Chapter IV. Fire History, 1492 to 2010

> All the oak timber was owned by well-to-do families and was divided off by lines and boundaries as carefully as the whites have got it surveyed today. It can be easily seen by this that the Indians have carefully preserved the oak timber and have never at any time destroyed it.
>
> The Douglas fir timber they say has always encroached on the open prairies and crowded out the other timber; therefore they have continuously burned it and have done all they could to keep it from covering the open lands. Our legends tell when they arrived in the Klamath River country that there were thousands of acres of prairie lands, and with all the burning that they could do the country has been growing up to timber more and more.
> --Chenawah Weitchahwah, 1916 (Thompson 1991: 33).
>
> Instead of finding an uninterrupted forest carrying 100,000 feet or more per acre reaching from the Cascades to the Pacific, the first settlers seventy-five years ago [ca. 1840] found in the valleys great areas of "prairie" land covered with grass, brakes, or brush which were burned and kept treeless by the Indians, and mountain sides upon which forest fires had destroyed the mature forest and which were then covered by a "second-growth" of Douglas fir saplings or poles
> --Thornton Munger (1916: 92).

The word "history" can be defined in two ways: the period of time beginning in which people enter an environment, and the period of time beginning in which eyewitness accounts were first documented for an area. For the South Umpqua headwaters, the initial written accounts we have are from General Land Office land surveyors, who first entered the study area in 1857 (Hathorn 1857). According to local archaeological data, people were at South Umpqua Falls at least 3,000 years before then, and probably several thousand years before that time as well (O'Neill 1988: 164). By appending the word "fire" to history, we can redefine the term, such as occurs when the word history is modified by other qualifying terms, such as "geological history" or "natural history."

In recent years the practice of interpreting fire scars during the course of tree ring analysis has commonly become known as "fire history" (e.g., Agee 1993; Stephens et al. 2010). This practice is limited by several factors: e.g., such a "history" is limited to the age of the trees (or quality of the stumps) in an area, because it is their annual growth rings being considered; catastrophic stand replacement events typically involve crown fires and stop ring production altogether, so stand history must therefore be considered by other methods; not all fires leave scars (frequent ground fires are less apt to do so, for one example, and thick-barked older trees are less likely to be scarred, for another – see Stephens et al. 2010); there is no specific method for differentiating between human-caused "prescribed fires" and lightning-caused wildfires (so-called "Fire Return Intervals"); only one tree at a time can be sampled and analyzed, thereby making landscape-scale fire histories expensive, inconclusive, difficult and/or impossible, etc.

Another, related, form of "fire history" has also been developed in recent years; that of analyzing charcoal deposits in small lakes and ponds (e.g., Long et al. 1998). This method has many of the same analytical problems as tree rings, and shown to be unreliable when compared to actual documented events (Zybach: 2003: 230-234; Impara 1997; Long 1996), and impossible to differentiate between human-caused fires and lightning-caused wildfires -- or the effects of prehistoric wind patterns on the size and location of charcoal deposits.

Dubrasich (2010; Appendix B) does a good job of describing Indian burning history in the study area, and supporting his statements with current literature and field measurements. In Chapter III I discuss the likelihood that Indian populations within the study area have apparently declined significantly at intervals during the past 500+ years. Boyd (1999a) and others relate these changes in human population principally to diseases introduced from Europe and Africa, beginning in 1492. Several of the trees measured by Dubrasich exceed 600 years in age; thereby providing the availability of tree rings for fire history analysis during the entire time of local human population decreases. For those reasons (availability of long-term tree-ring data correlating with periods of human population decline, and relationship of fire use to presence and numbers of people in an environment), this chapter will cover the period of time from 1492 to 2010 (the time of this research), and will primarily depend on field observations, field measurements, and historical documentation for its construction. Tree-ring fire scar and charcoal deposition analyses will not be used, for reasons stated and for limitations of time and resources. Because of the nature and purpose of this research, three areas (and timeframes) of fire history will be considered for the study area: precontact Indian burning history, beginning in 1492; general fire history, beginning in 1857; and catastrophic (greater than 100,000 acres) wildfire history, for the entire 1492 to 2010 time period.

Indian Burning History, 1492 to 1856

Because people were constantly present in the study area 200 years ago, fire was also constantly present. In order to keep campfires and cooking ovens fueled, firewood and other fuels had to be gathered regularly and systematically stored across the landscape. Firewood gathering activities probably focused on areas closest to campgrounds, campsites, and along trail networks. Different fuels had different uses: grass, twigs, moss, and cedar for kindling; Douglas-fir and pine for heat and light; alder, maple, and vine maple for curing meat and berries; and madrone, oak, and manzanita for cooking. Patch fires were used seasonally to rejuvenate food plants, for weeding, and to create weaving materials: late winter and early spring fires were used to maintain bracken fern prairies ("brakes"); summer fires were used for harvesting tarweed and other seed crops; and fall burning was used to rejuvenate huckleberry fields, treat hazel clumps, and harvest acorns. Broadcast burning was performed on seasonal basis for clearing trails and underbrush, for hunting, and for creating fuels; mostly in late summer and early fall when plants were dry and before snow or heavy rains had set in. Individual trees and clumps of trees were burned to create firewood and harvest pitch.

Because intentional anthropogenic fire was a constant presence in the landscape at that time, and had been for thousands of years previously, vegetation composition, structure, and distribution patterns reflected the historical human uses of the landscape. Lightly-fueled areas including prairies, savannahs, and open park-like forests were established and maintained, greatly reducing the likelihood – or even possibility – of catastrophic-scale wildfires. Lightning fires occurred, but they encountered limited fuels within an anthropogenic mosaic maintained by human-set fires, and hence lightning fires were constrained to burn within that established vegetation composition, structure, and distribution.

Eyewitness accounts and knowledgeable journalists provide a number of specific references to precontact land management activities in southwest Oregon, and often made informed observations regarding apparent management objectives. Walling (1884: 334), for example, refers to broadcast burning hilltops as an aid to "seed and acorn gathering":

> 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.

Takelma and Molalla were the principal Tribes present in the study area during late-precontact time, as described in Chapter III. Virtually nothing is known of Umpqua Molalla plant management methods. An eyewitness observer did write, however: "On the west face of the Cascades the Molallas claimed dominion, and fire was their agency for improving the game range and berry crops" (Minto 1908: 153), and that observation is likely accurate (Minore, et al. 1979; Boyd 1999b; Stewart 2002; Zybach 2003). However, other methods of plant management, including pruning, thinning, tillage, peeling, and weeding, also had to have been performed in order to increase plant productivity and product quality, and little or nothing is known about the Molalla in those regards. These processes were probably universal throughout the range of these plants, however, (K. Anderson 2005: personal communication, September, 2010), and can reasonably be inferred for the Molalla; Anderson (1993) also suggests experimental methods by which such practices might be rediscovered.

More is known about the Takelmans use of fire in the local area, however, principally through eyewitness and oral tradition accounts. Sue Shaffer, long-time chairwoman of the Cow Creek Tribe and life-long resident of South Umpqua Valley, for example, has written (Shaffer 1990: 142):

> Indians were the first environmentalists. Our ties to our Mother earth are different than those of the people who came after us. We have always understood that we must protect the resources that sustain us. The fall burning practices to keep our forests clean were common. This was to keep the forest clear of fallen logs, underbrush and other debris that collected. It also served the purpose of killing unwanted bugs and insects, harmful to the forest. By keeping the forest floor clean there was an assurance of plentiful food for the game animals, which were the main food source for many tribes. It also provided a clear view for the hunters.

Henry T. Lewis, note anthropologist and Indian burning expert, used Shaffer as a source in his accounts of local burning practices (Lewis 1990: 83):

> Sue Shaffer: "When I was a very little girl, I remember asking (Uncle Bob Thomason), "when do you do the burning?" His reply was always, "When the time is right." He would often go out in the field, away from the house and sniff the air, also wet his finger and hold it up (although there was no wind that I could perceive, and say, "Not yet" or "it's time." I never knew on what he based his reasoning. The fires were set annually, but I'm sure on a rotating basis. As for time of year, it would appear that some burning was done in the early Spring, although the bulk of it was in the Fall, perhaps after the first rain, for even in aboriginal times the annual fires were recognized as a way to balance the ecology. After Fall fires, there was a quick greening, providing food for the forest animals."

Chuck Jackson, a life-long Drew, Oregon resident (see Figure 2.01), prominent Cow Creek Tribal member, and nephew of Bob Thomason, observed (2010: personal communications):

> Chuck: You can go and anywhere you go in the mountains, if you'll look, you'll see it. Like the big old growth cedars, the big firs and the big trees all got fire scars. All of them. I mean, anywhere you go, you'll find the fire scars.
>
> Bob: You think that was from people camping and building fires on the leeward side or starting the pitch going on the sugar pine?
>
> Chuck: I don't know, they burned everything.

