**APPENDIX: FIRE HISTORY AND FIRE PATTERN AFFECTS ON STAND DEVELOPMENT AND LANDSCAPE PATTERNS ON THE UMPQUA RESOURCE AREA WITH EMPHASIS ON THE NORTH COQUILLE, MIDDLE CREEK AND TIOGA CREEK SUBWATERSHEDS**

## Fire Pattern Affects on Stand Development and Landscape Patterns

### Timing of Stand Replacing Fires

The major stand replacement fires in the Hemlock Zone appear not to be random events but are rather the result of regional and even continental scale climatic conditions. Heinselman (1983) observed that large areas of forest, in regions characterized by infrequent high intensity fires, can be traced back to fires that burned in a few major fire years. Where weather information is available, we know most of these major fire years are associated with periods of severe drought. For example, 1755-1759 were major fire years in both the Rockies and the Lake States (Heinselman, 1983). A 500-year age class is found throughout the Cascades, and the Olympic Mountains. That age class may have been initiated by fires associated with a drought period or even a short term climatic change (Franklin and Hemstrom 1981).

The 500-year age class in the Cascades, and the 400 to 460-year-old stands in Tioga Creek, Middle Creek and East Fork Coquille River areas regenerated during the Little Ice Age. This was a period of cooler drier weather in the Northern Hemisphere. The weather pattern predisposing the Lakes States and the Rockies to fires from 1755 to 1759, may have been the same predisposing factor leading to the fires occurring from 1738 to 1790 on the Coos Bay District, and to the stand replacement fires that lead to the regeneration of the 250-year age class found in both the Washington and Oregon Cascades. Agee (1991) identified 14 fire events in the Oregon Cave National Monument, of which 9 corresponded to fire scar dates or regeneration pulses observed in the Middle Creek, North Coquille, Tioga Creek and West Fork Smith River Subwatersheds, and in the East Fork Coquille Watershed. The 1845 to 1855 fires, documented in every fire history done on the Coos Bay District, coincide with pioneer and early newspaper accounts of fires on the Oregon Coast from 1845 to 1849 (Morris, 1934). The largest of these fires was probably the 1849 fire that burned 800,000 acres between the Siuslaw and Siletz Rivers (Morris, 1934, Walstad et.al. 1990). This is likely the same 1849 fire documented in the West Fork Smith River Subwatershed fire history. The 1845 to 1855 fires included landscape scale stand replacement events on the Siuslaw National Forest and at the north end of the Coos Bay District. On sites visited in the South Fork Coos River, North Fork Coquille, and East Fork Coquille, these mid-19th century fires were wide spread stand modifying (low to moderate severity) fires, but did cause stand replacement on ridge tops, upper slopes, south aspects, and valley side locations.

Climatic differences over time may have affected growth patterns. The Douglas-fir growth ring patterns for nearly all trees regenerated in the 1738 to 1790s are sufficiently different from the pattern lain down by trees regenerated before 1700 that an experienced observer can identify trees in the 1738-1790 age class with a glance at the cut surface of a stump. The ring widths of a 1735-1780 age class tree show rapid growth for the first 80 to 100 years (3 to 4 rings/ inch initially tapering to 6 or 8 over time). Then the growth abruptly slows to where a magnifying glass is sometimes necessary to get an accurate ring count. Trees regenerated before 1700 also tend to show rapid initial growth but their growth rates start to decline almost immediately, and continue to decline steadily for the life of the tree. These patterns were observed while looking at hundreds of tree stumps from Roman Nose Mountain to the East Fork Coquille River.

### Stand Structural Development as Influenced by Low to Moderate Burns in Established Stands

Stands regenerated following a fire, which killed all previously existing trees on the site, are even-age and predominantly Douglas-fir. If these stands experience subsequent low to moderate severity fires then there may be one or more additional age classes. In multi-cohort[1] stands, Douglas-fir is usually the only species representing the oldest age class. Hemlocks and cedars, with their thin bark and shallow roots, are less fire tolerant than the Douglas-fir and only survive very cool fires or in the unburned patches left by those fires that burn in a mosaic pattern. On those sites where the subsequent fire killed most of the older age class of trees, the younger age class is dominated by Douglas-fir. Where the second fire kills only a few of the older trees, the resulting partial shade favored establishment of an even-age understory hemlock stand (Hofmann, 1924).

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[1] A cohort is a group of trees regenerating after a single disturbance. A multi-cohort stand is a stand that arose after two or more disturbances. All but the first disturbance would be less than stand replacing in severity (Oliver; Larson, 1990).

Most of the old growth stands sampled while preparing fire histories for watershed analysis had experienced underburns of sufficient severity to:

- eliminate the fire intolerant species that regenerated at the same time as the overstory Douglas-fir.
- reduce vegetation competition by setting back the herb and shrub layer and creating gaps in the overstory, which provides the partial shade conditions that favor hemlock and cedars over Douglas-fir.

As a result, the overstory and the understory stands not only occupy different in canopy strata, they also are distinctly different ages and composed of different tree species. Extreme age differences on the upper slopes above Tioga Creek, Park Creek, and East Fork Coquille River where the overstory Douglas-fir regenerated between 1534 and 1622 and the understory hemlock regenerated after underburn(s) between 1912 and 1923. Further more, these underburns were of sufficient severity to kill all hemlocks and redcedars that had been on those sites before 1912 excepting isolated individuals growing in moist protected draws.

Most of the understory hemlock stands, observed during the fire history work, date from either the 1845-1855 fire episode or the period from 1891 to 1944, and most of those trees regenerated during the 15 to 20 year period immediately following the underburn. The understory hemlock stands regenerated from 1912 to 1944 either are in or starting to emerge from the stem exclusion stage. Their canopies are so tight as to exclude all but a few scattered ferns and shrubs.

The most complex landscapes support stands initiated during the 1534-1622 fire episodes. These stands were modified by moderate severity fire(s) during the 1738-1790 fire episode and further modified by low to moderate severity fires dating from the 1845-1855 and/or the 1881-1944 fires. These landscapes are characterized by the following features:

- The southwest facing ridges often support stands that are a single age and single story. These are the most recently burned areas on the landscape, and appear to be more frequently burned than the rest of the landscape. Consequently, these are the youngest wild stands on the landscape.

- The south to west facing slopes, and the upper ridge locations on other aspects support two or three cohorts divided into two distinct canopy stratum. The upper stratum is occupied by older Douglas-fir. The most common overstory age class is younger than 300 years old. The lower stratum is occupied by younger even-aged hemlock with an occasional Douglas-fir.

- North facing slopes, and the lower slopes usually support three cohorts and sometimes a fourth cohort. The upper stratum is occupied by older Douglas-fir. (1534-1630 and/or 1738-1790 birth dates.) The lower stratum is occupied by younger even-aged hemlock with an occasional Douglas-fir.

Generally landscapes dominated by stands that established as the result of the 1738-1790 fire episode, and later subject to low to moderate severity fires, are less complex:

- The south to west facing slopes, and the upper ridge locations on other aspects support two cohorts divided into two distinct canopy stratum. The upper stratum is occupied by older Douglas-fir dating to 1738-1790. The lower stratum is occupied by younger even-aged hemlock with an occasional Douglas-fir. On some sites, the understory is dominated by stump sprouting shade tolerant hardwoods. There are a few small patches of young trees on south facing ridge tops that date to local fires after 1900.
- North facing slopes, and the lower slopes usually support a single story stands that show little evidence of underburns. These stands are described in detail below.

**Stand Structural Development Where There Were No Underburns**

Stands on the lower slopes in the Upper North Coquille and Little North Fork Coquille Drainages, both in the North Coquille Subwatershed, provided a unique opportunity to see how old growth stands develop where there were no underburns. The dominant and co-dominant trees are Douglas-firs that regenerated between 1760 and 1780. A small number of western hemlocks and western redcedars came in following the disturbance. Ring counts show the western hemlock and western redcedar regenerating between 1779 and 1840. Hemlock and cedar regeneration appeared to peak between 1811 and 1831, after Douglas-fir regeneration tapered off. Today, those hemlocks and cedars are found in the intermediate crown position, and are generally tall enough to reach the lower live limbs of the overstory Douglas-fir. These western hemlock and western redcedar have full crowns covering up to 70% of the boles.

