AN ABSTRACT OF THE THESIS OF
Claire C. Rogan for the degree of Honors Baccalaureate of Science presented on May 30, 2012. Title: Mixed-Conifer Stands of the Deschutes National Forest: A Brief History

Abstract approved: ________________________________________________________________

Tom Spies

In an effort to qualify the historical management and its effects on current stand structure, historical records, literature of the inter-mountain West, and current observations were utilized to paint a picture of the Deschutes National Forest.

Stand data were collected for the Deschutes during the summers of 2009 and 2010. Data include tree size distribution across the forest including regeneration, historical numbers of large pines based on cuts found, photographs, and spatial distribution data. Observations and notes from this field work will be used along with the data to describe current conditions and how they reflect historic management. Historical records were organized into a database for future use.

A historical narrative of the Deschutes National Forest, current observations, and a catalog of historical references were produced in an effort to aid in future management decisions. The narrative and observations are intended to paint a picture of how the forest was and is currently, and how it could be managed to create more resilient forest stands in the Deschutes. The catalog is aimed to gather a database of historical documents in one location to aid in future research and management.

Key words: Deschutes National Forest, stand structure, forest history, historical catalog
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Mixed-Conifer Stands of the Deschutes National Forest:  
A Brief History

By:  
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I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

Claire C. Rogan, Author
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Mixed-Conifer Stands of the Deschutes National Forest: A brief History

Introduction

Mixed-conifer stands of the Deschutes National Forest have undergone many types of anthropogenic management throughout the centuries, starting with manipulation of the landscape by indigenous people. While mixed-conifer forests have long been altered, little is known about the effects of historic management on current stand structure—especially post-European settlement. “Indeed, what is striking about the region is the very recent and very rapid pace of human-induced environmental disturbance over very extensive areas in a very brief span of time” (Robbins 1994).

Historic logging, grazing, and shifts in fire regime have all contributed to increased density and a change in composition within mixed-conifer forests throughout the region (Hessburg, Agee, and Robbins 2005). These alterations are thought to increase the risk of high-severity fires, insects, and pathogens in the remaining mature mixed conifer stands.

Conservation of mature mixed-conifer forest stands has become a primary management objective of the Deschutes National Forest. Persistence of mature mixed-conifer forests is dependent on restoring its historic structure (pre-European settlement), species composition, distribution, and disturbance regime (Hessburg, Salter, and James 2007). Effective restoration relies on an understanding of the current state of mixed-conifer forests and the forces, natural and anthropogenic, that have created current landscape conditions. Therefore the goal of this paper is to describe historical settlement,
development, and management of the Deschutes National Forest and their effect on current mature mixed-conifer stands.

A historical data search was conducted to learn more about the historical settlement and management of what is now the Deschutes National Forest. This history was used in conjunction with current observations and data from field work during the summers of 2009 and 2010 to draw conclusions about the effects of historic and current management and policy on current mixed-conifer stand structure and composition.

**Study Area**

The Deschutes National Forest lies in central Oregon, just east of the crest of the Cascade Mountains. This paper focuses on the area that is now the Deschutes National Forest and may be referred to as the “Deschutes region.” The map below shows the location of the Deschutes, relative to the other National Forests in Oregon:
Figure 1. Oregon National Forests Map. Deschutes National Forest found in center of map. From University of Oregon Libraries.

Forest cover types vary with elevation and environmental conditions going east from the crest of the Cascade Mountains. Stands of fir (Abies, spp.) and hemlock (Tsuga, spp.) occupy the higher elevations, while the lowest elevations are dominated by ponderosa pine (Pinus ponderosa) or juniper (Juniperus occidentalis) woodlands. Mixed-conifer forests occupy the transition. The following is a typical forest sequence for Eastern slopes of central Oregon Cascade Range as described by Swedberg and West (Franklin and Dyrness 1988):
Increasing Elevation | Forest Zone
---|---
| *Juniperus occidentalis*
| *Pinus ponderosa*
| *(Pseudotsuga menziesii)*
| *Abies grandis*
| *(Abies amabilis)*
| *Tsuga mertensiana*

*Table 1. Excerpt of Table 21.—Typical zonal forest sequences at locations in eastern Washington and Oregon adapted from the indicated sources. Species names in parentheses indicate the enclosed zone may be absent or only fragmentally represented*

