopes where chaparral is thought to have occurred.

Table 4. A summary of plant communities of the Rogue Valley derived from General Land Office Surveys

GLO vegetation class	Percent Area
Prairie	30.9
Shrubland	0.4
Savanna (oak)	1.2
Woodland (mixed hardwood – mixed conifer)	41.2
Closed forest, upland conifer	24.4
Closed forest, riparian wetland	1.8
Water	0.3

Cross tabulation with satellite imagery (Table 5) classified to include urban buildup and agricultural development indicate that woodlands and mixed conifer forests are the least altered from historic landscape abundance. Oak savannas were mostly converted to urban use, while the majority of current agricultural lands were historically grassland. The conversion of oak savanna to urban development indicates the underlying soils had less agricultural potential than soils underlying other plant communities. While some conversion of woodland to agricultural occurred, the steep slopes and poor soils likely prevented early agricultural exploitation.

Table 5. Cross tabulation of GLO survey vegetation descriptions with WODIP (1993) vegetation classes based on area expressed as a percentage.

GLO vegetation class	Urban	Urban-ag	Forest	Non-forest veg.	Barren	Water
Closed forest, riparian wetland	3	61	23	5	1	7
Closed forest, upland	1	19	65	13	1	0
Composition unknown	0	1	66	33	0	0
Prairie	5	91	1	3	0	1
Savanna	9	81	4	5	0	0
Shrubland	4	81	6	6	1	2
Unvegetated	2	69	22	5	2	0
Woodland	1	39	30	28	1	0

Plant Communities and Structures Evident in Historic Photos

Historic and repeat photos provide the best graphic description of historic vegetation composition and structure, as well as evidence of the factors that influence change over time. Photo-pair descriptions are grouped by primary findings, although many of the photo pairs provide evidence of several factors influencing control over vegetation change.

Edaphic Control of Meadows and Open Woodlands

SAMPSON CREEK

Looking northwards towards Ashland, OR, Figure 2, taken in July of 1915, shows short statured Garry oak in the foreground, oak-dominated slopes in the left middle ground, and patchy oak woodlands/savanna interspersed with grassy meadows in the mid-right background. The photo retake (July 2004) shows larger statured oaks in the foreground, conversion to conifer in the left middle ground, with the woodland in the background remaining relatively unchanged.