Transects were run through reference stands next to the North Fork Coquille in sect. 21, T.26S., R.10W., Will. Mer. and Little North Fork Coquille in sect. 19, T.26S., R.10W., Will. Mer. Illustrations 1, and 2 are the graphic representations of that data[2]. The stand structural differences between the north and south facing slopes, shown in the illustrations, are probably due to differences in fire intensity, and relative growth rates of the shrubs typical for each aspect. Other factors affecting the difference between the aspects are mountain beavers, which are more common in north facing draws, and the greater tendency for red alders to establish on the more moist north aspects following disturbance. Both mountain beaver clipping and red alder competition limit the amount and distribution of conifer regeneration. Normally fire intensity is greater on south aspects. This higher intensity exposes a more uniform expanse of mineral soil, and is more effective at killing or severely retarding stump sprouting hardwoods and shrubs. The shrubs found on the south facing slopes, evergreen huckleberry, rhododendron, salal and Oregon grape have a slow growth rate. Myrtle, which is found on the south aspects, can vigorously resprout but big game browsing usually holds myrtle in check during the grass/ shrub successional stages. Vine maple and salmonberry aggressively resprout and effectively compete for growing space on north aspects. On moist protected areas in north facing draws and head walls these shrubs may even escape fire damage. Resprouting vine maple, like myrtle, can be held in check by big game browsing. Our observation is big game prefer to use south aspects and subsequently will exert greater browse pressure on resprouting shrubs on those sites. In addition, mountain beaver, red alders and shrubs can exclude conifers from moist areas, which over time results in the gaps in the forest canopy characteristic of the north aspect stands. A more detailed description of the differences between north and south aspects is provided below.

<u>South facing slopes, where there is no indication of underburning have the following characteristics</u> -
The overstory is almost entirely Douglas-fir and most of those occupy the co-dominant position. The few western redcedars and hemlocks present are in the intermediate position. The stands are often single story. Some stands are two story with a Douglas-fir overstory and a myrtle understory. The few understory western hemlocks and cedars are found next to gaps in the overstory.

The canopy is very uniform and the stands well stocked. The uniformity and density on the south slopes cause the tree crowns there to be 65% to 80% of the crown sizes on the north aspects, based on measurements made on aerial photos. When there are large openings, they are associated with salvage logging, root rot pockets, and nonforest ground. In mature stands, there is open space between the crowns, which is the result of the crown abrasion during high winds (Oliver; Larson 1990). That space allows enough light to reach the forest floor to support a moderate to a dense brush layer on most sites.

The branching pattern on the Douglas-fir suggests a past period of very high crown competition. The upper 30% to 40% of most Douglas-firs exhibit a normal branching pattern with the middle third often exhibiting fan-shaped epicormic branching. The fan shaped branching is stimulated on the boles of the surviving trees as light levels increase inside the stand following competition mortality of the less vigorous trees the stand. The fan shaped epicormic branches are of particular interest in that they provide nesting platforms and substrate for epiphytes.

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[2] The surveyors mapped tree bole and shrub locations along the transects. They also recorded, DBH, relative tree heights, total crown depth, length of boles with epicormic branching, crown diameter, and shrub heights. Field work and illustrations done by Michael Rodriguez and John Colby.