Mixed-conifer stands can be divided into wet and dry types based on precipitation, elevation, and the resultant understory species composition. For both, the primary cover type is typically described by ponderosa pine, Douglas-fir, and grand fir. Secondary cover types include western larch (*Larix occidentalis*), lodgepole pine (*Pinus contorta*), quaking aspen (*Populus tremuloides*) and cottonwood (*Populus trichocarpa*) (Hessburg et al. 2007). It is not uncommon in the Deschutes region for grand fir (*Abies grandis*) and white fir (*Abies concolor*) to hybridize. In the context of this study, the hybrid is referred to as “*Abies grandicolor*.” This naming convention is consistent with *Forested Plant Associations of the Oregon East Cascades.*
Pre-National Forest History

Native Americans managed the landscape of the Intermontane Northwest long before European settlers arrived (Robbins 1994). Through seasonal burning, indigenous people were able to perpetuate food crops and encourage forbs for wild game. In dry mixed-conifer and pure ponderosa pine stands, this intentional burning, in conjunction with natural, frequent, low severity fires, maintained a park-like structure and kept ingrowth to a minimum. Historic photos reveal towering ponderosa pines with very little regeneration.

Surveys of the area by John B. Leiburg indicate that “when settlers learned that burning the forest attracted game…they set the woods on fire” (Robbins 1994). In Leiburg’s surveys, he noted that since Euro-American settlement, fires were “more numerous and devastated much larger areas” (Robbins 1994).

As Euro-American immigrants settled in central Oregon in the late 19th and early 20th centuries, they with them brought nonnative plant and animal species “such as sheep, goats, cattle, and pigs, wheat, barley, rye and corn. Indigenous plants and animals were successively eliminated from areas brought under cultivation because their apparent lack of utility made them “weed and pest” species” (Hessburg and Agee, 2003).

Settlers of central Oregon initially began selective cutting of large timber for construction and development. It didn’t take long for the early settlers to recognize the financial value of the timber in the Deschutes region. Several entrepreneurs that moved into the area began cutting large ponderosa pines before they ever had a way of transporting the lumber to the mill.
During the mid-19th century, Congress authorized four railroad surveys in an effort to advance access to the western United States. Road building projects were also funded, as road builders made their way west. “So began the process of forest and rangeland fragmentation at a broad regional-scale.” During this period, more than 50.5 million hectares of land were granted to railroad companies—initially to the Union Pacific and Central Pacific railroads—the finishers of the first transcontinental railroad (Hessburg and Agee 2003).

Convention was to grant the railroads land in 20 odd-numbered sections for each 1.6 kilometers of track laid across the country and 40 sections for each 1.6 kilometers of track across western territories. It was Congress’ hope that the railroad companies would turn around and sell their granted land to settlers to mitigate the costs of construction, as well as promote settlement and development of the western states. By granting odd-numbered sections of land to the railroad companies, each block of land had the potential to be managed in different ways—timber, ranching, grassland, etc.

Movement of goods—regionally and nationally—was greatly aided by the extending web of railways. New rail-lines enabled easy, efficient transportation of logs; moving them first to local mills for processing, then distributing the resulting lumber products around the country. This significantly bolstered the utilization and management of what is now the Deschutes National Forest.

European settlement in the area created a need for timber products, as well as land conversion for other uses. As railways expanded, more people were able to access the Deschutes region, and more goods could flow. Thus, timber shifted from a necessity to a commodity.
Management History, post-European Settlement

Timber Harvest

As Euro-Americans settled the area around what is now the Deschutes National Forest, the landscape was dominated by large ponderosa pine trees. Seeing this as the most useful species for building—opposed to the “less suitable” trees in the understory—the largest of the ponderosa pines were cut. This selective, or “high-grade,” logging practice continued as fewer and fewer large ponderosa pines remained following each harvest entry.