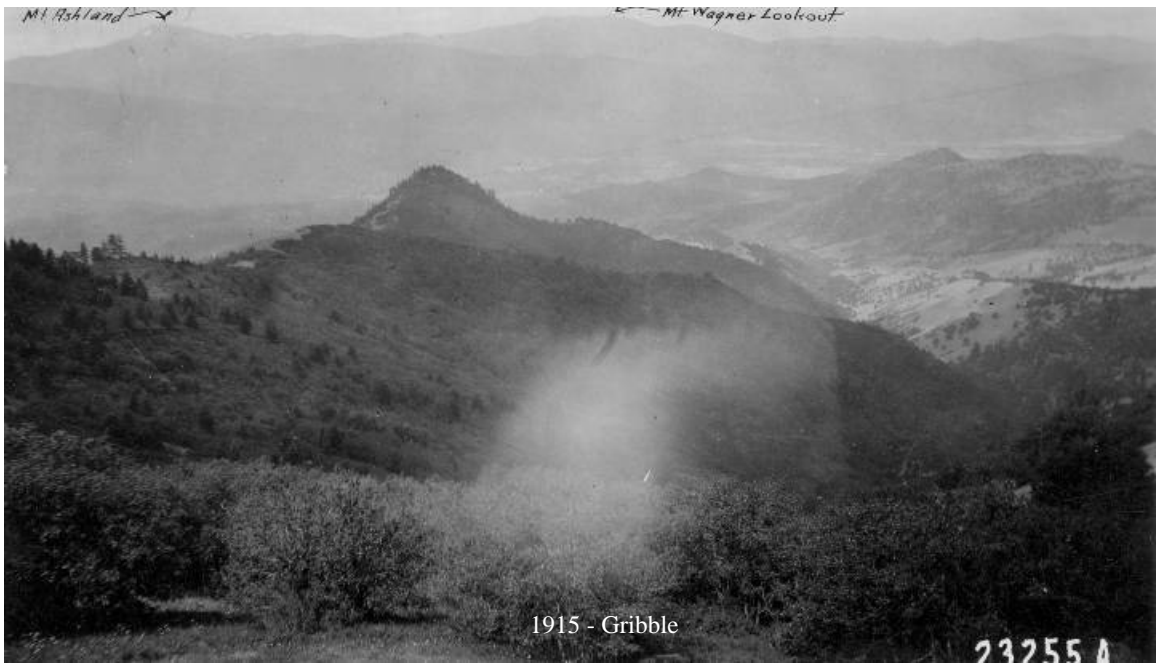


Figure 2. Sampson Creek Original and Repeat Photos

Taken several hundred meters below the previous photos, a second photo shows a foreground dominated by perennial forbs (Figure 3). The grassy areas in the mid background show high use by livestock, as indicated by the parallel 'trailing.' A lone ponderosa pine is visible in the extreme right middle ground. The canopy of the

background oak woodland is pierced by numerous Douglas-fir trees. The current foreground is dominated by yellow starthistle and annual grasses. Young Douglas-fir have grown and overtopped oak trees in the background and are increasing in abundance in the mid-ground of the oak woodland.



Figure 3. Sampson Creek Original and Repeat Photos

Repeat photos from the flanks of Greensprings Mountain depict several patterns of change common to the grasslands, woodlands, and forests of southwest Oregon. Native herbs have been replaced by annual grasses and noxious weeds, ponderosa pine favored by shorter fire-return interval have declined in number, while more shade tolerant Douglas-fir are present in greater abundance in areas previously dominated by Garry oak. The repeat photos also illustrate the retention of the open oak woodland/savanna habitat through edaphic control.

HIGHWAY 66

The original 1928 photo (Oregon Department of Transportation) taken along Highway 66 shows an oak woodland with open grassy patches along the ridge (Figure 4).



Figure 4. Highway 66 Original and Repeat Photos

The most striking difference between the original and repeat photo is the loss of large conifers interspersed through the woodland. Grassy patches appear smaller, but this may be due to the increased stature of oaks.

TALLOWBOX MOUNTAIN FIRE LOOKOUT

The original 1930 photo shows extensive stands of *Quercus chrysolepis* and areas of conifer on more mesic sites (Figure 5). The repeat photos show extensive intrusion of live-oak woodlands stands by conifers when compared to the original. A recent fire outside of the photo view-frame shows loss of conifer and a strong ability to resprout by canyon live oak. Most of the meadows visible in 1930 remain unchanged in the repeat photo. This photo demonstrates the susceptibility of *Q. chrysolepis* stands to conifer invasion, as well as the edaphic control of meadows visible in the photo.



Figure 5. Tallowbox Original and Repeat Photos

ANDERSON BUTTE FIRE LOOKOUT

The Anderson Butte fire lookout photos (Figure 6) taken in 1934 show little change in comparison to fire-lookout photos taken at the Wagner Butte fire lookout (see below). An area of conifer expansion at the cost of non-conifer vegetation is evident. A ridge-top reduction in shrubs is a result of recent fuel-reduction activities. There are several

examples of ridgetop grasslands remaining unchanged over time, identifying the role of soils in controlling the open character of meadows.



Figure 6. Anderson Butte Original and Repeat Photos

Loss of Fire-Mediated Meadows and Open Oak Woodland

WAGNER BUTTE FIRE LOOKOUT

The most obvious change from the original 1930 photo at the Wagner Butte fire lookout is the loss of grassland to conifers along the ridgeline (Figure 4), an area known to have been managed by Native Americans (Lalande 1995).

