Silvicultural Prescriptions for

Additional Forest Management Areas

- An Update

A Report Prepared for
The City of Ashland

by

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Introduction

Small Woodland Services, Inc. was commissioned in 1995 by the City of Ashland to prepare a silvicultural prescription for a portion of their ownership in Parcels 4 and 5, as delineated in the Ashland Forest Plan (McCormick and Associates, 1992). This area had previously been specifically prioritized for silvicultural treatment and forest management activities to achieve the City's three primary objectives for management of their forestlands:

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.

Small Woodland Services, Inc., presented the prescription to the City of Ashland in a report entitled "A Silvicultural Prescription for High Priority Forest Management Areas" (Main, 1996). That report provided a generalized description of the prioritized management area, as well as a summary of the biological, ecological, and historical factors that produced the existing vegetational conditions on the site. In addition, the report presented an overview of the process of silvicultural planning, with in-depth discussions of each of the important parts of that process. Descriptions and prescriptions for individual units were then presented, with a summary and prioritization of proposed management activities within each unit.

In the ensuing two years, most of the silvicultural activities recommended in that report have been successfully completed within the prioritized management area. Modification of pre-existing vegetation, primarily through stand density reduction, has

The descriptions, prescriptions, discussions, and analyses contained in this report are specifically designed for the City of Ashland and its forestlands and may not necessarily be directly applicable or pertinent to other lands or ownerships in the vicinity. Stand conditions on the City of Ashland forestlands are unique within the Ashland watershed in that they are largely dominated by younger age and size classes initiated after the major wildfires in the early 1900's. City of Ashland objectives for their forestlands are also unique. Although there is considerable overlap with those of the U.S. Forest Service, the other major landowner in the Ashland watershed (a Memorandum of Understanding was signed between the two parties in 1985), the political, legal, social, and economic climate in which the two organizations exist is quite different, in some cases dramatically. Obviously, these differences are even more pronounced when compared with adjacent non-industrial private landowners in the forest-urban interface. Each of these non-biological parameters has considerable influence on how forest and resource management decisions are made and implemented. **Great care and caution should be taken in suggesting that analyses and recommendations contained herein are directly applicable to other agency, industrial, or private, non-industrial ownerships.**

Physical Description of Management Area

Location: This report addresses Parcels 3, 5 (primarily west of Ashland Creek), 6, 7, and 8 as delineated in the Ashland Forest Plan (McCormick and Assoc., 1992) (see map on preceding page).

Acres: The entire acreage owned by the City of Ashland within the Ashland watershed (not including the Winburn parcel) is 485.58. This report includes the remainder of those acres not originally covered in the February, 1996 report "A Silvicultural Prescription for High Priority Forest Management Areas" (Main, 1996). This report focuses on descriptions and proposed management of the upland areas of these forestlands. Although the total acreage includes Reeder Reservoir and the aquatic and riparian habitat along Ashland Creek, these areas are not specifically addressed in this report.

Access: Access to this management area is limited. The only access to Parcel 3 is from the rock quarry at the bottom of the parcel. Access to the west side of Ashland Creek is provided via USFS Road 2060, although very steep topography exists on either side of the road. The only access to the large bulk of the area on the east side of Ashland Creek is the Reeder Reservoir access road primarily located at the canyon bottom adjacent Ashland Creek.

Topography: Parcel 3 is located on relatively uniform easterly/northeasterly aspects running from Ashland Creek upslope to the western property line below the dominant ridge line. Elevation of this parcel ranges from 2,200 to 3,500 feet above sea level. The remainder of the management area is located within and on both sides of the Ashland Creek Canyon, failing to reach ridgelines on either side.

An Update of Silvicultural and Management Objectives

Considerable work has been completed since the preparation of the original document "A Silvicultural Prescription for High Priority Forest Management Areas" (Main, 1996). Implementation of proposed silvicultural treatments has allowed for further refinement of goals and opportunities within the management of City-owned lands. ORGANON growth and yield plots installed on the City ownership have provided information regarding present stand conditions and future stand development possibilities. Additional professional assessments funded by the City have determined more clearly geological and slope stability hazards. A botanical inventory has identified sensitive plant species and proposed methods for minimizing impacts to those species during forest management activities. Professional improvements have been made in assessment and implementation of silvicultural and stand management treatments designed to reduce the intensity and subsequent impacts associated with wildfire. Many of these treatments can simultaneously improve forest and/or stand health. All of these developments, among others, have allowed for a refinement of methods and possibilities for achieving the objectives outlined by the City of Ashland. These will be further described in the following sections.

Stand Management

In "A Silvicultural Prescription for High Priority Management Area (Main, 1996), generalized forest management objectives were described for those portions of Parcels 4 and 5 east of Ashland Creek, followed by specific stand management descriptions and prescriptions for each identified unit. This report will present descriptions and

Stand Structure

As stands develop, they typically progress through a series of stages, each of which contains specific and recognizable structural characteristics. Associated with these developmental structural changes in stands through time are simultaneous changes in a number of objectives or values, such as wildfire potential, wildlife habitat, insect and disease relations, species compositions, and numerous others. Management activities, or the lack of them can produce changes in stand conditions through time that can optimize or detract from specific objectives.

Oliver and Larson (1990) describe four general stages of stand development that occur following a stand replacing disturbance: stand initiation, stem exclusion, understory re-initiation, and old growth. After disturbance, the stand initiation stage occurs for several years while new plant species invade the site. As seedlings and saplings grow, the developing vegetation tends to make a transition to dense canopies of the stem exclusion stage where growing space becomes fully occupied, site resources fully utilized, and new individuals prevented from entering the site. The stem exclusion stage continues until the trees get larger and natural mortality occurs, providing openings in the main canopy. In this understory re-initiation stage, new species and individuals begin to grow in the understory. Eventually, these overstory trees die and the trees initiated during understory re-initiation emerge to develop into the dominant stand, subsequently creating the true old growth stand structures characterized by multiple-age classes, size classes, and multi-layered canopies.

This model provides a good conceptual framework with which to understand how stands develop over time. However, this march over time through the four stages of stand

Typical Successionary Changes in Forest Structure Producing More Wildfire Prone Vegetation

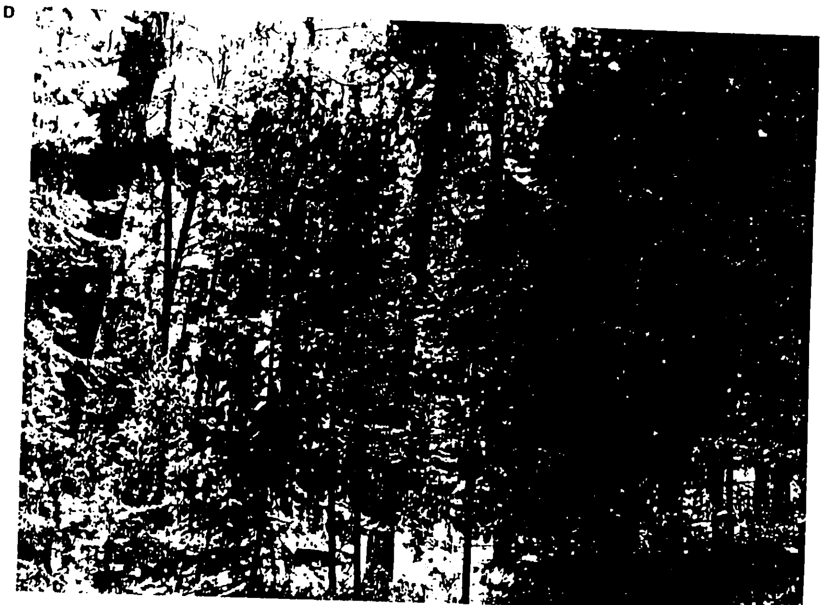
A

B

FIG. 10.6. *Landscape change with fire exclusion in* Pseudotsuga *forests of western Montana.* A: *In 1909, the forest is wide-spaced ponderosa pine, with little Douglas-fir, that has been lightly and selectively cut. The understory is snowberry and herbs.* B: *By 1928, Douglas-fir invasion is evident.*

C

D



C: *In 1938, the pattern continues.* D: *By 1948, a major structural change is largely complete, and the herbaceous understory has been shaded out.* (From Gruell et al. 1976; photos courtesy of USDA Forest Service Archives.)

within stands, trees may die as individuals and become snags. The biology of the cadre of insects that attack Douglas-fir suggests that the larger trees within the stands on the City forestlands are the most likely to be attacked and killed. This is unfortunate from both silvicultural (to be discussed later) and wildfire management perspectives. Snags can rapidly escalate wildfire behavior by spreading firebrands from their tops as well as representing significant safety hazards during wildfire suppression activities.

As insect populations increase, however, insect-related mortality begins to occur in patches, rather than in single trees. As insect populations explode, these patch sizes can become quite large, such as occurred in Lithia Park in the early 1990's when virtually all of the overstory Douglas-fir were killed. This increasing patch size of insect-related mortality of overstory Douglas-fir had also already occurred prior to the initiation of treatment in Parcels 4 and 5 (most notably in Unit D logged in summer 1996, and in numerous headwall locations throughout the area). Insect-related mortality in patches of expanding sizes ultimately encourages the patch to return to the much more fire prone vegetation types that typify earlier successional stages of stand development, particularly if a stand was dominated by a single species, such as Douglas-fir on the more northerly aspects in the City forestlands.

Unfortunately, development of understocked or nonstocked stand openings as a result of insect-related mortality (and/or any other type of vegetation removal) can change flow regime (the character, timing, and distribution of flows) and water discharge from a watershed. This occurs in two primary ways: (1) increases in surface or overland flow of water, and (2) increased potential for development of debris slides, debris torrents, or other major landslide events. These have potentially serious consequences not only failures, including major debris slides or torrents, however, is and should be a genuine concern on the City of Ashland forestlands. The occurrence of numerous major landslide events in the 1997 New Year's Day storm in undisturbed forests throughout the Ashland watershed makes these concerns well placed. Several slumps that occurred on City of Ashland forestlands during that 1997 event were located adjacent small openings created by helicopter harvesting (1990) and patches of insect-related mortality (although most of the openings had no associated slump or landslide features). Management decisions that actively encourage removal of patches of vegetation (patch clearcutting) or encourage insect-related mortality (no treatment), particularly openings of larger sizes, can potentially carry associated potential unfavorable consequences from a geological/slope failure/flow regime perspective. This is particularly more relevant on the City of Ashland forestlands due to their close proximity to Reeder Reservoir and the main Ashland Creek canyon bottom, allowing for greater likelihoods of increased amounts of direct sediment input into the hydrologic system, with impacts felt in aquatic ecosystems downstream throughout the Rogue River watershed area.

The highly stressed condition of many significantly overstocked stands and subsequent likelihood of excessive insect-related mortality thus represents a potentially highly undesirable outcome from both wildfire management and geological/hydrological perspectives. Reducing stand densities to improve stand vigor and subsequently decrease the likelihood of insect-related patch size mortality is an obviously appropriate management response. However, implementing stand density reduction activities that maintain densities and distributions of trees sufficient to prevent, or at least not accelerate, slope failure is a difficult and complex management challenge, particularly given that

As a result, suppression efforts can be concentrated during a wildfire event to encourage a transition from an unmanageable crown fire to a more manageable surface fire. Canopy densities are created that allow aerial retardant to reach the ground. Surface and ladder fuels are significantly reduced so that firefighting personnel can be safely deployed and utilize the areas for backfiring operations and fireline construction.

Shaded fuelbreaks have been the primary wildfire management strategy implemented on U.S. Forest Service lands to date in the Ashland watershed. Budget realities alone have prevented a more expansive wildfire management program. Nonetheless, implementation of shaded fuelbreaks has definitely increased the level of protection of the multiple resource values from destruction from catastrophic stand replacement wildfire.

