The Influence of Prehistoric Human Activity on the Maintenance and Management of Middle Elevation Mountain Meadows in the Western Cascades, Oregon

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Introduction

Although they occupy only a small portion of the landscape, less than 5% according to Dailey (2007), meadows are the most biologically diverse locales in the western Cascades. Within the past 150 years, montane meadows have been contracting in size and connectivity. Takaoka and Swanson (2008) found that many of these montane meadows have contracted by 50% since 1946. Past research has been unable to firmly identify the mechanisms that stabilized and maintained the meadows prior to changes that began 150-200 years ago. Similarly, factors contributing to the rapid loss of meadows since circa 1850 have been very difficult to isolate. Very little research has examined the relationship between indigenous populations and montane meadows and the potential prehistoric behaviors that may have been responsible for the existence and maintenance of these montane meadows. The neglect of research into prehistoric human impacts upon and relationships with the Cascades landscape is surprising given prior research that shows its importance in other localities (Johannessen et al. 1971; Cronon 1983; Russell 1997).

In this study, I examine what is known about the behaviors of prehistoric people in and around the western Cascades of Oregon and their relationship to montane meadows. To do this, I will address what is known about the ecology and geography of montane meadows, the prehistory and history of the central western Cascades, and what we can learn through examinations of trees surrounding modern meadows.
Meadow Ecology and Geography

Franklin and Dymess (1988:101) defines the meadows of interest in this study as a special type of community within the Pacific Silver fir (*Abies amabilis*) vegetation zone in the western Cascades of Oregon and Washington. The western Cascades are dominated by coniferous forest, with non-forest openings, including meadows, occupying a very small part of the landscape. Non-forest openings are generally divided into three categories: shrub fields, mesic meadows, and xeric meadows. Shrub fields are commonly associated with steep slopes associated with snow avalanches, slow landslides, and snow and soil creep. Shrub fields are dominated by Sitka alder (*Alnus sinuate*) and vine maple (*Acer circinatum*). Xeric and mesic meadows are distinguished chiefly by substrate and related moisture. Xeric meadows tend to occur where soils are thin and rocky and are often associated with boulders and rocky outcrops – areas where little soil moisture is present during times of the year with little precipitation. Mesic meadows occur in locations with deeper, less rocky soils where moisture is likely to be reliably present for a longer period of time after the cessation of steady precipitation. While shrub fields and meadows are present throughout the western Cascades, they are much more common above 1000 m and below 1500 m in elevation, in the Pacific silver fir (*Abies amabilis*) zone. Below this zone is the western hemlock (*Tsuga heterophylla*) zone and above is the mountain hemlock (*Tsuga mertensiana*) zone. Xeric and mesic meadow communities are dominated by different species of grasses, forbs, and small shrubs. They generally occur on ridgetops and upper ridge slopes (Hickman 1968, 1976; Miller and Halpern 1998; Takaoka and Swanson 2008).
Takaoka and Swanson (2008) examined the changes in the three types of non-forest openings from 1946 through the present. They found that, in the western Cascades, shrub fields are largely stable and have not expanded or contracted in the past 60 years. Approximately 25% of the xeric meadows contracted while about half of the mesic meadows contracted.

The existence and maintenance of shrub fields and xeric meadows is explainable by geomorphological mechanisms. Both rely on physical conditions that, for the most part, prohibit the growth of large conifers and, therefore, the conversion of shrub fields and xeric meadows to coniferous forest. Shrub fields occupy unstable ground that prevents the establishment of large conifers but allows for the existence of flexible smaller deciduous trees. Xeric meadows occupy thin, rocky soils that usually provide too little moisture and nutrients for large conifers. These factors explain why these two types of non-forest openings are stable. Mesic meadows, though, rely on no known geomorphological mechanism for their existence. Mesic meadows occupy locations with thick, well developed soils with ample moisture and nutrients for coniferous tree growth and no known characteristic to retard tree growth, explaining the higher degree of conifer encroachment or meadow contraction in mesic meadows in the past 60 years. Similar meadows can be created by fire and logging, but will also contract if not maintained. Therefore, it is likely some form of disturbance that created mesic meadows in the first place and understanding this disturbance or disturbances is the key to managing and maintaining mesic meadows in today’s western Cascades landscape.