The aforementioned high-grading was aided by the location of the rail lines. The parcels of land granted to and subsequently sold by the railroad companies were laid out adjacent to the rail-lines. A train’s ability to traverse a track is severely restricted by the grade, and as a result, usually follow relatively favorable terrain. The gentle, easily accessible slopes made logging relatively easy. Large ponderosa pines were the first to be cut, as they were the most valuable and useful for building purposes. During the early part of the 20th Century, most areas were selectively cut (high-graded)—rather than clear-cut—due to the non-profitable, unusable nature of the other tree species present in the forest types (e.g. fir, lodgepole pine).

With subsequent harvest entries, fewer and smaller large pine remained. Expanding rail lines and forest road systems allowed for logging to move into previously inaccessible areas. As harvest processes pushed into higher elevations, logging occurred more frequently in the mixed-conifer forests of central Oregon.
In an oral history, George Donaldson described logging in central and eastern Oregon (“Trails,” compiled by Lorene Allen). Born in 1901, he logged during the times of horse and railroad logging, and eventually for the U.S. Forest Service. Here is his first-hand account of how selective cutting was executed:

They practiced selective cutting. To do this they classified the trees. The #1 tree was a tree that had just sprouted, up to about 12 feet. A #2 tree went up to about 12 inches in diameter. The #3 and #4 trees were nice big trees. The only difference was that the #4 was mature—it had commenced to flatten off at the top. The only tree they cut was a mature tree, #4. Only if there was something wrong with the tree did they cut any other kind—a fire scar at the base, a leaner, or one with mistletoe (“Trails,” compiled by Lorene Allen).

While this is one account of U.S. Forest Service timber harvesting in the early part of the 20th Century, it is fairly representative of logging throughout the Deschutes National Forest at that time, as well.

Before World War II, most of the pine logged in the United States came from the Lake States. After the war, there was a shortage, so timber companies looked to the Mountain West to obtain their source of lumber. At this time, a boost in the economy allowed for railroads to be completed and bridges to be built. With an increased demand for timber, beyond that of framing lumber for the local communities, silvicultural prescriptions made a shift from selective cuts to clearcuts—the plantation-centric management long practiced on the west side of the Cascade Mountain Range.

With the growing need for timber in the Mountain West and across the United States, the logging industry boomed in central Oregon in the mid-twentieth century. These logging practices left a legacy across the landscape that can still be seen today on the ground and in aerial photographs.

*Fire Suppression*
Throughout the development of the area that is now the Deschutes National Forest, there were both direct and indirect modes of fire suppression. Domestic grazing reduced the amount of fuels, roads and rail construction acted as fire breaks, and land allocation by the federal government lent itself to additional landscape fragmentation. Additionally, land conversion to agriculture eliminated places of common fire ignition and increased the need to prevent fires from burning crops (Hessburg, et al. 2005). A similar fire suppression story resonates throughout the West. As population increased, so did the need to protect homes, crops, and timber from catastrophic fire.

Historically, small, low intensity fires controlled in-growth of shade-tolerant species in the ponderosa pine stands of the Deschutes National Forest. With fire suppression, fuel accumulates on the surface and in “ladders” of small tree crowns that eventually grow into the bottom of the upper canopy. Consequently, when a fire does occur, it appears to be much more severe than in the past. Figure 2 (Hessburg, et al. 2005) depicts reconstructed and current maps for a subwatershed of the Lower Grand Ronde in the Blue Mountains of Northeastern Oregon:
Figure 2: Reconstructed maps of a dry forest subwatershed in the Blue Mountains displaying current and historical structural classes (Hessburg et al., 2005).

While the maps depict changes in the Blue Mountains, they are consistent throughout the Intermontane Northwest.
Field Work Overview

In an attempt to quantify and describe the current structure of mixed-conifer stands of the Deschutes National Forest, I collected stand data and tree cores as a part of a larger study during the summers of 2009 and 2010. While the intent of this paper is to provide a brief history and qualify observations throughout field work, this protocol overview is intended to provide a background for the observations made in the field.

