City Forest Lands Restoration Project Phase III

Photo from the collection of Terry Skibby

Prepared for:
The City of Ashland
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Executive Summary

The Ashland Forest Lands Commission (AFLC), in its ongoing role of implementing the Ashland Forest Plan (AFP), proposes the next phase of forest management for the 160 acre Winburn Parcel. While embracing ecologically responsible stewardship principles and an open and transparent community decision-making process, this report outlines the goals necessary to implement the third phase of the AFP.

The goals of Phase III of the Winburn Parcel are to:

1. Protect water quality for the City
2. Maintain and promote ecosystem health
3. Reduce the wildfire risk to the City

The Winburn Parcel is unique amongst city-owned land for several reasons, chiefly its geographic location at the confluence of two perennial creeks that feed the City water source, Reeder Reservoir, and inside the Ashland Creek subwatershed. In addition, the forest on this parcel and the surrounding 6,000 acres is unhealthy and poses a significant wildfire and water quality danger to the City due to 100 years of fire suppression.

This interdisciplinary report provides a detailed overview of the parcel, including data from 69 permanent monitoring plots, specific forest management strategies (prescriptions) for each of the seven distinct units within the parcel, and discussions of the soil, hydrology, flora and fauna.

In accordance with the guidelines set forth in the AFP, "a carefully applied program of tree salvage, thinning, and prescribed fire" should continue to be used within the Winburn Parcel. Strategies to implement this plan include removing the smallest and weakest trees, while leaving the largest, healthiest trees to help reduce fire danger, soil erosion and ecosystem degradation. Potentially, removal of commercially valuable timber could take place, but no trees will be removed simply to add value to a timber sale.

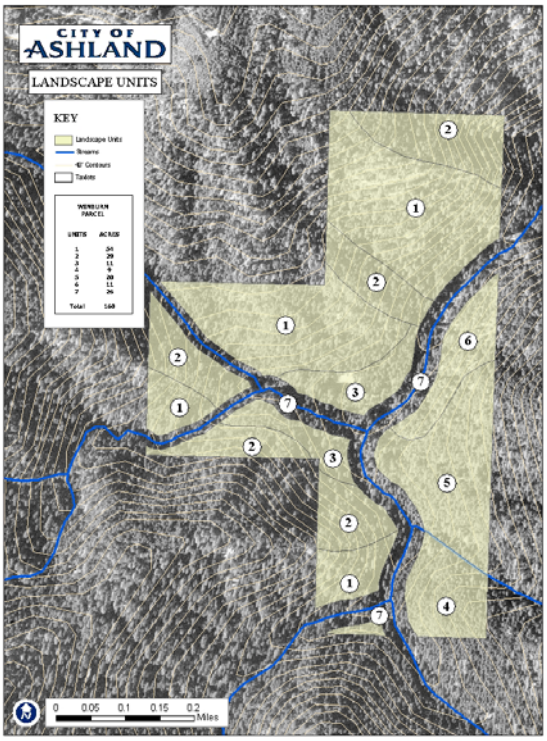
Moreover, site monitoring and adaptive management of the Winburn Parcel will attempt to emulate the historical role of fire in the ecosystem while protecting water quality and quantity, cultural resources, healthy soils, slope stability concerns, a mature forest ecosystem, spotted owl nesting and foraging habitat, resident fish populations, and the rest of the rich biodiversity the area enjoys.

Progress on these goals began for the Winburn Parcel in 2000-2001 and already the area has benefited from the management actions performed. Promoting a healthy forest through stewardship of this distressed parcel should produce a win-win for the environment and the City.

PART I- GENERAL PROPOSAL

Introduction

The City of Ashland, under the stewardship of the Ashland Forest Lands Commission (AFLC), has been working over ten years planning the restoration of city owned forestlands. Throughout the city ownership the AFLC has been engaged in cooperative forest health projects with neighbors and other jurisdictions, both in planning and groundwork. Forestry professionals, concerned citizens, and environmental groups have guided these projects.



Much of the forest land in the Ashland watershed is overstocked due to the suppression of natural fires in the watershed. Since 1995, the City of Ashland has been actively working to restore stands on their ownership to more disturbance resistant and resilient conditions. In addition, there are areas of untreated logging slash created during 1991 harvest operations. While brush and small trees continue to be thinned, this thinning work has focused on the removal of small, understory trees (less than 7 inches diameter at breast height (dbh) that have been cut and burned on site. This work has reduced ladder fuels and promoted age diversity in some areas. On occasion, a small number of commercial size hazard trees have been cut and a commercial timber sale under Phase II on the lower watershed was completed in 2003.

Nevertheless, many stands still exist with *high tree densities* in larger size classes (greater than 7 in dbh). These dense stands experience increased stress during drought periods. As a consequence they are subject to substantial beetle and parasite attack as well as an increase in the potential for uncharacteristic, high intensity wildfire.

Changes in fire regimes have had a significant role in the development of the Ashland watershed. Fire regimes are determined by fire frequency, season, intensity, duration, and scale (patch size), as well as periodicity and variability. Fire regime information will help inform our decisions for prioritizing areas for hazardous fuels treatments, silvicultural treatments, and prescribed fire.

Ashland Forest Plan

The AFLC is charged with implementing the Ashland Forest Plan (AFP) adopted by the City Council in May of 1992. The purpose and need for the AFP was to place the City's 1,075 acres of forestland under a workable regime of protection and management. The AFP states the following: "In our judgment, created disturbance that emulates natural processes must be reintroduced into the watersheds. This means vegetative manipulation and prescribed fire." The

AFP further states: “In order to emulate the historical role of fire in the ecosystem, a carefully applied program of tree salvage, thinning, and prescribed fire will be introduced.” Appendix A of the AFP lists a number of priority projects to be completed by May of 1993. This includes quarry restoration, road maintenance, prescribed fire treatments, and construction of fuelbreaks. Additional lower priority projects such as fuel reduction, grass seeding, tree planting, hand piling and burning, closing roads, and road maintenance are also listed.

In November of 2001, the AFLC revised the goals and strategies of the AFP to reflect the changes that have occurred on city owned lands since 1992. The effects of increased population in the wildland urban interface with the associated increased risk of wildfire, increased mortality of larger trees, and extended drought are some of the reasons that led to the adjustments of the AFP. These revised goals and strategies align directly to the original goals and policies of the AFP.

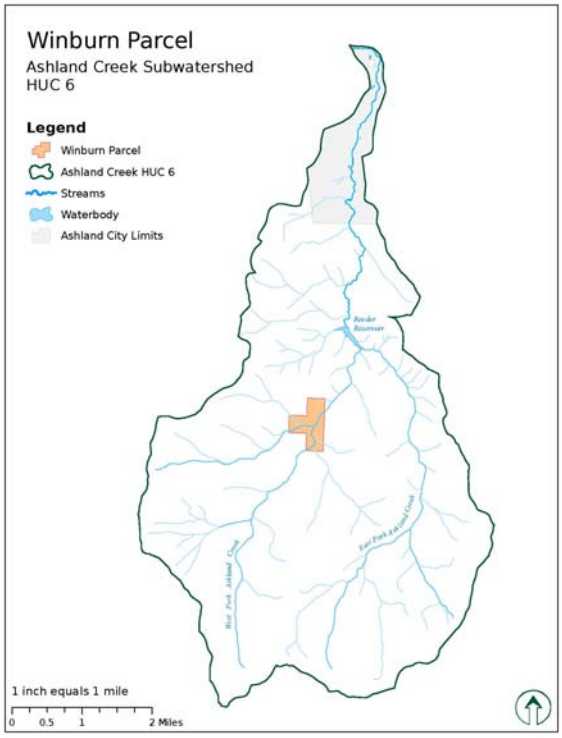
The city has accomplished a number of restoration treatments listed in the original AFP. These include brushing, pre-commercial thinning, establishment of native grasses, tree planting, and prescribed fire application (hand piling and burning). Most of this work has been completed on the lower portion of the City ownership adjacent to and below Reeder Reservoir. Management of the 160 acre Winburn Parcel (City Forest Lands Restoration Project Phase III), located in the middle of the watershed above Reeder Reservoir, is the next step in the continuing forest restoration and resource management process.

The Winburn Parcel

As part of ongoing forest and resource management, Marty Main of Small Woodland Services Inc. developed a silvicultural overview and analysis for the Winburn parcel. Other portions of the City ownership have already been addressed by similar documents (City Forest Lands Restoration Project Phase II, 2003; A Silvicultural Prescription for High Priority Forest Management Areas, 1996; Silvicultural Prescriptions for Additional Forest Management Areas - An Update, 1998). This project document is based on Main’s Silvicultural Overview and Analysis of the Winburn Parcel (2005) and the City Forest Lands Restoration Project, Phase II. It incorporates discussion on the ecological importance of the Winburn Parcel in its context with USDA Forest Service lands and the remainder of the watershed. This plan completes the third phase of silvicultural and forest management planning for the City of Ashland forestland ownership.

Silvicultural and forest management activities on the Winburn Parcel have long been discussed within the context of enhancing and helping achieve the City's three primary forestland objectives:

1. Protection of watershed values and maintenance of water quality and quantity for the City.
2. Maintenance and/or promotion of forest and ecosystem health.
3. Reduction in wildfire hazard and risk.



Unlike the rest of the City ownership, however, the Winburn Parcel is located in the center of the northern half of the federally mandated Mt. Ashland Late Successional Reserve. As a result, ecosystem values are very different. The Winburn Parcel contains significant mid and late-successional stands compared to the rest of the City ownership, which is dominated by younger age and size classes initiated after major wildfires in the early 1900s. For this reason, the Winburn Parcel's second objective focuses much more directly on maintenance and/or promotion of late-successional values within the larger context of forest and ecosystem health.

Numerous field trips to the parcel and considerable discussion about objectives over the years have developed a solid foundation for the preparation of this management plan. The descriptions, prescriptions, and analyses contained in this report are specifically designed for the City of Ashland ownership on the Winburn Parcel and may or may not be directly applicable to the objectives with the other major landowner in the Ashland watershed, the USDA Forest Service. The scale, intensity, and track history of management is different, giving the City more flexibility in planning and implementing forest management projects. The availability of significant inventory data on the City ownership, including 69 permanent monitoring plots on the Winburn parcel, allows the City unique adaptive management opportunities.

The opportunity for coordination with the USDA Forest Service on a landscape level is critically important. The ongoing development of the Ashland Forest Resiliency (AFR) project by the Forest Service, with considerable input from the City (specifically in the form of a Community Alternative), suggests that forest and resource management on a landscape level in the Ashland watershed integrally ties the two owners both ecologically and socioeconomically.

Important issues to consider on the Winburn Parcel include water quality and quantity, protection of late successional characteristics, spotted owl foraging habitat, resident fish populations, cultural (historical) resources, and slope stability. Phase III of continuing active forest restoration and fuel hazard management in City owned forestlands are addressed in this document.

Purpose

As stewards of the city forestlands, the Ashland Forest Lands Commission wrote this proposal to direct the continuing restoration work. Our ongoing research and field observations will help guide the practicing professionals who continue to restore this valuable community resource.

The goal of this third phase of the Forest Lands Restoration Project is to enhance forest resilience and health by modifying existing stand conditions. This will be done by thinning suppressed understory and middle-canopy trees. This may include trees larger than 8" in diameter generally considered to have commercial value.

There are many areas of moderate to high geologic hazard on the Winburn Parcel. There is a distinct conflict between the goal of reducing tree density to ensure stand health and the necessity of maintaining enough tree cover to protect slope stability. To date the city has deferred thinning these areas. Continuing to defer management activity, however, could lead to accelerated tree mortality associated with drought. Trees holding the soil in place could be lost. As part of this project, treatments will be recommended to help resolve this inherent conflict. A series of entries for careful treatment may be necessary on these sites.

In planning this next phase, the AFLC has specified the Desired Future Condition (DFC) of the various forest stand types within the Winburn Parcel. This interdisciplinary process has considered a wide variety of factors that are essential for maintenance of a healthy forest ecosystem. Factors addressed include: adequate water supply, healthy soils, stable slopes, reduced fire hazard, dead and down woody materials, and the broad category of biodiversity protection, which includes managing existing native animal, plant, and fungi species.

Goals

- Employ ecologically responsible stewardship principles and an open and transparent community decision-making process.

- Promote forest health through reducing stand densities.

- Maintain structures, features, and processes critical to the functioning of late seral forests, such as tree densities and biodiversity appropriate to the forest type, large snags, down logs, multi-layer canopy, soil structure, and nutrient cycling.

- Reduce significantly the likelihood of a large scale, high intensity wildfire through activities that will ultimately restore a disturbance regime more closely emulating the historic range of natural disturbances, including reintroduction of natural and/or prescribed fire. This goal will not be accomplished with a single management action and may take years or decades to complete.

- Protect and improve aquatic and riparian transition zone habitat.

- Increase stability and productivity of surface soils by increasing effective ground cover, including coarse woody material, mosses, native grasses, and low shrubs.

- Maintain and protect wildlife by preservation of key habitat characteristics and retention of structural diversity across the landscape.

Guiding Principles

- We acknowledge that forest ecosystems are complex and dynamic and that our understanding of the interlocking ecological functions of a healthy watershed is incomplete. Management activities will be based on thorough site evaluations by experts in forest ecology, geology, silviculture, fire ecology, botany, wildlife, soils, and fisheries. In addition, we will continue to draw from the experience of our own site-work over the past eight years. Monitoring protocols will be continued and broadened to allow for adaptive management.

- *No trees will be removed simply to add value to a timber sale.* First and foremost, this project will be planned to address forest health. Stand density reduction will be ecosystem driven. What is left behind is more important than what is removed. Timber and other forest commodities will be generated only as a by-product of restoration activities.

- Proposed treatments are site-specific based on plant community types. For instance, on stable slopes with southerly aspects, more open stand conditions will be promoted to maintain and encourage pine species. On moister, northerly aspects with steep slopes, a more closed canopy stand condition (mostly Douglas-fir) will be promoted emphasizing a full rooting profile to mitigate potential geologic hazards.

- Hardwoods such as Pacific madrone and particularly California black oak will be prioritized for retention, especially larger and/or dominant trees.

- Tree removal will be determined by the particular Desired Future Condition (DFC) for that stand including desired stand densities, structures, and compositions rather than by any specific diameter or age class delineation. The trees to be removed will mostly be in the age class of 50-100 years old. This is the age class that has developed in these stands as a result of fire suppression efforts since 1910.

- Management activities are designed to protect and promote larger diameters / older age classes of conifers and hardwoods on the city ownership. Exceptions to this principle will be clearly identified, mapped, and explained. Promoting these more mature forests will most effectively accomplish the goals and guiding principles identified for the city forestlands

General Description of Project Area

The Winburn Parcel is a 160-acre City of Ashland owned tract located about one mile southwest of Reeder Reservoir in the middle of the Ashland Creek Watershed. It is located in the center of Section 32 in Township 39 South, Range 1 East at the intersection of Weasel Creek and the west fork of Ashland Creek, which together comprise close to 6,000 acres of watershed above that intersection. Both streams are perennial and have resident populations of cutthroat trout. Numerous seasonal, intermittent and ephemeral drainages and topographic draws drain into these primary streams. The property is completely surrounded by USDA Forest Service lands.

The Winburn Parcel provides an interesting chapter in the City of Ashland's history. The property was developed in the early 1920's by Jesse Winburn, a noted and somewhat eccentric public figure. He developed an early road to the property, completed small structures and improvements and planted several giant sequoias. Remains of the foundations of these structures, as well as remnants of other improvements and changes, can still be found on the Winburn parcel.

Important issues to consider on the Winburn Parcel include water quality and quantity, protection of late successional characteristics, spotted owl foraging habitat, resident fish populations, cultural (historical) resources, and slope stability concerns on a significant portion of the area.

Stand structure is variable, reflecting the impact of stand-replacing fires, logging, fire exclusion, and lower intensity fires. A selective removal of scattered conifers of various species and sizes was conducted in 1990 on the Winburn Parcel through a timber exchange between the City of Ashland and a private timber company.

The dense understory layer is currently stressing many of the larger trees. Thinning of small diameter trees (less than 7 inches dbh) has already occurred directly under many of these big overstory trees in an effort to reduce moisture stress. This work is ongoing.

Much of the Winburn Parcel also has high to very high tree densities in the intermediate size classes. In order to ensure continued survival of the largest overstory trees, some additional density reduction is needed. Some of the Winburn Parcel will not be treated in deference to other resource values or because additional stand density reduction is not needed at this time. Portions of the Winburn Parcel are relatively intact native forests with little need of management.

Access to the Winburn Parcel is poor and can currently only be accomplished on foot. An old USDA Forest Service Road connecting Reeder Reservoir with the 2060 Road (where it crosses Winburn Ridge) parallels the west fork of Ashland Creek through the center of the parcel, but has been closed for many years and is currently impassable to vehicular traffic.

Topographically, the parcel is diverse, with numerous ridges and incised drainages associated with easterly flowing Weasel Creek and the northerly flowing west fork of Ashland Creek. Approximately 20 percent of the parcel is comprised of gentle (0 to 20 percent) slopes associated with these major streams, their floodplains, and associated gentle low-slope positions. The remainder of the parcel varies from moderate to very steep (35 to 80+ percent) topography. Elevation varies from 3340 to 3900 feet above sea level.

Ecological Conditions

Soils and Hydrologic Function

Soils and hydrologic function are key elements of the Ashland watershed ecosystem that protect and/or promote forest health and municipal water supplies. These two elements are integrally related in the effects they produce and can be significantly altered by various forest and resource management actions.

Soils on the Winburn Parcel are similar to those found elsewhere in the Ashland watershed; decomposed granitics derived from intrusive igneous rocks formed during the Jurassic Age, 145 to 164 million years ago. These gravelly sandy loams are moderately deep, coarse textured soils that can be very well drained. The general lack of cohesiveness of these soils allows them to be easily moved and eroded, particularly during major storm events when a high likelihood exists for surface (sheet and gully) erosion, as well as mass soil movements such as debris slides and debris avalanches. The 1999 Forest Service EIS, "Ashland Watershed Protection Project", describes the soils:

> *Soils have been classed as having severe and very severe erosion hazard rating on the steeper slopes because of a combination of factors which include non-cohesive sandy texture of the soil, general lack of coarse fragments, and steeper slope gradients. On gentler slopes however, the erosion ratings are moderate. Topsoils are generally less erosive than subsoils because of the soil organic matter and root systems that bind the sands together. The subsoils, when exposed, are highly erosive. Areas in the Watershed where exposed subsoil can be observed are: on many of the cutbanks of roads transecting the Watershed, bike trails, recent landslide scars, and over-steepened slopes adjacent to perennial and intermittent streams*. (page III-7)

Precipitation on the parcel, which annually averages around 30 to 35 inches, includes some that falls as snow during winter months. The possibility of significant rain-on-snow events, particularly at elevations of 3500-5000 feet (which encompasses the entirety of the Winburn Parcel) can dramatically increase the likelihood of slope failure and significant flooding during major storm events, although no major slope failures appear to have occurred on the Winburn Parcel during the most recent major storm event of January 1, 1997. Summer thunderstorms can also cause significant erosion when they occur at rates that supersede the ability of the soil to absorb the precipitation, resulting in excess overland flow. In general, the presence of Reeder Reservoir prevents any major debris slides initiated on the Winburn Parcel from reaching the City of Ashland.

Both surface erosion and mass wasting events deliver sediment to the West Fork of Ashland Creek and ultimately into Reeder Reservoir, affecting water quality and storage space in the reservoir. Sediment delivery into the aquatic system is controlled by surface erosion, ground cover, root strength and abundance, slope gradient, number and size of landslides, and magnitude and timing of weather events, as well as proximity of landslides to draws or live streams. All of these factors influence soil hydrologic function, of critical importance in a municipal watershed. High severity fire can reduce protective vegetation and duff and litter layers, while increasing runoff rates, surface erosion, likelihood of mass wasting events, and eventual sediment delivery into the aquatic system. Creation of water repellant soils that often develop after high intensity wildfire events further increases runoff rates and surface erosion.

There is also a high potential for surface erosion when soils are disturbed by loss of soil organic cover and soil organic matter as well as compaction. In potential forest management on the Winburn Parcel, loss of soil cover is the most important disturbance consideration. Compaction is not expected given that ground-based equipment will likely not be used in this relatively inaccessible location. Loss of soil organic matter can occur from erosion during land management activities or high-intensity and long duration wildfires.

Maintaining trees and associated canopy cover can help stabilize soil profiles. Vegetation greater than 25 years of age, especially conifers, hardwoods and brush species, has larger, deeper root systems than younger vegetation. Roots are the "twine" that provides soil cohesion, while simultaneously drawing large amounts of water that would otherwise increase soil saturation and encourage slope failure. Loss of roots due to excessive tree mortality from logging, insects, disease or fire exacerbates the potential for both surface erosion and mass soil movement, at least until vegetation returns to the site (usually in 5-10 years or more following complete removals). Ecologically based silvicultural thinnings that retain enough canopy cover to protect forest soils while creating stand structures that reduce the likelihood and severity of fire are a primary management strategy designed to maximize benefits and minimize risks. Road construction, an important management-related practice that can significantly increase the potential for significant slope failures is not planned for the Winburn Parcel in deference to the many important watershed values that produce the municipal water supply for the City of Ashland.

A technique referred to as Landslide Zonation and Risk Evaluation has been completed for the Winburn Parcel (Hicks 2000) in its entirety. This technique identifies and maps landslide features and active soil movement through detailed field reconnaissance. It also assigns activity levels and influence zones to all landslide terrain and subsequent determination of hazard levels. A map of this work completed by Hicks (2000) for the Winburn Parcel is included in the Appendix. In landslide-prone areas identified by this work, vegetation removal will be significantly reduced or avoided altogether.

Forest Management

Ground based tractor logging can cause significant disturbance to soil cover. Tree removal on the Winburn Parcel will likely be conducted using helicopters, the logging system best suited to protection of soil and prevention of loss of soil organic matter.

Maintenance and protection of effective ground cover is critically important to avoid surface erosion. Post-treatment standards will follow those used by the USDA Forest Service (AFR DEIS, pg. III-24) that call for maintenance of minimum effective ground cover greater than 60% after the first year and greater than 70% following the second year on all moderate class slopes (<35% gradient). On severe slopes (>35% gradient) effective ground cover should reach greater than 70% the first year and greater than 85% the second year.

These standards will also help protect long-term site productivity, as 90% or more of key processes affecting site productivity occur within the upper 12-in of soil. This is the major zone of root development, water storage and use, and nutrient retention. Granitic soils tend to be low in organic matter, the key energy and tissue building material controlling soil productivity, which largely occurs in the upper topsoil layer.

Wildfire

Management activities on the Winburn Parcel will be designed to minimize the likelihood of mass wasting landslide events by reducing the probability of large scale, high severity wildfires. When wildfires occur, a high percentage of the vegetation in a stand is killed and large areas of

soil is exposed, which is the single most negative potential impact that can contribute to large mass wasting events.

Likewise, forest management activities described in this document are designed to reduce the likelihood, scale, severity, and duration of fire, which will minimize losses of soil organic matter in the long-term. Slope steepness is also a critical factor affecting the potential for both surface erosion and mass soil wasting, with steeper slopes of much greater concern. Surface erosion delivers sediments to draws where it accumulates over time, increasing the potential for debris slides.

Soil Moisture

The soil moisture regime must remain unchanged except for activities that restore natural water tables. Hydrologic function is closely tied to soils and geology as well as effective ground cover including shrub growth and down wood (coarse and fine). To retain hydrologic function of the spring in Unit 5a and along the existing riparian areas generally, these ecologically functioning riparian areas would not be treated, as required under the Oregon Forest Practices Act, including an additional 150-foot buffer to retain the microclimatic regime. Exceptions could be made reflecting site-specific characteristics and needs for riparian restoration.