Prehistory and History of the Western Cascades, Oregon

Prehistory
Prehistorically, western Oregon was a complex mosaic of different tribal groups who practiced very different but intertwined hunting and gathering lifestyles at the time of European contact. Different cultures and tribal groups practiced very different lifeways in the Willamette Valley, Columbia River Valley, Umpqua River Valley, Deschutes River Valley, Klamath Basin, Great Basin, Cascade Range, and the Oregon coast. The ecological differences in these localities lead to the development of unique cultures adapted to the local environments. At the same time, extensive trade networks encouraged interaction between the different groups, leading to intermarriage and cooperation, as well as warfare (Minor and Pecor 1977; Pettigrew 1990; Ames and Maschner 1999).

The two historic groups most likely associated with western Cascade montane meadows are the Kalapuya and Molala. Figure 1 shows the locations of these two groups in 1851, when they signed treaties giving up their claims to the majority of the land in the Willamette Valley and western Cascades. Figure 2 shows a close up of the same map showing the tribes identified with the central western Cascades. The Kalapuya are shown as the only tribal group present in the Santiam, McKenzie, and Middle Fork of the Willamette River watersheds. This map suggests that the Kalapuya, often thought to be a strictly Willamette Valley group, actually occupied large portions of the central western Cascades in Oregon. Figure 1 also shows that two separate groups of Molala lived north and south, respectively, of the Kalapuya in the western Cascades. One group of Molalla lived west of Mt. Hood in the Molala River basin and adjacent foothills and mountains. The second group of Molalla lived west of Crater Lake.
Figure 1. Map of western Oregon showing the locations of different tribal groups in 1851.
At the time of European contact (circa 1800), the Kalapuya were the sole inhabitants of the Willamette Valley south of Willamette Falls, including the coast range and Cascades foothills. The Yoncalla band of the Kalapuya also occupied a portion of the upper North Fork of the Umpqua River basin. The Kalapuya were widespread but adapted to an interior lifestyle. Because they occupied the Willamette Valley – the main location of EuroAmerican settlements – some records exist describing their culture (Mackey 1974; Zenk 1990; Juntunen et al. 2005). The Molalla, living in the Cascades...
and fewer in number than the Kalapuya, did not have the degree of interaction with EuroAmericans that the Kalapuya did, so had little written about them (Minor and Pecor 1977).

The first known Euro-American contact and description of the Kalapuya of the Willamette Valley comes from employees of the North West Company (soon to be part of Hudson’s Bay Company) exploring the valley for furs. The journal of Alexander Henry (1897) is the first known description of the Kalapuya and provides some information regarding their lifestyles. Henry describes the Kalapuya as highly mobile people who eat a wide variety of foods and have few permanent possessions. According to Henry, the Kalapuya rely most heavily on camas (Camassia quamash) roots, but also heavily exploit deer, which was abundant in the Willamette Valley. Continuing expeditions by fur trappers and explorers, specifically David Douglas in 1826 and the Wilkes’ Expedition in 1841, provides further details regarding the lifestyle and behaviors of the Kalapuya. According to both of these observers, the Kalapuya burned the Willamette Valley every year in order to keep the valley floor open and grassy (Douglas 1972; Eld 1841; Johannessen et al. 1971). The yearly burning of the valley floor had many effects. First, burning produced a landscape dominated by open grassy areas with scattered Oregon white oak (Quercus garryana) and hazelnut (Corylus cornuta) trees. Figure 3 is a painting by Paul Kane from 1847 showing a southerly view of the Willamette Valley and a painting by Henry Warre from 1845, both showing an open, grassy landscape with scattered trees. Such a landscape was the result of frequent, low-intensity fires set by the Kalapuya.
Unlike the Kalapuya, little was written about the Molala. The Molala were relatively small in number compared with the surrounding tribes. Still, they were known to trade with the Kalapuya, Chinook, Tenino, and Klamath tribes surrounding them. The Molala lived chiefly in the Cascade Mountains and western foothills. While they likely exploited many plants for food, they were known mainly as very good hunters of deer and collectors of huckleberries (*Actinium* spp.), which they traded. The northern Molala lived primarily around the Molala River west of Mt. Hood, exploiting the high mountains during summer and the foothills and lower river during winter. The southern Molala lived west of Crater Lake, likely exploiting the high mountains during the summer and living in the middle reaches of the Umpqua River and its tributaries during the winter. There is disagreement as to whether the northern and southern Molala were physically separated by the presence of numerous Kalapuya bands in the western Cascades or if they occupied the western Cascades from Mt. Hood to Crater Lake (Minor and Pecor 1977). Either way, it is likely that whichever tribal group lived in the central western Cascades practiced a similar foraging lifestyle, exploiting the available resources. With the extensive trade networks established in Oregon, methods of foraging improvement, like burning, would have been widely understood.
As mentioned above, little is known about the Molala and their practices. There is a good deal known about surrounding indigenous groups, though, and the methods that they used for improving their harvests of various plants and animals. French (1999) discusses the methods that many Plateau peoples used to manage and improve huckleberry harvests in the eastern Cascades of Oregon. According to French (1999), huckleberry fields were burned at least every five years to maintain good harvest levels. Camas also benefited indirectly from burning. Burning camas fields prevented other plants from crowding camas plants and reduced competition, allowing fields to grown that were, at times, nearly all camas (Boyd 1999; Norton, Boyd, and Hunn 1999; White 1999). Indigenous people also burned to increase bracken fern (Pteridium aquilinimum), another staple of many Pacific Northwest indigenous populations (White 1999). Finally, the deer hunted by the indigenous inhabitants of western Oregon prefer edge habitats in which there are plenty of grasses and young shrubs to browse upon (Boyd 1999). Annual burning in the Willamette valley was how the Kalapuya maintained extensive edge habitats, and burning meadows in the Cascades would have a similar effect. Therefore, many of the desired foods of the indigenous inhabitants of the Cascade foothills and mountains – deer, camas, bracken fern, and huckleberries – all benefit greatly from and, to some degree, require burned habitats to maintain large numbers.