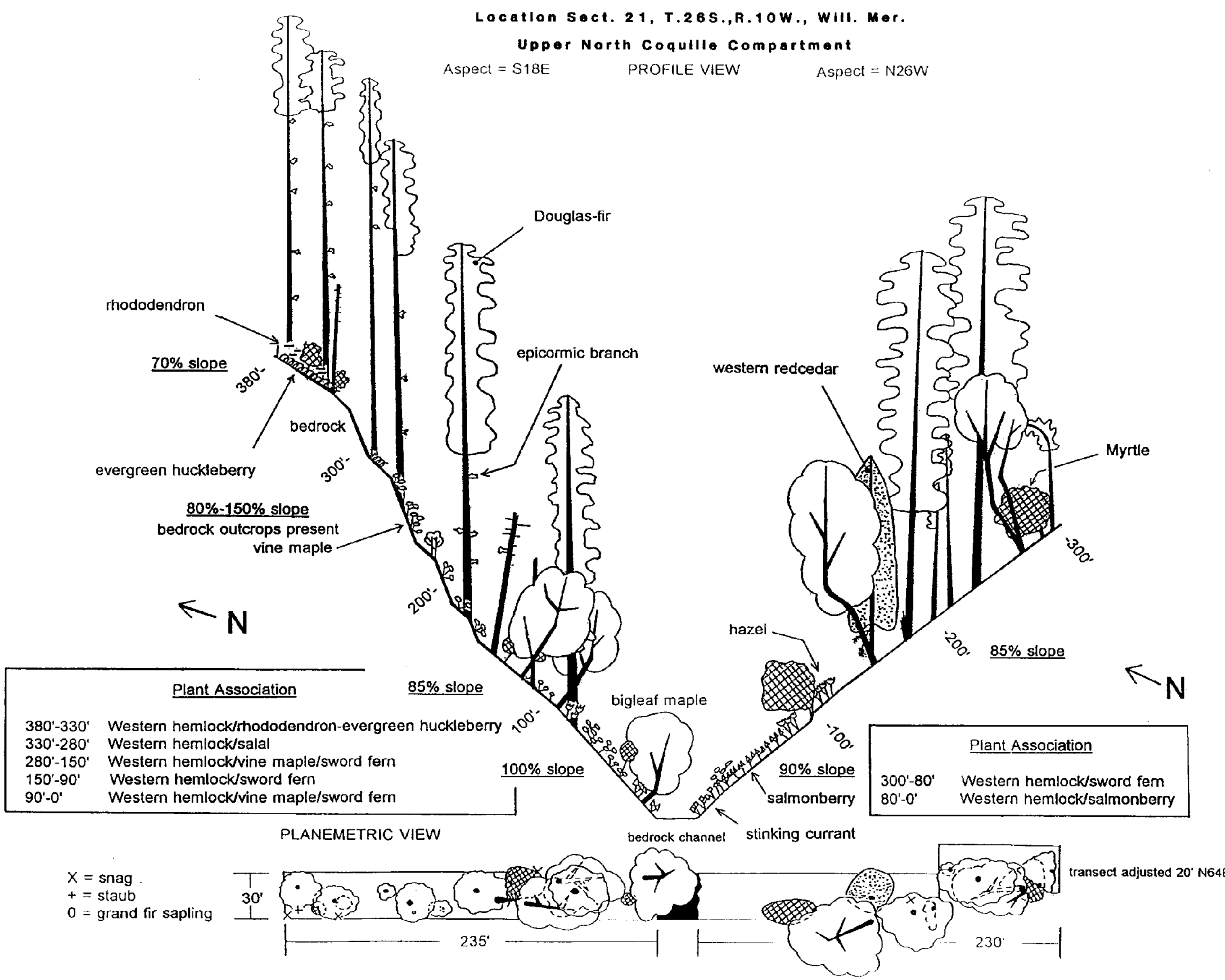


**Illustration 1**

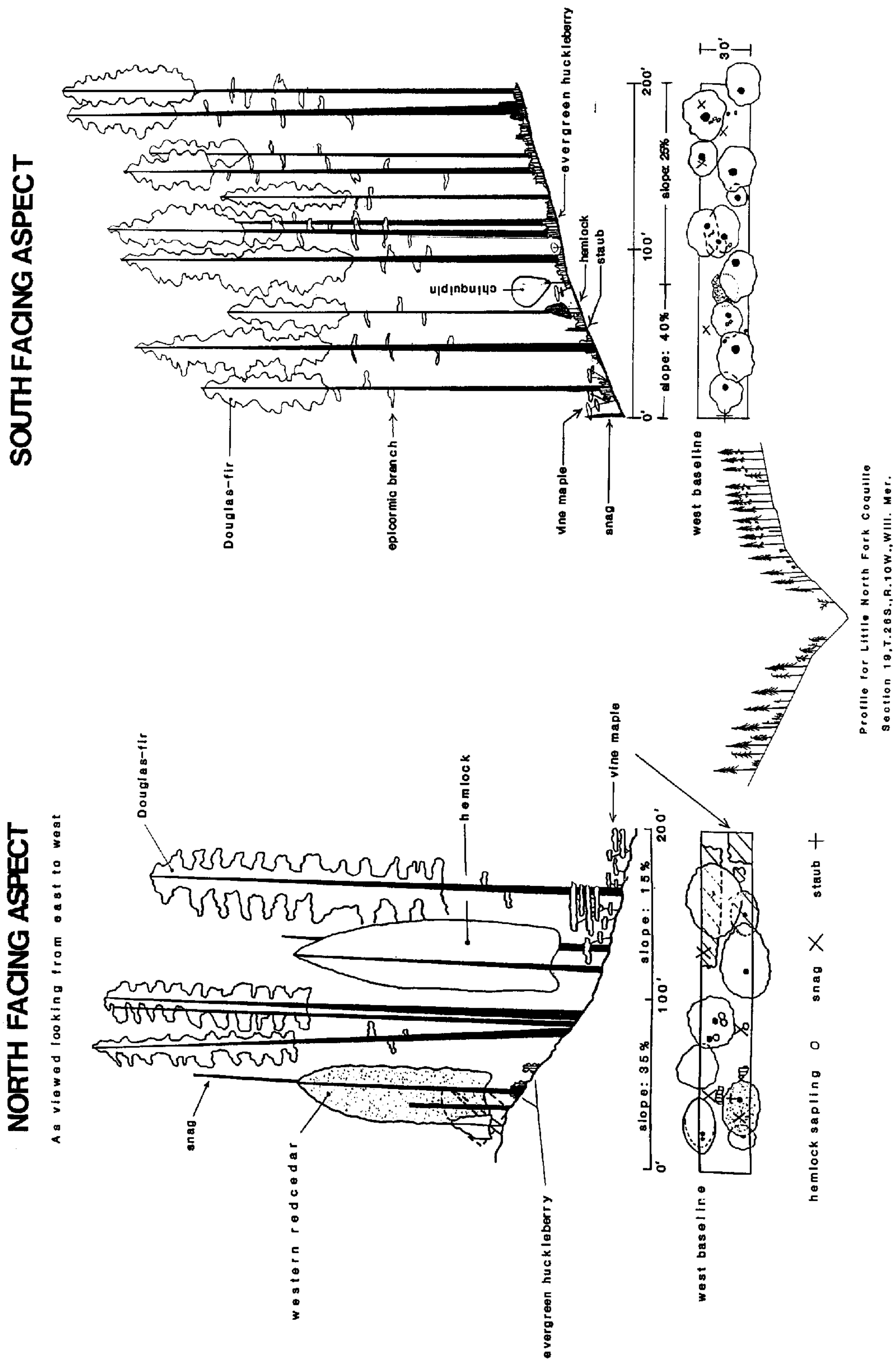


**Illustration 2**

Shrubs, which are on most sites, exclude conifer regeneration in the understory. The shrub layer is usually dominated by sclerophyllous shrubs like salal and evergreen huckleberry. Vine maple and hazel may also be present and locally abundant. Patches of vine maple on upland south facing slopes are associated with moist areas like draws and head walls or are associated with shallow soils. In the later case, the bedrock under the shallow soil is holding the water running through the soil up close to the surface making that water readily available for plant use. Patches of understory regeneration are largely confined to disturbances associated with salvage logging, and road construction.

North facing slopes, where there is no indication of underburning have the following characteristics -
The forest canopy has a rougher texture than south facing stands as seen on the aerial photos. This is due to several factors. There are more gaps in the canopy. The overstory canopy closure is in 40% to 70% range. As viewed from the ground, the openings in the canopy sit over brushy areas (typically vine maple or salmonberry). The margins of the gaps are often occupied by redcedars, hemlock and sometimes bigleaf maple. There is a more pronounced differentiation of the Douglas-fir into crown classes, and a greater variation in crown lengths, when compared with Douglas-fir on the south facing slopes.

On the north and west sides of the Coos Bay District, headwalls and steep ground next to the first order draws often have vine maple and/or salmonberry brush layers and low conifer stocking. When these salmonberry and/or vinemaple dominated sites exceed 95% slope, there is often no conifer stocking.

Crown gaps are occasionally observed on steep sloped north facing head walls with swordfern ground cover. Observations of the Douglas-firs next to these gaps (with respect to the height of the base of the crowns, branch size, and presence of epicormic branching on the exposed lower bole facing into the gaps) suggest the gaps had supported red alders during the first 70 to 100 years following stand initiation.

Redcedar and hemlock are more common on the north than on the south aspect. Like on the south aspect, they are typically found in the intermediate crown position, and most often next to gaps between Douglas-fir crowns. Redcedars and hemlocks become progressively more common as one comes closer to the riparian zone.

As on the south facing slopes, there is little conifer regeneration in the understory except where there is a disturbance.

**Effects of the Combination of Stand Replacement Fires and Reburns**
Many large stand replacement events on the Coos Bay District are multiple burns. These include the 52-year 1738 to 1790 episode and the 56-year 1534 to 1590 episode. This reburning pattern affected future stand structures including age structure of the overstory trees, snag and CWD amounts, and woody debris in streams.

Where reburns skipped moist areas and/or burned through reproduction in a mosaic pattern, the resulting stands have a wider range of birth dates than would be expected based on regeneration lag alone. This process is most clearly observable in the West Fork Smith River Subwatershed where the 1849, 1885 and 1892 fires all burned the same site.

Spies *et al* (1988) found souther Coast Range stands have lower levels of course wood debris compared with similar aged forests in the Cascades and attributed that difference to fire being more frequent and extensive during the last 150 years in the Coast Range.

The timing and amount of large woody debris input to streams depends on the stocking levels, and mortality patterns in the adjacent riparian stands. Streams that pass through young forest contain large woody material from the stand that existed before the last stand replacement fire and small woody debris from the current stand. The relative amount of material from the pre-fire and post-fire stands changes over time. When the pre-fire stand was old-growth, the change is gradual and may take more than a century. Where fire kills all of the old trees next to a stream and reburns consume the woody debris that those trees would have otherwise contributed to the site, the result is a deficiency of course woody debris and a long lag period before the new trees beside streams can contribute wood to the stream. The resident time of debris recruited from the pre-burn stand depends on the size distribution and species composition of that stand. If the pre-fire stand was young and the stream contains only small diameter material, the debris carried over to the post-fire conditions will decompose faster than old-growth size material. Under these circumstances, total stream debris loading will decline appreciably during stand reestablishment (Swanson &

Lienkaemper 1978). Riparian zones impacted by stand replacement fire dating to the 1845-1855 fire episode, the 1868 fire, or the first fires in the 1891-1944 episode, which were subsequently reburned, are the sites most likely to be deficient in CWD.

Frequent reburns resulted in a stand type on some sites that is no longer maintained on today's the landscape. That stand type was called “timber scattering” by the land surveyors that encountered these stands during the last century. Timber scatterings could occur over a significant area on those landscapes frequented by fire, and are documented in the Middle Creek (Chapman, 1875), Tioga Creek (Lackland, 1898) and West Fork Smith River (Chandler, 1901a, 1901b) Subwatersheds. The old trees in the “timber scatterings” were highly resistant to fire because of their thick bark and the distance of their crowns above the fuels on the ground. The surveyors described timber scatterings as having dense brush or young tree regeneration. Superficially, a timber scattering on an aerial photo looks like an East Side open park like stand[3]. However, the dense brush and tree regeneration would have given the Coast Range timber scatterings a fundamentally different character when viewed on the ground[4].