In extreme wildfire behavior throughout the West, however, the narrow shaded fuelbreaks have not always been effective at stopping advancing wildfires (Van Wagtendonk, 1996; Weatherspoon and Skinner, 1996). Area-wide treatment of fuels is increasingly being accepted and used in conjunction with shaded fuelbreaks to further reduce the risk of damage or destruction to important forestland values (Weatherspoon and Skinner, 1996). In these defensible fuel profile zones (DFPZ), stand density and fuel reduction activities are conducted on larger areas up to one-quarter mile wide. Within DFPZ, stand density reductions do not have to be as dramatic as within shaded fuelbreaks, and a greater range of stand densities can be retained. Rather than relying on external inputs such as aerial retardant and personnel deployment to maximize suppression benefits within a narrow strip, DFPZ's are designed to produce vegetation and stand structural values that can, as much as possible, stand alone without external inputs during wildfire especially if it can be done on an area-wide basis, such as occurred in Parcels 4 and 5.

Within the new management areas, work in appropriately located shaded fuelbreaks should still be done first (to provide the greatest benefit in the shortest amount of time) before proceeding to more area-wide fuel reduction. The four most important locations (see map in Appendix) for immediate implementation of shaded fuelbreaks are:

1. The ridgeline above and south of the Ashland Creek Road subdivision in Parcel 3, tying into the quarry to the bottom (east).
2. The ridgeline immediately east and above Hosler Dam, particularly if the U.S. Forest Service can complete the remainder of the fuel reduction work and tie into their existing fuelbreak.
3. Units H and J on the west side of Ashland Creek, particularly if the U.S. Forest Service can complete fuel reduction and complete the shaded fuelbreak between Unit H and their fuelbreak upslope.
4. The ridgeline at the north end of Unit S (if deemed appropriate from a slope stability perspective), tying in the U.S. Forest Service fuelbreak to the east and to the proposed shaded fuelbreaks in Units H/J (except for the riparian habitat along Ashland Creek).

Although wildfire can never be totally prevented from the Ashland watershed (nor is it perhaps even desirable to do so in the long run), each of these fuel reduction strategies is most appropriately thought of as risk management. Each successive fuel reduction project further decreases the risk of damage to the investment—in this case, the many values associated with the Ashland watershed.

Completion of these shaded fuelbreaks and other future area-wide fuel reduction and wildfire management potential, while maintaining full site occupancy and subsequent minimization of potentials for slope failure. The social, political, and legal implications associated with aggravating slope failure on any of their acres (in a landscape that is already extremely prone to slope failure) suggest this to be a prudent approach to management for the near future.

Once improvements have been made from wildfire management and forest health perspectives, other values and/or silvicultural strategies may be more easily and effectively incorporated into active management of the City forestlands. Prescribed burning may be able to be much more cheaply, safely, and effectively implemented once initial stand density reduction and slash treatment activities have been undertaken. Improving wildlife habitat values by creating an appropriate mix of stand structures on a watershed or landscape level can also then be more effectively implemented. For instance, most of the City ownership does not contain stand structural values conducive to the promotion of spotted owls or other mature forest dependent wildlife species. Implementing management strategies to encourage vertical structure and multilayered canopies could certainly improve the long-term potentials for mature forest habitat values within the City forestland. However, creating these structures at this time would conflict with wildfire management strategies, as multilayered canopies contain excessive ladder fuels capable of initiating and/or aggravating wildfire behavior. The Bear Watershed Analysis (1995) suggests that managing for suboptimal spotted owl habitat in strategic locations within the Ashland watershed to maximize opportunities for wildfire management may be appropriate rather than risking catastrophic losses of late successional habitat to wildfire. Given the topographical location of the City of Ashland forestlands of the most basic and important structural values of late successional forests.

Stand Density

As stands proceed through the typical progression of stand development as previously described, competition for resources between trees steadily increases in a relatively predictable series of stages.

In the first stage, individual trees are free to grow and fully utilize site resources, unaffected by competition from other trees, although they may struggle from competition from shrubs, grasses, broadleaved herbs, and other competing vegetation. Overall stand growth is less than optimal during this stage, as site resources are not fully utilized by developing seedlings and saplings.

Eventually, trees continue to grow until the point where they begin to compete with each other. At this onset of competition, individual tree growth begins to decline and self-pruning begins. During stage 2, there is still less than full site occupancy and total stand growth remains less than optimal.

In stage 3 of stand density development, overall stand growth reaches its potential at relatively full site occupancy. Although individual tree growth is less than in stages stands in stage 3 develop into relatively closed canopies where shortages in light and moisture begin to significantly limit the development of understory vegetation. Size differentiation between trees becomes more obvious as larger, more dominant trees begin to separate in size from smaller, less vigorous trees. In some situations, however, size differentiation is minimal due to excessive stand densities and stand stagnation can result in which entire stands of individual trees significantly decrease in growth and vigor.

A relatively long plateau in stage 3 is typical (see Figure 1), when stand growth is optimized and full site occupancy exists. Eventually, however, stands enter a fourth stage where self-thinning from density-related mortality occurs. Stands in this stage are usually highly susceptible to insect-related mortality in outbreaks that can involve individual trees up to entire stands. Total stand growth decreases as trees die, perhaps increasing growth of adjacent individual trees. Site occupancy can be more variable, particularly as individual trees or small patches of trees begin to die. Stagnated stands that are highly susceptible to attack from bark beetles, as populations of bark beetles can rapidly expand to high numbers where even the healthiest conifers are attacked and killed. Wholesale destruction of a tree species within a stand can occur, such as occurred with Douglas-fir in Lithia Park in the early 1990's and more recently in portions of Parcels 3, 4, and 5. If Douglas-fir is the primary species in the stand as it is throughout most of the City forestlands, large understocked or unstocked openings can occur, obviously a disadvantage from a slope stability or wildfire management perspective as described previously.

Without disturbance, however, some stands continue to develop until a relatively predictable boundary is reached (see Figure 2) that is a theoretical maximum between tree size and stand density. At this boundary point, any additional stand growth is offset by a corresponding decrease in numbers. This boundary line exists for any tree species, and holds true regardless of site quality.

Disturbances, either natural (fire, insects and disease, windthrow, landslides, etc.) or management related (prescribed burning, pre-commercial thinning and release, harvesting, etc.) shift stand densities backward into lower stand densities and fewer trees stages of stand density development previously described. Figure 1 indicates relationships between relative density and the previously described stages of stand density development.

Management actions, such as thinning and release treatments, can be implemented to create stand densities that optimize objectives, such as those outlined by the City of Ashland. Ideally, stand densities can be maintained within stage III of stand density development (i.e., above RD .35 to .40 but below RD .55 to .60) through periodic removals. This will insure full site occupancy while maintaining stand densities conducive to stand and forest health (provided significant disease agents are not at work). Stand densities within this range also minimize the development of within-stand insect-related mortality and/or stagnation that occurs at greater RD's. Ongoing patch mortality and subsequent snag development are particularly undesirable results from both slope stability and wildfire management perspectives, as previously described in the section on stand structure.

However, most stand densities on the City forestlands are very high to extreme, well into Stages IV and V of stand density development. Relative density indices (RD) of untreated stands of .70 to 1.0 are typical, indicative of moderately to severely stagnating stands. Individual trees exhibit these density-related effects by small, poorly developed crowns, decreasing radial growth rates, susceptibility to insect attack, and tree mortality.

Maintaining stand densities that fully occupy the sites (RD's between .35-.40 and .55-.60) will generally prevent initiation of understory vegetation and ladder fuels while maintaining full site occupancy. These RD's generally corresponds to basal areas that range between 110 to 130 and 160 to 180 square feet per acre in most of the existing maintaining stand densities as close to RD .55-.60 as possible (typically around basal areas of 175± square feet per acre in the stands of the City's ownership), may be an appropriate management response to optimize slope stabilities.

Although a large range of RD's (.35 to .60) and basal areas (110 to 175+) comprise Stage III of stand density development and maintain desired full-site occupancy, it is clear that opposite ends of that range are preferred from wildfire management and slope stability perspectives. The removal of any single stem from a forestland minimally reduces the risk of potential damage from wildfire, while simultaneously minimally increasing minimally the risk of potential landsliding/slumping. Given that avoiding risk is not possible in this situation (some level of risk is associated with both doing nothing [increased potential of mortality, wildfire, and future slumping] and with implementing stand management practices [increased short-term landslide potential]), it is obviously in the City's interest to shift desired RD's and stand densities to best fit the specific site needs of each location on their ownership.

Variations in stand density reduction to address these concerns has already occurred in Parcels 4 and 5, which are generally the least prone to landslide activity of the City forestlands. Initial thinning (from below) and release treatments have lowered stand densities and RD's to more desirable levels, given the City of Ashland's objectives. Basal areas of most treated stands have been initially reduced to an average of 175 to 200 square feet per acre, which generally corresponds to average RD's of .50 to .65. These stands initially ranged in pre-treatment RD's from .70 to 1.0.

Considerable within-stand variation is typical, however, and individual spots can be well outside that average range. Thinning to create lower stand densities was common reducing tree stress, improving tree vigor, and repelling attacking bark beetles.

In Parcels 4 and 5, then, initial stand density reductions were largely thinnings "from below." Almost invariably, the thinnings were light in nature, seldom reaching desired RD's in this single entry. A heavier stand density reduction would have been inappropriate at this time for two reasons:

1. The moderately to severely overstocked stands, particularly those on more northerly aspects, could have easily received significant tree shock, windthrow, tipping over, etc., if opened up too quickly. Several light thinnings to slowly bring a stand out of stagnation is highly desirable in such a situation. In severely stagnated stands (RD = 0.8 - 1.0+), the traditional prescription calling for liquidation of growing stock and basically starting over was not considered an option, particularly given slope stability concerns and impacts on flow regimes and slope stability.
2. Larger, merchantable trees would have had to have been felled in order to achieve more optimal stand densities. Not only would this have represented an unnecessary loss of potential income for the City (or at least loss of a financial offset for accomplishing forest and watershed management conditions), but would also have made slash reduction activities (i.e., piling and burning) much more difficult and expensive, as larger merchantable sized pieces are much more difficult to handle manually. **It must be noted, however, that in numerous units on City forestlands (see Table I appendix; Unit prescriptions), desirable stand densities will NOT be able to be achieved without removal of merchantable size classes of conifers.**

already inherently possess good log quality characteristics, although most are currently too small yet to bring increased values in the marketplace. Improving stand densities, encouraging crown and diameter growth, and redistributing growth onto fewer, larger trees, will, in the long term, result in of stands comprised of higher quality, more valuable timber, an obvious long-term economic advantage for the City.

The immediate necessity of maintaining full stocking over as much of the ownership as possible for as long as possible, however, suggests that stand management directions should focus on long rotation silviculture. Sites fully occupied with large diameter conifers with minimal surface or understory fuels also represent an optimal future stand condition over much of the City forestlands, given their long-term objectives centered around watershed values and maintenance of water quality and quantity. The stand density management guidelines and indices described above can help in that process.

There may be locations within the City forestlands, however, where the potential hazard associated with landslide events (damage to the water pipeline, water treatment plant, homes and/or other improvements, etc.) is so great that vegetation manipulation of any kind is not warranted at this time. **It should be the responsibility of the City of Ashland to determine acceptable levels of risk and subsequent amounts of vegetation removal, if any, for these sites.** Hicks (1997) slope stability and hazard zonation mapping can be used to assist in risk assessment by the City. Several tables in the Appendix indicate those units where risk assessment by the City will be necessary prior to implementation of any forest management activities.

It should be noted that with each succeeding stand density reduction implemented and the impact of fire suppression and subsequent changes in stand densities, canopy closures, and other ecological relationships. For similar reasons, hardwoods and brush species are probably more common. These changes are particularly evident on more southerly and westerly aspects on the City forestlands. Thinning to promote the pines whenever possible and perhaps decrease the abundance of hardwoods in some situations is appropriate. If ponderosa pine natural regeneration is going to be successful, significant stand openings and reductions in stand densities will have to occur.