Archeological investigations in the areas surrounding known meadows reveal prehistoric usage of these meadows. The types of sites located around the meadows also lend some clues to the types of activities that occurred in and around the meadows. For example, Bunchgrass Ridge is a well-studied meadow complex in the northwestern portion of the McKenzie River watershed. Figure 4 shows locations of some
archeological sites surrounding Bunchgrass Ridge. Bunchgrass Ridge, itself, has not been surveyed for archeological sites, so the lack of recorded sites there does not mean that they are absent.

Figure 4. Map showing the density of archeological sites surrounding Bunchgrass Ridge, a well-studied meadow complex in the central western Cascades. Most recorded archeological sites in the Cascades consist of either lithic scatters containing hunting implements or stripped Western red cedar (*Thuja plicata*) trees showing evidence of bark-stripping. Bark stripping was most commonly associated with the creation of baskets for huckleberry transportation (Minor and Pecor 1977).

**Early History**

Early explorations in western Oregon appear to be restricted to the Willamette, Umpqua, and Rogue River valleys and low elevation tributaries. Important examples of early explorations include the Wilkes Expedition of 1841, Peter Skene Ogden’s 1827 expedition to find an inland route from the Sacramento River valley to the Columbia River valley, and David Douglas’ 1826 expedition in the Willamette and Umpqua River
valleys. Most of the Cascade Mountains remain uninvestigated for most of the 1800s. Exceptions include blazing trails for overland trade and migration – the Barlow Road south of Mt. Hood, Santiam Highway over Santiam Pass, and the Scott Trail over McKenzie Pass (Minor and Pecor 1977). Records from these investigations appear to discuss the landscape of the major river valleys that they follow and describe little of the surrounding upland landscape where montane meadows are located.

The major early use of the Cascade Range involves sheep grazing. Sheep were grazing in the Cascades from approximately 1850 onward, but at varying levels. The most intense period of sheep grazing in the Cascades was during the late 1800s. In 1897, F.V. Colville of the USDA investigated sheep grazing in the Cascades for potential damages to the forest. Colville (1898) determined that most of the western Cascades could withstand the degree of grazing it was experiencing and that only a few places exhibited severe damage. Colville (1898) discusses the use of meadows as the main source of grazing lands in the Cascades and mentions that some herders burned parts of the forest to increase and improve grazing lands. In the early 1900s, the new Cascade Forest Reserve instituted policies regulating the numbers and locations of sheep grazing and began a policy of encouraging sheep herders to stop burning the meadows and forests as the value of timber was considered more important than the value of grazing (Ingram 1916).