During the summer of 2009, sample sites were established throughout the entire Deschutes National Forest based on PNW-FIA Annual Plot Design. Each site consisted of four macroplots with a radius of 17.84 meters. The following data were collected at each macroplot:

- GPS coordinates
- Location and characteristics of two witness trees
- Slope
- Aspect
- Plant association, according to Forested Plant Associations of the Oregon East Cascades
- Photos taken in each cardinal direction
- Diameter at breast height (DBH), species, crown class (Keen, 1936), and height to live branches of trees greater than 50.0 cm DBH
- Keen class and fire scar characteristics for Douglas-fir (*Pseudotsuga menziesii*) and ponderosa pine
- Diameter, species, and decay class (from 1-5, with 1 being sound and 5 rotten) of cut stumps greater than 50.0 cm across the face
• Species, height, DBH, and decay class of snags greater than 50.0 cm DBH

Each macroplot consisted of a subplot of radius 7.28 meters. Within this plot, the characteristics for trees, snags, and stumps greater than 10.0 cm were measured and recorded as described above.

Additionally, a microplot of radius 2.5 meters was established one meter to the east of plot center. In this plot, trees and regeneration less than 10 cm were classified into height categories. Sites added during the summer of 2010 included a microplot to the west to encompass the varying distribution of regeneration in mixed-conifer stands.

Sites added during the summer of 2010 were intended to encompass more wet-mixed-conifer sites. Sites with a suitable spread of live trees established during the summers of 2009 and 2010 were revisited during Summer 2010 to obtain cores from a range of species and diameters in order to establish the age of the older trees and to gain an understanding of the in-growth of tolerant species.

In addition, a one square kilometer intensive unit was sampled in order to obtain a distribution of species across a larger area. Plots were distributed across the site and included a tally of tree size distribution. Trees and stumps greater than 50 cm were tallied within a 10 m radius and trees stumps less than 50 cm were tallied within a 5 m radius. All cut stumps were measured for diameter and height within the plot and identified by species.

This intensive data collection in the mixed-conifer stands of the Deschutes National Forest will be used to aid in discussing first-hand observations in the field.
Field Observations

An aerial view of the Deschutes National Forest reveals forests that have resulted from a mosaic of management practices over the last century—old clearcuts intermingled with areas of even older high-grade, selective logging. From lower elevation stands in the ponderosa pine to higher elevation mountain hemlock (*Tsuga mertensiana*), most areas were logged in some way at some point.

The extreme variability in the mixed-conifer stands, as discussed throughout this paper, was one of the initial observations during field work. While field plots were located within one to one and a half kilometers from the road, per protocol, the path from truck to site was often full of change. In a short 200 meters, researchers could walk through several forest types. This makes distinguishing between natural and human effects on structure quite difficult.

Existing research for mixed-conifer forest types in central Oregon has been limited. Field observations indicate that our lack of understanding of this forest type is partly a function of the extremely high environment and compositional variability throughout the stands. Computer simulation models of these forests exist but have difficulty in truly and accurately expressing the variable nature of the pattern and dynamics of mixed-conifer forests.

For example, it wasn’t uncommon to start the hike into a plot in a pocket of lodgepole pine, wondering, “Isn’t this supposed to be an old-growth pine site?” In a very short distance, the lodgepole pine would give way to a tangled stand of grand fir with lingering lodgepole pine and the remnants of large, old ponderosa pines in the form of cut
stumps. Some residual, large ponderosa pines could often be seen in the distance. As the walk continued, this unpredictable pattern could be observed.

Additionally, high under story densities were consistently seen throughout the Deschutes, amongst much lower densities of over story ponderosa pines. The following histograms and corresponding photograph show the densities for a typical site, Site 1045, with shade tolerant encroachment (grand fir, in this case). The following species abbreviations were used: PIPO for ponderosa pine, PSME for Douglas-fir, ABGC for grand/white fir.

![Understory Histogram](image)

**Figure 3. Typical shade tolerant encroachment. Site 1045 under story density histogram depicting grand fir (ABGC) encroachment.**
Figure 4. Over story densities for Site 1045. Several large ponderosa pine and Douglas-fir. Shows historic existence of large trees at low densities

Image 1. Corresponding image of site for density histograms. Large ponderosa pine stumps and residual trees amongst dense regeneration.
The density histograms in Figures 1 and 2 show extremely high densities of grand fir under a few residual, over story ponderosa pines. The cut stump in the photo shows evidence of historic management. The extremely high densities of shade tolerant species were most likely released after logging and perpetuated subsequent fire suppression.