> Bob: Or do you think it's 'cause of the ground fires?
>
> Chuck: The Indians burned everything. That's how you got rid of all the brush, you burned it . . . Different areas. They would burn.
>
> Bob: Just depending on when it got decadent or something?
>
> Chuck: They'd look at it. If the brush was getting too much in with the huckleberries or anything that was foreign was coming into 'em, they burned it. Well, when I was a kid, well, in fact, two years ago, I was trapped in a gorse patch . . . or in the nineties you go back on some of these trails and they've got some big trees across them, and I can take those trees out, it's not a problem. Doesn't cost me any money or anything to take 'em out. I go up and dig out [*motions digging under the tree*], and I'll find a big old pitch knot and I'll break it up and put it under the tree and light it, and get a good fire going and build it all up with bark and stuff and then when I come back it's gone, the trail's clear.
>
> Bob: I think that's one of the things that a lot of people don't realize, that you obviously know a lot about. There wasn't a lot of dead wood out there. People used it for firewood or they got rid of it or the regular fires going through burned it up -- that all this dead wood they got out there now . . .
>
> Chuck: It's just trash.
>
> Bob: . . . never was there before.
>
> Chuck: The whole forest is trash now. Never used to, it looked like a park before.

Types of Indian Burning. Indian burning practices are defined as those uses of fire in precontact time and early historical time that resulted in changed or stabilized landscape-scale vegetation patterns (see Table 4.01). Four principal categories of these practices are recognized: firewood gathering and burning, patch burning, and broadcast burning (Lake and Zybach: In Review). Individual trees and logs were burned, as Jackson describes, to clear trails, to fell, as hearths (windbreaks), and for pitch production. Firewood gathering and burning ("firewood burning") involved the movement of fuels to specific locations before burning, and resulted in areas that contained relatively little (or, conversely, stockpiled) large, woody debris -- and designated spots of intense, repeated, and prolonged heat. Patch burning is defined as having a specific purpose and involving fuels within a bounded area, such as burning an older huckleberry patch, a segment of trail, or a field of weeds. Broadcast burning is the practice of setting fire to the landscape for multiple purposes and with general boundaries, such as burning a prairie to cure tarweed seeds, eliminate Douglas-fir seedlings, expose reptiles and burrowing mammals, and to harvest insects.

Firewood. Firewood gathering and use was a daily process for most families, hunters, gatherers, and travelers for hundreds and thousands of years throughout the South Umpqua basin. Principal locations were probably located along trails, campgrounds, and townsites. Springs, peaks, waterfalls, meadows, berry patches, root fields, nut orchards, camas patches, and other favored locations were also sites of seasonal camping and food processing activities that required intensive localized firewood gathering. The value of firewood to families and communities -- at least in areas of scarcity -- was illustrated by Clark's April 17, 1806 assessment of "the 2nd Chief" at the Skillute trading village near Celilo Falls (DeVoto 1953: 355):

> I was envited into the house of the 2nd Chief where concluded to sleep. This man was pore nothing to eat but dried fish, and no wood to burn. Altho' the night was cold they could not rase as much wood as would make a fire.

Clark was gauging the man's wealth by the amount of fuel he had available, rather than food or housing: despite the apparent poverty of the 2nd Chief in regards to firewood, Clark also "observed maney stacks of fish remaining untouched on either side of the river" (DeVoto 1953: 353).

Type of burning	**Products and purposes**	**Timing**
Individual tree	1-2 purposes: tree felling, living hearth, pitch production, trail clearing.	Situational.
Firewood gathering and burning	1-2 purposes: heat, light, cooking, boiling, cleaning, fuel stores, celebration, ceremony, security.	Daily: concentrated near homes, trails, settlements and campgrounds.
Patch burning	1-2 purposes: hunting, berry patch maintenance, root fields harvesting, pest control, weaving materials, trail maintenance.	Seasonal and situational.
Broadcast burning	Multiple purposes: stable wildlife habitat; curing seeds; hunting; viewing; transportation; weaving materials; acorn harvest.	Seasonal: late summer, early fall for grasslands; late winter, early spring for bracken fern.

Table 4.01 Western Oregon Indian burning practices, pre-1857 (Lake and Zybach 2010).

The cumulative results of widespread and systematic firewood gathering over time undoubtedly had a major impact on the location, distribution, and quantity of fuels consumed during wildfire, field clearing, or crop management processes. The likelihood of most bonfires, campfires, oven fires, and sweathouse fires resulting in wildfire events was probably very low. Unattended fires, left for the purpose or desire of being spread were probably fairly common (Minore 1972; French 1999). Such fires were intended to spread whenever possible and cannot be considered escapements.

Patch Burning. Berry patches, hazel clumps, sugar pine groves, and manzanita fields were all burned from time to time, depending on opportunity and need. Sugar pines were burned individually to encourage pitch production or as a windbreak; huckleberries were burned to eliminate rank vegetation and weeds and to stimulate berry growth; hazel and beargrass was burned periodically to produce weaving materials. Cumulatively, these practices totaled hundreds or thousands of acres a year in southwest Oregon; and dozens or hundreds of acres within the study area. Daily and seasonal trail clearing activities, combined with occasional and seasonal brush clearing, hunting, seed curing, and sprout-inducing (for food and weaving materials) burns, made year-round open field burning a likelihood. Areas most likely to be burned in this manner included ridgeline trail segments, hilltop balds, bracken fern prairies, berry patches, hazelnut orchards, and other travel corridor segments or croplands (Zybach 2002). The escapement potential of such fires was probably moderate at times, depending on weather, the fuels being burned, and the condition of burn boundaries.

Broadcast Burning. Areas of annual seed production, particularly fields of tarweed and sunflowers, were burned every summer over large acreages (Boyd 1999b). Large bracken fern prairies were also burned annually in the Oregon Coast Range (Zybach 2003: 156-159), western Washington (Norton 1979), and western Canada (Turner 1991), but it is unknown how the plant was managed in southwest Oregon, if at all (Jackson 2010: personal communications). Oak savannas, riparian prairies, and ridgeline grasslands were often burned annually, too, to clear leaves, kill competing trees and shrubs, produce forage for deer and elk, and/or to make acorn and hazel nut harvesting easier (Boyd 1999b; Stewart 2002). Pine woodlands, were burned whenever fallen needles became thick enough to sustain flame (e.g., Leiberg 1900: 249):

> The forest floor in the type is covered with a thin layer of humus consisting entirely of decaying pine needles, or it is entirely bare. The latter condition is very prevalent east of the Cascades, where large areas are annually overrun by fire. But even on the western side of the range, where the humus covering is most conspicuous, it is never more than a fraction of an inch in thickness, just enough to supply the requisite material for the spread of forest fires.

Seasonal broadcast burning activities varied from firewood and patch burning actions in two important ways: fire boundaries were not so clearly defined, and there were multiple objectives for burning. The possibility of escapement from these actions was, as with patch burning, probably moderate at times.

Effects on Native Wildlife. Areas that were regularly burned produced a number of food plant species, as well as plants that could be used for other purposes, such as weaving materials, medicines, dyes, and construction materials (Zobel 2002: 307-308). Acorns, hazelnuts, camas, wokas, tarweed, huckleberries, blackberries, bracken fern, nettles, tobacco and other food, fiber, fuel, and medicinal crops were often managed in select areas over long periods of time. Crops were maintained and harvested in discrete locations in which the dominant species—usually the crop species itself—had been established or rejuvenated within a few days, weeks, or months time. This approach created a condition that is called "even-aged" management. Foot trails or canoe traffic, depending on location, provided direct access to favored croplands.

The development and maintenance of transportation corridors, extensive oak savannas, grassy prairies, brakes, berry patches, chinquapin and hazelnut groves, root fields, meadows, and balds by Indian burning practices also resulted in beneficial habitat to a number of plant and animal species (see Chapter V), providing sunlight, abundant food, ready travel routes, and certain types of cover. During infrequent wildfire events, these areas were not as prone to being burned, or burned at relatively low temperatures, and could also function as "refuges" for threatened wildlife species (Zybach 2003). By providing stable breaks in strategic parts of the landscape (ridgelines, peaks, and riparian corridors) with little long-term fuel build-ups, these areas also protected adjacent land areas that produced firewood, large wood products, and provided long-term habitats for big game animals, forest-dwelling species, or other useful plants, such as mosses and mushrooms (Kimmerer and Lake 2001; Zybach 2003). The use of fire across the landscape, therefore, provided benefits for people that were shared by a wide range of plant and animal species, many of whom were apparently dependent, or otherwise benefitted greatly, on these practices to maintain habitat or food.

Shrubs, flowers, and grasslands are quickly invaded and replaced by trees when prescribed fire (or other regular disturbances, such as grazing or mowing) is removed from the environment (e.g., Moravets 1932; Zybach 1999). These plants provided much of the basic food stores for precontact people in the forms of fruits, nuts, seeds, roots, stems, and bulbs (Todt and Hannon 1998; Boyd 1999b; Anderson 2005). Many of the same foods were also important to the survival of such animals as bear (Wilkes 1845b: 184), deer (Whitney 2001), and butterflies (Schultz and Crone 1998). Coblentz (1980: 348), for example, notes, "acorns are among the most important fall and early winter foods for numerous wildlife species."

Times of Indian Burning. The seasonality and timing of firewood gathering, patch burning, and broadcast burning was critical to the success of these practices, both to human practitioners and to affected plant and animal populations. Table 4.02 shows the general correlation between historical South

Umpqua (and western Oregon, generally) weather patterns and the seasonal timing of local precontact Indian burning practices.