**Early to Middle 1900s**

Corresponding to the early 1900s institution of policies controlling grazing locations and numbers and timber management are the appearance of early maps of the Cascade Forest Reserve. Figure 5 is a selection of the map showing the Cascade Forest
Reserve around the McKenzie River. The selection shown in Figure 5 is part of the section of the current Willamette National Forest that contains the HJ Andrews Experimental Forest and part of the Three Sisters Wilderness Area – both locations containing montane meadows. Lookout Mt., Bunchgrass Ridge, Carpenter Mt., and Horse Pasture Mt. all contain significant montane meadows. Figure 6 is a selection of the same map showing parts of the current Willamette National Forest surrounding the south fork of the McKenzie River. Sawtooth Ridge, Chucksney Mt., and Grasshopper Mt. all contain significant montane meadows, as well. Note that as of 1912, most of these areas have not been mapped and surveyed using the State-Plane survey system. Many trails are noted as dotted lines in these areas, but few other geographical details are present.

Figure 5. Portion of a 1912 Map of the Cascade Forest Reserve showing part of the upper McKenzie River valley around the main fork of the McKenzie River, including numerous locations containing meadows, including Lookout Mt., Carpenter Mt., Horse Pasture Mt., and Bunchgrass Ridge.
Figure 6. Portion of a 1912 Map of the Cascade Forest Reserve showing part of the upper McKenzie River valley around the south fork of the McKenzie River, including numerous locations containing montane meadows, including Chucksney Mt., Grasshopper Mt., and Sawtooth Ridge.

The notations showing the trails on this map are important, though, as they likely show at least some trails that were prehistoric in origin. The areas that have been surveyed and mapped according to the State-Plane system include the locations of major homesteading activity in the McKenzie River valley. Due to harsh winter weather and difficulties in
clearing forests, little of the uplands in this area were ever homesteaded (Minor and Pecor 1977). Only the McKenzie River valley itself provided the protection and flat arable land that attracted homesteaders. As of 1912, only one homesteader was noted east of McKenzie Ranger Station and only four homesteaders are noted east of the town of Blue River. Therefore, many of the meadows in this study, located at similar longitudes to the McKenzie Ranger Station, were only utilized seasonally for grazing, as noted by Colville (1898) and Ingram (1918).

One important locality recorded on the 1912 map is Obsidian Cliffs. Figure 7 shows the Three Sisters high Cascades area from the 1912 map showing the location of Obsidian Cliffs, as well as Scott Trail and a Sheep Driveway. While most of the High Cascades had not been surveyed, some features were well known enough to be

Figure 7. Portion of a 1912 Map of the Cascade Forest Reserve showing part of the upper McKenzie River valley around the Three Sisters in the High Cascades, including Obsidian Cliffs, Scott Trail, and a Sheep Driveway.
mapped and described. Obsidian Cliff was a well known and very important source of tool stone for the indigenous population of west and central Oregon, and the obsidian acquired at this prehistoric quarry was traded at the major trading centers on the Columbia River (Minor and Pecor 1977; Skinner and Winkler 1994). Note the two sheep driveways – one north of Black Crater and the second east of the Three Sisters. As of 1912, sheep herding was still a major industry in the Cascades (Ingram 1918; Minor and Pecor 1977).

Toponymy provides some clues to the history and prehistory of this area, as well as the landscape of 1912. Bunchgrass R.S. on Bunchgrass Ridge suggests that this area was at least partially covered by grasses and, therefore, a meadow. Similarly, Horse Pasture Mt. suggests a pasture capable of supporting horses and, therefore, also a meadow. Grasshopper Mt., while not as obvious, suggests that grasshoppers may have been present in substantial numbers, which would also insinuate the presence of meadows. Similarly, a few names connect areas to Native American use. Indian Ridge and Squaw Holes both suggest a Native American connection, and both are on trails identified on the 1912 and 1925 maps.

The maps of the Cascade Forest Reserve from 1925 show some progress in surveying these areas. Figure 8 portrays the same general area as Figure 6, showing progress in surveying, although apparently with some questions of accuracy as shown by the dashed lines indicating sections. Most trails from the 1912 map are still included on the 1925 map, and most have now acquired names. Very few trails from the 1912 map had names. One prominent exception is Scott Trail, which would eventually become the
McKenzie Highway. By 1925, more trails had either acquired names, or trail names were deemed to be more important and therefore worthy of being placed on the map.

Highways had become more obvious on the 1925 maps, likely indicating completion of
the McKenzie Highway and potential importance of this transportation route across the Cascades. Also, the 1925 map differentiates between privately owned lands (hatch-marked) and lands controlled by the Cascade Forest Reserve (USDA). This may indicate a growing awareness of the authority of the federal government in managing the forest landscape in the Cascades, which was resented by some in western Oregon (Minor and Pecor 1977).