Other important soil protection strategies designed to maintain optimal hydrologic functioning include:

1. Leave a high quantity of coarse woody material (CWM). This strategy utilizes woody material of all sizes to stabilize slopes, help provide effective ground cover, and act as a reservoir of biological activity that is critical in maintaining long-term site productivity. The amount of coarse woody material retained on site should be high (8-12 logs per acre) in most places on the Winburn Parcel. Small wood (under 3-in diameter) will generally be reduced or removed to reduce fire hazard either through pile burning and/or prescribed underburning; however, small wood is important on steep slopes to help maintain soil stability. Larger wood is placed in contact with the soil with attention given to side-hill placement (on the contour) to slow downslope surface soil movement. This tactic is especially suited to steep slopes. Although larger CWM generally does not significantly increase flame length or rate-of-spread of wildfire, the longer fire residence time can have an impact on soils and site productivity *in situ*; increase mop-up and monitoring time, and cost; increase re-burn possibilities; and make effective prescribed burning more difficult. Balancing multiple objectives in these scenarios will require a site-by-site, or unit-by-unit, analysis of benefits and risks.

2 .Canopy management. Relatively consistent tree canopy cover has important values, as described above, for protecting soils from either surface erosion and/or slope failure due to mass wasting events. This is especially true on steeper sites typically found on more northerly aspects within the Winburn Parcel. Denser canopies tend to favor an increase in mosses and shade tolerant herbaceous cover, which can be "seeded" on these sites where moisture allows. Overall groundcover can be very low under some very dense stands, thereby increasing surface soil erosion. In other areas, creating more open tree canopies can allow development of the natural ground layer vegetation, especially on dry sites where grasses and low shrub species are important ecosystem elements. On these sites, a relatively quick growth response can be seen in

ground layer vegetation in even light thinnings and can be significant when the tree canopy is reduced to 40%-50% cover. These are also appropriate sites to encourage retention of a diversity of tree species including hardwoods; however, hardwoods tend to decline in abundance at the elevation of the Winburn parcel. Establishment of native perennial grasses (such as blue wildrye (*Elymus glaucus*), California brome (*Bromus carinatus*), fescues (*Festuca* spp.), and other early successional vegetation can actually help reduce surface soil erosion in these situations. Candidate sites for development of more open canopies are typically on more southerly aspects of 50% slope gradient or less. These sites may also become prime candidates for future prescribed fire. At the far end of the spectrum is the development of small canopy gaps (<1 acre) where development of early successional vegetation is prioritized. These sites should be carefully located in areas that are the least prone to surface erosion and/or potential slope failure. Seeding of native grasses and planting of native tree species immediately following gap creation would be appropriate in these situations.

3. Leave greater stand densities and/or untreated tree patches where slope stability is a concern. Areas such as identified landslide hazard zones and intermittent upland draws high in the topography may benefit from retention of higher densities of trees in order to reduce the likelihood of slope failure in the short-term. These benefits should be balanced with associated long-term drawbacks on a site-by-site basis. For example, this strategy may lose its effectiveness over time if excessive bark-beetle related mortality occurs due to excessive stand density and subsequent moisture stress. In this scenario, increased loss of larger overstory trees, which are more effective in holding soils together at deeper depths, is also a potential disadvantage in the long run. There can also be a higher level of fire hazard associated with these stand conditions, with increased impacts on soils and slope stability in a fire event. Lighter thinning in these areas, perhaps in small steps or stages over several years, may allow the remaining trees to develop the additional root structure necessary to stabilize soils. Experimenting with implementation of this strategy in a variety of settings on the Winburn Parcel, followed by careful monitoring, is an important part of the long-term learning process.

5. *Utilize low-intensity prescribed underburning once stands have received an initial treatment to create more favorable fuel profiles.* Future prescribed underburning is a critical part of the long-term of management and protection of soils and hydrologic function on both the Winburn Parcel and in the Ashland watershed. Key to success in this work is to develop situations and opportunities where applied fire can effectively reduce fuels, while simultaneously maintaining sufficient effective ground cover. It is likely that spring burning will be preferred over autumn burning, at least initially, to protect soils, minimize duff and litter consumption, and maintain hydrologic functioning. Burning across ownership boundaries with the USDA Forest Service will be essential in this undertaking - an example occurred in spring 2007 in a joint burn across administrative boundaries in the lower watershed.

Implementing ecologically-based forest management strategies that produce stand structures that can reduce the likelihood, size, intensity and/or duration of fire is the primary method for protecting healthy soils and associated hydrologic functioning on the Winburn parcel. Management should be conducted in a manner that doesn't impact existing soils and hydrologic functioning in the short term. Careful monitoring will be essential in determining the degree of success or failure in any project. Ultimately, it is intended that these initial steps will result in

forest ecosystems that can, at some point in the future, support naturally occurring fire as the primary disturbance event at a scale and intensity that does not negatively impact soils and hydrologic regimes in the Ashland watershed.

Riparian / Fisheries

Production of high qualities and quantities of water from the Ashland watershed for use by the City of Ashland remains a primary goal guiding forest and resource management on both City lands and in the Ashland watershed. The key to successfully achieving this objective is maintenance and/or promotion of healthy, fully functioning aquatic and riparian ecosystems.

In 2001, a Level 2 stream survey of the West Fork of Ashland Creek was completed by the Siskiyou Research Group for the Forest Service. The survey extended approximately 4.13 miles above Reeder Reservoir, including the portion of the creek that traverses through the Winburn parcel. Although the portion of the creek through the Winburn Parcel was not separately surveyed or delineated, it is assumed that the information provided in that report applies to the Winburn Parcel as the aquatic and riparian conditions are similar throughout the survey area. The bulk of the relevant information comes from Reach 1 which covers the area from Reeder Reservoir to Weasel Creek on the Winburn parcel. The rest of the area on the Winburn Parcel above Reach 1 is similar to the lower portion of the Winburn parcel.

Most of the surveyed section of the West Fork Ashland Creek flows through a colluvial canyon valley-type steep narrow canyons containing moderately entrenched channels with low bankfull width-to-depth ratios and moderate to high stream gradients. This valley-type is consistent with a good portion of the creek as it flows through the Winburn parcel, particularly the portion below Weasel Creek. Aquatic habitats on the creek consist of rapids, cascades with pocket pools, and plunge pools. Another key aquatic habitat type on the Winburn Parcel, as a result of confluences with several tributaries, is alluviated canyons characterized by discontinuous floodplains, scattered terraces, and other alluvial deposits. These portions contain gravel and cobble substrates, side channel habitat, and more spawning and rearing habitat, largely due to lower stream gradients. The presence of these alluviated canyons and associated features on the Winburn Parcel is important due to their relative scarcity on the West Fork Ashland Creek.

The aquatic habitats on the West Fork Ashland Creek are generally described as diverse and of good quality. They do tend to suffer from sedimentation and embeddedness, a natural occurrence in this watershed, dominated by highly erosive, decomposed granitic parent materials. The surveyor also surprisingly found a low amount of instream large woody material. However, he cites the likely recruitment potential of future coarse woody material (CWM) due to the presence of significant mid and late seral riparian forests. The survey also found a robust population of cutthroat trout throughout the West Fork Ashland Creek. Anadramous fish species are blocked from utilizing this area by the Granite Street Reservoir and by Reeder Reservoir.

The riparian habitat along the creek is described as high quality, consisting of multi-aged stands of mixed hardwoods and conifers, including a significant component of mature trees. Riparian vegetation provides many important ecosystem services critical to healthy functioning of aquatic systems, including, but not limited to:

- bank stability and mitigation of erosional effects; acting as natural filters trapping waterborne sediments;
- shading and subsequent reduction of water temperatures;
- reducing flood stage flows and subsequent slower year-round release of water;
- acting as substrates for insects and other organisms, as well as providing nutritional inputs;
- providing inputs of large woody debris that provides cover and improves functional habitat for fish and other organisms.

The riparian vegetation along the perennial creeks on the Winburn Parcel is generally intact, well-established, and functional, with a high degree of diversity both in species and sizes.

A single, specific management plan for the aquatic and riparian resources on the City of Ashland ownership in the watershed, including the Winburn parcel, has not yet been developed. To date, no management activity has occurred within a legally mandated Riparian Management Area (RMA) (70-100 feet, as per the Oregon Forest Practices Act) on the City ownership, except in some cases during the 1990 helicopter harvest.

Little active management is needed at this time within this 70-100 foot RMA on the Winburn Parcel. This is appropriate because the riparian and aquatic systems are currently operating at a high level of functionality. Virtually no action items are recommended for the West Fork Ashland Creek in the recently completed "Ashland Watershed- Assessment and Action Plan" (2008). Rather, in Chapter X, Evaluation of Watershed Condition (Summary) of that document, both the East and West Forks of Ashland Creek are described as "Riparian condition excellent" (pg. 4), "High quality drinking water for the City of Ashland" (pg. 5), "Cutthroat and rainbow trout appear to be thriving" (pg. 6), "Excellent fish habitat despite the lack of instream Large Wood"(pg. 7),and "Macroinvertebrates extremely diverse and abundant; many rare taxa" (pg. 7).

Carefully designed and implemented management activities within a broader defined RMA may be appropriate on the Winburn parcel; the USDA Forest Service's RMAs are typically much larger, by default 300 feet adjacent to fish-bearing streams, unless more carefully determined RMA boundaries are determined on the ground. For instance, alluviated canyons and broader valley bottoms that occur at the confluence of major drainages such as on the Winburn parcel, are classic locations of fire refugia - locations that naturally burn with less frequency and intensity in fire events, and are subsequently important in landscape level fire management. It may be appropriate to consider light understory thinning and/or other sensitive fuel management practices to retain this important value in the RMA's on the Winburn Parcel due to their importance in the wildfire-prone Ashland watershed. This management activity would have increasing validity higher in the riparian network on very intermittent upland portions that have vegetational and site characteristics that much more closely match the adjacent more wildfire-prone uplands. A very site specific, gradational approach to the need and/or desirability for active management within the larger hydrologic network on the Winburn Parcel seems appropriate. Vegetation manipulation, riparian restoration, and/or other management activity within this area should be, at most, minimal of low impact and, particularly, conducted in conjunction with other landscape level work designed on adjacent USDA Forest Service lands in the Ashland Forest Resiliency project.

Coarse Woody Material

Coarse woody material (CWM) performs important ecological services, such as stabilizing surface soils, increasing organic content in soils over the long term and providing habitat for the many organisms that depend on wood in various stages of decay. The volume of CWM retained on the Winburn Parcel will depend on site-specific considerations such as plant community, topography, slope gradient, wildfire management considerations, the potential for insect outbreak, as well as other site-specific considerations.

A number of activities and processes can affect the CWM component and have affected the current conditions as well as altered the historic conditions of CWM on city owned forestlands. Actions such as mortality salvage can immediately change forest structure by removing the snags and subsequently changing down log amounts. A more subtle change in the dead wood component of the Ashland watershed has also occurred through fire exclusion, which likely has increased the amount of woody material on the forest floor particularly in the small to medium size classes. Down logs previously consumed during fires now have a longer residence time as they decompose rather than burn. This has allowed a higher volume per acre of down logs to accumulate than would have occurred with a more frequent fire return interval. Increasing mortality of trees of all sizes from insects and disease has likely increased the amounts of snags and ultimately coarse woody material developing in the Ashland watershed. At the same time, the absence of a fire that would have fallen dead trees or killed live trees creating snags has reduced the natural recruitment of down logs and snags. While the exact number of snags and down logs appropriate to a particular plant community with a normal fire return interval is unknown, some patterns have surfaced in recent data analyses in southwestern Oregon; snags and down logs are not distributed in the same fashion across the landscape.

Snag and coarse woody material inventories were conducted on the Winburn Parcel in 2000 to provide baseline data. Coarse woody material inventories for the entire Winburn Parcel were generally high, at least in part due to logging slash left after the 1990 logging. Data from the 2000 inventory indicated an average of two pieces per acre 5 to 9-inch diameter; 12 pieces per acre 10 to 14-inch diameter, and 12 pieces per acre ≥20-inch diameter (See Table 1). Overall, in the upland area outside of the riparian and aquatic habitat, an average of 7.5 snags per acre exists, of which 4.25 per acre are 18-inch dbh or greater..

Table 1. Winburn Inventory Data Collected in 2000

Unit	Trees per Acre (TPA)	Hardwoods per Acre	Basal Area (BA) (ft^2/ acre)	Quadratic Mean Diameter (QMD) (inches)	Crown Ratio (mean)	Relative Density (RD)	Snags per Acre		Course Woody Material Pieces per Acre			Douglas-fir Dwarf-mistletoe (% of DF infected)
							Total	18-in+	5-9-in	10-19-in	20-in+	
1*	697	91	218	7.6	.202	.842	8.1	3.3	1	18	11	26
2	437	109	143	7.8	.210	.548	6.8	4.2	9	15	14	17
3	356	8	188	9.8	.454	.655	4.5	4.5	0	11	24	29
4	220	0	283	15.4	.226	.827	7.1	7.1	0	0	3	46
5*	605	8	229	8.3	.164	.852	13.0	4.6	0	3	8	32
5a	395	19	197	9.6	.226	.583	28.0	6.7				33
5b	745	0	251	7.9	.145	.954	3.1	3.1				31
6	523	2	167	7.7	.342	.642	10.5	6.1	0	5	20	22

* The Winburn inventory was completed in the year 2000. Non-commercial thinning was completed in portions of these units in 2001-2002.

Late Seral Habitat

Stand Structure

Of the three characteristics that traditionally describe forested stands: density, structure, and composition, structure is the most important of the three affecting fire behavior and severity. The diverse set of stand structures within the project area makes prescription development to achieve wildfire management benefits difficult. Existing, desired, and future stand structure must be effectively described in order to assess the effectiveness of proposed treatments. A description of stand structure can be facilitated by delineating each of the various sizes, ages and layers of vegetation in a stand, typically referred to as cohorts. In the project area, combinations of three general cohorts tend to occur as classified below (AWSA 1999):

Cohort #1 - Older, mature cohort

- Generally 25 to 50-inch+ dbh, 150 to 300+ years
- Tend to be spatially dispersed, occurring singly or more commonly in small aggregations, creating a clumpy horizontal stand structure.
- Generally initiated and developed in the pre-settlement era when disturbance patterns were of a more frequent, low to moderate intensity type creating a greater diversity of age classes.
- More common in topographical areas that act as fire refugia such as gentle ridgelines and riparian areas.
- The most common species by Plant Association Group (PAG):
  Ponderosa Pine PAG: Ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*)
  Douglas-fir PAGs: Ponderosa pine, Douglas-fir
  White Fir PAGs: Sugar pine (*Pinus lambertiana*), ponderosa pine, Douglas-fir, Shasta red fir (*Abies magnifica* var. *shastensis*)
  Oregon White Oak PAG: Oregon white oak (*Quercus garryana*), ponderosa pine, Douglas-fir

Cohort #2 - Intermediate cohort

- Generally 10 to 25-inch dbh, 80 to 140 years.
- Tend to be more spatially and structurally uniform, typical of more even-aged stand structures.
- Typically initiated following moderate to high-intensity disturbance, such as the 1901 or 1910 wildfire events.
- Not having been thinned by subsequent fire, this cohort is often currently at excessive stand densities more typical of the stem exclusion stage of stand development, and rapidly declining in growth and vigor.
- Common species:
  Ponderosa Pine PAG: Ponderosa pine, Douglas-fir, California black oak (*Quercus kelloggii*)
  Douglas-fir PAGs: Ponderosa pine, Douglas-fir, white fir (*Abies concolor*)
  White Fir PAGs: Sugar pine, ponderosa pine, Douglas-fir, Shasta red fir, white fir
  Oregon White Oak PAG: Oregon white oak, ponderosa pine, Douglas-fir

Cohort #3 - Young cohort

- Generally 1 to 10-inch dbh, 10 to 50 years old.
- Typical of the stand initiation or understory re-initiation stage of stand development.
- Tend to be spatially and structurally uniform (e.g. plantations) typical of even-aged stands; a younger example of cohort #2.
- Most noticeable in stands with recent disturbance history.
- Common species:
  Ponderosa Pine PAG: Ponderosa pine, Douglas-fir, California black oak
  Douglas-fir PAGs: Ponderosa pine, Douglas-fir, white fir
  White Fir PAGs: Sugar pine, ponderosa pine, Douglas-fir, Shasta red fir, white fir
  Oregon White Oak PAG: Oregon white oak, Ponderosa pine, Douglas-fir

In all stands and treatments described below, the intention is to leave trees that were part of the stand prior to fire exclusion, the first cohort, and to reduce the abundance of younger recruits in the third and second cohorts grown over the last 80 to 100 years. To maintain diversity of ages and inclusion of multiple regeneration events, and to ensure ongoing stand development, it is important that none of the cohorts are completely removed.

Large Trees

In general, the objective is to leave the largest healthiest trees and remove the weakest and smallest trees. This project is designed to promote and maximize retention of larger trees (>17-inch dbh). Generally, smaller trees (Cohorts 2 and 3) will be thinned from below to establish the more desired open forest structure and to the extent possible, the largest trees of all species in the stand would be retained. Therefore, removal will primarily include trees in the 50-100 year age class and 6-17-inch diameter size range. However, to meet density reduction objectives, trees of larger size classes may be considered for removal if stands or individual trees meet the criteria listed below and a sufficient number of snags and the coarse woody material components have already been retained. In these cases, individual trees to be removed that are over 17-inch dbh will be tracked with explanations for public review. Examples of large trees considered for removal include:

1. *Trees selected on the basis of site specific ecologically-based forest management practices.*
2. *Mid-successional to mature stands with excessive density.*
   Such a stand would have all large trees and the steadily increasing stand density is compromising vigor and long-term sustainability of the stand as evidenced by high basal areas, very slow growth rates, weakening crowns, the loss of pine or hardwood species and high levels of in-stand mortality.
3. *Large conifers in suppressed or intermediate crown classes under more dominant and vigorous overstory conifers*
   Removal of these trees can improve vigor of adjacent large overstory conifers particularly overstory pine species and hardwoods. In some cases, clumps of three or more large trees are growing in close proximity and removal of one or several could be considered, especially if those removed are considerable smaller than those retained (e.g. one 24-inch dbh pine is removed while three 36-inch pines are

retained.) In general, clumps of the same species will be considered as single trees provided additional stand density reduction is completed around them.

4. *Dead or Dying Trees*
   Individual trees may be considered for removal (if snag and CWM needs have been met) in order to minimize the spread of rapidly expanding insect or disease populations.

Botany

Vegetation on the property is dominated by a mixed coniferous forest cover. Canopy openings are rare, except those created by the 1990 helicopter logging. Douglas-fir is the primary coniferous species, with lesser amounts of white fir (more northerly aspects) and ponderosa pine (more southerly aspects). Sugar pine and incense cedar (*Calocedrus decurrens*) are uncommon on more southerly aspects and Pacific yew (*Taxus brevifolia*) occurs sporadically on the moister, more northerly aspects. Several giant sequoia (*Sequoiadendron giganteum*) were planted on the property during the Jesse Winburn era and still stand.

Hardwoods are less abundant than in stands lower in the watershed. Pacific madrone (*Arbutus menziesii*) is the most common hardwood, but seldom comprises more than 10 percent of total basal area or trees per acre (tpa). Other hardwoods are much less common including: California black oak on southerly aspects, golden chinquapin (*Castanopsis chrysophylla*) and bigleaf maple (*Acer macrophyllum*) on moist lower topographic positions and more northerly aspects. Common understory species are outlined in Table 2.

Table 2. Common understory species on the Winburn parcel

Common understory species	
oceanspray	*Holodiscus discolor*
hazel	*Corylus cornuta*
serviceberry	*Amelanchier alnifolia*
wild rose	*Rosa nutkana*
princes pine	*Chimaphila umbellatta*
bracken fern	*Pteridium aquilinum*
sword fern	*Polystichum munitum*
tall Oregon-grape	*Berberis aquifolium* var. *aquifolium*
Pacific dogwood	*Cornus nuttallii*
Common mesic area understory species	
creeping Oregon-grape	*Berberis aquifolium* var. *repens*
trailing blackberry	*Rubus ursinus*
thimbleberry	*Rubus parviflorus*
twinflower	*Linnaea borealis*
wood sorrel	*Oxalis oregana*
Douglas maple	*Acer glabrum* var. *douglasii*
false Solomon's seal	*Smilacina racemosa*
Hooker fairybell	*Disporum hookeri*

Riparian vegetation along perennial streams includes alder (*Alnus rhombifolia*), bigleaf maple, dogwood (*Cornus nuttallii*), Pacific yew, and understory species such as various sedges, rushes, and horsetails (*Typha* spp.). Salal (*Gaultheria shallon*) also occurs in riparian areas. This species is common throughout mesic portions of the Pacific Northwest but is uncommon in the eastern Siskiyous.

South aspect forests are part of a plant community that only rarely occurs in the Ashland Creek watershed. In this community, large ponderosa pine, Douglas-fir and occasional sugar pine dominate the overstory. The understory is white fir and Douglas-fir. The shrub and herb layers are sparse. The large conifers are valuable heritage and wildlife resources and should be protected. This plant community has a number of successional pathways. It has been open pine forest at times, fairly dense Douglas-fir and white fir forest at other times. When open, grasses such as California fescue (*Festuca californica*) and perennial herbs such as beargrass (*Xerophyllum tenax*) can flourish. In this document, the plant community is described as the Ponderosa Pine / Douglas-fir / White Fir type.

North aspect forests are white fir associations with Douglas-fir in the overstory and white fir in the understory. Madrone and sugar pine are also occasionally found. In this document, the plant community is described as the Douglas-fir / White Fir type. The shrub layer is diverse and can respond vigorously to increased light from canopy openings. Maintenance of a healthy overstory should be a priority in these stands.

Inventories for rare or sensitive plant species have not been completed for the parcel, although formal surveys have been completed for Forest Service ownership in the watershed. A survey for rare and/or sensitive vascular plants was conducted for the rest of the City ownership within the Ashland Creek Watershed by Wayne Rolle, USDA Forest Service.

Habitat potential exists for several rare plant species. Following is a brief description of sensitive vascular plant species that may occur on the Winburn Parcel.

***Cypripedium fasciculatum* (Orchidaceae) clustered lady's slipper**
Clustered ladies slipper is a candidate for state listing in Oregon and is listed as "Threatened" in Idaho and Washington. This species occurs in riparian and other mesic areas.

***Cypripedium montanum* (Orchidaceae) mountain lady's slipper**
Mountain ladies slipper is a watch list species (see Table 4) in Oregon (Oregon Natural Heritage Program (ONHP List 4) and California. This species occurs in montane forest habitats on dry undisturbed slopes.

***Festuca subuliflora* (Poaceae) crinkle-awn fescue**
This species is uncommon locally but occurs more frequently in the Coast Ranges and to the north. Forest Service botanical surveys have located several populations within the Ashland Creek watershed. Canopy openings may negatively impact crinkle-awn fescue.

***Hieracium greenei* (Asteraceae) Greene's hawkweed**

Greene's hawkweed is an ONHP List 3 species. It occurs in Oregon and California. This species grows on dry slopes in montane forest.

***Horkelia tridentata* (Rosaceae) three-leaved horkelia**
Three-leaved horkelia is an ONHP List 2 species. It occurs in Oregon, California and Nevada. In Oregon this species is only known from the Ashland Creek watershed. This species grows in dry forest openings and is found in openings on the lower City ownership.

***Silene lemmonii* (Caryophyllaceae) Lemmon's catchfly**
Lemmon's catchfly is an ONHP List 3 species. This species occurs in wide variety of forest habitats. Forest Service botanical surveys have located Lemmon's catchfly in disturbed and undisturbed sites within the Ashland Creek watershed.

***Smilax californica* (Liliaceae) California smilax**
California smilax is an ONHP List 4 species. This species occurs on streambanks in coniferous forest.