If maximizing timber volume and value were higher priorities for the City, then maximizing growth of conifers alone could be promoted. This has not been identified as a key objective, however. Thus, in the short term, any of the native species can serve to provide watershed values and slope stability, forest health, or wildfire management benefits. Since stand density reductions in the future will likely focus on removal of merchantable conifers and subsequently provide income for the City, it is not unwise to favor the two primary conifers at this time—Douglas-fir and ponderosa pine—all other things being equal. Too, in the long run stands dominated by larger, older conifers and mature forest values (particularly those with poorly developed understories and fuel profiles) represent an optimal stand type from other perspectives as well, most notably wildfire management.

From a biodiversity or wildlife habitat perspective, however, greater species diversity, both within stands and on a watershed level, is desired. Too, hardwoods, for example, have numerous other values as described in "A Silvicultural Prescription for High Priority Management Areas" (Main, 1996) including suspected benefits associated with stand health as well as possible reduction of wildfire severity in mixed stands.

of vegetation is a potential increase in surface flows and potential decrease in slope stability as roots decompose and root strength decreases, an increase in potential landslide activation and subsequent potential for increased downslope and downstream impacts upon values-at-risk. Since vegetation removal has both positive and negative potentials in this situation. Clear delineation of those locations on the City of Ashland forestlands that are prone, in various degrees, to landslide activity is essential. As a result, the City of Ashland, in September of 1996, contracted with B. G. Hicks, engineering geologist, to conduct a mapping of landslides, slope instabilities, and zones of geologic hazard within their ownership. This work was completed in July, 1997, and submitted to the City. In that report, Hicks categorized landslide activity on the ground and rated the locations as active, sub-active, dormant, inactive, or unclassified (no indications of landslide activity). With this information, Hicks then produced landslide hazard levels which assessed the risk associated with implementation of forest management activities (such as harvesting or road construction) that can aggravate landslides and potentially affect downstream or downslope land values, structures and other improvements, streams and fisheries, and other values-at-risk.

This carefully delineated mapping of landslide activity and zones of hazard was designed to provide input into the decision-making process regarding forest and resource management of any particular site or stand on City forestlands in the Ashland Creek watershed. From a geological or slope stability perspective, prevention of and/or minimization of catastrophic wildfire or other events (i.e., insect-related mortality) that remove all or almost all vegetation from a site is of the highest priority. This, then, infers the necessity of vegetation manipulation and/or modification such as previously described.

by City personnel prior to initiation of management activities are indicated in the Appendix in "Comparison of Objectives and Concerns by Unit" and "Current Priorities - City of Ashland Forestlands."

Management decision-making may be influenced by passage of recent legislation that authorizes the Oregon Department of Forestry to withhold approval of forest operations on "high risk" sites that are subject to landslides and/or debris torrents that can threaten human life. This legislation, formally Senate Bill 1211, became effective on July 18, 1997, and is a temporary statute that terminates on January 1, 2000, at which time it is planned that more permanent statutes will be in place. The law basically requires the Oregon Department of Forestry to prohibit all forest operations when three conditions are met:

1. When a proposed forest operation includes a high risk site as determined by a number of specific characteristics, including active landslides, slopes greater than 80 percent, headwalls greater than 70 percent, etc.
2. When residences, schools, or other occupied buildings or high use public roads are located downslope of the proposed operation where they could be struck by a fast-moving landslide event.
3. When a landslide initiated in the proposed operation area could reach the buildings or roads.

Before initiating any operations on any suspected high risk sites, it is highly advised that the City of Ashland contact the Oregon Department of Forestry to review possible applicability of this new statute to any portion of the City's forestlands. The City's proactive development of geologic mapping of their ownership, Light, judicious thinning, piling and burning may also be applied in the future to reduce wildfire susceptibility while maintaining geologic/ hydrologic integrity.

Engineering geologist Billy Hicks has additionally recommended that in future stand density reductions, particularly during harvest operations, trees for removal not be aligned straight up and down on steep, stability sensitive slopes.

Rare Plant Species

Forest management practices can be modified where necessary to produce more favorable conditions for survival and/or spread of rare plant species, provided they are (1) known and locations mapped, and (2) management practices delineated and understood that can encourage a given species. Stand structures can then be developed and/or modified through techniques previously described to encourage the individual species of concern.

In the spring and summer of 1997, a botanical survey of the City of Ashland lands in the Ashland Creek Watershed was conducted under contract by U.S. Forest Service botanist Wayne Rolle. He found and described three plants of particular interest that were found: (1) three-leaved horkelia (Horkelia tridentata), (2) Lemmon's catchfly (Silene lemmonii), and (3) crinkle-awn fescue (Festuca subuliflora).

As a result of Rolle's inventory and recommendations, it appears that no particular changes or adaptations of proposed forest management activities are warranted at this time. Rolle concludes that, for Horkelia tridentata, (1) reduction in stand densities such as proposed and implemented will likely be beneficial for this species; and (2) City lands subsurface flow. In effect, roads act as surface flow paths, becoming an integrated component of the stream network. Greatly accelerated sediment delivery to stream systems results, even without considering the impacts associated with the debris slides and debris torrents initiated and/or accentuated by the 2060 road in the January 1, 1997 storm event. These major erosional events destroyed portions of the 2060 road and will require major maintenance costs to upgrade once again to a fully usable status. Simultaneously, they contributed sizable amounts of sediment into stream systems, temporarily increased flood stage flows, threatened the water treatment plant, and removed considerable forestland out-of-production, thereby reducing groundwater storage capacity and ultimately acting as yet another surface flowpath to more rapidly deliver both surface and subsurface flows into the stream network.

Because of these major potential watershed-level impacts, no new roads are planned or recommended for management of the City of Ashland forestlands. Future removal of merchantable logs in stand density reduction activities should be done by helicopter, subsequently avoiding the need for new roads and minimizing impacts to other resource values.

Upgrading and/or restoration of existing roads should be a high priority for the City of Ashland. Various techniques can be designed and implemented to disperse water to subsurface pathways and reduce sediment input into the stream network. These include increasing the density of waterbars, draindips, and culverts; relocating these drainage devices where appropriate; outsloping road surfaces; stabilizing cutbanks with riprap retaining walls and/or filter fabric; restoring vegetation in fresh fills and/or failures; and numerous other techniques.

Perhaps most importantly, a proactive plan for management of the aquatic and riparian habitat within the City's forestlands is badly needed. To date, management planning and implementation of forest management activities has focused on hillslope and upland terrestrial habitat. No activity has been implemented within the 100-foot riparian buffer along Ashland Creek. However, management practices may be applicable that could actually improve aquatic and/or riparian habitat values within this area from Reeder Reservoir to Lithia Park. Extensive work has been done characterizing and monitoring aquatic and riparian habitats elsewhere in the Ashland Watershed by the U.S. Forest Service. A more proactive approach to managing impacts to aquatic and riparian habitats within the City forestlands should be prioritized.

The City forestlands have long received considerable recreational use, though largely unmonitored and unsupervised. Hikers and mountain bikers have been the primary users of the area, although unwelcome transient camping has also been common. Each of these activities brings potential impacts to the City forestlands, most notably an increased potential for erosion and sediment input into the aquatic system, as well as increased risk of wildfire. With the ongoing fuel reduction activities within City forestlands, it is suspected that an increase in recreational use is possible. A proactive approach to the possibility of increased recreational use is highly recommended. Recent discussions regarding development of a recreational plan emphasizing appropriate trail usage and maintenance is certainly a step in the right direction.

Stand density reduction activities, as prescribed for forested stands throughout the City ownership, involve removal of trees to create more optimal stand conditions to meet predesignated objectives. In many situations within the City forestlands, reaching

Unit Descriptions and Prescriptions

Unit G - 28 acres

Description: Unit G comprises three subunits on very steep (55 to 85+ percent) southeasterly to northeasterly aspects on the west side of Ashland Creek. These subunits are characterized by a dense vegetation largely initiated after the 1959 wildfire, which burned intensely in this unit, effectively removing almost all of the above ground vegetation. Rare larger overstory ponderosa pine and Douglas-fir 100 to 150 years old and up to 30 inches DBH that survived the fire are currently scattered throughout Unit G, although many are dead or dying (particularly Douglas-fir) amidst the heavy competition of the developing understory stand. This developing stand is heavily dominated by brush and smaller hardwood species that are well adapted for recovery following major catastrophic disturbances. Pacific madrone in the 2 to 12 inch DBH size class is particularly dominant, especially on more northerly aspects where it grows in close to pure stands in some locations. California black oak, generally of a slightly smaller size class, increases in abundance on more southerly aspects, along with whiteleaf manzanita and deerbrush ceanothus. Douglas-fir of a similar size class as Pacific madrone is the primary conifer (particularly on more northerly aspects) and in small spots is fully stocked (most notably subunit G3) although invariably under competition from other conifers, hardwoods, and brush species. Shade tolerant incense cedar is occasionally found as an understory seedling or small sapling. Large portions of Unit G contain few conifers, however, particularly on more southeasterly aspects. With over 38 years of unrestricted growth since the 1959 wildfire, however, the stands in Unit G are currently overstocked, typically ranging from 1,000 to 2,500 trees per acre. This dense thicket of mixed conifers, hardwoods, and brush species creates a dense fuel profile highly susceptible to another wildfire event, especially given the very steep slopes. Although Hicks' landslide zonation work indicates few areas of active landslide activity (only one area of activity level 2 was delineated in subunit G1), one can expect increased likelihood of slope instability on the very steep slopes above 65 to 70 percent. Estimated 100 year site index for Douglas-fir is 90 to 100 on more southerly aspects, 110 to 120 on more northerly aspects.

Prescription: Management actions designed to treat existing vegetation throughout much of Unit G are a low priority at this time. Development of the less wildfire prone vegetation through typical fuel reduction techniques (thinning, piling and burning, etc.) will not be as effective in this unit as elsewhere on the City's forestlands due to (1) the dense, continuous fuel profile, with both significant horizontal and vertical fuel continuity, and crown canopies, even of preferred leave trees, still close to ground level; (2) very steep sites that add to increased wildfire behavior, and (3) the greater difficulty in piling and burning slash on these steeper sites without scorching leave trees.

Two important locations for fuel reductions do exist, however: (1) in the upper 100+ feet of subunit G1 in order to widen the effective fuelbreak along the ridgeline adjacent Unit H. Vegetation removal in this area should be coordinated with input from a consulting geologist to insure that the potentials for landsliding are not unnecessarily

Prescription: Creating a shaded fuelbreak in Unit H should be one of the highest priorities on the City of Ashland forestlands. Fortunately, the existing open stand conditions should make the process easy in this location. Development of a 200 to 400-foot wide unit could be tied into the U.S. Forest Service fuelbreak to the west if the agency completes the connector between the property line and their existing fuelbreak. This would offer an excellent location to stop the advance of a wildfire spreading up-canyon on the west side of Ashland Creek. This is particularly important given the highly fire prone vegetation on very steep slopes in adjacent Unit G1 just down-canyon to the north. Ideally, the first step in the creation of the shaded fuelbreak should be removal of merchantable dead, dying, or heavily suppressed conifers, particularly Douglas-fir, if a property-wide helicopter timber sale occurs. Many of these dying trees will be unmerchantable within 1-2 years; some already are unmerchantable snags and will have to be felled, along with any over-accumulations of larger hardwoods. The remaining post-treatment trees should primarily be larger, healthy overstory conifers in the 14 to 22-inch DBH range, with ponderosa pine preferred. Post-treatment stand basal areas should average 100 to 125 square feet per acre. Understory vegetation and ladder fuels should almost uniformly be removed from Unit H to create an optimal shaded fuelbreak. Small strips of brush may be maintained on the steeper (50 to 60 percent) slopes immediately above the 2060 road and above the intermittent draw that forms the south boundary of Unit H. It is important, however, that these strips of vegetation are very discontinuous, with large openings between them in order to maintain the effectiveness of the shaded fuelbreak. The effectiveness of the shaded fuelbreak could be additionally improved if thinning and fuel reduction work could be extended 100 feet to the north into Unit G1, pending review for slope stability problems by a consulting engineering geologist. In this initial treatment, all slash can be piled and burned. Future maintenance treatments in Unit H can be accomplished through the use of prescribed fire.