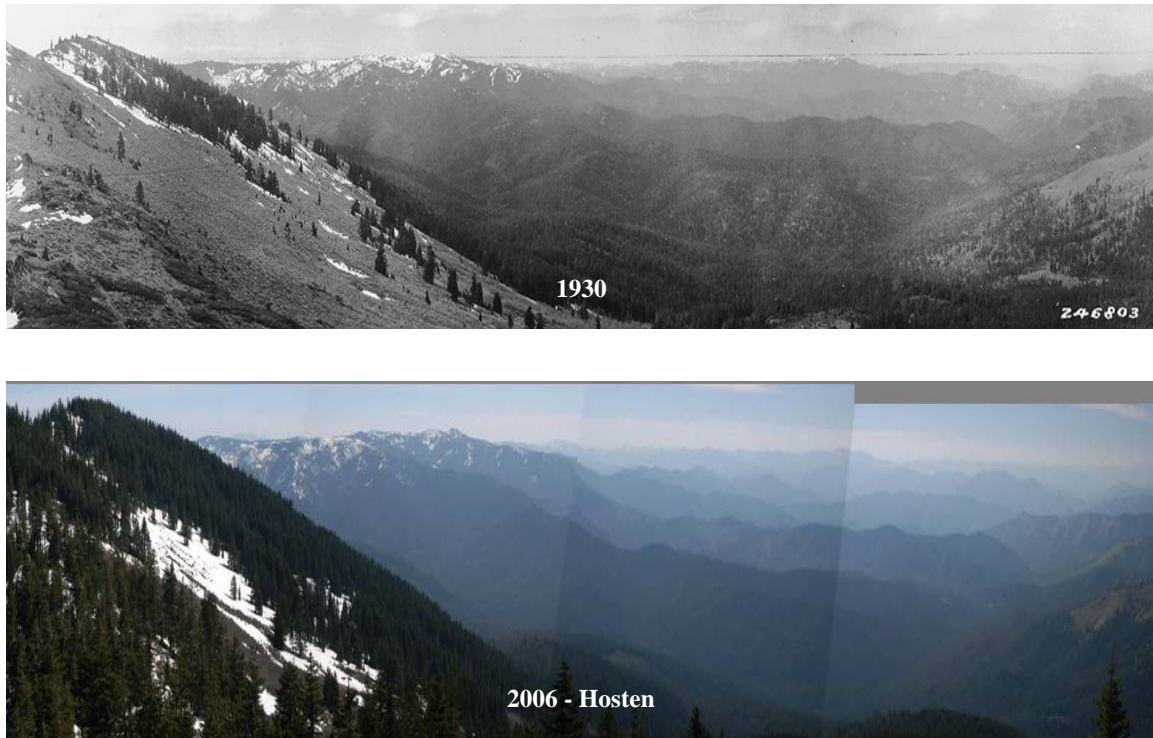


Figure 7. Wagner Butte Original and Repeat Photos

Mid-slope grasslands (not the grasslands visible 2006 in the previous photo) on Bald Mountain also appear reduced in comparison to the photo-retake. Other patches of shrub and grassland appear unchanged. Select use by Native Americans, topographic position, and soil appear to play a role in plant community dynamics by favoring different patterns of vegetation change over time.

CALIFORNIA - OREGON BORDER

The original 1923 photo shows an open oak woodland with a few heavily hedged buckbrush/oak resprouts in the foreground (Figure 5).



Figure 8. California-Oregon Border Original and Repeat Photos

The steep slopes on the background are dominated by Garry oak thickets. History accounts for season-long or year-long (weather permitting) grazing of open areas by horses, cattle, and sheep (the latter verified by trailing visible on the foreground hill). Such use likely resulted in browsing of shrubs by livestock and oak resprouts. While fence construction and tree harvest for firewood may account for the shrubs/resprouts in the original photos, a winter photo of the same local shows leaf retention on the shrubs, a characteristic of buckbrush. The repeat photo taken 80 years later shows a high canopy of Garry oak and no buckbrush. The background oak thickets remain relatively unchanged. The combination of activities identified in the original photo may have aided a transition to a different woodland composition and structure. The photo-pair indicates the need to incorporate past management and ecological site differences in the interpretation of successional processes on a site specific basis.