Month	Season	Weather	Temperature	Plant Fuels	Burning
Jan.	Winter	Wet	Freezing	Dormant	Firewood
Feb.	Winter	Wet	Freezing	Dormant	Patches
Mar.	Spring	Wet	Freezing	Budburst	Patches
Apr.	Spring	Mixed	Cool	New Growth	Patches
May	*Transition*	*Mixed*	*Warming*	*Growing*	*Projects*
Jun.	Summer	Dry	Warm	Growing	Firewood
Jul.	Summer	Dry	Warmest	Growing	Firewood
Aug.	Late Summer	Dry	Warmest	Dormant	Broadcast
Sep.	Late Summer	Dry	Warm	Dormant	Broadcast
Oct.	*Transition*	*Mixed*	*Cooling*	*Fall Growth*	*Patches*
Nov.	Fall	Wet	Freezing	Dormant	Firewood
Dec.	Fall	Wet	Freezing	Dormant	Firewood

Table 4.02 South Umpqua basin precontact seasonal burning patterns.

General Fire History, 1857 to 2010

Beginning in 1857, GLO Surveyors noted whenever their lines crossed into burned areas, and sometimes even recorded the names of burns, or commented on their extent. These are the only historical records of wildfires or purposeful burning we have for the study area until it was surveyed by foresters in 1899: Dodwell and Rixon (1903) from the north, and John Leiberg (1900; 1903) from the south. From that point in time the record improves dramatically, beginning with maps and occasional photographs and extending to annual reports, aerial photos, panoramic photos, GIS analysis, and Infrared imagery.

Leiberg surveyed most of the southern Cascade Range in Oregon, covering both the east and west sides of the range north to Tsp. 28 S., expertly remarking on timber species and volumes, reforestation history, and fire effects. In summarizing his findings for the region, he wrote (Leiberg 1900: 276): “Of the forested area examined, comprising in round numbers 3,000,000 acres, a total of 2,975,000 acres, or 99.992 per cent, are fire marked.”

Leiberg was an accomplished botanist with an eye for detail. His first-hand examination of millions of acres of forest land – which he measured, photographed, and also helped mapped – enabled him to make a number of perceptive observations regarding the history of the land he was examining. He counted tree rings and measured diameters of trees being sent to sawmills, observed Klamath Indians peeling bark from pine trees, sheep herders setting fires to alpine forests to create pasture, and homebuilders felling sugar pines to make shakes for their roofs. These observations, and others, allowed him to be very analytical in his assessments of forest conditions, and the effects of fire over time. For example, this observation on forest soils (Leiberg 1900: 255):

> On ground where fires have not run for one hundred to two hundred years humus covers the forest floor to a depth which varies from 3 to 5 inches. The litter consists of broken trees and branches. It is enormously increased in quantity when a fire, even of low intensity, sweeps through the forest.

In Leiberg's examination of Tsp. 31 S. Rng. 3 E. in the study area, he observed (Leiberg 1900: 285-286):

> Where the yellow-pine reforestations have reached an age of 200 years and upward, the yellow pine is giving way to the encroaching red-fir growth. Where fires of modern date [1855-1899] have burned away the reforestations in these places, lodgepole pine or brush growths have taken possession.

Leiberg also made insightful observations regarding the transition from Indian burning (where he was able to make eyewitness accounts in the Klamath Lakes area), to white immigration and landscape-scale fire use more adapted to land clearing, grazing, mining, and forestry practices that then typified the western slopes of the range (Leiberg 1900: 277-278):

> 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 scars . . .
>
> The age of the burns chargeable to the era of Indian occupancy can not in most cases be traced back more than one hundred and fifty years. Between that time and the time of the white man's ascendancy, or, between the years 1750 and 1855, small and circumscribed fires evidently were of frequent occurrence . . .
>
> 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 . . .
>
> It is not possible to state with any degree of certainty the Indian's reasons for firing the forest. Their object in burning the forest at high elevations on the Cascades may have been to provide a growth of grass near their favorite camping places, or to promote the growth of huckleberry brush and blackberry brambles, which often, after fires, cover the ground with a luxuriant and, to the Indian, very valuable and desirable growth. The chief purpose of the fires at middle elevations and on the plans or levels probably was to keep down the underbrush in the forest and facilitate hunting.

Cattlemen, sheepherders, hunters, and miners began moving into the study area in the 1850s and 1860s and thereafter. This was almost entirely an all-male population, although many of these men began setting up residences and occasionally bringing in wives and children in the late 1800s. Fires were set for entirely different reasons than when the land was occupied by Indians, but the pattern of vegetation limited the size and extent of the fires, no matter their purpose or when they were set.

Fred Mensch, in his August 27, 1905 summary description of Tsp. 29 S., Rng. 1 W., was among the first GLO surveyors in the study area to note large burns, to record their names, and to associate them with identified homesteaders (Mensch 1906: 6101 1/2-6101 3/4):

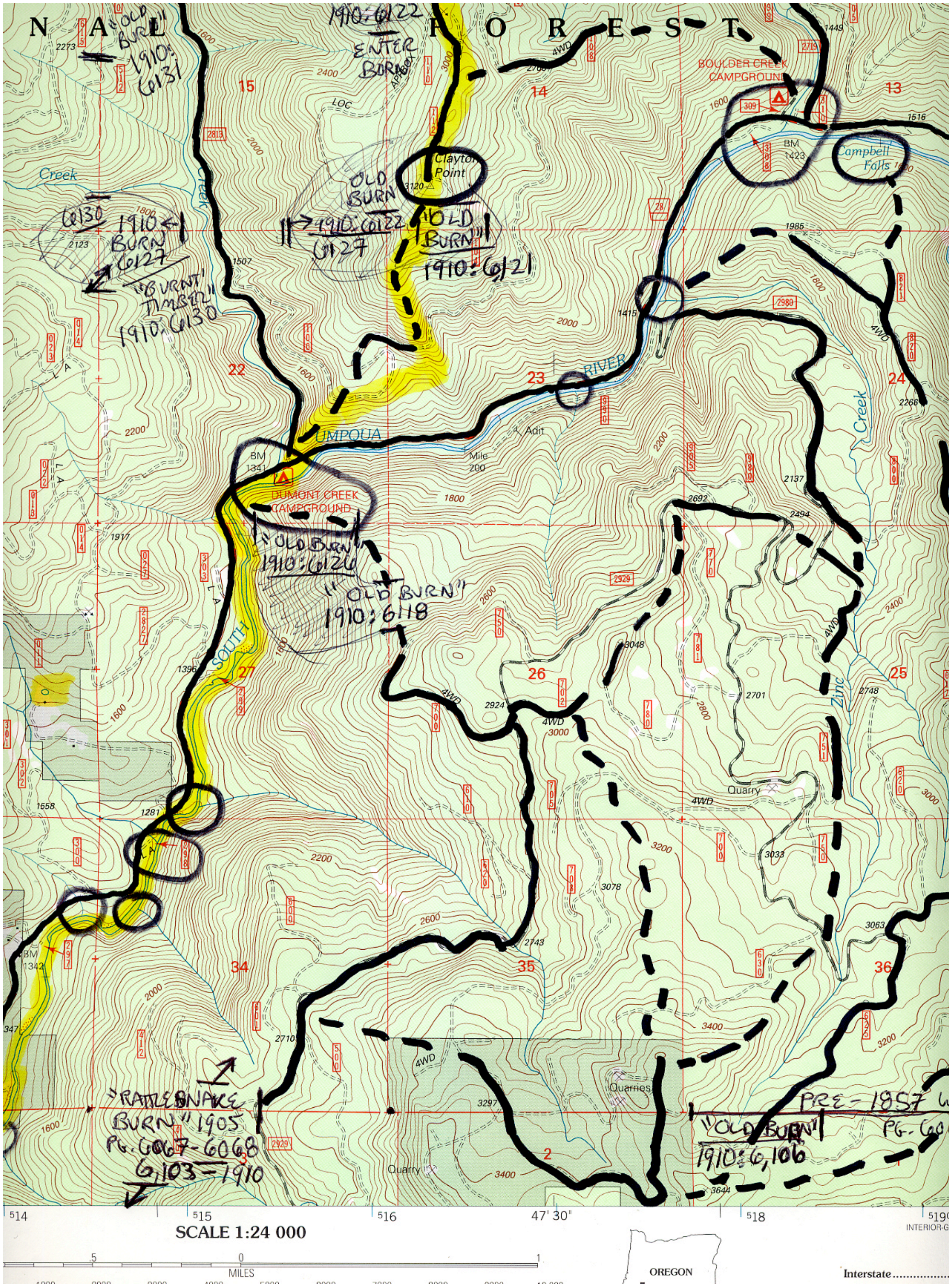
> The whole district is heavily timbered with the exception of some pine openings in sec. 28, and in places where the timber has been destroyed by fire, denuded tracts called "burns." These burns are timberless but are covered with dense undergrowth in the greater part of their extent. The Big Burn is some two miles long and a mile wide, embracing portions of secs. 18, 19, 20, 29, and 30.
>
> The Horseshoe Burn is about a mile long and a half mile wide and lies in secs. 28 and 29 . . . Many of the red firs and sugar pines are magnificent trees, some of them attaining a diameter of eight feet . . .
>
> Isadore Rondeau, in sec. 33, has a good house, barn, and other buildings, some 40 acres under fence with about 10 acres under cultivation, several head of horses and a small herd of cattle . . . Graham in sec. 28, has a cabin and about ten acres under fence . . . Geo. Rondeau has a cabin and a considerable area of cleared land on the Horseshoe Burn in sec. 29.