Unit J - 7 acres

Description: Unit J is located on unique topography on the west side of Ashland Creek where four small topographical draws flow together prior to convergence into Ashland Creek. This creates virtually the only area on the City of Ashland forestlands on the west side of Ashland Creek where slopes are gentle to moderate, primarily from 20 to 40 percent. Soils are deep at these lower topographical locations and 100 year site indices of 115 to 125 for Douglas-fir occur, even on these southerly to easterly aspects. Conifer growth and stand vigor is among the best of City forestlands west of Ashland Creek. Douglas-fir comprises over 80 percent of the stand basal area, primarily in 70 to 95-year-old, 14- to 24-inch DBH trees. Individual Douglas-fir up to 30 inches DBH were found scattered around the unit, most notably older trees (125 to 150 years) on more southerly aspects. Comparatively good growth of existing overstory conifers was enhanced by rapid growth early in the development of the stands in Unit J. This produced a more marked differentiation of individual tree dominance, as opposed to the more typical intense competition among trees throughout stand development that characterizes most stands on the City's forestlands. The 1959 wildfire which underburned be incorporated with existing helicopter logging slash and piled and burned—and/or possibly prescribed underburned. Ultimately, however, low-intensity prescribed burning can be utilized (in coordination with similar practices in adjacent Unit H) to maintain reduced slash levels and further retard understory vegetation development.

Unit K - 33 acres

Description: Unit K is located on primarily 60 to 75+ percent (but ranging as low as 40 and as high as 90 percent) easterly aspects adjacent Ashland Creek. Wildfire intensities in the most recent 1959 event were much less than in adjacent subunits of Unit G, largely being confined to surface fires that failed to damage or destroy existing overstory conifers while simultaneously removing competitive ladder fuels and improving growth and vigor of the overstory conifers. This is similar to adjacent Unit J, although site productivities are slightly lower, with an estimated 100 year site index of 110 to 120 for Douglas-fir. The unit is dominated by 12 to 22-inch 70 to 95-year-old Douglas-fir. However, individual trees up to 30 inches DBH and larger and 125 to 150 years of age are scattered throughout the unit. The portions of Unit K below the 2060 road (subunits K1 and K2) have a somewhat greater abundance of these larger 24 to 30+ inch DBH conifers than in most of the City's forestlands. This is due in part to the understory burning that occurred in the 1959 fire, killing many understory plants but releasing the larger, overstory conifers. Douglas-fir comprises 80 to 90 percent of the total stand basal area throughout Unit K, with Pacific madrone the next most common tree, although it is rapidly being overtopped in many places by overstory Douglas-fir. Ponderosa pine, California black oak, and incense cedar are uncommon trees within the unit. Stand densities are quite variable within Unit K, however, ranging from 100 to over 300 square feet per acre, often related to changes in wildfire intensities during the 1959 event. The development of understory vegetation since the 1959 wildfire has begun to add significant competition to the existing overstory conifers. Growth and vigor in the overstory conifers has declined in the last 5 to 10 years, largely due to the higher than desirable stand densities (RD's average .7 to .75 throughout Unit K). Some mortality of these overstory conifers has occurred, most notably on edges of the unit adjacent to where the 1959 fire burned intensely (most notably above the 2060 road in subunit K3). In these areas, bark beetle populations have exploded, killing many overstory Douglas-fir in a single area. Helicopter logging in 1990 removed some of these dead, dying, and other overstory trees in scattered patches throughout the unit.

Three major debris avalanches exist in Unit K, all initiated from various failures associated with Road 2060 during the 1997 New Year's Day storm. All three are sizable, particularly the most northerly of the three. All three ultimately provided direct input into Ashland Creek of major slugs of debris torrent material (with one almost hitting the water treatment plant) as large amounts of soils (down to bedrock) and vegetation were displaced. Although a small amount of clean-up work has been done, it appears that, to date, little else has changed on the 2060 road. The very steep land throughout much of Unit K below the 2060 road suggests that future slope failures are probable during major storm events if changes in road design and/or drainage are not instituted.

classes and numerous openings, at least partly resulting from helicopter logging of older mature trees in the 1990 harvest. The first stand type, delineated as subunit L1, is located in two primary locations, (a) on the steeper (65-80+%), more northerly aspects associated with the two minor draws in the middle of the unit; and (b) on gentler, 30 to 45 percent northeasterly aspects just above the road in the southeastern corner of the unit. Both of these stands appear to have been initiated after major wildfire engulfed these stands during the 1901 and/or 1910 wildfire events. Both of these stands are essentially even-aged and fully dominate the sites, with average basal areas of 200 to 250 square feet per acre. Douglas-fir poles comprise an average of 80 percent of the stand basal area, ranging in size from 8 to 10 inches to 22+ inches DBH, with diameters depending almost strictly on degree of dominance. These trees are generally healthy and relatively free from dwarfmistletoe, although growth rates have declined considerably in the past 10 years (typically ranging from 10 to 15 rings per inch on the best, most dominant trees to 30 to 40 or more rings per inch on the smaller, more suppressed poles). Pacific madrone comprises the remainder of the basal area (except for a rare incense cedar or ponderosa pine) and is rapidly dying out of these stands as it is becoming overtopped by the much taller firs. Very little understory vegetation exists in these dense stands. The over-steepened condition along the draws in (a) makes slumping likely, and signs of this occurrence are obvious (although none during the recent New Year's Day storm). The remainder of Unit L (delineated as subunit L2) is comprised of a very heterogeneous stand, again primarily of Douglas-fir and Pacific madrone. However, there are numerous openings, multiple age classes, and complex species mixes throughout this portion of the unit. The helicopter logging of 1990 removed scattered pockets of mature timber in a group selection type of harvest in which small openings of a tenth to quarter acre were created, leaving only scattered smaller hardwoods and Douglas-fir advanced regeneration amidst the slash created by the falling operation. Fortunately, this advanced regeneration is healthy and in many of these openings released after the 1990 helicopter logging. Coupled with natural regeneration of Douglas-fir (and occasional sugar pine, ponderosa pine, white fir, and/or incense cedar), it appears that these small openings will become fully stocked with no additional work at this time. These openings have numerous other groundcovers as well including creeping snowberry, whipple vine, dwarf Oregon grape, trailing blackberry, sword fern, thistles, grasses, and numerous other herbaceous groundcovers. Unfortunately, dwarfmistletoe infected overstory Douglas-fir surround many of these openings and provide sources of infection for these young, vigorous Douglas-fir regeneration. Some of these dwarfmistletoe infected overstory Douglas-fir are large, mature 150 to 200+ year-old, 30 to 40+ inch DBH trees, usually in small pockets that escaped severe damage in the 1901 and 1910 wildfires. One pocket of mature Douglas-fir at the high point in this subunit against the southern property line is particularly noteworthy, although many of the larger trees were removed from this location in the 1990 harvest. One 42.7 inch DBH Douglas-fir with a healthy crown (excepting one dwarfmistletoe witches broom at the base of the crown) actually released after the adjacent patch cut, improving from 40 rings per inch to 14 rings per inch in the last 7 years. Other age classes are common in subunit L2 as well—multiple ages between 110 and 150 years; 80 to 95 year-old age class initiated after the 1901 and 1910 wildfire; and various stages of advanced regeneration less than 85 years old. Pacific madrone is

Unit M - 21 acres

Description: Unit M comprises the 40 to 70 percent southwesterly to northwesterly aspects immediately adjacent and northeast of Reeder Reservoir. Site conditions and subsequent vegetation varies within Unit M largely related to differences in aspect (as is typical throughout the City's forestlands). The unit, however, has historically been viewed as a single unit, primarily as a consequence of a prescribed underburn completed in 1997 throughout most of the unit. Continuing to view this area as a single unit is appropriate from a management perspective, with different subunits herein delineated to reflect inherent site differences. Distinction between subunits may be important in helping to guide future, more site-specific management actions.

Subunit M1 - This subunit is comprised of two primary sites in Unit M that are dominated by very shallow soils and subsequent reduced vegetation and fuel loads. These two sites, one at the northwest end of the unit and the other at the south end, have a sparse vegetation adapted to these harsh sites—primarily scattered mountain mahogany and an understory of grasses, Oregon grape, and other herbaceous vegetation. Slope gradients are moderate on the south end but steeper (up to 60 percent) on the northernmost site.

Subunits M2 and M3 - These subunits are located on 45 to 60 percent southerly to westerly aspects. These subunits are very similar in stand structures, densities, and species compositions to other units on more southerly aspects elsewhere in the City forestlands (such as Units E in Parcel 5 and Unit P described in this report). These subunits are dominated by a mixed conifer/hardwood forest, averaging between 150 and 200 square feet per acre of basal area. Douglas-fir typically comprises 50 to 65 percent of that total; ponderosa pine 10 to 15 percent; and the remainder in two hardwoods, Pacific madrone and California black oak. Most of the overstory of these species are currently 12 to 20-inch DBH primarily initiated after the 1901 wildfire event. Scattered throughout this subunit are older 115 to 175+ year-old conifers that survived this 1901 fire event and are currently 24 to 36+ inches DBH. ORGANON plots placed in subunit M2 indicated an average of approximately 550 trees per acre in dense stand conditions (RD = .71). Growth and vigor of trees in these conditions has declined in recent years, with radial growths of 25 rings per inch or worse not uncommon. Some Douglas-fir 20 to 40+ year-old advanced regeneration is scattered throughout these subunits. Patches of whiteleaf manzanita, both alive and recently dead, are also present in both subunits (similar to, though not as dense as in Unit C in Parcels 4 and 5). Other understory vegetation is sparse in these subunits. Estimated 100 year site indices are 100 to 110 for ponderosa pine and Douglas-fir, improving in downslope directions.

Subunits M4 and M5 - These two small subunits are located on 55 to 70+ percent northerly to northwesterly aspects. These subunits are very similar in structure, density, composition, and productivity to other units on more northerly aspects within the City of Ashland forestlands (such as Units B, N, and Q). These subunits are comprised primarily of Douglas-fir poles and small saw timber, with

Forest Service prior to burning. Concern about fire severity and potential associated mortality of overstory trees in Unit M suggested a "cooler" burn than may have normally been performed on USFS lands. Pretreatment and/or mitigation measures prior to prescribed burning included fuel reduction in the vicinity of 19 mature overstory conifers and piling and burning of dead and downed fuel accumulations within the state-mandated 100-foot buffer of Reeder Reservoir.

The prescribed burn itself was of very low intensity in Unit M, with intensities erring on the side of "low" and "cool." Maintenance of duff layers and organic matter far exceeded minimum thresholds desirable for prescribed burns; in many places, fire did not carry at all and left duff layers fully intact. Actual fuel reduction was variable around the unit, but was generally confined to surface fuels, fine fuels, and very small trees. Only in several small patches or one acre or less (most notably near the south unit line of Unit M) did fire and/or heat damage crowns and/or kill overstory trees. A cursory examination indicated that probably less than one percent of the stems greater than 5 inches DBH were killed in Unit M, and almost all of these were in these several small patches of intense fire. In many areas, the prescribed fire was of such low intensity that many stems 3 inch DBH or less, as well as brush species such as manzanita, were unaffected. It is suspected that little additional plant or tree mortality will ensue in the near future as a result of damage that occurred during the fire. In essence, stand densities in most places were altered very little by this initial underburn.