Table 3. ONHP Rankings- Oregon Natural Heritage Information Center

List 1	Taxa that are threatened with extinction or presumed to be extinct throughout their entire range.
List 2	Taxa that are threatened with extirpation or presumed to be extirpated from the state of Oregon. These are often peripheral or disjunct species which are of concern when considering species diversity within Oregon's borders. They can be very significant when protecting the genetic diversity of a taxon. ORNHIC regards extreme rarity as a significant threat and has included species which are very rare in Oregon on this list.
List 3	Taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.
List 4	Taxa which are of conservation concern but are not currently threatened or endangered. This includes taxa which are very rare but are currently secure, as well as taxa which are declining in numbers or habitat, but are still too common to be proposed as threatened or endangered. While these taxa may not currently need the same active management attention as threatened or endangered taxa, they do require continued monitoring.

No inventories of bryophytes, lichens, mosses, fungi, etc., have been conducted to date. There is potential for a rare liverwort (*Ptilidium californicum*) and large tree-dependent lichen (*Calicium viride*) in this area. Douglas-fir trees larger than 24-inch dbh on northerly aspects provide potential habitat for these two species. There is also potential for rare lichen species in the creek, particularly *Leptogium rivale*. There are no rare species likely to be associated with trees under 20-inch dbh. As in the lower watershed, there is little known about the fungi species that occur here.

Overall, currently the greatest threats to botanical resources within the Winburn Parcel are a decline of understory diversity due to fire exclusion and the risk of catastrophic fire, which could

lead to unpredictable long-term biological changes on the site. While fuels treatments could be expected to have potential impacts on individual plants, improvements in forest structure will provide long-term benefits to botanical resources that far outweigh any short-term effects.

Wildlife

Wildlife goals for this restoration project include maximizing biodiversity as well as maintaining or enhancing wildlife habitat. Along with the primary goals to preserve water quality, maintain forest health, and reduce the threat of catastrophic wildfires, wildlife habitat protection and enhancement will be a priority throughout this project.

Existing conditions

The Winburn Parcel is composed mainly of mature forests and, except for perhaps a few small areas, does not meet the definition of "old growth." This area provides some dispersal and foraging habitat for the Northern Spotted Owl and other raptors. The riparian corridors currently meet dispersal and foraging needs for forest carnivores and resting and denning sites are adequate along Ashland Creek except where logging or other disturbance has reduced the forest structure to early successional stages.

A wide variety of other wildlife species are also likely use the area for nesting, shelter and foraging. These may include the Pacific fisher, a federal Candidate species under the Endangered Species Act, a variety of salamanders and other amphibians, reptiles, and a wide variety of birds and other species dependent on snags and down wood. An estimated 37 bird species rely on snags for some portion of their life needs.

Maintenance of ecosystem function and key habitat characteristics of large snags and down wood, significant effective ground cover, maintenance of riparian areas, and riparian and hydrologic function, should provide for habitat needs for these species. While there are potential detrimental effects on individuals, the approach of this project should minimize effects to species populations and viability.

Northern Spotted Owl

Spotted owls nest within the vicinity of the Winburn Parcel and seasonally limit forestry operations during nesting season (April through August or September). Perhaps more importantly, legally mandated protection of spotted owl habitat values will be an important consideration affecting management directions and possibilities on the Winburn parcel.

Northern Spotted Owls are the only known federally protected threatened or endangered species in the area. Their occurrence in the vicinity could seasonally restrict timing of forest operations as well as potentially altering prescriptions to insure maintenance of habitat critical to their long-term viability. Recent inventory and analysis by the USDA Forest Service and US Fish and Wildlife Service suggest that thinning and stand density reduction may improve foraging habitat values as well as increasing habitat diversity, which may also improve spotted owl habitat values. Any planned work for the Winburn Parcel should continue to be reviewed by these agencies (as well as the legally required review by Oregon Department of Forestry) and activities should continue to be coordinated with planning and ultimate implementation guidelines as developed by the Forest Service under the Ashland Forest Resiliency (AFR) project.

Other Birds

The Ashland watershed, including the Winburn parcel, is home and breeding ground for many species of birds. In fact, the Douglas-fir forests of the Pacific Northwest have the highest densities of birds of all coniferous forests in North America (Altman 1999). However, many of these bird species are declining in population due to development, land management, and possibly as a result of vegetation changes in the absence of fire. The bird conservation organization, Partners in Flight, identified 20 bird species on which to focus conservation efforts in Oregon and Washington coniferous forests (see Table 4). Managing forest lands for these species will also benefit other species in associated habitat. Eleven of these focal species are found in the Ashland watershed and nine of these species require mature forest such as that comprising the Winburn Parcel (Table 2) (Altman 1999, Heinzelmann and Alexander 2004, Stephens and Alexander 2005). Habitat characteristics associated with these species include large snags, large trees, complex vertical and horizontal forest structure, and vegetation diversity (Altman 1999).

Of wildlife species inhabiting forest lands such as the Ashland watershed, birds are commonly used as indicator species due to their diversity and abundance, ease of census, close associations to habitat and mobility. Currently, the Klamath Bird Observatory is conducting research on USDA Forest Service lands in the Ashland watershed to determine the impacts of fuels reduction treatments on birds (Genzoli et al. 2006). Data from such studies can give us information on the effectiveness of our restoration efforts and be an important tool in adaptive management of forest lands in the Ashland Watershed.

Table 4. Presence of Partners in Flight focal species in the Ashland Watershed

Partners In Flight Focal Species	Focal species in the Ashland Watershed	Focal species requiring mature forest
Vaux's Swift		**X**
Brown Creeper	**X**	**X**
Red Crossbill	**X**	**X**
Pileated Woodpecker	**X**	**X**
Varied Thrush	**X**	**X**
Hermit Warbler	**X**	**X**
Pacific-slope Flycatcher	**X**	**X**
Hammond's Flycatcher	**X**	**X**
Wilson's Warbler		**X**
Winter Wren	**X**	**X**
Black-throated Gray Warbler		
Hutton's Vireo	**X**	
Olive-sided Flycatcher	**X**	
Western Bluebird		
Orange-crowned Warbler		

Rufous Hummingbird	
Band-tailed Pigeon	**X**
American Pipit	
Black Swift	
Lincoln's Sparrow	

Goals for Wildlife Enhancement

Density reduction treatments will follow these guidelines to maintain or increase wildlife habitat:

- Efforts will be made to increase the structural diversity of forest stands across the landscape.
- Treatment will aim to retain at least 15 to 20% of untreated, dense stands in the project area. In many cases, adequate areas of untreated vegetation will be retained for wildlife as a function of slope stability concerns, riparian and other reserve areas.
- Hardwoods, especially California black oak, will be retained and encouraged where appropriate.
- Existing canopy gaps will be utilized to maintain structural diversity across the landscape.
- Where possible, a multi-layered canopy will be retained or encouraged. Fuel hazard and density reduction goals will be weighed with other goals.
- During project layout and tree marking, trees that have indications of nest sites or cavities greater than 6-inch diameter will be retained and buffered to reduce impacts to wildlife.
- Additional logs will be added to the forest floor to provide needed micro-habitats.
- Snags will be retained unless they pose a hazard and snag recruitment (current and future) will be encouraged.
- Should removal of non-commercial trees be inadequate to reduce stand densities to desired levels, snag creation, as opposed to removal of large trees, will be considered to meet future snag and coarse woody material goals.
- Cutting trees within riparian transition zones (100-300 feet of streams and draws) will be minimized providing fuel hazard reduction goals can be met. Within riparian zones thinning will entail either girdling or retention of downed trees on site as coarse woody material unless there is an associated hazard.
- Active fuel management treatments will be restricted between March 1st and July 30th to minimize impacts to breeding populations of forest dwelling species. No cutting or chainsaw use will be allowed after March 1 and no prescribed burns will be allowed after April 1.
- While recognizing that there will be an effect on terrestrial mollusks, salamanders and other organisms, activities will minimize the impact on the landscape (i.e., there will be no tractor logging, and any timber removal will be done by helicopter).

Forest Disturbances

Significant changes in disturbance patterns within the last 150 years have created vegetation conditions that are much different than occurred prior to European settlement of southern Oregon. One of the basic tenets of ecologically based forest management is to use natural

disturbances and stand development processes as foundations for developing appropriate silvicultural practices. Natural forest disturbances include wind, landslides and other slope failures, ungulate herbivory, insects and disease, floods, changes in climate, and fire. Silvicultural actions and stand management practices suggested for the Winburn Parcel are designed to be "planned disturbances" that emulate as much as possible historical disturbance patterns and regimes.

Fire

The most significant change in disturbance regimes in the Ashland watershed, as well as most of southern Oregon, has been in the frequency, severity, size, and duration of fire. Research has shown that in low to mid elevations sites like those in the Ashland watershed, fire occurred at a frequency of 5 to 25 years prior to European settlement in the 1850s; primarily small scale, low-intensity fire was the norm . Since 1910, frequencies of fire have been reduced dramatically, especially with the advent of fire suppression and subsequent fire exclusion from the Ashland watershed. On the Winburn Parcel, we suspect that the last major fire events may have occurred in 1901 and/or 1910. The historic fire regime of frequent low-intensity fire has been replaced by a more infrequent, higher severity fire regime. The area is currently at risk of a high severity wildfire, as is most of the Ashland watershed. Although a small amount of high intensity, stand replacing fire may be beneficial to the ecosystem over time, social factors are now a major concern and it is our priority to retain forest canopy and soil stability consistent with a healthy municipal watershed. Therefore, significant efforts will be made to reduce the likelihood of a stand-replacing fire.

Vegetation changes have resulted in an increased potential for uncharacteristic, high severity, large-scale fire, certainly undesirable given the City's objectives. Changes in vegetation conditions and patterns as a result of fire exclusion include increased stand densities and stocking levels; increased fuel levels and wildfire prone vegetation types and fuel profiles; shifts in stand structure and species composition; increased likelihood of mortality from insects and disease; and decreased ecosystem diversity.

In historical fire regimes, fire varied in intensity from site-to-site and tended to interact cumulatively with other disturbance agents (especially insects and disease) in many situations. Higher vegetation density and relatively continuous structure, both horizontally and vertically, have created conditions for a fire to rapidly escalate in magnitude. High stand densities also increase the likelihood of insect-related mortality, as does weakened tree condition from disease such as dwarf mistletoe. Increased tree mortality tends to further increase the potential likelihood and severity of wildfire. It is our intent to use the planned disturbance of ecologically based silvicultural thinnings to emulate historical disturbance regimes to create more desirable vegetative conditions.

The main objectives with respect to fire in the Winburn Parcel Restoration Project are to:

- Reduce fuel levels
- Restore vegetation to a more discontinuous vegetation/fuel complex
- Reintroduce low intensity fire

In most areas pretreatment will be required prior to any underburning. Pretreatment includes, but is not limited to: cutting, hand piling, and hand-pile burning of understory vegetation. Pretreatment is required in most situations because the existing vegetation has developed outside of the natural fire regime. Pretreatment allows for the opportunity to safely introduce low intensity prescribed fire and reduce the risk of high intensity fires.

Prescribed underburning, however, is complicated by a host of factors that may make its use problematic on the Winburn Parcel. Considerations include balancing fuel hazard reduction goals with duff retention and soils protection goals; smoke management; liability issues; availability of trained personnel; coordination with the USDA Forest Service; seasonal restrictions (e.g., spotted owls); narrow windows of opportunity to accomplish the work; poor access and associated difficulty in mop up; as well as other issues.

Road access is limited on city lands. Access to water sources is also limited. These two important factors limit the feasibility of successful underburning on many portions of city-owned land. If underburning without pretreatment were to be attempted, all fire control lines would have to be dug by hand due to erosive soils. Water needed to hold these lines would have to be pumped from reliable water sources such as Reeder Reservoir or one of the creeks. This would require portable pumps and tanks to be carried in along with the hoses and fittings to plumb all the hand dug firelines.

A further difficulty presented by underburning comes from the fact that there may be no difference in canopy cover within the unit to be burned and the adjacent areas. Therefore, the fuel moistures within the underburned unit would be the same as those outside the unit, making containment of the fire within the unit difficult.

Given the site constraints, handpiling the slash and burning the piles has the best chance of successfully reducing undesirable fuel loading. Slash created by this project will be immediately piled for burning as part of the project and burned within two years. The follow up treatments in subsequent years, to the extent possible, will include underburning or broadcast burning to emulate ecosystem processes.

Insects

Insects that damage or kill conifers (most notably bark beetles) and other vegetation are important parts of healthy, functioning forest ecosystems, serving many important ecological roles. They are an essential form of disturbance that can effectively reduce stand densities, improve overall stand vigor, provide important wildlife habitat values, supply coarse woody material for the forest floor, facilitate nutrient cycling, and perform numerous other important ecological functions.

In most healthy forest ecosystems, insect-related mortality is usually light and scattered, with largely the weakest trees being attacked. However, in forests of increasing levels of stress and/or declining in forest health, damage from insects can increase dramatically and become an uncharacteristically high severity or perhaps even large-scale disturbance. Bark beetles attack trees under severe cumulative stress as they can detect "stressed" trees caused by a combination of factors that weakens trees, including drought, disease, soil compaction or disturbance, logging damage, and a host of other environmental stressors. The most common form of stress in of

southern Oregon forests, however, is uncharacteristically high stand density, primarily the result of a change in fire regimes through fire suppression and the subsequent lack of more frequent, light disturbances such as low-intensity fire. Increased stand density over time reduces the availability of site resources for individual trees (e.g., soil moisture, nutrients, and available light). The resulting reduced tree vigor makes conifers more susceptible to successful attack by various insects. Once a bark beetle gains entry to a stressed and/or weakened tree, it can chemically communicate this fact to others of its species, thereby causing a "mass attack," which kills trees outright. As populations of insects and/or stand densities increase, stand level mortality of conifers can result in a disturbance regime of increased scale and severity.

Each coniferous tree species on the Winburn Parcel is associated with a set of species-specific bark beetles. Ponderosa pine is susceptible to attack from the western pine beetle (*Dendroctonus brevicomis*), pine engraver beetle (*Ips pini*) and the red turpentine beetle (*Dendroctonus valens*) among others. A separate cadre of beetles, including the Douglas-fir twig weevil (*Cylindrocopturis furnissi*), flatheaded fir borer (*Melaniphila drummondi*) and the Douglas-fir beetle (*Dendroctonus pseudotsugae*) attack Douglas-fir. White fir is particularly susceptible to infestation from the fir engraver beetle (*Scolytus ventralis*). Sugar pine is most often attacked by the mountain pine beetle (*Dendroctonus ponderosae*). Each of these insects has its own particular biology and style of interaction with its particular host species. Knowledge of the insect biology and associated ecological interactions is key to formulating and implementing an appropriate “planned disturbance” (i.e., ecologically based silvicultural or stand management activity).

Rapid expansion of flatheaded fir borer (*Melanophila drummondi*) populations in the Ashland interface area resulted in significant mortality of Douglas-fir during the major droughts of the early 1990s (e.g., almost all of the Douglas-fir in the Lithia park uplands were killed in that event) and again during the 2001-2002 drought event. If conditions allow bark beetle populations to build up to high numbers, even healthy trees can be overcome by mass attacks; as many as four generations of some bark beetle species can occur in one summer season, allowing for rapid population expansion. Larger older conifers of low to moderate vigor, often the most desirable trees for retention in the Ashland watershed, are particularly susceptible to bark beetle related mortality during these outbreaks.

Ecologically based silvicultural strategies to reduce the likelihood of larger scale and/or higher severity disturbance from insects will focus on reducing stand densities in most of the stands on the Winburn Parcel well in advance of drought, allowing time for improved tree vigor to repel insect infestation. This has already been done with non-commercial size classes in portions of Units 1 and 5, beginning in 2000. Special emphasis has been placed to date on density reductions around highly preferred larger older conifers greater than 25-inch dbh (+/-) and 150 years of age (+/-). Resulting slash has been piled and burned to further reduce the likelihood of impact to these legacy trees during a wildfire event.

Additional silvicultural practices to limit the frequency, scale, and/or severity of insect-related disturbances include rapid treatment of available insect breeding habitat (i.e., green slash produced during thinning activities) particularly important for pines; seasonally appropriate thinning (usually autumn) when most beetles are dormant and ensuing slash has time to cure before beetle re-emergence the next spring: and attempting to maximize species and structural

diversity through stand management practices, including the use of a gap-based approach for development of a more heterogenous stand structure.

The natural disturbance process of insect-related mortality, currently at an increased potential of severity and scale as a result of management decisions and practices over the last 150 years, is likely to further increase in scale, severity and frequency in the event of predicted global warming scenarios.

Forest Diseases

Damage and/or mortality to conifers from forest diseases is usually insidious, often scattered in occurrence, and difficult to monitor and manage to achieve desired objectives. More commonly, however, forest diseases tend to weaken trees or otherwise make them susceptible to demise from other disturbance agents, such as insects, fire or excessive stand density. Implementing forest management strategies that reduce damage from forest diseases, or at least do not aggravate them, is an important part of ecologically-based forest management in the Ashland watershed.

At the same time it is important to note that, like insects and other forms of disturbance, forest diseases are natural and important parts of healthy functioning forest ecosystems. Once again, balance is a key concept and the degree to which a specific disease has moved outside its normal range of disturbance will dictate the appropriateness and degree of a management response designed to achieve City objectives.

The two most important forest diseases to be addressed on the Winburn Parcel at this time are dwarf mistletoe disease and laminated root disease in Douglas-fir.

Dwarf mistletoe

Dwarf mistletoe is a parasitic plant that potentially infects all conifers in the Ashland watershed, however, each conifer has its own associated species of dwarf mistletoe (i.e., host-specific). Although the disease is most elevated and of most concern in the Ashland watershed and the Winburn Parcel, Douglas-fir inventory results from the Winburn Parcel have indicated that 22% of the Douglas-fir are currently infected with dwarf mistletoe.

When seeds of dwarf mistletoe mature they are forcibly projected out into the forest canopy potentially infecting adjacent trees of the same species up to 50 feet from the source tree. The disease may also be spread by birds to some degree. The disease will ultimately kill the infected tree, although more typically the disease makes the tree more susceptible to demise from other agents, most notably bark beetles (reduced tree vigor) and fire (heavily infected trees with abundant vertically arranged brooms – thick foliage masses produced by the tree in response to the disease – are more susceptible to conflagration in prescribed and/or wildland fire). Heavily infected trees also can be wildfire hazards by transporting low to moderate intensity fire into upper canopy layers thereby increasing crown fire development, spotting, and wildfire rates-of-spread. The lack of frequent, low to moderate intensity fire in the last century is thought to have been significant in increasing the abundance and severity of this disturbance agent. In heavily infected stands dwarf mistletoe disease can initiate unfavorable stand conditions and development trajectories (loss of large Douglas-fir and associated structural and habitat values,

infection of younger Douglas-fir and undesirable long-term changes in species composition, etc) given the long-term goals of the City.

However, large dwarf mistletoe produced brooms of Douglas-fir, are important nesting locations for spotted owls in the Ashland watershed, particularly those in larger trees in the lower slope positions preferred by the owls. At least three nest site locations have been documented within one-half mile of the Winburn Parcel. Retention of dwarf mistletoe produced brooms as nesting sites and habitat for the spotted owl is an important objective in the management of the Winburn parcel.

Balancing multiple objectives in managing dwarf mistletoe is challenging. On the Winburn parcel, this will be assessed on a site-by-site basis. Retention of dwarf mistletoe-infected Douglas-fir will be prioritized if they are larger trees, have abundant large brooms and are in more favorable lower slope positions utilized by owls for nesting. Removal of trees infected with dwarf mistletoe may be prioritized when trees are smaller/younger (e.g., less than 16-inch dbh and 100 years); are likely not to live much longer (i.e., will not live long enough to produce a viable nesting location); and/or are in locations not prioritized for nesting (i.e., upper slope positions). Additionally, they will be prioritized for removal in order to achieve wildfire management objectives in locations where removal could significantly benefit an associated legacy conifer (e.g., 25-60-inch dbh and 150+ years of age); and/or in small patches where removal and small gap creation could enhance both prey base for the owls, and establishment and survival of preferred shade-intolerant species such as ponderosa pine. Where mixed tree species occur, isolation can also be used to minimize spread where an infected Douglas-fir is surrounded by non-host species (pine, white fir, hardwoods, etc).

All management activities implemented on the Winburn Parcel will be reviewed by appropriate regulatory agencies, most notably the Oregon Department of Forestry (Oregon Forest Practices Act), to insure long-term protection of the critically important spotted owl populations in the Ashland watershed. In addition, the City has been integrally involved in ongoing discussions with the USDA Forest Service and the US Fish and Wildlife Service regarding the long term viability of spotted owl populations in the Ashland Watershed; coordinated management across both ownerships is imperative.

Laminated Root Disease

Laminated root disease, is caused by the native fugus *Phellinus weirri*. It is a disease that affects both Douglas-fir and white fir. Pines and incense cedar, however, are resistant to the disease and hardwood trees are completely immune. Laminated root disease survives in the soil up to fifty years after the death of an infected tree and therefore is a disease "of the site." It requires root-to-root contact to spread and cannot grow freely through the soil. Disease centers expand radially an average of one to two feet per year, although many healthy-appearing trees on the edge of expanding centers can be infected without showing symptoms. Wind-throw of infected trees is common and is easily observed by root balls created when roots have rotted off just below the root crown (Thies & Sturrock, 1995).

The preferred treatment for minimizing the effects and spread of laminated root disease would be removing all Douglas-fir and white fir and planting/encouraging pines or incense cedar or

favoring hardwood species. Infected areas must be flagged and monitored to determine if the area has been treated adequately and prevent host trees from reestablishing themselves on the sites.

Cultural Considerations

The Winburn Parcel provides an interesting chapter in the City of Ashland's history. The Winburn property was originally homesteaded by Nimrod and Anna Long in May of 1899. The one room cabin was built near the confluence of Weasel Creek and the West Fork of Ashland Creek and was sold to Jesse Winburn, a noted and somewhat eccentric public figure, in 1920. Jesse Winburn helped develop an early road to the property and completed small structures and improvements as well as planting several exotic tree species including several non-native giant Sequoias. Remains of the foundations of these structures, as well as remnants of other improvements and changes, can still be found on the Winburn Parcel. This area comprises the only relatively level area in the entire Winburn Parcel. A natural feature of this site is an open meadow, currently only about one quarter acre in size. Both the Sequoias and the meadow could be considered a cultural resource.

An Inventory, Historic Documentation, and Assessment of Cultural Resources at Lithia Springs and Winburn Camp were completed for the City by Nan Hannon and Clayton Lebow in December 1987. The report lists two significant sites: the Winburn Cabin site and the historic dump site. The report notes that neither site would be eligible for the National Register, but recommended treating the cabin as if it was (i.e., to limit access and allow no destructive activities on the site). The dump site does not need to be considered in future management plans according to the report.

Recreational use of the Winburn Parcel (hiking, biking, equestrian, and camping) should be restricted due to limited access and close proximity to Reeder Reservoir.

Monitoring

Monitoring, in this context, is defined as obtaining accurate information and maintaining a long term record of it. The monitoring would entail a purposeful and systematic observation and documentation of characteristics of the landscape and responses of the landscape to management, or lack thereof.

Monitoring is an ongoing part of the restoration on city forestlands. It is expected that over time there will be changes in understory vegetation and tree growth. The effects of the density reduction, prescribed fire, or other silvicultural treatments need to be monitored to evaluate their effectiveness. Currently the City's consulting forester is responsible for establishing monitoring sites and methodology for the monitoring process. Ideally, over time, an agreement with Southern Oregon University could incorporate monitoring work into student projects and research curriculum at nominal cost to the city.

The monitoring plan is designed specifically to:

- Track ecosystem elements that are likely to change as a result of the stand density reduction; these include tree vigor, ground layer vegetation, species composition, and soil cover;
- Compare effects of treatments at different locations;
- Ensure that the desired effects are produced; and
- Provide feedback on the effectiveness of our actions so we can respond in the future to make better management decisions (adaptive management)**.**

The Four Phases of Monitoring:

1. *Inventory or Baseline Monitoring*: to provide an initial assessment of species distribution and environmental conditions.
2. *Implementation Monitoring*: to determine if the activity is accomplished as planned.
3. *Effectiveness Monitoring*: to determine if an activity achieved the stated goals or objectives.
4. *Validation Monitoring*: to determine if the assumptions and models used in developing a management plan are correct.