**Stand Level Management Implications**

Understory regeneration of shade tolerant trees occurred in pulses following underburns. Ground fires, which would harm few Douglas-fir, easily kill the hemlocks and cedars that were on a site before the fire. Consequently, ground fires and prescribed underburns may reduce stand diversity in the short term. These fires would kill hemlocks in the overstory creating gaps and kill understory hemlocks decreasing species diversity and possibly eliminating the understory. This mortality will result in an increase of snags and course woody debris. In the long term, gaps in the canopy will allow for regeneration of shade tolerant trees, shrubs and herbs.

Reforestation using a species mix that is heavy to fire intolerant species will predispose those stands to a correspondingly higher tree mortality in the event there is a low intensity fire or a prescribed underburn in the future. Whether this is a concern depends on the risk of fire and management objectives. On moist sites, such as riparian areas and north slopes where fire is infrequent, the inability of a species to tolerate a ground fire may not be an issue. On hot dry southwest facing sites, where there is a high risk of wild fire, managing for fire tolerant species to the exclusion of fire intolerant species makes both economic and ecological sense.

The fire intolerance of hemlock and certain other species should be addressed in cutting prescriptions where the intent is to emulate the effects of fire on a stand. If a density management prescription is to emulate the effects of a low or moderate intensity fire, then most of the hemlocks near ridge tops, on south to west aspects, and where plant indicators signal droughty condition should be marked for removal. This will reduce tree species diversity on those areas. The percentage of the fire intolerant trees marked for cutting should decrease as the marking crew moves around to the north aspect, moves down hill and on benches. In the short term, this will result in lower species diversity on some sites but will increase diversity on the landscape scale by restoring variation in species composition as it is affected by the interaction of fire and topography.

If a management objective is to increase species and stand structure diversification over the long run, then treatment prescriptions must address the prerequisites for understory tree establishment, which include temporary reduction of understory brush and herb competition, seed bed creation, and providing sufficient light for the establishment of an understory stand. Regenerating trees in the understory may be accomplished, at the least expense, by selecting units with a dense closed canopy where there is little understory brush. On those sites there is no need to do site preparation to control brush following the treatment to open the overstory.

There are other types of disturbances that can also open the overstory canopy thereby increasing the light levels.

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[3] Timber scatterings were still visible as a distinct type on aerial photos taken over the Tioga Subwatershed in 1943. An oblique view of a timber scattering in the Tioga Subwatershed can be seen in the background of the lower photo of Tioga Camp on page 136 in Swift Flows the River by Dow Beckham published 1990 by Arago Books, Coos Bay OR.

[4] Photographs taken from Coos Mountain Lookout in 1936 show the steep south rim of Park Creek Drainage, in the Middle Creek Subwatershed, supporting an open stand. That stand has since filled in with a dense conifer understory. Walks through a recently cut unit on that rim suggest that the former open condition allowed large colonies of columbia tiger lily, fawn lily, and iris to establish there. These plants are favored by light or high shade, and well drain soils. The extent of available habitat for these plants has be reduced by the loss of open stands and timber scatterings. On the Umpqua Resource Area - Coos Bay District, the columbia tiger lily is largely confined to road cut banks. The fawn lily is uncommon and when it is found it is usually on the edge of rock bands or adjacent to rocky ridges. The iris is more wide spread but it too is largely confined to exposed ridge top road right of ways and to plantations on oregon grape or salal sites where big game browsing has slowed conifer seedling growth.

These include blowdown and insect and disease caused mortality. Where there is advance tree regeneration that can respond to the increased light levels, then the openings will be occupied by those trees. Not all advance regeneration is vigorous enough to stand the shock of sudden exposure to increased light levels and air movement. Where there is only brush in the opening created by mortality in the overstory, that brush will increase in vigor and mass often excluding new regeneration originating from seed.

**Effects of Topography on Fire Patterns and Implications for Managing on the Landscape Scale**

The size and magnitude of destruction of the great Coast Range fires have so captured our attention that we overlook the possibility that patchy light to moderate severity fires may also play a part in shaping stand structure and distribution. The rarity of large catastrophic fire events is pointed out through an analysis by Strauss et. al. (1989) that showed for the Fire Climate Region 12, coastal Washington and Oregon, 1 percent of the fires resulted in 80 percent of the area burned. In their discussion on the effects of topography on fire patterns, Morrison and Swanson (1990) commented that gentle topography might facilitate extensive stand replacement fires under favorable weather conditions. Whereas, complex topography with many natural fire breaks, like creek bottoms, sharp ridges and associated changes in aspect and variability of plant community affect fuel loads and rate of spread. This complexity will favor patchy fires. The Coast Range is characterized by a complex topography consisting of short slopes, compared with the Cascades. High stream density and resulting multitude of sharp ridges, narrow draws and many aspect changes over short distances makes the Coast Range landscape rich in natural fire breaks. These natural fire breaks act to steal a wild fire's momentum rather than contain the fire resulting in a mosaic of fire intensity, and in turn, a mosaic of stand structures across the landscape. Aerial photos, particular early photos taken from 1943 to 1952, show the most complex fire patterns occurring on complex broken topography. A particularly good example is the north facing slopes in the Park Creek Drainage. The 1943 aerial photos of that area show very complex fire patterns with sharp contrasts occurring over very short distances. The distances are so short and the areas of uniform fire severity so small that the variations are best viewed as within-stand diversity. The boundaries of these complex burn patterns correspond directly to an equally complex topography. The complex topography allowed trees to survive in small moist sites protected from all but the most intense fires. Those protected pockets are located a few hundred feet away from exposed ridges that burn over during most fire events. Unstable north facing headwalls have scattered large open grown overstory trees, which have survived previous fires through a combination of discontinuous fuels, moist soils throughout the year, and a cool humid microclimate. Early twentieth century burns created (or maintained) open ground and young reproduction on ridge tops, and on exposed steep south to west facing aspects. Other stands with trees dating from 1540 to 1622 occupy the east end of the drainage and also protected sites next to the main stem of Park Creek, and north facing lower slopes, and benches.

In contrast on less complex topography there is correspondingly less complex fire pattern and the expression of fire severity as a function of aspect and slope position is obvious. The larger areas of uniform fire severity are stands of trees with relatively low in-stand diversity, as determined by uniformity of the canopy texture. Where there are topographic breaks and changes in aspect, there are pronounced boundaries between stands and thus diversity is expressed at the larger landscape scale as between-stand diversity.

The complexity of the fire patterns ties directly to the complexity of the topography. If the treatment objective for the Late-Successional Reserve is to reintroduce lost diversity, then prompts can be taken from the topography about whether it is more important to manage for high in-stand diversity over a large area or to manage for low in-stand diversity with the diversity expressed instead at the landscape level between stands.

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## Fire History of the Middle Creek Subwatershed

### Introduction

Summary - The fire history of the Middle Creek Subwatershed can be traced back to 1540. During that 450-year period, there were at least two landscape-level stand replacement fires, possibly followed by reburns. The large stand replacement fires occurred in or before 1540, and 1740. At least two other wide spread fires, which were moderate to low severity, occurred in the mid 19th century and early 20th century. The moderate to low severity fires resulted in patch openings, prepared the way for understory regeneration, and locally initiated new stands. Small localized fires were also detected on some sites.

Sources - Twelve regeneration units, in the Middle Creek Subwatershed, were visited and annual rings counted on 144 tree stumps. Tree birth dates were determined, and in turn date of origin for various components for each stand established. In this discussion on the fire history, the 12 regeneration units are called sites, and the tree stumps visited are called trees. This work on the Middle Creek fire history should be viewed as a reconnaissance survey. The sample size of 12 sites is too small to adequately map out the fire boundaries in this 50 square mile subwatershed or to establish a fire rotation or fire frequency or any other measure of periodicity. As of October 1994, no work to determine origin dates has been done in the Upper Middle Drainage or the Alder Creek Drainage[5]. The one site sampled in the Middle Lost Drainage is on the boundary with Vaughns Creek Drainage, and that one site could be logically lumped with the Vaughns Creek data.