The difficulties associated with conducting a prescribed underburn to reduce fuels in this fuel type while simultaneously preventing damage to overstory timber resulted in reduced levels of fuel consumption. Fuel reduction was primarily restricted to fine fuel classes which will reduce potential rates of spread in future low to moderate severity fires. Much additional fuel reduction work needs to be done, however, in order to create a more wildfire resistant vegetation type and improve the chances of stopping an advancing wildfire in this location. This can be accomplished through two primary activities: (1) creation of a shaded fuelbreak on the boundary between Units M and N, and (2) area-wide fuel reduction through a large portion of the remainder of Unit M.

Creation of a shaded fuelbreak between Units M and N has clearly and consistently been defined as a priority within the City forestlands, most recently as part of the 1997-98 priorities as approved by the Forest Committee. Constructed to standards similar to those elsewhere on City forestlands, this shaded fuelbreak would provide an excellent location with which to apply direct wildfire tactical suppression efforts (aerial retardant, fire fighting crews, etc.). Basal areas of 100 to 125 square feet per acre would be appropriate on the more stable ridgeline locations. Higher leave tree densities (i.e., 150± square feet pr acre) in this shaded fuelbreak may be appropriate, however, on the steeper slopes immediately above Reeder Reservoir or in other areas delineated as geologically sensitive.

Extending fuel reduction activities to encompass all of subunit M2 would provide area-wide fuel reduction and associated wildfire management benefits for up to one-eighth mile. This area-wide fuel reduction could be accomplished through manual fuel reductions similar to those applied elsewhere in the City forestlands, a second prescribed underburn, or perhaps a combination of both. Both techniques have been used in similar situations on the City forestlands to date, and costs associated with each could be stand basal area in Unit N is comprised of Douglas-fir, with most of the remainder in Pacific madrone. This even-aged stand was largely initiated following the 1910 wildfire. Larger conifers up to 24 to 36 inches DBH and 150+ years that escaped destruction in the 1910 wildfire are scattered around Unit N, mostly on small topographical lateral ridges. Light-sensitive hardwoods, particularly Pacific madrone, are mostly becoming overtopped and dying out. Other understory species and ground covers are sparse in these dense stands. Average stand basal area is 225 to 275+ square feet per acre, and very high relative densities (4 density plots measured in Unit N produced an RD = .93) indicate the extremely overdense conditions of the stands in Unit N. Considerable tree mortality can be expected from excessive stand density alone in the next 5 to 10 years. Fortunately, dwarfmistletoe is uncommon in the unit and the historically minor infections have not been able to gain establishment amidst these rapidly growing conifers that provide heavy shade to the lower crown positions where the mistletoe typically initiates. The steep, highly dissected nature of the topography of this unit helps explain the presence of both old and more recent landslide and slumps scattered throughout the unit. This unit contained numerous "active" and "subactive" landslides as mapped by Hicks (1997). Many of these active and subactive landslide areas have high inherent groundwater and the tall, spindly nature of the conifers (with small diameters) encourages windthrow in these small pockets. The inherent geology of Unit N suggests a high likelihood of landslide activity and subsequent development of debris slides and torrents in major storm events. The considerable landslide activity and convergence of peak flows in the New Year's Day storm of 1997 resulted in extensive gutting of the main channel at the bottom of the unit. The resulting debris torrent destroyed a major support for the water pipeline. Although the support has been replaced, it remains vulnerable to a similar event. Hicks (1997) also outlines another area of significant potential hazard to the pipeline in the southwestern corner of Unit N. **This pipeline location and susceptibility to damage from landslide activity during major storm events (hence the Hazard Level I delineated by Hicks, 1997) represents a significant risk that should affect decision-making as regards management of the upland forests of Unit N.**

Prescription: Steep to very steep ground and subsequent increased potential for slope failure and associated erosional events will have to shape stand management activities in Unit N. Unfortunately, these stands are currently extremely overstocked with a high degree of stagnation, suppressed trees, susceptibility to attack by bark beetles and subsequent tree mortality. Reducing stand densities to more appropriate levels (an average of 150 to 175+ square feet per acre = RD = .43-.51) is highly desirable in order to maintain a healthy and vigorous vegetation from a strictly silvicultural perspective. However, stand density reduction can be light (200± square feet per acre = RD = .60) and/or perhaps even avoided altogether in some locations in the unit, particularly in those areas delineated as active or subactive by a consulting geologist.

Understory thinning/release of pre-merchantable stems and hardwoods "from below" may help reduce stand densities, although in many places sufficient reduction to improve stand health will not be possible without removing merchantable size classes of conifers. Stand density reduction as part of a helicopter timber sale would have to be very site specific within the unit to insure retention of a spatially uniform distribution of throughout the ownership, as well as a higher abundance of more harsh site tolerant species such as poison oak, manzanita, and various grasses. Estimated 100 year site index is 100 to 110 for both ponderosa pine and Douglas-fir in the upper two-thirds of the unit. Site productivities improve towards the bottom of the unit, with 100 year site indices of 120 or more for Douglas-fir.

Prescription: Stand density reduction is desirable in the three subunits of Unit P. ORGANON and density plots installed indicated an average RD of about .70, well above the desired range of .35 to .60, but below the significantly overstocked and stagnated stands on more northerly aspects of adjacent Units N and Q, which typically have RD's of .80 to .90 and larger. Ideally, from a silvicultural or forest health perspective, average basal areas should be reduced to a range of 125 to 175 (RD = .33-.50) square feet per acre. This understory thinning from below should focus on pre-merchantable stems and particularly hardwoods to achieve more desirable stand densities. Preferred leave trees will generally be the largest in the stand, with healthy ponderosa pine prioritized. Stand density reduction should be particularly heavy around these trees. Ideally, this treatment would occur after a helicopter timber sale removed merchantable dead, dying, diseased, or heavily suppressed trees. Stand density reduction of non-commercial trees could be accomplished in Unit P by either manual thinning or by prescribed burning (such as occurred in the coordinated project with the U.S. Forest Service in Unit M). Management activities in Unit P may be best implemented if done so in conjunction with those in adjacent Unit Q—in essence, creating a management unit very similar to Unit M with its similar alternating aspects. This would be particularly important if and when prescribed burning is utilized, as the small subunits of P1, P2, Q1, and Q2 would be difficult to separate out and manage as individual units. As discussed in Unit M, manual thinning may be more desirable in the first entry in Units P and Q, as greater control over specific trees to be removed can be maintained. Treatment-related understocked pockets can be more easily avoided with manual thinning—of importance in minimizing the likelihood for potential landslides. Fortunately, landslide activity levels as determined by Hicks (1997) are low in both units P and Q, just as in Unit M. However, unlike Unit M, the relative hazard in Units P and Q is high due to the City of Ashland water pipeline located in the bottom one-third of each subunit. **This reality suggests that the City of Ashland should determine whether stand density reduction and subsequent fuel treatments are an acceptable risk in Unit P prior to initiation of any treatments.** If stand density reduction and fuel treatments are determined by the City to be an acceptable risk in this location, area-wide fuel reduction across all six subunits of Units P and Q would provide a good defensible fuel profile zone up to one-quarter mile wide—just as has been initiated in Unit M. Similarly, a shaded fuelbreak could be created along the ridgeline at the tops of Unit P and Q, although similar concerns with reduced stand densities and potential slope failure would exist in the steeper western portions of the shaded fuelbreak that drop down towards the City pipeline and ultimately Ashland Creek. This shaded fuelbreak would not be useful unless a simultaneous commitment can be made by the U.S. Forest Service to complete fuel reduction work on their lands connecting this proposed shaded fuelbreak with their established shaded fuelbreak to the east. The above listing of contingencies (need for a well. Recent work in Unit B, along with additional information from ORGANON growth and yield data, suggest that basal areas of 125 to 175 square feet per acre are ultimately desired from a silvicultural perspective in Unit Q. Although landslide activity and geological slope instability are not as pronounced in Unit Q as on other northerly aspects on the City forestlands (Hicks, 1997), the presence of the water pipeline towards the bottom of the unit suggests greater concern and risk associated with vegetation removal above it. **Just as in other nearby units, the assessment of benefit/risk and decision to implement stand density reduction in order to achieve long-term objectives must be made by the City of Ashland, given the pipeline location.** It would certainly be appropriate in this unit to opt for maintenance of higher basal areas (averaging 150 or more square feet per acre). Due to the highly stressed and stagnated condition of the stands in Unit Q, these desirable densities should not be produced in the first entry, however. Initial entries in Unit B, for example, typically produced basal areas in the range of 175 to 200 square feet per acre. These lighter entries prevent individual tree shock, windthrow, tipping over, etc., and allow the leave trees to more slowly add canopy, shift from shade to sun needles, and build bole strength. The ridgelines between subunits of Unit Q and adjacent subunits of Unit P are not as topographically dominant as in Unit B, however, and will not be as effective as shaded fuelbreaks. Management of the subunits of Unit Q will likely be closely associated with Unit P, just as has occurred in Unit M to the east of Reeder Reservoir. The management issues and concerns addressed in Unit P should be read, understood, and analyzed before any action is undertaken in Unit Q.

Unit R - 14 acres

Description: Unit R is a complex unit whose site and stand conditions, management history, and geological condition present a very difficult set of current management conditions. Unit R is located on northerly aspects on some of the steepest slopes in the City of Ashland forestlands, ranging from 70 to 100 percent and over (to almost vertical rock cliffs in several locations). These very steep slopes drop immediately down into Ashland Creek, immediately above the water treatment plant. In unlogged or lightly logged portions of the unit (delineated as subunit R1), stands are dominated by a mixture of Douglas-fir and Pacific madrone, averaging 175-225 square feet per acre of basal area. Pacific madrone is more abundant in Unit R (comprising over one-third of the total stand basal area) than other northerly aspects of the City forestlands (except those that were severely burned in the 1959 wildfire, such as in Unit G). They are typically in the 12 to 20 inch DBH size class and due to their frequency have prevented the dominance of solid Douglas-fir canopies that have shaded out madrone on other northerly aspects of the City forestlands. Similar sized Douglas-fir dominate most of subunit R1, although many are lightly to heavily infected with dwarfmistletoe in portions of the unit. In some places, the extensive development of this disease will encourage significant mortality of the coniferous component of the stand within the next ten years, obviously an undesirable occurrence from the slope stability perspective. Larger Douglas-fir seed trees 125 to 200 years old are scattered around the unit as well, although most dwarfmistletoe disease spreads, subsequently increasing the risk of slope failure. Minimizing this disease trend is, if at all possible, an obvious objective and would require removal of moderate to heavily infected dwarfmistletoe infected overstory Douglas-fir, particularly over young developing stands in openings created by the 1990 helicopter logging. The degree to which this practice further aggravates the potential for soil movement is one that would have to be determined by consultation with a consulting geologist. Judicious removal of dwarfmistletoe infected Douglas-fir within stands could help reverse the advance of this disease, although a single entry will not accomplish this goal. Repeated light entries would be ideal to insure that maximum root strength and evaporotranspiration be maintained over time. Unfortunately, repeatedly light commercial entries are generally not be possible logistically, as helicopter removal will likely only be accomplished in a single entry on the property, and removal of all dwarfmistletoe infected trees would create far too many openings and associated increased risk of slope failure. Eradication of dwarfmistletoe infected trees by girdling is a second option, particularly since wildfire management is not prioritized in this very steep unit. This may be particularly appropriate in areas where younger, but otherwise uninfected, Douglas-fir are established underneath older infected overstory conifers. In portions of the stand where dwarfmistletoe is not established (particularly on the western end), light thinnings from below (commercial and/or pre-commercial) can improve stand vigor and encourage long-term maximization of slope stability. Healthy hardwoods may be prioritized for retention in Unit R as they are both deep rooted and certainly not susceptible to dwarfmistletoe (although numerous other diseases can infect them as well). Planting of additional conifers in understocked openings to provide more rapid development of full stocking and subsequent root development and slope stability is certainly desirable. Planting of alternate species such as ponderosa pine, incense cedar, sugar pine, and even white fir or hardwoods (if available) will help prevent further spread of Douglas-fir dwarfmistletoe. Slash developing from any stand density reduction activities (thinning and release, harvesting, mistletoe eradication, etc.) should be piled and burned in places where accumulations are heavy. The old burn piles, devoid of competing vegetation, are excellent locations to plant seedlings of alternative species.