Although these locations are just outside the boundary of the study area, they do give an idea as to the size and importance of the areas that have been burned. The "Big Burn," for example, is two miles wide and a mile long -- at most, an area of about 1300 acres, which is relatively small by the wildfire standards of today. The "Horseshoe Burn" is even smaller, although it contains relatively successful homesteader George Rondeau; only about 320 acres in size.

Figure 4.01 shows a typical burn created to produce forage. This photo appears to have been taken in the mid-1930s, after the USFS had successfully reduced prescribed burning within the Umpqua NF boundaries – but while local ranchers continued to use the land for grazing purposes. Note three things here: the wide spacing and relatively small diameter of the snags in the burned area; the brush that has grown up among the snags due to the elimination of continued burning; and the perimeter of large, wide-spaced conifers in the background.

Figure 4.01 "Salting grounds, summit divide," ca. 1935, Rogue-Umpqua Divide (USFS collection).

Map 4.01 shows the location of a number of pre-1910 fires noted by the GLO surveyor during that year (Rands 1910). This survey includes Clayton Point, which was still surrounded by snags when Osborne photographs were taken from that location in 1932 (see Chapter VII). The yellow line separates the study area to the east from the perimeter to the west (surveyed by Mensch in 1906). Note the number and size of "burns" and "old burns" (as determined in 1910): most of these areas appear to be less than 100 acres in size, and the largest appear to be less than 200 acres, at most.



Map 4.01 Transcribed 1910 GLO locations of "Burns" and "Old Burns," Tsp. 29 S., Rng. 1 W.

Figure 4.02 is a 1946 aerial photograph showing that portion of Tsp. 29 S., Rng. 1 W. in Map 4.01, 36 years after Rands' GLO survey and 14 years after the Osborne photographs were taken from Clayton Point L.O. The South Umpqua River location is a good method for aligning these perspectives, as is the mouth of Zinc Creek, and Clayton Point, along the study area boundary. Note that the size and locations of earlier burns have not changed significantly in the intervening decades: whether this is a result of long-term snag recruitment of repeated burning is unknown, but the consistent patterning over time is significant.

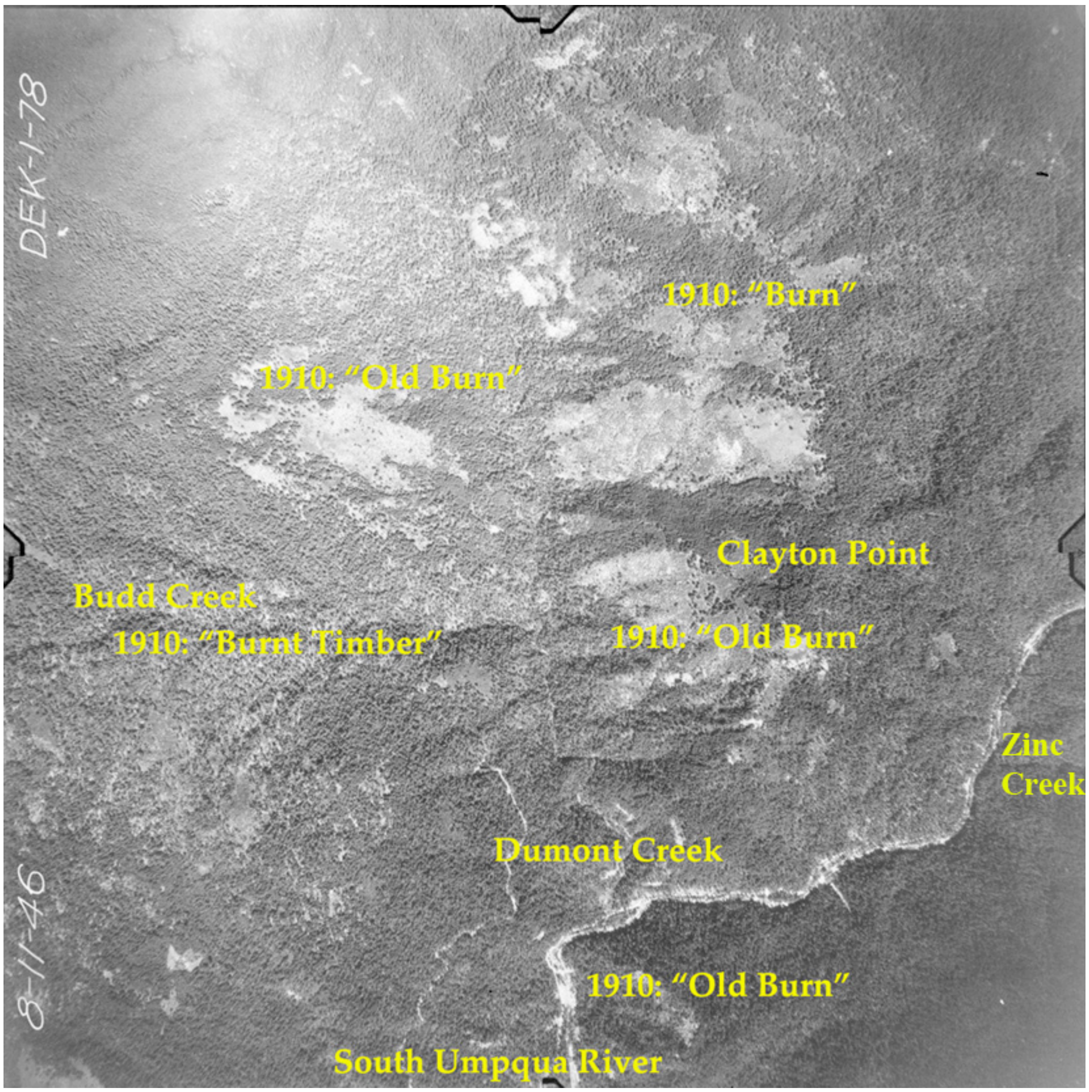


Figure 4.02 1946 aerial photo with 1910 GLO survey notations, Tsp. 28 S., Rng 1 W.

The widespread fires of 1910 caused a national awareness of the damage to forests and communities that could result from forest wildfires (Pyne 1982: 239-268). One result was the formation of state departments of forestry and privately funded fire protection organizations throughout the western US. In Oregon, the Department of Forestry (ODF) was created in 1911 to manage the State's forestlands and to fight wildfires on state and private lands. In Douglas County, the Douglas County Fire Patrol Association (now called Douglas Forest Protective Association) was formed in 1912 to prevent and fight wildfire on state, private, and USDI (now called Bureau of Land Management, or BLM) lands within the county's boundaries.

The ODF was put under the guidance of the Oregon Board of Forestry; among who's first duties was to appoint a State Forester to immediately begin coordinating fire prevention and fire suppression activities with the various county and private fire patrols around the State. The cooperative efforts of the State Forester and the fire patrols were (and are) summarized into an annual report, which the State Forester then presented to the Governor. These actions often resulted in conflicts with rural ranchers, hunters, and others, such as Bob Thomason (Shaffer 1989; Jackson 2010: personal communications), who continued to set fires along ridgeline trails, to rejuvenate huckleberry patches, to clear pastures, and for other purposes – and resented the need to apply for permits or report their activities in order to continue doing so. Officials from the US Forest Service, the Oregon Department of Forestry, and local Fire Patrol Associations soon began labeling these traditional practices as "incendiary," or even "arson." Some examples of this major shift in thinking in regards to long-standing prescribed burning practices can be seen in the Annual Reports of the ODF State Forester to the Board of Forestry. The Sixteenth Annual Report, for example, contained the following passages (Oregon State Board of Forestry 1927: 23):

> Incendiarism again heads the list of man-caused fires. It is possible that the field men are too prone to list fires as incendiary where the cause is unknown, or a little time devoted to investigation and reasoning would prove otherwise, nevertheless it is a fact that the greatest damage to standing timber in Western Oregon was due to this cause. The total number of fires from this cause is listed at 299 or 30 per cent of the total number of man-caused fires.
>
> During the night of July 27, over 50 incendiary fires were started on South Myrtle Creek in Douglas County. The lookout discovered the fires at 2:00 A. M. on July 28, and immediately reported them. Men were immediately sent to the fire but winds and low humidity caused them to merge into one immense fire, burning over 6,000 acres, and destroying 14 million feet of timber. Another incendiary fire was set on July 13, and destroyed 18 million feet of timber.
>
> The net loss in merchantable timber in Douglas County was 37,752 M board feet and over 37 million of this was due to incendiarism. Both Jackson and Josephine counties suffered from incendiary fires, but the loss was low in comparison to Douglas.

The Eighteenth Annual Report elaborated on this theme (Oregon Department of Forestry 1929: 13-14):

> The incendiary ranks first in the number of man-caused fires and second in the amount of property destroyed . . . The greatest difficulty with incendiary fires is encountered in Douglas, Jackson and Josephine counties. Apparently there are several motives. Some fires are set in order to burn out brush and small trees so that the land will be available for grazing. Other4s evidently desire to improve the hunting, some want to clean up the land so as to make prospecting easier, a few desire to secure work on the fire line, while some set fires out of pure maliciousness.
>
> While there might be some question as to the origin of a single fire, there can be no question as to the cause when so many fires start in a string along some trail, stream or ridge within a short time, as was very frequently the case last summer.