Implementation of the monitoring phases includes:

1) Inventory Monitoring

The City of Ashland has conducted an inventory of many ecosystem elements through the establishment of 69 permanent forest monitoring plots on the Winburn Parcel. Baseline data has been collected on tree vigor and density, canopy closure, conifer seedling abundance, snag development, coarse woody material, fuels, soils, and vegetative ground cover. Photos were taken at each plot center, with plot locations mapped using a Global Positioning System (GPS). A thorough geologic hazards inventory has been completed. In the vicinity of the Winburn Parcel, the Forest Service has monitored spotted owl activity, conducted a rare plant inventory, and surveyed for a variety of other botanical and wildlife species as part of the Ashland Forest Resiliency Project. A preliminary overview of the Winburn Parcel, including initial unit descriptions was prepared in 1999 and updated in 2002 (Main 1999, 2002). In addition a detailed timber cruise of the parcel was conducted in 2000 (Main, 2000). A silvicultural overview and analysis of the Winburn Parcel, including unit descriptions and prescriptions, was completed in 2005 and formed the basis for this plan. Subsequent plot measurements and ongoing discussions of the Ashland Forest Lands Commission have produced the final set of unit descriptions and silvicultural prescriptions presented in this plan.

2) Implementation Monitoring

Implementation monitoring basically asks, “Did we do what we said we would do?” For example, following the 2004 timber sale on the lower City of Ashland parcel, permanent plots were re-visited post-harvest to determine if implementation occurred as it had been designed (e.g., Were the trees marked for removal the actual trees removed in the operation?).

Existing permanent plots and associated photo points on the Winburn Parcel maintain a permanent record of conditions and allow implementation monitoring to occur whenever

desired following a treatment that produces a change to existing conditions. For instance, trees over 17-inch dbh that are proposed for removal will be tracked and accounted for through implementation monitoring.

There will be stages of review for interested parties to assess the progress of the project relative to the stated goals. Periodic public tours will be offered during the layout and marking stage to review tree marking. Additional tours will be conducted after the restoration work.

3) Effectiveness Monitoring

Effectiveness monitoring is used to help determine if project goals were met by a given management activity (i.e., Did it work?). For instance, effectiveness monitoring has been used on the Winburn property to answer the question, "Did the restoration work reduce the number of small trees that compete with highly desirable larger, older trees in Unit 1?"

Similarly, soil cover has been inventoried using a standard transect method at each of the long term monitoring plots. Some of these plots are in stands that will be included in this phase of density management while others are not. Repeat monitoring will be done periodically to determine our effectiveness at maintaining soil cover.

Ground layer vegetation has been inventoried in 1/5th acre plots at each forest inventory plot with major perennial species cover estimated in percent total cover. This will be repeated at approximately five year intervals to determine changes.

Regular visitation of permanent plots allows for a quantified approach to effectiveness monitoring for a number of variables following forest management activities. Regular, ongoing visits by the City staff, the Ashland Forest Lands Commission, and the consulting forester that advises the City has also provided a more qualitative effectiveness monitoring over time.

4) Validation Monitoring

The goal of validation monitoring is to verify the assumptions that guide proposed management activities and forest restoration efforts. For instance, improved tree vigor is a very important gauge of density management effectiveness efforts. This is most easily represented as diameter growth rate in rings-per-inch acquired through increment boring. Forest inventory plots can help determine if tree vigor is actually improving through increasing diameter growth over time.

Validation monitoring is in its beginning stages. Effective validation monitoring usually takes longer periods of time to provide concrete assessments about underlying assumptions. However, what is learned from all of our monitoring efforts provides a "feedback loop" that is key to guiding future adaptive management strategies.

Operational Consideration / Economics

As previously stated in *Goals* and *Guiding Principles*, the philosophical foundation of this restoration proposal is promotion of forest health on City-owned forestlands. This management plan is designed to encourage restoration of more functional forest ecosystems through application of ecologically-based forest management activities. Existing ecological conditions on the Winburn Parcel and potential for improving forest health is the primary focus of this document. As a result, there has been a conscious deferment of any detailed discussion of financial factors that typically influence resource management proposals. Our values have placed the highest priority on retention and promotion of ecosystem services such as drinking water supply, flood control protection, soil, and slope stability, erosion control, water infiltration and filtration, wildlife habitat, maintenance of soil fertility, as well as other factors.

The City realizes that as the planning process evolves, the financial considerations will become more apparent, and a subsequent cost/benefit analysis developed. The City cannot know the outcome of that analysis at this time and it is anticipated that the finances will fall in place with the other values that have been prioritized.

To date, management activities on the Winburn Parcel have been solely non-commercial in nature. Tree removal has been restricted to size classes that do not retain enough value in the marketplace to warrant removal. Ecologically appropriate understory thinning to improve stand conditions from a variety of perspectives has resulted in slash that has been largely piled and burned. These forest management activities have focused on those areas that would provide the most immediate and important benefits, such as thinning around large legacy trees to increase their long-term prospects for survival and understory thinning in stands that are severely overcrowded.

It is possible that additional removal of trees in various locations on the Winburn Parcel may result in removal of trees that could be of a size that would be marketable as logs or other forest products. Tree removal, if undertaken, is likely to be accomplished using helicopters only, in deference to the sensitive soils and steep slopes on the Winburn parcel, as well as very limited access. Vehicular access to the Winburn Parcel is currently non-existent, although an old Forest Service road, washed out and grown over, can be hiked from the upper end of Reeder Reservoir in 30 to 45 minutes. Two major road crossings on the Winburn Parcel have also washed out with large non-functional culverts still in place. Lack of access will obviously affect management options and decisions in the future as well as safety concerns for workers. To date, non-commercial stand density reduction, subsequent slash burning, and management planning work, such as inventories, have occurred via foot access.

Main (p. 31-32, A Silvicultural Prescription for High Priority Forest Management Areas, 1996) summarized the economics of helicopter yarding on the lower portion of the City of Ashland ownership.

> *"Unfortunately, achieving silvicultural objectives can be very expensive when helicopters are the intended harvest system. In this management area, the small size of the logs suggested for removal, the scattered nature of these logs, the low volumes per acre, and the*

low total volume all combine to suggest quite high helicopter logging costs, perhaps to the point of superseding log value."

Projected costs of tree removal using helicopters include

- Cost of planning, including sale layout and marking of trees
- Cost of cutting and removal of trees
- Cost of administration and oversight of project and contractor
- Cost of subsequent slash burning and other post-treatment mitigation measures

Potential sources of funding for the project include:

- Normal Operating Budget
- National Fire Plan Funding
- Regional Advisory Committee Grant
- Project revenue

Opportunities for action may be appropriate if and when, 1) market conditions for sale of logs improve; 2) economies of scale suggest coordination of commercial removal with adjacent owners (e.g., USDA Forest Service) and / or: 3) extensive or projected mortality from insects, disease, or wildfire in excess of desired snag and downed woody debris targets suggest the critical need for removal of merchantable trees.

If removal of merchantable timber is prioritized as part of management strategies for the Winburn Parcel, it should be coordinated if possible with timber sale or similar activities on adjacent USDA Forest Service lands as part of the Ashland Forest Resiliency Project. Combining management activities can result in a significant improvement in financial outcomes of any given project. Financial outcomes are also strongly influenced by log markets at the time of removal and the actual costs of removal of trees. These financial considerations will only be addressed once the specific ecological and silvicultural goals have been carefully considered and clearly delineated in this planning process. As indicated in the Guiding Principles for this project, "No trees will be removed simply to add value to a timber sale."

PART II- DESCRIPTIONS, LONG TERM DESIRED CONDITIONS AND TREATMENTS

Introduction

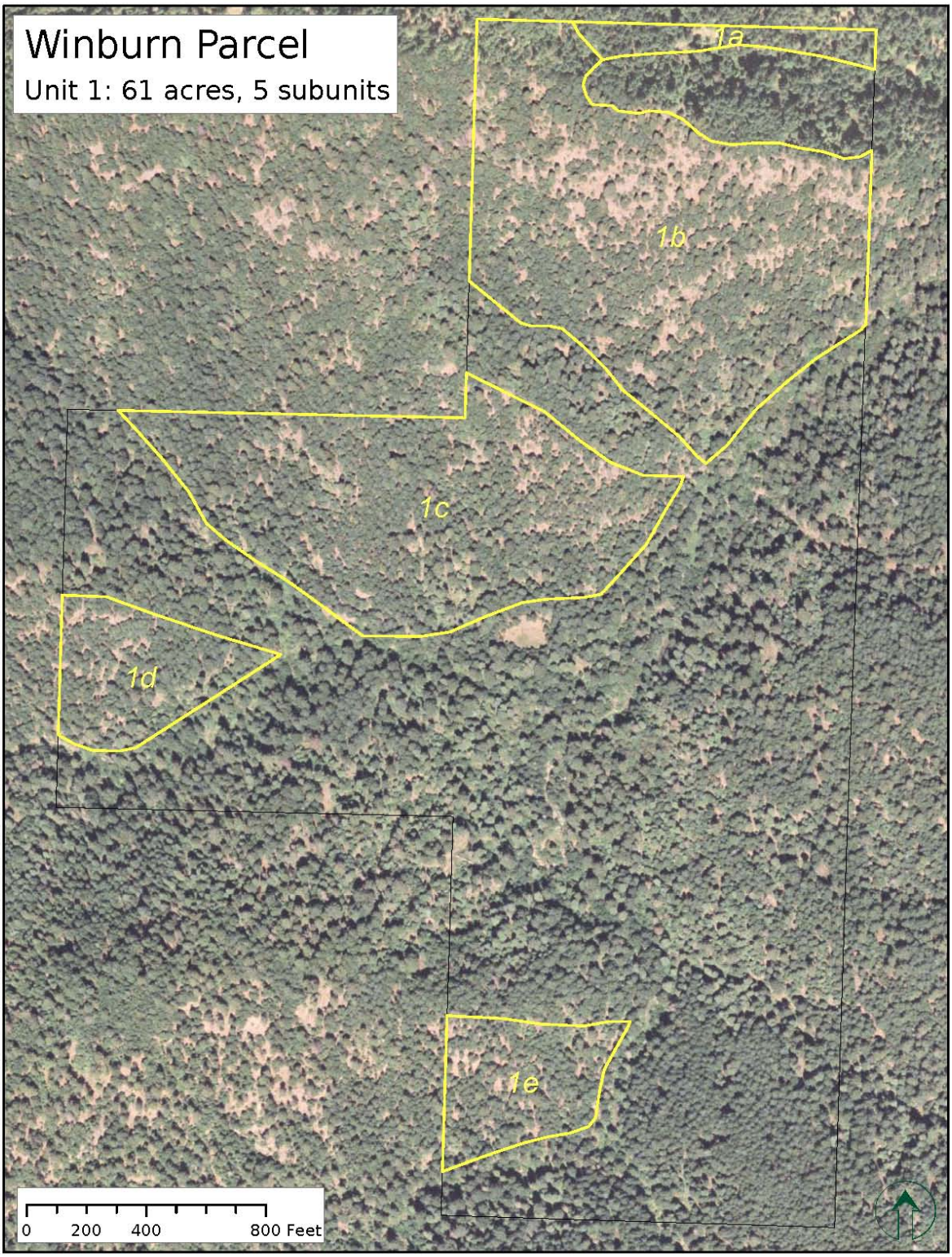
The Winburn Parcel is at mid-elevation with a high degree of variability in forest stand structure, density, and species composition. The moderate elevation and generally deeper soils has allowed these forests to develop differently than City of Ashland-owned lands in the lower watershed. Large trees are common, as are the other important elements that make older forests unique, including large snags, large logs, and canopy diversity. Current conditions are variable, but many areas have a distinct two or three layered stand structure with large trees above the intermediate and understory trees (See Table 5). In many areas a high stand density of small and intermediate trees creates stress in the larger trees. The goal in the Winburn Parcel is to protect and encourage mature and old growth stand characteristics as well as to enhance habitat for old growth dependent species. This will entail small tree (<7-inch dbh) thinning and in much of the area additional thinning of larger trees of intermediate and suppressed crown classes.

The Winburn Parcel has been divided into 7 units depending primarily on vegetation and stand conditions and determined by such variables as soils, slope, aspect, disturbance history, including recent management history, and others. In addition, several of the units are further delineated into subunits that all have the same general characteristics, but are topographically separated. The brief descriptions of these unit types should help provide further understanding about existing site conditions and vegetation, as well as resource management potentials, issues, and opportunities on the parcel.

Table 5. Winburn Inventory Data Collected in 2007/2008

Unit	Trees per acre (tpa)	Hard-woods per acre	Basal Area (BA) (ft^2/ acre)	Quadratic mean Diameter (QMD) (inches)	Crown Ratio (mean)	Relative Density (RD)	Snags/ Acre		Douglas-fir dwarf-Mistletoe (%of DF infected)	Crown Closure (densio meter) (%)	Stocking survey (tpa; <4.5-ft ht.)
							Total	18-in+ dbh			
1	369	11	208	9.8	0.254	0.724	16.4	3.5	27.2	83.5	191
2	407	27	144	8.0	0.266	0.542	41.7	5.3	21.8	78.3	317
3	336	33	198	10.4	0.436	0.674	3.7	3.7	23.6	72.1	471
4	198	0	288	16.3	0.236	0.820	22.8	6.2	20.4	82.4	380
5	284	7	224	12.0	0.240	0.722	16.8	7.0	12.8	83.4	145
5a	319	18	198	10.7	0.257	0.559	36.7	11.7	90.4	78.3	350
5b	261	0	242	13.0	0.227	0.755	3.6	3.6	8.2	86.7	8
6	519	2	170	7.7	0.320	0.649	4.2	4.2	9.4	84.3	325

Unit 1


Winburn Parcel
Unit 1: 61 acres, 5 subunits
1a
1b
1c
1d
1e
0
200
400
800 Feet

Unit 1 Description - 61 acres, 5 subunits
Unit 1 is located on 35 to 65 percent southeasterly to southwesterly aspects on the west side of Ashland Creek. Results from the 2008 inventory (see Table 5) indicate densely stocked, multi-species, uneven-aged stands with three primary cohorts:

Cohort 1: An average of 9 tpa of scattered 200 to 300+ year-old, 24-inch dbh and larger ponderosa pine, Douglas-fir, and uncommon sugar pine and incense cedar, including 5 tpa currently greater than 30-inch dbh. Estimates suggest that approximately one-third to one-half of this original cohort (particularly Douglas-fir) was removed in the 1990 timber sale;

Cohort 2: 80 to 100+ year-old primarily 6 to 18-inch+ dbh Douglas-fir and to a lesser extent white fir and Pacific madrone primarily initiated after a major disturbance around 1900 (most likely the 1901 wildfire event);

Cohort 3: 0 to 5-inch dbh seedlings and saplings developed within the last 50 years, particularly in the vicinity of openings, such as created by helicopter logging in 1990.

Douglas-fir of all sizes are ubiquitous throughout the unit; ponderosa pine of larger size and age classes are located primarily in the upper half slope positions; and white fir of primarily Cohorts 2 and 3 are located in the bottom half slope positions. Incense cedar and sugar pine are rare, scattered overstory dominants. Pacific madrone occurs largely in pockets and almost solely in Cohorts 2 and 3 initiated after the early 1900's wildfires. Original 2000 inventory vegetation conditions (see Table 1) prior to thinning were characterized by excessive stand densities (relative density = 0.863), averaging 697 tpa and 218 ft^2 per acre basal area. Understory Douglas-fir Cohorts 2 and 3 were found to be moderately to heavily infected with dwarf mistletoe in spots, with over one quarter of the Douglas-fir in the unit infected, many of which were in advanced levels of infection (Hawksworth dwarf mistletoe ratings 4, 5, and 6).

Highly valued overstory old growth dominants of all species were under considerable stress from developing understory cohorts prior to a non-commercial thinning and slash treatment initiated within a 50-foot radius of these trees in 2000-2001. This treatment not only improved tree vigor of these overstory dominant conifers, but also removed ladder fuels within their vicinity, decreased their susceptibility to wildfire and improved access for spotted owl utilization of the area.

Additional non-commercial thinning was completed throughout most of Unit 1 in 2002-2003, although portions of the stands in Unit 1 were intentionally retained as "unthinned" reserves. Post-thinning stand densities dropped to about 38% of original tpa and 85% of total basal area, while crown ratios improved 36% and quadratic mean diameter 50% (see Table 6). Non-commercial thinning focused on white fir, Pacific madrone, and suppressed and/or dwarf mistletoe-infected Douglas-fir. All slash from these thinnings was piled and burned, except scattered piles that were retained primarily in the bottom one-third slope positions for wildlife habitat values, including potential woodrat (the primary prey species for spotted owls) nesting

sites. The non-commercial work shifted retained stands to more vigorous overall conditions, improved the likelihood for long-term retention of larger overstory dominants, decreased potential wildfire behavior and severity, potentially improved flight access and prey base for spotted owl foraging, increased growing space, and ultimate development of early successional understory vegetation.

Table 6. Winburn Parcel – Unit 1 Pre- and Post-Treatment* Inventory Results

	Trees per acre (tpa)	Hardwoods Per Acre	Basal Area (ft^2 acre)	Quadratic Mean Diameter (Inches)	Relative Density	Mean Crown Ratio
Pre-Treatment	769	48	241	7.6	0.929	0.199
Post-Treatment	291	10	205	11.4	0.674	0.271

* Treatment was a non-commercial thinning from below completed in 2001-2002 throughout most of Unit 1. Post-treatment data is from thinned plots only

There is currently a noticeable lack of ponderosa and sugar pine in smaller size and age classes in Unit 1. Only about 1.6 pine per acre (all ponderosa pine) less than 16-inch dbh currently exist, and these are generally suppressed and of poor vigor. No sugar pine less than 20-inch dbh were found in the most recent inventory. Additionally, 2008 inventory data indicates that 24% of the standing pines are snags (mostly in size classes less than 16-inch dbh), compared with 2000 data that indicated that only about 5% of the standing pines were snags. These inventory numbers suggest an undesirable long-term decline in the species mix of these tree species that prefer frequent, low intensity disturbance and subsequently open stand conditions. In addition, stocking survey data revealed that parcel-wide only 10 ponderosa pine and three sugar pine per acre exist as small seedlings and saplings less than 4.5' tall. The pines are most abundant on the more southerly aspects of Unit 1 in small canopy openings, including patch openings created by the 1990 timber sale. In these openings (generally less than one acre, and typically ¼ to ½ acre), high levels of plant species richness and abundance exists, including early successional and shade intolerant species, such as pines. Understory species in these openings include Oregon grape, whipplevine (*Whipplea modesta*), oceanspray, deerbrush ceanothus (*Ceanothus integrrimus*), squaw carpet (*Ceanothus prostratus*), princes pine, bracken fern, and Pacific madrone sprouts. Even with these uncommon and relatively small openings in Unit 1, canopy closure averaged close to 84% for the unit as a whole.

All of the subunits in Unit 1 are also located on aspects, slope gradients, and in topographical positions that are good locations for fuel reduction zones, particularly in the lateral ridgeline locations. These areas were likely the most open forest conditions in the pre-fire exclusion era, and likely were areas of naturally reduced fuels and subsequent fire behavior. Openings in the existing stands in Unit 1 represent improved horizontal discontinuities in fuels, at least in the short-term, and provide seral stage and stand structural diversity.

Both total snags and coarse woody material amounts are high in Unit 1, based on 2000 inventory results which likely have changed little in the ensuing 8 years. High coarse woody material amounts (see Table 1) are at least in part the result of unutilized material left after the 1990 logging. This unit, along with portions of Unit 5, appear to have been the most heavily logged portions of the Winburn Parcel in that operation. Pockets of excessive logging slash remain, although some of those accumulations were reduced during burning of noncommercial thinning slash.

The estimated Douglas-fir 50-year site index is 75-80. Site productivity tends to increase in downslope directions, most likely due to increased soil depth and possibly decreased moisture stress in more humid lower slope positions. It is in these locations that white fir forms a greater percentage of the stand composition in Cohorts 2 and 3.

Plant Association Group (PAG) is rated as mostly Dry White Fir for Unit 1, but trending towards Moist Douglas-fir on lower, moister slope positions.

Unit 1 Prescription

Stand density reduction through non-commercial thinning, with subsequent slash treatment was initiated throughout most of Unit 1 during 2001-2003. From a management perspective, this was the initial phase of a restoration effort designed to encourage desirable species compositions, structures, and densities that will ultimately trend towards more appropriate functional processes for mature to late seral forests on this site. The benefits from this initial non-commercial thinning-from-below include:

- improved stand vigor;
- created more optimal conditions for retention of larger overstory mature conifers;
- encouraged development of a diverse tree species composition with particular emphasis on encouraging development of the pines;
- potentially reduced the behavior and severity of future fires;
- reduced stand level decline in Douglas-fir through preferential removal of trees heavily infected with dwarf mistletoe;
- increased potential development of more diverse and abundant understory vegetation with subsequent potential reduction in surface soil erosion;
- potentially improved prey base (woodrats), as well as access and potential forage success of spotted owls.

This prescription is designed to continue these trends towards ongoing development and encouragement of resilient late seral forests. Stand densities following initial non-commercial treatments in Unit 1 are still high, as quantified by a post-treatment relative density of 0.674 (see Table 6) immediately following treatment in the thinned portions of the unit (intentionally retained unthinned portions remain at relative densities of 0.90+) and current relative density index (2008) of 0.724 unit wide (see Table 5), including both thinned and unthinned areas. Preferred stand densities in Unit 1 are basal areas of 125 to 175 square feet per acre (relative density index 0.34 to 0.53) in areas dominated solely by Cohort 2 and 3 trees, with variable retention designed to produce structural diversity within the unit. Thinning should primarily be from below and designed to encourage rapid development of larger, most vigorous (i.e., those with the best crown ratios and radial growths) Cohort 2 trees particularly pines, incense cedar, Pacific madrone, and dwarf mistletoe-free Douglas-fir greater than 16-inch dbh. White fir is generally not a preferred conifer in Unit 1, with numbers increasing dramatically during the last century of fire exclusion (only 0.6 of the 72.3 total tpa are 18-inch dbh or greater) and on the lower edge of its environmental gradient (white fir snags increased from 0.2 to 1.9 per acre between inventories in 2000 and 2008). Retention of white fir is appropriate, however, when it is vigorous and particularly in the cooler, moister bottom one-third slope positions.

Within the vicinity of large, mature, Cohort 1 conifers (generally greater than 25-inch dbh), radius thinning should result in basal areas ranging from 100 to 125 square feet per acre (particularly around pines and in the upper half slope positions), and perhaps slightly higher basal areas around Cohort 1 trees in the more productive lower half slope positions. Continued protection and promotion of these legacy trees is probably the single most important management goal at this time in Unit 1, if not the entire parcel.

Thinning-from-below, in conjunction with slash treatment, should further improve vertical fuel discontinuities in the unit, while maintaining sufficient levels of vigorous overstory of various size and age classes to retard understory development of ladder fuels on a unit-wide basis. It is expected and even desirable, however, that increased understory development of grasses and herbaceous species will continue to occur, improving species abundance and diversity in this vegetation layer that had been lacking in the excessive pre-thinning stand densities.

Creation of additional patch openings in the stands in Unit 1 should be implemented similar to those created in 1990 to improve the abundance and richness of early successional vegetation (especially natural regeneration of pines), to create additional structural diversity, to increase horizontal fuel discontinuities in the unit, and to improve woodrat habitat and foraging success of spotted owls. Encouraging more structural heterogeneity in Unit 1 through creation of these patch openings, should be done without removing Cohort 1 trees. These openings can be situated in other appropriate locations, such as along gentle lateral ridgelines, in narrow strips situated along the contour, and in accumulations of dense Cohort 2 Douglas-fir heavily infected with dwarf mistletoe. Patch openings of uneven shapes are more desirable than the typical blocked arrangement of large openings in traditional harvest practices. An average of one additional opening per 10 acres is suggested initially in Unit 1. Steep, landslide-prone slopes should be avoided. These small openings should to be carefully monitored in the years to come for development of undesirable non-native invasive plant species and development of more hazardous wildfire prone, early successional vegetation profiles.