Since active stand management is less likely in Unit R to markedly improve wildfire management and stand vigor objectives, maintenance of the unit in a reserve status may be appropriate, particularly given its high geological hazard and risk. In a reserve status, Unit R could be managed to maintain or improve its inherent wildlife habitat values. The unit currently has good structural diversity, unlike most of the City of Ashland forestlands. Species diversity is also good, with a higher percentage of hardwoods than any other northerly aspects on City forestlands east of Ashland Creek. Dwarfmistletoe infected Douglas-fir and developing snags represent important wildlife habitat values, and given that Unit R is not prioritized for wildfire management, may not necessarily be considered negatives from a wildfire management perspective in this location. Long-term decline in conifers in Unit R as a result of dwarfmistletoe spread and excessive stand densities may allow expansion of the hardwood component and/or increased species diversity through interplanting of developing openings with alternate species.

Regardless of the management direction chosen, it must be recognized that a risk

percent, northwesterly aspects, suggesting a possible link between patch openings on very steep slopes and slope failure. Understory vegetation, sparse elsewhere in the unit, is much denser in these openings, dominated by snowberry, rubus sp., sprouting Pacific madrone, spotty Douglas-fir and/or incense cedar natural regeneration, and numerous grasses or other herbaceous vegetation.

Prescription: Unit S presents some serious silvicultural and management dilemmas. The steep to very steep slopes coupled with recent as well as historical landslide activity and general slope instability above a major value-at-risk (water treatment plant) suggest that at least portions of the unit should be considered for a reserve status with no activity warranted. This may, in fact, be legally required, under Senate Bill 1211 and the Oregon Department of Forestry should be contacted prior to implementation of any management activities to determine if those activities will have to be placed in a mandatory deferred status. Given these conditions, it seems unwise to recommend almost any type of stand manipulation that could ultimately be perceived as contributing to future slope failures in Unit S. The professional liability associated with a recommendation to remove vegetation from a slope prone to failure and above a major value-at-risk is an obvious disincentive to suggesting active management and/or vegetation manipulation. However, it simultaneously appears that if stand densities are not reduced in the near future, accelerated mortality of overstory Douglas-fir will occur, and with it the subsequent increased likelihood of slope failure as roots decompose. Six density plots established in Unit S produced a relative density of .86, indicating an extremely overstocked stand with an increased likelihood of significant tree mortality occurring in the near future. Non-commercial thinning from below, such as accomplished elsewhere on City forestlands, could be implemented in Unit S to improve stand densities. However, in most places thinning and release of non-commercial size classes will most likely be insufficient to produce desired stand densities, even those that are in the upper end of the range of acceptable stand density (RD = .5-.6 which generally correspond to basal areas of 175 to 200 square feet per acre). Additional stand density reduction would have to occur by removing merchantable size classes of conifers in a helicopter timber sale. Group select removals such as occurred in the 1990 sale should be avoided in Unit S—rather, a more traditional commercial thin with idealized spacing guidelines is desired to insure well distributed stocking throughout the area. Unlike more group select types of harvesting such as occurred in the 1990 harvest, this type of harvest system could be significantly more expensive, and perhaps ideally performed by a smaller helicopter than the mid-sized ships that performed the 1990 harvest. Stand density reduction may have to be precluded completely from slopes greater than 70 to 75 percent and/or active or subactive landslide areas delineated in the Hicks report. Site specific recommendations by a consulting geologist should be conducted prior to or during any planned removals of vegetation on these sites. It should be recognized that even with these more minimal reductions in stand density (resulting in residual basal areas of 175-200 square feet per acre), risk of landslide activation cannot be avoided. However, a proactive direction towards stand density management may, in fact, be less risky in the long run than no density management with its associated increased likelihood of patch mortality of Douglas-fir through bark beetle attack in these highly stressed stands. Removing smaller height initiated after the 1959 wildfire are also scattered throughout Unit T, particularly on more northerly aspects. An average of 1,000 to 1,500 hardwoods and conifers per acre exist throughout these areas. Portions of Unit T escaped high fire intensities in the 1959 wildfire, however. These areas, delineated as subunit T2, are now characterized by well stocked Douglas-fir 8 to 16 inches DBH, usually at basal areas ranging from 150 to 250 square feet per acre. Conifer stocking is less uniform in this unit than elsewhere on City forestlands due to variations in fire intensity. Openings created by slightly higher fire intensities during that 1959 event typically have naturally regenerated Douglas-fir saplings up to 35+ years old. Throughout this subunit, Douglas-fir generally comprises over 80 percent of the total stand basal area, with Pacific madrone the other most common tree species. Portions of these stands have had extensive insect-related mortality of the overstory Douglas-fir. Mortality is heaviest on the edges of the stands, adjacent the brushfields created after intense wildfire in the 1959 event. However, tree vigor is also reduced in the interior of these stands where stand densities are excessive and future insect-related mortality can be expected here, as well. Numerous old skid trails crisscross throughout Unit T, on ridgelines as well as on some of the steepest sideslopes. These appear to have been constructed during the 1959 wildfire event (as opposed to being constructed for logging purposes), and may still be channeling water during peak storm events. Estimated 100 year site index is 100 to 110 for Douglas-fir and ponderosa pine on the more easterly aspects and 110 to 120 for Douglas-fir on the more northerly aspects.

Prescription: Active management and/or manipulation of vegetation is a low priority in Unit T due to: (1) very steep topography and the subsequent increased risk of slope failure in sub-watersheds immediately above a newly developing subdivision on Ashland Creek Drive just to the north of Parcel 3; and (2) its inappropriate location for use as a defensible fuel profile zone. This is particularly true in those areas characterized by high-intensity wildfire in the 1959 event, in which conifers remain significantly understocked in most places. In these areas, it would be advantageous to reduce stand densities in the vicinity of the few scattered overstory ponderosa pine, but high costs of doing such scattered work probably does not warrant its implementation. Stand density reduction, however, has potentially more long-term benefits within older, established Douglas-fir dominated stands in Unit T. Silviculturally, this is of long-term importance because these isolated pockets of 80+ year-old conifers provide a seed source for naturally regenerated seedlings for a large area within their vicinity. Too, these stands provide structural diversity within the extensive brush and hardwood vegetation and provide root strength and slope stability on these steep slopes and headwall locations. Stand density reduction through light commercial thinning would be desirable for these reasons, particularly if it could be included with additional timber volume from adjacent dead and dying (but still salvageable) Douglas-fir. Planned removal of conifers may not be appropriate in the subwatersheds above the new subdivision on Ashland Creek Drive, however, due to the subsequent increase, however slight, of slope instability, even though conifers that die as a result of overdense stands and subsequent insect-related mortality in effect produce the same result on slope instability as their roots die and decompose. Given this topographical and political reality, Unit T may be best left in a no-treatment conifers would provide a less flammable fuel type. Removals should be heaviest along the ridgeline at the north edge of the unit, which in effect would act as the first line of defense against an oncoming wildfire. Narrow strips of reserve untreated brush and/or hardwoods aligned on-the-contour and/or along topographical drainages within the treated areas could help minimize slope instability on these geologically sensitive slopes and provide structural diversity, while still creating considerable fuel discontinuities. Openings created in the brushfields by this process should be planted with ponderosa and/or sugar pine at a wide spacing (15 to 20 feet) to try to re-establish a vegetation type that can potentially be less wildfire-prone in the long run. Hand cutting of whiteleaf manzanita (as has occurred elsewhere on the City forestlands) should prevent excessive germination of this species that can otherwise quickly become re-established, limiting fuelbreak effectiveness and competing with survival and growth of planted seedlings. Deerbrush ceanothus, on the other hand, should be grubbed out below the root crown to prevent re-sprouting. In hardwood-dominated stands, brush, sprouting hardwoods, and other understory vegetation can be removed and piled and burned to eliminate surface and ladder fuels. Overstory hardwoods should be thinned to open up canopies while still maintaining sufficient stocking for sites to remain fully occupied with a fully developed rooting profile for slope stability. Stand density reduction, thinning from below, reduction of ladder fuels, and snag removal should make existing stands of conifers in the southern half of the unit less wildfire-prone. This may be particularly valuable along the minor ridgeline that parallels the south property line in the upper half of the unit. Although these fuel reduction activities will not be able to extend to the upper western ridgeline off the City of Ashland property, it would be hoped that above described fuel reduction activities could direct fire upslope rather than upcanyon (and into the Ashland watershed) in a wildfire event. The establishment of this defensible fuel profile zone has increased in importance with the development of the new subdivision on Ashland Creek Drive just north of and below Unit U. This new subdivision represents a logical potential source of ignition—and stopping a developing wildfire initiated in this subdivision would be much easier at this initial location prior to its escalation into a full-blown wildfire event.

Unit V - 8 acres

Description: Unit V comprises the active quarry at the bottom (east end) of Parcel 3. It is currently utilized by the City of Ashland both for a source of granite and fill, as well as storage of various materials on occasion. In its current condition, the bare unvegetated slopes, coupled with periodic excavation, provide for constant overland flow, accompanied surface erosion and subsequent potential sediment input into Ashland Creek.

Prescription: The Ashland Forest Plan (McCormick and Associates, 1992) made specific recommendations to help restore the quarry area and ultimately minimize impacts on water quality, visual amenities, and other resources. Success of any potential restoration efforts clearly depends, however, on a City-developed decision to permanently close the quarry, or at least some portion of it. Restoration efforts would obviously be ineffective if restored areas are then once again opened up for utilization. If the City

Summary

The City of Ashland forestlands located within the Ashland Watershed area represent some of the most difficult forestlands to manage in southern Oregon. The ownership is topographically quite steep, typically 55 to 85 percent, with limited access. Slopes are inherently susceptible to surface erosion, slumps, landslides, gullying, and debris torrents, as evidenced by significant occurrence of all of these erosional events on New Year's Day, 1997. On these unstable slopes exist moderately to extremely overstocked mixed stands of hardwoods and conifers, mostly 80 to 100 years old, that are of significantly reduced health, vigor, and growth. Insect-related mortality has occurred as a result of excessive stand densities and will continue unless stand density reduction is implemented on a wide scale. Stand openings created by insect-related mortality can increase the likelihood of slumps, landslides, and other destructive earthflow events as roots decompose and surface flow increases, subsequently also changing flow regimes in the watershed. Patch related mortality also further contributes to an already existing extreme wildfire hazard. Unregulated access to the City's forestlands and close proximity to, if not location within, the urban-rural interface, suggest a simultaneous extreme wildfire risk. These issues are implanted onto a landscape that not only has critical value as a watershed for the City of Ashland, but also is part of an extremely important late-successional reserve whose importance and protection is clearly mandated under the Northwest Forest Plan.

The seriousness of these issues, and the likelihood that doing nothing would aggravate these problems, compelled the City of Ashland to begin an active management planning process beginning with the preparation of the Ashland Forest Plan (1992).

stability perspectives, that same alteration of vegetational structures can potentially increase slope failures, at least in the short term in some places. In fact, some areas within the new management area may actually be precluded from conducting forest operations as a result of recent legislation (July, 1997) preventing any operations on high-risk sites above specific categories of improvements. This report, then, has no intention of providing easy and/or immediate short-term solutions to the above-described concerns.