From the Twenty-First Annual Report (Oregon Department of Forestry 1932: 9-10):

> There were 1,621 fires on lands patrolled by the state and associations [in 1931]. This is the largest number of fires since 1924. Ninety-five per cent of the fires were man-caused – and increase of 18 per cent over 1930. Only 85 fires were set by lightning . . . The incendiary was the principal cause of fires. Five hundred and forty-eight or 34 per cent of the total number of fires were maliciously set. This is the largest number of incendiary fires for any one season. The incendiary situation was the worst ever faced by protection agencies, due primarily to the unemployment problem which was acute through the state . . . Josephine County had 116 incendiary fires, Douglas 109 and Jackson 76.

From the Twenty-Second Annual Report (Oregon Department of Forestry 1933: 4-5):

> During 1932 Oregon experienced one of the most destructive fire seasons in the history of organized protection . . .
>
> There were 1,686 fires reported during the season. This is the largest number occurring in one season since 1924. Ninety-five per cent were man-caused. Only 87 fires or 5 per cent were caused by lightning. As usual, incendiaries accounted for the largest number of fires by causes. There were 674 fires classed as incendiary which represented 40 per cent of the total number. Smokers ranked second with 352 fires or 20 per cent, and brush-burning third with 198 or 12 per cent . . .
>
> Douglas county had the largest number of fires with a total of 235. Of these 185 were incendiary.

From 1933 until 2002, relatively few wildfire events of note took place in the South Umpqua headwaters area of this study. This may have been in part to the establishment of Fire Lookout stations and aerial surveillance of the forest, combined with improved road systems and telephone communications prior to

WW II, or because of great increases in clearcut logging, road-building, technical advances in fire suppression, and the widespread deployment of youthful loggers and foresters throughout the area, equipped with the latest technological advances in firefighting equipment, chainsaws, caterpillar tractors, and chemical fire retardants after WWII. Perhaps it was the climate for those years, or federal policy – that reasoning as been given as well for the dearth of wildfires throughout western Oregon that seemed to take place everywhere except Tillamook County (and maybe the Smith River basin) in western Oregon for nearly 50 years – until the Silver Complex in the Kalmiopsis Wilderness area of the Klamath-Siskiyou Mountains in southwest Oregon in 1987, some bad wildfire years in the 1990s, and then the 2002 Fire Season; which affected much of western Oregon throughout late summer and early fall.

2002 Tiller Complex. In 2002 the snags of the Silver Complex in the Kalmiopsis Wilderness caught on fire, and nearly 500,000 acres burned and reburned in southwest Oregon: the largest wildfire in the State's history, so far as cost, damage, and acreage measures. On July 12th and 13th of that summer, lightning storms hit the South Umpqua headwaters, starting dozens of wildfires in their wake. Driven by extreme weather conditions and an initial lack of fire fighting crews (due to Regional staffing decisions for other large fires), the 2002 fires on the Umpqua escaped control and burned over a large landscape leaving "a natural pattern in the native forest" (Morrison et al 2003: iii).

By August 6th there were 19 active fires within the Tiller Complex, with an estimated 31,960 acres burned, at 25% containment. The largest fire in the Complex was the Boulder Fire, with total acreage at 13,960 acres. Seven fires were larger than 1000 acres: two of the four largest fires remained unstaffed until resources could be reassigned for other fires. Falling snags (dead trees) were said to pose a serious hazard to firefighters.

On August 7th there were still numerous active fires within the Tiller Complex, with a slight increase (from August 6) to an estimated 32,005 acres burned, at 25% containment. Current strategy became to reduce fuels on the perimeters – "denying fuel to the main fires, and to tie-off the west side before offshore winds set in" – which strategies were expected to increase the fire size "by 800 acres."

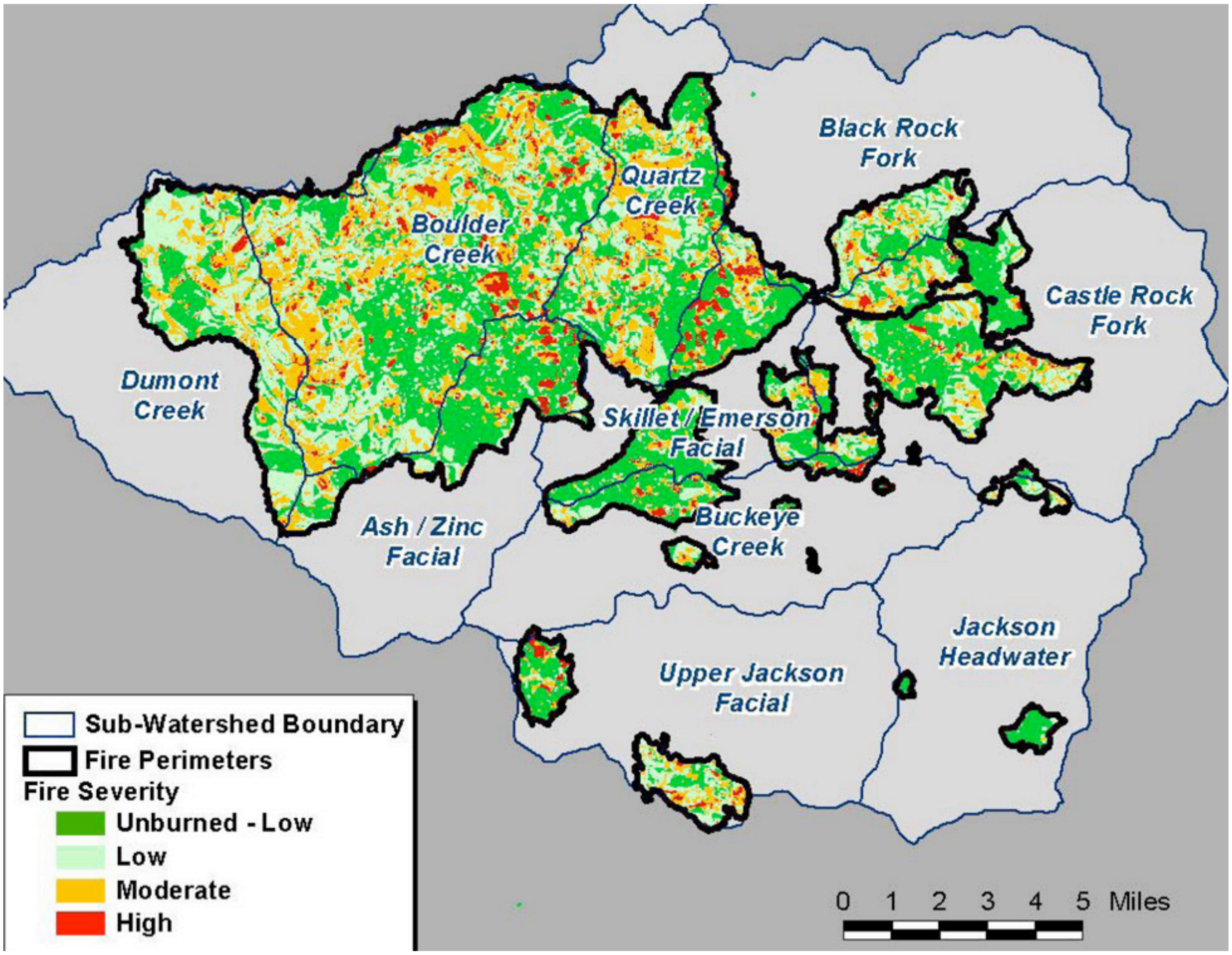
By August 18th the Tiller Complex Fire had grown to 53,900 acres and was 43 percent contained. The fire now consisted "eight large fires and numerous other small fires."

On September 4th the Tiller Complex was contained at 68,862 acres (Morrison et al. 2003: 5).

Map 4.02 shows the final extent of the Tiller Complex, including unburned land and burned lands considered to be of high, medium, and low severity. Note the general similarity with these patterns and earlier historical patterns shown on Map 4.01 and Figure 4.02. Perhaps this is the actual "natural pattern in the native forest" described by Morrison et al. (2003: iii), but it must be further noted that the earlier patterns were apparently due to human ignitions, rather than lightning storms; too, there is no way to determine the relative severity of the earlier burns, or why they remained persistent in the landscape.

Table 4.03 tabulates the areas shown on Map 4.02, based on Carloni (2005: 54). Figures are rounded to the nearest 500 acres, so the total fire size is increased 138 acres to 70,000 acres. This rounding process is for two reasons: partly to make the numbers and percentages easier to comprehend, and partly to dispel the illusion that there is more precision to the numbers generated by GIS; i.e., the 70,000 acres is every bit as accurate as the 68,862 acre figure, and easier to understand. Note that "old-growth" forest is listed as 44% of the entire area burned. Because no definition is provided for this designation, it is difficult to determine how this number was derived. Traditional definitions for old-growth trees and stands are those in excess of 200 years of age (e.g., Zybach 2003: 193-201). It is unlikely that the entire area shown is populated with 200-year old (and older) trees, so a more accurate description might be "conifer forestland," or something of that nature. The designation of "plantation" should be straightforward enough (an area reforested with planted seedlings), so perhaps there is a more accurate determination of that condition. The remaining area of "other vegetation" – as with the term "old-growth" – is difficult to understand. Is this second-growth, grassland, seedlings, brushfields? Any or all of the above?