Although ponderosa pine have proven to naturally regenerate in the openings created in 1990, it is suggested that rust resistant sugar pine be planted in openings to increase the abundance of these trees that have declined precipitously throughout southern Oregon as a result of (1) white pine blister rust, an aggressive wind-borne, non-native host specific disease; (2) preferential removal during logging operations; and particularly (3) sensitivity to excessive stand densities. No sugar pine less than 20-inch dbh were found in the 2007/2008 stand exam plots in Unit 1, and only two sugar pine seedlings (less than 4.5-feet tall) were found in the 32 1/50th acre stocking survey plots.

Currently, over one-quarter of the Douglas-fir in Unit 1 are infected with dwarf mistletoe disease, and given the relative certainty of ongoing spread of the disease in the absence of treatment, continued reduction of dwarf mistletoe on a stand level basis is suggested, particularly by focusing on removal of smaller to mid-sized Cohort 2 and 3 Douglas-fir with advanced levels of infection (Hawksworth rating Classes 3, 4, 5, and 6). These heavily infected trees can rapidly spread the disease, contribute significantly to increased fire behavior (both in wildfire and prescribed fire situations) and will likely not grow to larger sizes that could become viable

locations for future spotted owl nest sites. These trees were likely candidates for removal in the recently completed non-commercial thinning work. Heavy dwarf mistletoe infections in larger, mature Douglas-fir are much less common in the unit, in part because it is suspected that these were the trees preferentially removed in the 1990 timber sale. This current lack of dwarf mistletoe infected overstory Douglas-fir and the somewhat patchy distribution of moderately to heavily infected Cohort 2 trees make it seem possible that this disease can be reduced to a more acceptable level such that long-term development of larger, mature Douglas-fir can be envisioned in most of the unit. Retention of dwarf mistletoe infected Douglas-fir is most appropriate in the lower third slope positions where potential spread is reduced and there is greater potential for future utilization by spotted owls. However, it is unlikely that heavily infected Cohort 2 Douglas-fir will survive to a large enough size to provide spotted owl nesting habitat.

The balance of retaining appropriate levels and locations of dwarf mistletoe infected Douglas-fir on a landscape level for multiple wildlife habitat values, while simultaneously addressing the ongoing decline of the species through planned reductions in the prevalence of this disease will be a challenging management dilemma for years to come and hopefully one that continues to be informed by sound research, practical experience, and ongoing monitoring. On the Winburn parcel, retention of infected, large Cohort 1 Douglas-fir in Units 3 and 6, while reducing its prevalence in Cohorts 2 and 3 elsewhere on the parcel, is suggested as an interim, property-wide strategy.

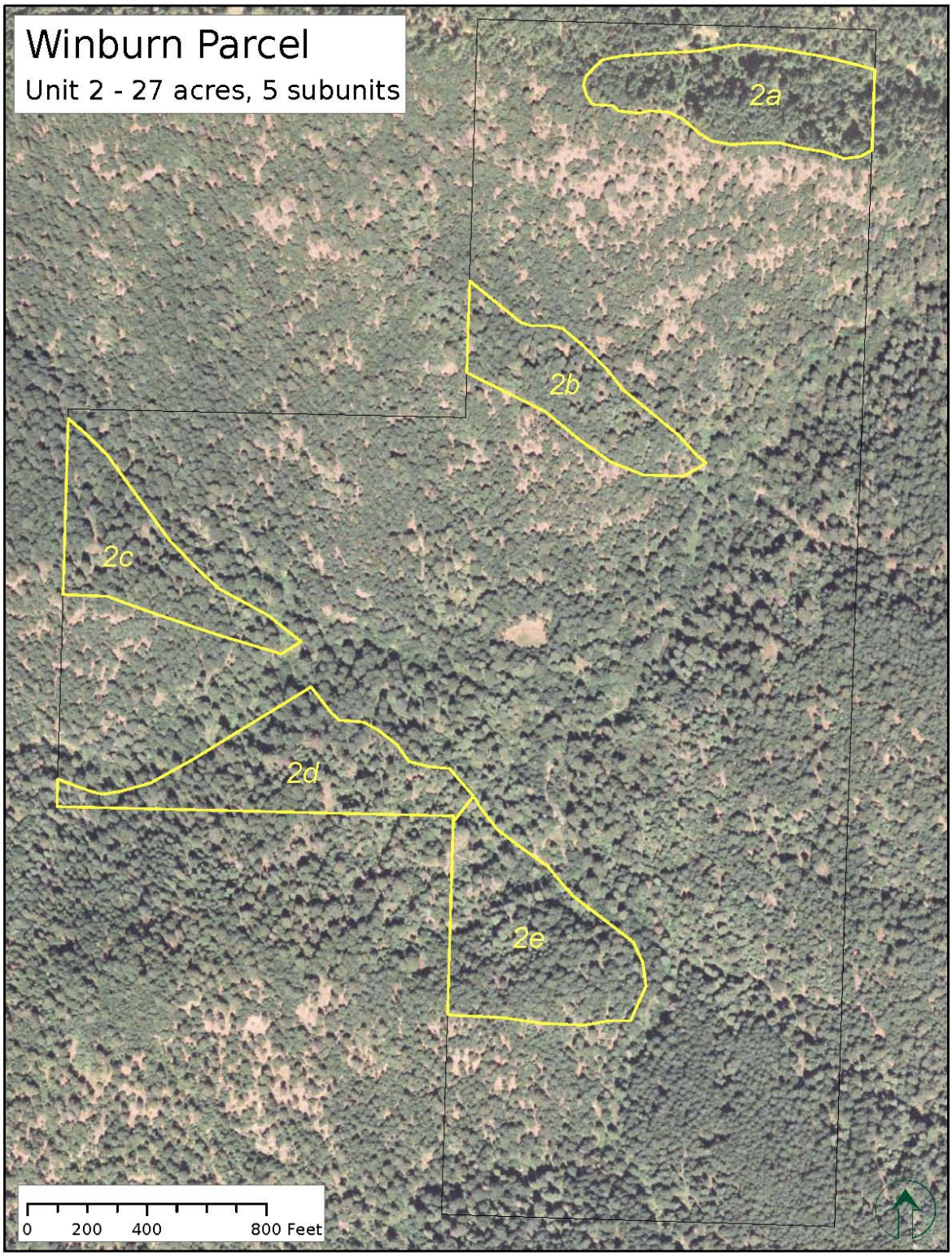
Retention of higher levels of stand density following stand treatment should also be prioritized adjacent any small ephemeral drainages in Unit 1.

Both snags and coarse woody material amounts are currently high, with expected continued inputs in the future, based on increases in snag abundance as shown in the recent inventory data (from 8.1 per acre in 2000 to 16.8 per acre in 2008).

Slash created by prescribed thinning treatments should be piled and burned, particularly in the vicinity of Cohort 1 and vigorous Cohort 2 trees. Once stand vigor has improved and potential fire behavior reduced by these treatments, prescribed fire and/or wildland fire use should be able to be utilized for stand and vegetation maintenance in the future. Unit 1 will be an excellent candidate for prescribed underburning once the second stand density reduction treatment has been completed.

Unit 1 is probably the most important unit on the Winburn Parcel from a wildfire management perspective. Modifications to the existing vegetation profile described above (i.e., creation of fuel discontinuities in both horizontal and vertical directions) should set up the unit to add to the Fuel Discontinuity Network as described in the Community Alternative developed under the Ashland Forest Resiliency (AFR) project.

Unit 2


Winburn Parcel
Unit 2 - 27 acres, 5 subunits
2a
2b
2c
2d
2e
0
200
400
800 Feet

Unit 2 Description - 27 acres, 5 subunits
Unit 2 is located on steep, northerly aspects ranging from 50% up to 85-90%+. Douglas-fir is the primary tree species currently comprising about 60% of total stand basal area. It occurs in all three cohorts as in Unit 1, but primarily in Cohorts 2 and 3. White fir is more common on these cooler, more northerly aspects than in Unit 1 and primarily of similar size and age classes, but of slightly greater overall vigor. Pacific madrone is an integral part in most of the stands in Unit 2 comprising about 19% of the total stand basal area (mostly in Cohorts 2 and 3), although rarely larger than 16-inch dbh. Both white fir and Pacific madrone have increased in abundance since the last major disturbance at the beginning of the 20th century, as evidenced by diameter distributions that include only rare trees greater than 100 years of age.

Small portions of Unit 2 may be overstocked, but in general this is not the case (relative density = 0.542, 407 tpa, 144 ft^2 basal area). This is in part due to scattered openings created by the 1990 harvest, windthrow of overstory trees, and occasional recent landslide activity. Even with these openings, canopy closure averages 78% in Unit 2. Improved site quality (50 year Douglas-fir site index = 90) and reduced stocking have produced slightly bigger tree size on the average, particularly for the Cohort 2 trees that dominate this unit. The lower stocking levels also allow for generally more vigorous overstory Cohort 2 trees, although 22% of the Douglas-fir in the unit are currently infected with dwarf mistletoe. Only about three tpa average are greater than 30-inch dbh, suggesting that the early 1900's disturbance event was more intense in most of this unit (particularly as compared to adjacent Unit 1), a pattern that is not surprising in steeper topography.

Current height to crown base is favorable from a wildfire management perspective in most stands in Unit 2 largely due to rapid growth on these productive sites and subsequently generally small crown development. Additionally, cooler, moister aspects reduce the length of extreme fire danger, both seasonally and diurnally. These factors, coupled with steeper slopes, generally make this unit less important from a wildfire management perspective, and less in need of active management solely from a wildfire management perspective.

Understory vegetation is sparse throughout unit, but is most abundant in existing openings and includes moist, cool site species, such as dwarf Oregon grape, princes pine, sword fern, hazel, and various mosses and other herbaceous vegetation. Natural regeneration of both Douglas-fir and white fir occur in these openings, with an average of 317 seedlings and saplings less than 4.5' tall in the unit as a whole.

Snags and large woody material are well represented across size classes in Unit 2. Snags, in particular, have increased within the last eight years (from 6.8 to 41.7 per acre), although not as significantly in the larger size classes greater than 18-inch dbh (from 4.2 to 5.3 per acre). Most noticeable was increases in understory small diameter (less than 12-inch dbh) Pacific madrone (from 0 to 27.4 per acre) and white fir (from 0 to 6.4 per acre).

Steepness on these northerly aspects makes them prone to slope failure, particularly in the inner gorges that were mapped as Hazard Zone 2 by Hicks (2000).

Plant Association Group is tentatively rated as Dry White Fir in upper slope positions and in smaller subunits, and Moist Douglas-fir in lower slope positions and in subunits with larger, more significant northerly and easterly aspects.

Unit 2 Prescription

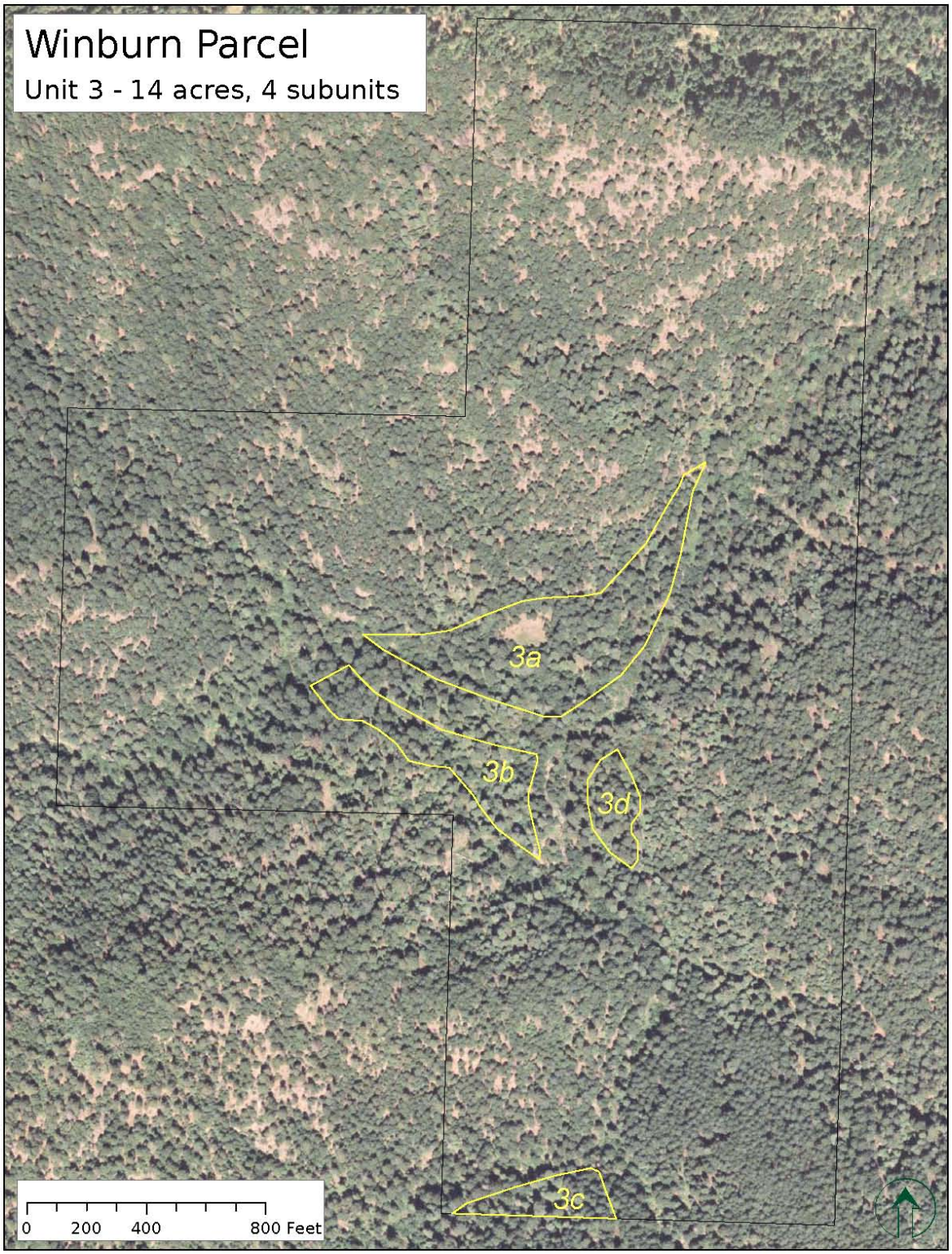
Existing stand densities, which are not excessive on a unit basis, coupled with the steep to very steep topography suggest that management actions are not a high priority at this time in most portions of Unit 2. A limited amount of thinning, either commercial and/or non-commercial, could be beneficial in releasing individual larger overstory dominant conifers, shade intolerant Pacific madrone 16-inch+ dbh, or in the small patches that exceed basal areas of 200 to 225 square feet per acre. Thinning should be "from below," leaving the largest, most dominant trees to respond to the more favorable growing conditions.

Just as in Unit 1, white fir should be preferentially removed in thinning efforts; its overall vigor is generally poor to fair on these sites at the lower elevational edge of its environmental gradient. However, it tends to be somewhat more vigorous than in adjacent Unit 1, and can be retained if an individual tree is healthy and vigorous.

Thinning slash up to 7-inch dbh should be piled and burned; however, steep slopes in Unit 2 suggest retaining small logs arranged on-the-contour (contour placement or felling) to minimize downward soil creep and erosion, subsequent accumulation in draws, and ultimate incorporation into the hydrologic network. Openings created in the 1990 timber sale have naturally regenerated and should require no planting.

Future frequent low to moderate intensity disturbance (e.g., light silvicultural thinnings from below and/or prescribed fire) may be necessary to provide a long-term advantage for more fire-resistant Douglas-fir over the less fire-resistant white fir. As in Unit 1, reduction in the amount of dwarf mistletoe infected Douglas-fir during thinning activities can help encourage long-term retention of this species on a unit basis.

Unit 3


Winburn Parcel
Unit 3 - 14 acres, 4 subunits
3a
3b
3d
3c
0
200
400
800 Feet

Unit 3 Description - 14 acres, **4 subunits**
Unit 3 is located on gentle (0 to 20 percent) slopes on various aspects. This unit is located adjacent to and associated with major stream and creek riparian ecosystems, as well as adjacent low hillslope positions. The unit is primarily clustered around the intersection of the two major streams: Weasel Creek and the west fork of Ashland Creek. These are moist sites with deep soils that produce high site productivities (50 year site index for Douglas-fir = 95).

This unit is characterized by unique understory vegetation. Salal is the most common understory species, more typically found in cool, moist environments, particularly in coastal regions. In the upper topographical positions adjacent drier upland settings, beargrass is another unusual understory species also typically found further to the west. Other understory species include those typical for cool, moist sites at this elevation in the eastern Siskiyous: Pacific yew, thimbleberry, trailing blackberry, hazel, Hooker fairybell, princes pine, and false Solomon's seal.

The stands in Unit 3 are characterized by considerable species and structural diversity. Individual small stands of up to several acres dominated by large Cohort 2 and occasional Cohort 1 Douglas-fir occur amidst other structurally diverse stand conditions, including pockets of dense advanced conifer regeneration, uneven aged mixtures of conifers typical of adjacent riparian habitats, and even very open stands with small numbers of conifers. These features suggest that disturbance has been more variable over space and time in Unit 3 within the last 100 years. A combination of factors has produced these variable stand conditions.

Laminated root disease may have been an ongoing source of disturbance over time in Unit 3. A current active center of this native disease has killed almost all of the 100-year-old Douglas-fir in a one-half to one acre area close to the site of the old Winburn camp. Haphazard logging to build structures at the Winburn camp may also have contributed to the variable stand and vegetation structures seen today. Excessive soil compaction from penned livestock in the Winburn camp era could have made some sites in the unit less hospitable for tree survival and growth. High groundwater, a condition unfavorable for both Douglas-fir and white fir, may also help explain some of the variability, as well as contributed to the increased levels of windthrow found in Unit 3. Additionally, overstocked stands and those infected with laminated root disease are susceptible to bark beetle related mortality, which can occur in patches and help create a more structurally diverse forest condition. There may have been other contributing factors as well. This variable vegetation and structural diversity resulting from a complex disturbance history is likely typical of the pre-settlement era.

Currently, Douglas-fir is the dominant conifer in the unit, comprising over three-quarters of the total stand basal area (average 198 total square feet per acre), although it ranges up to 300 square feet per acre in the center of individual dense stands. However, an equal number per acre of more shade tolerant white fir and Pacific yew occur, primarily as understory seedlings, saplings, and small advanced regeneration, while comprising only about one-quarter as much total basal area as Douglas-fir. This is indicative of a species change related to a change in disturbance history (i.e., fire exclusion), in which less fire tolerant but more shade tolerant species, such as white fir and Pacific yew, are favored. Overstory conifers in Unit 3 tend to be even-aged (usually 80 to

100 years or, in some cases, up to 130 years), but typically somewhat larger than elsewhere on the property (average of 8.3 tpa greater than 30-inch), in part due to improved site productivities. Hardwoods are uncommon in Unit 3 (8 tpa), with golden chinquapin becoming more common than Pacific madrone.

The high productivity of the site, coupled with the aforementioned disturbance agents, helps explain the high amounts of large coarse woody material in the unit, particularly of the larger size classes. It may also explain the relatively low number of snags per acre (3.7), although no plots were located in the laminated root disease pocket which is relatively quickly increasing the total number of larger snags in the unit. White fir above 18" dbh are particularly abundant as snags (36% of the standing white fir, as compared to 6% of the Douglas-fir above 18-inch dbh).

Valley bottom, floodplain and upper stream terrace locations that typify Unit 3 are common fire refugia, where fire is less likely to occur and/or be sustained. This is likely due to cooler, moister site conditions during fire season, elevated live fuel moistures, gentler topography and perhaps other factors. These conditions present obvious opportunities from a wildfire management perspective.

Potential heritage resources from the Jesse Winburn era are also located in this unit, including the foundations of structures and a swimming pool, several non-native giant Sequoias, and a remnant meadow/pasture that is slowly being lost to conifer re-invasion, particularly ponderosa pine.

Plant Association Group is primarily Wet Douglas-fir in Unit 3.

Unit 3 Prescription

A variety of vegetation structures, densities, and species compositions, as well as a diversity of associated functional processes, make it very difficult to provide a single prescription for Unit 3. In order to be effective any implemented management actions should be micro site-specific and cumulatively retain the inherent structural, functional, and species diversity of the site. The following general guidelines should guide Unit 3 management:

> (1) The high prevalence of large overstory conifers, even though not of advanced ages, should be maintained and/or promoted whenever possible. This may include thinning of both commercial and/or non-commercial size classes around these trees to obtain more desirable stand densities within their vicinity. Small, individual stands of larger Cohort 2 Douglas-fir should be thinned-from-below to leave the most vigorous larger trees (while retaining desirable stand-level characteristics) with an average retained basal area range of 175 to 225 square feet per acre (estimated relative densities of 0.45 to 0.60). This should be done in order to retain their long-term vigor, viability, and subsequent potential development into mature stands characterized by large diameter conifers.
>
> (2) Reduce abundance of non-commercial and small commercial white fir, which has increased in the last century. The gentle nature of the topography suggests that this could occur without significantly impacting riparian values, while providing more wildfire management benefits than can naturally occur in steeper topography. Wildfire

management benefits would be particularly enhanced by thinning in the portion of Unit 3 below Unit 1 and surrounding the Jesse Winburn site, increasing the block size and ultimate effectiveness of this potential fuel reduction zone. Retention of scattered unthinned patches of dense conifer saplings and advanced regeneration should be retained for structural diversity and important wildlife habitat values, particularly in areas closest to riparian buffers. Any thinning treatments in Unit 3 should have resulting slash piled and burned, although this also would be a good location to retain some unburned piles for possible woodrat and/or other wildlife habitat values.

(3) Unit 3 is a good topographical location to retain dwarf mistletoe infected Douglas-fir, for several reasons:

- The disease is less apt to spread large distances in these lower slope positions;
- Individual infected trees are less likely to torch and spread wildfire;
- Spotted owls prefer these lower slope positions for nesting in Douglas-fir dwarf mistletoe brooms.

A two acre stand of large 22 to 36-inch dbh Douglas-fir in the only part of Unit 3 on the east side of Ashland Creek is particularly heavily infected with dwarf mistletoe. This stand is a good example of a mature, though rapidly declining, stand with important wildlife habitat values that should be retained with little or no treatment. Given the high level of infection in this stand (almost all of the trees are infected, with many trees having dwarf mistletoe ratings of 4 to 6), it is unlikely that any silvicultural activities and/or thinnings could improve the long-term viability of the stand. Although retention of these types of stands provides critically important wildlife habitat values in the short term, long-term loss of mature stands like this one from dwarf mistletoe disease is an undesirable, long-term trend on the Winburn parcel.