It is hoped, however, that with the information provided, the City of Ashland can make informed choices about forest and resource management within the new management area that can slowly and incrementally change forest conditions such that long-term objectives can be maximized. Silvicultural and stand data that attempts to quantify the condition and state of decline of the stands within the area (particularly as they relate to stand density) is described and inventoried for the various units within the new management area. Geologic inventory, landslide activity rating, and delineation of hazard zones by Hicks (1997) form the foundation for assessment of geologic hazard for the area, with specific problem spots clearly delineated. Priorities for locations of fuel management and other vegetation manipulation from a wildfire perspective are also delineated. Specific descriptions and prescriptions for each unit delineated within the new management area are presented, addressing each of the above concerns. The often conflicting nature of these perspectives are rated and displayed both in table format and visually in overlay transparencies included in the Appendix.

Although positive management direction to achieve City objectives is obvious in some places, it is exceedingly complex and difficult in others. In these difficult situations, the ultimate decision as to how to proceed will have to be made by the

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STAND DATA —ORGANON OUTPUTS

Unit/ Subunit	Plot Type	Number of Plots	Total # of Trees	Basal Area (sq. ft. per acre)	TPQ (trees per acre)	Quadratic Mean Diameter (inches)	Relative Density Index (RD)	Notes (SDR = Stand Density Reduction)
A1	2	4	34	170	371	9.2	.61	Initial commercial & non-commercial SDR completed.
A2	2	4	35	180	397	9.1	.65	Initial non-commercial SDR completed
B1	2	5	77	308	866	8.1	1.16[2]	Unthinned headwall
B2	2	5	71	284	769	8.2	1.06[2]	Unthinned headwall area along northern property line
B2,3,4	1,2	15	139	199	417	9.3	.70	Initial non-commercial SDR completed
B5,6	2	5	52	245	565	8.9	.89[2]	Initial non-commercial SDR completed
D1	2	4	38	190	358	9.5	.67	Initial commercial and non-commercial SDR completed
E1,2,3	2	13	106	163	247	11.0	.56	Initial non-commercial SDR completed
F	2	5	69	276	511	10.0	.96[2]	
G1	2	3	33	110	572	5.9	.47	38-year-old stands initiated after 1959 wildfire
H	1	4	25	120	146	12.3	.38	
J	2	5	58	232	432	9.9	.80[1]	
K1,2	2	8	81	202	391	9.7	.71[1]	
K3	2	3	35	233	290	12.1	.75[1]	
L								Structurally very diverse stand
M2	1	4	45	187	548	7.9	.71[1]	
M3	1	3	39	241	505	9.3	.85[2]	
N	1	4	58	275	441	10.7	.93[2]	
P3	1	4	58	208	345	10.5	.70	
P1,2	2	4	41	205	324	10.8	.69	
Q1,2,3	2	6	89	297	689	8.9	1.07[2]	
R1	2	4	42	210	339	10.7	.71[1]	
S	2	6	74	247	460	9.9	.86[2]	

[1] Stand density very high; RD's 0.7-0.8; within-stand mortality occurring.
[2] Stand density extreme; RD's greater than 0.8; extensive within-stand mortality to be expected.

Plot Type
1 - Permanent ORGANON growth and yield plots installed and data collected.
2 - Stand density plots only—data collected was diameter by species for 20 basal area factor variable plots.

CURRENT PRIORITIES – CITY OF ASHLAND FORESTLANDS

(Listed by Number in Order of Importance)

Shaded Fuelbreak Completion

1. A1/B2
2. H/J/G1,2 (portions)
4. M/N[1]
5. S (north end)[1]
6. P/Q[1]

Stand Density Reduction - High Priority

1. B1,2 (unthinned portions)[1]
2. F
3. B5,6[2]
4. J[2]
5. S[1,2]
6. N[1,2]
7. M4,5[1]

Defensible Fuel Profile Zone (area-wide fuel treatment)

1. U[1]
2. M (particularly M2)
3. P/Q (particularly P3)[1]

Other

1. ODF review—Units B, B2, K, R, S, T, U
2. City of Ashland review and risk assessment (in order of importance)—Units S, D1, N, R, P, Q, K, B1, B2, A, T, U, L
3. Initiation of plan for restoration and/or improvement of roads, quarries, active erosional features.
4. Initiate inventory and analysis of Ashland Creek aquatic and riparian habitat.
5. Continue development of recreation and trails plan for City forestlands.
6. Consideration of and preparation for timber sale/harvest using helicopters.
7. Ongoing coordination with U.S. Forest Service to encourage watershed level management.

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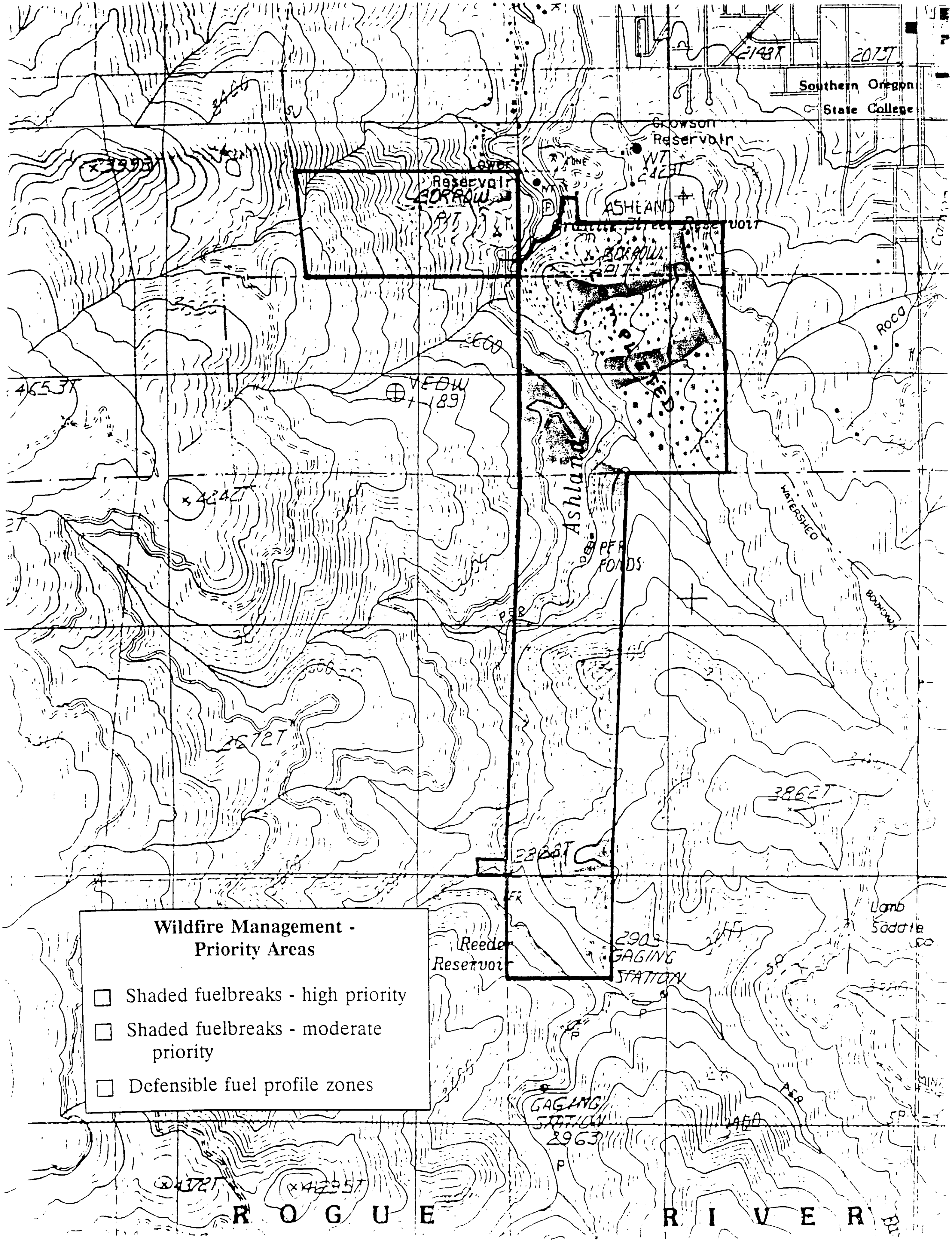
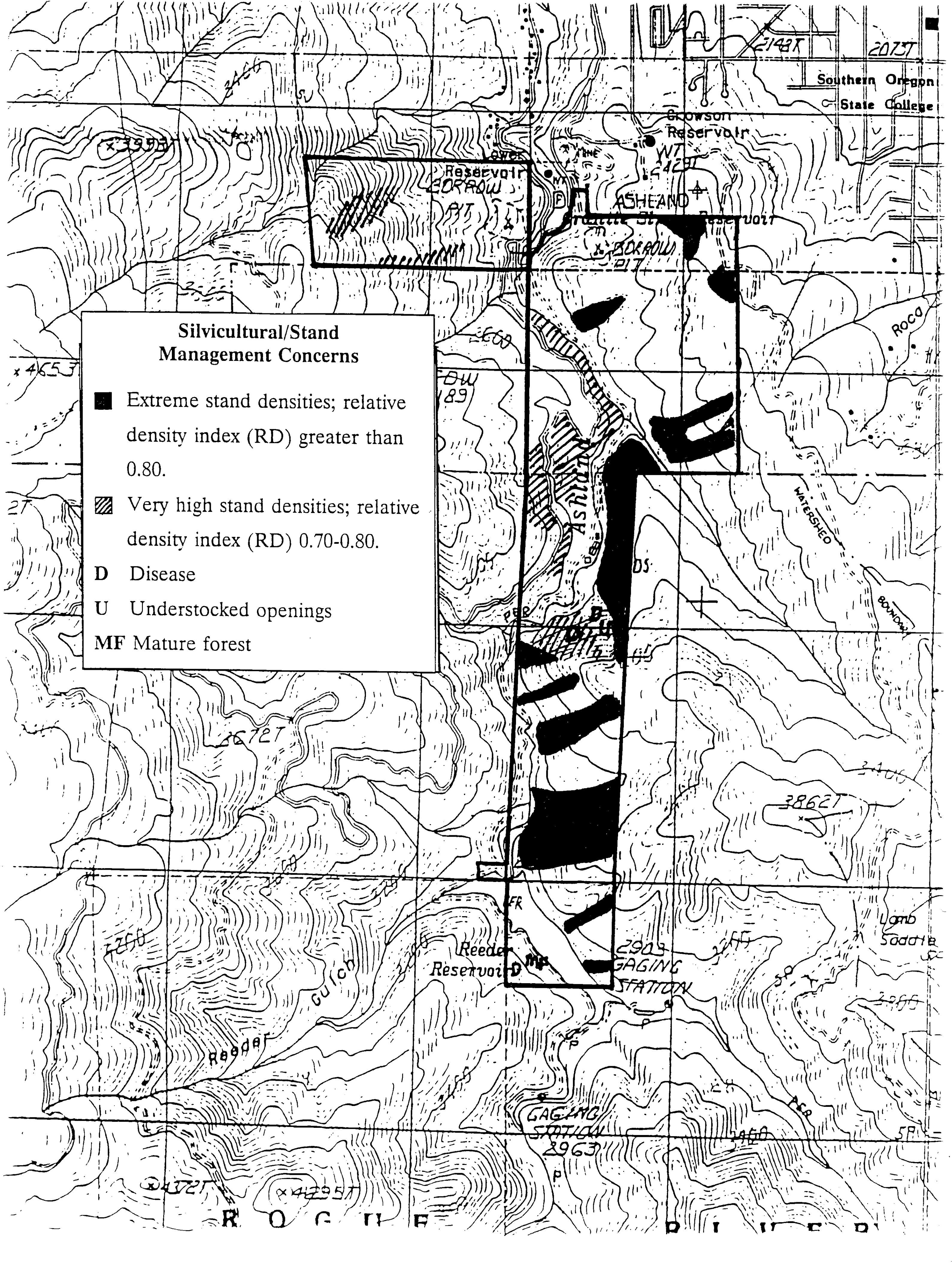
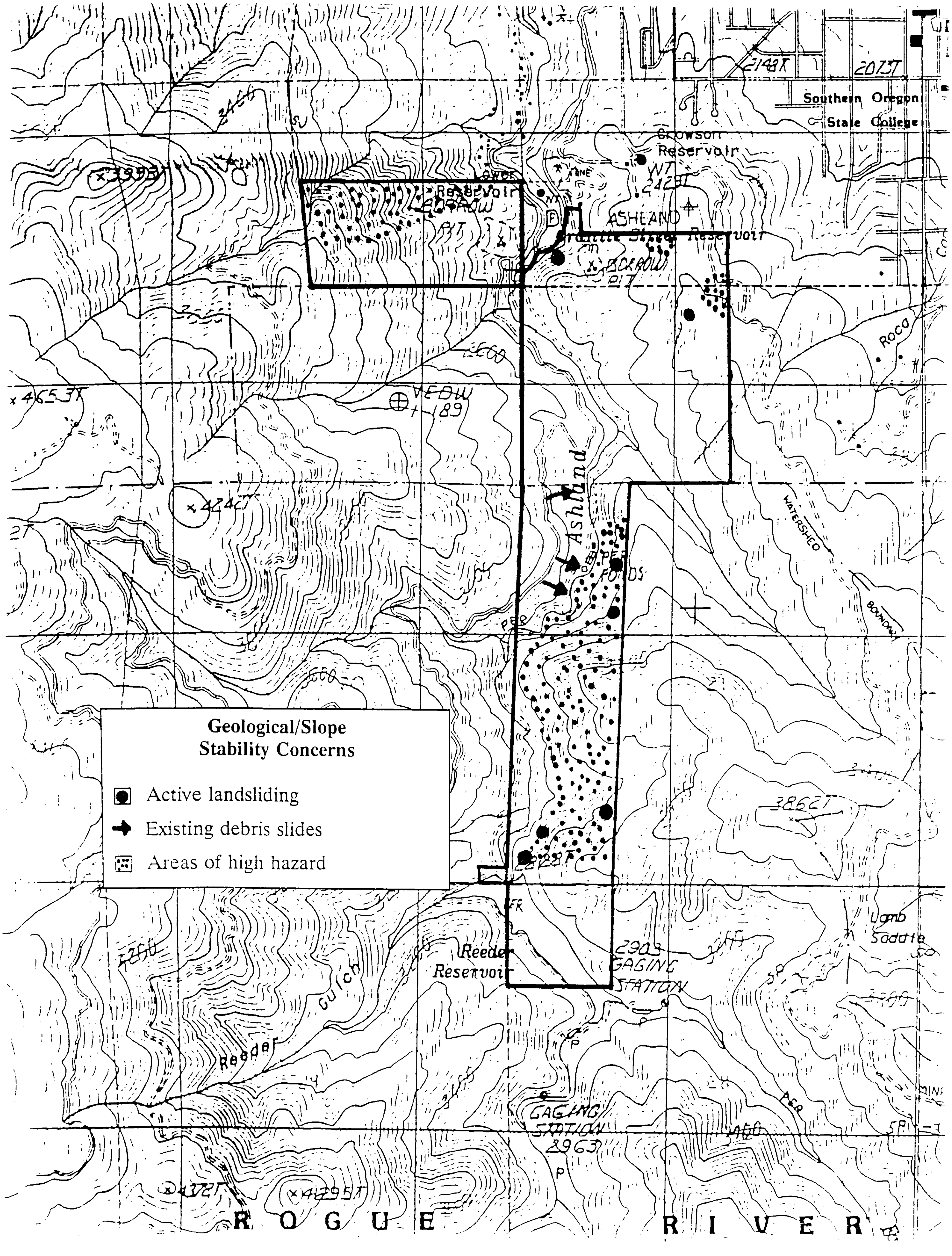
[1] Geologic concerns-needs analysis by consulting geologist and review by City of Ashland.