Cadastral survey notes were reviewed. The surveyors recorded when they encountered fire killed timber while surveying the section lines. The surveyors also noted timber density, blow-down, tree and brush species. This information was used to determine the occurrence and location of fires in the later part of the nineteenth century and to help describe forest structure and condition at that time. Other sources of information include vegetation maps from 1914 and 1936, forest type map from 1950, aerial photos dating from 1943, and a panorama photo taken from Coos Mountain in 1936.

### Fire History

1501 to 1600 - Trees originating in the 1500's have birth dates from 1540 to 1600. Two of the 12 sites, where birth dates were determined by counting annual rings, supported stands originating in the 1540's. Both of those sites are in the Park Creek Drainage. Other stands of 1540/1580 age class that survived stand replacement fire(s), in the 1700's, are suspected to have existed on moist protected lower slopes and benches along Vaughns Creek and Park Creek. This suspicion is based on looking at old aerial photos, on the size of stumps seen in old timber sale units[6], and based on the diameters of bearing trees recorded in the cadastral survey notes. However, this remains to be verified by actual ring counts. Trees, with birth dates in the 1500's, were found on four other sites distributed across the subwatershed. This showed that individual trees, and clumps of trees, with 1540/1600 birth dates, located on protected benches, and in draws survived the stand replacement fire(s) that occurred the 1700's. There are insufficient data to determine if there was a single stand replacement fire in or before 1540, or if there were a series of reburns.

Trees with birth dates in the 1500's are distributed across the subwatershed. It is therefore plausible that the 1540 to 1600 origin stands dominated the landscape in the Middle Creek Subwatershed before the stand replacement fire(s) in the 1700's.

1601 to 1700 - Of the 144 trees sampled, only four had birth dates in the 1600's. One tree, birth date 1611, was found on a small protected bench in a stand dominated by trees dating from 1877 to 1887. That site is near the west end of the subwatershed. The other three trees, with birth dates from 1617 to 1661, were found in the 2 Park Creek sites that supported the stands originating in the 1500's. The 1700's stand replacement fire(s) may have destroyed

[5] The appearance and proximity of the Alder Creek stands to those in the Upper North Coquille and Little North Fork Coquille Drainages suggests the Alder Creek Drainage has a similar fire history to the North Coquille Drainages to the north.

[6] Lance Finnegan, former Timber Manager for the old Burnt Mountain Resource Area, disclosed that a Douglas-fir 128 inches in diameter was cut on the west branch of Vaughns Creek, and a bench with 7 trees each greater than 100 inches was found in section 9 near Park Creek.

any evidence of stands with birth dates in the 1600's in the Middle Creek Subwatershed.[7]

1701 to 1800 - Stands with birth dates between 1740 and 1780 were probably the most common stands in the Middle Creek Subwatershed at the time Euro-Americans settled in Coos County. Trees had birth dates between 1739 and 1799 on 11 out of the 12 sites visited. The overstory is composed of trees in the 1740/1780 age class on nine of those 11 sites. The other two are the Park Creek stands originating in the 1500's. The 1740/1780 age class can be further divided into at least three regeneration pulses, from which one can infer that disturbances occurred about 1740, 1760, and 1780. This could mean there were multiple fires during the 1740/1780 period but that cannot be proven without first finding fire scars.

The occurrence of trees with birth dates from 1771 to 1795 in the two stands originating in the 1500's raises the possibility that those stands were underburned by the 1740/1780 fire(s). This speculation is supported by the fact no hemlocks with birth dates prior 1771 were found. Hemlocks have thin bark and are shallow rooted and, therefore, are easily killed by low intensity ground fires that would not kill the more fire tolerant Douglas-fir.

The ridge line that forms the common boundary between the Middle Creek Subwatershed and the Brummet Creek Subwatershed is the edge of the 1740/1780 fire(s). That burn boundary is clearly visible on the 1943 aerial photos.

The Middle Creek Subwatershed was revisited in 1996, to do additional fire history work. Ring counts on a Cherry Creek Ridge unit in sect 25, T.27S.,R11W, showed birth dates from 1744 to 1791, and fire scars in 1786 and 1799.

1801 to 1900 - No trees were found with birth dates between 1799 and 1848, except two hemlocks, birth dates 1833 and 1838, in one of the sites with a 1540/1600 age class overstory.

A pulse of hemlock and Douglas-fir regeneration occurred between 1848 and 1867 with the Douglas-fir coming in from 1850 and 1956. This pulse of regeneration was observed on nine sites across the subwatershed. Pitch rings dating from 1852 to 1856 were also common on the stumps of near by older trees.

Based on aerial photos, the severity of the 1850 fire varied from low to high over short distances in response to changes in aspect and topography. The 1850 fire burned as a stand replacement fire on steep south to west aspects where soils are shallow, or gravelly in the Little Cherry Creek area. On more protected sites, the 1850 fire caused a pulse of regeneration in the understory by creating openings in the overstory and killing understory herbs and shrubs. Understory trees that established following the 1850 fire, which were not subsequently killed by later underburns, can be found in the Cherry Creek and Vaughns Creek watersheds.

Two of the sites, where there was a regeneration pulse following the 1850 burn, are in the Little Cherry Creek drainage. The 1891 cadastral survey notes comment on the dead timber on the ridge tops and the south to west aspects in the same drainage (Cathcart 1892a, 1892b). Although the mapping is crude, the 1914 forest vegetation map shows unreforested burned timber land in that same area. This implies there was at least a 60-year regeneration lag on the steep southwest facing slopes in that area.

Sites in the Lower Middle Creek Drainage at the west end of the Middle Creek Subwatershed show evidence of local fires in the later 1800's. A fire scar showing burns in 1873 and 1881, and a regeneration pulse documents at least two local fires in the Big Bend Middle Creek area, section 5, T.28S., R.11W., Will. Mer. In section 33, T.27S., R.11W., Will. Mer., a regeneration pulse occurred from 1866 to 1868, and another pulse dating 1877 to 1887, indicates two local burns 0.2 miles apart.

During the 1996 revisit to Middle Creek Subwatershed to collect additional fire history data, fire scars found on Cherry Creek Ridge in section 25, T.27S.,R.11W. indicate a fire in 1851 and/or 1852. In another site on the divide between Park Creek and Vaughn’s Creek, fire scars indicated burns in 1849, in 1853 and/or 1852, and in 1885.

1901 to Present - A 1919-to-1934 regeneration pulse was observed on two sites in the Park Creek Drainage and on a site just over the ridge in the adjoining Vaughns Creek Drainage. Most of the trees in this pulse were hemlocks. On

[7] Casual growth ring counts suggest there was a fire in the late 1600's on the ridge between Tioga Creek and East Fork Coquille Watershed. This remains to be verified by more systematic sampling.

all three sites where the 1919/1934 trees were found, they were the understory trees. Elsewhere in the Park Creek Drainage, the 1943 aerial photos show open ground, young reproduction, and stands with low stocking on the south to west aspects and ridge tops. The 1936 panorama photos taken from Coos Mountain show scattered mature trees and ground that was either nonstocked or occupied with small reproduction on the upper slopes in Park Creek.

There are written records for a fire that may have lead to the 1919/1934 regeneration pulse. Cadastral survey notes from a 1918 survey (Mensch 1919), for an area on the south rim of Park Creek Drainage, record fire killed bearing trees, a burned up 1/4 corner post and burned timber. The bearing trees had been marked and the 1/4 corner set in the 1896 survey (Lackland 1898b). The fire therefore occurred after October 1896 and before May 1918. The period when this fire occurred is farther narrowed to between 1914 and 1918 since there is no indication of unreforested burns in the Park Creek area on the 1914 Oregon Forest Type Map.