By 1947, the map was designating the Willamette National Forest, not the Cascade Forest Reserve. Figure 9 shows a section of the Willamette National Forest that corresponds generally to area in Figure 6. More highways are shown on the 1947 map,
showing the increased importance of automobiles. Also, ownership is now designated by bold dark lines, similar to today’s national forest maps. No features appear to be related to sheep grazing, which was discontinued entirely in 1948, but had been severely curtailed by 1940 (Minor and Pecor 1977). The 1947 map does not show some of the back country ranger stations present in the 1912 map, potentially a sign of shifting attention from sheep grazing, where back country rangers may be desirable, to timber regulation, easily handled from a centralized ranger station.

The three maps discussed above show a growing awareness of the landscape in the central western Cascades during the early 1900s. The 1912 map had numerous open areas with little or no information. By 1925 most areas had been at least minimally surveyed and more landscape details such as feature names were available. The 1947 map shows essentially a modern version of the Willamette National Forest map, including the Three Sisters Wilderness Area and Three Sisters Game Preserve within the wilderness area. Montane meadows, though, are never directly mapped or indicated. Toponymy can identify areas that were likely meadows (and most are today). These maps also indicate some trails that were likely prehistoric trails which were then utilized by explorers and herders. While sheep herding was the prominent activity to occur on the Cascade Forest Reserve in the late 1800s and early 1900s, the prime locations for grazing – meadows – were not mapped and were only mentioned in terms of their utility and resilience by early managers (Colville 1898; Ingram 1916).

**Arboreal Evidence**

The extent of montane meadows is determined by their boundaries with the forest. Meadow contraction occurs when the forests surrounding the meadows expand, filling in
the meadows with young conifers. One method of determining the speed of meadow contraction is to extract wood cores from a sample of trees from the current forest boundary to deep within the forest (Miller and Halpern 1998; Haugo and Halpern 2007). This method can also determine when meadows began to contract as opposed to when they were stable. Numerous studies have shown that meadow contraction begins slowly in the early to mid 1800s and begins to occur very quickly in the early-mid 1900s (Miller and Halpern; Haugo and Halpern 2007; Takaoka and Swanson 2008; Rice, in process). These researchers attribute the increase in contraction in the 1900s to correspond to decreased grazing, resulting in fewer young trees being eaten by sheep and therefore allowed to grow. Researchers have not accounted for the beginning of meadow contraction in the early 1800s.

Climate and fire are the two most commonly discussed reasons for pre-1800 meadow stability. While the climate experienced some minor alterations in Oregon during the past 500-1000 years, such as the Little Ice Age, pollen records from western Oregon do not indicate any major changes in vegetation communities and appear to portray modern conditions (Sea and Whitlock 1995; Whitlock and Knox 2002; Long, Whitlock, and Bartlein 2007). This consistency in vegetation communities and relative stability of the climate would suggest that climate is not the major factor in creating and maintaining meadows up until the early 1800s.

The fire history of the area is very consistent with the climate history. Fire in western Oregon forests is infrequent as compared to forests in the Great Basin, Rocky Mountain, Southwest, and California ecoregions (Agee 1993; Whitlock and Knox 2002; Long, Whitlock, and Bartlein 2007). When natural fires do occur in western Oregon,
they are typically caused by lightening and are stand replacing fires that burn large patches of the forest (Agee 1993; Whitlock and Knox 2002; Long, Whitlock, and Bartlein 2007). The fire history of the McKenzie River watershed in the central western Cascades is consistent with this pattern (Burke 1980; Teensma 1987). Major fires are generally followed by the creation of young forests of similarly aged trees within a decade, not the creation of a meadow that is slowly infilled. It is unlikely, then, that major, lightening caused fires are the causes of meadows.