[2] Removal of merchantable size classes need to achieve desired stand density reduction.

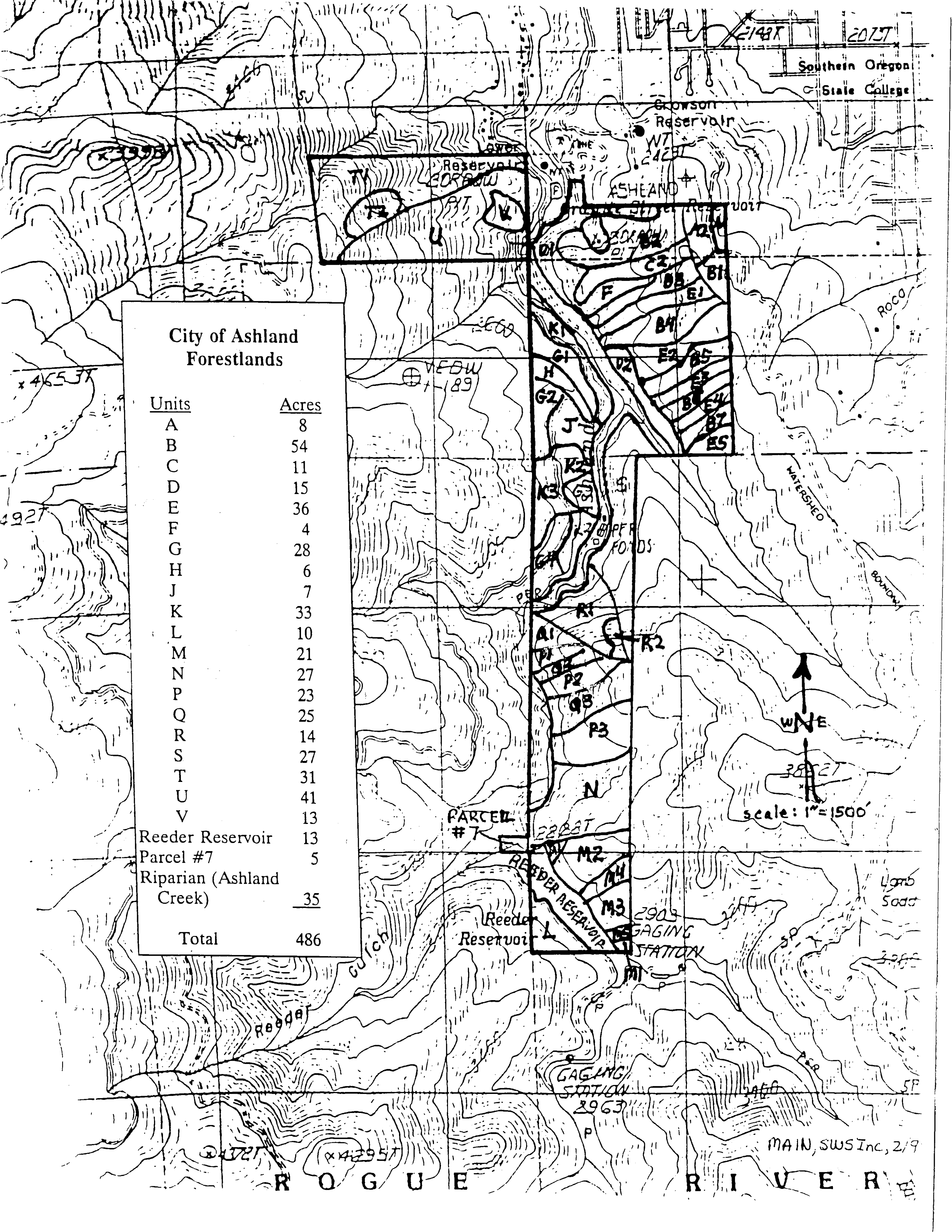

Wildfire Management -
Priority Areas
Shaded fuelbreaks - high priority
Shaded fuelbreaks - moderate priority
Defensible fuel profile zones
Southern Oregon
State College
Crowson
Reservoir
Reservoir
BORROW
PIT
ASHLAND
BORROW
PIT
Ashland
PFR
PONDS
WATERSHED
Roca
Reeder
Reservoir
GAGING
STATION
Lamb
Saddle
ROGUE
RIVER



Silvicultural/Stand Management Concerns
Extreme stand densities; relative density index (RD) greater than 0.80.
Very high stand densities; relative density index (RD) 0.70-0.80.
D Disease
U Understocked openings
MF Mature forest
Southern Oregon State College
Crowson Reservoir
Reservoir
BORROW PIT
ASHLAND
Ashland
WATERSHED
BOUNDARY
Roca
Reeder Reservoir
GAGING STATION
Gulch
Reeder
Lamb Saddle



Geological/Slope
Stability Concerns
Active landsliding
Existing debris slides
Areas of high hazard
Southern Oregon
State College
Crowson
Reservoir
Reservoir
BORROW
PIT
ASHLAND
Granite Street Reservoir
BORROW
PIT
Roca
VEDW
Ashland
WATERSHED
BOUNDARY
UPPER
PONDS
3862T
Lamb
Saddle
Reeder
Reservoir
2903
GAGING
STATION
Gulch
Reeder
GAGING
STATION
2963
4653T
4242T
4372T
4295T
ROGUE
RIVER



City of Ashland Forestlands

Units	Acres
A	8
B	54
C	11
D	15
E	36
F	4
G	28
H	6
J	7
K	33
L	10
M	21
N	27
P	23
Q	25
R	14
S	27
T	31
U	41
V	13
Reeder Reservoir	13
Parcel #7	5
Riparian (Ashland Creek)	35
Total	486

COMPARISON OF OBJECTIVES & CONCERNS BY UNIT

Numerical Categories: 5 - of extreme concern or very high priority
1 - Not a concern or priority at this time

Unit	Silvi-cultural Concerns	Wildfire Mgt. Priority	Geologic Concerns	ODF Review [1]	City Review [2]	Notes CT = Commercial Thinning; SD = Stand Density
A	3	5	5		X	Complete shaded fuelbreak on ridgetop; slope stability issues above Morton St. subdivision.
B_1	5+	3	5+	X	X	Stand density extreme; unstable headwall with potential impacts downslope.
$B_{2,3,4}$	4	3	4; 5+ in B_2	X	X	Need CT to achieve desired SD; headwalls unstable with pre-treatment insect-related mortality; north end of B_2 untreated with current extreme SD and unstable headwall with potential downslope impacts, wildfire management concerns.
$B_{5,6}$	5	2	2			Need CT to achieve desired SD.
C	2	2	2			Good fuelbreaks/shaded fuelbreaks created in 1996-97.
D	3	4	3, 5+ in D_1 slope failure		X	Slope failure identified in D_1 adjacent City waterline; plant more conifers in this location; extensive mortality in D_2 is wildfire hazard.
E	3	3	3			Good fuel reduction and shaded fuelbreaks.
F	5	3	3			Need CT to reduce extreme SD.
G	3	3	3			Several steep subunits with potential landslide activity as delineated by Hicks.
H	3	5	3			Finish shaded fuelbreak; remove merchantable snags.
I	5	5	3			CT needed to achieve desired SD; important location for shaded fuelbreak.
K	4	3	5+	X	X	Steep slopes in spots (80%+); no active landslides delineated; debris slides below 2060 road potential severe hazard—water treatment plant.
L	4	2	3		X	Patch of mature timber; dwarfmistletoe infection; numerous helicopter harvest related openings.
M_1	4	5	4			Prescribe burned in 1997; additional fuel reduction needed; shaded fuelbreak at north edge high priority