LOSS OF OPEN FOREST STRUCTURE

Figure 9 indicates an open forest structure with understory dominated by shrubs. The loss of the conifer overstory results in the creation of a de facto shrub community. Non-conifers appear to have increased in canopy cover and stature.



Figure 9. California-Oregon Border Original and Repeat Photos

INVASION OF MEADOWS BY BUCKBRUSH AND JUNIPER

This area in the vicinity of Hilt shows considerable incursion of former meadow by Oregon white oak, Juniper, and buckbrush (Figure 10). The area experienced high levels of season-long grazing by horses, sheep, and cattle thought to have converted bunchgrass dominated grassland to annual weeds prior to invasion by woody shrubs and trees (Wright unpublished, see Hosten et al. 2007).

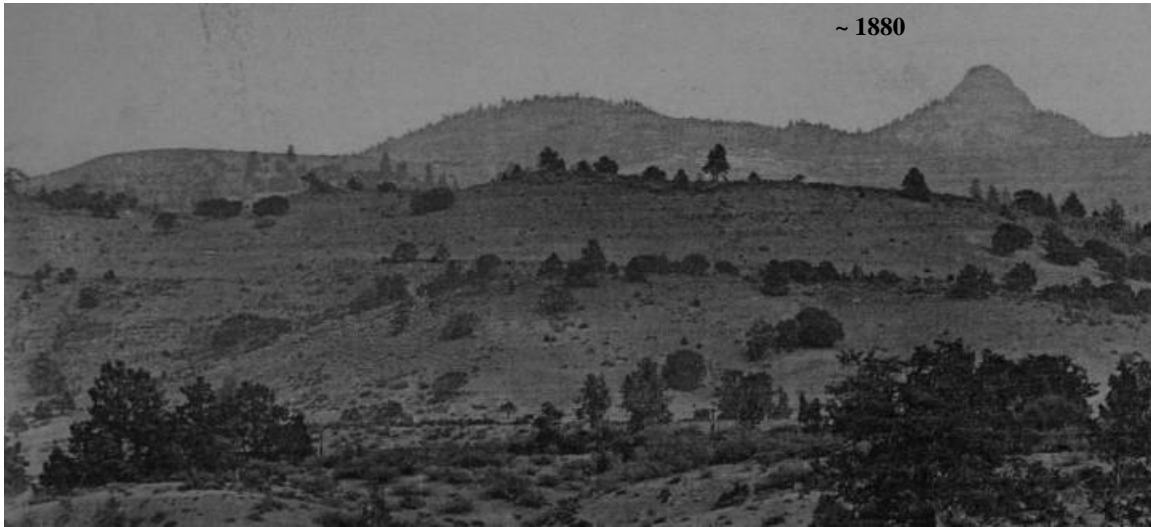


Figure 10. California-Oregon Border Original and Repeat Photos

Evidence of Historic High Canopy Non-Conifer Plant Communities

KEENE RIDGE OAK THICKETS

A series of photos (BLM archives, April 1960) taken at reservoir construction sites within meadows surrounded by Brewer's oak thickets provide an opportunity to examine vegetation changes following 45 years without fire (Figure 11). The meadows show an increased abundance of riparian vegetation due to the delayed onset of the grazing season allowed by the reservoir construction and improved livestock control consequent to

associated fencing projects. In repeat photos, the Brewer's oak thickets remain unchanged, including the stature of the isolated conifers piercing the oak canopy of the original photos. This and previous photos of high elevation oak thickets indicate these plant communities change slowly over time.