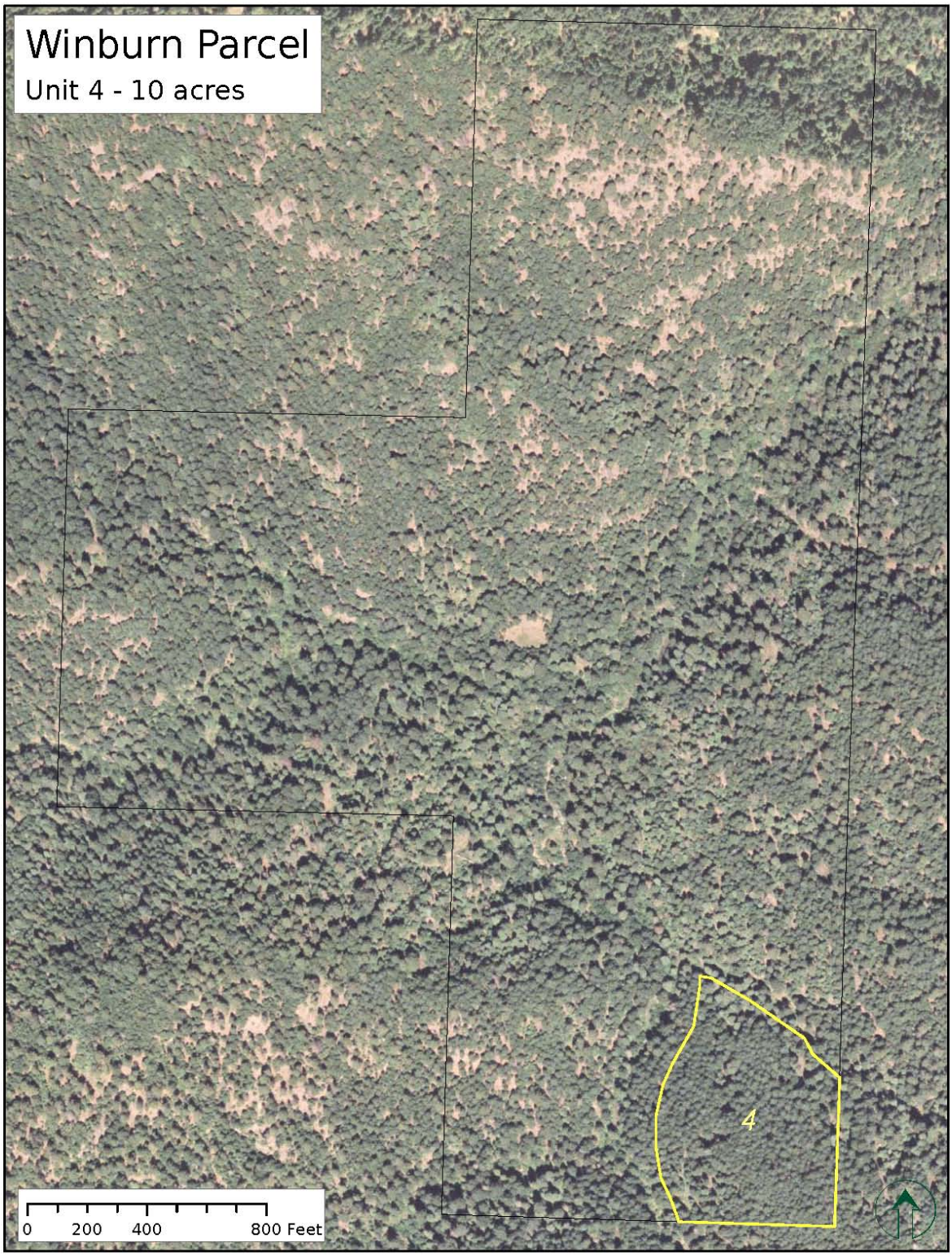
(4) Careful monitoring for newly initiated and/or expanding pockets of laminated root disease is important in this unit, as late successional features, particularly the prevalence of large conifers, can be considerably altered by this disease. At the same time, openings such as these are important agents creating structural, species, and functional diversity on the landscape, as well as helping to create horizontal discontinuities in crown fuels, an important wildfire management benefit. In the absence of fire over the last century, openings such as these are uncommon in the Ashland watershed and the opportunity to encourage early successional vegetation is an important function of these naturally occurring openings. The importance of retaining and/or promoting large Douglas-fir on the Winburn parcel, particularly given their removal in the 1990 logging and their decline due to dwarf mistletoe disease suggest that the one obvious expanding pocket of laminated root disease in Unit 3 be closely monitored. It may be appropriate in the future to prevent future expansion of the pocket by removing Douglas-fir from around the pocket and planting and/or encouraging non-host species, such as incense cedar, ponderosa pine, and/or hardwoods.

(5) Continue prioritizing wildlife habitat values in Unit 3 by maintaining the inherent vegetation and structural diversity - a key feature of productive wildlife habitat. The close proximity of riparian and aquatic ecosystems and adjacent upland systems make Unit 3

an important transitional habitat type for wildlife in general. Numerous other features, such as dwarf mistletoe brooms, high amounts of coarse woody material, an abundance of new, large snags from dwarf mistletoe and laminated root disease-caused mortality, and unique understory vegetation should continue to make Unit 3 a priority from a wildlife habitat management perspective.

(6) It is likely that microsite prescriptions and management activities for this unit would be adjusted as needed in deference to the critically important adjacent riparian and aquatic values. This may also depend on how and where riparian boundaries are delineated. The total area in Unit 3 may be reduced or increased depending on the location of riparian buffer boundaries, which should be flagged on-the-ground based on topographical, geomorphological, and stream characteristics, as well as vegetative site indicators.

Unit 4



Unit 4 Description - 10 acres
Unit 4 is located on gentle to moderate (10 to 45 percent) westerly to northwesterly aspects on an elevated bench above Ashland Creek and associated low slope positions. This unit is dominated by a very dense (relative density = 0.820) even-aged (approximately 100 years) stand of primarily 12 to 24-inch dbh Douglas-fir. Over 95 percent of both tpa and basal area are Douglas-fir, with over 85% of the total stand basal area comprised of Douglas-fir 12-inch dbh and larger.

This stand was initiated following an intense disturbance at the turn of the century (most likely the 1901 wildfire) perhaps in conjunction with logging associated with homesteading at that time. Overall stand growth has been excellent on this particular site (50 year site index for Douglas-fir is 95), but high relative densities, small crowns (average crown ratio = 0.236), high basal areas (288 square feet per acre average) and rapidly declining radial growths are indicative of a stand under considerable stress. The significant increase in snags since the 2000 inventory (from 7.1 to 22.8 per acre) may likely be explained by this high stand density and subsequent increased likelihood for attack by bark beetles. The combination of excessive densities and a developing bark beetle population suggest the possibility of additional increases in mortality of conifers in the near future. However, higher site productivities in this location may also delay a major pulse of bark beetle related mortality in the immediate future. As in Unit 3, white fir currently contribute a disproportionately high percentage of the snags in Unit 4 (32%), while only comprising about 4 % of the total tpa.

Douglas-fir dwarf mistletoe mostly occurs in light infections in the bottom one-third of the crowns (Hawksworth dwarf mistletoe ratings 1 and 2), largely in pockets in the bottom half of the unit. The dense, rapidly growing stand characteristics in Unit 4 have caused dieback and subsequent pruning of limbs low on the boles, which undoubtedly helped remove dwarf mistletoe infected limbs and discouraged shade intolerant dwarf mistletoe plants during the 100 year life of the stand

In existing dense stand conditions in Unit 4 (average canopy closure of 82%) very little understory vegetation and a high crown base, a very favorable stand structure from a wildfire management perspective, has resulted with minimal surface or ladder fuels and resulting significant vertical fuel discontinuities. Continued increases in within-stand mortality, however, may compromise the existing vertical fuel discontinuities and subsequent wildfire management effectiveness as ensuing openings allow development of early successional vegetation and a more vertically continuous vegetation profile in the future.

Species and structural diversity are very low in Unit 4 (including a noticeable lack of hardwoods), although these current stand conditions are somewhat unique on a landscape level. Uniform, even-aged single species stands are generally poor in terms of wildlife species richness, abundance and habitat values though they tend to be aesthetically appealing. Very low amounts of surface fuels and coarse woody material, although good from a wildfire management perspective, add to this lack of diversity and wildlife habitat value. However, existing stand characteristics suggest that mature forest values and rapid development of larger conifers in the

future can occur with associated beneficial wildlife habitat values, particularly if considerable density and bark beetle related mortality can be avoided at this stage of stand development. Erosion and slope stability issues are minimal in this unit of gentle slope gradients.
Plant Association Group is tentatively classified as Moist Douglas-fir in Unit 4.

Unit 4 Prescription
Stand density reduction in Unit 4 should be a priority in order to maintain the vigor of the large dominant conifers and the current stand structure. This is a somewhat classic situation in which both stand vigor and wildfire management values can be improved by thinning from below. Thinning solely non-commercial size classes would provide very little benefit in Unit 4 (non-commercial size class conifers only comprise about 1.4% of the total stand basal area) while the post-treatment retained stand would still have extremely high basal areas (284 square feet per acre). Thinning from below should concentrate on trees less than 18-inch dbh, although it is likely that in individual microsites throughout the unit, trees smaller than 18-inch dbh may be preferred as retention trees over other nearby, but poorer quality larger trees. Douglas-fir infected with dwarf mistletoe should be prioritized for removal in this unit, although retention of lightly infected trees could be acceptable if well-stocked canopies are retained. Nonetheless, it is clear from inventory data that trees greater than 20-inch dbh consistently are the most vigorous, with the best crown ratios (the only trees with crown ratios greater than 30%) and radial growths, and should be retained.

Several styles of commercial thinning could be prescribed for Unit 4. A relatively uniform thinning-from-below, down to 200-225 square feet of basal area (relative density 0.51 - 0.57) could maintain a dense canopy cover of large conifers, improve leave tree vigor, while improving height to crown base (an important wildfire management variable) and still maintain enough tree density to retard understory development (including ladder fuels). A second prescription suggesting more aggressive thinning (down to 175 to 200 square feet per acre, or relative densities of 0.44 - 0.51) could be utilized to promote more understory development (including conifers), create an opportunity for a more multi-aged stand structure, and perhaps grow larger diameter conifers quickly. In this approach, however, development of multiple cohorts and ladder fuels could compromise the good vertical discontinuities that currently exist in this dense stand. Opening up the stand to increasing light may also aggravate the spread of dwarf mistletoe which, although common, is currently only lightly infecting the bottom thirds of crowns and appears to be slowly shaded out in this dense stand.

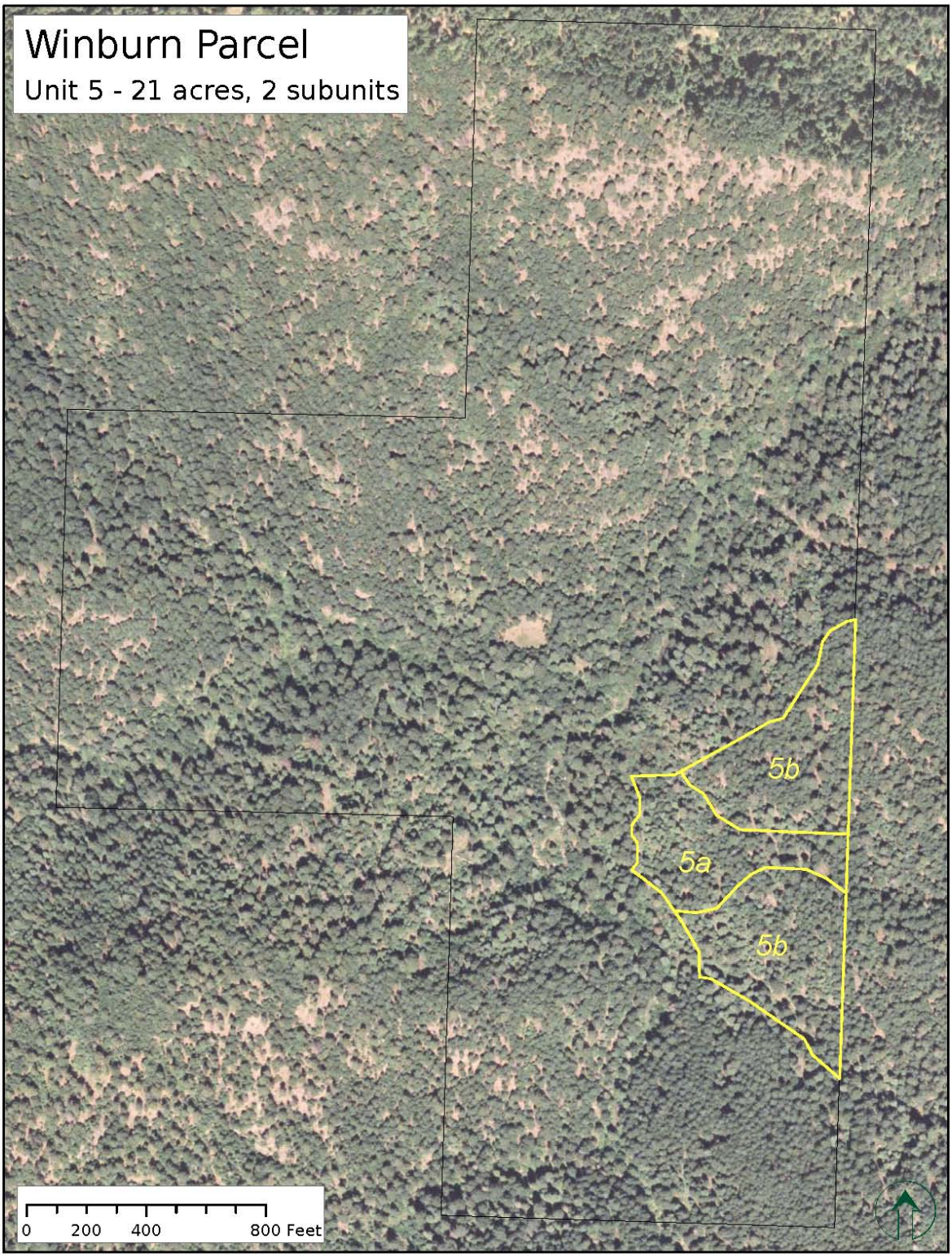
Utilizing the first prescription could provide a good opportunity for a fuel reduction zone (in association with adjacent Subunit 1d) that could impede wildfire progress in an up-canyon direction. At this point maintaining and/or improving those locations that have favorable wildfire management potentials should be a priority on a landscape level, at least until the watershed as a whole reaches a less wildfire prone condition. Maintaining higher stand densities and more pronounced canopies may also be desirable from a riparian habitat perspective, with Ashland Creek adjacent Unit 4. Utilizing the first prescription, but thinning heavily around large, vigorous dominants and maintaining higher densities elsewhere could be an intermediate prescription designed to encourage large tree development while maintaining generally dense stands. In the long term, this may speed the trajectory towards a late successional forest, while maintaining wildfire management benefits in the interim.

Retaining greater stand densities and some dwarf mistletoe infected Douglas-fir in the areas closest to Ashland Creek could be appropriate for future spotted owl nesting habitat and could provide coarse woody material and large wood inputs into Ashland Creek for important in-stream structures and improved stream function.

Coarse woody material amounts are low in Unit 4 (see Table 1), and retention of some larger boles on site may be appropriate in this situation, although it is possible that ongoing snag development will continue to increase coarse woody material amounts

Piling and burning slash following any treatment should be prioritized to maintain the wildfire management effectiveness of the unit, after which prescribed fire/wildland fire use could be utilized to maintain future stand and vegetation conditions.

Unit 5


Winburn Parcel
Unit 5 - 21 acres, 2 subunits
5b
5a
5b
0
200
400
800 Feet

Unit 5 Description - 21 acres, 2 subunits
Unit 5 is located on moderate (15 to 65 percent) westerly aspects east of Ashland Creek. Recent work suggests that Unit 5 is best understood and described in two subunits.

Subunit 5a is located on the gentler (10 to 35%) slopes largely located on old landslide deposits and lower slope positions. Slopes, soils and groundwater conditions in Subunit 5a are similar to Unit 3, while subunit 5b has steeper slopes more similar to Unit 1 (although on more westerly aspects). The resulting vegetation in these two subunits reflects these differing site conditions. Subunit 5a is dominated by a moderately dense, multi-cohort stand of mixed conifers, but heavily dominated by white fir (280 tpa), primarily in size classes up to 14-inch dbh. White fir is not particularly vigorous in this subunit, however, likely the result of a combination of some of the same disturbance factors as indicated for Unit 3, including high groundwater, root diseases, and the elevation of the unit on the lower edge of the environmental gradient for white fir.

Douglas-fir is uncommon in Subunit 5a (19 tpa), with only 5 tpa less than 20" dbh. This suggests that an agent like laminated root disease, high water tables, or other factors may have been at work here for many years, with a subsequent marked conversion to white fir, even though this may not be a very productive site for white fir. However, Douglas-fir is over three times more common than white fir as an overstory dominant greater than 20-inch dbh. Over 90% of the Douglas-fir in Subunit 5a are infected with dwarf mistletoe, however a very high number suggesting a decreased likelihood for long-term survival of this species in this subunit.

Even at only moderate stand densities (relative density = 0.559), crown ratios overall are low in this subunit, averaging only 0.257, indicative of a less than vigorous stand. Still, the subunit has high amounts of larger mature conifers, with about 8 tpa greater than 30-inch dbh and another 6+ tpa from 24 to 30-inch dbh, even though an estimated one-third to one-half of the larger overstory conifers greater than 30-inch dbh were harvested in Unit 5 in the 1990 timber sale.

The declining white fir and diseased Douglas-fir have contributed to rapid increases in tree mortality in Subunit 5a in the last eight years, with snags increasing from 14.0 to 36.7 per acre, by far the highest amounts of any unit on the Winburn parcel.

Understory vegetation reflects the moister site conditions similar to Unit 3, with the presence of the ubiquitous salal, trailing blackberry, hazel, twinflower, dwarf Oregon grape, beargrass, and others. A spring/seep and its immediate environs offers a unique vegetation and habitat type towards the bottom of Subunit 5a.

Subunit 5b is typical of the drier upland settings on more southerly to westerly aspects, such as in Unit 1. Prior to completion (2008) of a recent non-commercial thinning, piling and burning treatment, the stands in Subunit 5b were under excessive stress, as evidenced by very high relative density (0.953), basal area (251), and tpa (744), and very low crown ratios

(0.142). The stand was ripe for a major bark beetle infestation. Non-commercial thinning in Subunit 5b in 2007 reduced stand densities to more favorable numbers (261 tpa, 242 basal area, 0.755 Relative Density Index, and 0.227 crown ratio), but still indicate a stand under considerable stress. Douglas-fir currently comprises close to 90% of both the tpa and basal area primarily in trees up to 22-inch dbh. The non-commercial thinning treatment significantly reduced the number of white fir in the unit, almost all of which existed as suppressed understory trees less than 10-inch dbh. Fortunately, dwarf mistletoe disease is not common on Douglas-fir in Subunit 5b, with only about 8% of the trees currently infected.

Understory vegetation remains sparse under the dense canopies (86.7% canopy closure) of Subunit 5b. The sparse understory and ladder fuels, coupled with the high crown base improved during the non-commercial thinning, provides good vertical fuel discontinuity and a favorable stand structure from a wildfire management perspective, if the stand can be maintained into the future.

Fortunately, an understory treatment in a 50-foot radius around large overstory dominants, completed in 2002 throughout Unit 5, increased the likelihood of survival of these trees in the short term, much as was done in Unit 1. All slash from that work was piled and burned that also decreased the likelihood of mortality of these legacy trees during a wildfire event. However, considerable slash from the 1990 logging still remains in spots throughout Unit 5.

Preliminary Plant Association Group ratings for Subunit 5a are Moist White Fir; for Subunit 5b, Dry White Fir.

Unit 5 Prescription

The different site characteristics between Subunits 5a and 5b suggest that prescriptions should be tailored to reflect those differences.

Non-commercial thinning-from-below in Subunit 5b in 2007 reduced stand densities to more favorable levels (from 744 to 261 tpa; from 0.953 to 0.755 Relative Density Index). However, these current stand densities suggest that additional commercial thinning will be needed to create more optimal stand densities. Thinning-from-below will again be appropriate, primarily trees less than 18-inch dbh. Target densities to strive for are basal areas of 150-180 square feet per acre (Relative Density Index 0.35 - 0.45). Improved growth and vigor of retained trees should result thus increasing their long-term ability to withstand and/or recover from the effects of fire, as well as hastening their development into larger trees and older forest structures. Associated piling and burning of resulting slash should retain a good unit from a wildfire management perspective, with low surface fuels and high heights to crown base, while improving stand wildfire resistance and resilience. Once this stand structure is created, prescribed underburning and/or wildland fire use will likely be utilized for long-term maintenance in Subunit 5b.

The prescription for Subunit 5a is more complicated, but similar to Unit 3. Stand densities are not excessive in this subunit (relative density index 0.559), and has actually dropped since the original inventory due to increasing tree mortality and snag development. Unfortunately, however, tree vigor throughout the unit is low, including both the more common Cohort 2 and 3

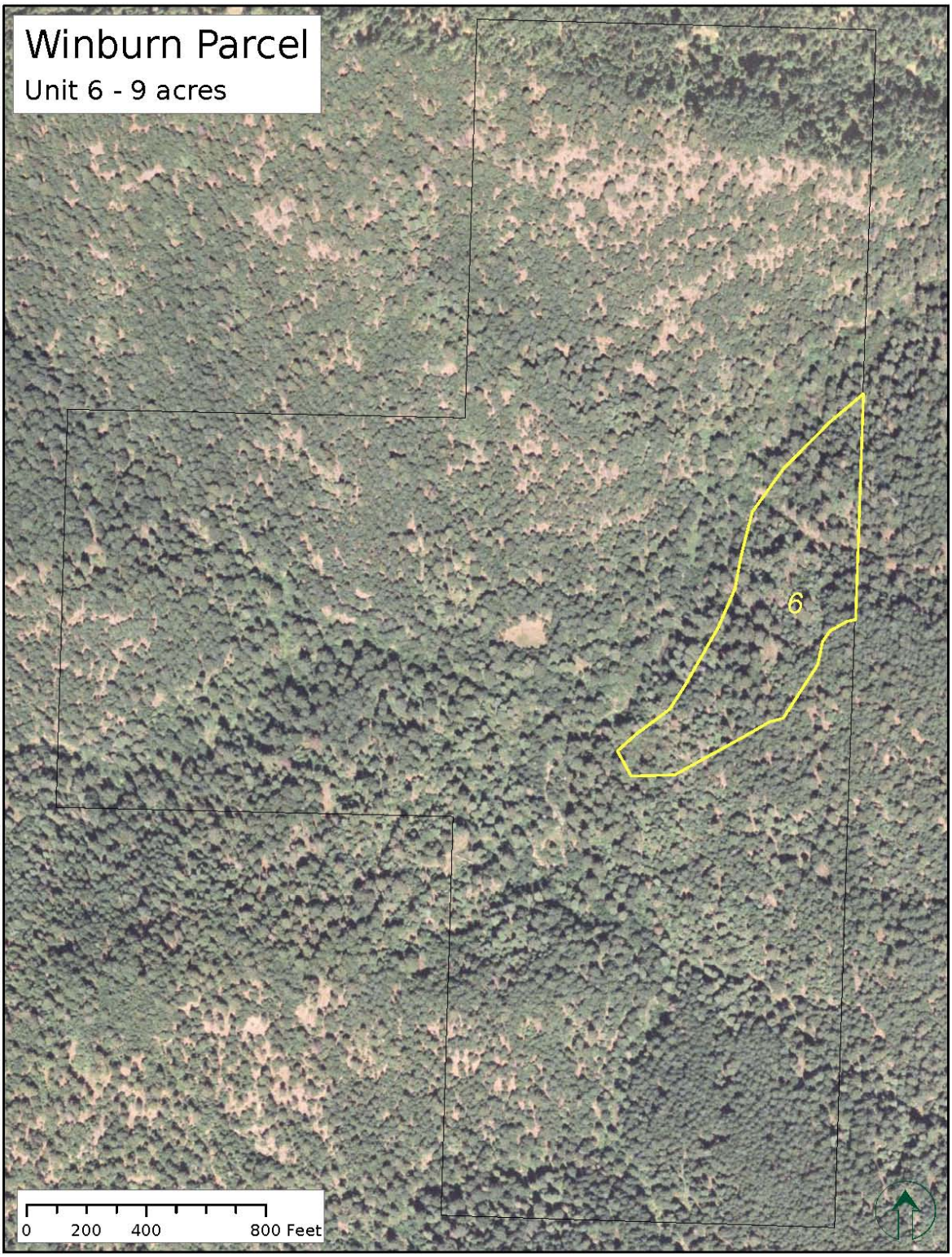
white fir as well as the overstory Douglas-fir. The general lack of understory Douglas-fir, however, offers an opportunity to leave dwarf mistletoe infected Douglas-fir in the overstory without infection of associated understory Douglas-fir.