Despite difficulties in understanding the types of vegetation (other than plantations) affected by these fires, the map and table clearly present several important points: 1) only about 30% of the total area burned, so the actual amount of burned ground was closer to 20,000 acres than to 70,000 acres; 2) the pattern is one of dozens (or hundreds) of small fires, with no single area being heavily affected; 3) only 4,000 acres total seemed to be characterized as (roughly) "stand replacement events," and those generally seem to be evenly distributed across the landscape; 4) plantations seemed more likely to experience major mortality during this event than other vegetation types; and 5) the fires seem to be defined by subbasin boundaries (see Chapter VII) more than any other factor – whether this was because of topography, existing vegetation/fuel patterns, and/or back burning strategies implemented on August 7 could not be determined from the cited reports.



Map 4.02 2002 Tiller Complex Fire boundaries and severity (Morrison et al 2003: 14).

Type	Unburned	Low	Medium	High	Total	Percent
Old-growth	23,000	4,000	3,000	1,000	31,000	44%
Plantation	8,500	2,000	3,000	2,000	15,500	22%
Other Veg	17,500	2,500	2,500	1,000	23,500	34%
Total	49,000	8,500	8,500	4,000	70,000	100%
Percent	70%	12%	12%	6%	100%	

Table 4.03 2002 Tiller Complex "burn intensity by stand type" (Carloni 2005: 54).

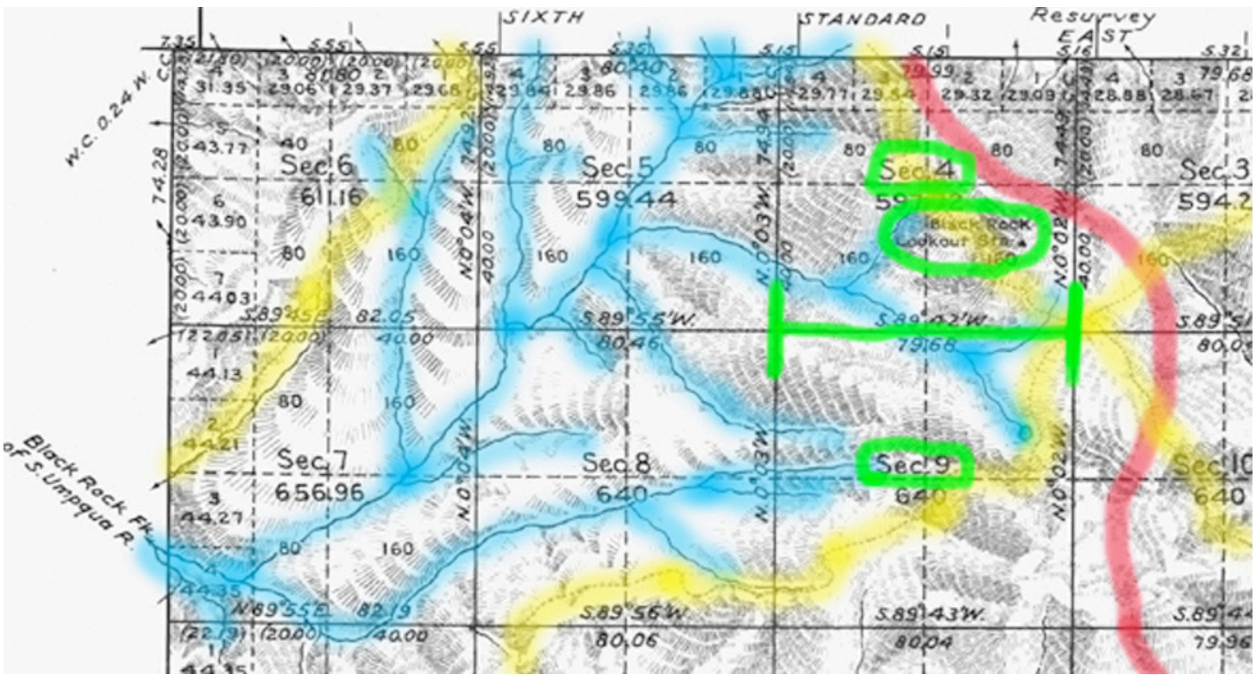
2009 Boze and Rainbow Creek Fires. The Boze Fire resulted from lightning storms that passed over South Umpqua headwaters on September 12 and 13, 2009. The fire affected the French, Boze, Prong, and Copeland Creek drainages to the immediate east and north of the 2002 Tiller Complex Fires on the Black Rock Fork subbasin of the South Umpqua River. The Rainbow Creek Fire was first reported on September 22, 2009, to the east of the 2002 Tiller Complex Fire on the Castle Rock Fork subbasin of the

South Umpqua River. It was also ignited by one of more lightning strikes on a ridgeline separating the Black Rock Fork from the Castle Rock Fork, and then moved rapidly northward into the Black Rock Fork subbasin.

Figure 4.03 shows a portion of the GLO survey notes taken on an east-to-west transect between Section 4 and Section 9 of Tsp. 28 S., Rng. 3 E., to the immediate south of Black Rock (Raymond 1929: 10,537). This is a portion of the land that burned on September 22 during the first day of the Rainbow Creek Fire. Map 4.03 shows this area of land, with a green highlight showing the transect between Section 4 and Section 9 described in Figure 4.03. The intersection of the east-west transect line with the north-south dashed "quarter sec" line between the "Sec. 4" and "Sec. 9" labels on Map 4.03 is the point labeled "39.84" [chains] on Figure 4.03. Note that the bearing trees at this point are only 8-inches and 10-inches

0.10	Trail, bears NE. and SW.
10.00	Creek, 3 lks. wide, course SW.
39.84	Set an iron post, 3 ft. long, 1 in. diam., 30 ins. in the ground, for ¼ sec. cor., with brass cap marked
	¼ S 4 / S 9 1929
	from which
	A fir, 10 ins. diam., bears N.77*E., 62 lks. dist. Marked ¼ S 4 B T.
	A fir, 8 ins. diam., bears S.67*E., 63 lks. dist. Marked ¼ S 9 B T.
	Desc. 90 ft. over W. slope.
42.45	Creek, 5 lks. wide, course NW., enter heavy timber, bears NW. and S., asc. 290 ft. over NE. slope.
52.00	Leave heavy timber, bears N. and S., enter an old burn, very dense undergrowth.

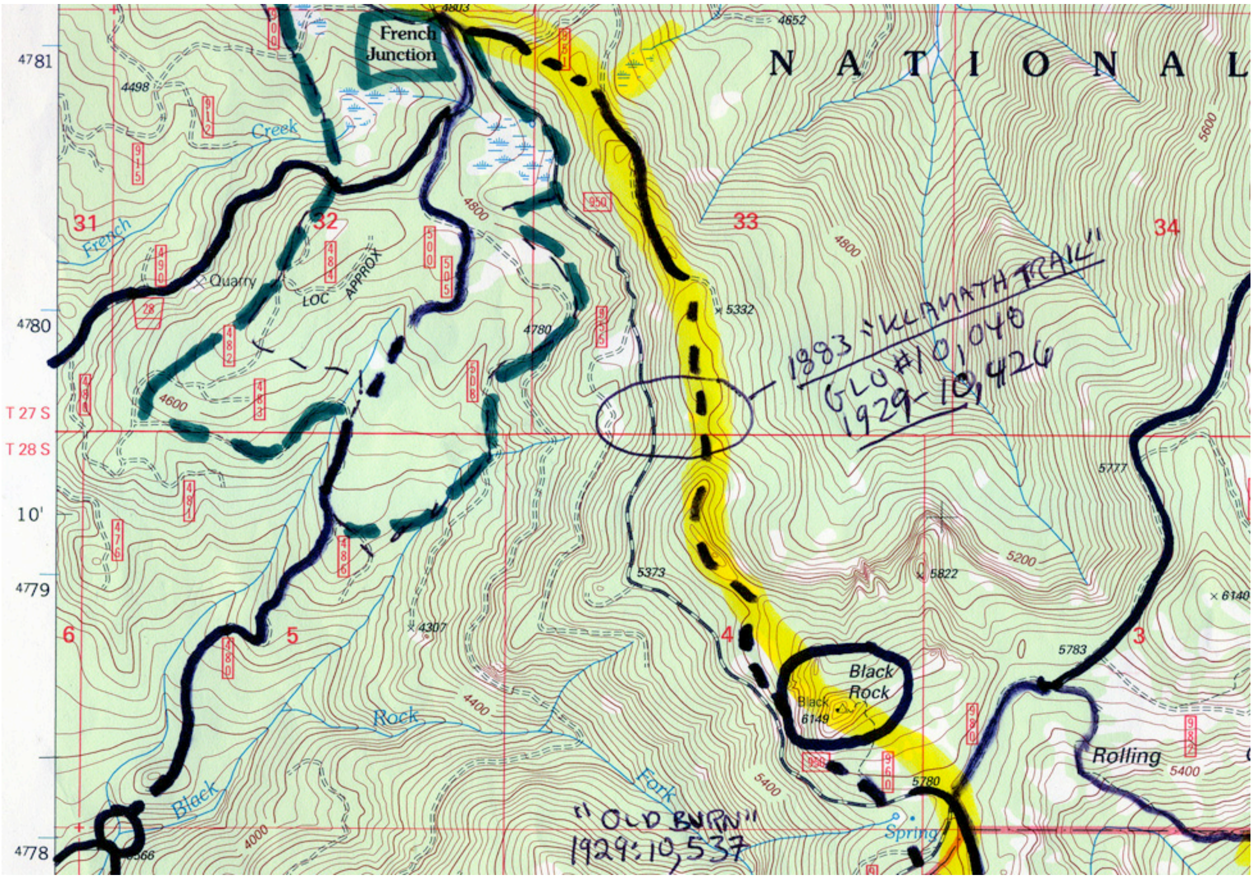
Figure 4.03 1929 GLO Black Rock survey notes, Sec. 4 and Sec. 9 division, Tsp. 28 S., Rng. 3 E.
in diameter. They are not old-growth, and are far more likely to be very young [perhaps 20-year old] Douglas-fir poles or saplings. As the GLO surveyor, Raymond, continued east another 175 feet along this line in 1929, he encountered a strip of "heavy timber," bearing northwest by south; continuing due east on the same transect another 630 feet he then entered "an old burn" with "very dense undergrowth" (see Figure 4.01), bearing north and south. Therefore, in 1929, this mile-long strip of land passed through some very young trees, some older trees, and into a burn in less than ¼ mile distance.