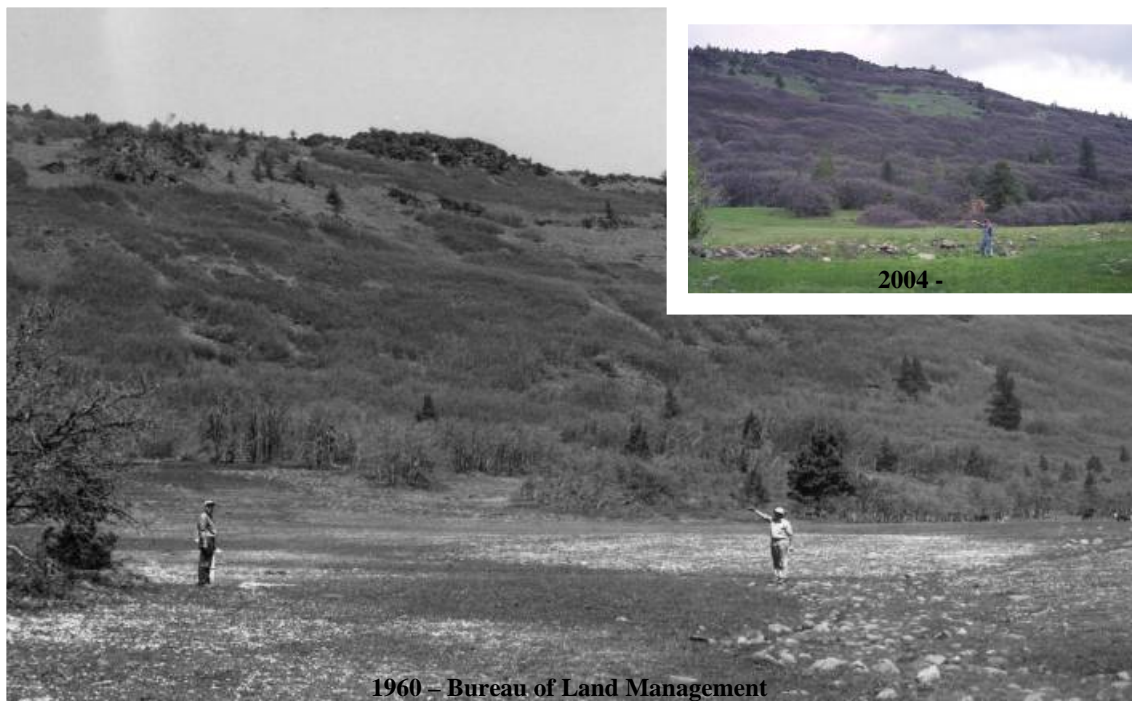


Figure 11. California-Oregon Border Original and Repeat Photos

ROXIE ANNE

The original photo of Roxie Anne (1920s) identifies the dense woodland with patches of conifer in the draws (Figure 12). Open grassy areas are common throughout the photo. The repeat photo shows only a slight increase in the extent of conifers. Some grassy areas appear smaller due to oak encroachment. The photo identifies the long-term existence of high canopy woodlands, as well as the loss of meadows by encroachment along the meadow edge by hardwoods.