The early twentieth century fires are responsible for a small stand replacement burn on the southwest facing slope in section 10 located in Park Creek Drainage. They are also responsible for stand replacement burn(s) on the ridge top between Park Creek and Brummet Creek. Elsewhere there were low to moderate intensity fires that opened the overstory of the stands and added complexity to the already existing mosaic burn pattern on the north facing head walls of Park Creek and Vaughns Creek, and set back the brush layer, thereby allowing for a seed catch and establishment of an understory.

In Sec. 33, T.27S., R.11W., Will. Mer., a fire scarred tree was injured in 1936, 1941, and 1946. Numerous other stumps on that site also had fire scars. The 1936 scar was likely due to the Fairview Fire, which burned land in parts of Middle Creek, Burton Prairie and Eastern Blue Ridge, and occurred at the same time as the Bandon Fire. The 1943 aerial photos document the occurrence of a small moderate-intensity burn on that site.

**Stand Structure, in the Middle Creek Subwatershed, As Affected By Fire History**

<u>Stands With a 1540/1600 Birth Date Overstory</u> - The two stands that came in after the 1540 stand replacement fire(s) have different stand structures. Western redcedars with birth dates earlier than the 1920's are not included in this discussion because they were all hollow, making determination of birth dates impossible. Mature cedars were present in moist areas but how they fit into the age structure of the stands may never be known.

The site at the southeast end of Park Creek Drainage contained an overstory of Douglas-firs with birth dates ranging from 1543 to 1638. The understory birth dates range from 1920 to 1932 with most of the trees being hemlocks. Two hemlocks were found next to a creek with 1771 and 1795 birth dates. The low severity underburn that lead to the 1920's regeneration pulse may have killed most of the hemlocks that had previously existed on the site. The only hemlocks surviving that underburn were those trees on particularly moist areas like the two hemlocks with birth dates in the 1770's found next to the creek. All of the trees with birth dates in the 1600's were found on the upper slopes.

The site at the northwest end of Park Creek Drainage near where Park Creek enters Middle Creek contained an overstory of Douglas-firs with birth dates ranging from 1548 to 1570. Large western redcedars were found on the lower slopes but all those cedars were hollow and therefore no birth date could be determined. A lone Douglas-fir with a birth date of 1661 was found. A Douglas-fir with a 1792 birth date and a hemlock with a 1859 birth date may have come in following the 1740/1780 fire(s) and the 1850 fire. Other hemlocks had birth dates in 1833, 1838, 1849 and 1884. These dates do not correspond to fires or regeneration pulses in adjacent drainages and without additional data must be considered the result of local disturbances.

<u>Stands With A 1740/1780 Birth Date Overstory</u> - The most common stand structure observed in the 1740/1770 age class stands is a predominant two-aged, two-story stand structure with occasional trees representing one or two additional age classes. The overwhelming majority of the overstory trees are Douglas-fir with birth dates between 1739 and 1799. Remanent individual or clumps of Douglas-firs with birth dates from the 1500's are sometimes found on protected sites such as moist benches or creek side locations.

The understory trees were evenaged with most having a birth date in the 1850's or 1920's. Western hemlock, with an occasional Douglas-fir, dominated the understory. Understory western redcedars were also found on suitably moist sites. Birth dates for western redcedars were rarely determined during the reconnaissance survey because they were nearly all hollow. Observations on the age structure of understory hemlock may not apply to cedar.

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## Fire History of the North Coquille Subwatershed

The Upper North Coquille Drainage, and parts of section 19, T.26S., R.10W., Will. Mer. in the Little North Fork Drainage are the only areas left today that are useable as mature/ old-growth forest condition reference sites in the subwatershed. The field work supporting the following discussion is based on those drainages. The fire history is based on a short reconnaissance survey and may not fully capture the disturbance history in the two drainages, let alone the subwatershed. The earliest known aerial photos covering the subwatershed were taken in 1943. There was already logging going on in the subwatershed then.

Stand initiation following the most recent stand replacement fire - Based on the 1943 aerial photos, most of the North Coquille Subwatershed was at one time covered by stands with a uniform aged overstory. This uniformity is attributed to these stands regenerating following a catastrophic fire (and likely a series of reburns) before 1754. Based on ring counts done in Upper North Coquille and Little North Fork Drainages, most of the regeneration came between 1760 and 1780. However, on two of the seven sites visited, most of the Douglas-fir birth dates are later. That may be due to reburns on those sites, or regeneration was delayed by animal damage, lack of a seed source, harsh site conditions or brush competition.

The dominant tree species was Douglas-fir. A small number of western hemlocks and western redcedars came in following the disturbance. Ring counts show the western hemlock and western redcedar regenerating between 1779 and 1840. Hemlock and cedar regeneration appeared to peak between 1811 and 1831, after Douglas-fir regeneration tapered off. Today, those hemlocks and cedars are found in the intermediate crown position, and are generally tall enough to reach the lower live limbs of the overstory Douglas-fir. These western hemlock and western redcedar have full crowns covering up to 70% of the boles.

Upper slopes and ridge top - The ridge, on at least the north and east rim of the Upper North Coquille Drainage, had a low severity underburn in about 1847± 2 years. The event is documented by fire scars on the sites visited on the drainage's rim. That event was followed by a regeneration pulse lasting until at least 1863.

A moderate severity burn covering about 180 acres in the southeast corner of the drainage occurred about 1919 or 1920 and is visible in the 1943 aerial photos. That burn left fire scars on several trees. That same site also burned in 1847. No hemlocks were found on that site that regenerated before the 1919 event. The 1919 fire may have killed the fire intolerant hemlocks that were on the site prior to the event. Western hemlock seeded in from 1925 to 1936 following that fire. This site is the only place where trees predating the 1754 stand replacement fire(s) were found. One tree had a 1447 birth date. The other tree was a snag when it was cut so it cannot be dated. However, it was more than 539 years old when it died.

A small high severity burn is also visible on the 1943 photos, occurred on the ridge line between the Little North Fork Coquille and the headwaters of the North Fork Coquille River. That fire covered about 30 acres. That fire has not been dated but is likely either a late 19th or early 20th century event.

Protected lower slopes - Ring counts done in recently logged units and walks through standing timber suggest that fire has not visited some, if not all, the sites on lower protected slopes since the stand replace fire(s) in the 1700s. If there were any fires there, the burning was so light as to not leave any fire scars or stimulate obvious recruitment of understory trees.