It is appropriate to restrict thinning in Subunit 5a to radius thinning around preferred conifers (i.e., other than white fir) and hardwoods that are 16-inch dbh and larger to try to encourage long-term retention of these structural and species components in the stands. Even larger dwarf mistletoe infected Douglas-fir may survive longer if thinning-from below within their vicinity improves their vigor. Basal areas of 100-150 square feet per acre can be retained around these legacy trees with the lower levels in that range more appropriate in the vicinity of more shade intolerant pines and hardwoods. All resulting slash should be piled and burned.

Existing conditions suggest that other values such as wildlife habitat and hydrological features are elevated in importance in this subunit. Abundant snags, higher than anywhere else on the Winburn parcel, make it important from a wildlife habitat perspective. The dwarf mistletoe infected overstory Douglas-fir may provide spotted owl nesting opportunities, particularly given their close proximity to Unit 3 where the same is prioritized. The spring/seep is another important wildlife habitat feature and should be retained in a no treatment reserve status with at least a 50-foot buffer in all directions. Its location at the bottom of Subunit 5a suggests the importance of groundwater in this unit and the ultimate importance in terms of hydrologic inputs.

The high amount of year-round foliar moisture in understory plants such as salal, coupled with generally reduced stand densities, gentle slopes, and low slope positions, suggests an inherently reduced potential for higher intensity wildfire behavior in Subunit 5a, making retention of such wildlife habitat features as snags and dwarf mistletoe brooms less problematic from a wildfire management perspective. Coupled with commercial thinning and slash treatment in Subunit 5b (as described above) and the associated vertical fuel discontinuities, Unit 5 could begin to act as an important zone with which to minimize wildfire spread in most wildfire events.

Unit 6



Unit 6 Description - 9 acres
Unit 6 is located on very steep (60 to 85%) northwesterly aspects. Portions of these very steep slopes were classified as Hazard Zone 1 by Hicks (2000), although no slope failures in 1997 were evident and/or mapped.

This unit is dominated mostly by a two-cohort stand: larger Douglas-fir and occasional pines 20-inch dbh and larger (close to 18 per acre) over a dense stand of understory Douglas-fir and white fir primarily from 1 to 6-inch dbh and up to 30 feet height. Some of the larger conifers greater than 30-inch dbh were removed in the 1990 timber sale, but close to 8 tpa of this size class remain.

Current stand densities are not excessive in Unit 6 (relative density = 0.649, basal area = 170, tpa = 519) primarily because about two-thirds of the tpa are less than 4-inch dbh (Douglas-fir, white fir, Pacific yew). Although abundance of dwarf mistletoe in Douglas-fir is not as large as elsewhere on the parcel (9.4% of the Douglas-fir are infected), it is well established in many of the overstory Douglas-fir (over 40% of the Douglas-fir larger than 20-inch dbh) serving as possible future spotted owl nesting habitat. This overstory dwarf mistletoe will continue to infect the Douglas-fir understory over time likely shifting conifer species composition towards white fir.

Plot data suggested a decrease in snag abundance since the original 2000 inventory, although the high amount of dwarf mistletoe infection in the overstory Douglas-fir suggests ongoing recruitment of large snags over time. The combination of abundant snags, high canopy closures (84.3% average) in structurally diverse stands and especially the frequent dwarf mistletoe brooms on larger Douglas-fir in this topographical location makes this unit important from a wildlife habitat perspective.

The unit steepness and existing multi-layered canopies also make Unit 6 a low priority from a wildfire management perspective.

Plant Association Group for Unit 6 is tentatively rated as Moist Douglas-fir.

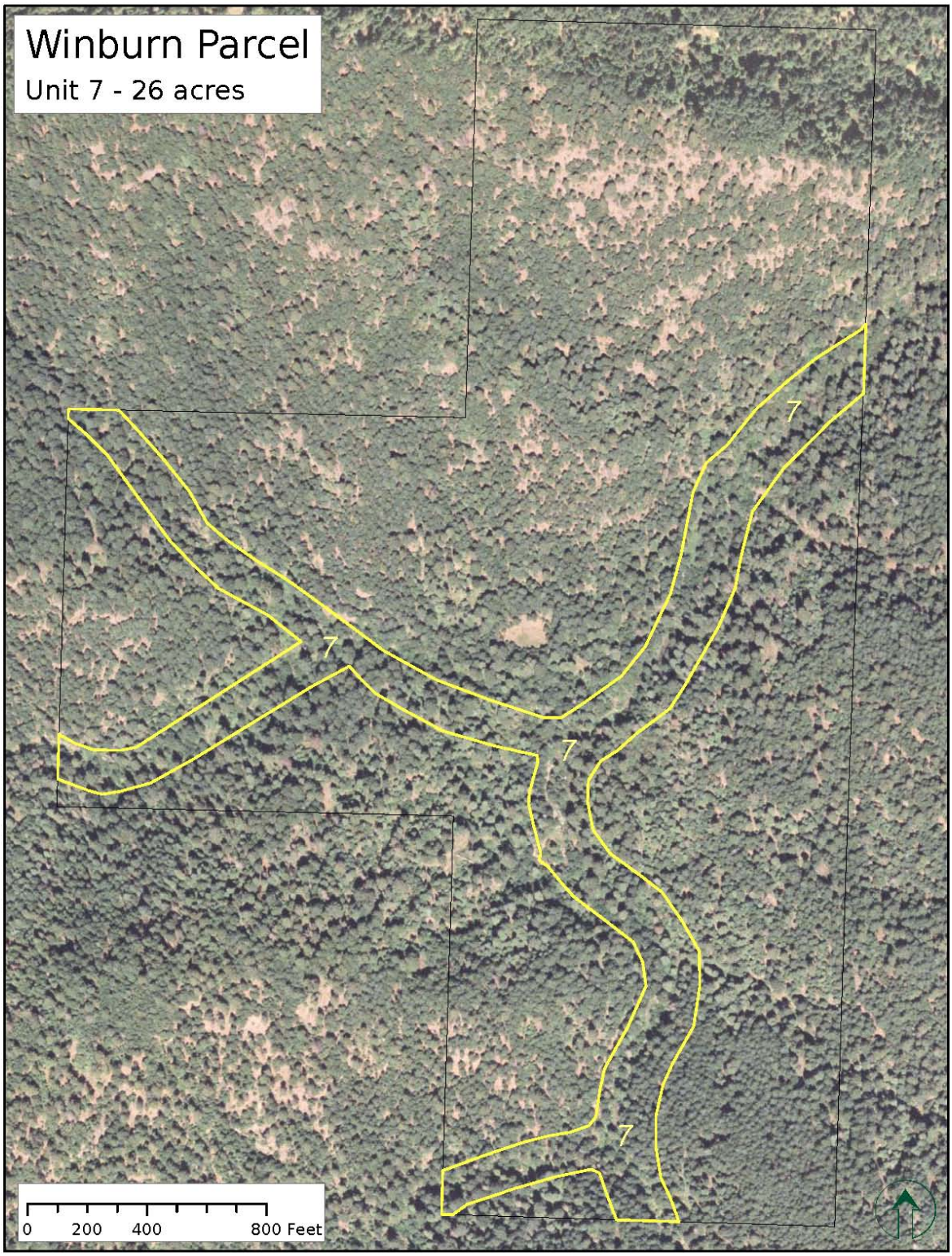
Unit 6 Prescription
Management activities designed to improve multiple objectives in Unit 6 are a low priority for a variety of reasons. Existing stand densities alone do not necessarily justify reduction at this time; crown ratios are generally good and relative densities, though high (0.649), are still on the edge of acceptability. Further, the steepness and multi-cohort structure in Unit 6 make it a low priority for treatment from a wildfire perspective; and fuel reduction activities have decreased influence on wildfire behavior on very steep slopes. Existing dwarf mistletoe infected overstory Douglas-fir currently are providing current and future spotted owl nesting habitat in an ideal topographical location. Perhaps most importantly, slope stability mapping indicated Unit 6 as Hazard Zone 1, suggesting extreme hazard with the maximum risk of failure. This does not categorically mean that no treatment is warranted, but it certainly suggests that important reasons must clearly be

identified prior to initiating vegetation modification (i.e., overzealous tree removal could aggravate slope instability on these steeper slopes).

The complex interaction of biological, ecological, and geographical features in this unit suggests that long-term objectives may be best met by doing little, if any, treatment at this time, particularly as regards larger overstory trees. It is doubtful that silvicultural treatments could significantly reduce dwarf mistletoe disease in this situation without a major reduction in larger overstory trees where it is well established. Unfortunately understory Douglas-fir will continue to be infected with dwarf mistletoe from above, with a corresponding long-term reduction in abundance of Douglas-fir on this unit, hastening a species conversion towards white fir. However, retaining dwarf mistletoe infected in overstory Douglas-fir with significant brooms provides potentially important spotted owl nesting sites, particularly in these more heavily utilized lower slope positions.

Treatment that could be considered include non-commercial thinning, piling and burning within 50 feet of overstory conifers (as was previously done in Units 1 and 5) to possibly increase their longevity, even those infected with dwarf mistletoe. It is suggested that non-commercial thinning to an average basal area of 150 square feet per acre within the 50-foot radius of uninfected overstory Douglas-fir, focusing particularly on removal of white fir. White fir could be a desirable part of the mix to retain, however, around dwarf mistletoe infected overstory Douglas-fir. Slash treatment (i.e., piling and burning) around preferred overstory trees should be done to increase the likelihood of their survival in a wildfire event and, hopefully, decrease the likelihood of transferring ground fire to crown fire in dwarf mistletoe infected overstory Douglas-fir. It is expected that large snags will continue to develop in Unit 6 over the next 10 to 30 years as dwarf mistletoe infected Douglas-fir die. The high amount of dwarf mistletoe infected Douglas-fir suggests the added importance of retaining uncommon, larger 16-inch + dbh alternate species, including hardwoods where they occur in this unit, and perhaps also thinning within their vicinity. All of these management activities are low priority items at this time, however; management activities elsewhere in the property are a higher priority.

Unit 7



Unit 7 Description - 19 acres
Unit 7 comprises the aquatic and riparian ecosystems associated with the perennial streams, West Fork of Ashland Creek and Weasel Creek, as well as their associated riparian buffers. These are excellent examples of healthy, functioning aquatic ecosystems and pristine salmonid fish habitat for the Siskiyou Mountains. Unit 7 includes aquatic and riparian systems in both steep constrained topography, as well as that associated with broader floodplains such as at the confluence of Ashland Creek and Weasel Creek. An intensive inventory of the fisheries and aquatic resources and conditions was completed for the entire length of the West Fork of Ashland Creek by the USDA Forest Service in 1969/70 and in 2001.

Existing riparian vegetation is well established throughout Unit 7 and includes such moist site facultative species as alder, bigleaf maple, Pacific dogwood, Pacific yew, and understory species, such as salal, hazel, sedges, rushes, and horsetails. Native upland hardwoods and conifers of multiple ages and sizes are also well-established throughout, combining to form a diverse assemblage of vegetational species and stand structures, including portions that contain late seral characteristics. This vegetation grades into a similar but more transitional vegetation type in adjacent Unit 3. No active management has occurred in Unit 7 since 1990 when a small amount of commercial harvesting occurred within the unit.

The size of Unit 7 for this plan was determined by assigning riparian management buffers of 70 to 100 feet on either side of major fish-bearing streams on the property (Ashland Creek, Weasel Creek) as required under Oregon Forest Practices Rules. Small, intermittent, non-fish bearing drainages higher in the uplands on the Winburn Parcel were not included in the mapping and delineation of Unit 7, even though they too require a minimum 10 foot buffer of retained vegetation. Although different stream/creek types require buffers of different sizes, it is also important that all of these areas be collectively considered as a single functional unit, with riparian and aquatic processes strongly interrelated and interconnected throughout the hydrologic network.

Significantly greater buffer sizes are required under USDA Forest Service guidelines up to 300 feet, or a more site specific riparian buffer developed by on-the-ground inventories. Considerable difference exists between the two regulatory standards, and the City of Ashland may choose to expand the buffers and subsequent total acreage in Unit 7. Functionally, riparian influence zones vary in size, and will be carefully inventoried, analyzed and delineated on-the-ground if and when active management practices are being considered.

Unit 7 Prescription
For the most part, active management in Unit 7 is not a high priority on the Winburn Parcel particularly in the highly constrained, steep canyons. An inventory of potential restoration treatments along Ashland Creek, Weasel Creek, and the unnamed perennial stream at the southwest corner of the parcel should be conducted, although activities will likely not be a high priority given that the functional condition of these streams is good. This inventory should be coordinated with the USDA Forest Service inventory and analysis work that has already been completed for the Ashland watershed in the Ashland Forest Resiliency Project. If restoration

treatments such as log/rock placement are desired, they are great to have in place prior to potential high severity disturbances in order to facilitate the recovery process.

Active stand and vegetation management activities within the riparian management areas are also not a high priority in this unit, particularly in the highly constrained, steep canyons and along the major fish-bearing streams and creeks (i.e., Ashland Creek, Weasel Creek). From a wildfire management perspective, however, broad valley bottoms associated with major stream intersections are classic fire refugia where historically fire tended to burn less frequently. Thinning-from-below primarily of non-commercial size classes with associated piling and burning to restore and/or accentuate wildfire management goals may be most appropriate in these fire refugia at two sites in Unit 7: 1) in the area connecting Units 1e and 4, and 2) in the vicinity of the confluence of Ashland Creek and Weasel Creek. Thinning in these locations should generally be light and variable, with a conscious effort to maintain and/or promote both aquatic/riparian function and late seral stand characteristics.

Actual riparian management area boundaries should be determined and delineated on-the-ground prior to initiation on any management activities. It may be desirable to expand buffer size to more closely match the riparian influence zone based on vegetative indicators, topographic conditions and other hydrologic variables.

An inventory of potential restoration treatments along Ashland Creek, Weasel Creek, and the unnamed perennial stream at the south west corner of the parcel should be conducted although activities will likely not be a high priority given that the functional condition of inventory and analysis work that has already been completed for the Ashland watershed in the Ashland Forest Resiliency Project. If restoration treatments such as log/rock placement are desired, they should be put in place prior to potential high severity disturbances in order to facilitate the recovery process.

In general, active vegetation management in aquatic/riparian ecosystems to help restore more typical functional processes and disturbance regimes becomes gradationally more appropriate as one moves higher in the hydrologic network. In the intermittent drainages higher in upland settings on the Winburn parcel, riparian influence is less pronounced and vegetation is more similar to that in adjacent upland settings. In these locations, fire historically interacted with the vegetation in ways not much different than in adjacent upland settings, and active management to restore such less wildfire prone vegetational conditions is more appropriate. Whenever active management in riparian influence zones is considered, purposeful retention and/or creation of a variety of stand structures, densities, and compositions is desired.

Riparian management areas are required by law to meet, in the least, the minimum width standards as described under the Oregon Forest Practices Act (see above). Actual riparian management area boundaries should be determined and delineated on-the-ground prior to initiation of any management activities. It may be desirable to expand buffer size to more closely match the riparian influence zone based on vegetative indicators, topographic conditions, and other hydrologic variables.

Removal of the large, old washed-out culverts would be beneficial, particularly if helicopters are working in the area.

APPENDIX

Summary of Prescriptions

Unit 1

- Commercial thin to basal areas of an average 125-175 square feet per acre on a stand level basis.
- Utilize principles of variable density thinning. Heavier thinning (BA 100-125) within 50-foot radius of preferred overstory conifers (especially ponderosa pine, sugar pine, Douglas-fir, and incense cedar) and hardwoods 16-inch+ dbh.
- Retain unthinned patches.
- Creation of additional small patch openings - 1 per 10 acres.
- Retain higher stand densities next to ephemeral draws and drainages.
- Continued reduction in Cohort 2 and 3 dwarf mistletoe infected DF, especially in upper 2/3 of slope positions.
- Pile and burn all resultant slash.
- Plant rust-resistant sugar pine seedlings in existing and/or created openings.

Unit 2

- Limited commercial and/or non-commercial thinning to release preferred overstory conifers and hardwoods (16-inch +dbh) or to reduce densities in small patches where basal areas exceed 200-225 square feet per acre
- Pile and burn all resulting slash
- Utilize contour felling/placement where possible to reduce downslope surface soil movement

Unit 3

- Manage on a unique micro-site basis, with emphasis on importance of adjacent riparian habitat.
- Non-commercial thinning (particularly of white fir) adjacent to Unit 1 to improve wildfire management effectiveness. Retain half or more of unit in unthinned patches. Pile and burn all resulting slash.
- Commercial and non-commercial thinning of small individual stands within the unit to restore basal areas of 175-225 square feet per acre. Utilize non-commercial thinning first where possible to achieve desired basal areas. Maintain inherent heterogeneity of stand conditions within the unit.
- Retain dwarf mistletoe infected overstory Douglas-fir in most of this unit, especially in lower portions adjacent identified riparian habitat. Removal more appropriate in lightly infected stands adjacent upland settings (e.g., Unit 1).
- Monitor laminated root disease pocket.

Unit 4

- Commercial thinning to either basal area average 200-225 or 175-200 square feet per acre. Thin heavier around large, vigorous dominant trees.
- Pile and burn all resulting slash.

Unit 5

- Subunit 5a- Radius thinning (50-foot +/-) around preferred conifers and hardwoods 16-inch +; thin to basal areas 100-150 square feet per acre within radius. Pile and burn all resulting slash.
- Subunit 5b - Commercial thinning to an average stand basal area of 150-180 square feet per acre. Pile and burn all resulting slash.
- Maintain a 50 foot untreated buffer around spring/seep at bottom of unit.

Unit 6

- Management actions are a low priority at this time.
- If desired, non-commercial thin, pile and burn in a 50-foot radius around preferred overstory conifers and hardwoods retaining an average basal area of 150 square feet per acre in that radius thinning. Adjust species retention to fit conditions of dwarf mistletoe in overstory Douglas-fir.

Unit 7

- Management actions are a low priority; the riparian/aquatic system has good functionality at this time.
- Width and delineation of riparian buffers determined on a site specific basis on-the-ground, using legally mandated widths as a minimum.
- Consider non-commercial thinning, piling and burning in a small percentage of the unit to tie into other fuel management treatments in adjacent Units 1 and 3.
- Consider restoration treatments, if necessary, in coordination with USDA Forest Service.
- Removal of washed out culverts if possible.

Glossary of General Forestry Terms

Age class: A classification of trees of a certain range of ages.
Aspect: The direction in which any piece of land faces.
Basal area: The cross-sectional area of tree boles in a forested area as measured at the diameter at breast height (dbh).
Biological Diversity: The variety of living organisms considered at all levels of organization, including the genetic, species, and higher taxonomic levels, the variety of habitats and ecosystems, as well as the processes occurring therein.
Bole: The main stem or trunk of a tree.
Broadcast Burning: Intentional burning of fuels and/or vegetation where the fuel has not been separately piled and the fire is applied under predetermined conditions such that it is allowed to spread freely throughout a pre-designated unit.
Brushing: A generic term referring to the practice of removing all, or a portion, of the brush component in a unit of forest vegetation to meet some pre-designated objective (e.g., fuel reduction, seedling establishment, etc.); can be done manually or with equipment.
Canopy: The more or less continuous cover of branches and foliage formed collectively by adjacent trees and other woody species in a forest stand. Where significant height differences occur between trees within a stand, formation of a multiple canopy (multi-layered) condition can result.
Coarse Woody Material: Portion of tree that has fallen or been cut and left in the woods. Pieces are at least 16-inch in diameter (small end) and at least 16-foot long.
Cohort: A group of trees developing after a single disturbance, commonly consisting of trees of similar age, although it can include a considerable range of tree ages of seedling or sprout origin and trees that predate the disturbance.
Crown Class: A class of tree based on crown position relative to the crowns of adjacent trees.

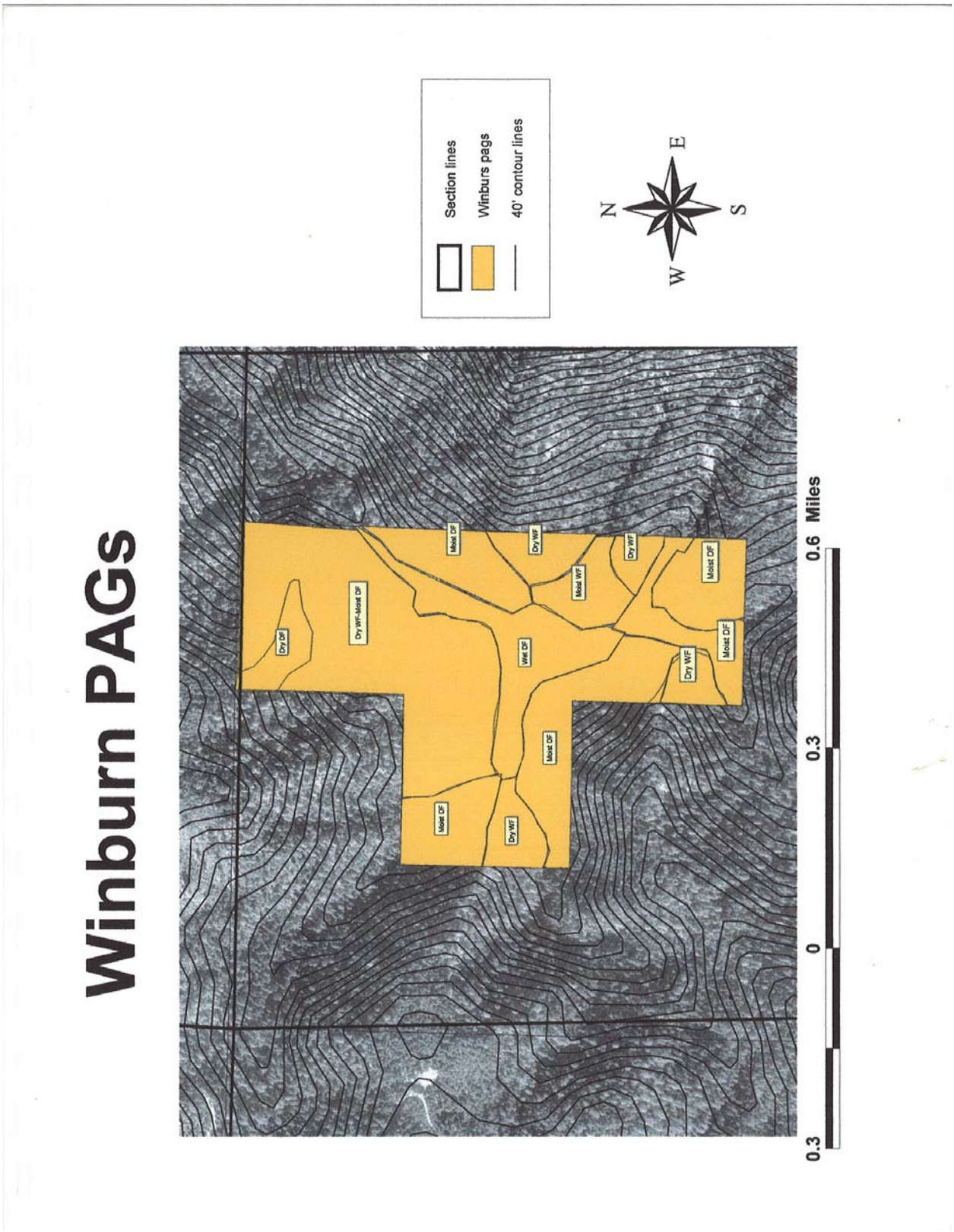
- **Dominant**: Crowns extend above the general level of crown cover of others of the same stratum and are not physically restricted from above, although possibly somewhat crowded by other trees on the sides.
- **Co-dominant**: Crowns form a general level of crown stratum and are not physically restricted from above, but are more or less crowded by other trees from the sides.
- **Intermediate**: Trees are shorter, but their crowns extend into the general level of dominant and co-dominant trees, free from physical restrictions from above, but quite crowded from the sides.
- **Suppressed**: Also known as overtopped. Crowns are entirely below the general level of dominant and co-dominant trees and are physically restricted from immediately above.