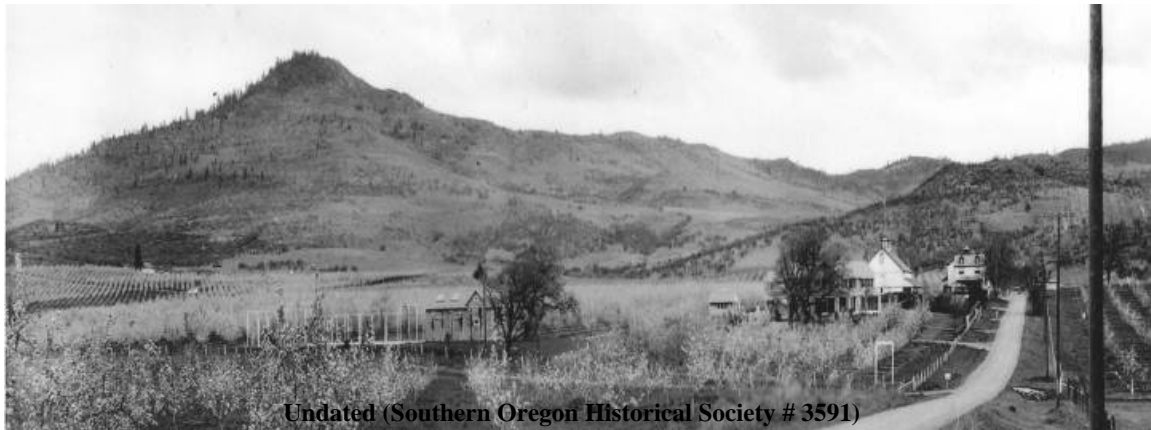


Figure 12. Roxie Anne Original and Repeat Photos

BALD MOUNTAIN

The sequence of three original photos taken by John Gribble (1910-1915) show serviceberry brush fields with patches of conifer along the Bald Mountain ridge top (Figure 13). Grassy areas appear to be associated with rocky shallow soils. The repeat photos show an increase in conifers at the cost of the brush fields in draws, while the grasslands remain relatively unchanged. These photos show conifers expanding into stands of serviceberry, but open areas remaining open due to shallow or excessively well drained soils.



Figure 13. Bald Mountain Original and Repeat Photos

VIEW OF LITTLE APPLGATE

The view of the Little Applegate River drainage shows a landscape that was much more open historically (Figure 14). Early forest service rangers complained that local ranchers burned repeatedly to create forage for their livestock (Gribble, unpublished diaries,

Lalande 1995). The fire return interval of the late 1800's and early 1900's may have been shorter than immediately prior to European colonization. Woody vegetation has since accumulated in the mid-slope and upper slopes of formerly more open areas in the far background. The open conifer structure with shrub understory of the mid foreground is now replaced by non-conifer



1916 - Gribble (SOHS #19960)



2006 - Hosten

Figure 14. Little Applegate Original and Repeat Photos

STERLING CREEK

Local interest in the Sterling Creek goldmine resulted in a series of early photos (1910-1920) depicting hydraulic mining activity along the creek (Figure 15). All historic photos show shrub-dominated vegetation sometimes interspersed with conifers. Conifers are generally more evident in draws. The original extent of the whiteleaf manzanita chaparral ranged from the creek bottom to the ridge top. While the extensive growth of conifers in the bottomlands and interspersed private lands make the exact retake of photos difficult, characteristic photos of the same area continue to show chaparral and grassy meadows of the original photos on mid to upper slopes of the field of view. Photos indicate the long-term existence of shrublands.