Map 4.03 Annotated Black Rock portion of 1929 GLO map, Tsp. 28 S., Rng. 1 E.

Map 4.04 shows this same area, the east west transect between Sec. 4 and Sec. 9 in Tsp. 28 S., Rng. 3 E. to the south of Black Rock, transcribed onto a current USGS field map; along with a segment of the historic Klamath Trail surveyed in 1883 (Flint 1883: 10,048).

Table 4.03 shows photographs of the Rainbow Creek and Boze fires on September 22, 2009: the day the Rainbow Creek Fire was first reported, and the same day it burned completely across the transect described and shown on Figure 4.03 and on Map 4.03 and Map 4.04. All of these photos were taken on the same day, with the exception of photograph E., which may have been taken on a different day. All photographs were taken from the government "Inciweb" website (www.inciweb.org/incident/1893/),



Map 4.04 Annotated USGS Black Rock field map, with Sec. 4 and Sec. 9 divide, Tsp. 28 S., Rng. 3 E.

maintained by the USFS, BLM, the National Park Service, and several other federal agencies, and which contains significant additional information on these fires. All photos are credited as given at that location.

Map 4.05 shows the progression of the Boze and Rainbow Creek fires from September 15 to September 28, 2009, including the September 22 start of the Rainbow Creek Fire documented on Table 4.03. The base for this map was also obtained from the Inciweb website, but it was cropped and annotated with geographical locations, study area boundary line, and subbasin labels to make it easier to relate to other maps and illustrations in this report.

On October 3, 2009, infrared aerial photographs were taken of the two fires and determined that the Boze Fire had become an estimated 10,640 acres and the Rainbow Creek Fire an estimated 6,085 acres, bringing the total for the two fires to about 16,725 acres.

A. Rainbow Creek Fire start (P. Zerr).


B. Rainbow Creek Fire blow-up (J. McEnroe).

B. Boze and Rainbow Creek fires (J. Baldwin).

C. Rainbow Creek flame (J. Baldwin).


D. Boze Fire night patrol (XTreme Wildlands, Inc.)

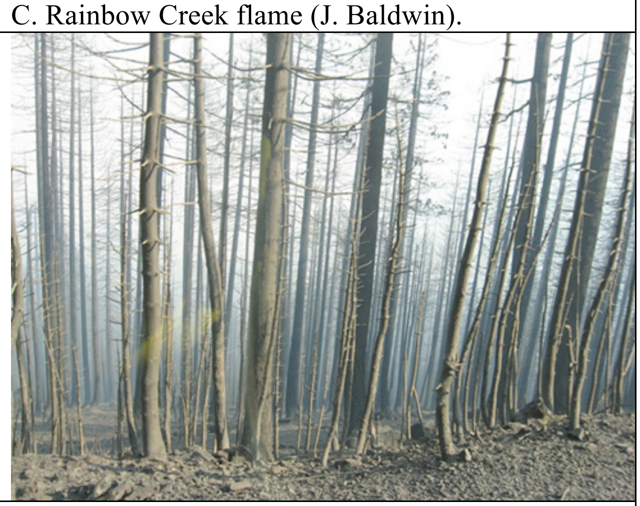
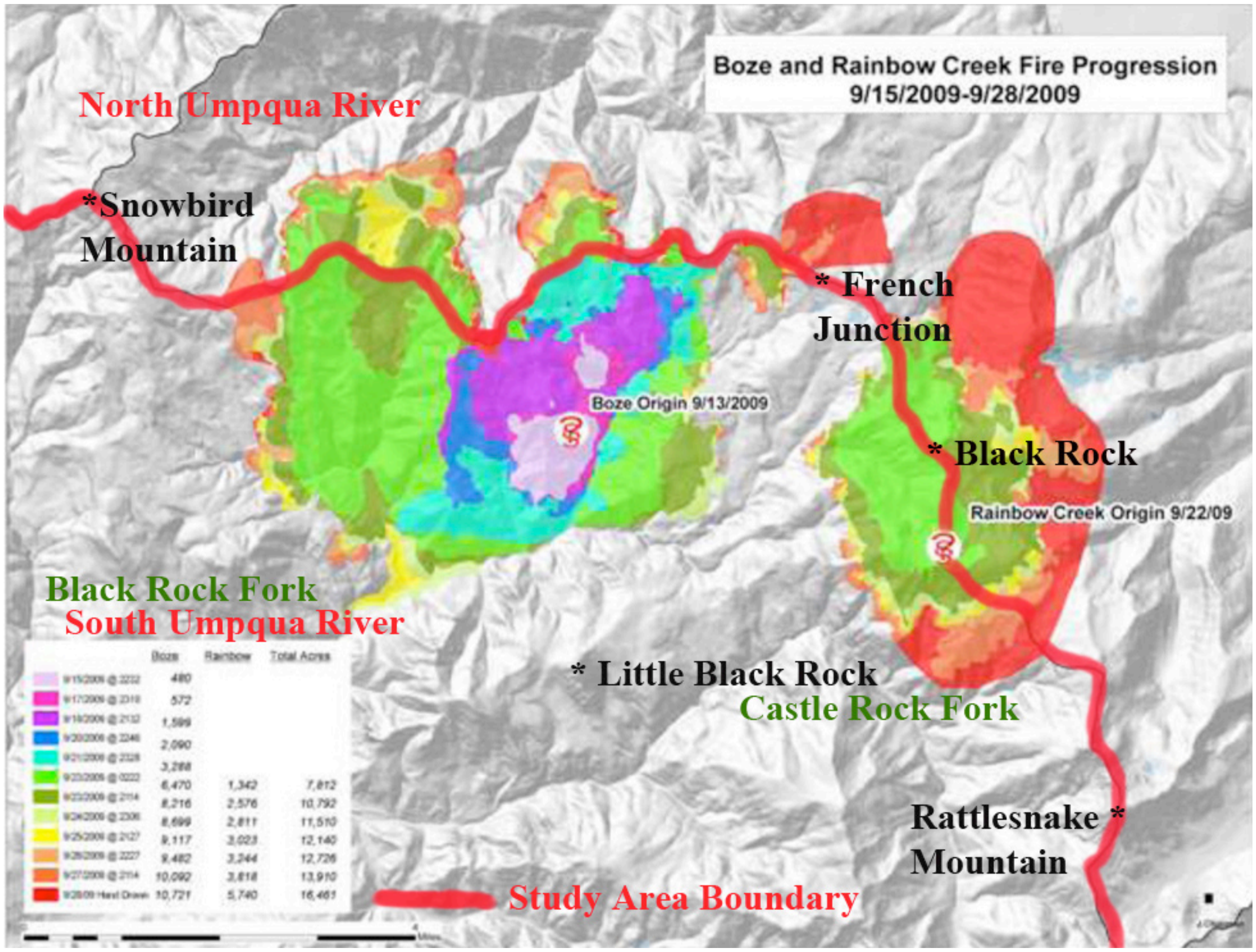

E. Boze Fire aftermath (K. Sands).

Table 4.04 Boze and Rainbow Creek fires, September 22, 2009 (www.inciweb.org/incident/1893/).



Map 4.05 Boze Fire and Rainbow Creek Fire daily burning progression, September 15-28, 2009.