## Distribution of Birth Dates, by Decades, Observed in the Upper North Coquille and Little North Fork Drainages

| | **ALL** BIRTH DATE RANGE | NUMBER | **DF ONLY** BIRTH DATE RANGE | NUMBER | **WH ONLY** BIRTH DATE RANGE | NUMBER | **WRC ONLY** BIRTH DATE RANGE | NUMBER | FIRE SCAR DATES | NUMBER |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1440 | | 1440 | | 1440 | | 1440 | | | |
| 1441 - | 1450 | 1 | 1450 | 1 | 1450 | | 1450 | | earliest birthdate | |
| | 1460 | | 1460 | | 1460 | | 1460 | | | |
| | 1470 | | 1470 | | 1470 | | 1470 | | | |
| | 1480 | | 1480 | | 1480 | | 1480 | | | |
| | 1490 | | 1490 | | 1490 | | 1490 | | | |
| 1491 - | 1500 | | 1500 | | 1500 | | 1500 | | | |
| | 1510 | | 1510 | | 1510 | | 1510 | | | |
| | 1520 | | 1520 | | 1520 | | 1520 | | | |
| | 1530 | | 1530 | | 1530 | | 1530 | | | |
| | 1540 | | 1540 | | 1540 | | 1540 | | | |
| 1541 - | 1550 | | 1550 | | 1550 | | 1550 | | | |
| | 1560 | | 1560 | | 1560 | | 1560 | | | |
| | 1570 | | 1570 | | 1570 | | 1570 | | | |
| | 1580 | | 1580 | | 1580 | | 1580 | | | |
| | 1590 | | 1590 | | 1590 | | 1590 | | | |
| 1591 - | 1600 | | 1600 | | 1600 | | 1600 | | | |
| | 1610 | | 1610 | | 1610 | | 1610 | | | |
| | 1620 | | 1620 | | 1620 | | 1620 | | | |
| | 1630 | | 1630 | | 1630 | | 1630 | | | |
| | 1640 | | 1640 | | 1640 | | 1640 | | | |
| 1641 - | 1650 | | 1650 | | 1650 | | 1650 | | 1644 | 1 |
| | 1660 | | 1660 | | 1660 | | 1660 | | | |
| | 1670 | | 1670 | | 1670 | | 1670 | | | |
| | 1680 | | 1680 | | 1680 | | 1680 | | | |
| | 1690 | | 1690 | | 1690 | | 1690 | | | |
| 1691 - | 1700 | | 1700 | | 1700 | | 1700 | | | |
| | 1710 | | 1710 | | 1710 | | 1710 | | | |
| | 1720 | | 1720 | | 1720 | | 1720 | | | |
| | 1730 | | 1730 | | 1730 | | 1730 | | | |
| | 1740 | | 1740 | | 1740 | | 1740 | | | |
| 1741 - | 1750 | | 1750 | | 1750 | | 1750 | | | |
| | 1760 | 2 | 1760 | 2 | 1760 | | 1760 | | | |
| | 1770 | 16 | 1770 | 16 | 1770 | | 1770 | | | |
| | 1780 | 26 | 1780 | 24 | 1780 | 1 | 1780 | 1 | | |
| | 1790 | 7 | 1790 | 7 | 1790 | | 1790 | | | |
| 1791 - | 1800 | 6 | 1800 | 5 | 1800 | 1 | 1800 | | | |
| | 1810 | 2 | 1810 | 1 | 1810 | 1 | 1810 | | | |
| | 1820 | 3 | 1820 | 1 | 1820 | 2 | 1820 | | | |
| | 1830 | 2 | 1830 | | 1830 | | 1830 | 2 | | |
| | 1840 | 1 | 1840 | | 1840 | | 1840 | 1 | | |
| 1841 - | 1850 | 1 | 1850 | | 1850 | 1 | 1850 | | 1846-1849 | 7 |
| | 1860 | 6 | 1860 | 3 | 1860 | 2 | 1860 | 1 | | |
| | 1870 | 1 | 1870 | | 1870 | 1 | 1870 | | | |
| | 1880 | | 1880 | | 1880 | | 1880 | | | |
| | 1890 | | 1890 | | 1890 | | 1890 | | | |
| 1891 - | 1900 | | 1900 | | 1900 | | 1900 | | | |
| | 1910 | | 1910 | | 1910 | | 1910 | | | |
| | 1920 | | 1920 | | 1920 | | 1920 | | 1919-1920 | 4 |
| | 1930 | 4 | 1930 | | 1930 | 4 | 1930 | | | |
| | 1940 | 1 | 1940 | | 1940 | 1 | 1940 | | | |
| NUMBER OF OBSERVATIONS | | 79 | | 60 | | 14 | | 5 | | |

## **Summary of Fire Histories for Adjacent Watersheds**

Fire Occurrence and the Time in Years Since the Previous Fire for Each Drainage in the Tioga Subwatershed

| Fire year | Burnt Ck | Upper Tioga Ck | Middle Tioga Ck | Lower Tioga Ck | Notes |
|---|---|---|---|---|---|
| | Number position shows drainage and year of each known fire. The number is the time in years since the previous known fire in the drainage. | | | | |
| 1404 | | | earliest date | | |
| 1476 | | | 72 | | |
| 1534 | earliest date | | | | |
| 1546 | | | 70 | | same event? |
| 1548 | 14 | | | | |
| 1558 | | earliest date | 12 | | |
| 1567 | 19 | | | | |
| 1579 | | 21 | | | same event? |
| 1584 | | 5 | | | |
| 1606 | 39 | | | | |
| 1621 | 15 | | | | |
| 1707 | 86 | | | | |
| 1728 | | | 170 | | |
| 1735 | | | | earliest date | |
| 1741 | | | 13 | | |
| 1753 | 46 | | | | |
| 1756 | | | 15 | 21 | |
| 1771 | 18 | | | | |
| 1780 | | | 24 | | |
| 1797 | 26 | 213 | | | |
| 1799 | 2 | | | 43 | |
| 1845 | 46 | | 65 | 46 | |
| 1855 | | | 10 | | |
| 1867 | 22 | | 12 | | |
| 1875 | 8 | | | | |
| 1891 | 16 | | 24 | | |
| 1896 | 5 | | 5 | | |
| 1903 | 7 | 106 | | | |
| 1906 | | | 10 | | |
| 1918 | 15 | 15 | 12 | | |
| 1923 | 5 | | | | |
| 1932 | | 14 | 14 | | |
| 1942 | 19 | | | | |
| 1951 | | 19 | | | 1952 Williams R. Fire? |

**East Fork Coquille**

**Time Between Major Fires in the East Fork Coquille Watershed (calculated at the watershed scale)**

| Fire date | years since last fire: | | Number of sites where a fire was detected in: | |
|---|---|---|---|---|
| | Considering all fires in the East Fork Coquille Watershed | Considering only large fires (fires observed on 3 or more sites, including sites in adjacent watersheds) | East Fork Coquille Watershed (sample size: 14 sites/ 153 trees) | Tioga Ck., Middle Ck., and North Coquille Subwatersheds (sample size: 34 sites/ 377 trees) |
| 1534 | earliest known date | earliest known date | 2 | 3 |
| 1545 | 11 | 11 | 1 | 5 |
| 1553 | 8 | 8 | 5 | 4 |
| 1574 | 21 | 21 | 3 | 1 |
| 1613 | 39 | - | 1 (2 adjacent sites) | 1 |
| 1626 | 13 | - | 1 | 0 |
| 1738 | 112 | 164 | 2 | 5 |
| 1753 | 15 | 15 | 1 | 10 |
| 1769 | 16 | 16 | 1 | 5 |
| 1779 | 10 | 10 | 2 | 5 |
| 1798 | 19 | 19 | 2 | 2 |
| 1811 | 13 | - | 1 | 0 |
| 1850 | 39 | 52 | 8 | 2 |
| 1854 | 4 | 4 | 1 | 2 |
| 1898 | 44 | 44 | 3 | 0 |
| 1891 | 7 | 7 | 1 | 4 |
| 1912 | 21 | - | 1 | 0 |
| 1917 | 5 | - | 2 | 0 |
| 1922 | 5 | - | 1 | 1 |
| 1932 | 10 | - | 1 | 1 |
| 1936 | 4 | 45 | 1 (not well sampled but known to have burned a large area) | 1 (not well sampled but known to have burned a large area) |
| | 21 | 32 | Average number of years between fires during the 402 year period from 1534 to 1936 | |