Because these descriptions of stand observations can seem vague, and are often difficult to pinpoint due to the variability, additional photographs are included throughout the discussion to illustrate the various situations observed across the Deschutes National Forest. The following photographs depict various stand structures and increased densities observed throughout fieldwork on the Deschutes:
Image 2. Stand structure of a mixed-conifer site with little historic or recent logging. Fire suppression appears to have allowed in-growth of a dense understory.
Image 3. Large, old ponderosa pines tower over a dense understory of grand fir. The density below the large ponderosa pines does not allow the stand to continue on the same ecological trajectory that brought it to this point. Until some sort of density reduction in the understory occurs, be it natural or mechanical, pine regeneration will be very limited.
Image 4. An incredible density that was found throughout the Deschutes National Forest. It is thought that many of the mixed-conifer forests were not historically so dense. The increased density is a result in a management shift over the last 200 years—through little logging activity and active fire suppression.

Image 5. A healthy site of ponderosa pine. This was not a normal occurrence on the Deschutes National Forest. There is some grand fir regeneration seen in the photo, but not nearly as intense as the previous photos.
Image 6. This image depicts a site where incense cedar (Calocedrus decurrens), rather than grand fir, acts as, the shade tolerant species. This was a unique situation found mostly on Green Ridge in the northern half of Deschutes National Forest.

Image 7. A fantastic representation of a common site in the Deschutes National Forest—large ponderosa pine with an abnormally high density of grand fir in the understory.
Image 8a.

Image 8b.
Image 8c. Sites dominated by ponderosa pine, and a healthy cohort of regeneration exists. The sites in the photos and those similar were typically found in the northern half of the Deschutes National Forest at lower elevations. Future management will be necessary to ensure that a healthy density is achieved to promote propagation of the pine stand and support growth of the existing pines.
Observed Effects of Historic Management

In the mixed-conifer forests of the Deschutes region, ponderosa pine are typically more scattered in clumps throughout a stand, interspersed with a variety of shade-tolerant species—usually grand fir or Douglas-fir—depending on environmental parameters such as temperature, precipitation, elevation, aspect, slope, and substrate.

Due to the aforementioned unpredictability, it is difficult to pinpoint cause-and-effect of management and resulting structure and composition within this forest type. Therefore, current field observations will be coupled with silvicultural knowledge to gain an understanding of the effects of historical management on the mixed-conifer stands of the Deschutes National Forest and surrounding areas.

Research shows that growth rates of shade-tolerant species significantly increase after the over story tree removal (Seidel 1989). As discussed in the historical management of the Deschutes National Forest, many stands of large, old pines were “high grade” logged, in which the large, over story pines were removed for their high quality and value, and the shade tolerant species were subsequently released.

The release of shade tolerant species was observed throughout the Deschutes National Forest. At lower elevations some plantations were replanted with pine, but early logging relied on natural regeneration. On sites with low productivity, the released tolerant species “grew like weeds,” quite literally. The rapid in-growth, in many cases, prevented survival of the ponderosa pine regeneration, and consequently, there appears to be a shift in stand structure. It must be noted that this was observed more commonly where there were larger true fir or Douglas-fir cut stumps or standing trees, and site conditions were favorable for growth. Drier, lower elevation sites that were
predominately pine prior to logging remained that way. Clearcuts were more common in these stands, which can be seen in historic and current aerial photographs.

The following photographs depict management, historic and more recent across the Deschutes National Forest:

*Image 9. An old skid road with historic cutting of large ponderosa pine, as indicated by the large stump. While there is a healthy population of medium sized pines, small grand fir are abundant throughout the understory; this may have implications for future management. A prescribed burn or thinning may be necessary to maintain the integrity of the stand.*
Image 10. The density of the stand shown does not promote growth to pines of historic size and density. Future management may be needed to reduce the density and encourage growth. Current densities are most likely a result of fire suppression.
Image 11. The historic cut-stump in the center of the photo illustrates much of what was found throughout the Deschutes National Forest: historic cut stumps with dense ingrowth, and as seen in other photos, the occasional large ponderosa pine, that was probably not chosen as valuable at the time of harvest. The large grand fir on the left is approaching the cut diameter limit and may prevent regeneration of ponderosa pine.