Crown fire: Fire that advances through the tops of trees.
Defensible fuel reduction zones: Areas of modified and reduced fuels that extend beyond fuel breaks to include a larger area of decreased fuels. These would include managed stands with reduced amounts, continuities, and/or distributions of fuels that would provide additional zones of opportunity for controlling wildfire.
Density management: Cutting of trees for a variety of purposes including, but not limited to: accelerating tree growth, improved forest health, to open the forest canopy, promotion of wildlife

and/or to accelerate the attainment of old growth characteristics if maintenance or restoration of biological diversity is the objective.
Diameter at breast height (dbh): The diameter of a tree 4.5 feet above the ground on the uphill side of the tree.
Down, dead woody fuels: Dead twigs, branches, stems, and boles of trees and shrugs that have fallen and lie on or near the ground.
Eco-type: A more or less homogeneous natural community type which occupies specific niches in the landscape. More or less synonymous with "landscape unit," but landscape units often will sub-divide an eco-type (often based on steepness of slope).
Fire hazard: The kind, volume, condition, arrangement, and location of fuels and vegetation that creates an increased threat of ignition, rate of spread, and resistance to control of wildfire.
Fire regime: The characteristic frequency, extent, intensity and seasonality of fires within an ecosystem.
Fire risk: The chance of various ignition sources, either lightning or human-caused, causing a fire.
Fire season: The period of time, usually during the summer and fall, when there are drier conditions and higher temperatures, and restrictions and rules designed to minimize forest fire risks are put into effect.
Fire severity: Measures the effect of fire on an ecosystem, especially the effect on plants. Fires are commonly classed as low, medium, and high.
Fire weather conditions: The state of the atmosphere within 5 to 10 miles of the earth's surface indicated by measures of temperature, pressure, wind speed, wind direction, humidity, visibility, clouds, and precipitation. The potential for fire weather conditions to influence fire behavior is generally described in terms of low to extreme.
Forest Health: The ability of forest ecosystems to remain productive, resilient, and stable over time and to withstand the effects of periodic natural or human-caused stresses such as drought, insect attack, disease, climatic changes, fire, flood, resource management practices, and resource demands.
Fuel continuity: A qualitative description of the distribution of fuel both horizontally and vertically. Continuous fuels readily support fire spread. The larger the fuel discontinuity, the greater the fire intensity required for fire spread.
Fuelbreak: A strip of land in which vegetation has been manipulated such that fires burning into one are more easily controlled.
Ladder fuels: Flammable vegetation that provides vertical continuity between the surface fuels and tree crowns.
Landscape unit: A defined area of land with relatively consistent topography and vegetation.
Log Decomposition Class - Any of five stages of deterioration of logs in the forest; stages range from essentially sound (class 1) to almost total decomposition (class 5).
Lop and scatter: A method of slash treatment in which slash is cut into smaller pieces and spread out to decrease fuel accumulations so that it lies closer to the ground to increase decomposition rate.
Hawksworth dwarf mistletoe rating: A method of determining the level and/or severity of infection of dwarf mistletoe disease (*Arcuethobium* species). See the Hawksworth rating system description in the Appendix for more detail.
Mature Stand: Traditionally defined as a discrete stand of trees for which the annual net rate of growth has peaked. Stands are generally greater than 80-100 years old and less than 180-200

years old. Stand age, diameter of dominant trees, and stand structure at maturity vary by forest cover types and local site conditions. Mature stands generally contain trees with a smaller average diameter, less age class variation, and less structural complexity than old-growth stands of the same forest type.
Merchantable timber: Trees large enough to be sold to a mill.
Monitoring: the process of collecting information to evaluate if objectives and expected results of a management plan are being realized or if implementation is proceeding as planned.
Mycorrhizae association: Symbiosis between particular species of fungi and the roots of vascular plants.
Noxious weeds: A term that generally refers to non-native plants introduced into an ecosystem. Noxious weeds tend to be aggressive, poisonous, toxic, difficult to manage and/or otherwise undesirable or threatening for healthy ecosystem functioning**.**
Old-Growth Forest: A forest stand usually at least 180-220 years old and typically suggesting the following characteristics: moderate to high canopy closure; a multilayered, multispecies canopy dominated by large overstory trees; high incidence of large trees, some with broken tops and other indications of old and decaying wood (decadence); numerous large snags; and heavy accumulations of wood, including large logs on the ground.
Overstory: The uppermost canopy layer in a stand.
Plant association: A group of plant communities which share the same set of dominant species and usually grow in a specific range of habitat conditions. There can be significant variation between sites and there is a great deal of variation at different successional pathways, vegetation trends and management opportunities.
Plant community: An area of vegetation in which the same set of species is present in all layers (tree, shrub, herb/grass, moss, and lichen)
Plant series or PAG: a group of plant associations that share a common feature of favoring development of particular tree species that will become dominant over time if the forest matures without disturbance.
Precommercial, or noncommercial, thinning: The removal of trees of little or no commercial value from a forest stand to achieve a pre-designated silvicultural objective (e.g., improve stand vigor, reduce wildfire danger, etc.)
Prescribed underburning: involves the controlled application of fire to understory vegetation and downed woody material when fuel moisture, soil moisture, and weather and atmospheric conditions allow for the fire to be confined to a predetermined area and intensity to achieve the planned resource objectives. (USDA, 2001)
Relative Density Index: The ratio of the actual stand density to the maximum stand density attainable in a stand. Used as a way to measure quantitative differences between stand densities. Measured on a scale between 0 and 1.00.
Release: A term used to indicate the increased growth that occurs in a tree or stand of trees following stand density reduction.
Restoration Ecology: The study of theoretical principles and applications in population and community ecology aimed to restore and rehabilitate highly disturbed or degraded ecosystems to their more natural states.
Riparian area: A geographic area (150-300-foot) influenced by an aquatic component and adjacent upland areas.

Seral Stage: A distinct but transitory developmental stage in the process of ecological succession characterized by a unique assemblage of plant species and vegetational structures. Seral stages are usually described as early, mid, and late.
Silviculture: The art and science guiding the establishment, growth, composition, health and quality of vegetation in forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.
Site index: Site index is a method of measuring and describing the potential productivity of any given site based on the height of dominant conifers by species at a given age.
Site productivity: The capacity of an area of land to produce carbon-based life forms.
Slash: Tree tops, branches, bark, and other typically non-merchantable debris left after forest management activities.
Slope percent: A standard way of measuring the steepness of any slope; specifically, a percent figure based on the rise in elevation in feet over a 100 foot distance (i.e., 25% slope equals a rise of 25 feet over a 100 foot distance). Although no uniform standards describing steepness exist, a typical classification is as follows: flat (0-5%), gentle (5-25%), moderate (25-55%), steep (55-75%, very steep (75%+).
Snag - Any standing dead or partially-dead, tree at least sixteen inches in diameter at breast height (dbh) and at least sixteen feet tall.
Stand (Tree Stand) - An aggregation of trees occupying a specific area and sufficiently uniform in composition, age, arrangement, and condition so that it is distinguishable from the forest in adjoining areas.
Stand Density - An expression of the number and size of trees on a forest site. May be expressed in terms of numbers of tpa, basal area, stand density index, or relative density index.
Stand Density Index - A measure of stand density independent of site quality and age. From the stand density index, an approximate number of trees, of a chosen diameter, capable of being supported on an acre can be determined.
Stocking level: The number of trees in any given area expressed as trees/acre.
Succession: The process through which vegetation develops over time as one community of plants replaces another; often described in terms of stages.
Swamper burning: A method of burning in which slash is thrown onto a burning pile.
Thinning from below: The cutting of non-dominant trees in a stand, usually in order to give more site resources to the dominant trees or to reduce ladder fuels.
Tree vigor: A measure, either subjective or quantitative, of the relative health of an individual tree.
Underburning: A type of broadcast burning that is applied under an existing stand of trees.
Understory: The vegetation layer between the canopy and the forest floor, including forbs, shrubs, smaller trees, and other low-lying vegetation.
Wildland/urban interface: A geographic area in which the urban and/or suburban setting is juxtaposed and transitionally grades into the wildland environment.


Winburn PAGs
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Winburns pags
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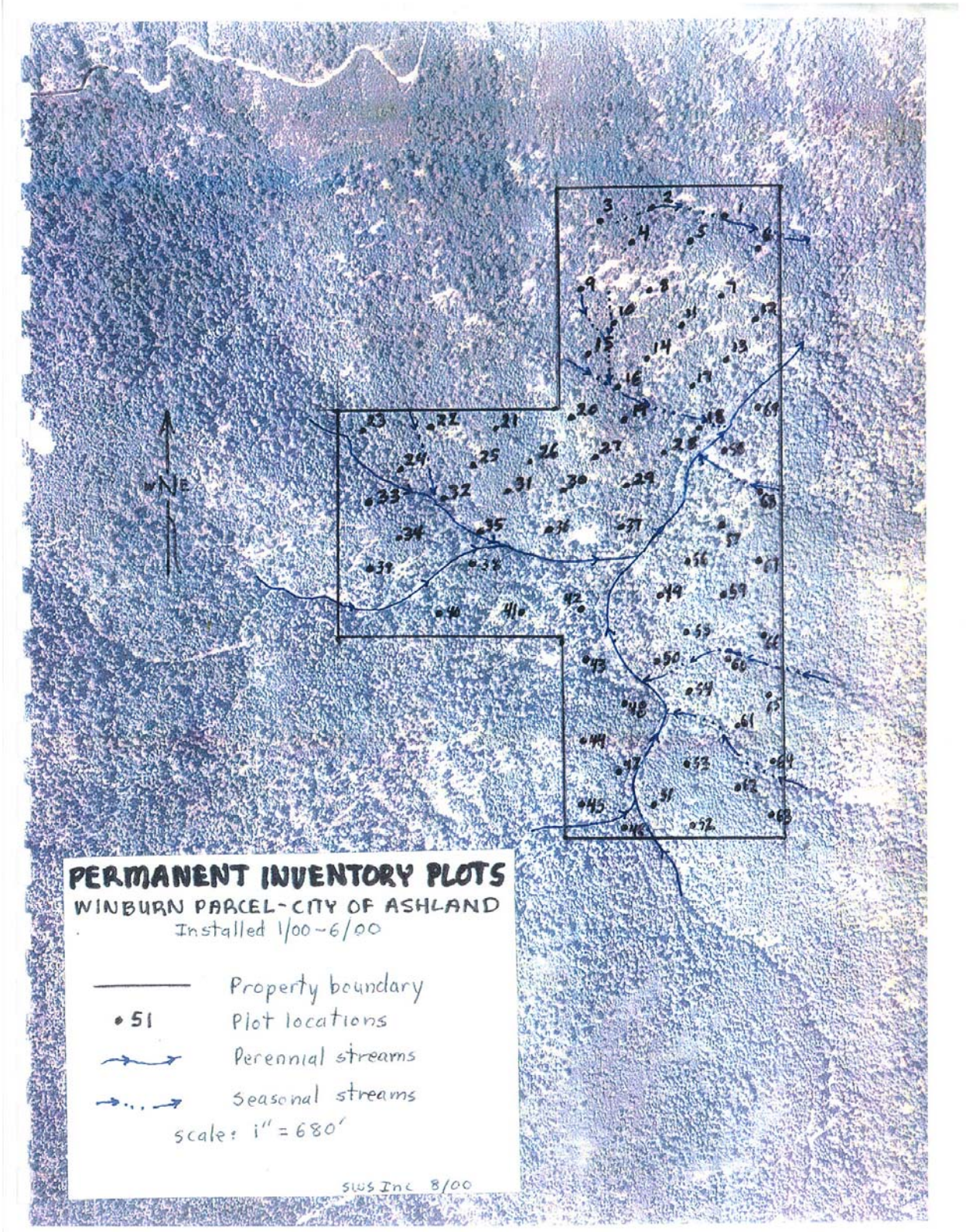
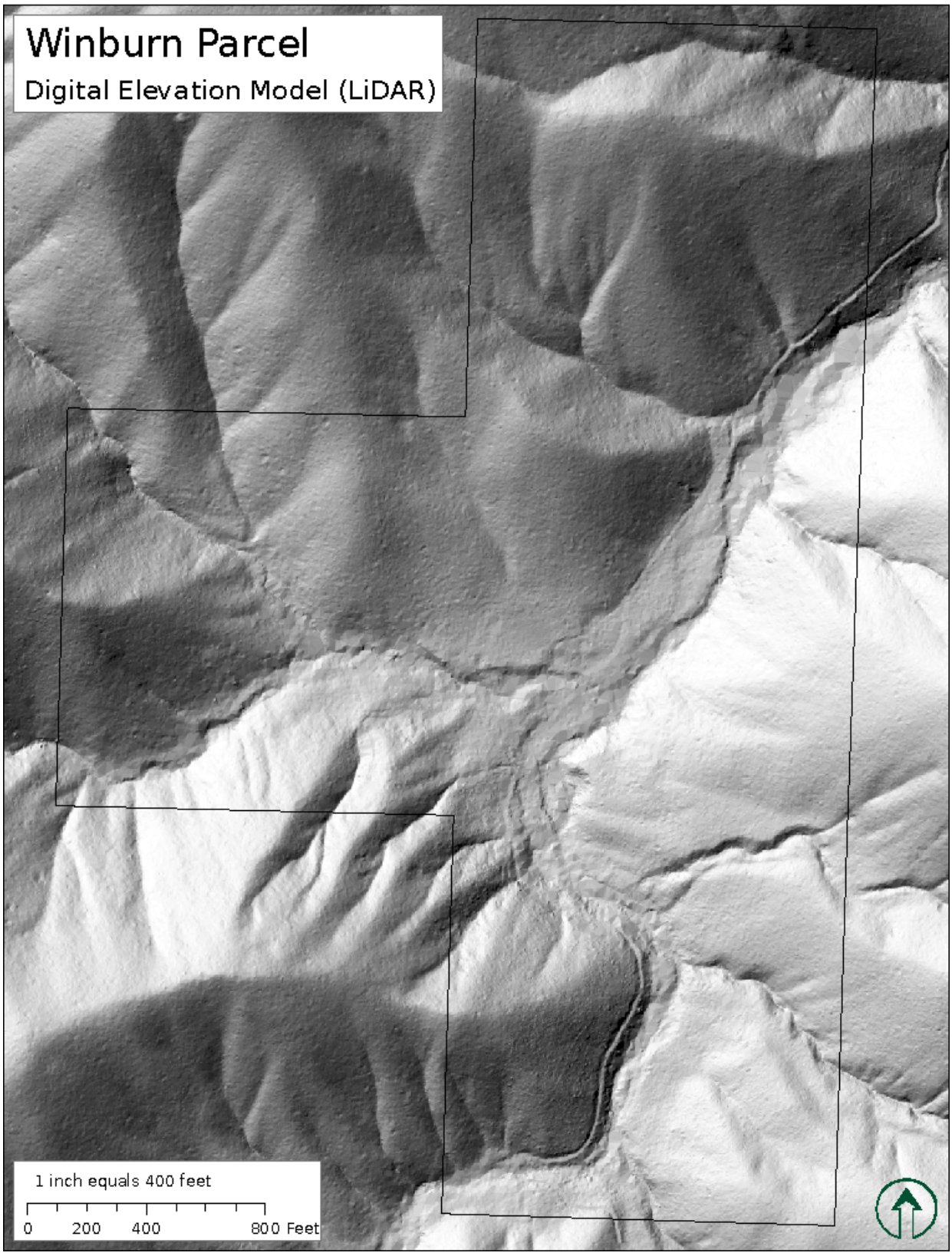
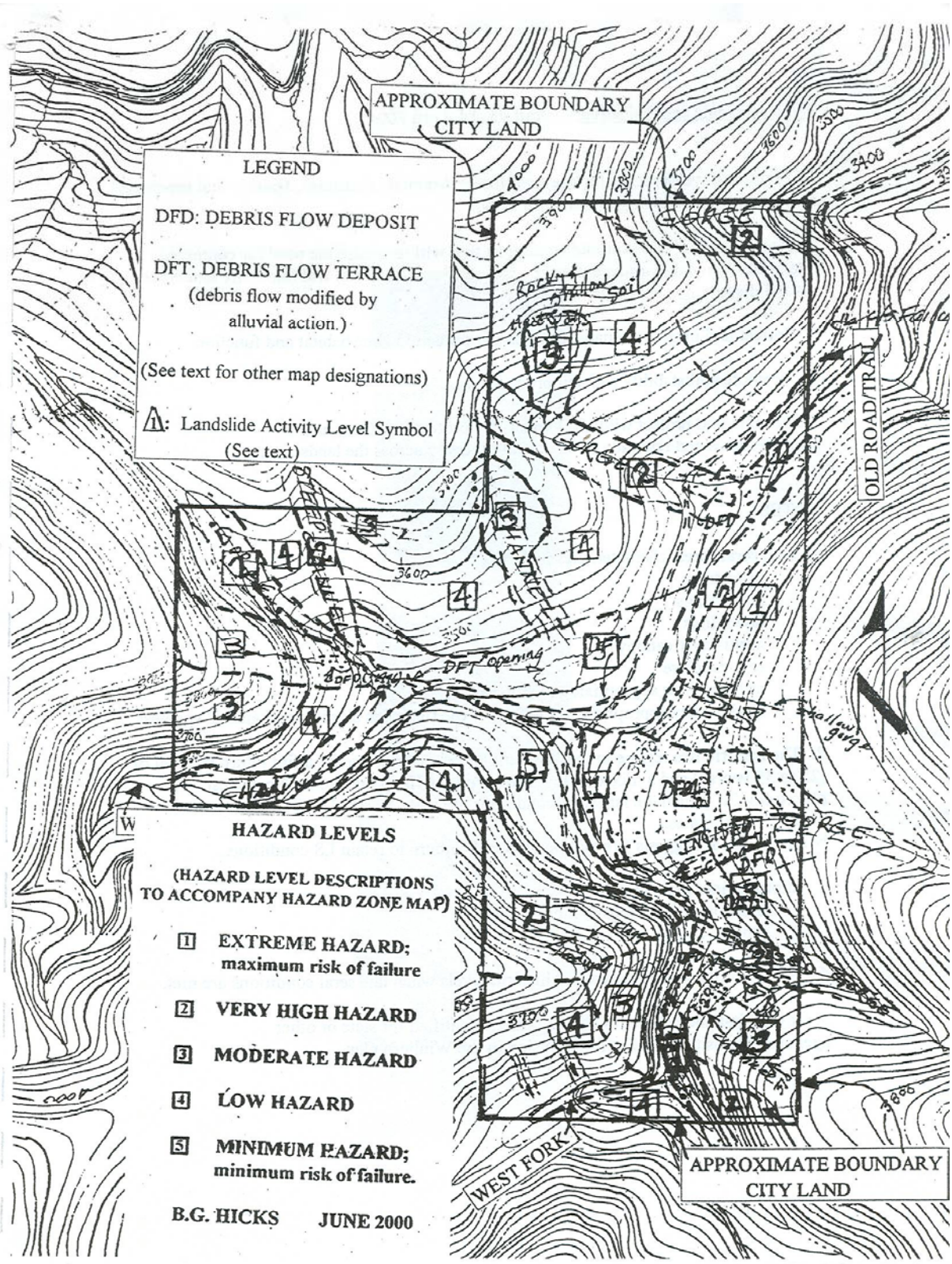
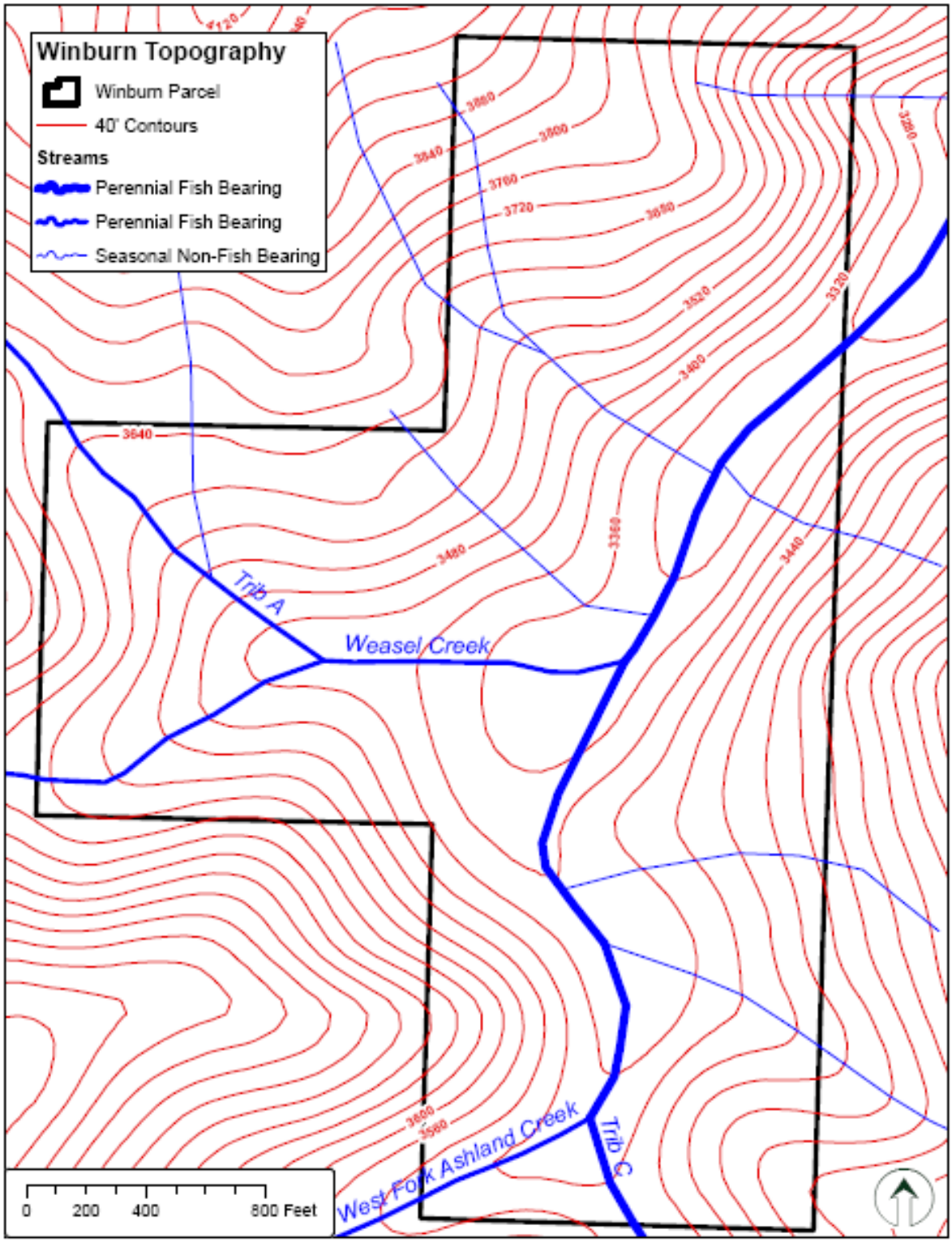
0.3
0.6 Miles


PERMANENT INVENTORY PLOTS
WINBURN PARCEL - CITY OF ASHLAND
Installed 1/00 - 6/00
Property boundary
• 51 Plot locations
Perennial streams
Seasonal streams
scale: 1" = 680'
SWS Inc 8/00


Winburn Parcel
Digital Elevation Model (LiDAR)
1 inch equals 400 feet
0
200
400
800 Feet



Map by B.G. Hicks, Consulting Engineering Geologist


Winburn Topography
Winburn Parcel
40' Contours
Streams
Perennial Fish Bearing
Perennial Fish Bearing
Seasonal Non-Fish Bearing
3880
3840
3800
3760
3720
3680
3640
3600
3560
3520
3480
3440
3400
3360
3320
3280
Trib A
Weasel Creek
West Fork Ashland Creek
Trib C
0
200
400
800 Feet

The 6-Class Dwarf Mistletoe Rating System

Frank G. Hawksworth