## Fire History for the East Fork Coquille From 1534 to 1936

| **fire activity periods** | **Fire History Patterns and Their General Locations inside the East Fork Coquille Watershed** | | | | **Fire activity outside the East Fork Watershed** |
|---|---|---|---|---|---|
| | West end of the watershed: stand initiation in the 1700s | Stands initiated in the 1800s (intermixed with stands dating from both the 1700s and the 1500s.) | Middle part of the watershed: stand initiation in the 1500s. (The LSR and adjacent lands) | East end of the watershed | abbreviations used:<br>WS - watershed<br>SWS - subwatershed<br>D - drainage |
| **Before 1534** | Unknown. Evidence destroyed by subsequent fires. | Unknown. Evidence destroyed by subsequent fires. | Unknown. Evidence destroyed by subsequent fires. | Unknown. Evidence destroyed by subsequent fires. | The earliest documented fires on the Coos Bay Dist., were in or shortly before 1404 and 1447. A single probable fire scar suggests a fire in 1476. These events are only documented in sect. 27, T26S-R10W on the Tioga Ck./ North Coquille divide. |
| **1534 to 1590**<br><br>The regeneration pattern and wide distribution of trees dating from this period suggest the 1534 fire was a very large stand replacing event followed by multiple reburns. These fires must have been extremely severe because fire history work, to date, has only revealed one small area on the Tioga Ck./ North Coquille Divide where trees survived the 1534-1590 fires. | Unknown. Stands in the western half of the Middle Ck. SWS and the western third of the East Fk Coquille WS appear to have similar age structures and fire histories. This suggests a few stands in the East Fk Coquille, like stands on the west end of Middle Ck. SWS, may have scattered isolated trees growing in protected locations that date to the 1534-1590 and the 1613 to 1655 periods. | Unknown. Evidence destroyed by subsequent fires. | Probable fire years are 1534, 1545, 1553 and 1574. | Unknown. Evidence destroyed by subsequent fires. | Probable fire years in Middle Ck. SWS: 1534, 1545, 1590. Observed tree birth dates suggest possible additional fires in the Park Ck. D. after 1545.<br><br>Probable fires in Tioga Ck. SWS: 1534, 1545, 1553, 1567. Observed tree birth dates suggest possible additional fires in the Upper Tioga Ck. D. after 1574. |
| **1591 to 1737**<br><br>Infrequent and seemingly random birth dates, and unreplicated scars suggest few local low to moderate severity fires and no large stand replacement fires in the East Fk Coquille or in the subwatersheds immediately to the north in this period. | Unknown. See the above note for the 1534 to 1590 period. | Unknown. Evidence destroyed by subsequent fires. | Local moderate severity fire in 1613 burned in and around sect. 17, T27S-R10W. Unreplicated scars suggest a possible low severity local fires in 1637, 1714, 1727. | Stand replacement fire in or before 1626. Data set too small to detect if the fire was local or widespread. | A pulse of hemlock regeneration after 1655 suggests either an underburn or partial blowdown near Burnt Mt. peak.<br><br>The oldest tree birth date observed in the W. Fk Smith R. SWS suggests a fire there in or shortly before 1650. |

| **fire activity periods** | **Fire History Patterns and Their General Locations inside the East Fork Coquille Watershed** | | | | **Fire activity outside the East Fork Watershed** |
|---|---|---|---|---|---|
| | West end of the watershed: stand initiation in the 1700s | Stands initiated in the 1800s (intermixed with stands dating from both the 1700s and the 1500s.) | Middle part of the watershed: stand initiation in the 1500s. (The LSR and adjacent lands) | East end of the watershed | abbreviations used:<br>WS - watershed<br>SWS - subwatershed<br>D - drainage |
| **1738 to 1799**<br><br>The 1738 fire and subsequent reburns were very large events. The east and south boundaries for the stand replacement part of this fire complex fires are the top of the "China Wall" in Steel Ck. and Cherry Ck.; the divide between Middle Ck. and the East Fk Coquille, and the divide between Middle Ck. and Tioga Ck. To the south and east of that boundary, the 1700 fires were low to moderate severity fires on some sites and left no surviving evidence on other sites. | Probable fire years are 1753, 1769, 1779, and 1798. Multiple burns on the sect. 9, T28S-R11W site resulted in a 3-cohort overstory stand. Each of the other 3 sites examined in this part of the watershed has a single cohort overstory. | Unknown. Evidence destroyed by subsequent fires. | Probable low to moderate severity burns in 1738 and 1798 documented on the north rim of the watershed and just east of the China Wall.<br><br>Found no evidence for a fire in the 1700s on the 3 sites examined east of T28S-R11W and south of the East Fk. Coquille River. | Unknown. Data set is too small to distinguish between a random fine scale disturbance and a low severity fire. | These fires were stand replacing events in most of the west half of Middle Ck. SWS., west rim of Tioga Ck. SWS and the Upper No. Fk. and the Little North Fk D. Probable fire dates are 1738, 1753, 1762, 1969, 1779, and 1789.<br><br>Trees dating to this time are found in the Loon Lake Area. The 1769 fire is documented in the W. Fk. Smith R. SWS.<br><br>Stands dating from this time common in the Cascade Mtn. |
| **1800 to 1844**<br><br>Detected only one local fire during this period. Otherwise, infrequent and seemingly random birth dates, and unreplicated scars suggest few if any local low to moderate severity fires and no large stand replacement fires in the East Fk Coquille or in the subwatersheds to the immediate north. | Local moderate severity fire burned in Steel Ck. in 1811. | Unknown. Evidence destroyed by subsequent fires. | | | |

| fire activity periods | Fire History Patterns and Their General Locations inside the East Fork Coquille Watershed | | | | Fire activity outside the East Fork Watershed |
|---|---|---|---|---|---|
| | West end of the watershed: stand initiation in the 1700s | Stands initiated in the 1800s (intermixed with stands dating from both the 1700s and the 1500s.) | Middle part of the watershed: stand initiation in the 1500s. (The LSR and adjacent lands) | East end of the watershed | abbreviations used:<br>WS - watershed<br>SWS - subwatershed<br>D - drainage |
| **1845 to 1868**<br><br>1845 to 1855 was a major fire episode in the Oregon Coast Range.<br><br>The Coos Bay fire burned in 1868. | The hemlock dominated understories, on these sites, date from 1850 and/or 1868. | These stands regenerated following small to moderate sized stand replacement fires that burned in 1850 and/or 1868. Many of these are single story stands populated by a single cohort with either a 1850 or a 1868 birth date. Other stands have a single story stand structure but contain two cohorts: the younger dating from 1868 and the older dating from 1850. | Stands with a scattering of trees surviving from the 1500s are dominated by Douglas-firs that regenerated following the 1850 and/or 1868 fires. Hemlocks that regenerated after 1850 and/or 1868 are the most common understory tree species on sites with moderate or well-stocked overstory stands dating from the 1500s. Early 20th century fires killed most of the 1850/68 understory hemlocks, along the north rim of the East Fk Coquille east of Vaughns Ck. | The data set for the east end of the East Fk Coquille WS is too small to say whether fires burned during this period. However, the East Fk Coquille WS data, when combined with Tioga Ck. SWS data, suggests no large fires, of sufficient severity to recruit regeneration or scar trees, burned close to the crest in this part of the Coast Range before the beginning of the 20th century. | The 1845 to 1855 fires were very large stand replacement events in the Coast Range north of Smith R. South of Smith R., these fires locally replaced stands on many south to west facing ridge tops. Elsewhere, these fires were low to moderate severity burns largely confined to mid and upper south to west facing slopes. |
| **1869 to 1935** | Based on a small data set there is little evidence for a fire in this area during this time. | Based on a small data set there is little evidence for a fire in this area during this time. | A local fire in 1891 resulted in understory regeneration in Elk Ck.<br><br>Fires in 1912, 1917,1922, and 1932 burned in the Brummet Ck. D. These fires caused stand replacement along the ridge tops and upper slopes on south west aspects. These fires also under burned mid and upper slope stands on the south and west aspects killing the understory hemlocks and prepared the way for new hemlock regeneration. | The data set for the end of the East Fk Coquille WS is too small to say with certainty whether any fires burned during this period. Limited data does suggest no large fires, of sufficient severity to recruit regeneration or scar trees, burned in the Kneeper Ck. area during this period. | Low to moderate severity fires burned in the Tioga Ck. SWS in 1891, 1896, 1906, 1919 (and/or 1917), 1922, and 1932. These fires also caused local stand replacement in the Burnt Ck. Drainage and on some upper slopes and ridge tops.<br><br>The 1919 burn was also a low to moderate severity fire in Park Ck., Vaughns Ck., and Upper North Coquille Drainages. |
| **1936**<br><br>The Bandon, Fairview, Sitkum, and Powers fires all burned simultaneously. | | | The 1936 Sitkum fire was in this part of the watershed. | | |