Image 12. The cut-stump in this photo was most likely from a harvest before the East Side Screen was mandated. However, the implications of the rule are illustrated well in this photo. While there are large ponderosa pine (seen in the left and center background), the large grand fir shade the site well enough that the chance of ponderosa pine regeneration are slim.
Image 13a.

Image 13b. These photos show more recent management to reduce density around larger pines. The more dense areas are most likely a wildlife clump. Image 12b is an up-close photograph of the wildlife clump and clearly show the density found. Intensive management will be required to ensure successful maintenance of the ponderosa pine stand.
Incredibly dense ponderosa pine regeneration does not support the growth and propagation of traditional stands of large pines—like the ones that the cut stump shows evidence of.

Image 15. Cutting from a drier, Ponderosa pine site. The presence of lodgepole pine seen can regenerate and become dense below the large ponderosa pine.
Image 16. In the images above, the sites are dominated by Ponderosa pine, and a healthy cohort of regeneration exists. A site like this was found in the northern half of the Deschutes National Forest at lower elevations. Future management will be necessary to ensure that a healthy density is achieved to promote propagation of the pine stand and support growth of the existing pines.
Observed Effects of Fire Suppression

While the maps in Figure 2 represent the Blue Mountains in Northeastern Oregon, the results are consistent with observations in the Deschutes National Forest: fewer old ponderosa pine stands, higher levels of fuel loading, increased crown fire potential, and increased flame length. The pictures below depict just that. In the first photo, older ponderosa pine can be clearly seen amongst a sea of regeneration.

*Image 17. In-growth of shade tolerant species and subsequent fuel provided.*
Image 18. The large cut stump surrounded by thick in-growth was not uncommon throughout the Deschutes National Forest.
Observed Effects of Current Policy on Mixed-Conifer Stands

The effects of more recent management can also be observed in the field. The federal forest developed three Eastside Screens to manage forests on the east side of the Cascade Mountains in Oregon and Washington. One of the screens that’s effects can be observed in the Deschutes National Forest is the policy to restrict cutting trees greater than 21 inches (53 centimeters) diameter at breast height (Youngblood 2005). This limit was set in order to prevent cutting of old-growth in the Eastside forests (S. 220, 2011). However, immediate observations in the mixed-conifer forest showed that a tree’s age cannot be determined by its size in this region. For example, data from the cores taken during 2009 and 2010 fieldwork have shown that some of the larger grand fir can be as young as 80 years old while a ponderosa pine of equal size may be hundreds of years old.

In the field, sites were observed that had been thinned under the rules of the Eastside Screens. While the density was reduced around the large ponderosa pines, larger shade-tolerant tree species were left. The larger, residual shade-tolerant trees are able to reseed the site and provide shade for the regeneration. Additionally, when the thinning occurs, the existing shade-tolerant regeneration is released and allowed to thrive in these conditions. Such prescriptions were almost ineffective entirely, as the ponderosa pine regeneration are often still unable to survive under a thick carpet of regeneration.

The following photos depict large grand fir, approaching the cut limit, amongst historic ponderosa pine:
Image 19. Large grand fir and large ponderosa pine cohabitating a site. In the background, grand fir regeneration is abundant and very little pine regeneration exists. Historically, fire would have reduced the regeneration and allowed for shade intolerant ponderosa pine to regenerate.

Image 20. Large ponderosa pine can be seen on the far left and center of the photo. This was not an uncommon scene throughout the Deschutes National Forest. It is important to note the largest grand fir, right foreground. It is approaching the diameter cut limit and if left to regenerate could impact the future of Ponderosa pine on this site.
Catalog of Historic Data and References

In conjunction with field work, a historical data search was conducted in order to find as much information as possible about historic stand management, structure, and any other relevant material. Initially, this historic investigation was thought to be a simple task: go to relevant offices and societies, find cabinet on the Deschutes National Forest, and all maps, photographs, silvicultural prescriptions, etc. will be there. Quite the opposite was found. Due to a number of circumstances—office moves, departmental specific organization, etc.—historical references were discovered to be scattered throughout the Deschutes National Forest Offices, historical societies, and other relevant locations.

As restoration and reclamation efforts become more desired and active on the Deschutes National forest, historical data are often useful as a supplemental source of information. They can aid in painting a better picture of how the Deschutes National Forest was managed and what it may have looked like throughout history, in order to complement work to create more resilient stands across the forest.