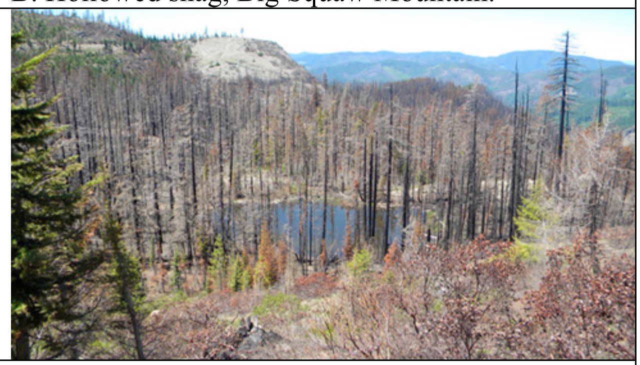
Table 4.04 shows the aftermath of the 2002 and 2009 wildfires in the study area. Photographs, C., F., and H. show effects of the Tiller Complex eight years after it occurred. Not in particular the ridgeline burn pattern on C. This type of “natural break” in fire effects is typical of the types of vegetation patterns representing historic Indian burning practices, as well as the subbasin-defined patterns shown on Map 4.02. Also, compare the snag-overstory/shrub-understory pattern of H. with Figure 4.01. The two individual snags likely burned during 2002 as well, but note the differences in their patterns: A. is an isolated snag with evidence of large lower limbs, demonstrating that it was open-grown throughout much or all of its existence; B. is hollowed out as if it had an entirely different burn history, and is surrounded by smaller diameter snags that moved in during more recent times.

Figure 4.04 is a last look, toward the northeast, at the Sec. 4 and Sec. 9 survey transect line south of Black Rock that burned on September 22, 2009 -- as it appeared one year later, on July 13, 2009

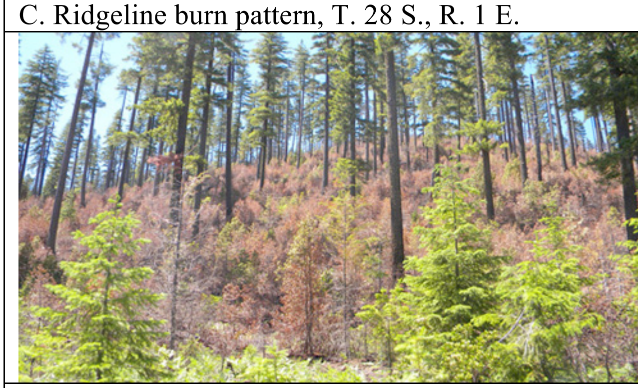
A. Burned snag, Big Squaw Mountain.

B. Hollowed snag, Big Squaw Mountain.

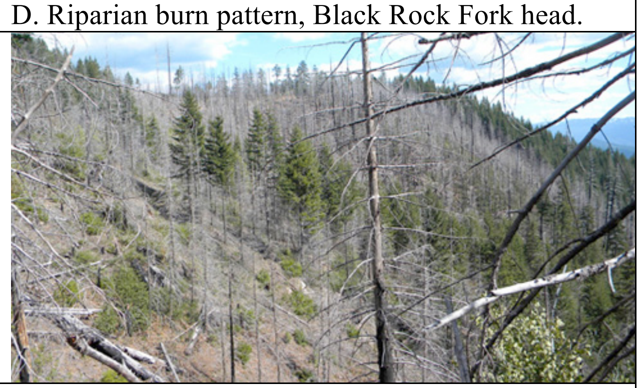
C. Ridgeline burn pattern, T. 28 S., R. 1 E.



D. Riparian burn pattern, Black Rock Fork head.

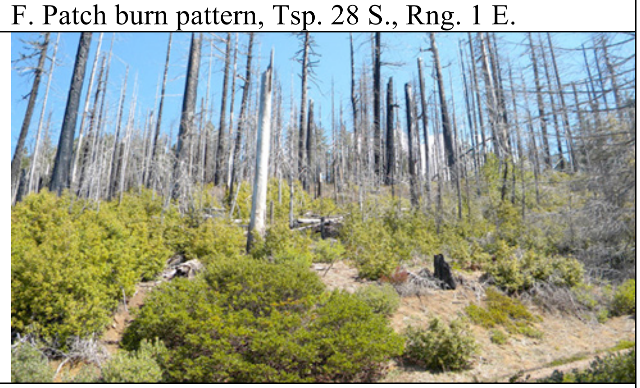


E. Understory burn pattern, French Junction.



F. Patch burn pattern, Tsp. 28 S., Rng. 1 E.

G. Spot burn pattern, Quartz Creek bridge.



H. Old burn, Cavitt Mt., Tsp. 28 S., Rng. 1 E.

Table 4.05 South Umpqua headwaters wildfire aftermath patterns, 2010.

Catastrophic Wildfire History, ca. 1490 to 2010

Catastrophic forest fires, by definition, are wildfires that cover more than 100,000 acres of contiguous forestland during the course of a single event (Zybach 2003: 6-7). Catastrophic fire years are calendar years in which more than 100,000 acres of forestland within a given area are burned by wildfire, whether during the course of a single event, or as a result of numerous events (ibid.: 93).

The South Umpqua headwaters area, surprisingly, has no history of catastrophic-scale wildfires. Although large, stand-replacement events have become more commonplace in recent years, a variety of conditions and circumstances seems to have kept this area free of wildfires approaching the scale of the historic Coast Range "Great Fires" (Zybach 2003); the more recent 1987 Silver Complex and 2002 Biscuit Fires in southwest Oregon; or the 2003 B&B Complex to the north**.**

This pattern (catastrophic-scale wildfires to the north and west of the study area; but not inclusive of the study area) seems to have been consistent throughout historical time, and likely for several hundred years before then as well.

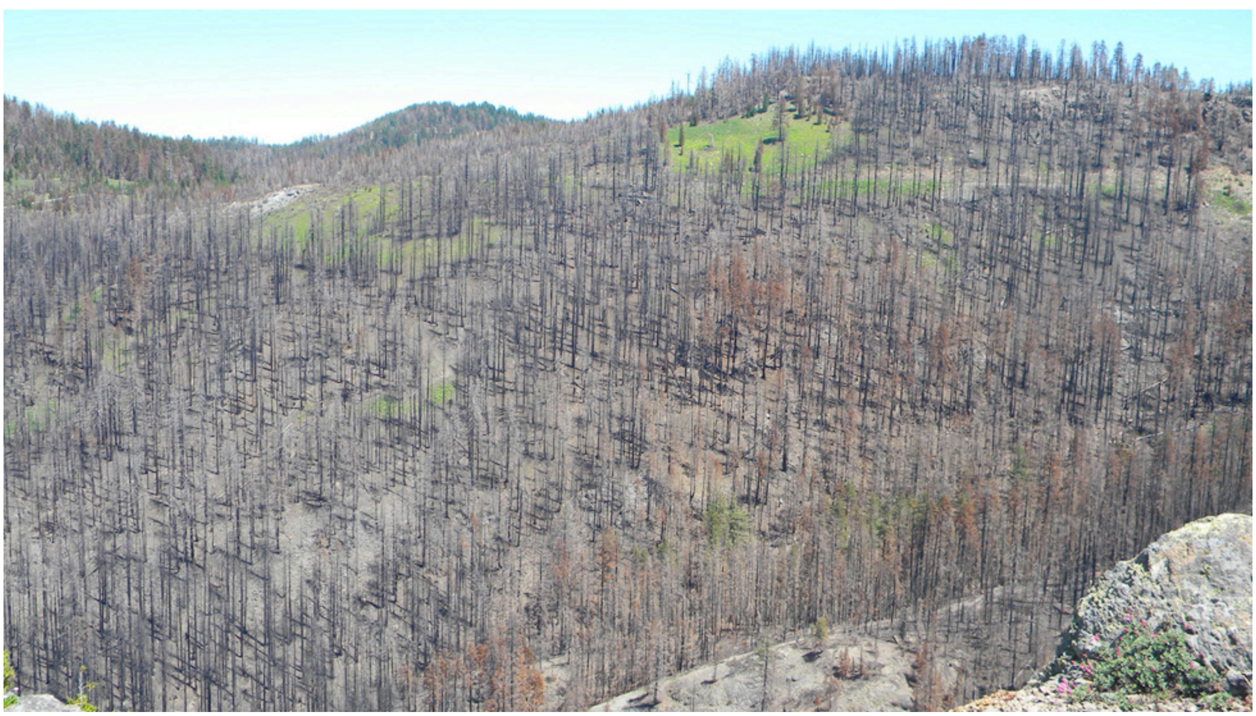


Figure 4.04 Looking NE of Black Rock, across Sec. 4 and Sec. 9 divide of Tsp. 28 S., Rng. 3 E.

The1900 USDI GIS map shown on Table 2.01, is the earliest historical map shown in the sequence. The original 1900 USDI map (Thompson and Johnson 1900) was included with a report by Gannett (1902). In describing map, he stated (Gannett 1902: 11):

> The most startling feature shown by the land-classification map of this State is the extent of the burned areas, especially in the Coast Range and in the northern half of the cascades. It must be understood that the areas represented here as burned are only those in which the destruction of timber was nearly or quite complete. Areas which have been burned over with only a partial destruction of the timber are not here represented.

In considering this record, two questions come to mind: 1) Has the South Umpqua headwaters regions simply been fortunate to have escaped such catastrophic-scale wildfire events during the past few centuries (with recent indicators being that this won't likely continue indefinitely); or, 2) Does some configuration of topography, geology, local weather patterns, and/or vegetative cover exist in this area that – at some point – confines such extensive wildfires and restricts their spread?

The recent increase in size and severity of wildfires within the study area boundaries suggests that a trend may be developing in which future wildfires will become ever more destructive and difficult to contain, unless something is done to alter that trajectory.