Frequent, small, low-intensity fires would not destroy an entire forest, but would prevent most tree seedlings from becoming established by killing them but not harming large, mature trees (Thilenius 1968; Johannessen et al. 1971; Lalande and Pullen 1999; Turner 1999). This method of frequent, low-intensity burning is the reason for the open savanna and prairie conditions that Euro-American settlers encountered when they first arrived in the Willamette Valley. Mature trees that grow in such areas are likely to have open-form characteristics like large, low, well-developed limbs (coniferous) and broad, spreading limbs and crowns (deciduous) (Thilenius 1968; Johannessen et al. 1971). Meadows that were maintained by frequent, low-intensity fire would potentially be ringed by large coniferous trees exhibiting some open-form characteristics. These trees would no longer be on the edge of the meadow if the meadow has contracted, but using techniques discussed earlier, the “original” meadow-forest boundary could be located. Once this boundary is located, the morphology of the old boundary trees could potentially support an interpretation of frequent, low-intensity fire as a method of meadow management. Preliminary investigations have shown this to me true in Lookout Mountain. Figure 10 shows two photos of old-growth trees that likely designate the
“original” meadow-forest boundary around 1800. Note that both trees have low, well developed branches – an uncommon trait among trees in dense forest. Figure 11 is a photo of the same meadow clearly showing the invasion of the meadow by small conifers. Also, Figure 11 shows the infilling of an older, savanna like condition on the hilltop. A few older, taller trees are being infilled by many younger, smaller trees. This is likely the result of a cessation in low-intensity but frequent fires set by indigenous populations.

Figure 10. Two photos of old growth trees in forests surrounding a large meadow on Lookout Mountain showing open-grown morphology.

Figure 11. Photo showing the meadow near the trees in the Figure 10 photos with clearly encroaching conifers in the foreground and a contrast between many young and a few old trees in the background.
A similar and related pattern involves the distribution of tree species around the meadows. Some tree species are more fire tolerant than others. Douglas-fir (*Pseudotsuga menzesii*) is the most fire tolerant of the conifers in the western Cascades, while western hemlock (*Tsuga heterophylla*) and mountain hemlock (*Tsuga mertensiana*) are fire intolerant. Pacific silver fir (*Abies amabilis*), the most common tree species in the forests surrounding most montane meadows, is moderately fire tolerant (Agee 1993). Therefore, if the older trees that represent the “original” meadow-forest boundary are more fire tolerant than most trees deeper in the forest, it suggests that fire was more common in that locality than deeper in the forest. Initial observations along the Lookout Ridge Trail indicate that the older trees are Douglas-fir while the younger trees that have grown up around them to create the current forest are largely Pacific silver fir. This suggests that some ridgeline trails in the study area were burned often with low-intensity fires. This is a pattern discussed in detail by Lelande and Pullen (1999) and Norton, Boyd, and Hunn (1999). Both groups of researchers discuss how indigenous populations of southern Oregon and southern Washington, respectively, burned the understories of forests in areas utilized as trails. Trails were meant to be kept very open, unlike the dense surrounding forest. A similar pattern was observed by Henry Eld of the Wilkes Expedition (1841) in the foothills of the Umpqua River valley, as shown in his diary illustration (Figure 12). Henry Eld’s illustration shows a Native American ridgeline trail in the Umpqua River valley’s foothills, approximately 100 km south of the current study area, which has been recently burned. Henry Eld illustrated a number of other fire influenced landscapes in the Umpqua River valley. Note the isolated large trees surrounding the trail, indicating a savanna like condition on this and potentially other trail
systems as opposed to dense forest. In the illustration, the smaller, younger trees have been killed by the fire while the older trees survived relatively undamaged.

Figure 12. Illustration from Henry Eld of the Wilkes 1841 expedition showing a recently burned ridgeline trail in the Umpqua River valley foothills.

**Conclusion**

While no direct evidence exists that solidly ties the existence of montane meadows to Native American practices, there are many indirect lines of evidence that do. Archeological investigations show aboriginal activities to be common around known meadows. The practices of the Kalapuya and other indigenous groups around the Cascades show a tendency towards using fire to create open areas in otherwise forested localities in order to increase the presence of certain plants and animals. These practices, common throughout the region, were likely practiced in the Cascades as well. Major plant crops such as huckleberries and bracken would greatly benefit from burning, as would deer. Aboriginal transportation routes (trails) were also commonly burned in the
surrounding area. At least some early trails indicated on the earliest available maps of the
Cascade Forest Reserve are likely aboriginal in origin, so would also indicate aboriginal
burning practices in the area. The lack of early Euro-American explorer descriptions of
the Cascade Mountains and the lack of information provided by the earliest maps provide
no supporting (or contradictory) evidence, though. Further investigations providing more
detailed descriptions of the surrounding forests and reconstructing the “original”
meadow-forest edges and archeological information will provide more supporting or
contrary information concerning aboriginal use, maintenance, and management of
montane meadows.
References Cited