With this in mind, a catalog of historical references was created in order to provide a resource for future managers and researchers. While the list is not unlimited or extensive, it provides good references, as well as locations that may be useful for future research and management.

Three major locations were found to be the most helpful and the most useful for finding information on historic management of the Deschutes National Forest: Sisters Ranger District, Deschutes National Forest Supervisor’s Office, and the Des Chutes Historical Museum (run by the Deschutes County Historical Society). A database was
created using Microsoft Excel. In the database, there are three worksheets, one for each of the previously mentioned locations. Within each worksheet, resources are categorized by title, format, location, author, time period, condition, and any pertinent notes. Additionally, available maps and photos were listed with location. The Des Chutes Historical Society has a fantastic collection of old photographs, depicting an array of logging by forest industry and the U.S. Forest Service. The historical references for each location can be found in Appendix A through Appendix C.

**Conclusion**

Historical records reveal that the native people of the Deschutes region actively managed the forests and grasslands through burning. These man-made fires in conjunction with frequent, natural low-severity fires minimized in-growth of shade tolerant species and maintained a more open stand of ponderosa pines, as can be witnessed in historic photographs and journals.

European-American settlement in the Deschutes region imposed a high demand on the land—a need for building products and agricultural space. As an expanding transportation network grew with the economy after World War II, it allowed greater access for timber harvest. High-grade logging gave way to clear-cutting as the demand for timber grew regionally and nationally.

With the expansion of development into native forests and grass lands, fire suppression became more important to the settlers. Not only were modes of fire ignition
and spread limited by development, the need to protect crops, timber, and communities was very important and still is today.

Historic management, fire suppression, and current policy have all set the mixed-conifer stands on—what some ecologists and managers believe—an unnatural stand development trajectory. The release of shade tolerant species after logging and subsequent fire suppression has appeared to alter species composition and greatly increase stand densities.

It must noted that some recent research has suggested that stand densities do not differ greatly, if at all, from those historically (Baker 2012). However, field observations consistently revealed sites of high densities of shade tolerant species and regeneration where old ponderosa pine stumps suggest a historically lower stand density. Increased densities in mixed-conifer stands create a higher risk for catastrophic fire, insects, and pathogens.

A more thorough understanding of the structure and distribution (historic and recent) of mixed-conifer stands can aid ecologists and managers in creating more resilient forests across the Deschutes National Forest. Additionally, the historic catalog will serve as a resource for future research and management to make historic data and information more easily accessible.

**Looking Back**

Before starting field work in 2009, I imagined “hunting” for large ponderosa pine across the Deschutes National Forest. This proved harder than expected; perhaps not for
lack of large trees but due to the high variability in structure and composition across the landscape. Each site presented a new puzzle to solve: linking observations of management to the current status of the stand. My background in Forest Engineering sparked an interest in connecting historic management to current stand structure and composition in the Deschutes National Forest.

In order to learn more about the history, I began a data search in the Deschutes National Forest offices and the Deschutes County Historical Society. Tracking down historic data and information proved to be more difficult than expected due to office moves, missing maps and photos, etc. The historic catalog is intended to aid future researchers and managers in such a process.

All in all, I learned that it’s really important, especially in the Deschutes National Forest, to consider all possible influences on forest trajectory when considering future management. There are many variables that contribute to the current structure and composition of mixed-conifer stands of the Deschutes National Forest. This paper is intended to serve as an aid in clarifying variables that I found to be most influential.
Bibliography


Appendix A

Deschutes National Forest Supervisor’s Office

Bend, Oregon
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Appendix B

Sister’s Ranger District Office

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GLO Plats located in "Historic Misc." file in Don Zettel's office

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- 1930-1939
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- 1960-1969
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- METSKER PLATS
- GOULD OWNERSHIP 1915
- DNF QUAD ADDITIONS 1953
- DNF 1932 RANGE ALLOTMENT MAPS
- DNF 1950 RANGE ALLOTMENT MAPS
- USGS QUADS 1929-1932 (Madras, 3-Sisters, Mt. Jeff, Bend)
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Appendix C

Deschutes County Historical Society

Des Chutes Historical Museum

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