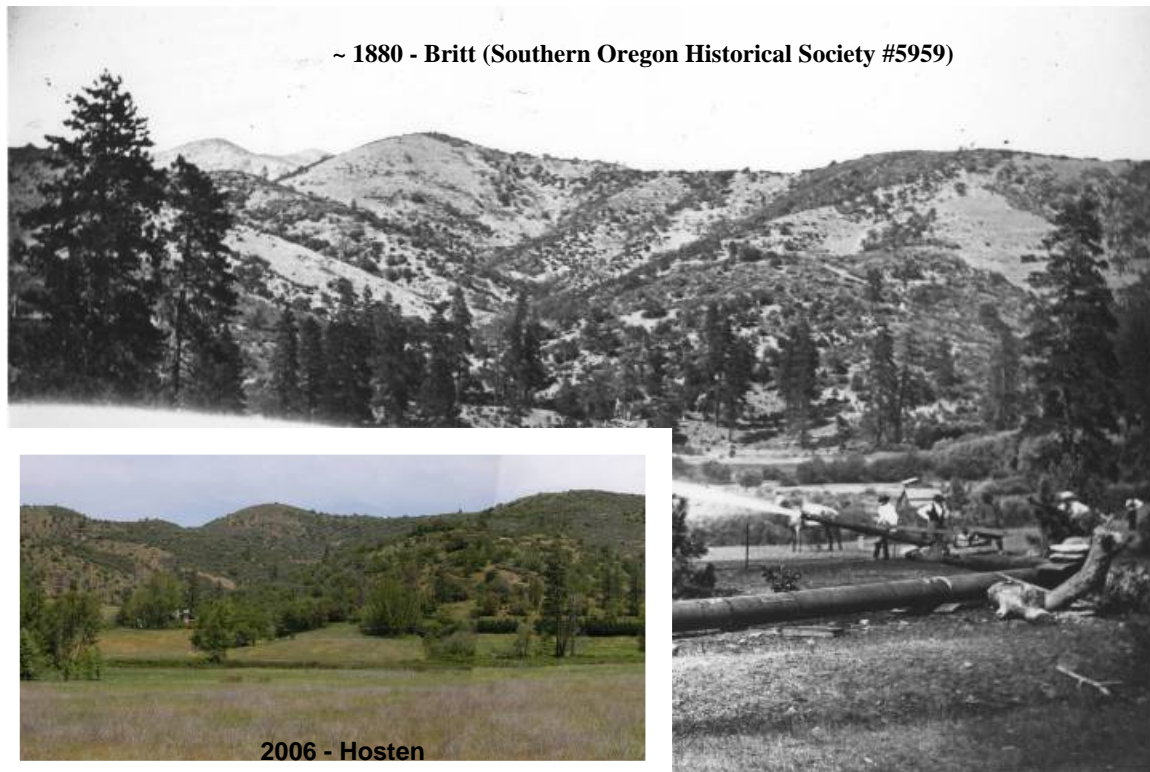


Figure 15. California-Oregon Border Original and Repeat Photos

INFLUENCE OF SCARIFICATION AND TREE PLANTING

Past scarification and planting of shrub dominated stands with conifer indicate some chaparral sites are able to support conifer following site intensive treatments. The scarification process generally included the use of a bulldozer to create windrows of uprooted shrubs. The piles of dead shrubs were burned by fire and seeded with perennial grasses during a subsequent winter. Figure 16 shows a successful conversion to conifer domination, and also that the untreated chaparral stands can be stable over many decades.



Figure 16. Poorman Gulch Original and Repeat Photos

SUMMARY AND CONCLUSIONS

The general assertion that the historic landscape was more open than current conditions is validated for many plant communities by repeat photography. Photo pairs show a loss of high elevation grassland to woody shrub and tree domination, transition from shrubland and woodland to conifer domination, or increased density of woodland by a younger cohort of Garry oak. However, some grassland and oak dominated communities are remarkable for their lack of change over time. These include oak savannas grasslands that have retained their open structure without fire. High clay (particularly shrink-swell clay) and shallow soils frequently define currently open vegetation structure. Shallow soils underlain by fractured bedrock still support open oak savanna.

Plant community maps of the Rogue Valley Basin derived from General Land Office surveys of the mid 1800s indicate that the woodland oak structure was more prevalent than oak savanna in southwest Oregon within the extent (Rogue Valley) of GLO derived historic vegetation maps. Historic anecdotes also indicate that close-canopied vegetation described as ‘chaparral’ was relatively common on the toe slopes of some southerly exposures prior to active fire-suppression of the twentieth century. Others have also found historic evidence for chaparral when many state the landscape to have been more open (Burcham 1987). Historic anecdotes identify livestock as playing a role in the depletion of native perennial bunchgrasses and subsequent invasion of woody species. This association is validated for grazed conifer forests (Belsky et al. 1997). Other high canopy communities that appear little changed includes chaparral, and high elevation Brewer’s oak thickets.

Historic data (the photos in particular) show that close-canopied plant communities have expanded their range into adjacent, more open vegetation. Several photos show the conversion of resprouter shrub and hardwood (*Quercus garryana*, *Q. chrysolepis*, *Amelanchier sp.*) stands to conifer domination.

The preponderance of open vegetation structure in the Little Applegate and specific topographic locations across the larger landscape may relate to historic Native American use of the landscape. All observations about vegetation change are within an era of transition induced by reduced Native American population consequent to the introduction of influenza, smallpox, and other diseases. Local history suggests lowlands, highlands and specific mid-elevation sites were targeted by Native American management (Lalande 1995).

The mutually supportive historic datasets and extant knowledge of plant community-soil relationships indicate that patterns of vegetation change in southwestern Oregon are complex, and cannot be explained simply by fire-suppression. Instead, complex interactions between soil type and depth, heterogeneous use of the landscape by Native Americans and subsequent loss of Native American management, along with fire suppression, are all likely factors that shaped current vegetation composition and distribution.

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